Extracting Attribute Data

You can reuse existing AutoCAD drawing content, including attributes, to create a table or external file. This is an example of data extraction, which was first introduced in Chapter 21. You can extract data from most AutoCAD objects, including the size and location of drawing geometry and attributes. You can also extract data from file properties, such as Title and Author.

Extracting attribute values to form a table or text file is an excellent application for data extraction and is useful for creating bills of materials, schedules, and associated lists, such as parts lists, application lists, data lists, index lists, and wire lists. The data is already available, so you can add it to a table or text file without having to retype the information. Extracted data is also associated with the table or text file. As a result, when you make changes to the extracted data in the drawing, the corresponding information in the table or text file updates.

NOTE

The data to extract must be in the current drawing or in another drawing that you include in the data source.

Data Extraction Wizard

To create a table or text file that references drawing data, access the **DATAEXTRACTION** command directly or pick the **From object data in the drawing** (**Data Extraction**) radio button from the **Insert options** area of the **Insert Table** dialog box.

The **Data Extraction** wizard allows you to select the information to extract from the drawing. Data extraction has many applications, and multiple data extraction commands and options are available. The following information focuses on a basic example of using data extraction to develop a bill of materials table. You can apply this information to a variety of similar and more advanced data extraction requirements.

Figure 25A-1 shows an example of a basic landscape plan. The trees, shrubs, and plants are blocks that include attributes that specify species, height, diameter, and cost. Each block reference is placed on the appropriate TREE, SHRUB, or PLANT layer. This example uses data extraction to extract the species, height, diameter, cost, and quantity of each different tree, shrub, and plant to create a landscape bill of materials. **Figure 25A-2** shows the original objects and attributes used to create the block and each type of item created using the block.

Ribbon
Annotate
> Tables
Insert
> Linking & Extraction
Data Extraction…
Type
DATAEXTRACTION
EATTEXT
DX

A basic landscape plan. The tree, shrub, and plant blocks contain extractable attributes that can be used to form a bill of materials.
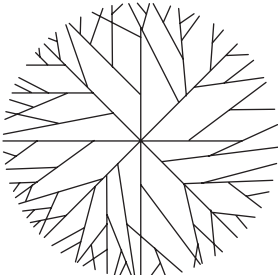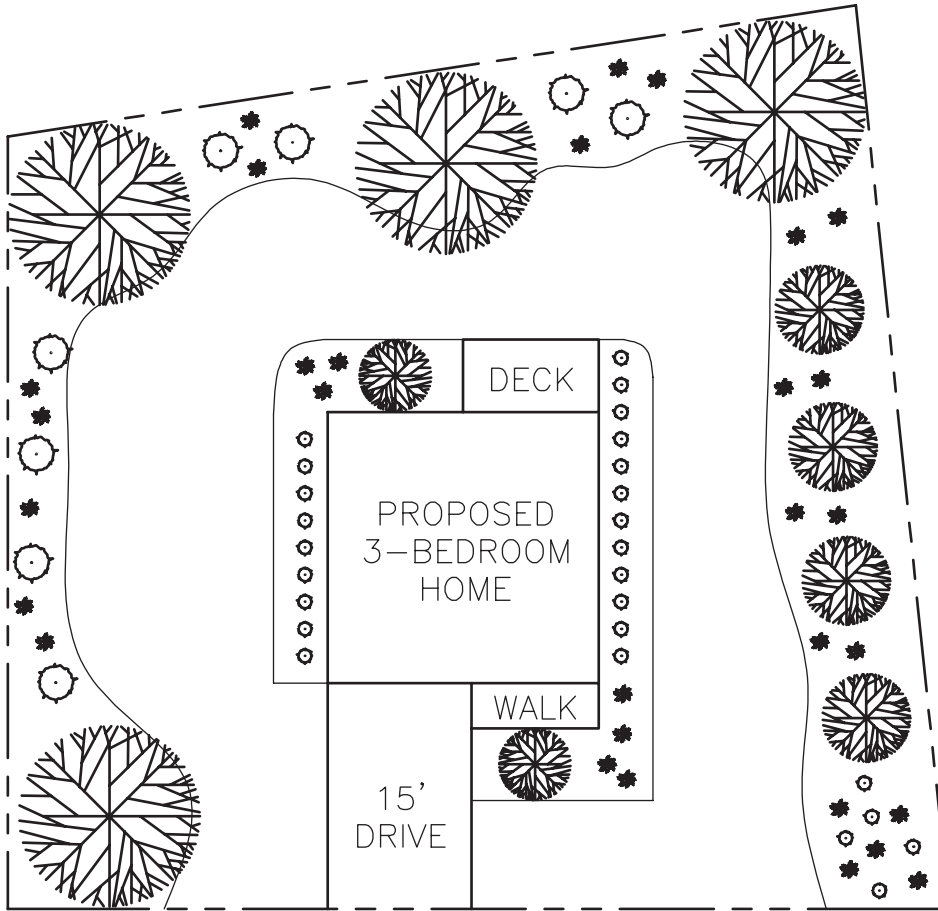

Figure 25A-2.
The original objects and attributes before block definition.

