AutoCAD® Map 3D 2009

Tutorials

Autodesk®

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Contents

Introducing AutoCAD Map 3D 2009

- These tutorials provide an overview of the product and hands-on exercises to help you learn many aspects of AutoCAD Map 3D.

What You Can Do With AutoCAD Map 3D 2009

AutoCAD Map 3D is the leading engineering GIS platform for creating and managing geospatial data. AutoCAD Map 3D bridges CAD and GIS by providing direct access to data, regardless of how it is stored, and by enabling the use of AutoCAD® tools for maintaining a broad variety of geospatial information. Using Open Source FDO Data Access Technology, AutoCAD Map 3D natively accesses geospatial data stored in relational databases, files, and web-based services, providing easy management of large geospatial data sets while streamlining entire workflows.

The topics in this section describe what you can accomplish with AutoCAD Map 3D.

Combine map objects

The Autodesk Feature Data Objects (FDO) Data Access Technology helps you work seamlessly on a variety of geospatial and non-spatial databases and file formats natively, without the need for translation and risk of data loss. These data sources may contain a single feature type, such as parcels or street

centerlines, or may contain a complex data model with multiple features and attribute tables. AutoCAD Map 3D automatically resolves differences in scale and coordinate systems.

You can add the following types of items:

- AutoCAD drawing objects
- Geospatial features stored in a relational database, such as Microsoft® SQL Server, Oracle® Spatial, and MySQL
- Features stored in a geospatial data file format, such as an ESRI® SHP or Autodesk® SDF file
- Features stored in middleware, such as ESRI® ArcSDE®
- Raster images, including DEM (page 164) surfaces that show elevation
- Web-based maps from WFS (Web Feature Service) sites
- Web-based images from WMS (Web Map Service) sites
- Attribute or point data stored in a spreadsheet or database that can be linked to drawing objects
- Data from third-party providers, leveraging the power of Open Source

You can add add **geospatial data** using the following techniques:

- Drag and drop file-based sources into your map.
- Use the Data Connect dialog box to connect to any non-DWG data source and add the feature classes you want.
- Use data-based queries to add a subset of data from the data source to your map.

You can add add **objects from AutoCAD drawings** using the following techniques:

- Use data-based queries to add objects from a drawing (find all objects on a particular layer, all objects of a certain size, all objects with certain properties).
- Define areas to add (draw a selection window).
- Add specific drawing layers.

Create and edit map objects

Use several methods to create and edit objects:

- Use the full set of AutoCAD editing tools and commands to add or change map objects from different object sources without converting the data. You can use these commands on drawing objects and FDO data.
- Use the Data Table to change values for GIS feature data.
- Use the Data View to edit attribute data values for drawing objects.

Your changes immediately update your map. For both drawing objects and GIS features, you can choose whether to update the original data stores with your changes.

Use map-related data

Use attribute data as the basis of queries and display it as text in your map.

For drawing objects, you can do the following:

- Import attribute data.
- Attach drawing objects with links to external data.
- Link database entries to the data already associated with drawing objects.
- Create and manage attribute data within AutoCAD Map 3D using Data View.
- Display attribute data on your map as text.

For geospatial feature data, you can do the following:

- Join an attribute data store to an existing feature class.
- Create and manage attribute data within AutoCAD Map 3D using Data Table.
- Display attribute data on your map as text.
- Examine and publish map metadata.

Format map objects

Change the way objects in the map appear, without changing the objects themselves:

- Assign visual properties to object groups, or to objects that match certain criteria.
- Use themes to vary visual properties based on attribute values.
- Save display layer definitions (which include styling information and pointers to the data source) for re-use.
- Use special formatting options for raster images to show hillshade, contours, and more.

Manage map data

Manage the structure of data and move data from one format to another:

- Use Schema Editor to create new schemas.
- Add and delete features and properties in existing schemas.
- Use Data Connect to create a new data store from within AutoCAD Map 3D.
- Use Bulk Copy to copy data from one data store to another.
- Export DWG data to a variety of geospatial data formats, including Oracle, ArcSDE, SDF, and SHP.
- Export your entire map to DWG format.

Perform analysis on maps

Use the following methods to analyze data:

- Sort, filter, and edit information about map items in a tabular format.
- Locate specific coordinate points and measure the geodetic distance between points.

- Visually communicate relative values and scale with themed displays.
- Temporarily join data from external data stores to features in your map and use that data to theme the features.
- Create contour maps to help you analyze 3D terrain.
- Use raster-based theming to analyze elevation, slope, and aspect, drape map data over surfaces and view the data in 3D, and more.
- Create buffer zones based on feature properties and select objects based on their proximity to a buffer. Save the buffer as its own feature class, for future re-use.

Publish maps

In addition to printing your maps on a plotter, you can do the following:

- Use *map books* to divide a large map into tiles, which are rendered on separate pages. You can include a legend, title, and other information on each page.
- Produce *maps with insets* using map books.
- Create comma-separated *reports* as text files, listing information about objects in attached drawing files. You can import the report files into a spreadsheet, database, or document.
- Use *Autodesk MapGuide®* technology to post maps and map books on the web or on an intranet. The way that you send maps to this platform varies, depending on whether you use the current version of Autodesk MapGuide, MapGuide Open Source, or Autodesk MapGuide versions 6.5 and earlier.
- Save maps in *Autodesk DWF* format to use with Autodesk Design Review (the latest version of the DWF Viewer), and distribute or post the results on the web or on an intranet. You can create map books in DWF format. As long as you have assigned a coordinate system to all the maps in your DWF file, the publishing operation automatically converts the coordinate information to latitude/longitude coordinates. Autodesk Design Review 2008 can automatically navigate to a specific location when you enter coordinates, and displays coordinates of any location in the map when you move your mouse over that location. When your computer is integrated with a GPS device that uses the NMEA 0183 protocol, field workers can

center the map to the coordinates provided by the integrated GPS device on your system, and display the "my coordinates" icon within the map.

- Create a static *web page* from your map.
- Use eTransmit to package all the files your map uses and send them to another AutoCAD Map 3D user.

Basic Product Concepts

You must understand the following concepts before you begin using AutoCAD Map 3D. If you are an experienced AutoCAD user, some of these concepts may be familiar to you.

Map files and display maps

A *map file* is a drawing that connects to all the sources for your map: geospatial features, drawing objects, raster images, and attribute data.

Each map file can contain multiple *display maps* (for printing or for online distribution), in which you can selectively hide or show items in your map. Maps exist only as conceptual structures, and are not separate entities or files.

You can apply styles to the items in a display map, based on data, layers, and other criteria. Changes that you make to the appearance of items in a map do not affect the actual data in your map file.

Source files and map files

One map file can use multiple sources. For example, you might attach a DWG file to your map file, query in one or two of its layers, and add them as Display Manager layers. Then, you might connect to a SHP file that becomes another layer in your display map, or add features from a geospatial database. The map file remembers all the connections and which objects you've added to the map file.

The relationship between the sources and the map file is dynamic. If the data in the source file changes, those changes are updated in your map file. When you change the objects in your map file, you can save those changes back to their original sources.

For drawing objects, you can lock the source drawings so no one else can use them, and you can use save set options to control whether your changes are saved back to the original drawings or affect the current map only.

For geospatial features, you can set an option to save changes to the original source automatically, or you can work offline and update the feature source when you finish editing. Check out a feature to lock it for other users (if the feature source supports this) and check it back in to make it available again.

Drawing objects and geospatial features

Objects in maps fall mainly into two categories: drawing objects and geospatial features. Drawing objects come from AutoCAD drawings and geospatial features from a centralized data store (like an Oracle database) or a spatial data file (like a SHP or SDF file).

Some AutoCAD Map 3D functions are more useful for one object type than for another. For example, the drawing cleanup feature eliminates extraneous lines in DWG files, but drawing cleanup does not work on a geospatial feature.

Some functions use different commands, depending on the object type. The following table explains the functions available for the two data types:

Geospatial features only	Description	DWG objects only	Description
Connecting to features	Geospatial features appear in your map as soon as you connect to their data stores and add them to your map. Check out the feature to edit it and check it back in to update it in its source. Stay connected to the data store while you work, or work offline. If your data store supports versioning, you can manage versions.	Attaching source DWG files	Attach a DWG file to your map and then use a query to include objects from the DWG file in your map. Only objects that match the criteria in your query are added to the map. The set of source DWG files attached to your map is called a drawing set. You can save the current drawing set and set options for it.
Data Table	Add and edit feature data. You can perform a join to	Data View	View and edit data stored in an external database table

Geospatial features only	Description	DWG objects only	Description
	add external data sources to feature classes, but you can edit only the direct connection to that data and not the joined data.		and linked to drawing objects.
Schema Editor	Group features by criteria.	Classifying Objects	Group objects by their properties or data.
Publish to Autodesk MapGuide	Publish web-based maps containing both geospatial features and drawing objects to a server platform.	Export to Autodesk MapGuide version 6.5 and earlier	Export drawing objects to a file that can be used by a server platform. (Geospatial features are not exported.)
Save data in other formats	Save features from a geospatial database in a spatial data file, such as SDF, and save a layer from Display Manager (page 164) for re-use. Use Bulk Copy to copy a feature class from one data format to another. Export geospatial data to DWG format.	Export data in other formats	Export to a variety of drawing and geospatial data formats.
View data before adding it to your map	N/A	Quick View drawings	Display attached DWG files without querying any objects into your map.
Buffers	Create zones based on properties and analyze objects based on their proximity to the buffer. Save the buffer as its own feature class for future re-use.	Topology	Set up geometric relationships for GIS analysis functions, such as network tracing, buffer analysis, overlays, and more.

Geospatial features only	Description	DWG objects only	Description
Correct data errors	N/A	Rubber Sheet, Map Trim, and Drawing Cleanup	Correct drawing errors.
	N/A	Transform	Move, rotate, and scale a drawing object or objects.
Metadata	View metadata about the geospatial data sources in your map.	Drawing Statistics	View information about the active source DWG files in your map.
Versioning; Check-in and check-out	Manage versions (for data stores that support them) and check out data to lock it while you use it.	Drawing Maintenance	Index your DWG files for quick searching and lock or unlock objects.

Importing/exporting data vs. connecting to data stores

When you add data to your map (geospatial features, drawing objects, or attribute data), the link to that data is "live." If you are connected to the data store and it is updated, the related item in your map is also updated. If you change the data in your map, you can update the data in the data store.

However, when you import data you get a "snapshot" of the data at the time you import it. If the data changes after that, you will not see any changes in your map unless you import the data again. There is no way to update imported data in its source. Similarly, when you export data, you export the current data only. The connection to the live data is lost.

Getting Ready to Use the Tutorials

These AutoCAD Map 3D tutorials cover the following:

- Getting started (page 22): Take a quick tour of the application. Create a new map file, assign a coordinate system, connect to data, style features, and save your work.
- Building a map (page 31): Learn all the basics of creating a map from start to finish. Use multiple sources, design themes and composite styles to change the appearance of objects, create new features and edit them, and publish your finished map.
- Analyzing Data Using Styles, Joins, and Buffers (page 77): Add a surface and style it using a theme and contour lines to show elevation. Join an external database to a feature and create a style using both sets of data. Create a buffer zone that highlights areas within 1000 feet of a river and identify parcels that lie within that zone. Export comma-separated data to use in a report to the owners of those parcels.
- Managing Data From Different Sources (page 105): Export drawing objects to Autodesk SDF format, and then connect to the resulting SDF file to add it as a layer in another map. Use Bulk Copy to copy the SDF data to SHP format. Import the SDF data to convert it back to drawing layers.
- Styling, Splitting, and Using Joined Data with Polygon Features (page 139): Connect to geospatial data for parcel polygons. Join a data source to the parcels to add assessor data. Add a new calculated property that uses native and joined properties. Split a parcel into two uneven pieces using the Split command and assign attributes to each resulting parcel using Split/Merge rules.

Preparing your sample data

When you installed AutoCAD Map 3D, the tutorial sample data was installed on your computer in the *\Program Files\AutoCAD Map 3D 2009\Help\Map 3D Tutorials* folder. You will need that sample data to use the tutorials.

Copy the *Map 3D Tutorials* folder to *My Documents*. That way, if you change the sample files, the original versions remain unchanged and can be used again and again.

To make a copy of the sample data

1. In Windows Explorer, navigate to the *\Program Files\AutoCAD Map 3D 2009\Help* folder.
2. Right-click the *Map 3D Tutorials* folder and click Copy.
3. Navigate to your *My Documents* folder.

   NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

4. Paste the *Map 3D Tutorials* folder into *My Documents*.

   A new folder is displayed in *My Documents*, for example *C:\My Documents\Map 3D Tutorials*.
5. Add the location to the Favorites list in Windows Explorer, or make a note of it.

Saving your tutorial maps

You can create a folder for any map files you create or change as you use the tutorials.

To create a folder for your tutorial map files

1. Open Windows Explorer.
2. Navigate to the *C:\My Documents* folder.

   NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

3. Click File menu ➤ New Folder.
4. Change the name of the new folder to *My AutoCAD Map 3D Tutorial Data*.

Setting up the tutorial window

Resize the window that displays the tutorial instructions so you can see it while you work.

To resize the tutorial window

1. To display the tutorials, in AutoCAD Map 3D, click Help menu ➤ Tutorials.
2. In the tutorials window, click 

to hide the pane that contains the Contents, Index, and Search tabs.

   Use  to go to either the next or previous pages in the exercises.

Choosing a workspace

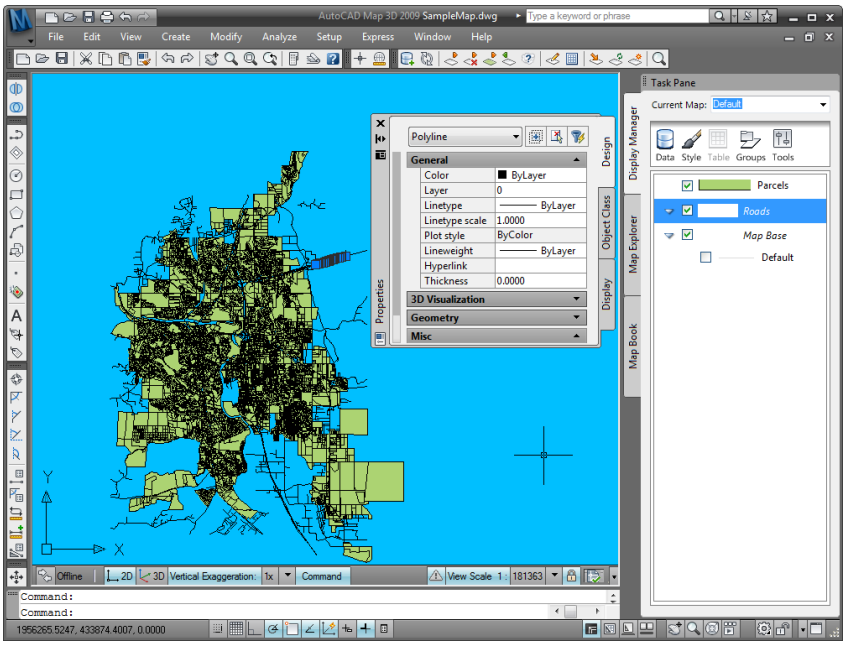
The tutorials assume that you are using the Map 3D for Geospatial workspace unless otherwise noted. This is the default workspace. If you change to a different workspace, switch to the Map 3D for Geospatial workspace for the tutorials.

To change to the Map 3D for Geospatial workspace

1. Click View menu ➤ Menu/Toolbar Layout.
2. Select the Map 3D for Geospatial workspace.

Taking a Quick Tour of AutoCAD Map 3D

Start by becoming familiar with the AutoCAD Map 3D window:



The AutoCAD Map 3D window

To display the AutoCAD Map 3D window

1. Before you begin the tutorial, see Getting Ready to Use the Tutorials (page 10).
2. On the desktop or the Start menu, start AutoCAD Map 3D.
3. In AutoCAD Map 3D, click File menu ➤ Open. Navigate to the folder in *My Documents* where you copied the sample files.
4. Open *SampleMap.dwg*.

   An alert may tell you that an undefined drive alias (page 164) is referenced. If so, click Define and follow the steps below. If not, proceed to the "Menus and Workspaces (page 14)" topic.

   #### To define a drive alias

   - The alias you need to define is already selected. Click in the Actual Path field and click Browse.

- Navigate to the folder where you copied the sample files. Open that folder and click OK. (Be careful to select the *Map 3D Tutorials* sub-folder, not the parent *My Documents* folder.)
- Click Add, and then click Close.
  The sample data location is now mapped to your drive alias. After this, you can open the sample data without defining any further aliases.

Menus and Workspaces

In AutoCAD Map 3D, all the commands related to a particular task are on the same menu. For example, commands related to new objects are on the Create menu, commands related to editing are on the Modify menu, and commands related to analysis are on the Analyze menu.

Commands on the menus vary, depending on which workspace you are using. One workspace is customized for working with geospatial data; one is for drawings; and one is for users of previous versions of AutoCAD Map 3D.

You can customize any workspace to include the toolbars and menus you like, specify the contents of each toolbar and menu, keyboard shortcuts, and how the mouse buttons behave.

To specify a workspace

1. Click View menu ➤ Menu/Toolbar Layout.
2. Select the workspace most appropriate for your work.
   - If you work mainly with geospatial data, select Map 3D For Geospatial. The tutorials assume that you use the Map 3D For Geospatial workspace unless otherwise noted.
   - If you work mainly with Autodesk drawings, select Map 3D For Drawings.
   - Users of previous versions may prefer Map Classic.

Toolbars

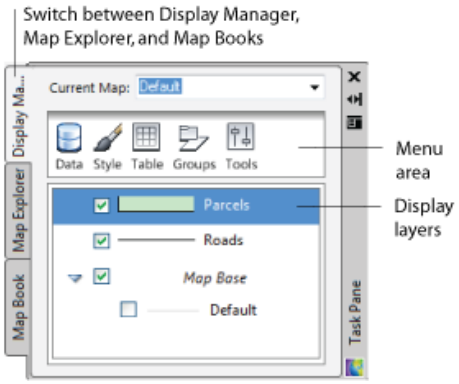
The toolbars in AutoCAD Map 3D provide access to AutoCAD functions and AutoCAD Map 3D functions:

AutoCAD Map 3D tools

AutoCAD drawing tools

Task Pane

The Task Pane gives you quick access to frequently used features, and groups these features into task-related views.



The Task Pane

There are three tabs:

- Display Manager (page 164), where you manage features stored in data stores (databases, geospatial data files, and raster files), attach drawing files, and change the appearance of features. Each geospatial feature class is a layer in Display Manager. You can add drawing layers as well.
- Map Explorer (page 166), where you view the elements of your map project, such as the files you connected to as sources, queries you used and saved, templates for linking drawing objects to data, and so on. Use this view to query in objects from attached drawings and view the data for any object.
- Map Book (page 166), where you divide a large map into "tiles," which are each rendered on a separate page. You can publish map books in a variety of formats, both for printing and for online display.

Use these techniques when for the Task Pane

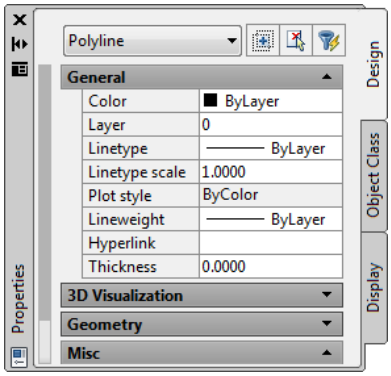
- To switch between views, click the tabs on the Task Pane (page 168).
- To see options for the current Task Pane tab, click an icon in the menu area at the top of the Task Pane.
- To hide the Task Pane, click its Minimize button. Hold your cursor over the Task Pane title bar to see the Minimize button. To display the Task Pane after hiding it, move your cursor over the title bar.
- To make the Task Pane a floating palette, grab its title bar and drag it to the desired location. Drag the title bar to a window edge to dock it again.

NOTE To minimize the Task Pane each time you move your cursor away from it, right-click the Task Pane title bar and turn on Auto-hide.

- To close the Task Pane, click the X in its top right corner. To open it, click View menu ➤ Task Pane.

Properties palette

View the properties of the selected drawing object in the Properties palette.



The Properties palette

To use the Properties palette to style drawing objects

1. In the *SampleMap.dwg* file, select a road.
2. Right-click the road and click Properties.
   The Properties palette is displayed.
3. Click the Design tab if it is not already displayed.
   The roads are objects in an AutoCAD drawing. Notice that the current selection is defined as a Polyline. You can use the Properties palette to change some aspects of a drawing object's appearance.
   - To change the way the currently-selected road segment is displayed, click in the Color field and then click the down arrow to select a color. If you are asked whether to add this object to the save set, click No. With your cursor positioned in the map, press Esc to see the results.

- To change the color for all roads, click Setup menu ➤ AutoCAD Layer. Click in the Color field for layer 0, which contains the roads, select a color, and click OK.
  The color of all the roads changes to the color you selected.

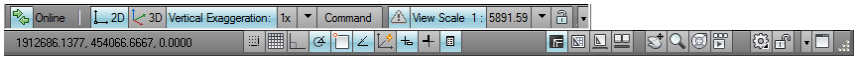
To use the Style Editor to style geospatial features

1. In the *SampleMap.dwg* file, select the Parcels layer in Display Manager (page 164).
2. Click a parcel in the map.
3. If the Properties palette is not still open, right-click the parcel and select Properties.
4. Click the Display tab.

   The styling information for the parcels does not appear on the Properties palette because the parcels are stored in an SDF file—they are geospatial features, not drawing objects.
5. To change the color of the parcels, click the Style button in the Task Pane (page 168) menu area.
   - Click in the Style field in the middle of the Style Editor window.
   - Select a different Foreground color and click OK.
   - Close the Style Editor by clicking the X in its top right corner. The changes are displayed in your map.

Status bars

The area at the bottom of the application window displays status information and includes some controls for changing the view.



The status bars

The controls on the left side of the uppermost status bar show the following:

- Online/offline switch
- Two-dimensional/three-dimensional buttons

- The vertical exaggeration setting (Click the down arrow to select a different setting.)
- Command (Displays the command line window.)

The controls on the right side of the uppermost status bar show the following:

- Warnings (View warnings by clicking the icon.)
- The current view scale (Change this by clicking the down arrow.)
- Whether styling is linked to zooming (Toggle this by clicking the lock icon.)
- Autodesk Trusted DWG (This indicates that the drawing is a DWG, DWT, or DWS file that was created with Autodesk applications or RealDWG™-based applications that are trusted by Autodesk.)
- Drawing Status bar menu (Click the arrow to see choices.)

The controls on the left side of the lower status bar show the following:

- Current cursor coordinates
- AutoCAD tools

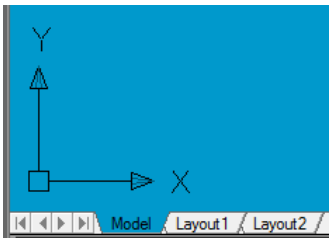
The controls on the right side of the lower status bar show the following:

- Model/layout buttons (View model and display space and add layouts.)
- AutoCAD viewing tools
- Workspace switching
- Toolbar/Window Position locking (Toggle the locked status of toolbars and windows.)
- Application status bar menu (Click the arrow to see choices.)
- Clean Screen (Toggle the display of all tool areas.)

Instructions for the current command will replace some status bar items, and some items will appear only while an operation is in progress, for example, publishing or plotting.

Layout tabs

Most of the time you work in model space, where you create your map on a 1:1 scale. You can create multiple paper space layouts, where you can place a title block, include several views of the same item, and include notes. Switch between model space and layout spaces using the tabs at the bottom of the application window.



Model and Layout tabs

By default, each map has one Model tab and two Layout tabs. Create more Layout tabs if you need them.

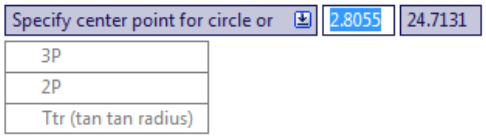
To display and hide the Model and Layout tabs

1. At the bottom of the application window, right-click  (the Model Space icon).
2. Click Display Layout and Model Tabs.

   To hide the tabs again, right-click a tab and click Hide Layout And Model Tabs.

Dynamic input

For experienced AutoCAD users, the command-line interface is a shortcut for creating objects and specifying properties. In AutoCAD Map 3D, you can use the command prompt (dynamic input) within the map area.



An example of dynamic input

Keep the following rules in mind:

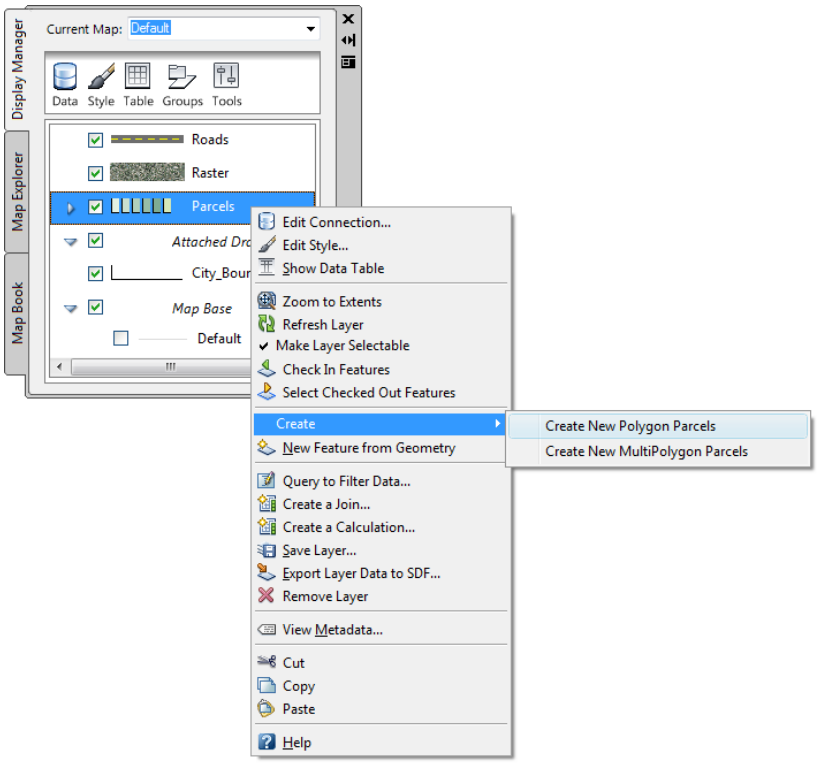
- Some commands require that you specify vectors with your cursor. When you finish doing this, press Esc.
- Some commands require that you select an object. Click the object and press Enter.
- Some commands have multiple input fields. Press the Tab key to move from one to another.
- When the down arrow icon appears in a prompt, press the down arrow on your keyboard to see a list of options for that command. Press the down arrow again to move between options, and then press Enter to select the highlighted one.

To use dynamic input

1. Position your cursor over an empty space in the map.
2. Enter *circle* and press Enter.
3. Respond to the prompts to draw a circle.
   - For the circle's center point, click somewhere in the map.
   - For the radius of the circle, enter *500* and press Enter.

Shortcut menus

Each item in AutoCAD Map 3D has a custom menu that contains commands available for that item at the current time.



An example of a shortcut menu in Display Manager

To use a shortcut menu, do either of the following

- Right-click an item in the map.
- Right-click an item in the Task Pane (page 168).

Getting Started

This lesson provides an overview of the basic tasks needed for creating maps.

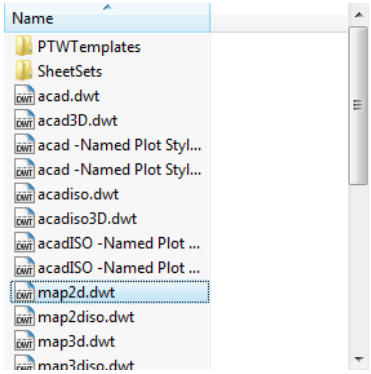
You will use the Display Manager to bring in a file containing road data, change the way the roads are displayed, and then save your work. In about fifteen minutes, you will have a complete map.

Creating a New Map

Create a new map file using a standard template. Assign a coordinate system, which will be used for any new data you add to your map.

To create a new map

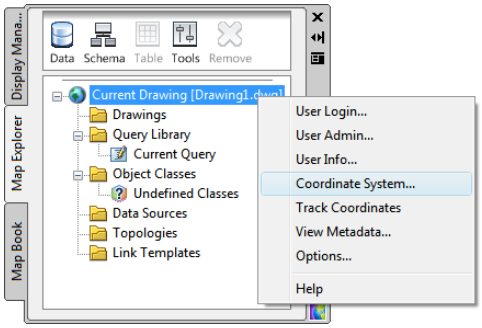
1. Before you begin this tutorial, see Getting Ready to Use the Tutorials (page 10).
2. From your desktop or the Start menu, start AutoCAD Map 3D (if it isn't already running).
3. In AutoCAD Map 3D, click File menu ➤ New.
4. In the Select Template dialog box, select *map2d.dwt* and click Open.



Select map2d.dwt

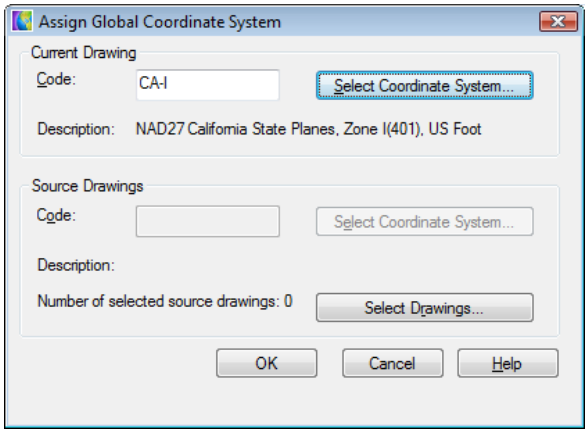
This file is an AutoCAD template that is set up to work with two-dimensional maps in AutoCAD Map 3D.

5. Assign a coordinate system for your map.
   - In the Task Pane, click the Map Explorer tab.
   - In Map Explorer (page 166), right-click Current Drawing and click Coordinate System.



Set the coordinate system from the Task Pane.

- In the Assign Global Coordinate System dialog box, for Code, enter *CA-I* . (Enter uppercase letters *CA*, hyphen, uppercase letter *I*.)



Specify the code for your coordinate system.

NOTE To find the code for a particular coordinate system, click Select Coordinate System in this dialog box and select a coordinate system by category. Use the Properties button to see information about different coordinate systems until you find the one for your map.

