

# Chapter 2

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## *Insert, View, and Rubersheet Tools*

### **Learning Objectives**

**After completing this chapter, you will be able to:**

- *Insert an image into a drawing*
- *Transform the coordinate system of an image*
- *Correlate the images in a drawing*

## INTRODUCTION

This chapter aims to introduce you to the interoperability feature of AutoCAD Raster Design. AutoCAD Raster Design tools enable you to easily insert, manage, and view scanned drawings, satellite images, aerial photographs, and digital elevation models. In this chapter, you will learn to insert a raster image into a drawing and you will also learn to transform the image coordinate system while inserting it into a drawing that has a different coordinate system.

In this chapter, we will also discuss some of the most commonly used raster operations such as scaling, moving, and rubbersheeting the inserted images. Moreover, you will learn to control the display of the inserted image using the options in the **RASTER DESIGN** palette.

## INSERTING AN IMAGE

Sometimes we need to modify vector data or raster data. For that we need to insert these datasets into the drawing window of the software interface. AutoCAD Raster Design provides tools and options to insert raster images and drawing files in the drawing window using the **Insert** tool. The **Insert** tool allows you to specify the image correlation information to position, scale and rotate the image precisely so that every point on the image represents the true location on the surface of the earth. The image correlation parameters can be specified manually or by selecting the correlation source. Note that like the **Insert** tool, AutoCAD and AutoCAD MEP support the **ATTACH** command for inserting images. The procedure to insert a raster image using the **Insert** tool is discussed next.

### Inserting a Raster Image Using the Insert Tool

<b>Ribbon:</b>	Raster Tools > Insert & Write > Insert
<b>Command:</b>	IINSERT



To insert a raster image into your drawing, choose the **Insert** tool from the **Insert & Write** panel of the **Raster Tools** tab; the **Insert Image** dialog box will be displayed, as shown in Figure 2-1. You can use the various options provided in the **Insert Image** dialog box to search, browse and select the raster image to be inserted into your drawing. The various options in this dialog box are discussed next.

In this dialog box, preview and the detailed information of the raster image are displayed on the right side. You can also browse for image data from the folder icons displayed on the left in this dialog box. Some of the options of this dialog box are discussed next.

#### Look in

You can choose an option from the **Look in** drop-down list to specify the folder or directory that contains the raster image. On selecting the required folder or directory, the content of the selected folder will be displayed in the list box below this drop-down list.

#### Search the Web



You can use the **Search the Web** button to find and select any raster image from the internet. On choosing this button, the **Browse the Web - Open** dialog box will be displayed. In this dialog box, specify the name and the URL of the file to be opened in the **Name or URL** edit box and then choose the **Open** button; the image from the specified path will be opened.