Block	Used to Create
SPECIES HEIGHT DIAMETER COST	Birch trees: 30' tall, 20' diameter, $50 each Lace leaf maple trees: 5' tall, 8' diameter, $250 each Crab apple trees: 15' tall, 10' diameter, $35 each
SPECIES HEIGHT DIAMETER COST	Geranium plants: 10" tall, 18" diameter, $10 each Fern plants: 18" tall, 18" diameter, $12 each
SPECIES HEIGHT DIAMETER COST	Rhododendron shrubs: 4' tall, 4' diameter, $75 each Heather shrubs: 18" tall, 18" diameter, $15 each

Begin Page

The **Begin** page of the **Data Extraction** wizard begins the data extraction process by creating, editing, or referencing a data extraction file. See **Figure 25A-3**. To create a new data extraction file (DXE), select the **Create a new data extraction** radio button and then pick the **Next** button to display the **Save Data Extraction As** dialog box. Use the dialog box to create a DXE file. Saving the DXE file displays the next page of the wizard.

To use an existing DXE file to form a new data extraction, pick the **Create a new data extraction** radio button and check the **Use previous extraction as a template (.dxe or .blk)** check box on the **Begin** page. Pick the ellipsis (**…**) button to open the **Open Template** dialog box and select the existing data extraction template (DXE) or a block template (BLK) file. Pick the **Next** button to display the next page of the wizard.

You also have the option of modifying an existing data extraction file by picking the **Edit an existing data extraction** radio button. Pick the ellipsis (**…**) button to open the **Select Existing Data Extraction File** dialog box and select the DXE file to modify. Then pick the **Next** button to display the next page of the wizard.

Define Data Source Page

The next page of the wizard, **Define Data Source**, allows you to specify the drawings, sheet set, or individual objects from which to gather data. See **Figure 25A-4**. Sheet sets are covered later in the textbook. The **Drawing files and folders:** area shows the files and folders added to the data source. Pick the **Drawings/Sheet set** radio button to gather information from the current drawing and, if necessary, other drawings. Select the **Include current drawing** check box to add the current drawing file to the data source.

To add other drawing files or sheet set data files to the data source, pick the **Add Drawings…** button and use the **Select Files** dialog box to select the files. To select all drawings associated with a saved sheet set file, change the **Files of type:** option to *.dst and navigate to the sheet set file. Pick the **Add Folder…** button to add the files in a folder to the data source using the **Add Folder Options** dialog box.