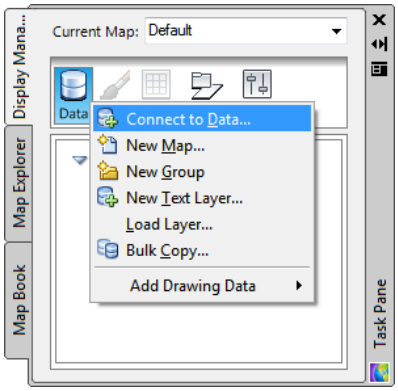
- Click OK.

Use Data Connect to Add Data to Your Map

Use Display Manager to bring in a file containing road data.

To add data to your map

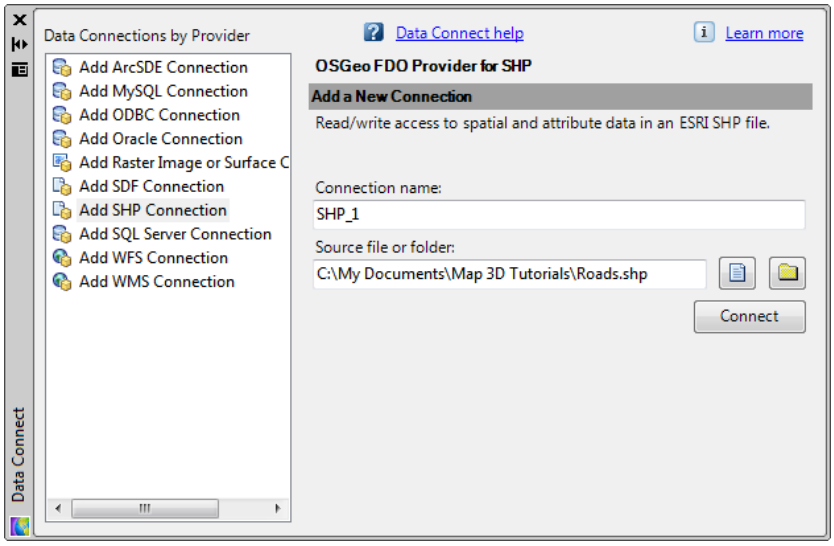
1. In the Task Pane (page 168), switch to Display Manager (page 164).
2. In the Display Manager menu area, click Data ➤ Connect To Data.



Use the Data menu in the Task Pane to add any kind of data to a map.

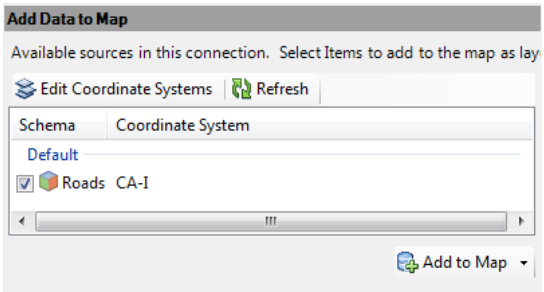
   The Data Connect (page 163) window is displayed.

3. Under Data Connections By Provider (on the left side), click Add SHP Connection.
4. Click the file icon next to Source File Or Folder (on the right side).
5. Navigate to the sample data folder (page 10) and select *Roads.shp*. Click Open.
6. Click Connect to add the road SHP file as a data source.



To add a feature, first connect to its source.

7 In the Data Connect window, under Add Data To Map, select Roads and click Add to Map.



Select an item and examine its coordinate system.

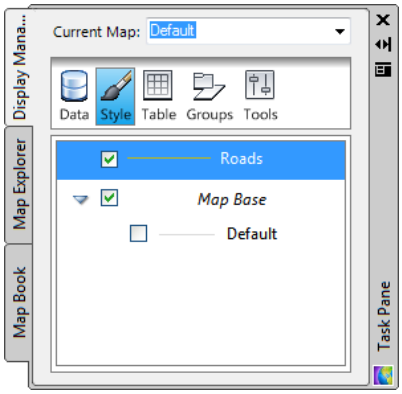
8 Close the Data Connect dialog box by clicking the X at the top of the window.

Style a Feature

Change the appearance of the roads.

To style the roads

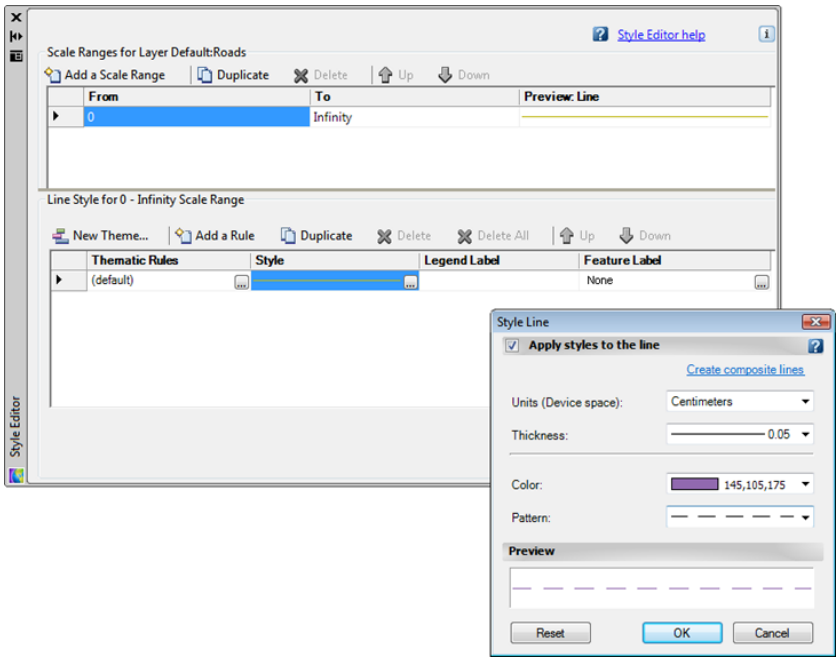
1 In Display Manager (page 164), select the layer labeled "Roads" and click Style in the menu area.



Select the Roads layer and click Style.

The Style Editor window is displayed over your map.

2 In the Style Editor window, click ... for Style and select a thickness, color, and pattern for the roads. Click OK.



You can select a thickness, color, and pattern for the lines in the Style Line dialog box.

3 Click the X at the top of the Style Editor window to close it.

4 Save your work.

- Click File menu ➤ Save.
- Specify a name and location for your map.
  Notice that map files use the file extension *.dwg*, just as AutoCAD drawings do. Both file types use the same basic file format.
- Click Save.

Where You Are Now

In the map, you can see the styled roads.

Tutorial: Building a Map 2

About This Tutorial

The lessons in this tutorial take you through the entire workflow of building and publishing a map. You will use real data from the city of Redding, California. As you work through the tutorial, you will do the following:

- Start a map project by connecting to all the data stores needed by your map. Data stores can include geospatial databases, spatial data files, such as Shape (SHP) and SDF files, AutoCAD drawings (DWG files), and raster images. Connecting to a data store makes the information in that data store available to your map.
- Style the objects in your map so you can easily identify them. Styles can help you provide complex information quickly and intuitively. For example, themed styles can show population density, water depth, or the relative height of geographic features.
- Edit objects in your map. In AutoCAD Map 3D, you can check out and edit any type of object—geometry in a drawing file, a schema in an ESRI SHP file, or geospatial data stored in an Oracle database—using AutoCAD commands. You can then save the changes back into their original format. You can also use the Data Table to change the properties of geospatial data.
- Publish the resulting map for display on a website. In this tutorial, you publish to DWF format (for use with Autodesk Design Review). You can also publish or export to Autodesk MapGuide, save your map as a static web page, or package all the files needed to edit the file and transmit them to another AutoCAD Map 3D user.

Lesson 1: Use Multiple Sources

In the first set of lessons, you practice connecting to data from a variety of sources.

Exercise 1: Drag and drop a source file

Start by creating a new map file and adding the city boundaries of Redding to it.

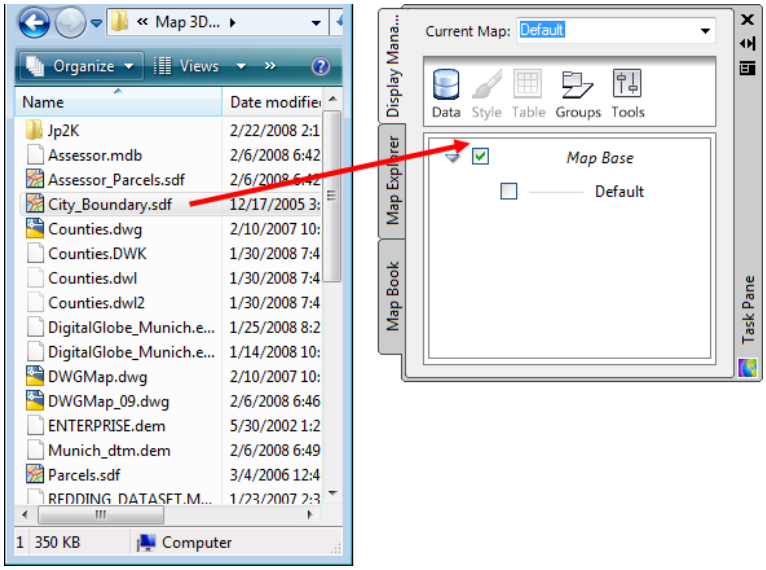
To create a map and add a source file

1. Before you begin this tutorial, see Getting Ready to Use the Tutorials (page 10).
2. Create a new map file.
   - Click File menu ➤ New.
   - Select the *map2d.dwt* template.
   - Click Open.
3. Set the coordinate system for the map.
   - Switch to Map Explorer (page 166) in the Task Pane (page 168).
   - Right-click Current Drawing and click Coordinate System.
   - Enter *CA-I* and click OK.
4. Add the city boundaries to your map by dragging and dropping a source file to Display Manager.
   - Switch to Display Manager (page 164) in the Task Pane.
   - Use Windows Explorer to navigate to the folder in *My Documents* where you copied the sample files.

     NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

   - Resize the AutoCAD Map 3D window and your sample data folder window so you can see both of them at the same time.

- Drag and drop the *City_Boundary.sdf* file onto the lower area of the Display Manager, just above the Map Base layer.



Drag and drop the city boundary file to Display Manager.

The Redding city boundaries appear in your map.

5 Click File menu ➤ Save. In your tutorials folder, name the file *BuildMap1.dwg* and click OK.

To continue this tutorial, go to Exercise 2: Attach a drawing file (page 33).

Exercise 2: Attach a drawing file

You can use Display Manager to attach an AutoCAD drawing file.

NOTE This exercise uses the *BuildMap1.dwg* map you created in the previous exercise.

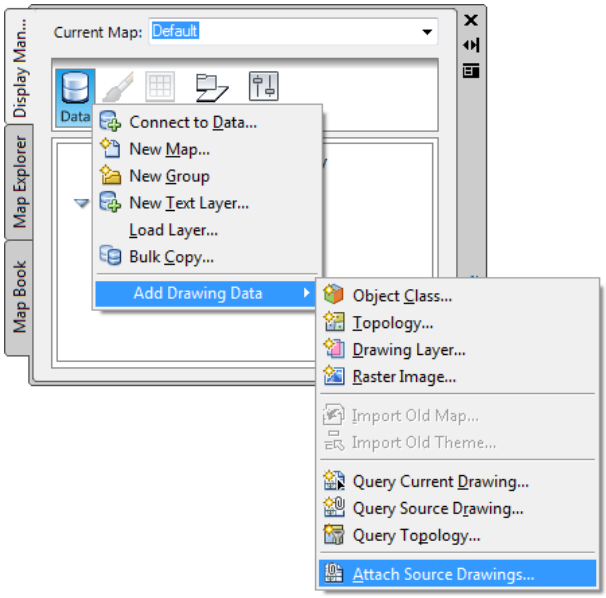
To attach an AutoCAD drawing file

1 If you have not already done so, copy the *\Program Files\AutoCAD Map 3D 2009\Help\Map 3D Tutorials* folder to *My Documents*.

NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

2 In the *BuildMap1.dwg* file, in the Task Pane, click the Display Manager tab.

3 Click Data ➤ Add Drawing Data ➤ Attach Source Drawings.



Use Display Manager to attach a drawing file.

4 In the Define/Modify Drawing Set dialog box, click Attach.

5 Navigate to the folder in *My Documents* where you copied the sample files and select *Counties.dwg*.

NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

6 Click Add and then click OK.

7 In the Define/Modify Drawing Set dialog box, click OK to attach the drawing file to your map.

   When you attach a drawing, it is not listed in Display Manager (page 164) and it does not appear in your map. You must "query in" objects from the drawing to use in your map. You will do that in the next exercise.

8 Click File menu ➤ Save to save your work.

To continue this tutorial, go to Exercise 3: Query in data from the drawing (page 35).

Exercise 3: Query in data from the drawing

The drawing file you attached is a map of California with polygons defined for each county. Since the city of Redding is in Shasta County, you will add the Shasta County boundaries to your map. You can query in data based on location, properties, or data. In this case, query by the name of the county, which is stored as object data.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To query in drawing data

1 In the *BuildMap1.dwg* file, in Display Manager (page 164), click Data ➤ Add Drawing Data ➤ Query Source Drawing.

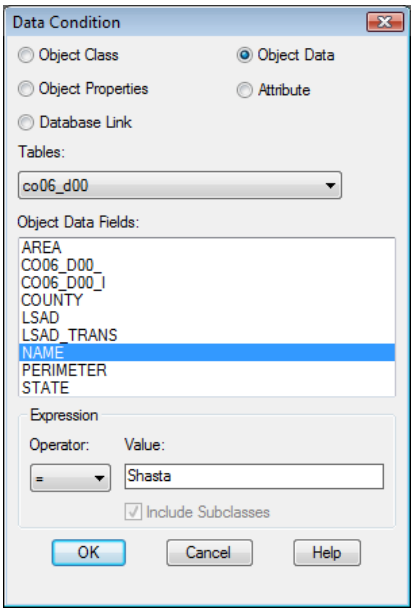
2 In the Define Query Of Attached Drawings dialog box, under Query Type, click Data.

3 In the Data Condition dialog box, select the Object Data option.

4 In the Object Data Fields list, select NAME

   NOTE Do not change the Tables setting.

5 Leave Operator set to = . For Value, enter *Shasta*.



Define the data condition for the query.

The query is case-sensitive. Be sure to enter it as shown.

6 Click OK in the Data Condition dialog box, and then click OK again to execute the query.

7 Click View menu ➤ Extents.

The Shasta county boundaries are now displayed in the map, and an Attached Drawing Element layer is displayed in Display Manager.

8 Click File menu ➤ Save to save your work.

NOTE You may see an alert as you work through the remainder of the tutorial, warning you that the association between queried objects in the current and attached drawings will not be retained once the current drawing file is closed. This message reminds you to save back any changes you make to the original drawing file. Since you will not edit the Shasta County drawing in this tutorial, you can safely ignore the alert.

To continue this tutorial, go to Exercise 4: Use Data Connect (page 37).

Exercise 4: Use Data Connect

Use Data Connect (page 163) to connect your map to a file containing parcel data.

Use the Data Connect dialog box to attach any non-DWG data source: database formats, such as ArcSDE, Oracle, or SQL Server; an ODBC source, such as Microsoft Access; a raster file; web-based sources such as WMS or WFS; or spatial data files, such as SDF and SHP.

Data Connect displays information about all attached non-DWG data sources, even if you didn't use Data Connect to attach them. For example, the SDF file you dragged and dropped into your map is listed in the Data Connect dialog box.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To use Data Connect

1. If you have not already done so, copy the *\Program Files\AutoCAD Map 3D 2009\Help\Map 3D Tutorials* folder to *My Documents*.

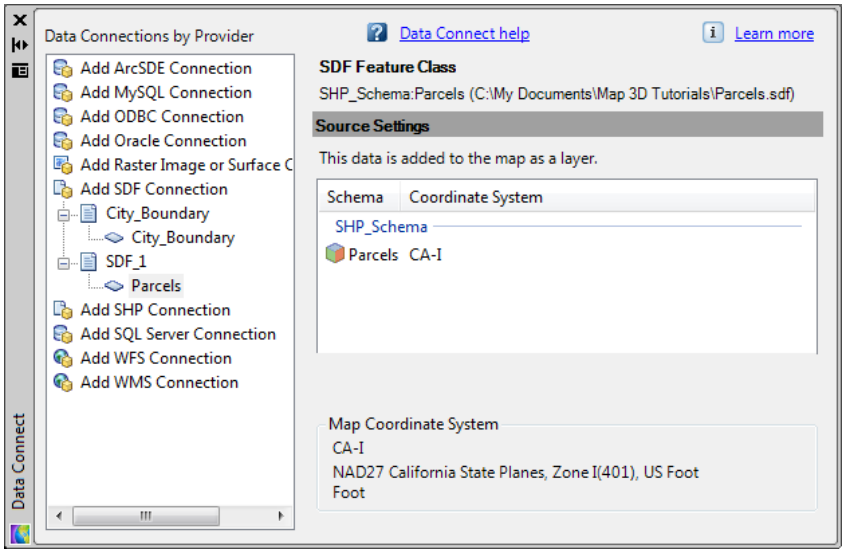
   NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

2. In the *BuildMap1.dwg* file, in Display Manager (page 164), click Data ➤ Connect to Data.
3. Under Data Connections By Provider, select Add SDF Connection.
4. Click the file icon next to Source File.
5. Navigate to the folder in *My Documents* where you copied the sample files and select *Parcels.sdf*. Click Open.
6. Click Connect to add the parcel data file as a data source.
7. Under Add Data To Map, select Parcels.

   The coordinate system for this feature class is displayed next to its name. If this information was incorrect, you could click the current coordinate system listing to see a down arrow and select a different coordinate system.

NOTE Do this only if you know the original coordinate system for the feature—do not change the coordinate system to match your map. AutoCAD Map 3D converts each feature from its own coordinate system into your current map's coordinate system automatically. If you change the coordinate system, the conversion may not be correct.

8 Click Add To Map.



In the Data Connect dialog box, connect to a data provider and then select the feature class you want.

When you click Add To Map, a layer called Parcels is displayed in the list in the Display Manager (page 164). A layer can be styled, saved, displayed, or hidden, independent of other layers in your map.

9 Click File menu ➤ Save to save your work.

To continue this tutorial, go to Exercise 5: Add a raster image (page 38).

Exercise 5: Add a raster image

Photographs and other images formed of pixels are called raster images, while images formed of lines and arcs are called vector images. Bring in an aerial

photograph to display behind the objects in your map. Real-world elements in the raster image line up with the geometry in your map and make it easier for the viewer to get a visual orientation.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

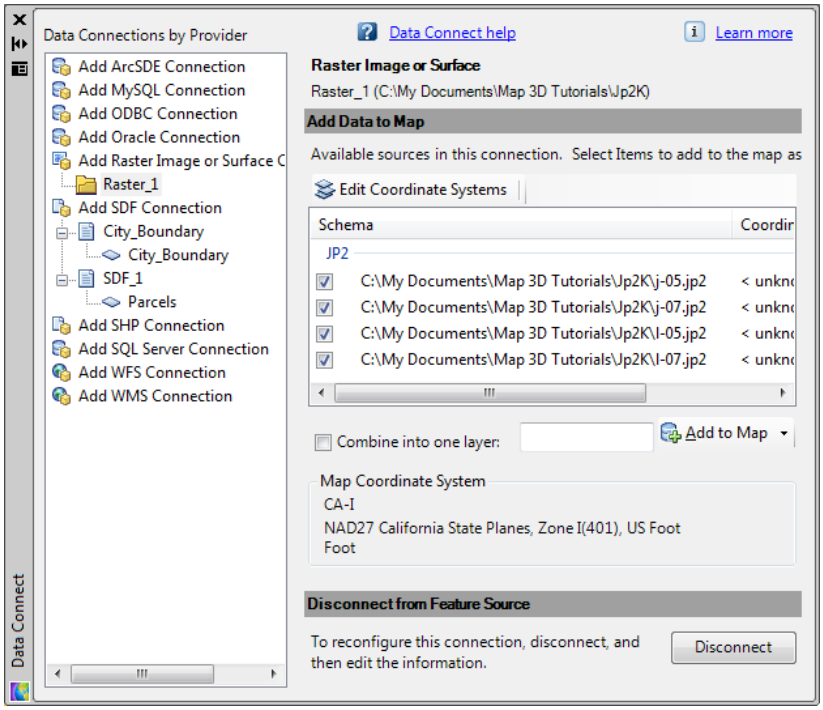
To add a raster image

1. If you have not already done so, copy the *\Program Files\AutoCAD Map 3D 2009\Help\Map 3D Tutorials* folder to *My Documents*.

   NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

2. In the *BuildMap1.dwg* file, the Data Connect (page 163) window should still be displayed. If it is not, open Display Manager (page 164). Click Data ➤ Connect To Data.
3. Under Data Connections By Provider, select Add Raster Image Or Surface Connection.
4. Click the folder button next to Source File Or Folder.
5. Navigate to the folder in *My Documents* where you copied the sample files, find the folder containing the JPEG 2000 raster files (originally called *JP2K*), and select it. Click OK.
6. Click Connect to add the folder as a data source.
7. Under Add Data To Map, select the the j-05, j-07, l-05, and l-07 items.

   The folder contains multiple JPEG 2000 files, each of which covers a small area of the city of Redding.



If your folder contains multiple images, select the ones you want.

8 Set the coordinate systems for the images.

- Click Edit Coordinate Systems.
- In the Global Coordinate System dialog box, click in the blank field in the row labeled “Default” and click Edit.
- For Category, select USA, California.
- Under Coordinate Systems In Category, click CA-I.
- Click OK in both dialog boxes, to return to the Data Connect dialog box.
  All the images now show CA-I as their coordinate systems.

9 Select Combine Into One Layer, so you can style the raster images as a single item in Display Manager.

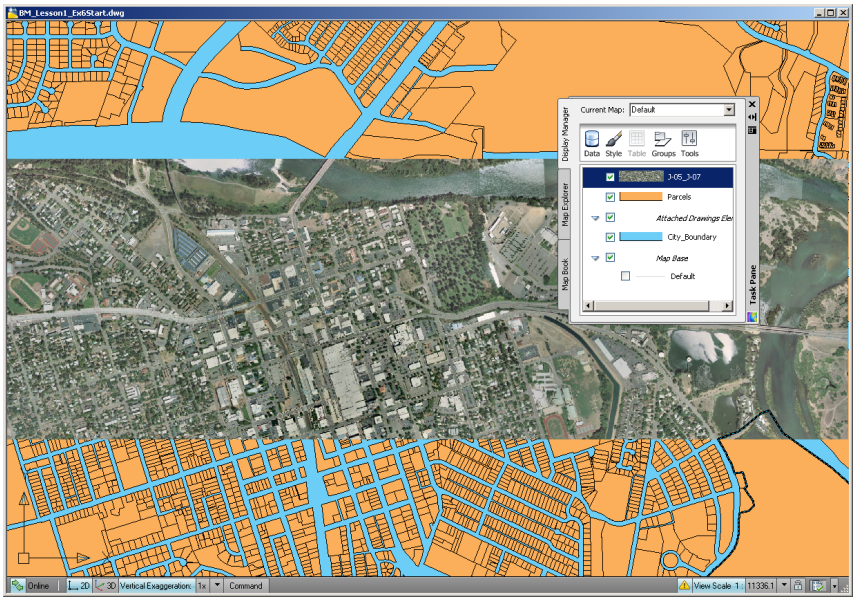
10 Enter a name for the layer, for example, ReddingRasterImages.

11 Click Add To Map.

To see the results

1 Close the Data Connect dialog box.

2 Right-click the new raster layer and click Zoom To Extents.



To continue this tutorial, go to Exercise 6: Display the raster image behind other features (page 41).

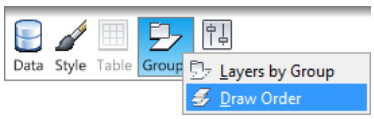
Exercise 6: Display the raster image behind other features

You want the raster image to provide context for the parcels in your map, but right now it is hiding the parcels. Move the raster behind the parcels and set transparency for the parcels so you can see the raster image.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To display the raster image behind other features

1. In the *BuildMap1.dwg* file, in the Display Manager (page 164) menu bar, make sure the fourth item reads Draw Order. If it reads Groups, click it and change it to Draw Order.



2. Drag the new raster layer just below the Parcels layer.

   The list of layers is the draw order (Z-order) for your map. The item at the top of the list is also at the top of the map's Z-order. Dragging the raster image below the Parcels layer places it behind that layer in your map.

   To see the raster layer behind the parcels, make the city boundary layer white and make the parcels semi-transparent.

3. In Display Manager, select the City_Boundary layer.

4. Click Style to see the Style Editor.

   NOTE If the Style Editor is docked, move your cursor over it to display it. It may be docked at the left side of the application window.

5. In the Style Editor, in the Polygon Style For 0 - Infinity: Scale Range section, click the Style entry.

6. Change the Foreground Color to white and click OK.

7. Without closing the Style Editor, select the Parcels layer in Display Manager.

   The Data Connect dialog box updates to show the values for the Parcels layer.

8. In the Style Editor, click the Style entry again.

9. Move the Foreground Transparency slider to 50% and click OK.

   Close the Style Editor. Right-click the Parcels layer and click Zoom To Extents to see the results.

10. Save your map.

Where you are now

You have assembled all the raw materials for your map. The aerial photograph provides context. The geometry from the DWG drawing shows the county boundaries, and the SDF files add the city boundary and parcel outlines.

Lesson 2: Style Map Features

In the Getting Started lesson, you changed the style for the roads in your map by changing the color, thickness, and pattern for the lines representing roads.

In this lesson, you use themed styles to give the viewer an immediate sense of the value of each parcel.

Exercise 1: Create a theme for the parcels layer

A theme uses a range of colors to represent an analogous range of values. You can also use theming to show relative area, population density, water depth, or height of geographic features.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

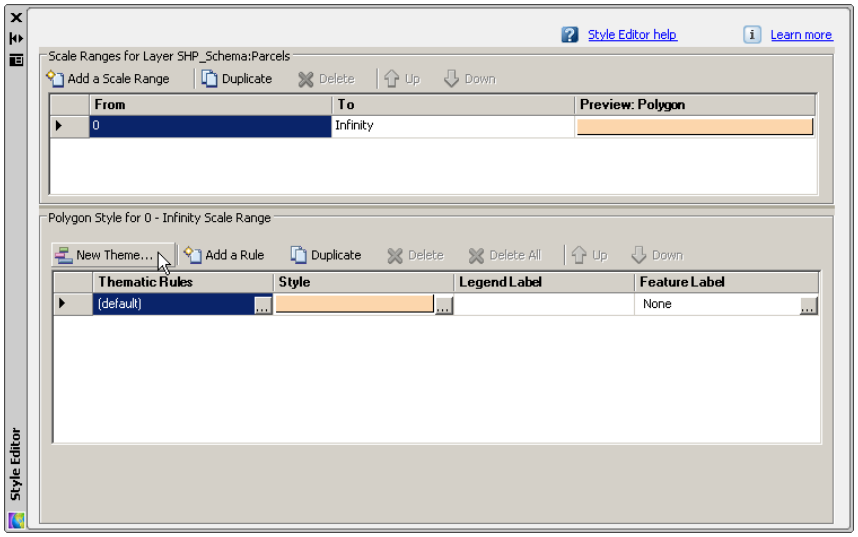
To style the parcels layer with a theme

1. Open your finished map from the previous lesson.
   - Click File menu ➤ Open.
   - Locate *BuildMap1.dwg*.
   - Select it, and click Open.
2. Create a theme for the parcel layer.

   A theme is a display style. Styles for geospatial features are assigned by layer.
   - In Display Manager (page 164), select the Parcels layer and click Style.

     NOTE If the Style Editor is docked, move your cursor over it to display it. It may be docked at the left side of the application window.

- In the Style Editor, under Polygon Style For 0 - Infinity Scale Range, click New Theme.



Click New Theme to define a theme for the Parcels layer.

To continue this tutorial, go to Exercise 2: Define the theme (page 44).

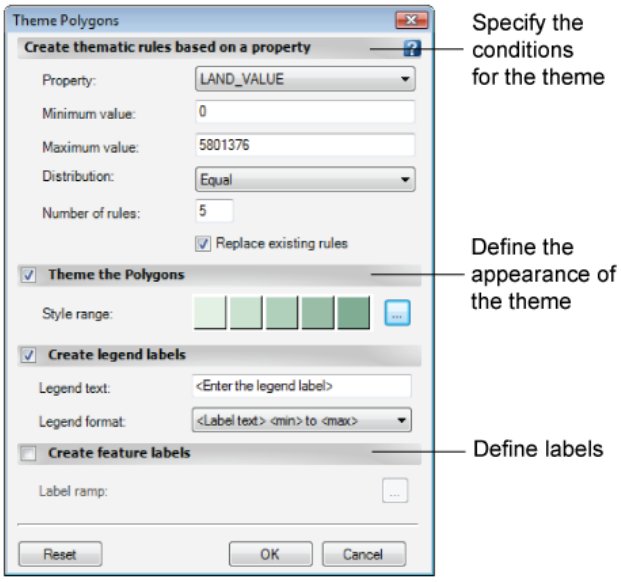
Exercise 2: Define the theme

Tie the theme definition to the value of the parcels: lighter colors will represent parcels with lower values and darker colors will represent parcels with higher values. The parcel value is the "condition" used to determine the color of the parcel in the map.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To define the theme

1. In the Theme Polygons dialog box, under Create Thematic Rules Based On A Property, click the down arrow next to Property and select LAND_VALUE. Leave the minimum value, maximum value, and distribution settings as they are.



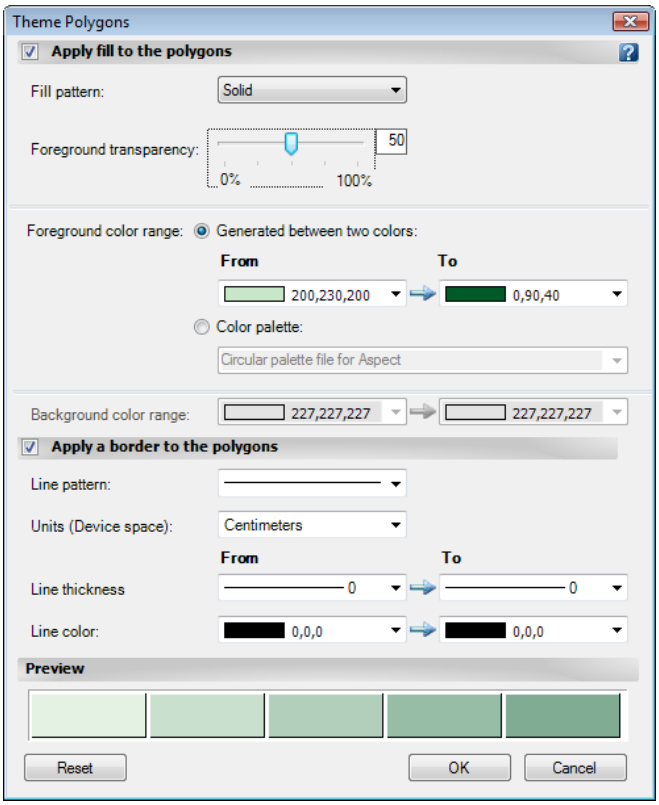
Use the Theme Polygons dialog box to design your theme.