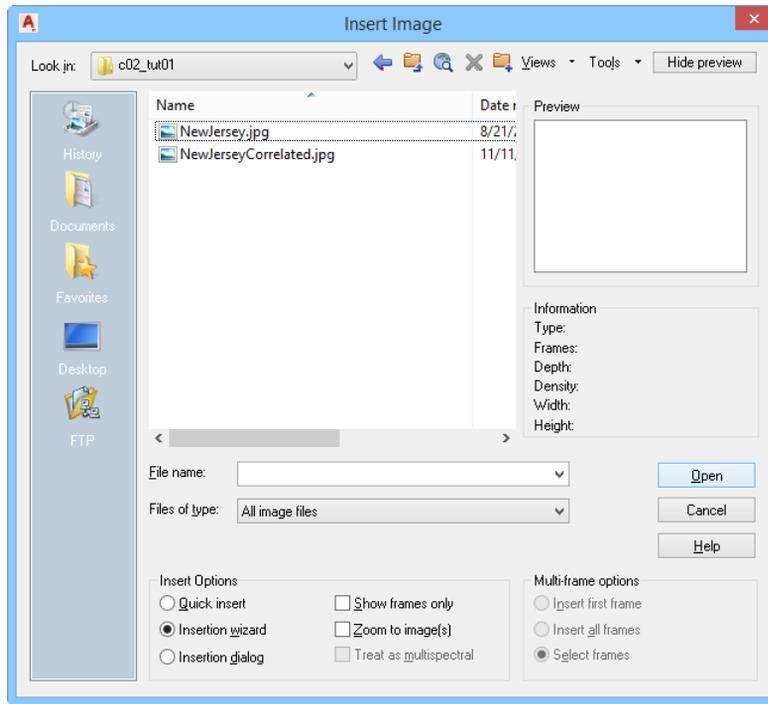


Figure 2-1 The *Insert Image* dialog box

## Files of type

This drop-down list contains the list of supported image file formats. You can choose an option from this drop-down list to filter the image format for selection.



### Note

*AutoCAD Raster Design does not support .img file format, if you try to insert this file format, a message informing about an unknown format or invalid file will be displayed.*

## File name

The **File name** drop-down list displays the name of the raster selected in this dialog box. This drop-down list also displays the path of recently used rasters. You can open a recently used raster by selecting an option from this drop-down list.

## Preview Area

This area displays the preview of the selected image, as shown in Figure 2-2.

## Information Area

The **Information** area in this dialog box displays general information such as image type, size, density and so on of the selected raster image, refer to Figure 2-2.

## Hide preview

You can use this button to toggle the display of the selected image in the **Preview** and **Information** area.

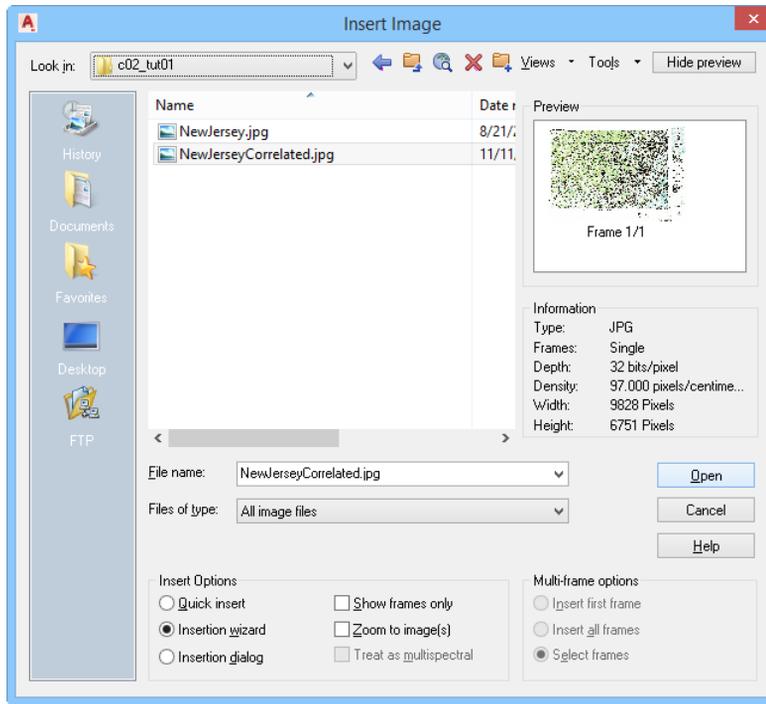


Figure 2-2 The image preview displayed in the *Insert Image* dialog box

## Insert Options Area

Using the options in this area, you can specify the method of inserting an image in the drawing. You can select one of the radio buttons such as **Quick insert**, **Insertion wizard**, or **Insertion dialog** from this area to provide correlation values to your drawing. You can also specify other insertion options by selecting the **Show frames only**, **Zoom to image(s)**, and **Treat as multispectral** check boxes to display image and zoom level.

The various image insertion options are discussed next.

### Quick insert

You can select this radio button to insert an image into the drawing. While inserting the image using this option, AutoCAD Raster Design uses the correlation information available in the image, separate correlation file, or default values specified in the **AutoCAD Raster Design Options** dialog box.

### Insertion wizard

Selecting this radio button will enable you to specify additional image insertion parameters like correlation source, positioning values, and so on. Select an image from the selection area of the **Insert Image** dialog box. Next, select the **Insertion wizard** radio button and then choose the **Open** button; the **Pick Correlation Source** page will be displayed, as shown in Figure 2-3.