Figure 25A-3.
Use the **Begin** page of the **Data Extraction** wizard to create a new data extraction file, reference a data extraction template, or edit an existing data extraction file.
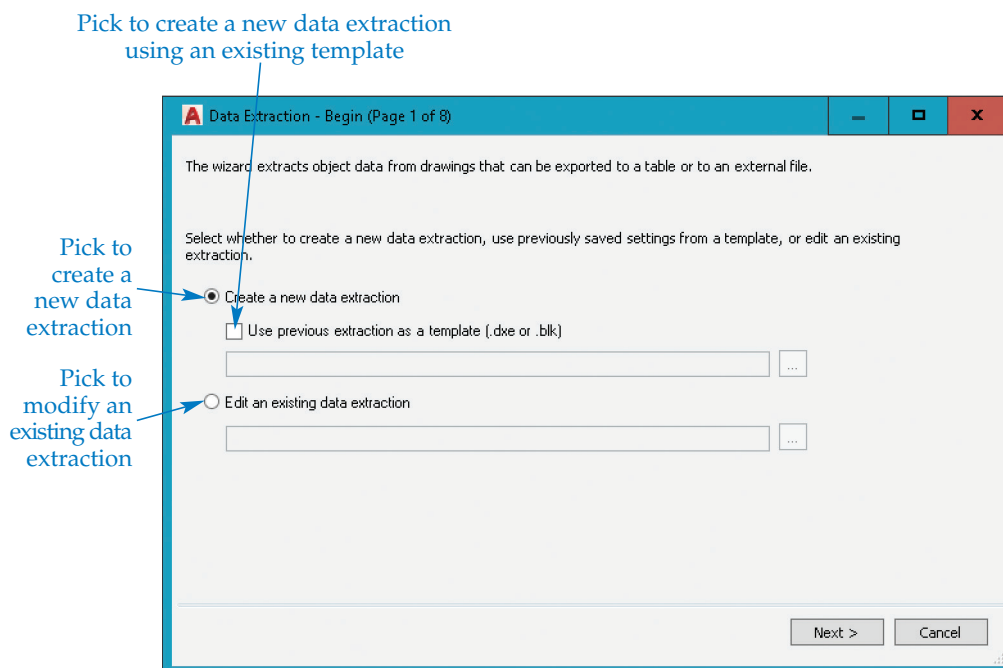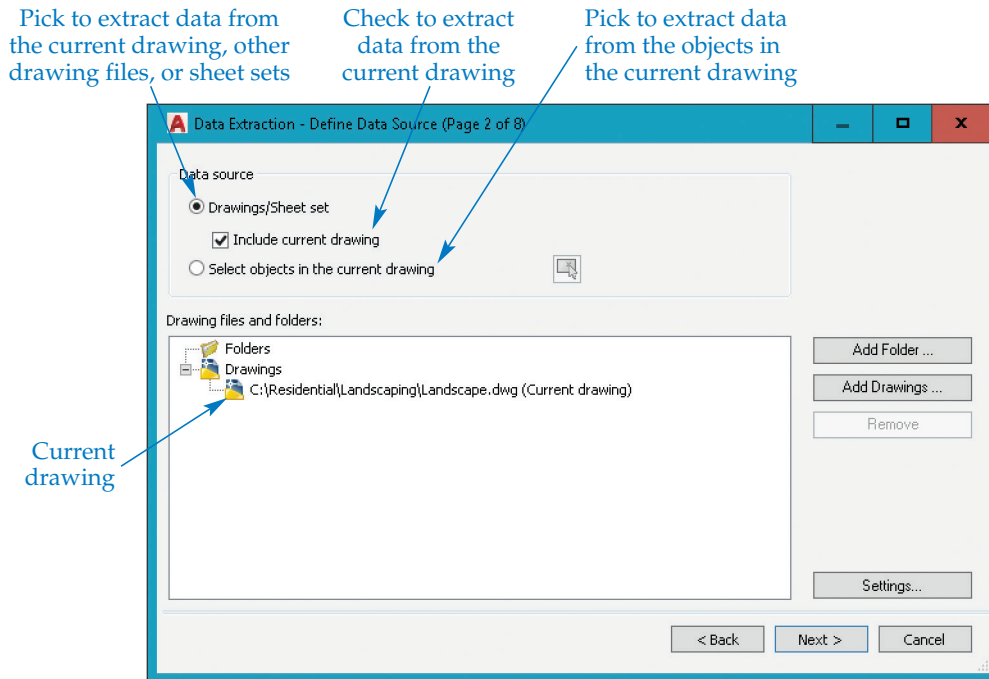
Pick to create a new data extraction using an existing template

Pick to create a new data extraction

Pick to modify an existing data extraction

Figure 25A-4.
Select the drawing or drawings, sheet set, or objects from which to extract data. This example shows selecting the current drawing of the landscape plan as the data source.

Pick to extract data from the current drawing, other drawing files, or sheet sets

Check to extract data from the current drawing

Pick to extract data from the objects in the current drawing

Current drawing

NOTE

To remove a file or folder from the **Drawing files and folders:** list, select the file or folder and pick the **Remove** button, or right-click on the file or folder and pick **Remove**.

Another option for gathering data is to select specific objects in the current drawing. Pick the **Select objects in the current drawing** radio button and then pick the **Select objects in the current drawing** button. This returns you to the drawing area to select objects to include in the data source. You can only select objects from the current drawing.

Picking the **Settings…** button opens the **Data Extraction - Additional Settings** dialog box. Select the **Extract objects from blocks** check box to include block information in the extraction. Select the **Extract objects from xrefs** check box to include objects in xrefs in the extraction. Select the **Include xrefs in block counts** check box to count xrefs as blocks during extraction. Pick the **Objects in model space** radio button to extract only the objects in model space and ignore objects in paper space. Pick the **All objects in drawing** radio button to include all objects in the drawing in the extraction.

PROFESSIONAL TIP

Add multiple files or a sheet set to the data source to compile file properties such as Title, Comments, Drawing Revision, and File Name. You can use this data to create a bill of materials, parts list, or similar table.
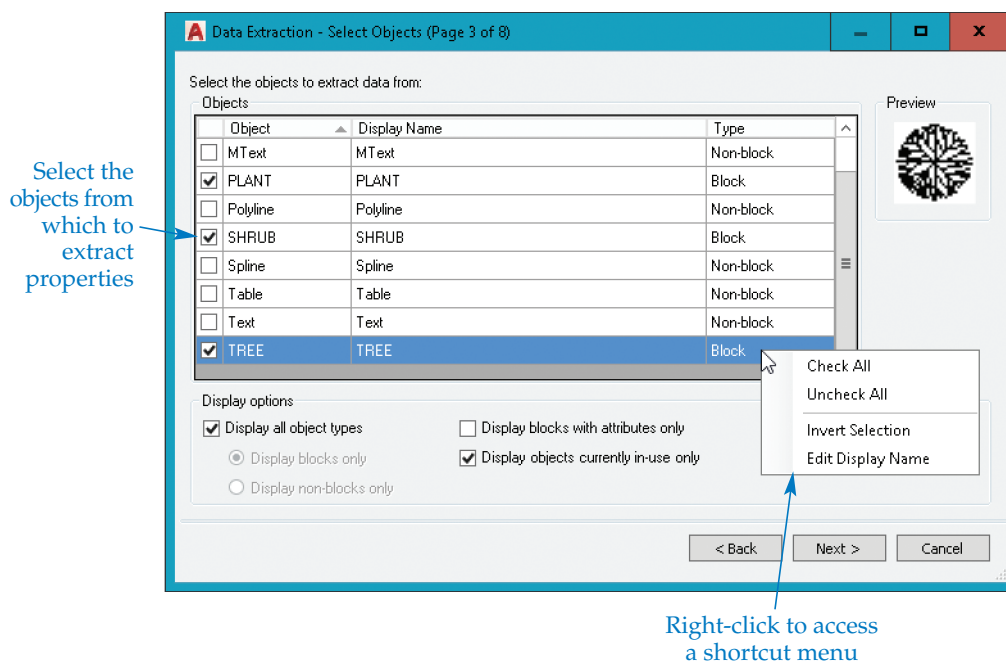