2 Under Theme The Polygons, click … next to the illustration of the Style Range.

3 Set Foreground transparency to 50% so you can continue to see the raster image below the parcels.

4 For Foreground Color Range, select colors from the color boxes under From and To.

5 Experiment with line thickness and color, if you like.



Set transparency, colors, and line attributes for the theme.

6 Click OK.

To continue this tutorial, go to Exercise 3: Add labels (page 46).

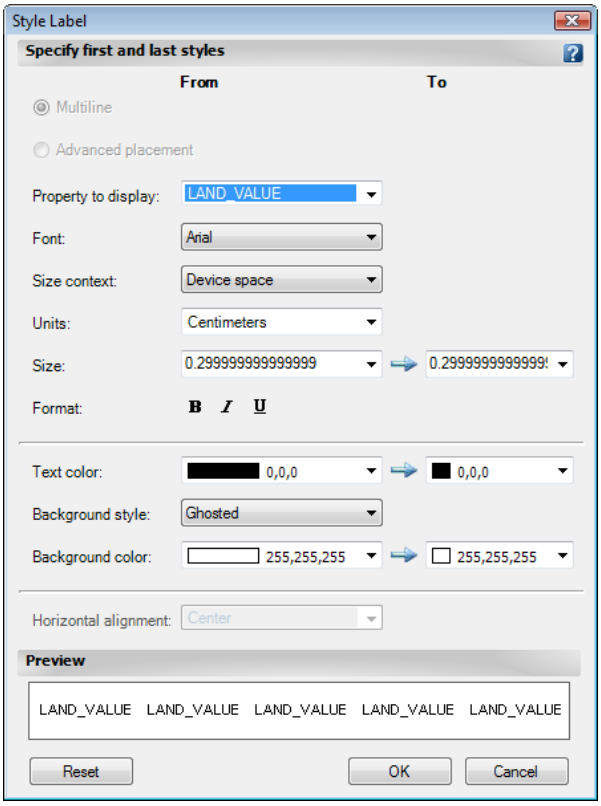
Exercise 3: Add labels

Add a label for each parcel, based on its land value.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To add labels

1 In the Style Editor, select Create Feature Labels and click … next to the picture of the Label Ramp.



Select the property whose data will be displayed in the labels.

2 In the Style Label dialog box, for Property To Display, select LAND_VALUE. Leave the other settings at their current values for now.

3 Click OK to close the Style Label dialog box. Click OK again to apply the theme to your map.

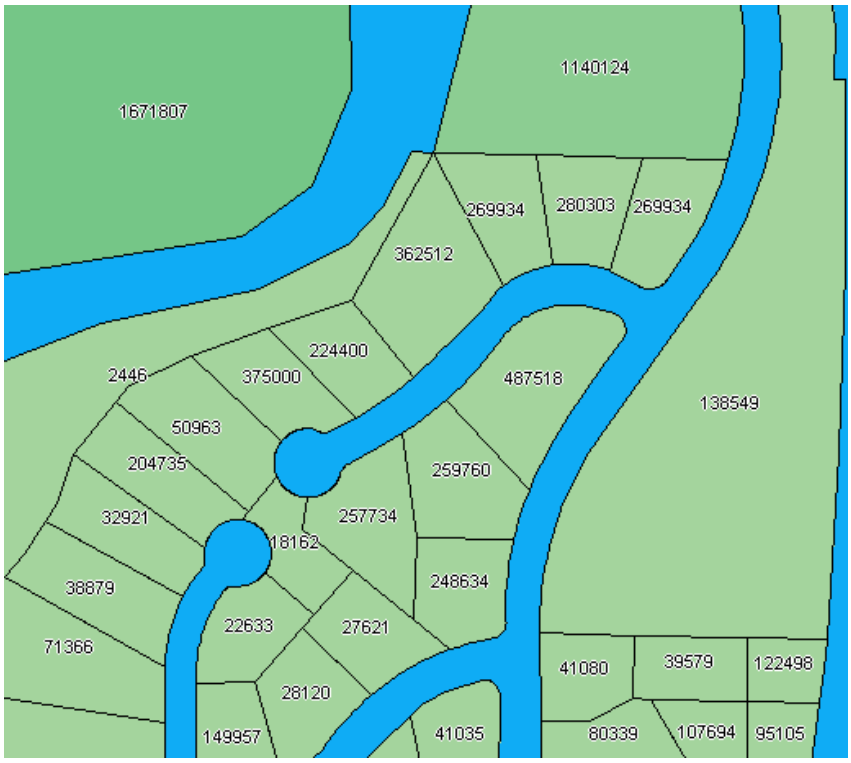
4 Close the Style Editor so you can see your map again.

5 Use the Zoom Window tool to zoom in so you can see the labels.

TIP The smaller you draw the zoom window, the larger the magnification will be.

6 Save your map.

Where you are now



Themed parcels with labels

In the map, the parcels are colored to represent their relative values, which are displayed as labels on each parcel.

Lesson 3: Change the Display by Zoom Level

Use styles to make objects display differently, depending on the viewer's zoom level. In this example, when the viewer is zoomed in, roads are dark gray with

a dashed yellow centerline. When the viewer zooms out, the roads display as solid black. When the viewer zooms out far enough, roads are not displayed at all.

Exercise 1: Add roads to your map

Add roads to your map and assign several styles to them, with each style displaying at a different zoom level.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To add roads to your map

1. If you have not already done so, copy the *\Program Files\AutoCAD Map 3D 2009\Help\Map 3D Tutorials* folder to *My Documents*.

   NOTE The location of *My Documents* varies, depending on your operating system. For Microsoft Windows XP, it is usually *C:\MyDocuments*. For Microsoft Vista, it may be *C:\Documents and Settings\Administrator\My Documents\Map 3D Tutorials*.

2. Open your finished map from the previous lesson.
3. ■ Click File ➤ Open.
   ■ Locate *BuildMap1.dwg*.
   ■ Select the map, and click Open.
4. In the Task Pane (page 168), switch to Display Manager (page 164) .
5. In the menu area, click Order and change it to Groups.
6. Use Windows Explorer to navigate to the folder in *My Documents* where you copied the sample files.
7. Resize the AutoCAD Map 3D window and the sample data folder window so you can see both of them at the same time.
8. Drag and drop the *Roads.shp* file to the lower area of Display Manager, just above the Parcels layer.

To continue this tutorial, go to Exercise 2: Create a composite road style (page 50).

Exercise 2: Create a composite road style

Create a composite style to combine two line styles to form a realistic-looking road style. The composite style is displayed when you zoom in to a certain scale range in your map, but a simpler style is displayed when you zoom out.

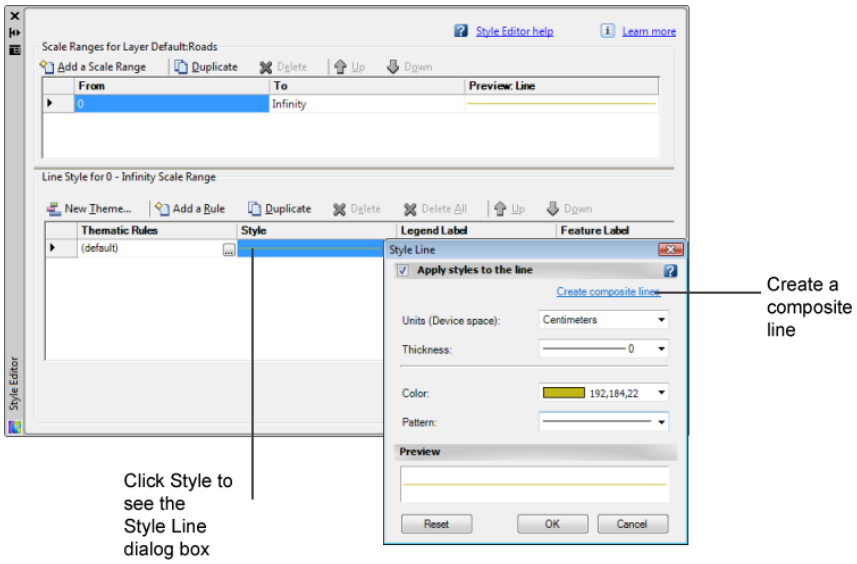
NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To create a composite style

1. In Display Manager, select the Roads layer and click Style.

   NOTE If the Style Editor is docked, move your cursor over it to display it. It may be docked at the left side of the application window.

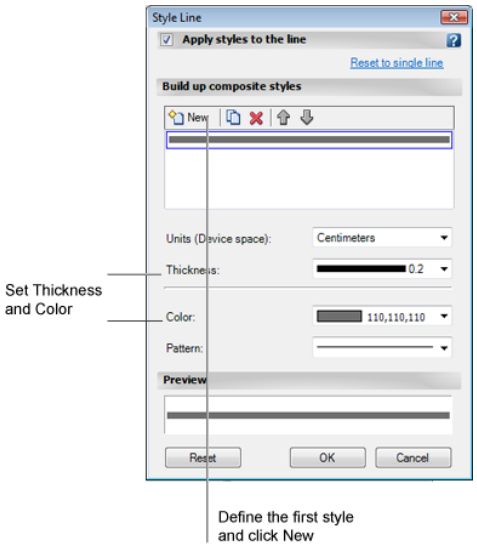
2. In the Style Editor, click the Style field.
3. In the Style Line dialog box, click Create Composite Lines.



Use the Create Composite Lines link to combine line styles.

4 For Thickness, select 0.2, and for Color select a dark gray.

5 Click New to create the second part of the line style.



The Build Up Composite Styles area displays the styles you added up to now.

6 Select a bright yellow for Color and a dotted option for Pattern.

Notice that the preview now displays a dark gray line with a dashed yellow line inside it.

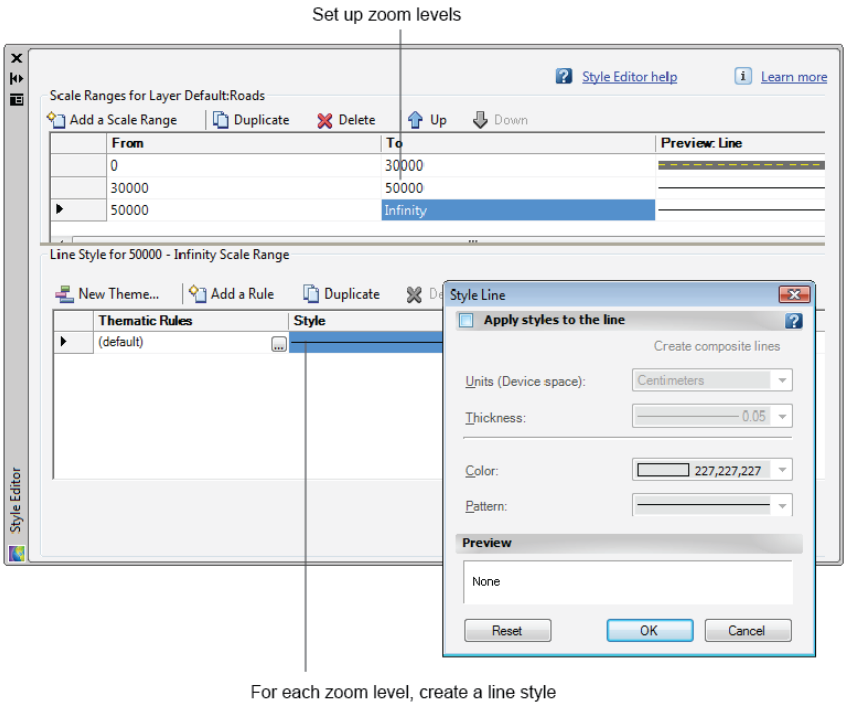
A composite line for roads

7 Click OK.

Now define scale ranges and assign styles to them. Each scale range represents the zoom levels at which a style is displayed. When you are zoomed between the levels of a range, the style for that range is displayed.

8 In the Scale Ranges area at the top of the Style Editor, click the word "Infinity" and enter *30000* to replace it.

The composite style you just created appears for this range.



Set up zoom levels and assign a style to each one.

9 Define a scale range and specify a solid line style for it.

When the zoom level is within this range, the roads will be displayed as solid lines.

- Click Add A Scale Range.
- Set the range to go from 30000 to 50000.
- Click the Style field in the bottom area of the Style Editor.
- Reset the style to a single line.
- Change the color to black.
- Select a solid pattern (at the top of the list).
- Set the line thickness to .05.
- Click OK.

10 Define another scale range so that no styling is applied to the roads when you zoom out to a distant view.

- Click Add A Scale Range again.
- Set the new range to go from 50000 to infinity.
- Click the Style field in the bottom area of the Style Editor.
- Clear the Apply Styles To The Line check box at the top of the Style Line dialog box.
- Click OK.

The style for this scale range is now None. When you zoom out to a distant view, you won't see the roads.

11 Close the Style Editor.

12 Save the file.

To continue this tutorial, go to Exercise 3: View styles at different zoom levels (page 53).

Exercise 3:View styles at different zoom levels

Zoom to different scales in your map to see the different line styles.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To see the styles at different zoom levels

1 In the *BuildMap1.dwg* file, use the Zoom Window tool to zoom in so you can see the labels and the composite lines.

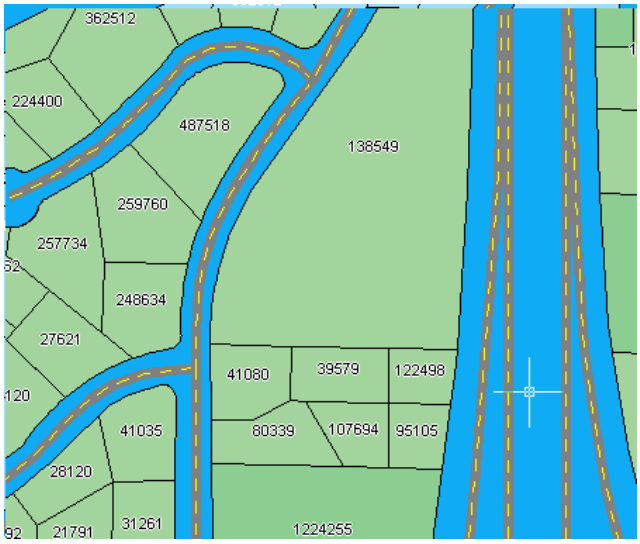
TIP The smaller you draw the zoom window, the larger the magnification will be.

2 Zoom out to see thinner black lines for the roads.

3 Zoom out even farther until the roads are not displayed.

4 Save your map.

Where you are now



At a scale of 1:10000, the roads display the composite style.

In the map, the roads are themed to display appropriately at different zoom levels.

Lesson 4: Create Map Features

Use the powerful editing abilities of AutoCAD to draw new features.

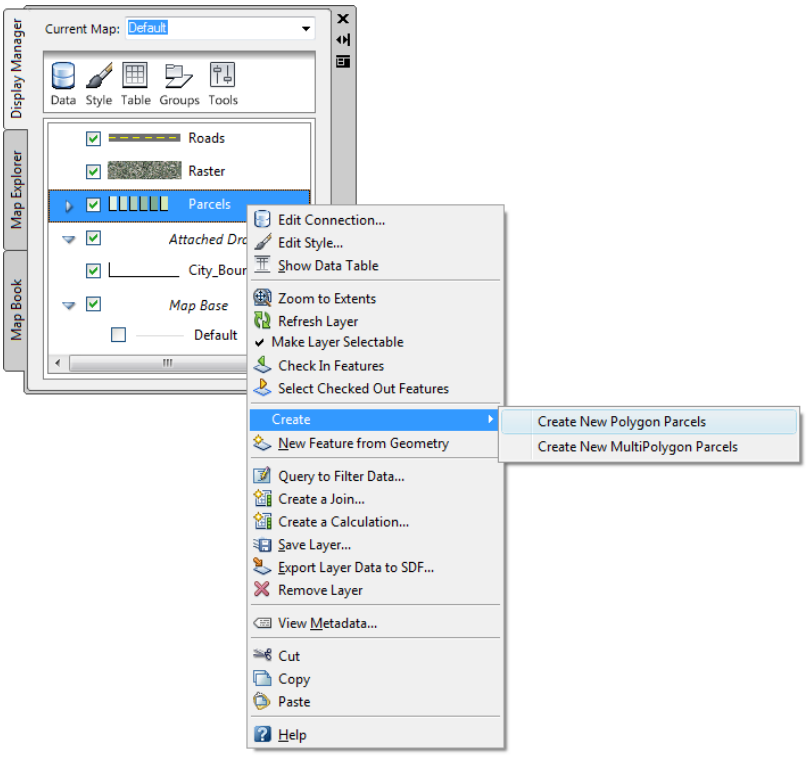
Exercise 1: Draw a new parcel

When you draw a new feature, it is automatically added to the layer from which it was created. The source for that layer is updated to include the feature you added.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To create a new feature

1. If it is not still open, open your map from the previous lesson.
   - Click File menu ➤ Open.
   - Locate the *BuildMap1.dwg* file.
   - Select it, and click Open.
2. In the Task Pane (page 168), switch to Display Manager (page 164) .
3. Right-click the Parcels layer.
4. Click Zoom to Extents.
5. Right-click the Parcels layer again and click Create ➤ Create New Polygon Parcels.



Create a new feature on an existing layer.

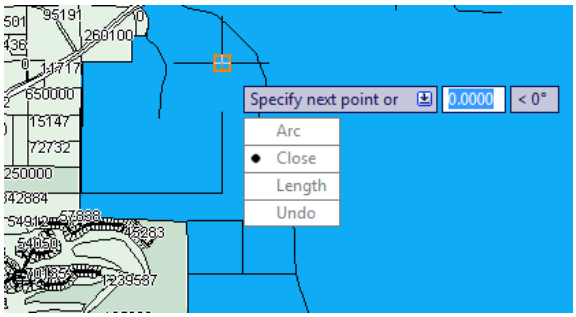
6 Click a starting point in the map for the new parcel.

Click an area on the border of the city.

7 Click three more points to define the beginning of the parcel and its first three sides.

8 Press the down arrow on your keyboard to see a menu of choices in the dynamic input line.

9 Press the down arrow again until a dot is displayed next to Close, showing that it is selected.



Use dynamic input to draw the parcel.

10 Press Enter to close the polygon.

11 Select Exit from the dynamic input menu to complete the command.

The parcel is complete and the Data Table (page 164) is displayed.

NOTE If the Data Table is docked, move your cursor over it to display it. If the Data Table does not display automatically, select the Parcels layer in Display Manager and click Table.

To continue this tutorial, go to Exercise 2: Add information about the new parcel (page 56).

Exercise 2: Add information about the new parcel

In the Data Table (page 164), add information about this parcel.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

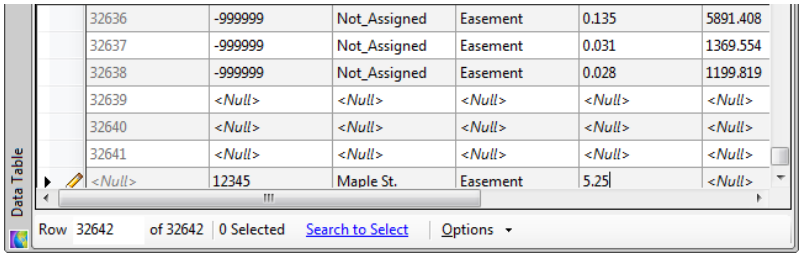
To add information about the new parcel

1. Click in the new blank row in the Data Table.
2. Fill in the data fields for this parcel.

   Look at the other entries to see what a logical entry would be for each column.
3. Right-click the parcel in the map and click Check-in Feature.

   The original data source is updated with your changes.
4. Save your map.

Where you are now



A new Data Table entry

You have added a new parcel and updated the parcel data to reflect your changes.

Lesson 5: Find Objects

Use the Data Table (page 164) to find objects that match certain criteria. Then, use the Data Table to zoom in to that area of your map.

Exercise 1: Display the Data Table

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

Display the Data Table (page 164) for any layer.

To display the Data Table

1. If it is not still open, open your finished map from the previous lesson.
   - Click File menu ➤ Open.
   - Locate the *BuildMap1.dwg* file.
   - Select it and click Open.
2. In the Task Pane, switch to Display Manager (page 164).
3. In Display Manager, select the Parcels layer and click Table.
4. If the Data Table is docked against the left side of the application window, move your cursor over it to see its contents.

To continue this tutorial, go to Exercise 2: Filter the Data Table (page 58).

Exercise 2: Filter the Data Table

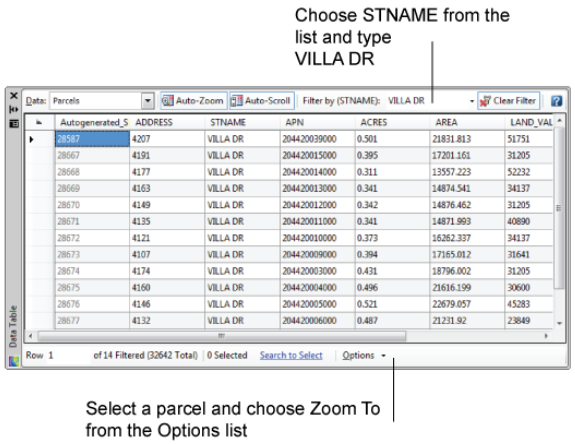
Filter the Data Table (page 164) to show a subset of parcels—in this case, only parcels on Villa Drive.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To filter the Data Table

1. In the Data Table (page 164), in the Filter By list, select the STNAME field and enter *VILLA DR* into the field.

   The field is case-sensitive, so be sure to enter all capital letters. Do not spell out the word "Drive."
2. Click Apply Filter to show only parcels on Villa Drive.



Use the Data Table to filter the parcels you see.

3 Make sure Auto-Zoom is on.

This button is a darker color when it is on; otherwise, it is the same color as the window.

4 Click in a parcel's dark-gray, left-most field to select that parcel.

NOTE You may need to scroll the Data Table to the left to see the left-most fields.

AutoCAD Map 3D scrolls to the selected parcel and displays it to the right of the Data Table.

5 Make a note of the number in the Autogenerated_SDF_ID field, because you will need to use it again later.

6 Close the Data Table.

NOTE You can do a more sophisticated search by clicking Edit menu ➤ Search. That option lets you query a layer with a Boolean condition—for example, ACRES > 1 to find parcels that are larger than an acre. The map then shows only the objects that match your query.

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7 Save your map, but leave it open for the next lesson.

Where you are now

You used the Data Table to zoom to a parcel.

Lesson 6: Edit Objects

Edit objects and then update their original data stores.

Exercise 1: Check out and edit a feature

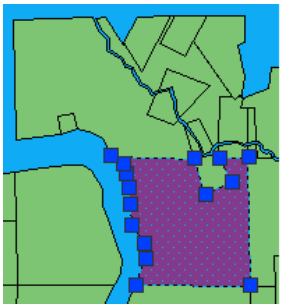
If AutoCAD Map 3D is set to check in your changes automatically, the source file will update while you edit. This might result in inadvertent changes to the data store. The safest way to edit geospatial data is to turn off automatic update feature before you edit a feature. Once you make your changes, check the feature in to update the data store with your changes and make the feature available to others again.

When you edit a feature, that feature is automatically checked out and locked for editing by anyone else (if the data format supports such locking). Other people can view the feature source, but they cannot change it until you check it back in.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To edit an object

1. If you closed your finished map from the previous lesson, re-open it and display the Data Table for the Parcels layer.
   - Click File ➤ Open.
   - Locate the *BuildMap1.dwg* file.
   - Select it, and click Open.
   - In the Display Manager, click the Parcels layer and click Table.
   - Zoom to a parcel on Villa Drive.



The parcel is checked out automatically and displays grips.

2 To turn off the automatic update option, click Edit menu and make sure there is no check mark next to Update Edits Automatically.

3 Use the grips to change the size and shape of the parcel, just as you would any AutoCAD polygon.

4 When you finish, click Edit menu ➤ Check-In.

To continue this tutorial, go to Exercise 2: Update information for the edited feature (page 61).

Exercise 2: Update information for the edited feature

Use the Data Table (page 164) to find the entry for the parcel you edited, and change its information. When you edit a feature (whether in the map or in the Data Table), you automatically check it out. Check in the feature to update its source with your changes.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To edit the feature information

1 Redisplay the Data Table for the Parcels layer.

Select the Parcels layer and click Table, or right-click the Parcels layer and click Show Data Table.

2 In the Data Table (page 164), select Autogenerated_SDF_ID from the Filter By list and enter the parcel ID number you noted earlier (the one you just edited).

3 Click Apply Filter to filter the list and see the parcel entry.

4 Change the area of the parcel and close the Data Table.

5 To update the information in the data source, Click Edit menu ➤ Check-In.

The information is now available to other users.

6 Save your map.

Where you are now

You edited a parcel and updated its data to reflect your changes. You checked in the feature to update the source file.

Lesson 7: Create a Legend

Create a legend that lists the layers in your map, using a color key that identifies each one. The legend is an object that you drop into place on your map.

Fine-tune the legend to show only the layers you want, in the order in which you want them (even if this order is different from your draw order).

Exercise 1: Insert a legend object

Insert a legend anywhere on your map.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To insert a legend in your map

1 If it is not still open, open your finished map from the previous lesson.

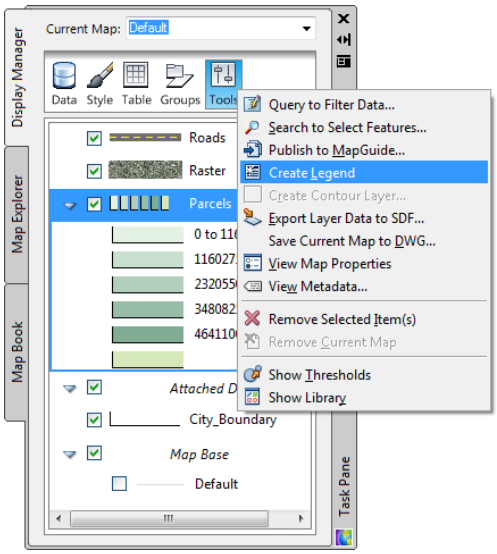
- Click File ➤ Open.
- Locate the *BuildMap1.dwg* file.

- Select it, and click Open.

2 In the Task Pane (page 168), switch to Display Manager (page 164).

3 Select the Parcels layer, right-click and click Zoom To Extents.

4 Click Tools ➤ Create Legend.



Use the Tools menu in Display Manager to create a legend.

5 In your map, find a blank area for the legend.

6 Click where you want the legend to appear.

Notice that each layer listed in Display Manager (page 164) is displayed in the legend automatically, with its identifying color. The items are listed in the order in which they appear in Display Manager.

7 Save your map.

Where you are now

You added a legend to your map.

To continue this tutorial, go to Exercise 2: Change the order of items in the legend (page 64).

Exercise 2: Change the order of items in the legend

The legend reflects the organizational order in your map. You can move items in Display Manager (page 164) to change their order in your legend. You can also turn layers off to prevent them from appearing in the legend.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To change the order of items in the legend

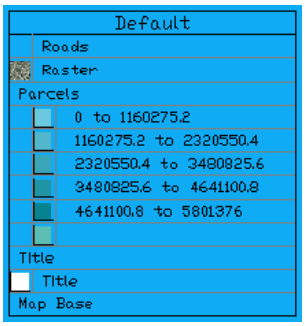
1. In the Display Manager menu area, click Groups ➤ Draw Order.

   Notice that the option name changes to Order, to show that you are now viewing by draw order.

2. Drag an item to a different position.

   The change in your legend is not visible yet.

   The parcel layer has multiple entries (one for each level in the theme that you created for it). Notice that the legend also includes the Map Base layer, which doesn't belong in a legend.



The default legend includes the Map Base layer.

3. In Display Manager, clear the check box for the Map Base layer.
4. Click Tools ➤ Update Legend.
5. Save your map.

Where you are now

You removed the reference to the Map Base layer from the legend, and the legend now reflects the new organizational order.

Lesson 8: Publish Your Map

Publish a georeferenced map in DWF format, for eventual display on the Web or on an intranet. DWF (Design Web Format™) is an open, secure file format developed by Autodesk for sharing engineering design data. DWF files are highly compressed, so they are smaller and quickly transmitted and viewed. This format can include object data or feature attributes, as well as the graphical elements of your map.

As long as you have assigned a coordinate system to all the model-space maps in your DWF file, the publishing operation will automatically convert the coordinate information to latitude/longitude coordinates. Autodesk Design Review 2008 can automatically navigate to a specific location when you enter coordinates, and displays coordinates of any location in the map when you move your mouse over that location. When your computer is integrated with a GPS device that uses the NMEA 0183 protocol, field workers can center the map to the coordinates provided by the integrated GPS device on your system, and display the "my coordinates" icon within the map.

Files in DWF format can be displayed using Autodesk® Design Review. For product information and a download link for this product, refer to the Autodesk Design Review page on the Autodesk website. Autodesk Design Review is the latest version of the Autodesk® DWF Viewer, and includes the ability to measure, mark up, stamp, review, convert, and aggregate DWF content.