In this page, you can specify the source for image correlation by selecting an option from the **Correlation source** drop-down list. If you select the **Image File** option from the **Correlation**

**source** drop-down list, you will have to provide correlation values in the **Correlation Values** area. If you select the **Default Values** option from the **Correlation source** drop-down list, the image will be inserted using default values provided in the image.

In the **Correlation Values** area, the **X** and **Y** display boxes display the coordinate values for the insertion of the raster image. Also, the rotation and scale values are displayed in their corresponding display boxes. The values displayed in the **Correlation Values** area depends upon the option selected from the **Correlation source** drop-down list. Note that, if the inserted image is already rectified, then the rectified X and Y coordinate values will be displayed in the **X** and **Y** display boxes.

The value in the **Density** display box displays the pixel density of the raster image. The image unit is displayed in the **Units** area below the **Density** display box, refer to Figure 2-3. The **Coordinate System** area displays the Coordinate Reference System (CRS), if applied, of the selected raster image.

On specifying the required options in this page, choose the **Next** button; the **Modify Correlation Values** page will be displayed, as shown in Figure 2-4. By default, the options in the **Modify Correlation Values** page will display the correlation values specified in the **Pick Correlation Source** page.

You can use the options in this page to modify the correlation parameters for the image to be inserted.



### Note

*The values can be edited only in the **Modify Correlation Values** dialog box.*

**Figure 2-3** *The Pick Correlation Source page*

**Figure 2-4** *The Modify Correlation Values page*

To modify a correlation parameter, specify the required value in the **Correlation Values** area. For example, to modify the different image unit, select an option from the **Image units** drop-down list. To modify the scale of the image, specify the required value in the **Scale** edit box. Note that to enlarge the image, specify a scale value larger than 1 in the **Scale** edit box and to reduce the size of the image, specify a scale value between 0 and 1.

On modifying the required correlation parameters, choose the **Apply** button; the modified correlation values will be applied to the image. Choose the **Next** button; the **Insertion** page will be displayed, as shown in Figure 2-5.

Using the options in the **Insertion** page, you can graphically or numerically specify the correlation parameters for inserting an image.

To specify the parameters numerically, enter the values in the required areas as explained in the previous sections. Alternatively, to graphically specify the values, choose the **Pick** button in the **Correlation Values** area; the **Insertion** page will be closed and you will be prompted to specify the base point for inserting the image. Click on the required location in the drawing; you will be prompted to specify the angle of rotation of the image. Note that moving the cursor in the drawing will rotate the image frame attached to the cursor about the specified base (insertion) point. Rotate the frame to the required angle by moving the cursor and then click to specify the rotation angle; you will be prompted to specify the corner. Note that the frame of the image is now fixed on the basis of the specified insertion point and rotation angle. You will also notice that the size of the frame changes on moving the cursor. Move the cursor to choose the required frame size and then click; the **Insertion** page will be displayed. This page will now show the correlation parameters that were specified graphically. You can specify the color of the image frame. To do so, choose the **Select** button in the **Color** area of the page; the **Select Color** dialog box will be displayed, as shown in Figure 2-6.