Select Objects Page

After you select a data source, pick the **Next** button to display the **Select Objects** page. See **Figure 25A-5**. This page lists all data source objects. The landscape plan drawing contains lines, splines, polylines, single-line and multiline text objects, blocks, and attribute definitions. Use the **Select Objects** page to select the objects that contain the data, or properties, you want to reference to create the table or external file. For example, select only blocks to create the landscape bill of materials, because the blocks contain all of the needed information.

Specify which objects to list by adjusting the settings in the **Display options** area. Deselect the **Display all object types** check box to filter the display of blocks. Select the **Display blocks only** radio button to list only blocks. Then select to list only those blocks with attributes by checking the **Display blocks with attributes only** check box. Pick the **Display non-blocks only** radio button to list all objects except blocks. Select the **Display objects currently in-use only** check box to show only the objects found in the data source.

Pick the check boxes corresponding to the objects you want to reference to create the table or file. Right-click on an object in the list to access a shortcut menu that allows you to select all objects, deselect all objects, or invert the selection. To change the display name of an object, right-click on the object and select the **Edit Display Name** menu option, or slowly double-click in the **Display Name** text box. Changing the object display name is a critical step for extracting certain types of data. Using the same display name for different objects is effective for grouping data into a single item. Changing the display name also provides a more descriptive name for the object. For the landscape plan example, the display name is set according to the block name, which does not require modification.

Figure 25A-5.
Select the objects in the data source from which to extract properties. This example will only extract data from blocks to create the bill of materials.

Select the objects from which to extract properties

Right-click to access a shortcut menu

Select Properties Page

After selecting objects using the **Select Objects** page, pick the **Next** button to display the **Select Properties** page. See **Figure 25A-6**. This page lists all the properties found in the selected objects and the data source files. Every object and file contains certain properties, or data. For example, the properties of a block include attributes and the color, linetype, and position properties.

The **Select Properties** page allows you to select the object properties to use to create the table or external file. The selected properties correspond to the table or list columns. For example, pick the COST, DIAMETER, HEIGHT, and SPECIES attribute properties to create the landscape bill of materials columns. All attributes created using the **ATTDEF** command are displayed in the list. Pick the check boxes corresponding to the properties you want to reference. Right-clicking on a property in the list provides a shortcut menu that allows you to select all objects, deselect all objects, or invert the selection.

PROFESSIONAL TIP

Reduce the number of properties shown in the list by deselecting the appropriate check boxes in the **Category filter** area. Notice that the only check box selected in **Figure 25A-6** is **Attribute**. This makes it very easy to select just the desired attributes.

NOTE

If an attribute contains a field, the field is automatically converted to text during the extraction process.

Change the property display name by right-clicking and selecting the **Edit Display Name** menu option. The display name of the property defines the table column header. You can also adjust the name during the next phase of data extraction.

Figure 25A-6.
Select the properties to extract from the selected objects. Only those properties associated with the selected objects and the data source files are available. This example needs to extract only the attribute properties to create the bill of materials.