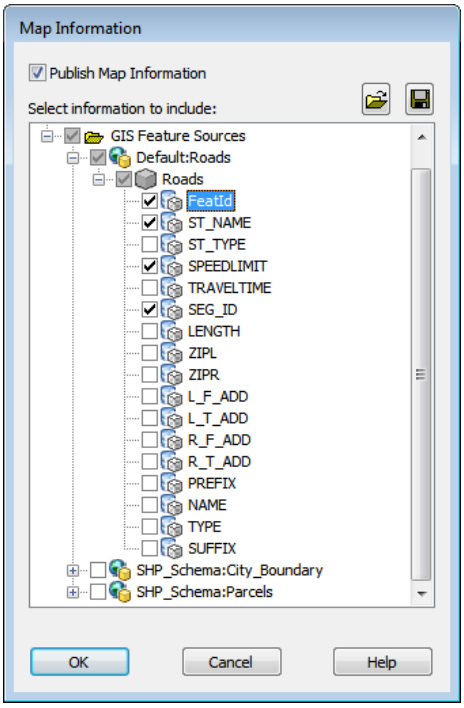
Exercise 1: Specify attributes to include

Set DWF publishing options that specify the attribute information to publish with your map.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To set publishing options

1. Open your finished map from the previous lesson.
   - Click File menu ➤ Open.
   - Locate the *BuildMap1.dwg* file.
   - Select it, and click Open.
2. Click File menu ➤ More Plotting Options ➤ DWF Publishing Options.
3. In the Map Information dialog box, select Publish Map Information.
4. In the Map Information dialog box, expand the items in the list and select the Roads and Parcels items.



You can include and exclude information at any level.

Notice that when you select Roads, everything under Roads is automatically selected.

5 To publish the information to an XML file, click the file icon and specify a location for the published file. Click Save.

   The XML file will be used by the DWF Publish operation.

6 Click OK.

To continue this tutorial, go to Exercise 2: Publish to DWF (page 67).

Exercise 2: Publish to DWF

Publishing to DWF is like printing to a file. You must set up plotting parameters just as you would if you were printing to a physical plotter. You apply those settings to your layout, which is like a plotting template. You display a layout tab for your map to activate the layout.

Each view of your map (which initially includes model space and two default layout spaces) is considered a sheet in your map sheet set. Learn more about sheet sets in the Help.

Use the Publish dialog box to specify the sheets to publish and whether to publish to a plotter or a file.

NOTE This exercise uses the *BuildMap1.dwg* map you created and modified in the previous exercises.

To publish to DWF

1 Save your map.

   You cannot plot or publish without saving first.

2 Click File menu ➤ Plot.

3 In the Plot dialog box, select a Printer/Plotter.

4 Click Apply To Layout, and then click Cancel.

   Printer/plotter settings are applied to your publishing job without sending the job to a plotter or printer.

5 If Model and Layout tabs are not displayed just below your map,

   right-click  in the status area at the bottom of the application window and click Display Model And Layout Tabs.

6 Click the Layout 1 tab.

7 Click File menu ➤ More Plotting Options ➤ Publish To DWF.

8 In the Publish dialog box, in the Sheets To Publish list, make sure that only the sheets you want are selected.

For example, if another map is open, its model and layout views will appear in the list. The default Layout2 view of the current map also appears. Select any undesired entries (such as Layout2) and click Remove Sheets.

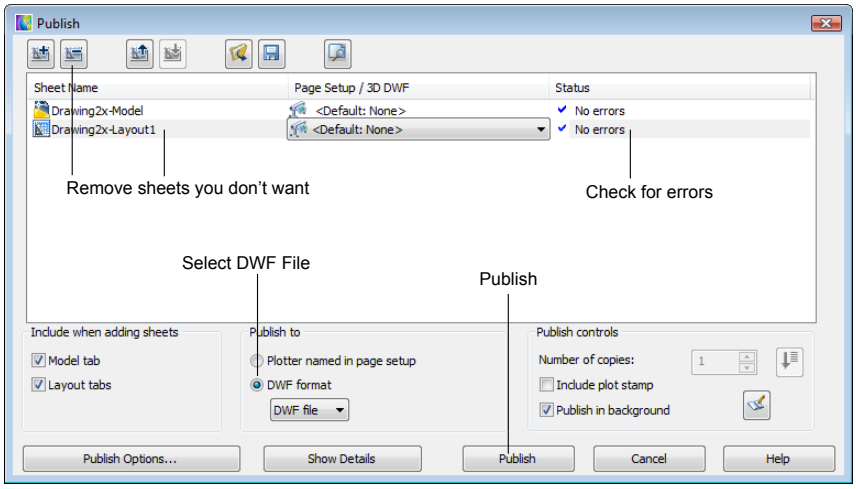
9 Under Publish To, click DWF File.

10 Click Publish Options and click Layer Information (under DWF Data Options). On the pull-down menu in this field, click Include.

This specifies that each layer in your map will be published to a separate layer in DWF. In Design Review, you can turn the display of these layers on and off independently.

11 Click OK to close the Publish Options dialog box.

12 In the Publish dialog box, click Publish (at the bottom of the window).



Set up the sheets to publish and select a publishing format.

13 Specify a location and a name for the published file and click Select.

14 If you are prompted to save the sheet list, click No.

15 You may see a message telling you that the job is processing in the background. Click OK to dismiss the message.

The files needed by Autodesk Design Review are published to the file you specified. Monitor the progress of the publishing operation by holding your cursor over the animated icon in the lower-right corner.

When the job is complete, click the link in the bubble that appears in the bottom, right-hand corner of the window to view any warnings or errors. Close the window when you are done.

Where you are now

You have published your map to a DWF file, which can be displayed in Autodesk Design Review.

Lesson 9: Branching Out - Finding Data Sources

As you go on to create your own maps, you will want to add data to enhance them. For example, you may want surface rasters with elevation data for your area, or generic vector symbols showing parks, hydrants, or other items.

The Autodesk geodata portal has access to multiple data providers. In this lesson, you'll explore the geodata portal and look at some sample data provided with AutoCAD Map 3D by the data providers who have partnered with Autodesk.

Exercise 1: Exploring the Data Portal - DigitalGlobe®

In this exercise, you'll visit the geodata portal and view the data available from DigitalGlobe®.

To explore the DigitalGlobe data

1. In your browser, go to *http://www.autodesk.com/geodata*.
2. On the geodata site, click Go Now for DigitalGlobe.
3. Click the image of the Verrazano Narrows Bridge in Brooklyn, New York to see the high-resolution satellite photo.

DigitalGlobe® has an exhaustive library of high-quality Earth imagery available for purchase.

4 To try out some of DigitalGlobe's data, click Download Your Free Trial and follow the directions on the screen.

Once you've installed DigitalGlobe and you start AutoCAD Map 3D, you should see a new ImageConnect menu on the menu bar.

Exercise 2: Exploring the Data Portal - NAVTEQ™

In this exercise, you'll view the data available from NAVTEQ™.

To explore the NAVTEQ data

1 Close the DigitalGlobe® window and display the Geospatial Solutions page in your browser window.

If you are not already at the Geospatial Solutions page, in your browser, go to *http://www.autodesk.com/geodata*.

2 On the Geospatial Solutions page, click Go Now for NAVTEQ.

3 Click the image of the city of Redding, California, to see the digital map.

NAVTEQ™ street geometry includes street networks, block address ranges, a Point of Interest (POI) database, administrative area boundaries, railroads, hydrological data, and land use information.

4 To try out some of NAVTEQ's data, click Download Free Sample and follow the directions on the screen.

Exercise 3: Exploring the Data Portal - Intermap™

In this exercise, you'll view the data available from .

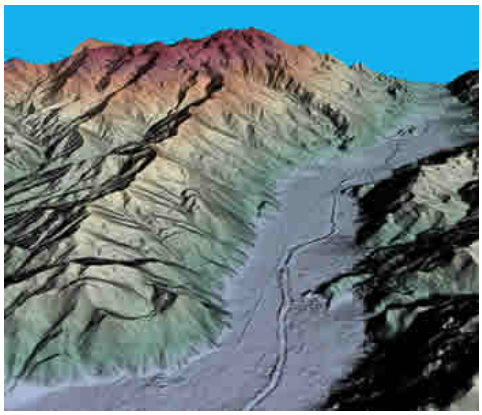
To explore the Intermap data

1 Close the NAVTEQ™ window and display the Geospatial Solutions page in your browser window.

If you are not already at the Geospatial Solutions page, in your browser, go to *http://www.autodesk.com/geodata*.

2 On the Geospatial Solutions page, click Go Now for Intermap.

3 Click the Digital Elevation Models image to see information about DEM topographic layers.



Intermap™ provides digital surface models, digital terrain models, orthorectified radar images, and color orthorectified radar images.

4 Close the browser windows.

Exercise 4: Trying Out the Sample Data

Sample data from each of these providers is included with AutoCAD Map 3D. In this exercise, you'll add some of this data to a map of the city of Munich, Germany

To work with the sample data

1 Create a new map.

- Click File menu ➤ New.
- In the Open dialog box, select the *map2d.dwt* template.
- In Map Explorer, right-click Current Drawing and click Coordinate System.
- In the Assign Global Coordinate System dialog box, for Code, set the coordinate system to LL84 and click OK.

2 Connect to a surface graphic.

- In Display Manager, click Data ➤ Connect To Data.

- In the Data Connect dialog box, under Data Connections By Provider, click Add Raster Image or Surface Connection.
- Click the file icon next to Source File Or Folder.
- In the Open dialog box, navigate to the Intermap *Munich_dtm.dem* raster file.
- Select the file and click Open.
- In the Data Connect dialog box, click Connect.
- In the Data Connect dialog box, select the image and click Add To Map.

3 Style the surface image.

- In Display Manager, select the surface layer.
- On the status bar at the bottom of the application window, click the down arrow next to Vertical Exaggeration.
- Increase the vertical exaggeration to 25x.
- In Display Manager, with the surface layer still selected, click Style.
- In the Style Editor, click the down arrow in the Style cell and select Theme.
- In the Theme dialog box, select Palette and select the Contour Palette.
- Click OK, then click Apply and close the Style Editor.

4 Connect to a satellite image of Munich.

- If the Data Connect window isn't displayed, in Display Manager, click Data ➤ Connect To Data.
- In the Data Connect dialog box, under Data Connections By Provider, click Add Raster Image or Surface Connection.
- Click the file icon next to Source File Or Folder.
- In the Open dialog box, navigate to the DigitalGlobe *munich.ecw* raster file.
- Select the file and click Open.
- In the Data Connect dialog box, click Connect.

- In the Data Connect dialog box, select the image and click Add To Map.

5 Style the satellite image.
   - In Display Manager, right-click the image layer and click Zoom To Extents.
   - In Display Manager, with the image layer still selected, click Style.
   - In the Style Editor, click Transparent.
   - Click Select and select a dark gray color in the raster image to be transparent.

6 Connect to a Navteq SHP file to add points representing restaurants.
   - In Display Manager, click Data ➤ Connect To Data.
   - In the Data Connect dialog box, under Data Connections By Provider, click Add SHP Connection.
   - In the Data Connect dialog box, click the file icon next to Source File Or Folder.
   - In the Open dialog box, navigate to the Navteq *Restrnts.shp* file.
   - Select the file and click Open.
   - In the Data Connect dialog box, click Connect.
   - Select Restrnts and click Add To Map.

7 Style the points to use symbols.
   - In Display Manager, select the Restrnts layer and click Style.
   - In the Style Editor, click  in the Style cell.
   - In the Style Point dialog box, click  next to Symbol.
   - In the Select A Symbol dialog box, click  next to Symbol Library and open the *Map - Points of Interest.dwg* file.
   - Select the Restaurant symbol.
   - If you want, in the Style Editor, change the Fill Color and Edge Color of the points so you can see them better.

- Click OK and close the Style Editor.

Where you are now

You explored the geodata portal and used sample data from Autodesk's partner providers to create a map of Munich using a surface with elevation, a satellite photo, and symbols representing restaurants.

Tutorial: Analyzing Data Using Styles, Joins, and Buffers

3

About the Analyzing Tutorial

Use AutoCAD Map 3D to analyze data in many ways. This tutorial demonstrates three of them:

- Analyze data visually, using surfaces.
  Connect to a surface (DEM) image and style it using a theme to show relative elevation. Then, connect to a file that shows parcel information and make the parcels semi-transparent so you can see the raster image below them. The elevation theme of the raster helps you see the elevation of the parcels.
- Analyze data with external information sources, using joins.
  Join a Microsoft Access database to the parcels layer in the map to see information about the parcel owners. Using joins, you combine data sources temporarily, without altering the original data stores. Use the combined data as though it were a single data source—for example, style a layer based on its joined data, even though the joined data is not part of the original layer data store. Create calculated fields using native and joined data.
- Analyze data by proximity, using buffers.
  Define a buffer around a street in Redding to see which parcels lie within a construction zone. Select the parcels that adjoin the buffer and save them separately so you can notify their owners, using the owner information you joined to the parcels.

Export relevant data to a comma-separated file that you can import into Microsoft Excel or Access. Use that data to create a report to send to the owners.

Lesson 1: Analyzing Data Visually, Using Surfaces

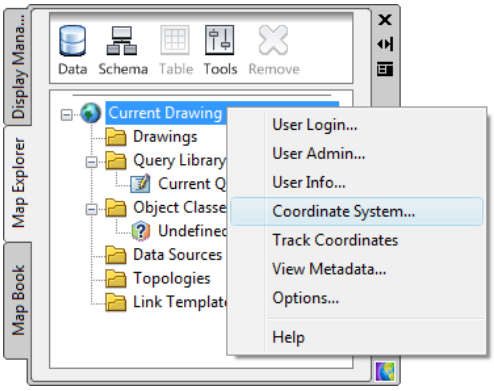
Use the Data Connect dialog box to connect to a DEM file and style it to show the elevation information it contains.

Exercise 1: Prepare your map file

Create a new map file and assign a coordinate system. Color the map background white so you can better distinguish features when you use color to style them. All maps you create from now on will use the new background color.

To create a new map file

1. If you have not already done so, copy the sample files for the tutorials (page 10) to a directory on your hard drive.
2. Start AutoCAD Map 3D and create a new map using the *map2d.dwt* template.
3. Assign a coordinate system to the new map.
   - Switch the Task Pane to Map Explorer.
   - Right-click the Current Drawing entry and click Coordinate System.



Set the coordinate system for the map in Map Explorer.

- Specify the CA-I coordinate system.

4 Click File menu ➤ Save. In your tutorials folder, name the file *AnalyzeMap1.dwg* and click OK.

To change the map background color

1 Click Setup menu ➤ AutoCAD Options.

2 In the Options dialog box, click the Display tab.

3 On the Display tab, in the Window Elements area, click Colors.

4 Under Context, select 2D Model Space.

5 Under Interface Element, select Uniform Background.

6 Under Color, select White.

7 Click Apply & Close, and then click OK.

To continue this tutorial, go to Exercise 2: Add a surface to view elevation data (page 80).

Exercise 2: Add a surface to view elevation data

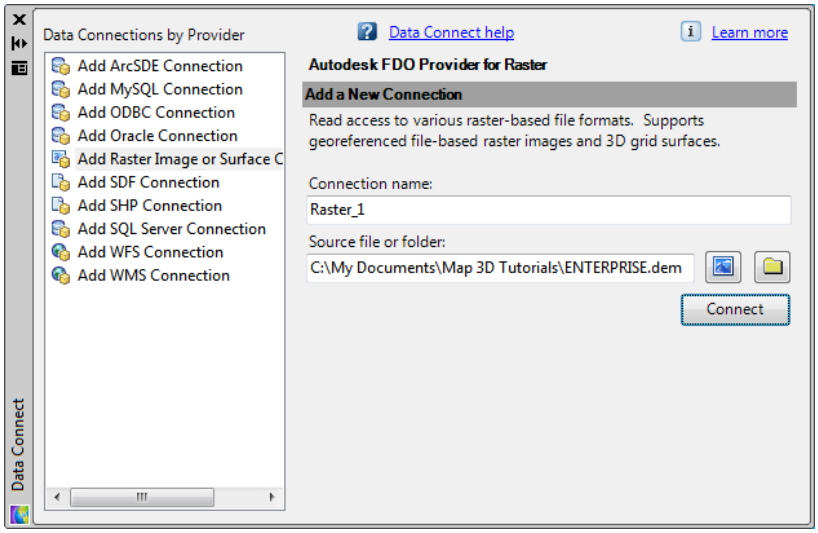
A surface is a raster file that contains elevation information. Use theming to make the surface reflect its elevation.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created in the previous exercise.

To add a surface to the map

1. Switch the Task Pane to the Display Manager.
2. In the Display Manager, click Data ➤ Connect To Data.
3. In the Data Connect dialog box, under Data Connections By Provider, click Add Raster Image Or Surface Connection and click  next to Source File Or Folder.
4. In the Open dialog box, browse to the *ENTERPRISE.dem* file, select it, and click Open.

   This file should be in the location where you copied the sample data.



Connect to the surface file in the Data Connect dialog box.

5. In the Data Connect dialog box, click Connect.

NOTE The coordinate system for the DEM file is UTM27-10. AutoCAD Map 3D automatically converts the data from that coordinate system to the one specified for your map.

6 Select the box for the DEM under Add Data To Map and click Add To Map.

7 Close the Data Connect dialog box to see the surface in your map.

To style the surface

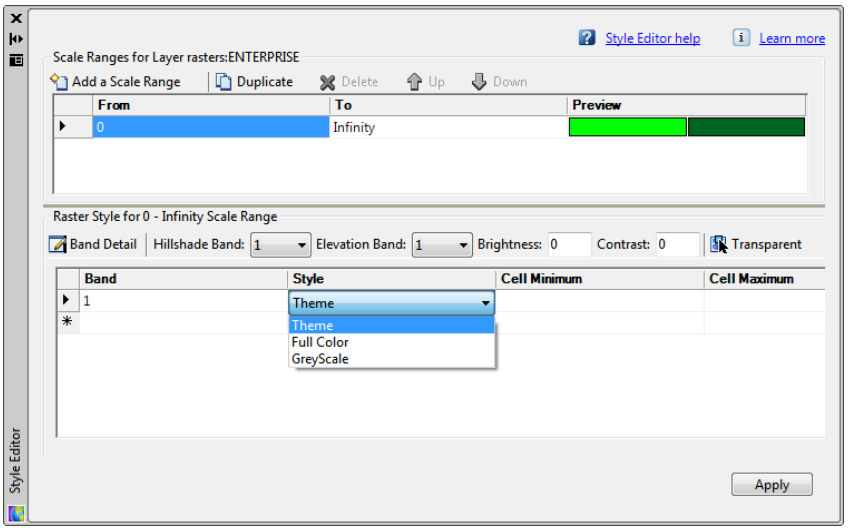
1 In Display Manager, select the ENTERPRISE layer, which contains the surface.

2 Click 

.

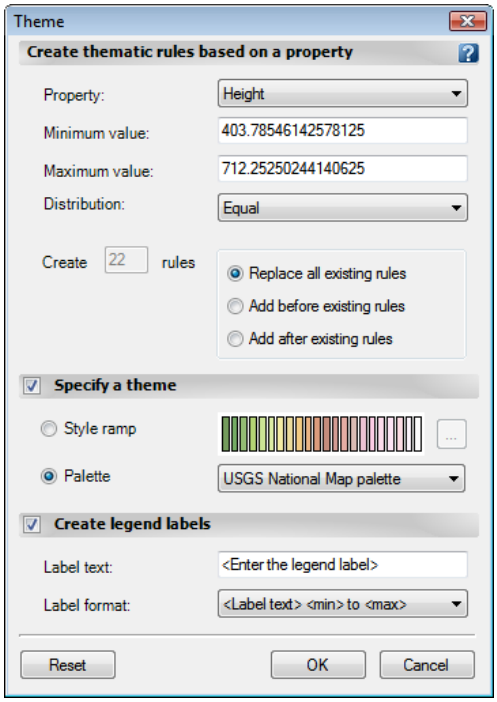
3 Create a palette for the theme.

- In the Style Editor, under Raster Style For 0 - Infinity Scale Range, click the down arrow in the Style entry and select Theme (even if it is already selected).



Click the first Style entry and select Theme.

- In the Theme dialog box, under Specify A Theme, click Palette and select USGS National Map Palette.

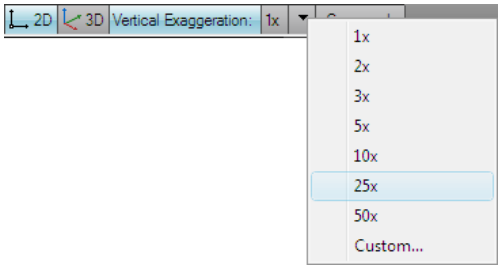


Select the USGS National Map palette as the theme for the surface.

- Click OK and then click Apply. Close the Style Editor.

4 Add exaggeration to show the differences in elevation more dramatically.

- In the status bar below your map, click the down arrow next to Vertical Exaggeration.
- Select 25x from the list.

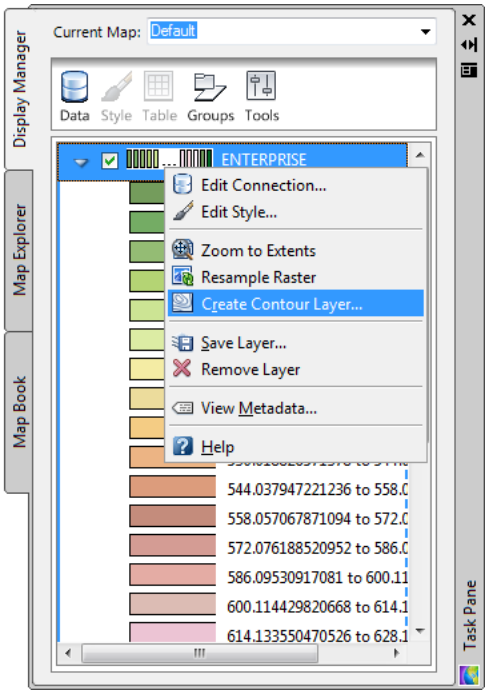


Set the Vertical Exaggeration to 25x.

5 Add contour lines to create a topographic map.

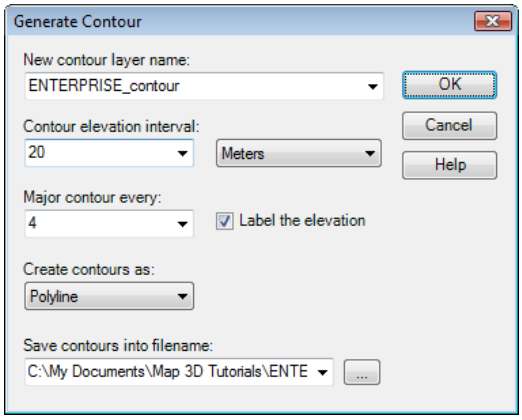
Each contour line connects points of equal elevation on the surface. The lines identify the elevation at a specific location on the surface, which can help the viewer clarify and analyze the 3D surface terrain.

- In Display Manager, right-click the surface layer and click Create Contour Layer.



In Display Manager, right-click the surface layer to create contours.

- In the Generate Contour dialog box, in the Contour Elevation Interval list, select 20.
- Leave the Units set to Meters.
- In the Major Contour Every list, select 4. This makes every fourth contour line bold.
- Select Label The Elevation. This labels the major (bold) contour lines only.
- For Create Contour As, select polyline.



The Generate Contour dialog box should look like this.

- Click OK.

NOTE To label the intervening contour lines, use the Style Editor to change the style for the new contour layer (not the surface layer itself). Select the contour layer in Display Manager and click Style. In the Style Editor, click the down arrow next to the Feature Label entry for "IsMajor=False," select Elevation as the Property for the label, and click OK. You can also use this method to change the color or style for the contour lines.

To continue this tutorial, go to Exercise 3: Add a layer on top of the surface (page 85).

Exercise 3: Add a layer on top of the surface

When you add a vector feature to a map containing a 3D surface and then display the map in 3D, AutoCAD Map 3D automatically drapes the vector on the 3D surface.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To add roads to the map

1. In Display Manager, click Data ➤ Connect To Data.

2 In the Data Connect dialog box, under Data Connections By Provider, select Add SHP Connection.

3 Click  next to the Source File field and navigate to the folder where you copied the sample files.

4 In the Open dialog box, select *ROADS.SHP* and click Open.

5 In the Data Connect dialog box, click Connect.

6 In the Data Connect dialog box, select the Roads layer under Add Data To Map and click Add To Map.

7 Close the Data Connect dialog box.

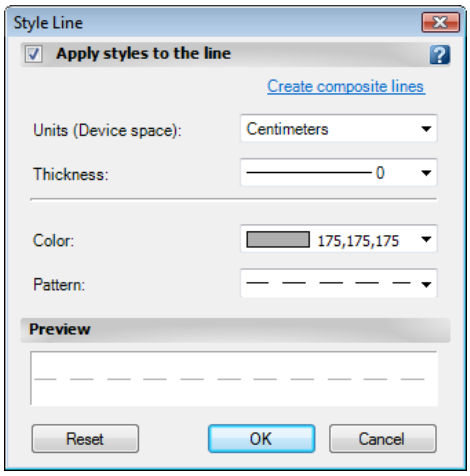
To style the roads in the map

1 In Display Manager, select the Roads layer and click Style.

2 In the Style Editor, click the Style entry.

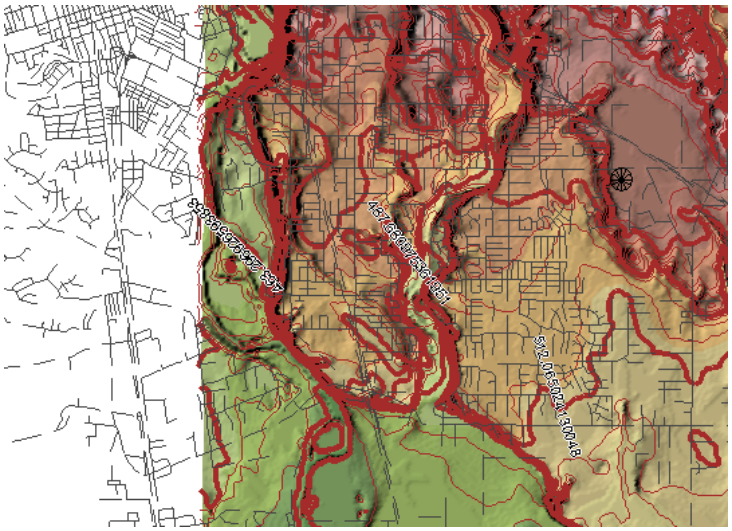
3 In the Style Line dialog box, change the road color to dark gray.

4 Select a dashed pattern for the lines.



Select a dark gray, dashed pattern for the roads.

5 Click OK and close the Style Editor.



Your map now contains the styled surface and road layers.

To continue this tutorial, go to Exercise 4: Drape a parcel layer on top of the surface (page 87).

Exercise 4: Drape a parcel layer on top of the surface

Now, add a layer that displays parcels in one part of the city of Redding. This layer contains size, value, and address information about the parcels. It does not contain information about the owners. You will join to a data source that contains that information later.

You will make the parcels semi-transparent so you can see the other features underneath.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To add the parcel layer to the map

1. In Display Manager, click Data ➤ Connect To Data.
2. In the Data Connect dialog box, under Data Connections By Provider, click Add SDF Connection.

3 Click  next to the Source File field and navigate to the folder where you copied the sample files.

4 In the Open dialog box, select *Assessor_Parcels.SDF* and click Open.

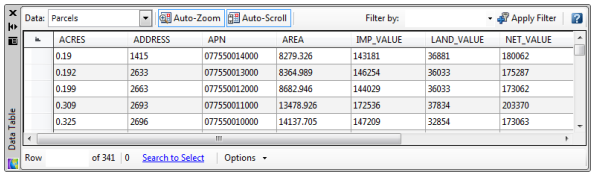
5 In the Data Connect dialog box, click Connect.

6 Select the Parcels layer under Add Data To Map and click Add To Map.

7 Close the Data Connect window.

8 In Display Manager, select the Parcels layer and click Table.

Information associated with the parcels is displayed, but the information does not include owner-related data.



Data associated with the parcel layer is displayed.

9 Close the Data Table.

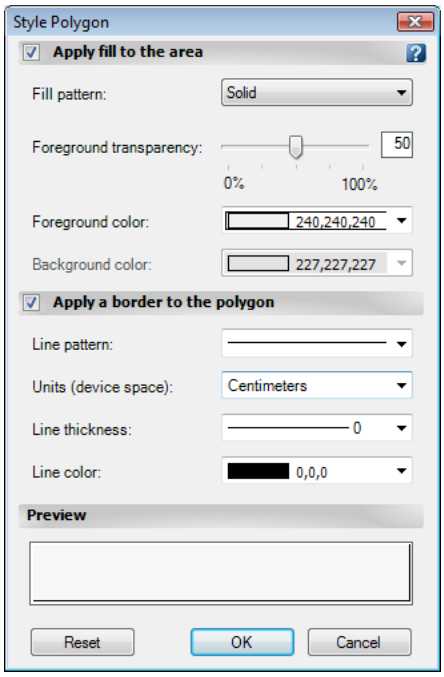
To style the parcels in the map

1 In Display Manager, select the Parcels layer and click Style.

2 In the Style Editor, click the color in the Style entry.

3 In the Style Polygon dialog box, change the Foreground Transparency setting to 50%.

4 Change the Foreground Color to a light shade.



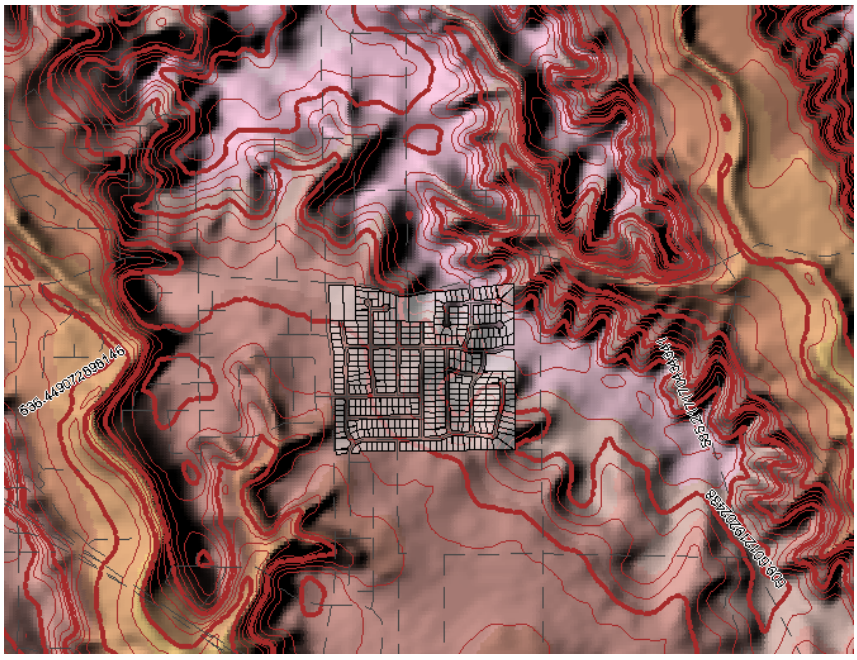
Change the foreground transparency for the parcel layer.