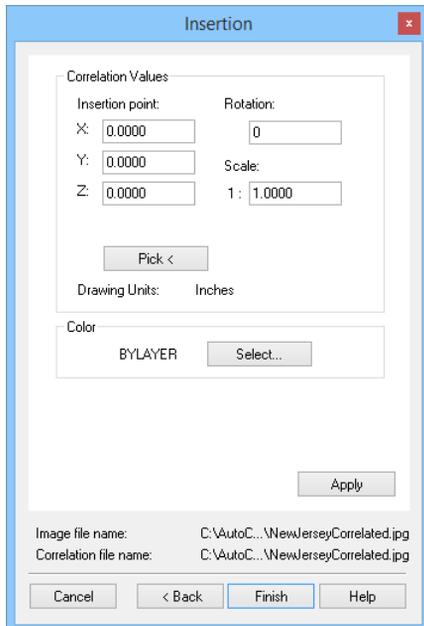


Figure 2-5 The Insertion page

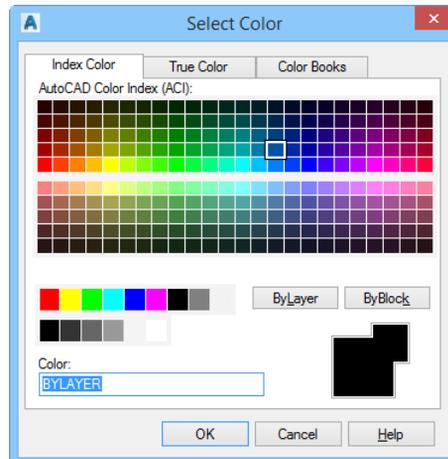


Figure 2-6 The Select Color dialog box

Choose the required color in this dialog box and then choose the **OK** button; the dialog box will be closed and the selected color will be displayed in the color preview box next to the **Select** button in the **Color** area of the **Insertion** page. Choose the **Apply** button in the wizard to apply the specified parameters.

Next, choose the **Finish** button in the **Insertion** wizard; the image is inserted in the drawing using the correlation parameters specified in the wizard.

### Insertion dialog

This radio button will enable you to specify additional image insertion parameters. To insert an image; select an image from the selection area of the **Insert Image** dialog box. Next, select the **Insertion dialog** radio button and then choose the **Open** button; the **Image Insertion** dialog box will be displayed with the **Source** tab chosen, as shown in Figure 2-7.

The options in this dialog box are similar to the **Pick Correlation Source** page, as discussed earlier.

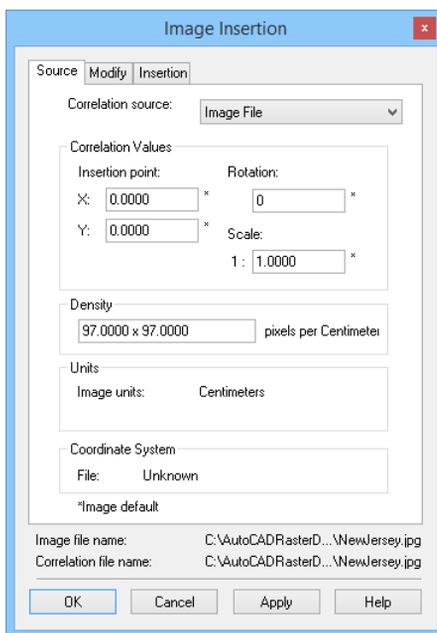


Figure 2-7 The **Source** tab of the **Image Insertion** dialog box



### Note

*In case you are using a GIS application like AutoCAD Map 3D as the base software for installing AutoCAD Raster Design, then while inserting an image having coordinate system different from the coordinate system assigned to the drawing, the **Transform** page will be displayed after the **Modify Correlation Values** page. You can use the options in this page to transform the coordinate system of the image.*

### Show frames only

To display only the frame of the inserted image in the drawing, select the **Show frames only** check box in the **Insert Image** dialog box, refer to Figure 2-2.

### Zoom to image(s)

You can select this check box to automatically zoom to the extents of the inserted image. This check box is cleared by default as a result AutoCAD Raster design will not zoom to the extents of the inserted image.

### Treat as multispectral

This option will be activated only when two or more images are selected in the selection area of the **Insert Image** dialog box. Using this option you can insert the selected images as a multispectral dataset. Inserting a multispectral image into the drawing is discussed in detail further in this book.

## Multi-frame options Area

You can select an option in this area to specify which image frame you want to insert from a multiframe image. A multiframe image dataset consists of multiple images within a single file. Note that, each image within the multiframe file has a separate frame.

To activate this area, select a multiframe image like *.ntf* extension file in the selection area of the **Insert Image** dialog box. If you select the **Insert first frame** radio button, the first frame from the multiframe dataset will be displayed in the drawing. Similarly, if you select the **Insert all frames** radio button, it will insert all the image frames of the multiframe dataset.