Select the object properties to extract

Right-click to access a shortcut menu
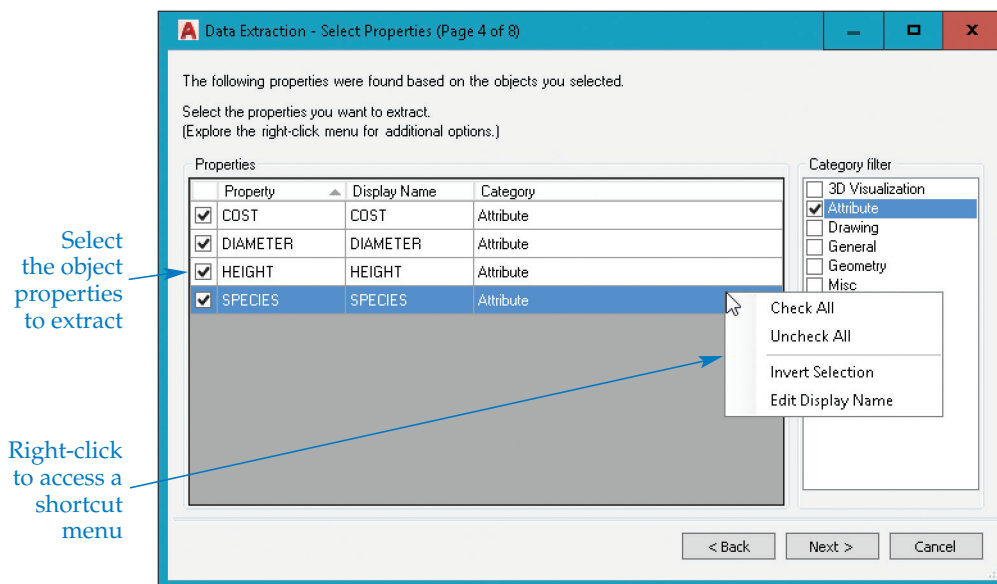
Refine Data Page

After selecting the properties to extract, pick the **Next** button to display the **Refine Data** page. See **Figure 25A-7A**. The **Refine Data** page allows you to adjust table or list content and display characteristics before inserting the table or creating the external file. The results of the extraction appear in a table format, with the selected properties displayed in columns and each object in a separate row.

You can access most options by right-clicking on a column to display the shortcut menu shown in **Figure 25A-7B**. Select the **Sort Ascending** option to sort the rows in ascending alphanumeric order. You can also set ascending row order by picking the heading once to display an up arrow to the right of the column name. In this example, the SPECIES column is sorted in ascending order. Select the **Sort Descending** option to sort the rows in descending alphanumeric order. You can also set descending row order by picking the heading again to display a down arrow to the right of the column name. Select the **Sort Columns Options...** option to open the **Sort Columns** dialog box. The **Sort Columns** dialog box is also available by picking the **Sort Columns Options…** button.

Select the **Rename Column** option to rename the column heading. Type a new name and press [Enter] to rename the column. For the landscape bill of materials example, change the default Count column name to QUANTITY. Select the **Hide Column** option to hide the column that was right-clicked. Hidden columns are not included in the extraction.

The Count and Name columns are available in addition to the selected property columns. You can add the Count and Name columns to the table by picking the **Show Count Column** and **Show Name Column** options. You can also toggle the Count and Name columns on and off using the **Show count column** and **Show name column** check boxes. The landscape bill of materials example does not require the Name column.

Select the **Set Column Data Format…** option to access the **Set Cell Format** dialog box. The **Data type:** area lists, in alphabetical order, the following options for formatting the selected table cell: **Angle**, **Currency**, **Date**, **Decimal Number**, **General**, **Percentage**, **Point**, **Text**, and **Whole Number**. Selecting a format presents options for adjusting the format characteristics. Different options are available depending on the selected format. The landscape bill of materials example uses a **Text** cell format for data in the SPECIES column, a **Whole Number** cell format for data in the QUANTITY column, a **Currency** cell format for data in the COST column, and a **Decimal Number** cell format for data in the HEIGHT and DIAMETER columns.