5 Click OK and close the Style Editor.

The parcel layer is draped over the surface. Because it is transparent, you can see the surface underneath.

Where you are now

You added a surface that contains elevation information, and you used that information to create a theme that varies color by elevation. You added contour lines to identify the elevation levels. You draped a layer of data over the surface and made it transparent so you could evaluate its elevation based on the surface below.



The styled surface helps you evaluate parcel elevation.

Lesson 2: Analyzing Data With External Information Using Joins

Join the parcels layer to a Microsoft Access database that contains owner information.

To connect to an Access database from AutoCAD Map 3D, you must first set up an ODBC connection for that database using a control panel in Windows. Then, connect to this source using Data Connect, just as you connected to the physical data sources in your map. The database source contains a field that you can match to a field in the Parcels layer, so you can join the data to the parcels and style or analyze all the resulting data seamlessly.

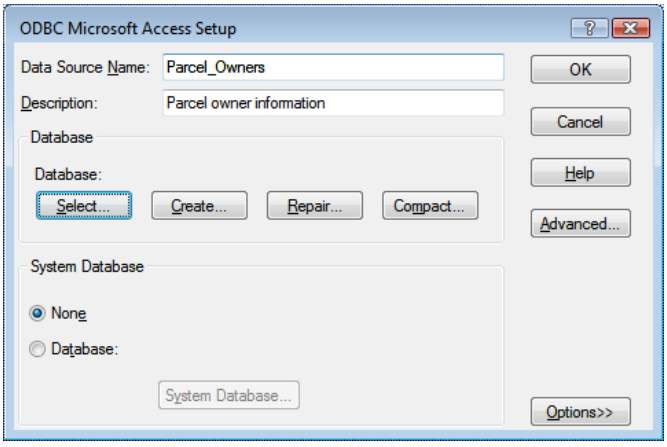
Exercise 1: Set up an ODBC connection for an Access database

Set up an ODBC connection for the Access database using the Administrative Tools control panel in Windows.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To set up an ODBC connection for the Access database

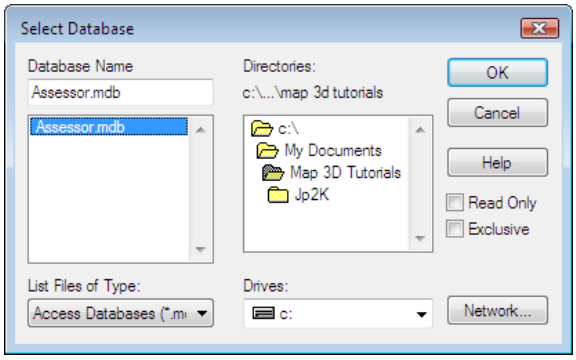
1. From your Windows desktop, click Start menu ➤ Settings ➤ Control Panel and open the Administrative Tools control panel.
2. In the Administrative Tools window, double-click Data Sources (ODBC).
3. In the ODBC Data Source Administrator dialog box, click Add.
4. In the Create New Data Source dialog box, click Microsoft Access Driver (*.mdb) and click Finish.
5. In the ODBC Microsoft Access Setup dialog box, for Data Source Name, enter *Parcel_Owners*.
6. Enter a description, for example, "Parcel owner information."



Name the data source.

7. Under Database, click Select.

8 In the Select Database dialog box, navigate to the sample files and select the *Assessor.mdb* file.



Specify the database for this data source.

9 Click OK in the Select Database, ODBC Microsoft Access Setup, and ODBC Data Source Administrator dialog boxes.

10 Close the Administrative Tools control panel.

To continue this tutorial, go to Exercise 2: Connect to the Access database (page 92).

Exercise 2: Connect to the Access database

Specify the new connection in Data Connect. You don't need to add any specific feature class layers from the ODBC source to the map. All the information becomes available to AutoCAD Map 3D automatically when you connect to the ODBC source.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

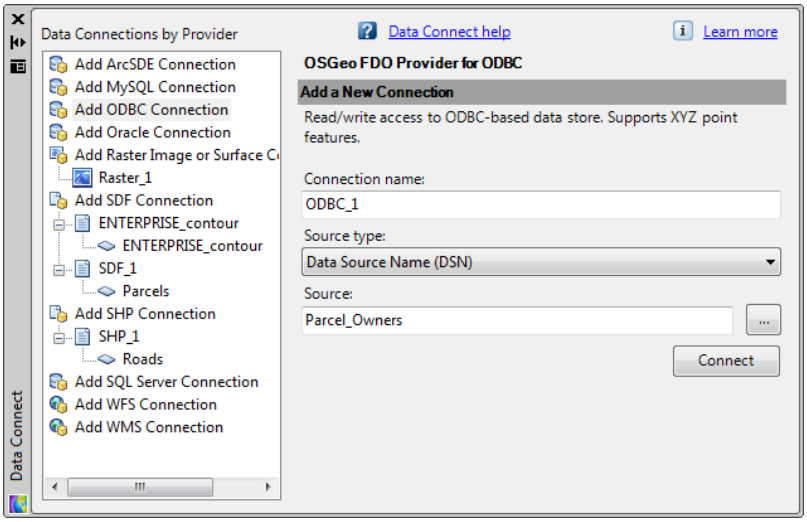
To connect to the Access database from AutoCAD Map 3D

1 In Display Manager in AutoCAD Map 3D, click Data ➤ Connect To Data.

2 In the Data Connect dialog box, under Data Connections By Provider, click Add ODBC Connection.

3 Click the button next to the Source field under Add A New Connection.

4 In the Open dialog box, select *Parcel_Owners* from the list of Data Source Names and click Select.



Connect to the ODBC data source the same way you did to the surface and SDF data sources.

5 Click Connect.

6 In the User Name & Password dialog box, click Login without entering anything in the fields. (This database has not been set up for user name and password protection.)

Do not add any layers to your map. AutoCAD Map 3D sees all non-spatial data automatically after you connect to its source.

7 Close the Data Connect window without adding anything to your map.

To continue this tutorial, go to Exercise 3: Join the data from the ODBC source to the layer containing the parcels (page 94).

Exercise 3: Join the data from the ODBC source to the layer containing the parcels

After you connect to an external data source, you can join it to a layer in your map using the Data Table (as long as the two data sources share a common property). You can see the results of the join immediately.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To join the ODBC parcel data to the geospatial parcel layer

1. In Display Manager, select the Parcels layer and click Table.
2. At the bottom of the Data Table, click Options, and click Create a Join.

   In the Create A Join dialog box, the Primary Table Initiating The Join entry is automatically displayed.
3. For Table (Or Feature Class) To Join To, select the ODBC_1:Fdo:Assessor layer.
4. For This Column From The Left Table, select APN.

   The entry for the corresponding Matches This Column From The Right Table is automatically displayed.
5. Click OK to display all the data in the Data Table.
6. Scroll to the right to see the owner information.

To continue this tutorial, go to Exercise 4: Use the joined data for calculated fields and styles (page 94).

Exercise 4: Use the joined data for calculated fields and styles

Now that you have joined owner data to the parcels layer, you can use the joined information to create a calculated field and determine your styles.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To create a calculated field using joined data

1. At the bottom of the Data Table, click Options, and click Create A Calculation.
2. In the Create A Calculation window, enter a name for the calculated field, for example "AcresByArea."
3. Click Property to see a list of properties for the current layer. Select ACRES.
4. Click the operator for "divided by" (the slash character).
5. Hover over the `[value]` marker that is inserted to see a tooltip with choices. Click Enter a Property. Select AREA.
6. Click Validate to make sure the expression is a valid calculation.
7. When you see "The expression is valid," click OK to create the calculated field.

   Scroll to the right in the Data Table to see the new field (just to the left of the joined fields). It is gray, to indicate that it is a calculated field and cannot be edited. However, you can use it for styling.

You can display information differently at different zoom levels in AutoCAD Map 3D, so you can create a style that displays owner names (from the joined data source) on the parcel layer at a high zoom level, but not at a lower one.

To create a style using the joined data

1. In Display Manager, select the Parcels layer and click Style.
2. Click the  button in the field under Feature Label.
3. For Property To Display, select Assessor|OWNERLASTNAME.
4. Click OK.
5. Click Add a Scale Range so that you have two scale ranges, both the same.
6. Set the bounds of the first scale range to 0 to 10000 and the second to 10000 to Infinity.
7. Select the second scale range (10000 to Infinity).
8. Click  in the Feature Label field.
9. Clear the check box for Create A Label (at the top of the dialog box) and then click OK.

10 Close the Style Editor.

11 Save your map file.

The new Parcels style will display the owner's name when the view is zoomed to 10000 or closer. The labels are not displayed when you zoom out further than that.

Where you are now

You joined information from a Microsoft Access database to a layer containing parcels. Using the combined data, you created a calculated field and a style that displays parcel owner information at high zoom levels, but does not display these labels at lower zoom levels.

Lesson 3: Analyzing Data by Proximity Using Buffers

Create a buffer that specifies an area within 100 feet of a particular street and use it to see which parcels will be affected by a construction project. Save the affected parcel data to a separate SDF file.

Compare the two sets of parcels—the original set of Redding parcels and those that lie within the construction zone—by attaching both SDF data sources to your map as separate layers and styling them differently.

Exercise 1: Create a buffer representing a construction zone

Start by creating the buffer.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To create the buffer

1 If your map is not still open, click File menu ➤ Open and open it.

2 In Display Manager, clear the check boxes next to the surface and contour layers to hide those layers and see the rest of the process more easily.

3 Right-click the Parcels layer and click Zoom To Extents.

4 Click Analyze menu ➤ Buffer.

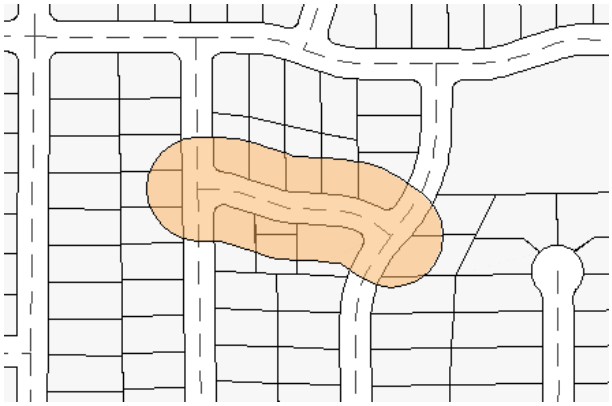
5 In the Buffer Features dialog box, set the buffer distance to 100 feet and click Merge All Buffers.

6 Click Select Features.

7 Click a road in your map that runs through the parcel area.

8 Press Enter to return to the dialog box.

9 Click OK.



The buffer is created as a separate layer in your map.

To continue this tutorial, go to Exercise 2: Select the parcels within the construction-zone buffer (page 97).

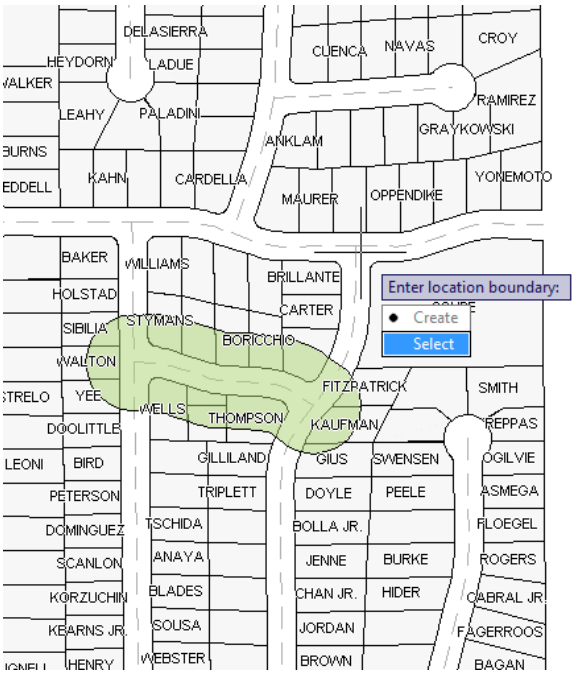
Exercise 2: Select the parcels within the construction-zone buffer

Use the buffer in a query to determine which parcels are within the construction zone represented by that buffer. Then, export those parcels to an SDF file for future use.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To find the parcels in the construction zone

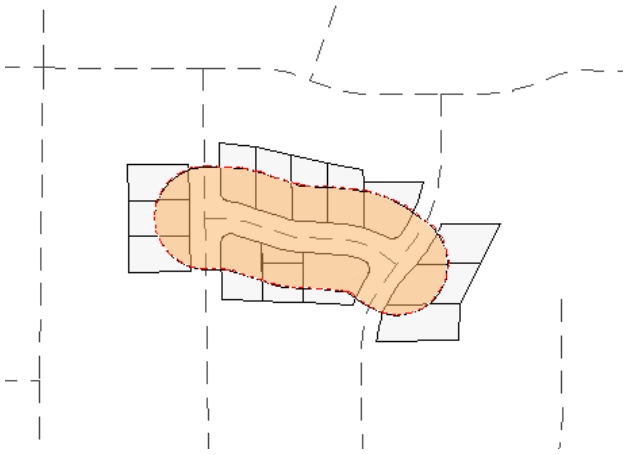
1. In Display Manager, right-click the Parcels layer and click Query To Filter Data.
2. In the Create Query dialog box, click Zoom Extents to zoom the drawing window to the extents of the parcels layer.
3. In the Create Query dialog box, click Locate on Map and select Touching Any Part Of ➤ Polygon.
4. In the Enter Location Boundary prompt, click Select.



Click Select in the prompt. Click the buffer to select it as the location condition.

5. In the prompt "Select object," click the buffer polygon.
6. In the Create Query dialog box, click OK.

AutoCAD Map 3D filters the parcels to show only those that match the buffer query you just defined.



Only the parcels that match the filter criteria are displayed in the map.

To continue this tutorial, go to Exercise 3: Export the construction-zone parcels to an SDF file (page 99).

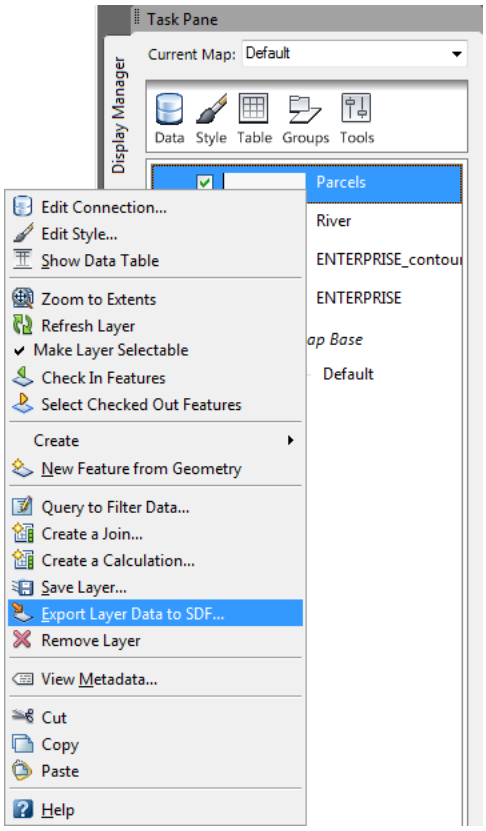
Exercise 3: Export the construction-zone parcels to an SDF file

The map now displays only the parcels that lie within 100 feet of the road under construction. Select these parcels and save them to an SDF file so you can easily use this information again.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To export the filtered parcels to an SDF file

1. Right-click the Parcels layer in Display Manager.
2. Click Export Layer Data to SDF.



Right-click the parcels layer to export it.

3 Specify a name and location for the file and click Save.

For example, name this file ConstructionParcels to distinguish it from the other parcel file.

To continue this tutorial, go to Exercise 4: Compare the two parcel layers (page 100).

Exercise 4: Compare the two parcel layers

Remove the filtered parcel layer and connect to both the original and filtered parcels as separate layers.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

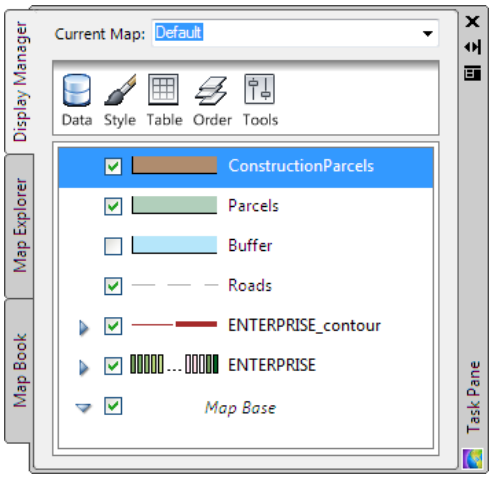
To compare the two parcel layers

1. In Display Manager, right-click the Parcels layer and click Remove Layer.
2. In Display Manager, click Data and click Connect to Data.
3. In the Data Connect dialog box, connect to the SDF file you just created, which contains only the parcels that lie within the construction zone. Add this data to your map.

   Leave the Data Connect window open, but move it to one side so you can see the Task Pane.
4. In Display Manager, select the new Parcels layer, and then click its name. Enter a new name, for example, ConstructionParcels.
5. In the Data Connect dialog box, connect to the file that contains the original set of parcels. Add this data to your map and close the Data Connect dialog box.

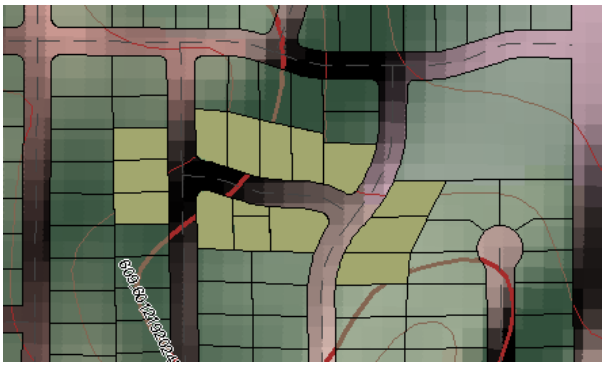
   The new layer is called Parcels in the Display Manager.
6. In Display Manager, right-click the original parcels layer (Parcels) and click Edit Style.
7. In the Style Editor, set this parcel layer to be semi-transparent (50% transparency) and a light green color. Leave the Style Editor open.
8. Click the construction-zone parcel layer (ConstructionParcels).
9. In the Style Editor, set this parcel layer to be opaque (0% transparency) and a medium brown color. Close the Style Editor.
10. In Display Manager, re-display the surface raster image by selecting its box and the box for the contour layer.
11. In Display Manager, clear the check box for the buffer layer.
12. In Display Manager, click Groups and click Draw Order.

    The name changes to Order and you can set the draw order of the layers in your map.
13. Make sure the draw order looks like this:



Click Groups and click Draw Order to change the name of the button to Order. Use Order to change how layers overlay each other.

Where you are now



Your map now displays the raster image, overlaid with the roads, the original parcel layer, and the construction-zone parcels.

Lesson 4: Creating a report

Export the Data Table information for the construction-zone parcel layer to a comma-separated file, which will include the joined owner data.

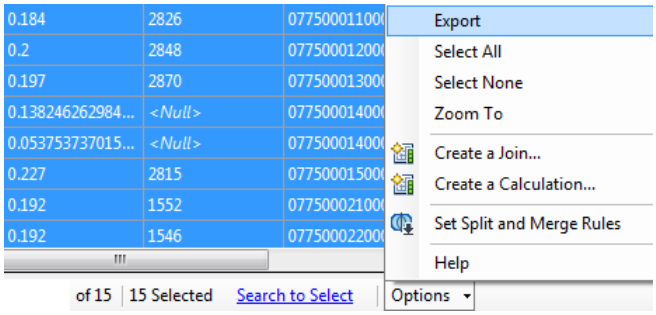
Exercise 1: Export the data to CSV for use in a report.

Display the Data Table for the construction-zone parcels. Export the data to a comma-separated file. You can use the data in any way you like, for example, in a report or to create a mailing list for the owners of the construction-zone parcels.

NOTE This exercise uses the *AnalyzeMap1.dwg* map you created and modified in the previous exercises.

To export the construction-zone parcel data

1. In Display Manager, select the construction-zone parcel layer and click Table.
2. In the Data Table, right-click the left-most column and click Select All.
3. Click Options (at the bottom of the table) and click Export.



Export property information from the Data Table.

4. Specify a name and location for the file and click Save.
5. Save and close your map file.

Where you are now

You exported information from the Data Table as a comma-separated file that can be used to generate a report.

Tutorial: Managing Data From Different Sources

4

About the Managing Data Tutorial

An AutoCAD Map 3D map can contain DWG objects you query in from drawing files, as well as features from multiple geospatial data sources, such as Oracle database stores and SDF files. Once you add data to your map, you can convert it from one data format to another. For example, you can do the following:

- Make DWG data available in a geospatial format for other organizations.
- Move your own organization's data into a geospatial environment.
- Bring geospatial data into a drawing file.
- Use options that are available only for drawing data or only for geospatial data, and then return the data to its native format.
  For example, you can import geospatial data to convert it to DWG format and then use drawing cleanup commands (which are not available for geospatial data). You can convert DWG data to geospatial format and use the split/merge commands to assign attribute data to the split or merged features. These commands are not available for drawing objects.
- Save a map in DWG format so AutoCAD users (without access to AutoCAD Map 3D) can make changes to map data.

Select the appropriate method to move data into or out of a map:

Method	Update Options
Attach a drawing to your map and then query in the objects to use.	If you change the objects, you can update the original drawing or not.
Connect to geospatial (FDO) data.	You can maintain a live connection to the data, or work offline and update your data store when you finish.
Import data into your map, automatically converting it to DWG format. Importing inserts a "snapshot" of the data. You can import from a variety of geospatial sources.	Use this option when you don't want to affect the original data store, and you don't want changes in that data store to change your map.
Export drawing objects to a variety of formats. No geospatial features are exported, but you can save all the features and objects in your map to AutoCAD DWG format and then export it.	The original data is unchanged.
Use Bulk Copy to convert geospatial data to another geospatial format.	The original geospatial data source is unchanged.
Export your map or individual drawing layers to the Autodesk SDF format, or to SHP, ArcSDE, or Oracle, and then use Bulk Copy to move it to other formats.	The original DWG data is unchanged.

Converting Drawing Layers to Feature Classes

In an AutoCAD drawing, you can use layers to organize information. For example, you might have separate AutoCAD layers for roads, parcels, and so on. Geospatial data stores use schemas for this purpose. In a schema, each feature class might serve the same purpose as a drawing layer.

SDF is a proprietary Autodesk format. It supports a schema that can include multiple feature classes within a single file, the same way that a single drawing can include multiple drawing layers. In this tutorial, you will create an SDF file with a schema whose feature classes reflect the layer structure of a drawing

file. Each layer in the drawing file becomes a feature class in the SDF file. when you export it.

The Export dialog box has a mapping option that lets you assign each layer to a target feature class and convert object data to geospatial attribute data. Once you set up the mapping, you can save your settings as a profile, allowing you to use the settings over and over again.

Using the Resulting SDF File

Once the data is stored in the SDF file, you can connect to that SDF data store and add the features to a map as Display Manager layers.

One advantage of geospatial data stores is the ease with which you can control attribute data (called "properties" for feature classes). In this tutorial, you will add a "constrained" property to a feature class in the SDF schema.

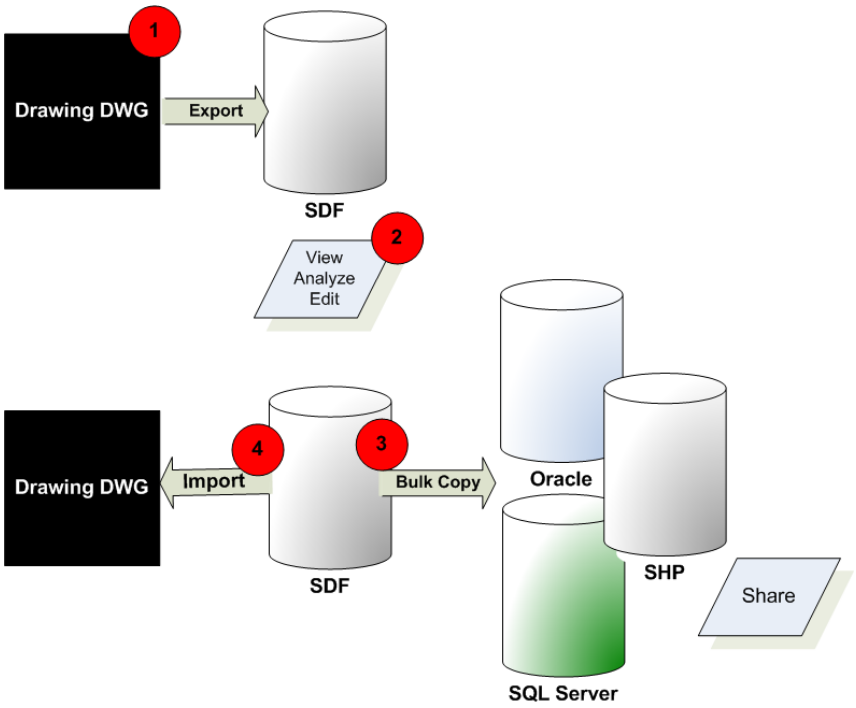
A constrained property can have only one of a set of predefined values, or only values within a particular range. For example, you can define a Zoning property whose values can be only Residential, Commercial, or Public.

Moving SDF Data to a Different Geospatial Format

Once data is in a geospatial format, you can use Bulk Copy to move it to a different geospatial format. For example, you can copy SDF data to a set of SHP files.

Converting the Data to DWG Format

If needed, you can re-import your changes in DWG format. If you create a template file specifying the original layers for the data, you can place each feature class into its appropriate drawing layer. Once you import the data into a drawing layer, it uses the layer's styling information, rather than the styling you applied to the Display Manager layer.



Lesson 1: Converting Drawing Layers to Feature Classes

The Autodesk SDF format supports a schema that can include multiple feature classes within a single file. In this tutorial, you will create an SDF file with a schema whose feature classes reflect the layer structure of a drawing file. Each layer in the drawing file becomes a feature class in the SDF file. Each feature class has properties that match the object data fields for the original layer.

Converting drawing layers to feature classes involves the following steps:

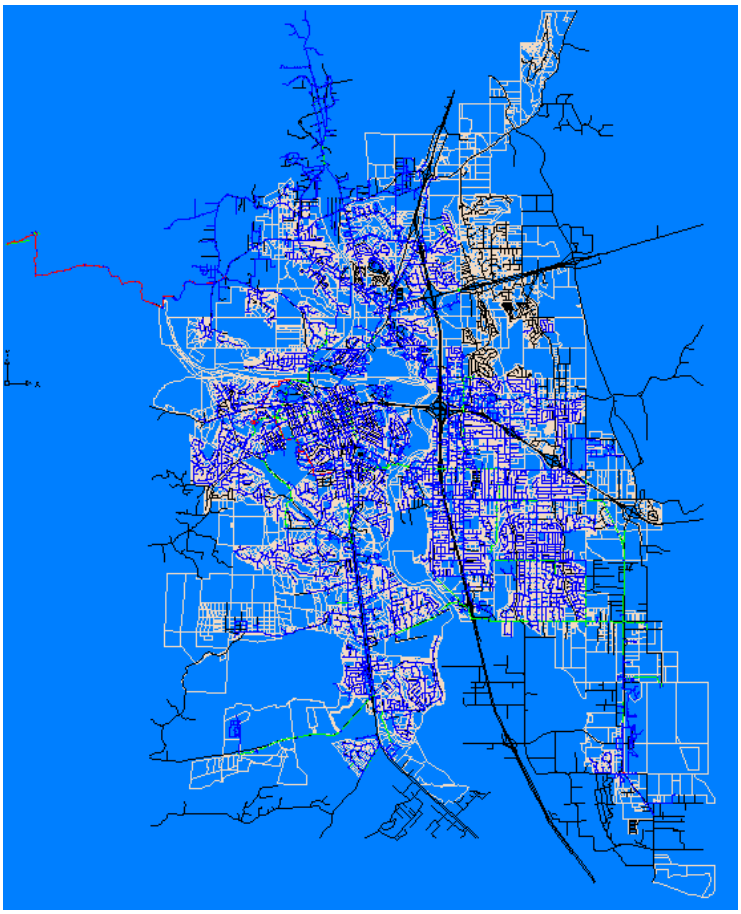
- Examine the original drawing layers.
- Examine the original object data.
- Export the drawing layers to the new SDF file.

Exercise 1: Examine the original drawing layers

You will create an SDF file with a schema whose feature classes reflect the layer structure of a drawing file. Examine the original drawing layers, so you can check the resulting SDF file to see if it is structured correctly.

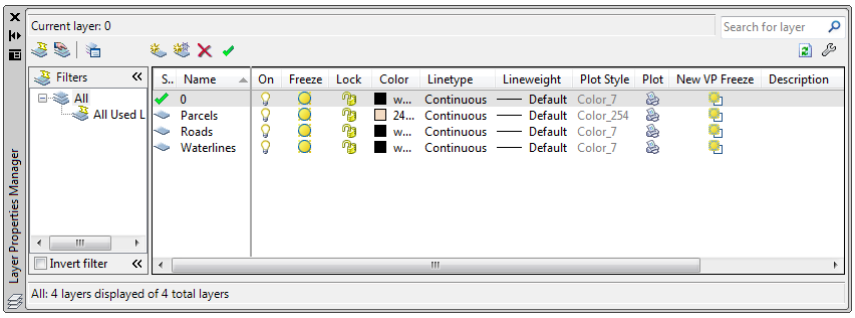
To examine the drawing layers

1. If you have not already done so, copy the sample files for the tutorials to a directory on your hard drive. See Getting Ready to Use the Tutorials (page 10).
2. Start AutoCAD Map 3D.
3. Click File menu ➤ Open and open the sample map called *DWGMap_09.dwg*.



The DWGMap_09.dwg drawing has multiple drawing layers.