### Note

*If the **Quick insert** radio button is selected in the **Insert Image** dialog box, AutoCAD Raster Design will directly insert the selected image into the drawing without prompting for any additional input parameters from the user.*

In case you are using AutoCAD Raster Design with a GIS application such as AutoCAD Map 3D, AutoCAD Raster Design provides the options for coordinate transformation while inserting an image having coordinate system different than that of the drawing.

## TRANSFORMING IMAGE COORDINATE SYSTEM

As discussed earlier, while inserting an image having coordinate system different than that of the drawing environment, AutoCAD Raster Design will display the **Transform** page after the **Modify Correlation Values** page, refer to Figure 2-8.

On selecting the **Insertion dialog** radio button in the **Insert Image** dialog box while inserting an image in the drawing, the **Transform** tab will be displayed in the **Image Insertion** dialog box. Note that, before inserting the desired image, you need to assign coordinate system to the drawing environment, only then this tab will be displayed.

You can use the options in the **Transform** tab for transforming the image coordinate system. Note that, to activate the options in this tab you need to select the **Transform to drawing's coordinate system** check box in the **Transform** area. The options in the **Transform** tab are discussed next.



### Tip

*If the image coordinate system and drawing coordinate system have different coordinate values, the image will not open in your drawing area.*

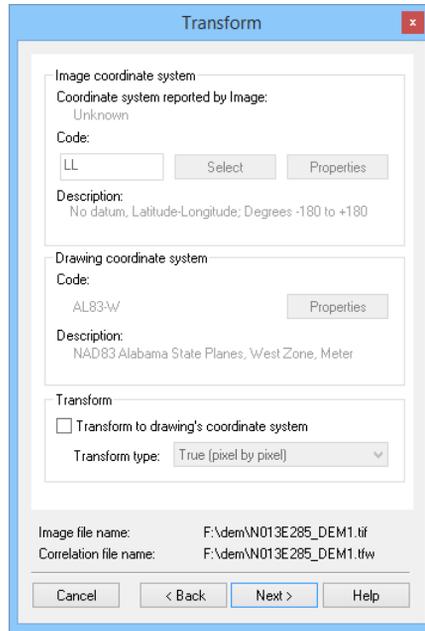


Figure 2-8 The Transform page

## Image coordinate system Area

In most cases, AutoCAD Raster Design will identify the coordinate system of the selected image and will display it in the **Image coordinate system** area of the **Transform** page.

You can also specify a coordinate system for the image using the options in this area. To do so, enter the coordinate system code in the **Code** edit box. AutoCAD Raster Design will search the coordinate system library for the specified code. Alternatively, you can specify the coordinate system by selecting the required coordinate system from the library. To do so, choose the **Select** button; the **Select Coordinate System** dialog box will be displayed, as shown in Figure 2-9.

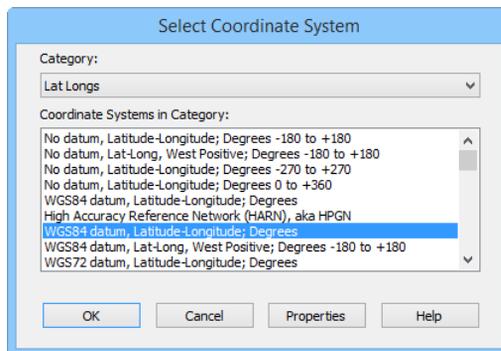


Figure 2-9 The Select Coordinate System dialog box

In the **Select Coordinate System** dialog box, select the required category of the coordinate system by selecting an option from the **Category** drop-down list. On doing so, the coordinate systems in the selected category will be displayed in the **Coordinate Systems in Category** list box. Next, choose the required coordinate system in the **Coordinate Systems in Category** list box, refer to Figure 2-9, and then choose the **OK** button; the code of the selected coordinate system will be displayed in the **Code** edit box of the **Transform** page.

In AutoCAD Raster Design, you can view the properties of the selected coordinate system. To do so, choose the **Properties** button in the **Image coordinate system** area; the **Coordinate System Property** dialog box will be displayed, as shown in Figure 2-10. Note that you cannot edit the CRS parameters using the options in the **Coordinate System Property** dialog box.