NOTE

A currency symbol ($) is added automatically to cells displayed using the **Currency** cell format. As a result, you should not type $ before the attribute value when inserting a block. Adding the $ symbol manually prevents formulas from functioning properly.
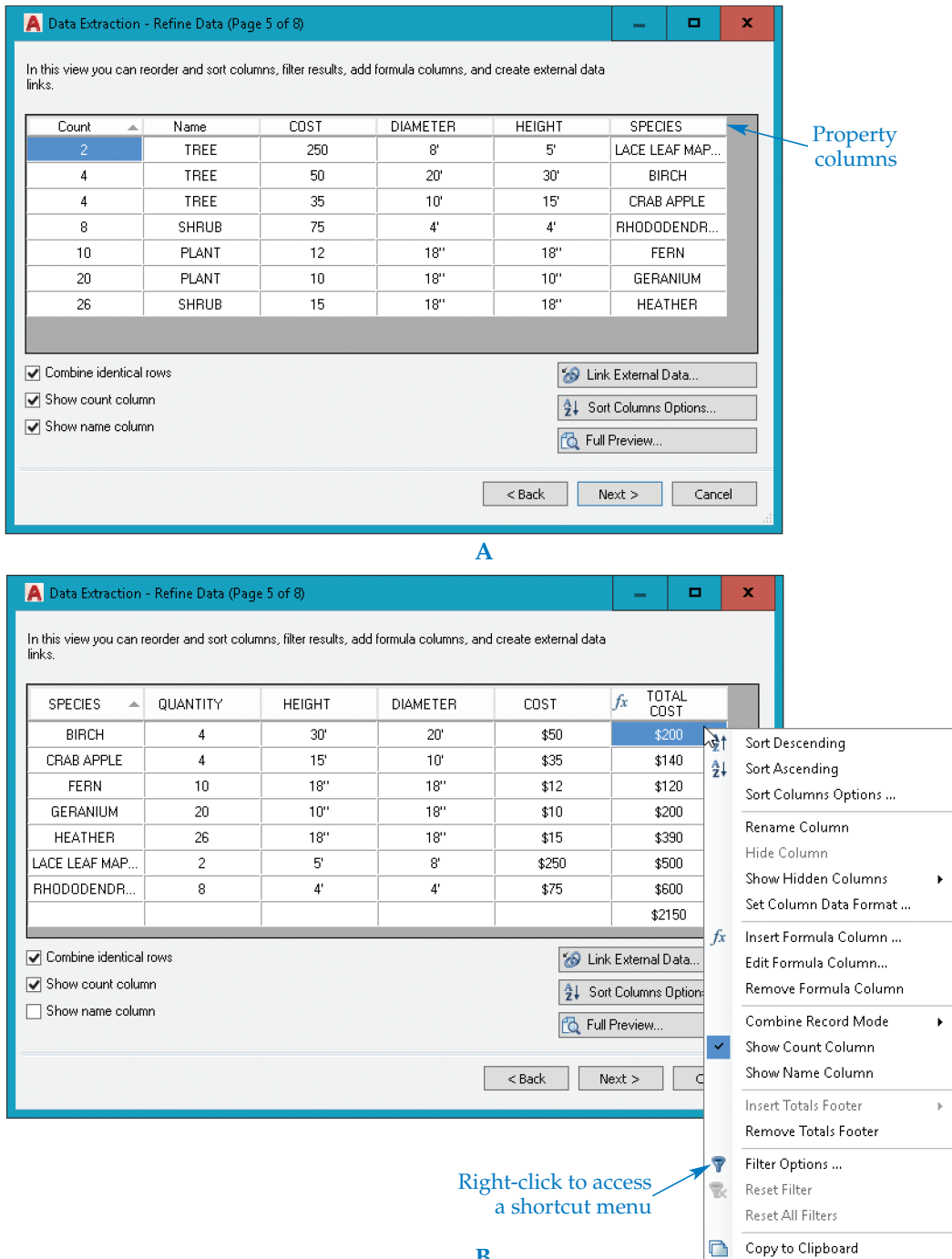
Select the **Insert Formula Column…** option to access the **Insert Formula Column** dialog box and add a column that uses a formula to calculate cell data. For example, the landscape bill of materials example contains a QUANTITY column and a COST column. Add a formula column named TOTAL COST and specify a <QUANTITY>*<COST> formula to calculate the total cost for the items. Select **Edit Formula Column…** to edit the formula used in the column. Select **Remove Formula Column** to delete the selected formula column.

The **Combine Record Mode** cascading menu is available only when you check **Combine identical rows**. Select the **Separate Values** option to display a row for each unique data value. Select the **Sum Values** option to add the data values of equal items together. The landscape bill of materials example uses the **Sum Values** option to total the quantity of each type of tree, shrub, and plant.

Select the **Insert Totals Footer** option to add a cell at the bottom of the selected column that calculates and displays column data cell values. Select the **Sum** option to calculate the sum of all values in the column. Select the **Max** option to show the largest single value displayed in the column, or select **Min** to show the lowest single value. Select **Average** to calculate the average value of the column data cells. Select **Remove Totals Footer** to delete the cell. Add a **Sum** totals footer to the TOTAL COST column as shown in **Figure 25A-7B**.

Figure 25A-7.
Use the **Refine Data** page to adjust table content and display characteristics before inserting the table or creating the external file.

A

B

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The order of columns can be changed to create a logical arrangement of columns in the table or external file. To reorder a column, pick on the column heading and drag to move it left or right to place it before or after other columns. In the landscape bill of materials example, the SPECIES column is located on the left end of the table format and the TOTAL COST column is located on the right end.

Select **Filter Options…** to open the **Filter** dialog box. Any rows unchecked in the **Filter** dialog box are not included in the extraction. The **Reset Filter** option resets any filters for the column that you right-clicked. The **Reset All Filters** option resets all filters in all columns. Pick the **Copy to Clipboard** option to copy the information to the Windows Clipboard in the same format displayed in the table.

To display a preview of the data, pick the **Full Preview…** button below the list of data. The window that opens displays the data as it will appear when extracted. Close the preview window by pressing the [Esc] key or using the **Close** button.

NOTE

You can add existing data entered in a Microsoft Excel spreadsheet or a comma-separated (CSV) file to the table by picking the **Link External Data…** button to access the **Link External Data** dialog box.

Choose Output Page

After you adjust the data using the **Refine Data** page, pick the **Next** button to display the **Choose Output** page. See **Figure 25A-8**. In the **Output options** area, select whether to display the data as a table in the current drawing, extract the data to an external file, or both. To create a table, check **Insert data extraction table into drawing**.