4 Click Setup menu ➤ AutoCAD Layer to see the drawing layer information.



To continue this tutorial, go to Exercise 2: Examine the object data (page 111)

Exercise 2: Examine the object data

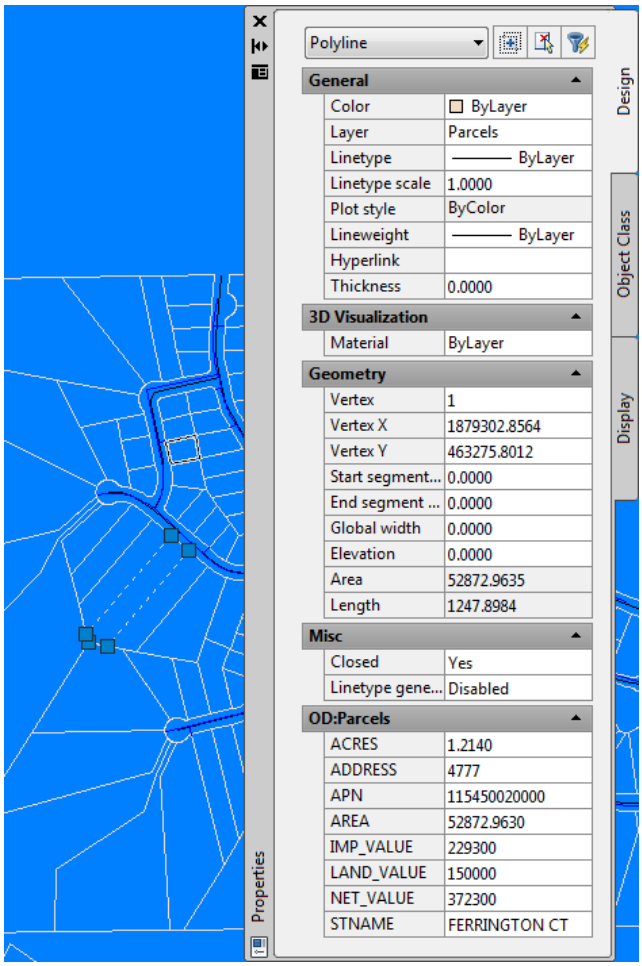
The drawing layers in your DWG file will become the feature classes in the new schema. The properties for each feature class are determined by the object data properties in the drawing. Use the Properties palette to see the object data.

NOTE This exercise uses the *DwgMap_09.dwg* map file you opened in the previous exercise.

To view the object data fields

1. In the map, zoom in close enough to see individual objects.
2. Select one of the pink polylines in the map.
3. Right-click the polyline and click Properties.
4. Notice that the color for these polylines is BYLAYER. Check the lower area of the Design tab of the Properties palette to see the object data.

   The pink polylines represent parcels and have object data related to address, area, value, and so on.



You may see different information, depending on which polyline you selected.

5 Press Esc to deselect the polyline.

6 Pan, if necessary, to see the red lines in the upper left-hand corner of the map.

7 With the Properties palette still open, select a red line.

The red line represents a waterline. Notice that the color for this line is not BYLAYER. Within the layer, color has been used to indicate a

particular type of waterline. In this case it indicates size. Red waterlines are between 26 and 48 inches in diameter.

8 Deselect the red line and pan to the lower right side of the drawing.

9 Select a green line.

The green line is also a waterline, but it is a different size. Green waterlines are between 13 and 24 inches in diameter. Blue waterlines are between 1 and 12 inches in diameter.

10 Press Esc to ensure that no objects are selected.

To continue this tutorial, go to Exercise 3: Export the drawing layers to SDF - Select the layers (page 113)

Exercise 3: Export the drawing layers to SDF - Select the layers

In this exercise, you'll export the drawing layers from the original DWG file to a new SDF file. The original drawing layers become geospatial features with properties that reflect the object data and AutoCAD properties.

The Export dialog box has a mapping option that lets you assign each layer to a target feature class and convert object data and properties to geospatial attribute data. Once you set up the mapping, you can save your settings as a profile, allowing you to use the settings over and over again.

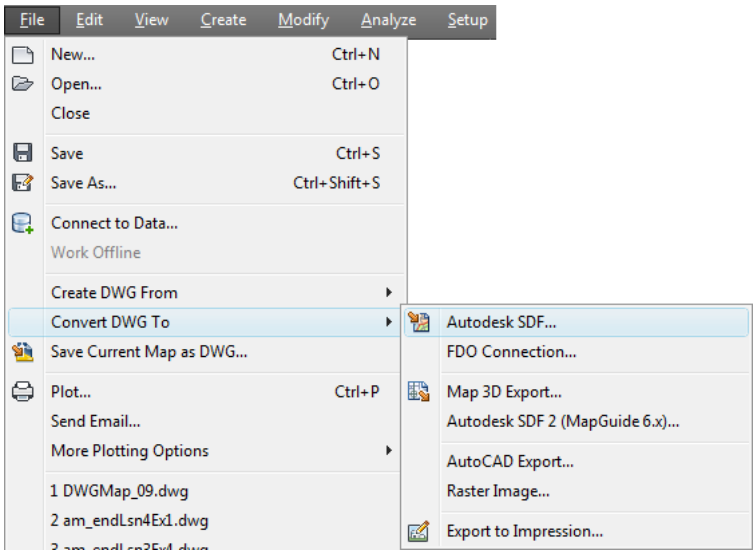
You cannot maintain styling information when you export drawing objects to SDF, but you can include object attributes. When you export the Waterline layer, you will map the Color attribute to a SIZE property.

The Export dialog box has three tabs. The following exercises describe the steps to take on each tab.

NOTE This exercise uses the *DWGMap_09.dwg* map file you opened and modified in the previous exercises.

To select the layers to export to SDF

1 Click File menu ➤ Convert DWG To ➤ Autodesk SDF.



2 In the Save dialog box, specify a location and a name for the new SDF file and click OK.

   Make a note of the file name and location, so you can connect to this file later.

3 In the Export dialog box, on the Selection tab, click Select All.

To continue this tutorial, go to Exercise 4: Export the drawing layers to SDF - Map object data to feature class properties (page 114).

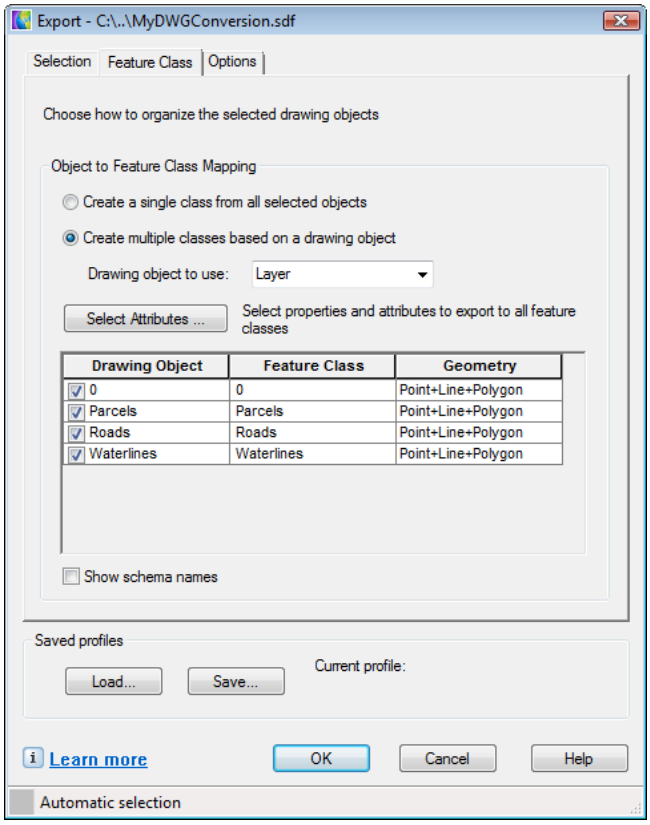
Exercise 4: Export the drawing layers to SDF - Map object data to feature class properties

The Feature Class tab lets you map the properties for each layer to its resulting feature class in the SDF file. You can specify some attributes as shared properties: all feature classes will have these properties. For example, Lineweight and Linestyle would apply to every feature class. You can specify other attributes as specific to a particular feature class. For example, Address would apply to Parcels only.

NOTE This exercise uses the *DWGMap_09.dwg* map file you opened and modified in the previous exercises.

To specify the properties for the SDF feature classes

1 In the Export dialog box, on the Feature Class tab, click Create Multiple Classes Based On A Drawing Object and, for Drawing Object To Use, select Layer.



The table in the dialog box updates to show the layer names and feature class names that will be used.

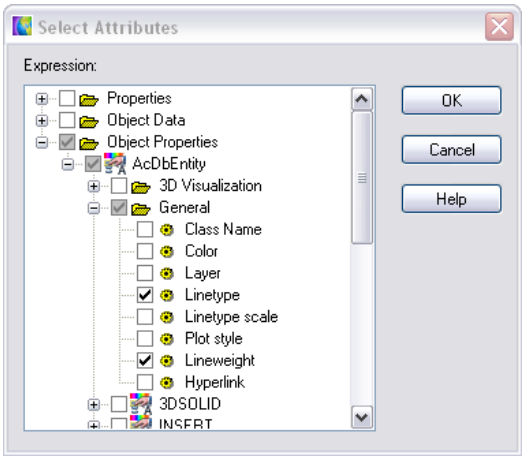
2 Deselect layer 0.

3 Click Select Attributes.

Attributes you specify here will be assigned to all the feature classes in the SDF file, so select only attributes that are appropriate for all of them. For example, you can select general properties, which include things like Lineweight, but not object data properties, which are specific to each feature class.

4 In the Select Attributes dialog box, expand the Object Properties item and the AcDbEntity and General items.

5 Check the box for the Lineweight and Linetype items and click OK.



6 In the Export dialog box, under Feature Class in the grid area, click the cell for the first layer, Parcels.

A ... button appears at the right side of the grid cell.

7 Click ... for the Parcels Feature Class cell.

8 In the Feature Class Property Mapping - Parcels dialog box, click Select Attributes.

9 Expand the Object Data item and check Parcels.

Now the resulting Parcels feature class will have the object data fields for the Parcels layer, but not for any other layer.

10 Click OK twice to return to the Feature Class tab.

11 Click in the Geometry cell for Parcels and change the entry to Polygon.

12 Repeat steps 6 through 11 for the remaining two feature classes, using the following table as a guideline.

Drawing Property	Feature Class	Geometry
Roads	Roads	Line

Drawing Property	Feature Class	Geometry
Waterlines	Waterlines	Line

To continue this tutorial, go to Exercise 5: Export the drawing layers to SDF - Map drawing properties to feature class properties (page 117).

Exercise 5: Export the drawing layers to SDF - Map drawing properties to feature class properties

The Feature Class tab lets you map AutoCAD drawing properties to properties in the SDF feature classes as well. If you have used color, lineweight, or line type to represent object characteristics, you can map these properties to the characteristics they represent. In this drawing, color is mapped to a waterline size. You can map each waterline color to a feature property.

NOTE This exercise uses the *DWGMap_09.dwg* map file you opened and modified in the previous exercises.

To map drawing properties to feature class properties

1. On the Feature Class tab of the Export dialog box, click in the Feature Class cell for Waterlines.
2. Click  .
3. In the Feature Class Property Mapping - Waterlines dialog box, click Select Attributes.
4. Expand the Properties item at the top of the list.
5. Select COLOR and click OK.
6. In the Feature Class Property Mapping - Waterlines dialog box, in the Feature Class Properties cell for COLOR, enter **Size**.
7. Click the .COLOR cell to see the  button.
8. Click  .

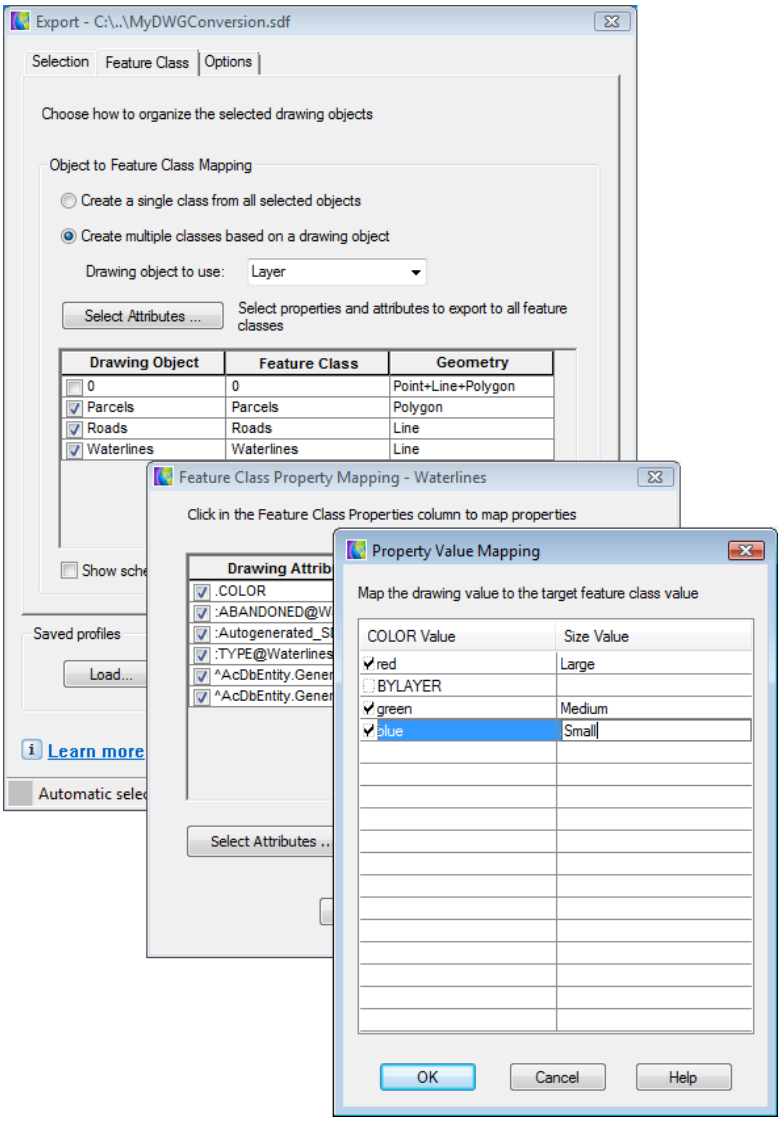
9 In the New Property Data Type dialog box, change the Data Type to String and click OK.

10 In the Property Value Mapping dialog box, select the box for each color (on the left side of the dialog box).

11 Classify the waterline sizes as Small, Medium and Large. Use this table as a guideline:

Color	Size
Red	Large
Green	Medium
Blue	Small

12 Click OK twice to return to the Export dialog box.



To continue this tutorial, go to Exercise 6: Export the drawing layers to SDF - Set Export Options (page 120).

Exercise 6: Export the drawing layers to SDF - Set Export Options

As the final step in the export operation, set the export options.

NOTE This exercise uses the *DWGMap_09.dwg* map file you opened and modified in the previous exercises.

To specify options for the export operation

1. In the Export dialog box, on the Options tab, select Treat Closed Polylines As Polygons.
2. Under Saved Profiles, click Save.
3. Specify a location and name for these export settings and click Save.
4. In the Export dialog box, click OK to export the data.
   The Export Progress dialog box displays the status of the export operation.
5. Close the map file.

Where you are now

You exported DWG layers to Autodesk SDF format, creating feature classes that reflect the layers and object data in your original drawing file.

To continue this tutorial, go to Lesson 2: Using the Resulting SDF Files (page 120).

Lesson 2: Using the Resulting SDF Files

Connect to the SDF file you created and edit the objects in the map as geospatial features. (If you imported the SDF file instead of connecting to it, the data would come back in as drawing objects instead of geospatial data.)

You can also add properties to the feature classes in your SDF file. In this lesson, you'll add a constrained property. Constrained properties can have only the values you specify: values within a particular range or within a list you specify.

This lesson involves the following steps:

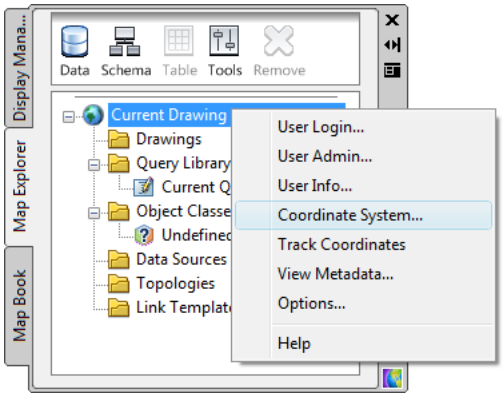
- Create a new map.
- Connect to the new SDF data.
- Add a new property.

Exercise 1: Create a new map

Create a new map file.

To create a new map file

1. Create a new map using the *map2d.dwt* template.
2. Assign a coordinate system to the new map.
   - Switch the Task Pane to Map Explorer.
   - Right-click the Current Drawing entry and click Coordinate System.
   - Specify the CA-I coordinate system.



Set the coordinate system for a new map from Map Explorer.

3. Click File menu ➤ Save and name and save your file.

To continue this tutorial, go to Exercise 2: Connect to the New SDF Data (page 122).

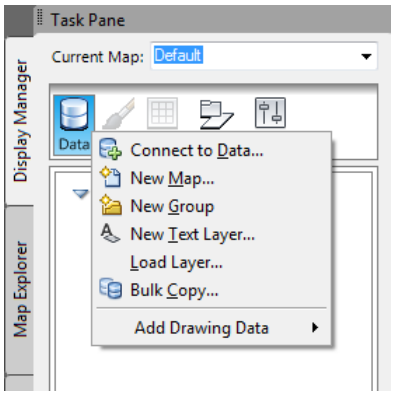
Exercise 2: Connect to the New SDF Data

Connect to the SDF file you created.

NOTE This exercise uses the map you created in the previous exercise, and the SDF file you saved in Lesson 1: Converting Drawing Layers to Feature Classes (page 108).

To connect to the new SDF file

1 In Display Manager, click Data ➤ Connect To Data.

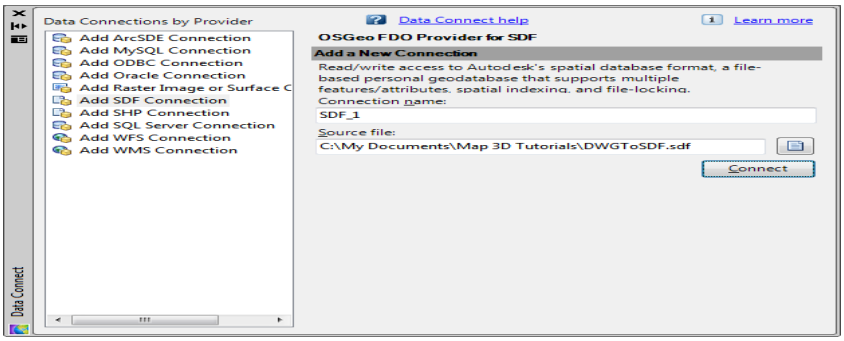


Switch to Display Manager to connect to data.

2 In the Data Connect dialog box, under Data Connections By Provider, click Add SDF Connection.

3 Click  next to Source File under Add A New Connection.

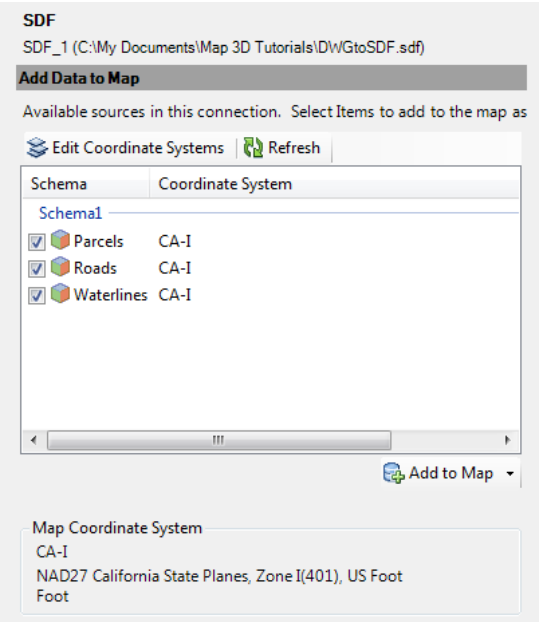
4 Open the SDF file you created in the last exercise.



Connect to the SDF file you just created.

5 Click Connect.

6 Select all the feature classes.



Each layer from your original map is listed as a separate feature class.

7 Click Add To Map.

8 Close the Data Connect window.

To continue this tutorial, go to Exercise 3: Edit the schema (page 124).

Exercise 3: Edit the schema

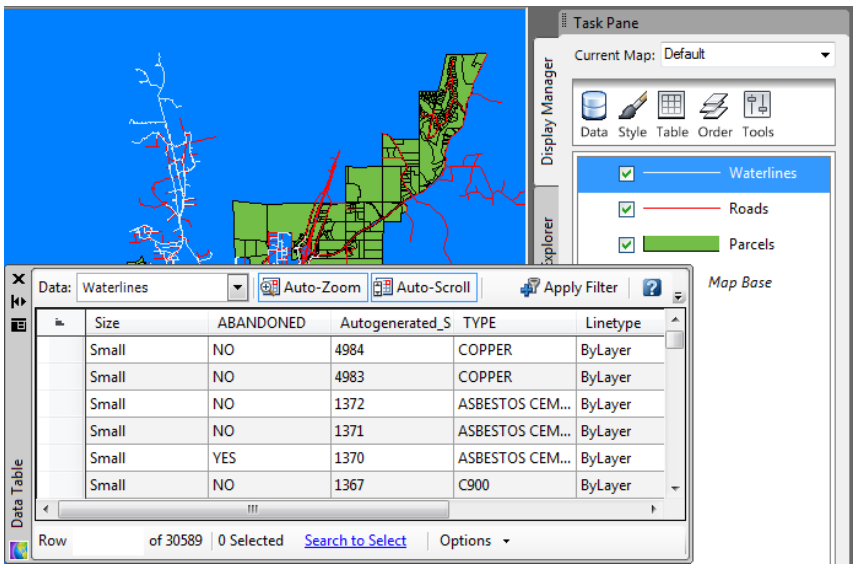
In this lesson, you will examine the feature classes you created. You'll view the attribute data in the Data Table (geospatial features do not appear in the Layer Properties Manager—it is just for drawing objects). Then, you'll add a feature class property using the Schema Editor.

NOTE This exercise uses the map you created in the first exercise, with the modifications you made in the previous exercise.

To examine the attribute data

1 In Display Manager, select the Waterlines layer and click Table.

NOTE In this example, the Data Table was undocked by dragging it away from the edge of the window.



The general properties and the object data specific to Waterlines appear in the Data Table.

2 In the Data Table, examine the properties for the Waterlines layer.
The color properties have been translated to a new Size property.

3 Close the Data Table.

To continue this tutorial, go to Exercise 4: Add a property (page 125).

Exercise 4: Add a property

A set of feature classes and their properties is called a schema. The schema can specify constraints that determine which objects you can add to a particular feature class. For example, to add an object to the Roads feature class, that object might need to be a line. Properties are like attributes—they are characteristics of all objects in the feature class. For example, a Roads feature class property might specify the number of lanes it has, or its speed limit.

You cannot change the schemas for all data source types, but you can edit the schemas for SDF files. In this lesson, edit an SDF schema to add a property to the Roads feature class.

In this exercise you will add new properties that are constrained, so that only certain values are valid for them.

NOTE This exercise uses the map you created and modified in the previous exercises.

Adding a property that is constrained to a range of values

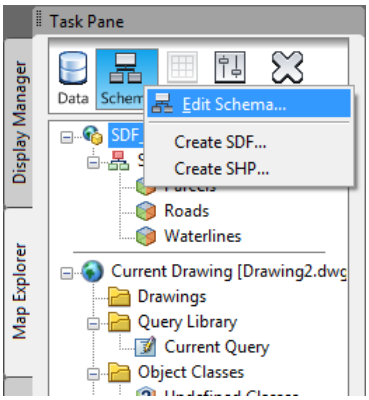
You can specify that only values within a particular range are valid. You can include or exclude each extreme of the range: the lowest possible value and the highest. For example, you can make a range 1 to 100 inclusive, or any value between 1 and 100, but not 1 or 100, or any combination.

To add a property to the Roads feature class that is constrained by range

1 Switch the Task Pane to Map Explorer.

2 Select the SDF data source at the top of the pane.

3 Click Schema ➤ Edit Schema.



Edit the SDF schema.

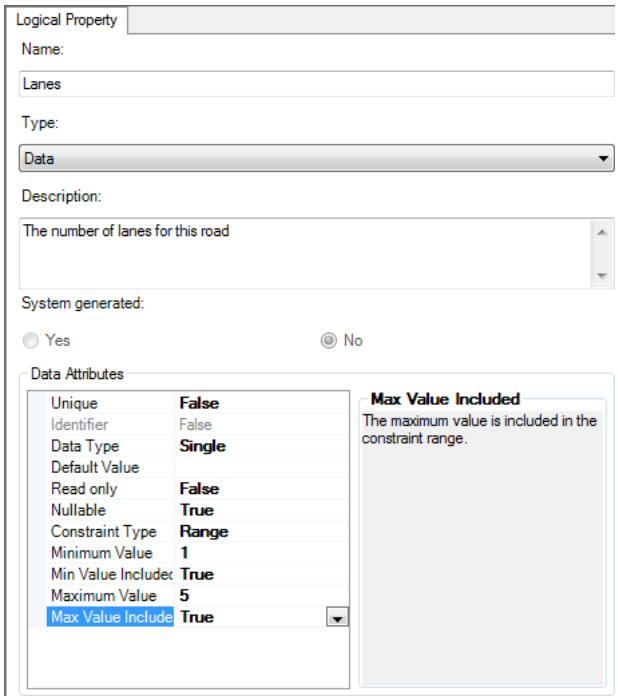
4 In the Schema Editor, expand the schema tree on the left to see the three feature classes.

5 Select the Roads feature class.

6 Click New Property at the top of the window.

Property1 appears on the left, under the existing properties.

7 Specify the characteristics of the new property using the information shown below:



Create a new property with these values. The last four fields appear after setting the Constraint Type.

This creates a property that represents the number of lanes for a road. The value must be a whole number between 1 and 5. There is no default value for this property.

By setting Min Value Included and Max Value Included to true, the highest and lowest values in the range are acceptable entries.

8 Click Apply.

The "Property1" entry on the left is updated to show the new name.

9 Click OK to close the Schema Editor.

To continue this tutorial, go to Exercise 5: Populating the new property with values (page 128).

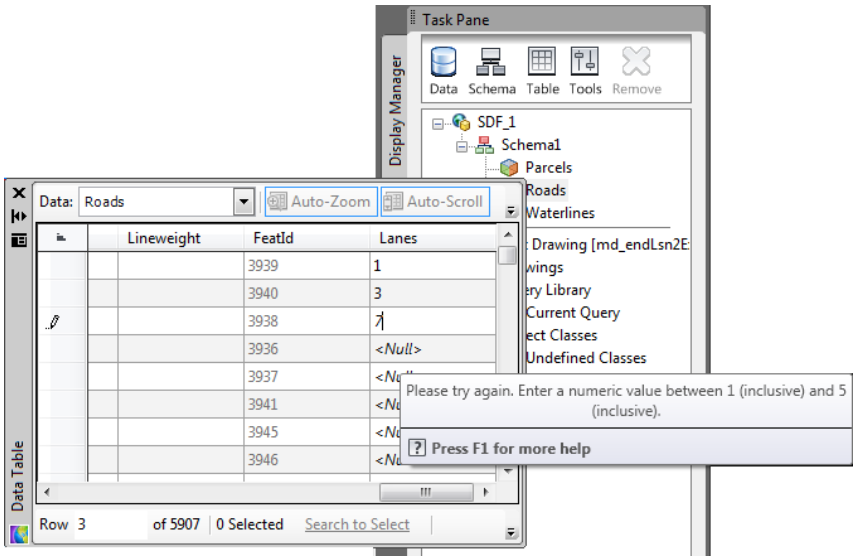
Exercise 5: Populating the new property with values

After you add a property to a feature class, you must enter the values for that property for each feature in the feature class.

NOTE This exercise uses the map you created and modified in the previous exercises.

To populate the new properties with data

1. Select the Roads entry in Map Explorer and click Table.
2. In the Data Table, scroll all the way to the right to see the new property.
3. Enter the number of lanes for a few roads.



If you enter a value that is outside the allowable range, a warning is displayed.

4. Close the Data Table.

Where you are now

You connected to the SDF file you created earlier and added a new property to its schema. You entered values for the new property in the Data Table.

To continue this tutorial, go to Lesson 3: Moving SDF Data to a Different Geospatial Format (page 129).

Lesson 3: Moving SDF Data to a Different Geospatial Format

Use Bulk Copy to move the Roads data in your map from the SDF format it currently uses to ESRI SHP format. The information will be stored in a set of new SHP files in a folder that you create. The layers in your map are geospatial features, so you can use Bulk Copy to move the data to any other geospatial data format.

NOTE This exercise uses the map you created with the *map2d.dwt* template and modified in the previous lesson (page 120).

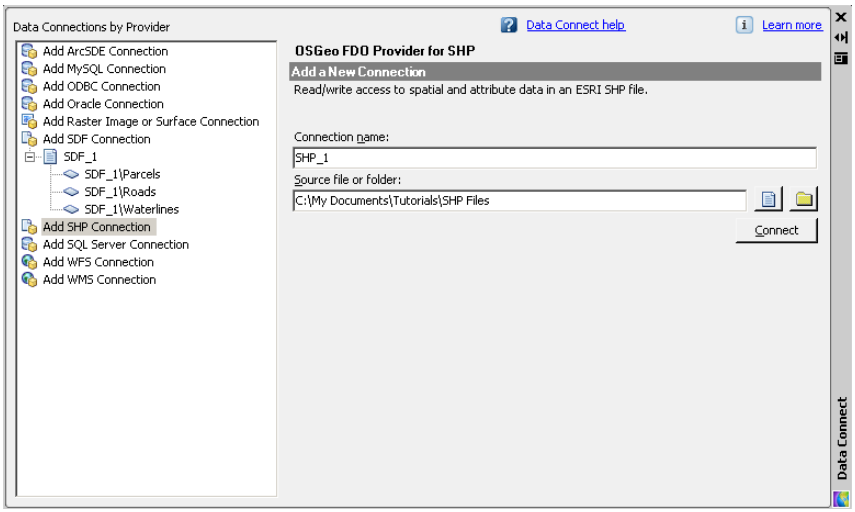
Exercise 1: Connect to a new SHP file folder

Create a new, empty folder to contain the SHP files. In order to convert and copy data to the SHP format, you must be connected to this folder. You use Data Connect to establish connections to data stores, even when you don't add anything to the map from the data store.

NOTE This exercise uses the map you opened in the first lesson, with the modifications you made in the previous exercises.