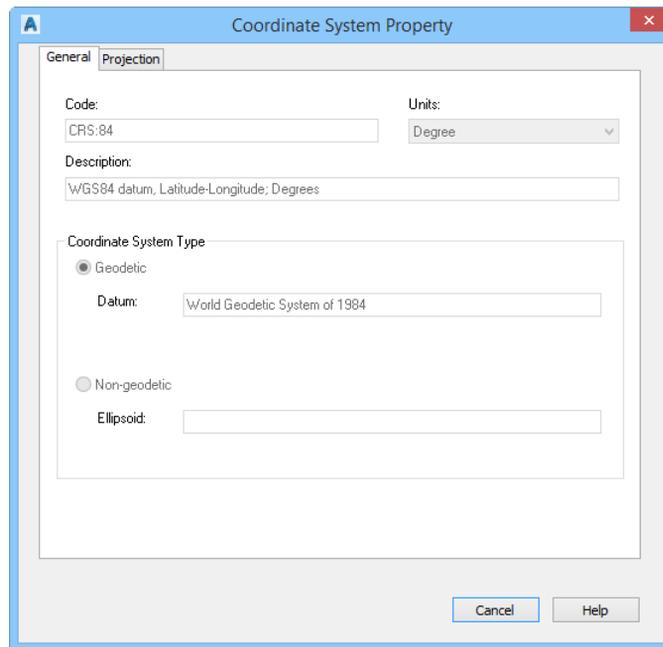


Figure 2-10 The *Coordinate System Property* dialog box

## Drawing coordinate system Area

The **Drawing coordinate system** area of the **Transform** page displays the coordinate system of the drawing environment. To view the properties of the drawing coordinate system, choose the **Properties** button in this area; the **Coordinate System Property** dialog box will be displayed, refer to Figure 2-10.

## Transform Area

Select the **Transform to drawing's coordinate system** check box in the **Transform** area to enable the transformation of the image to the drawing coordinate system. Note that, all the options in the **Transform** page will be deactivated if you clear this check box.

You can choose the type of transformation by selecting an option from the **Transform type** drop-down list. The various options in this drop-down list are discussed next.

### True (pixel by pixel)

The **True (pixel by pixel)** transformation type is applied to every pixel in the image. After applying this transformation type, the result will be more accurate. However, this is a slow process and requires large amount of resources for computing transformation.

### 4 point rubbersheet

You can select this option to enable image transformation using 4 points on the image. This transformation produces the most accurate results.

### 3 point affine

You can choose this option to enable affine transformation of the image. An affine transformation can differentially scale, skew, rotate, and translate a raster image. You need atleast 3 control points on the image to perform this method.

On specifying the required options in the **Transform** page, choose the **Next** button; the **Insertion** page will be displayed.



#### Note

*If you select the **Transform to drawing's coordinate system** check box in the **Transform** page, the options in the **Correlation Value** area of the **Insertion** page will be disabled.*

In the **Insertion** page, specify the required options as explained earlier in the chapter and then choose the **Finish** button; the selected image will be inserted in the drawing area.

The image inserted in the drawing is also added into the Tree View of the **RASTER DESIGN** palette. You can view the inserted image by clicking on the tree view symbol in the **RASTER DESIGN** palette. You can use this palette to view the properties of the inserted images. The various options in this palette can also be used to manage the raster images in the drawing. The various components of the **RASTER DESIGN** palette are discussed next.

## RASTER DESIGN PALETTE

**Ribbon:** Raster Tools > Manage & View > Manage  
**Command:** IMANAGE

The **RASTER DESIGN** palette in AutoCAD Raster Design is used to manage the inserted rasters in your drawings. Using this palette you can control the color and visibility of the image. You can also use this palette to view the image properties and related data.

To invoke this palette, choose the **Manage** tool from the **Manage & View** panel of the **Raster Tools** tab; the **RASTER DESIGN** palette will be displayed, as shown in Figure 2-11.



The options and areas in the **RASTER DESIGN** palette are discussed next.