Figure 25A-8.
Select whether to create a table in the current drawing or save the table to an external file.
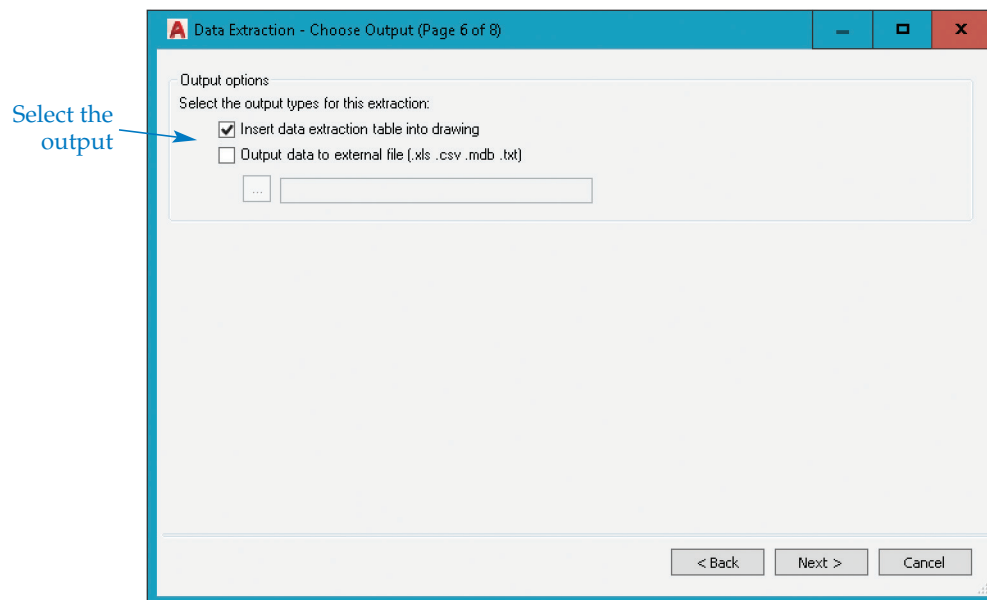
To save the data to an external file, check **Output data to external file (.xls .csv .mdb .txt)**. Then pick the ellipsis (**…**) button to display the **Save As** dialog box. Specify a file name and location for the file. Select the type of file to save using the **Files of type:** drop-down list. The available file formats are comma-separated (CSV) and tab-separated (TXT). If Microsoft Excel and Microsoft Access are installed on your computer, the XLS and MDB formats are also available. Pick the **Save** button to return to the **Choose Output** page. The folder location and file name are displayed in the text box below the **Output data to external file** check box.

Table Style Page

Pick the **Next** button to continue to the next page of the wizard. If you checked **Insert data extraction table into drawing** in the **Choose Output** page, the **Table Style** page appears next. See **Figure 25A-9**. Select a table style from the **Table style** drop-down list, or pick the **Table style** button to create or modify a style. The preview area shows a preview of a table with the current table style settings. The preview area shows table style properties, but does not adjust to the column and row settings.

If you select a starting table style, you can pick the **Use table in table style for label rows** radio button to use the starting table style title and headers. If you do not want to use a starting table style, or do not want the starting table style title and headers, pick the **Manually setup table** radio button. Enter a title for the table in the **Enter a title for your table:** text box. Select a title, header, or data cell style from the drop-down lists if necessary. Check the **Use property names as additional column headers** check box to use the column display names shown on the **Refine Data** page as the table column heads.

Finish Page and Output

The **Finish** page is the last page of the **Data Extraction** wizard. See **Figure 25A-10**. Pick the **Finish** button to finish the data extraction. AutoCAD prompts you to specify an insertion point for the table if you selected the **Insert data extraction table into drawing** check box on the **Choose Output** page. Pick a point or enter coordinates to complete the extraction process.

Figure 25A-9.
Select a table style and add a title and column headers.

Select a table style
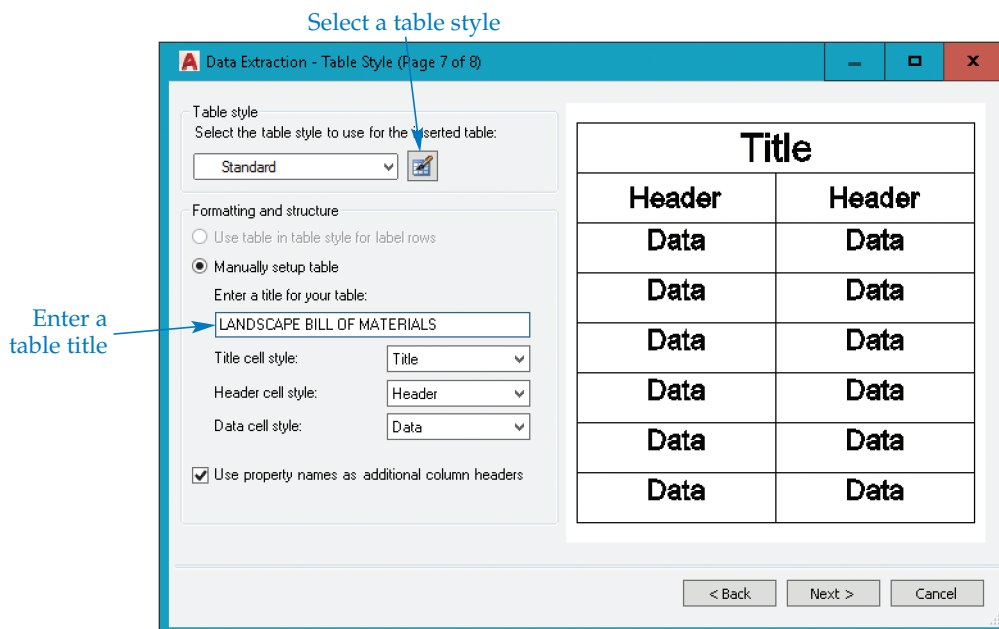
Enter a table title