To create and connect to the folder

1. Use Windows Explorer to navigate to the location where you copied your sample tutorial files.
2. Create a folder for the SHP files.
3. In AutoCAD Map 3D, switch the Task Pane to Display Manager.
4. Click Data ➤ Connect To Data.
5. On the left side of the Data Connect dialog box, click Add SHP Connection.
6. On the right side of the Data Connect dialog box, click the folder icon (not the file icon). Select the folder you just created and click OK.



Click the folder icon next to Source File Or Folder.

Click Connect and close the Data Connect window without adding anything to your map.

To continue this tutorial, go to Exercise 2: Use Bulk Copy to move an SDF layer to SHP format (page 130).

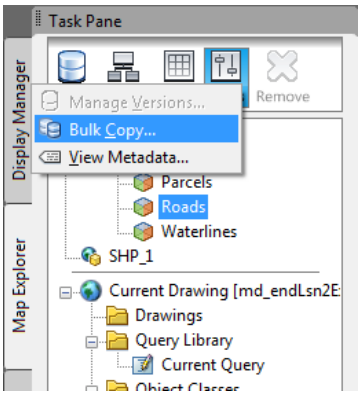
Exercise 2: Use Bulk Copy to move an SDF layer to SHP format

Copy the Roads layer from SDF format to SHP format using the Bulk Copy feature.

NOTE This exercise uses the map you opened in the first lesson, with the modifications you made in the previous exercises.

To copy the Roads layer to SHP format

1. In Map Explorer, select the SDF_1 schema.
2. Click Tools ➤ Bulk Copy.



Use Bulk Copy to convert data from one geospatial format to another.

3 On the left side of the Bulk Copy dialog box, select the SDF_1 connection and check the Roads feature.

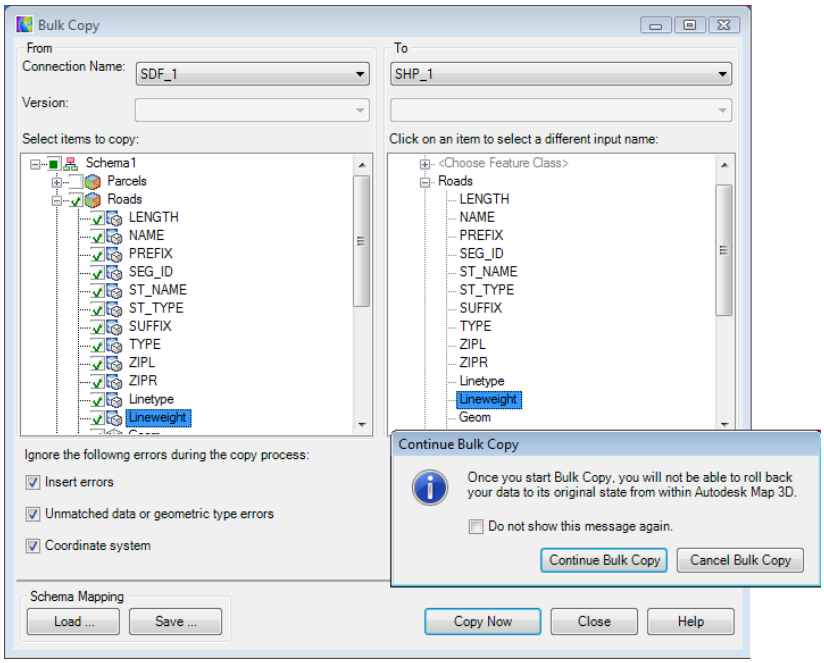
4 On the right side of the Bulk Copy window, select the SHP_1 connection.

5 Select the Roads entry on the right.

6 Under Ignore The Following Errors During The Copy Process, select all the items.

7 Click Copy Now.

NOTE If you see messages indicating that some property names are too long, shorten them (as shown in the illustration below) and click Copy Now again.



Copy the Roads data from SDF format to SHP format.

8 On the Continue Bulk Copy message, click Continue Bulk Copy.

The data from the SDF Roads layer is copied to the new SHP file.

9 Click OK on the Bulk Copy Results message and close the Bulk Copy dialog box.

Where you are now

You copied the data from your SDF layers to SHP format.

To continue this tutorial, go to Lesson 4: Importing SDF Files as DWG Layers (page 132).

Lesson 4: Importing SDF Files as DWG Layers

You moved some DWG data to SDF format and from there to SHP format, so you can distribute it to people who use geospatial data.

You may need to move the data back into DWG format. For example, if other people change the data, you can re-import it so you have the latest version. When you import SHP or SDF files, they are added to your map as drawing objects, not as geospatial data.

Exercise 1: Create a template for the imported material

When you import the SDF file into a map, you convert the data to DWG objects. (If you connected to the SDF file, the objects would remain in SDF data format.)

In order to maintain the formatting of the original DWG objects that you exported to SDF, you must create a template that duplicates that formatting. The template specifies the layers for the SDF feature classes.

NOTE This exercise uses the *DwgMap_09.dwg* map file you opened in the first exercise.

To create a template for the imported material

1. Open the original DWG file you exported to SDF.
   - Click File menu ➤ Open.
   - Select the sample map called *DWGMap_09.dwg*
2. Click File menu ➤ Save As.
3. Save the drawing as a template (*.dwt*) file called *DWGImportTemplate.dwt*.

   When prompted, enter a description of the template and leave the other settings set to their default values.
4. In the new template file, delete all the drawing objects so that the drawing is empty.

   Click Edit menu ➤ Select All, and then press the Delete key.
5. Save the template drawing file.
6. Create a new map using the *DWGImportTemplate.dwt* template.
   - Click File menu ➤ New.
   - Select the *DWGImportTemplate.dwt* template.

- Click Open.

  You don't need to assign a coordinate system to this new map, because that information is specified by the template.

To continue this tutorial, go to Exercise 2: Import the SDF layers (page 134)

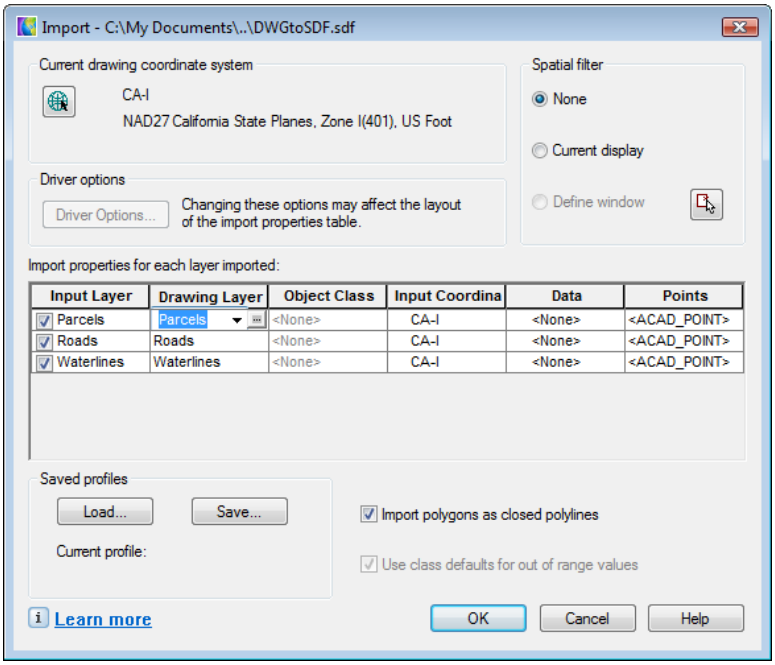
Exercise 2: Import the SDF layers

When you connected to the SDF file you created earlier in this tutorial, you brought in its data as geospatial features, and each feature class was a separate Display Manager layer. However, in this lesson you will import the SDF data as drawing objects, and each feature class will become a separate drawing layer.

NOTE This exercise uses the map you created with the *DWGImportTemplate.dwt* template and the SDF file you created in Lesson 1: Converting Drawing Layers to Feature Classes (page 108).

To import SDF layers

1. Click File menu ➤ Create DWG From ➤ Autodesk SDF.
2. Navigate to the SDF file you created, select it, and click OK.
3. In the Import dialog box, check Import Polygons As Closed Polylines.
4. Map the incoming feature classes to the layers in the template.
   - Click in the Drawing Layer cell for the first feature class (Parcels).
   - Click the down arrow that appears and select the Parcels drawing layer.



Be sure to select the correct drawing layer.

- Repeat the mapping process for the other two layers.

5 Map the Size property to object data.

- Click in the Data cell for Waterlines.
- Click the … button that appears.
- In the Attribute Data dialog box, click Create Object Data.
- For Object Data Table To Use, select Waterlines (not (Schema1_Waterlines).
- Click Select Fields.
- In the Object Data Mapping dialog box, check Size and, under Target Fields, enter **Size** in the corresponding cell.
- Click OK to exit the three dialog boxes.
  If you are asked to confirm your actions, click Yes.

6 Click View menu ➤ Extents to see the data in your map.

You can now work with the objects as you would any DWG data.

To continue this tutorial, go to Exercise 3: Use Display Layers to Assign Object Properties (page 136)

Exercise 3: Use Display Layers to Assign Object Properties

You can create display layers for each drawing layer in your new drawing. In addition, you can create separate display layers for each waterline size. By displaying a single display layer at a time, you can select the various sets of objects and assign the proper colors to them.

NOTE This exercise uses the map you created with the *DWGImportTemplate.dwt* template, with the modifications you made in the previous exercise.

To use display layers to assign object properties

1 Create a display layer for the Parcels layer.

- In Display Manager, click Data ➤ Add Drawing Data ➤ Query Current Drawing.
- In the Define Query Of Current Drawing dialog box, click Property.
- In the Property Condition dialog box, select Layer and set the Value equal to Parcels.
- Click OK to close each dialog box.
- In Display Manager, select the default display layer name (Current Drawing Element) and change it to Parcels.

2 Repeat the procedures in step 1 to create a display layer for Roads.

Select the Roads layer and name the display layer Roads.

3 Repeat the procedures in step 1 to create a display layer for Waterlines.

Select the Waterlines layer and name the display layer Waterlines.

4 Create a new display layer for waterlines whose Size property is set to Large.

- In Display Manager, click Data ➤ Add Drawing Data ➤ Query Current Drawing.
- In the Define Query Of Current Drawing dialog box, click Data.
- In the Data Condition dialog box, select Object Data.
- For Tables, select Waterlines.
- Select Size.
- For Value, enter **Large**.
- Click OK to close each dialog box.
- In Display Manager, select the default display layer name (Current Drawing Element) and change it to Large.

5 Repeat step 4 for the remaining sizes (Medium and Small).

6 Change the color of the Large waterline objects.

- Turn off all the display layers except for Large.
  To turn off a display layer, clear its check box.
- Click View menu ➤ Extents.
- Drag a selection box around all the objects that are displayed.
- Right-click one of the selected objects and click Properties.
- In the Properties window, change the Color from ByLayer to Red.
- Press Esc to deselect the objects.

7 Repeat step 6 for the Medium and Small layers, making Medium objects green and Small objects blue.

8 Turn on all the display elements to see the results.

While AutoCAD users will not be able to see the display layers (because AutoCAD doesn't have Display Manager), the layer and object properties are stored with the AutoCAD layers and objects and will be visible.

Where you are now

You imported an SDF file as DWG objects and styled them as they originally appeared.

5 Styling, Splitting, and Using Joined Data with Polygon Features

About the Styling, Splitting, and Using Joined Data with Polygon Features Tutorial

AutoCAD Map 3D has options that are specifically designed for geospatial features with polygon geometry. For example, you can use a special expression to find the area of a polygon feature; you can split a single polygon feature into two or more new features; you can merge two or more polygons into a single feature; and you can create rules for assigning properties to polygon features after you split or merge them.

In this tutorial, you will connect to geospatial data for parcel polygons. You will split a parcel into two uneven new parcels and assign attributes to each resulting parcel using Split/Merge rules.

You will join a data source to the parcels to add assessor data. You will create a new property called "ValueByArea." This is a calculated property that represents the area of each parcel divided by the parcel's value.

You'll export the parcel layer to create a new data store that contains the joined and calculated data as part of its native schema.

Connecting to the new data store, you'll create a theme based on an expression that references the calculated property.

Finally, you'll publish your map to MapGuide, so others can view it on a website.

Lesson 1: Connecting to Parcel Data

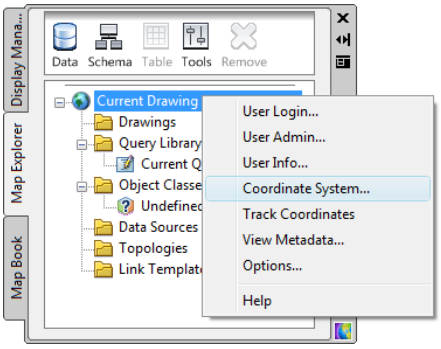
In this lesson, you will connect to parcel data from the city of Redding, California.

Exercise 1: Create a new map

Create a new map file.

To create a new map file

1. Click File menu ➤ New and select the *map2d.dwt* template.
2. Assign a coordinate system to the new map.
   - Switch the Task Pane to Map Explorer.
   - Right-click the Current Drawing entry and click Coordinate System.
   - Specify the CA-I coordinate system.



Set the coordinate system for a new map from Map Explorer.

To continue this tutorial, go to Exercise 2: Bring in the parcel data (page 141).

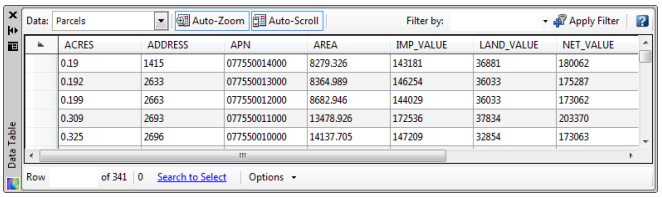
Exercise 2: Bring in the parcel data

Now, add a layer that displays parcels within the city of Redding. This layer contains size, value, and address information about the parcels.

NOTE This exercise uses the map you created in the previous exercise.

To add the parcel layer to the map

1. In Display Manager, click Data ➤ Connect To Data.
2. In the Data Connect dialog box, under Data Connections By Provider, click Add SDF Connection.
3. Click the file icon next to the Source File field and navigate to the folder containing the sample files.
4. Select *Assessor_Parcels.SDF* and click Open.
5. In the Data Connect dialog box, click Connect.
6. In the Data Connect dialog box, select the Parcels layer under Add Data To Map and click Add To Map.
7. Close the Data Connect window.
8. To see the data associated with this layer, select the Parcels layer in Display Manager and click Table.



Scroll to the right to see all the columns of parcel data.

9. Close the Data Table.

Where you are now

You connected to a data store containing parcel information. You viewed the geometry in your map and the attribute data in the Data Table.

To continue this tutorial, go to Lesson 2: Splitting a Polygon Feature (page 142).

Lesson 2: Splitting a Polygon Feature

You can define rules that determine how properties are assigned after you split a single feature into multiple pieces or merge multiple features into one. In this lesson, you'll define split/merge rules for the Parcels feature. Then, you will split a parcel into two uneven pieces and use the rules you defined to assign properties to each resulting parcel.

Exercise 1: Define Split/Merge Rules

You can use the AutoCAD Trim and Break commands to split polygons. However, the Split command has many advantages over those methods. A split always results in a valid feature, and has special logic to deal with attributes automatically.

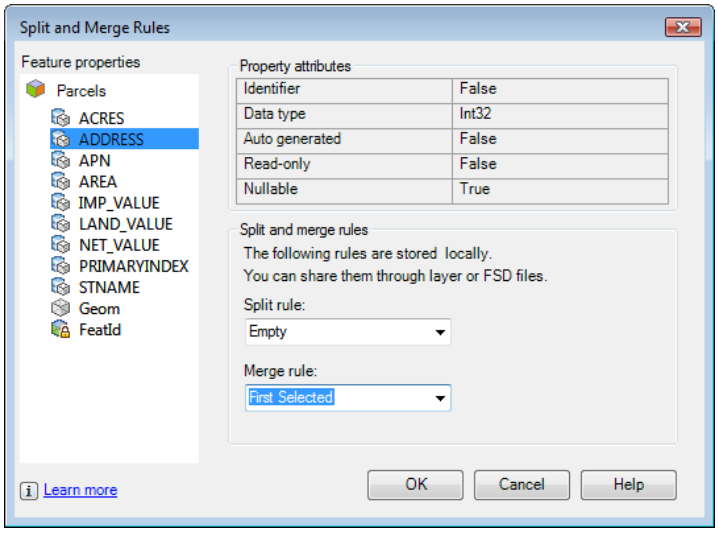
With Split, you can set rules for the assignment of properties when you split and merge geospatial features. You can use expressions for these rules.

For example, if you are splitting a parcel, you can specify that the land value of the resulting parcels be based on a calculation that you define. There are also choices for automatic calculations, such as assigning the average value of all merged features to the resulting feature, or dividing the value of a feature evenly among all its split features.

NOTE This exercise uses the map you created and modified in the previous exercises.

To create split/merge rules

1. To display the Data Table, in Display Manager, select the Parcels layer and click Table in the Task Pane.
2. In the Data Table, click Options (at the bottom of the window) and select Set Split And Merge Rules.



Each property of the Parcels feature is listed under Feature Properties on the left. Two properties (Geom and FeatID) are generated by the data store, so you cannot set rules for them. If you select them, you can see the rules that the data store uses to create them.

3 In the Split And Merge Rules dialog box, click the ADDRESS property.

4 For the Split Rule, specify Empty.

If you split this parcel, you must specify the address number for each new parcel that is created.

5 For the Merge Rule, specify First Selected.

If you merge multiple parcels into one, the new parcel will use the address number of the first parcel you select for the merge.

6 Specify rules for other properties, using the table below as a guide.

Property	Split rule	Merge rule
ACRES	Proportional Based On Area2D (Geom)	Sum
APN	Copy	First Selected
AREA	Proportional Based On Area2D (Geom)	Sum

Property	Split rule	Merge rule
IMP_VALUE	Proportional Based On Area2D (Geom)	Sum
LAND_VALUE	Proportional Based On Area2D (Geom)	Sum
NET_VALUE	Proportional Based On Area2D (Geom)	Sum
PRIMARY_INDEX	Empty	First Selected
STNAME	Copy	First Selected

For a complete description of the split/merge rule options, see Using Expressions In Split/Merge Rules.

7 Click OK.

To continue this tutorial, go to Exercise 2: Find the parcel to split (page 144).

Exercise 2: Find the parcel to split

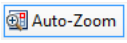
You can use the Data Table to find a particular parcel and zoom into it so you can split it.

NOTE This exercise uses the map you created and modified in the previous exercises.

To find the parcel to split

1 If the Data Table is not open, click the Parcels layer in Display Manager and click Table.

2 In the Data Table window, make sure Auto-Zoom is on.

When Auto-Zoom is on, it is a different color than the window background 

. When it is off, it is the same color as the window background.

3 Click Search To Select (at the bottom of the window).

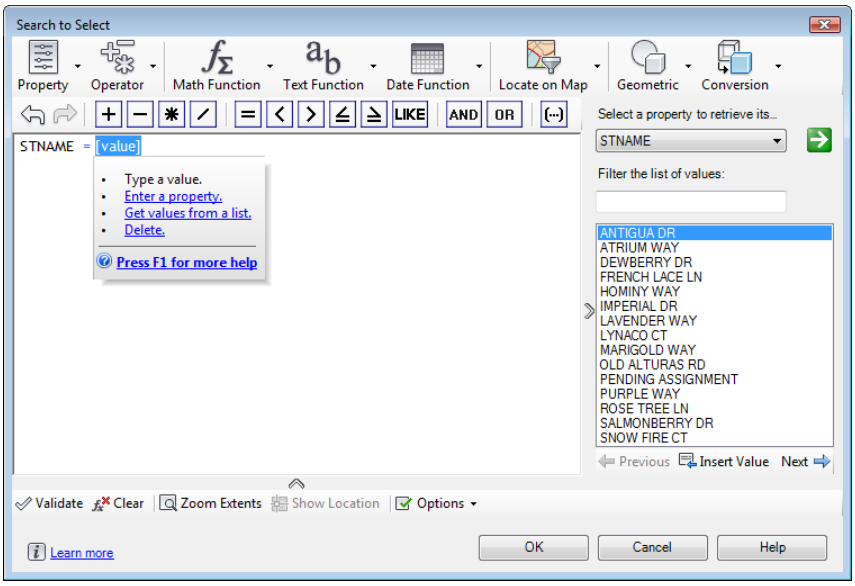
4 In the Search To Select window, click Property and select STNAME.

5 Click = (the equals sign in the toolstrip).

6 Place your cursor over the text that says “value.”

7 In the tooltip that displays, click Get Values From A List.

8 Click the green arrow next to STNAME in the properties list to see the street names for the Parcels feature.



The properties list appears when you click the green arrow. Your selection replaces the selected value.

9 Click Antigua Drive and click Insert Value.

Click Next if you don’t see Antigua in the list.

10 Click Validate (at the bottom of the window) to make sure the expression is valid.

11 When you see “The expression is valid,” click OK.

12 Click the heading for the STNAME column to sort the parcel records by street name.

In the Data Table, the entries for parcels on Antigua Drive are highlighted. The map is zoomed to that street, and the parcels are selected in the map as well.

To continue this tutorial, go to Exercise 3: Split the parcel (page 146).

Exercise 3: Split the parcel

You will interactively divide a parcel into two unequal closed polylines.

NOTE This exercise uses the map you created and modified in the previous exercises.

To divide one parcel into two new parcels

1. In the Data Table, click the leftmost column for one parcel on Antigua Drive.

   Make a note of the address, so you can compare your results later.

   When you click the leftmost column, you select that entry in the Data Table and automatically zoom to that parcel in your map.

2. Hide the Data Table so you can see the parcel more easily. Right-click the Data Table title bar and click  (Auto-Hide) in the Data Table title bar.

3. Click Modify menu ➤ Split.

4. At the first prompt, "Create new or multipart," click New.

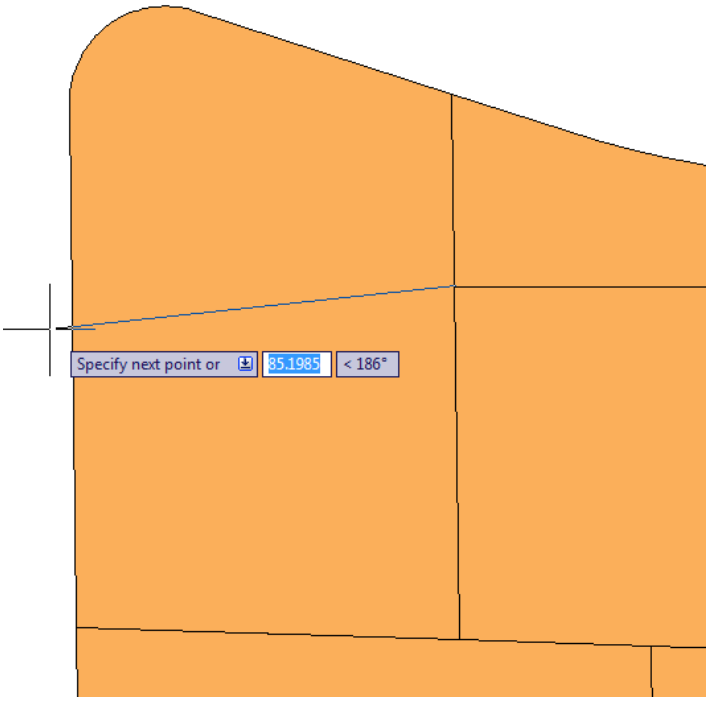
   You will split this parcel in two pieces. If you were creating more pieces, you would select Multipart.

5. At the second prompt, "Generate new feature ID or use existing," click New.

   This option auto-generates a unique identifier for the new parcel.

6. At the third prompt, "Would you like to draw or select the line for the split," click Draw.

7. Draw the line for the parcel split and press Enter.



When you specify the last point and press Enter, the parcel is split.

To continue this tutorial, go to Exercise 4: Examine the results (page 147).

Exercise 4: Examine the results

When you examine the results of your split in the Data Table, you will see that the properties of the two resulting parcels are calculated automatically, using the rules you specified.

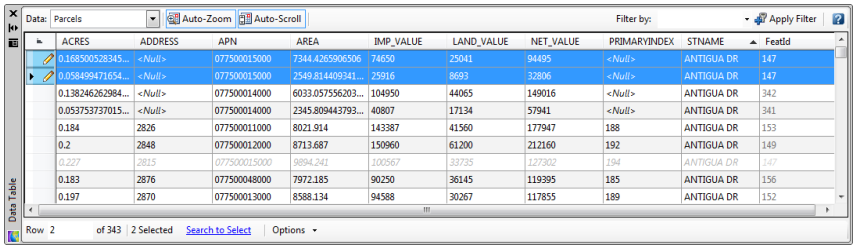
The theme for the Parcels layer updates to show the new parcels appropriately, reflecting the new values. The labels on the two new parcels update as well.

NOTE This exercise uses the map you created and modified in the previous exercises.

To examine the results of the split

1 In the Data Table, examine the attribute values for the new parcels.

The Data Table now shows two parcels on Antigua Drive.



ACRES	ADDRESS	APN	AREA	IMP_VALUE	LAND_VALUE	NET_VALUE	PRIMARYINDEX	STNAME	FeatId
0.168500528345...	<Null>	077500015000	7344.4265906506	74650	25041	94495	<Null>	ANTIGUA DR	147
0.058499471654...	<Null>	077500015000	2549.814409341...	25916	8693	32806	<Null>	ANTIGUA DR	147
0.138246262984...	<Null>	077500014000	6033.057556203...	104950	44065	149016	<Null>	ANTIGUA DR	342
0.053753737015...	<Null>	077500014000	2345.809443793...	40807	17134	57941	<Null>	ANTIGUA DR	341
0.184	2826	077500011000	8021.914	143387	41560	177947	188	ANTIGUA DR	153
0.2	2848	077500012000	8713.687	150960	61200	212160	192	ANTIGUA DR	149
0.227	2815	077500015000	9894.241	100567	33735	127302	194	ANTIGUA DR	147
0.183	2876	077500048000	7972.185	90250	36145	119395	185	ANTIGUA DR	156
0.197	2870	077500013000	8588.134	94588	30267	117855	189	ANTIGUA DR	152

The values have been updated, including the calculated property you created.

2 Right-click each new parcel and click Check In Feature.

Where you are now

You set up rules for splitting parcels and allocating property values to the resulting parcels. You used the Split command to divide one parcel into two uneven pieces. You examined the results in the Data Table.

To continue this tutorial, go to Lesson 3: Using Joined Data to Create Calculated Properties (page 148).

Lesson 3: Using Joined Data to Create Calculated Properties

You will join the parcel data to an assessor database to add information about the owners and values of the parcels.It does not contain information about the owners. You will join the Parcels layer to a Microsoft Access database that contains owner information.

To connect to an Access database from AutoCAD Map 3D, you must first set up an ODBC connection for that database using a control panel in Windows. Then, connect to this source using Data Connect, just as you connected to the physical data sources in your map. The database source contains a field that you can match to a property in the Parcels layer, so you can join the data to the parcels. Using the combined data, you will create a calculated property that is stored in the map but is not saved back to the original data stores. This

property is not available in either original data source alone. It requires a join and a calculation to create it.

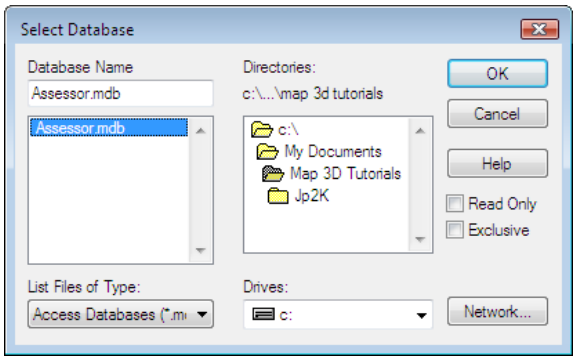
Exercise 1: Set up an ODBC connection for a Microsoft Access database

Set up an ODBC connection for the Microsoft Access database using the Administrative Tools control panel in Windows.

NOTE If you created an ODBC connection in the tutorial, "Analyzing Data Using Styles, Joins, and Buffers," you do not need to do so again. You can skip to the next exercise.

To set up an ODBC connection for the Access database

1. From your Windows desktop, click Start menu ➤ Settings ➤ Control Panel and open the Administrative Tools control panel.
2. In the Administrative Tools window, double-click Data Sources (ODBC).
3. In the ODBC Data Source Administrator dialog box, click Add.
4. In the Create New Data Source dialog box, click Microsoft Access Driver (*.mdb) and click Finish.
5. In the ODBC Microsoft Access Setup dialog box, for Data Source Name, enter *Parcel_Owners*.
6. Enter a description, for example, "Parcel owner information."
7. Under Database, click Select.
8. In the Select Database dialog box, navigate to the sample files and select the *Assessor.mdb* file.



Specify the database for this data source.

9 Click OK in the Select Database, ODBC Microsoft Access Setup, and ODBC Data Source Administrator dialog boxes.

10 Close the Administrative Tools control panel.

To continue this tutorial, go to Exercise 2: Connect to the Microsoft Access database (page 150).

Exercise 2: Connect to the Microsoft Access database

Specify the new connection in the Data Connect window. You don't need to add any specific feature class layers from the ODBC source to the map. All the information becomes available to AutoCAD Map 3D automatically when you connect to the ODBC source.

NOTE This exercise uses the map you created and modified in the previous exercises.

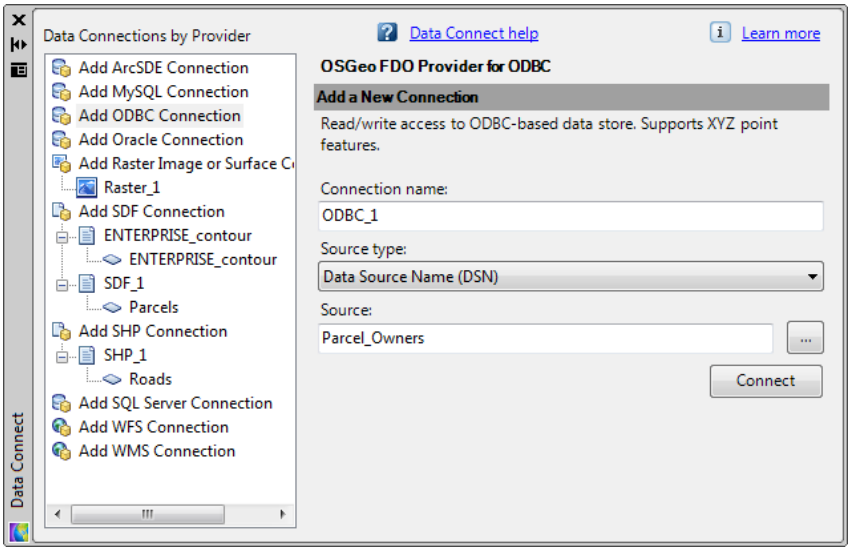
To connect to the Access database from AutoCAD Map 3D

1 In Display Manager in AutoCAD Map 3D, click Data ➤ Connect To Data.

2 Under Data Connections By Provider, click Add ODBC Connection.

3 Click … next to the Source field under Add A New Connection.

4 Select *Parcel_Owners* from the list of Data Source Names and click Select.



5 Click Connect.

6 When you see the User Name & Password dialog box, click Login without entering anything in the fields. (This database has not been set up for user name and password protection.)

Do not add any layers to your map. AutoCAD Map 3D has access to all non-spatial data automatically when you connect to its source.

7 Close the Data Connect window without adding anything to your map.

To continue this tutorial, go to Exercise 3: Join the ODBC data to the Parcels layer (page 151).

Exercise 3: Join the ODBC data to the Parcels layer

After you connect to an external data source, you can join it to a layer in your map using the Data Table (as long as the two data sources share a common property). You can see the results of the join immediately.

NOTE This exercise uses the map you created and modified in the previous exercises.

To join the ODBC parcel data to the geospatial parcel layer

1. In Display Manager, select the Parcels layer and click Table.
2. At the bottom of the Data Table, click Options, and click Create a Join.
3. In the Create A Join dialog box, the Primary Table Initiating The Join entry reads SDF_1:Schema1:Parcels. For Table (Or Feature Class) To Join To, select the ODBC_1:Fdo:Assessor layer.
4. For This Column From The Left Table, select APN.
5. For Matches This Column From The Right Table, select APN (if it is not selected automatically).
6. Click OK to display all the data in the Data Table.
7. Scroll to the right to see the owner information.

NOTE The joined data values for the new parcel you created with the Split command are not accurate. The database that contains the joined data does not know about the change to the parcel, so it cannot provide the proper new data for it. You must update the original data store independently to enter the data for the split parcels.

To continue this tutorial, go to Exercise 4: Save the properties to a new data store (page 152).

Exercise 4: Save the properties to a new data store

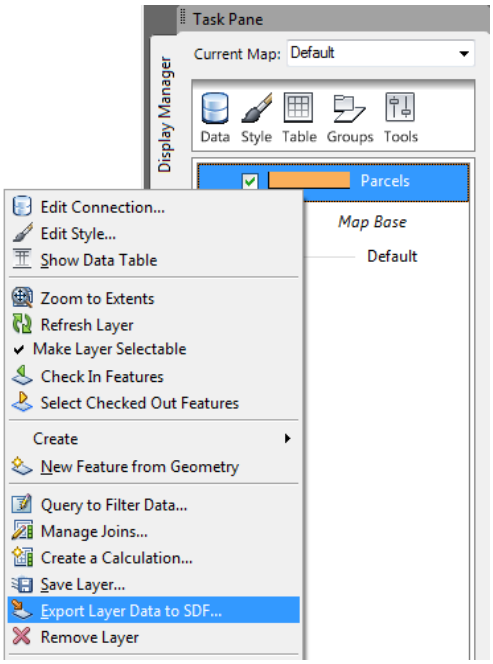
The Parcels layer now displays joined data. However, if you examine this data in the Data Table, you will see that it is gray. This reflects the fact that the joined data is not part of the original data store and cannot be edited or used in a calculated property.

However, you can save the layer out to a new data store, which will make the joined properties available as native properties in the future.

NOTE This exercise uses the map you created and modified in the previous exercises.

To save the original and joined properties to a new data store

1. In Display Manager, right-click the Parcels layer and click Export Layer Data To SDF.



2 Specify a location and name for the SDF file and click Save.

3 Create a new map.

- Click File menu ➤ New.
- Select the *map2d.dwt* template.

4 Assign a coordinate system to the new map.

- Switch the Task Pane to Map Explorer.
- Right-click the Current Drawing entry and click Coordinate System.
- Specify the CA-I coordinate system.

5 Connect to the new SDF file.

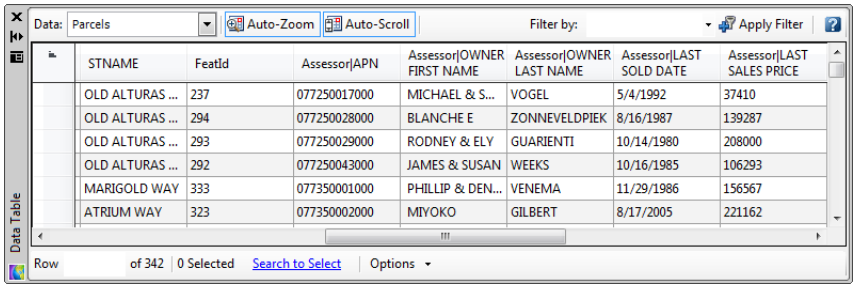
- In Display Manager, click Data ➤ Connect To Data.
- In the Data Connect dialog box, under Data Connections By Provider, click Add SDF Connection.
- Click the file icon next to the Source File field and navigate to the new SDF file.

- Select the new SDF file and click Open.
- Click Connect.
- Select the Parcels layer under Add Data To Map and click Add To Map.

6 Right-click the Parcels layer from the new SDF file and click Table.

7 In the Data Table, scroll to the right.

The joined properties are no longer gray. They are native properties of the new SDF file.



STNAME	FeatId	Assessor|APN	Assessor|OWNER FIRST NAME	Assessor|OWNER LAST NAME	Assessor|LAST SOLD DATE	Assessor|LAST SALES PRICE
OLD ALTURAS ...	237	077250017000	MICHAEL & S...	VOGEL	5/4/1992	37410
OLD ALTURAS ...	294	077250028000	BLANCHE E	ZONNEVELDPIEK	8/16/1987	139287
OLD ALTURAS ...	293	077250029000	RODNEY & ELY	GUARIENTI	10/14/1980	208000
OLD ALTURAS ...	292	077250043000	JAMES & SUSAN	WEEKS	10/16/1985	106293
MARIGOLD WAY	333	077350001000	PHILLIP & DEN...	VENEMA	11/29/1986	156567
ATRIUM WAY	323	077350002000	MIYOKO	GILBERT	8/17/2005	221162

To continue this tutorial, go to Exercise 5: Create a calculated property (page 154).

Exercise 5: Create a calculated property

Now that you have joined owner data to the Parcels layer and saved the result to a new data store, you can use the combined information to create a calculated property. The calculated property is the result of an expression: in this case, the last sales price divided by the area.

NOTE You must be connected to the data store that contains the data for the calculation in order to create or manage calculations.

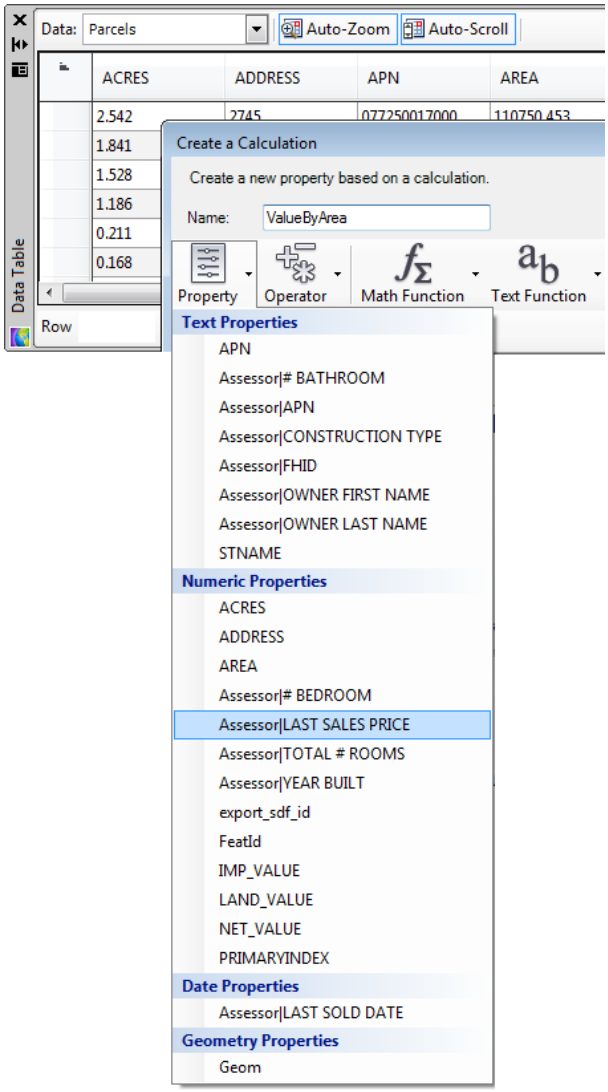
NOTE This exercise uses the map you created and modified in the previous exercises.

To create a calculated property using joined data

1 At the bottom of the Data Table, click Options, and click Create A Calculation.

2 In the Create A Calculation dialog box, name the calculated property "ValueByArea."

3 Click Properties. Select Assessor| LAST SALES PRICE.



4 Click the operator for "divided by" (the slash character).

5 Click Geometric ➤ Area2D.

This option calculates the area of a polygon.

6 Hold your cursor inside the parentheses, where you see the text "geometry property." On the tooltip that displays, click Enter A Property.

7 From the Properties list, select Geom.

Every spatial feature has a geometry property that you can use to calculate area or length.

8 Click Validate to make sure the expression is a valid calculation.

9 When you see "The expression is valid," click OK to create the calculated property and return to the Data Table.

Scroll to the right in the Data Table to see the new field. It is gray, to indicate that it is a calculated property and cannot be edited.

10 Close the Data Table.

Where you are now

You joined information from a Microsoft Access database to a layer containing parcels. You saved the layer out to a new SDF file, making all its data available in the future. You used the new data source to create a calculated property.

To continue this tutorial, go to Lesson 4: Theming Polygon Features (page 156).

Lesson 4: Theming Polygon Features

You can use the new calculated property you created as the basis for a theme that styles parcels according to their value by area.

Exercise 1: Creating a theme

A theme varies the display of individual features based on data values. For example, if you theme by parcel value, less expensive parcels might be a lighter color while more expensive ones are a darker shade.

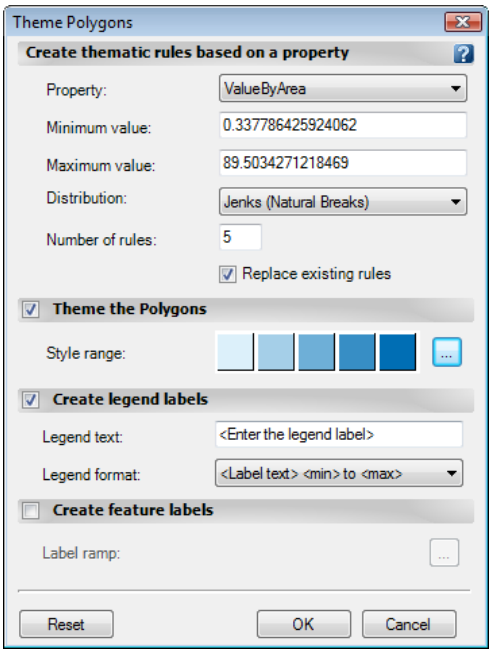
In this exercise, you'll create a theme based on the calculated property you defined for ValueByArea.

NOTE This exercise uses the map you created and modified in the previous exercises.

To create a theme using a calculated property

1. In Display Manager, select the Parcels layer and click Style.
2. In the Style Editor, click New Theme.
3. In the Theme Polygons dialog box, for Property, select ValueByArea.
4. For Distribution, select Jenks (Natural Breaks).

   The Jenks distribution method groups ranges of features at their natural breaks so that features with similar values are grouped together. This method shows the natural groupings in the data, rather than creating arbitrary breaking points.
5. Under Theme The Polygons, click … next to Style Range and set the foreground color range to any two colors.



6. Click OK twice to return to the Style Editor.

   Leave the Style Editor open for the next exercise.

To continue this tutorial, go to Exercise 2: Add labels that use an expression (page 158).

Exercise 2: Add labels that use an expression

You can label each parcel with text that is determined by an expression. In this exercise, you will create a label for each parcel that displays the parcel address on two lines.

The Style Editor should still be open from the previous exercise.

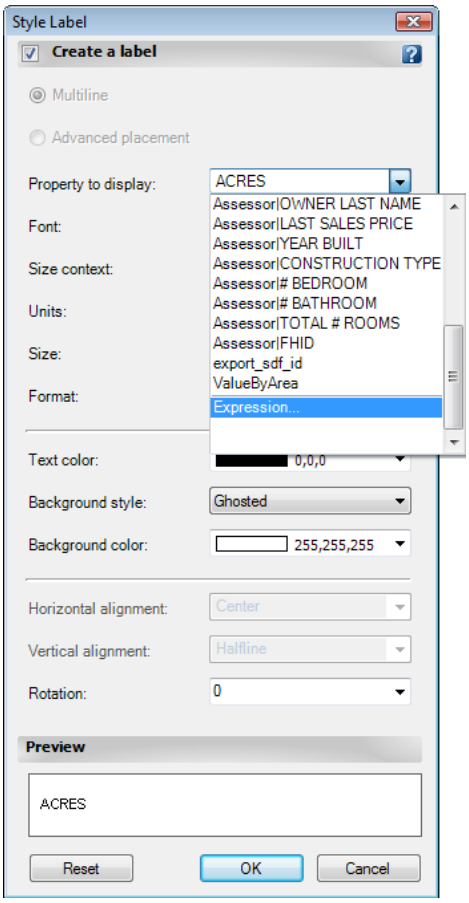
NOTE This exercise uses the map you created and modified in the previous exercises.

To add labels using expressions

1. In the Style Editor, click the entry under Feature Label for the first rule in the theme.

   Because you are theming the Parcels feature, you have one entry for each theme rule.

2. In the Style and Label Editor, click Property To Display, scroll down to the bottom of the list, and click Expression.



3 To create the two-line label, enter `Concat (ADDRESS, Concat ('\n', STNAME))`

   The Concat operator combines multiple properties and uses the `'\n'` argument to insert a line break.

4 Validate the expression.

5 Click OK in the Style and Label Editor.

6 In the Style Editor, click the entry under Feature Label for the second rule in the theme.

7 In the Style and Label Editor, click Property To Display, scroll down to the bottom of the list, and click the Concat expression you created earlier. Click OK twice.

   Once you create an expression for a label, you can select it from the Property To Display list. You don't need to re-create it each time.

8 Repeat steps 5 and 6 for each entry in the theme for which you want labels.

9 Close the Style Editor to see the changes.

Where you are now

You themed the Parcels layer, using a calculated property as the basis for the theme. You added labels whose content was determined by an expression.

To continue this tutorial, go to Lesson 5: Publishing Your Styled Map to MapGuide (page 160)

Lesson 5: Publishing Your Styled Map to MapGuide

When you publish a styled map to MapGuide, all queries, filters, labels, and calculated properties are saved to a *.layer* file and transferred to MapGuide.

From within AutoCAD Map 3D, you can preview the published information just as it will appear on the website.

Exercise 1: Publish to MapGuide

When you publish to Autodesk MapGuide, you create a web page containing a picture of your map. You will need rights to a MapGuide 2009 Server, which supports the new templates used in this exerciese. You must have credentials and write rights in order to do this exercise.

NOTE This exercise uses the map you created and modified in the previous exercises.

To publish to MapGuide

1 Save the map.

2 Click File menu ➤ More Plotting Options ➤ Publish to Autodesk MapGuide.

3 In the Publish To MapGuide dialog box, specify the URL for the target website.

If the site requires a password, a Connect to Site dialog box is displayed. Enter your user name and password.

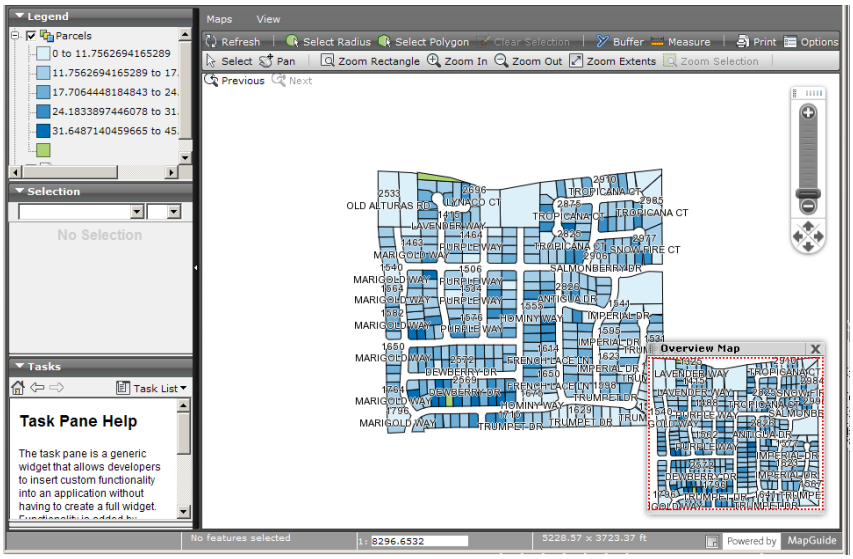
4 Select a folder for the published files.

To create a new folder, right-click the parent folder and click New Folder.

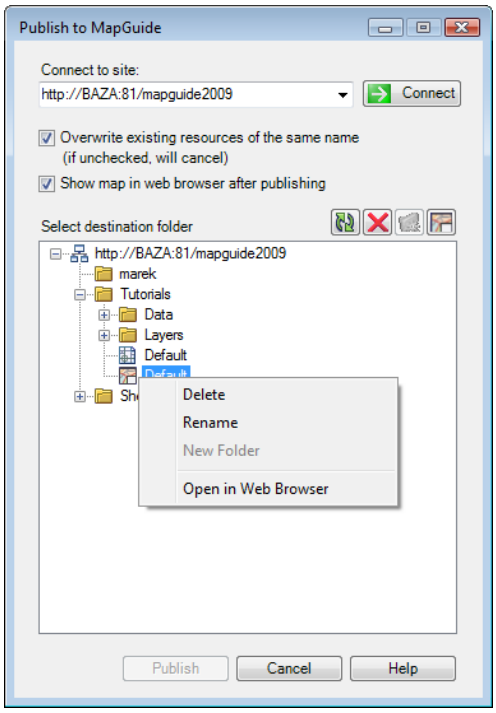
5 Check both options (for overwriting existing resources and previewing the results).

6 Click Publish.

Once the publish operation is complete, the results appear in a browser window.



7 To view the published map again later, click File menu ➤ More Plotting Options ➤ Publish to Autodesk MapGuide and connect to the website. Then right-click the map to view and click Open In Web Browser.



NOTE You can use tooltips to display information when the viewer holds the cursor over a particular area. Within Autodesk MapGuide Studio, you can create tooltips that display attribute values on the MapGuide web page when the viewer hovers over a parcel. For more information, see the Autodesk MapGuide Help.

Where you are now

You published your map to Autodesk MapGuide, complete with joined data, calculated properties, styling, and attribute data. You viewed the resulting web page from within AutoCAD Map 3D.

Glossary

6

attribute data Tabular data that describes the characteristics of a feature (page 165), for example, the number of lanes and pavement-type belonging to a road feature. See also external data (page 164), object data (page 166), property (page 166).

AutoCAD layer A layer in AutoCAD is a logical grouping of data. Layers are like transparent acetate overlays on a drawing. An AutoCAD layer differs from a map layer in Display Manager (page 164). A Display Manager layer references a feature source or a drawing source, contains styling and theming information, and optionally has a collection of scale ranges. See also layer (page 165), drawing layer (page 164), feature layer (page 165), or surface layer (page 168).

buffer A zone of a specific radius created around a selected feature. Used to select features within a specific distance of another feature. In AutoCAD Map 3D, you can define buffers for drawing topologies and for features, but you define them differently.

COGO Short for Coordinate Geometry. COGO inquiry commands extract geometric information from drawing objects such as lines, curves, closed polylines, and polygons. This information is useful if you want to verify the accuracy of your data, or send the data to the field. Inquiry commands are specific to drawing objects. They don't work on features.

contour lines A line that connects points of the same elevation or value relative to a specified reference datum. The lines can help you determine the elevation at a specific location on a surface, help clarify and analyze the 3D surface terrain, and help with tasks such as navigation.

coordinate system See global coordinate system (page 165).

Data Connect AutoCAD Map 3D window where you can access a data store (page 163) and add specific data to your map. Display the Data Connect window by clicking Data in Map Explorer (page 166)or Display Manager (page 164) (in the Task Pane (page 168)).

data provider Used by Data Connect to connect to geospatial data store (page 163)s.

data store A collection of feature class (page 165)es contained in a single data storage location. The data store contains feature classes defined within one or more schemas. Data stores can be files, such as an SDF file, or databases, such as an Oracle Spatial database.

Data Table In AutoCAD Map 3D, the feature (page 165)-based grid where you can view and edit attributes of selected spatial features, perform searches, and work with selection sets.

DEM Digital Elevation Model. A file that contains a representation of surface terrain. The surface is stored as a grid in which each cell can have any one of several different meanings, such as elevation, color, density, and so on.

digitize To convert existing data from paper maps, aerial photos, or raster (page 166) images into digital form by tracing the maps on a digitizer. Object locations are recorded as X,Y coordinates.

Display Manager A tab in the Task Pane (page 168) that handles the styling and theming of feature (page 165)s in your map.

display map All the settings for a specific map, such as the data to include, the appearance of each layer (page 165), and the legend definition. A display map can include objects from attached drawings, raster (page 166) images, and feature (page 165)s stored in data store (page 163)s, such as Oracle databases, SDF or SHP files, and ArcSDE. One map can include multiple display maps.

draping The process of overlaying a set of features or a raster (page 166) image on a surface so that the features or the image reflect the underlying terrain.

drawing layer A layer in Display Manager (page 164) that contains drawing objects from a DWG file. See also AutoCAD layer (page 163), feature layer (page 165), layer (page 165), or surface layer (page 168).

drawing set The set of source drawing (page 167)s attached to a map.

drawing source In Autodesk Map, a drawing (DWG) file and also its associated information, such as attached drawing files, drawing-based feature class (page 165)es, linked template data, and topologies. Compare with feature source (page 165).

drive alias In AutoCAD Map 3D, the mechanism that points to the folder where attached DWG files are stored.

DWF Design Web Format. An Autodesk file format for sharing two-dimensional, three-dimensional, and spatially-enabled design data on the Web.

external data The attribute data (page 163) linked to a map object but contained in a database or file outside the map file. See also object data (page 166), property (page 166).

FDO Feature Data Objects. An Autodesk software standard and general purpose API for accessing feature (page 165)s and geospatial data regardless of the underlying data store (page 163). See also feature class (page 165).

feature An abstraction of a natural or man-made real world object. A spatial feature has one or more geometric properties. For example, a road feature might be represented by a line, and a hydrant might be represented by a point. A non-spatial feature does not have geometry, but can be related to a spatial feature that does. For example, a road feature may contain a sidewalk feature that is defined as not containing any geometry. See also attribute data (page 163), FDO (page 164).

feature class A schema element that describes a type of real-world object. It includes a class name and property (page 166) definitions. Commonly used to refer to a set of feature (page 165)s of a particular class, for example, the feature class "roads" or the feature class "hydrants." See also FDO (page 164), schema (page 167).

feature layer A layer in Display Manager (page 164) containing feature (page 165)s from a single feature class (page 165) in a spatial data source. Feature layers are added to your map using Data Connect. See also AutoCAD layer (page 163), drawing layer (page 164), layer (page 165), or surface layer (page 168).

feature source Any source of feature (page 165) data that has been connected to a map. Compare with drawing source (page 164).

field A specific category of information in a data file, such as Address or Diameter.

geometry (Oracle Spatial database) The representation of a spatial feature (page 165).

GIS (Geographic Information System) A computerized decision support system that integrates geographic data, attribute data (page 163), and other spatially referenced data. A GIS is used to capture, store, retrieve, analyze, and display spatial data (page 167).

global coordinate system A method that converts the earth's spherical coordinates representing latitude and longitude into an AutoCAD Map 3D map Cartesian coordinate system, and accounts for the curvature of the earth's surface with a projection. A coordinate system is usually defined by a projection, an ellipsoid definition, a datum definition, one or more standard parallels, and a central meridian.

join A relationship that is established between attribute data and feature sources for the purposes of creating a new view of the data or for ad-hoc analysis.

label Text placed on or near a map feature (page 165) that describes or identifies it.

layer A resource that references a feature class (page 165) or a drawing source (page 164) that you add using Display Manager (page 164). The layer contains styling and theming information, and optionally a collection of scale ranges. See also AutoCAD layer (page 163), drawing layer (page 164), feature layer (page 165), or surface layer (page 168).

lock To make all or part of a disk file read-only so that it cannot be modified by other users on a network. Object locking applies to objects that are being edited by another user. File

locking applies to entire files, for example when an AutoCAD user wants to open a file while the file is being edited in AutoCAD Map 3D.

logical operator A symbol such as And, Or, Not, =, >, >=, <, and <= used to define logical relationships.

map A collection of layers displayed within a consistent coordinate system and extents. See also layer (page 165).

map book A collection of map tiles that you publish as separate pages. You can specify the layout and properties for your map book on the Map Book tab of the Task Pane (page 168).

Map Explorer The Task Pane (page 168) tab where you manage your mapping resources.

map query A set of conditions that specify the selection of drawing objects from source drawing (page 167)s. These conditions can be based on the location or properties of an object or on data stored in the drawing or in a linked database table.

mpolygon A polygon object. A polygon differs from a closed polyline in that it stores information about its inner and outer boundaries.

object data The attribute data (page 163) attached to a drawing object and stored in the drawing file. Compare with external data (page 164).

polygon A closed area that stores information about its inner and outer boundaries, and about other polygons nested in it or grouped with it. In a polygon topology, the polygon can be enclosed by any lines or arcs in the drawing. In addition, AutoCAD Map 3D supports a polygon object, sometimes called an mpolygon (page 166) or mapping polygon.

property A single attribute of a feature class (page 165). A feature class is described by one or more property definitions. For example, a Road feature class may have properties called Name, NumberLanes, or Location. See also attribute data (page 163), feature (page 165).

publish To generate output from a map.

query A set of criteria for specifying the selection of objects or records. For example, a layer (page 165)-based query can display only the objects on the layers that contain state and district boundaries.

raster Images containing individual dots (called pixels or cells) with color values, arranged in a rectangular, evenly spaced array. Aerial photographs and satellite images are examples of raster images used in mapping. Compare with vector (page 168).

resolution In a raster (page 166) image, the density of pixels-per-inch (PPI) or dots-per-inch (DPI).

save set Objects that were created or modified in the current drawing and are marked to be saved back to source drawing (page 167)s.

scale The ratio of the distance on a paper map to the distance on the ground. If a paper map has a scale of 1:100,000 (also represented as 1/100000), then a distance of 1 unit on the paper map corresponds to 100,000 units on the ground. On a digital map, scale represents the scale of the map from which the digital map was derived.

scale threshold Levels at which a map display changes. You can define different style (page 168)s at different scale thresholds. For example, turn on the display of road names only when the drawing scale factor is below 1:5000.

schema The metadata that provides a logical description of multiple feature class (page 165)es and the relationships between them.

SDF 2 A previous version of the SDF file format that was the native file format for Autodesk MapGuide (the last release was Autodesk MapGuide 6.5). Each SDF 2 file generally contained one feature (page 165) or type of data, for example points, lines, polygons, or text.

SDF 3 Spatial Data File. The current version of the SDF format that is the native format for the Autodesk MapGuide technology (Autodesk MapGuide Enterprise 2007 and MapGuide Open Source). Each SDF 3 file can contain multiple feature class (page 165)es or types of data stored in tables with attributes and geometry.

sheet An individual named object in a sheet set (page 167) that can be published. A sheet references a layout.

sheet set A named collection of sheets and sheet subset (page 167)s for publishing.

sheet subset A named collection of sheets within a sheet set (page 167). An individual sheet can be a member of only a single subset.

sheet template A drawing file that defines a title block and a layout for use in sheets. A sheet template can be specified for sheet set (page 167)s and sheet subset (page 167)s.

source drawing A drawing file attached to another drawing. The set of all source drawings attached to a drawing is called the drawing set. Use a query to retrieve selected objects from multiple source drawings.

spatial A generic term used to reference the mathematical concept of *n*-dimensional data.

spatial data Information about the location and shape of geographic feature (page 165)s, and the relationships between those features.

spatial database A database containing information indexed by location.

style Settings that specify how to display the objects in a Display Manager (page 164) layer. For example, you can style color, linetype, linewidth, and scale.

surface layer A layer in Display Manager (page 164) containing feature (page 165)s from a raster (page 166) image that contains elevation information. Surface layers are added to your map using Data Connect. See also See also AutoCAD layer (page 163), drawing layer (page 164), feature layer (page 165).

table A set of data arranged in records (rows) and fields (columns). When a table is displayed in a grid, records are displayed in horizontal rows and fields are displayed in vertical columns. Each field value in the table is displayed in a cell.

Task Pane AutoCAD Map 3D window that displays information about the current drawing. The Task Pane contains three tabs: Map Explorer (page 166), Display Manager (page 164), and Map Book (page 166). The Map Explorer tab lists attached source drawing (page 167)s, databases, queries, and link templates. The Display Manager (page 164) tab controls display layers and their style (page 168)s. The Map Book tab displays the map books available for publishing, and lets you create new map books. You can resize the Task Pane and place it where you want.

theme A style (page 168) that varies the appearance of an element in a layer based on the value of a specific property (page 166). For example, instead of coloring lakes blue, you could vary the shade of blue based on the depth of the lake. Instead of choosing one line width for all roads, you could vary the line width based on number of lanes.

vector A mathematical calculation of an object with precise direction and length. Vector data is stored as X,Y coordinates that form points, lines, and areas. Compare with raster (page 166).

viewport (paper space) A view of model space from a layout.

workspace Contains the commands and tools for specific tasks. The Map 3D For Geospatial workspace is tailored for working with spatial feature (page 165)s while Map 3D For Drawings is optimized for working with drawing objects.

To change your workspace, click View menu ➤ Menu/Toolbar Layout. Click a workspace.

zoom To change the display magnification so that it focuses on progressively smaller areas (when you zoom in) or larger areas (when you zoom out) of an image.

zoom extents To magnify a drawing based on its extents so that the view shows the largest possible view of all spatial objects.

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