Figure 25A-10.
The **Finish** page allows you to finish the procedure and insert the table or save the external file.
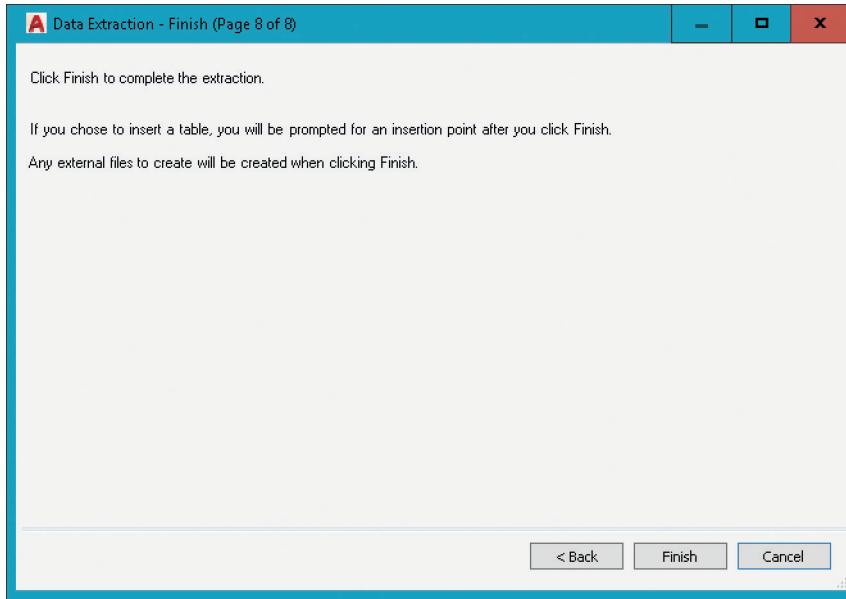

Figure 25A-11 shows the landscape bill of materials example described throughout this supplement in table format. If you chose to save the data to an external file, the data can be displayed on-screen using appropriate applications, such as Windows Notepad or Microsoft Excel.

NOTE

When you create a table using data extraction, you can update it when the data extraction file changes. A notification in the status bar indicates changes. You can also update a data extraction at any time using the **DATALINKUPDATE** command.
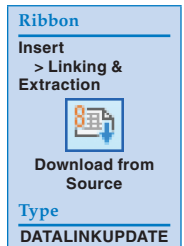
PROFESSIONAL TIP

The bill of materials described in this supplement is a basic list of the selected attributes of each block. As you become familiar with AutoCAD, customize it to meet your needs. For example, you can use dynamic blocks that include block tables or lookup tables and lookup actions to enhance the usefulness of data extraction. You can carefully plan and create a single dynamic block to use to insert many different symbols with numerous extractable properties.

Activity 25A-1

To practice extracting attributes, open AutoCAD and perform the following steps.

1. Open **EX25-2**, which you created in Exercise 25-2.
2. Use the **Data Extraction** wizard to extract the attribute information from the inserted blocks.
3. Create a table in the drawing with the attribute information. Also, save the extracted information as a comma-separated file.
4. Enter Windows Notepad and open the extract file to display the bill of materials on-screen.

Examples of the extracted attribute data used to create a table and saved as external files.

LANDSCAPE BILL OF MATERIALS					
SPECIES	QUANTITY	HEIGHT	DIAMETER	COST	TOTAL COST
BIRCH	4	30'	20'	$50	$200
CRAB APPLE	4	15'	10'	$35	$140
FERN	10	18"	18"	$12	$120
GERANIUM	20	10"	18"	$10	$200
HEATHER	26	18"	18"	$15	$390
LACE LEAF MAPLE	2	5'	8'	$250	$500
RHODODENDRON	8	4'	4'	$75	$600
					$2150

AutoCAD Table

Tab-Separated File (TXT)

Comma-Separated File (CSV)

Excel File (XLS)