Figure 2-11 The **RASTER DESIGN** palette

## Management Toolbar

You can select the **Image Insertions** option from the Image view drop-down list. On doing so, the **Image Insertions** view will be displayed in the **RASTER DESIGN** palette. You can also display the **Image Data** view in the **RASTER DESIGN** palette by choosing the **Image Data** option from the Image view drop-down list.

The Management toolbar in the **RASTER DESIGN** palette contains buttons that can be used to control the display of the items. You can use the **Expand Tree** button to display the hierarchy of objects in the Tree view. You can use the **Collapse Tree** button to hide the hierarchy in the Tree view.



You can either display the image preview or the data related to the image as a table in the Item view of the **RASTER DESIGN** palette. To do so, choose the **Show Image Preview** button in the Management toolbar.



Note that on right clicking in the Item view area of the **RASTER DESIGN** palette, a shortcut menu will be displayed. The options displayed in this shortcut menu will depend on the option selected such as **Image Insertions / Image Data** in the Image view drop-down list. You can use the options in the shortcut menu to manage the images in the drawing.

## Tree View

The tree view in the **RASTER DESIGN** palette displays the list of images in the drawing in a hierarchical view. Figure 2-12 shows the Tree view in the **RASTER DESIGN** palette in the **Image Insertions** view.

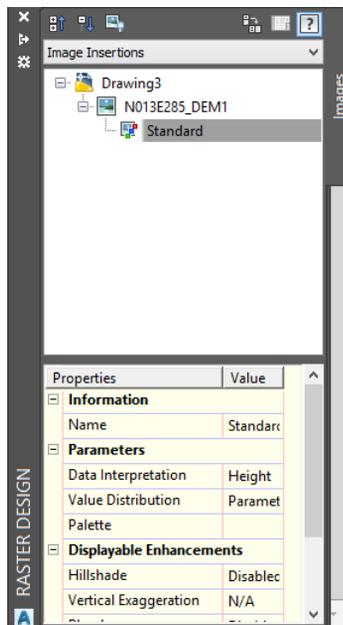


Figure 2-12 The Tree view in the **RASTER DESIGN** palette

## Item View

The Item view in the **RASTER DESIGN** palette displays the properties of the selected image in a table. You can define the display and order of the columns in the table. To do so, right click on the column name in the Item view; a shortcut menu will be displayed, as shown in Figure 2-13. Next, choose any option from the shortcut menu. On doing so, the columns related to the selected option will not be displayed in the Item view area.

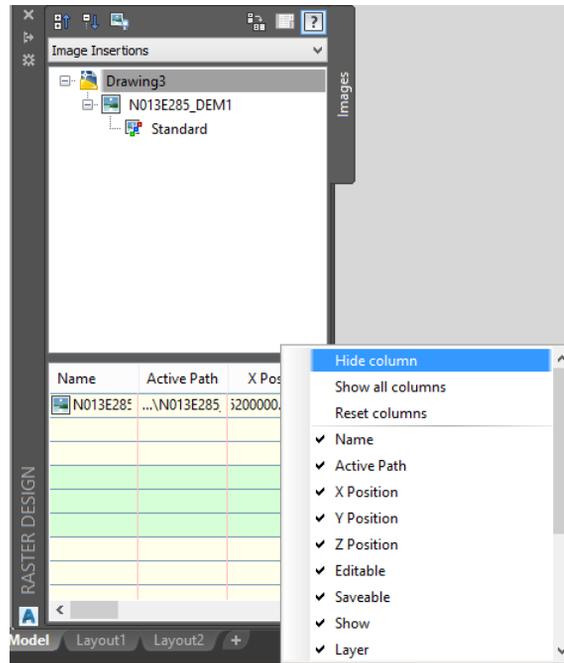
You can display the preview of the selected image in the Item view of the **RASTER DESIGN** palette. To do so, ensure that the **Image Insertions** option is selected in the Image view drop-down list. Next, choose the required image from the Tree view and then choose the **Show Image Preview** button from the Management toolbar; the preview of the selected image in the Tree view will be displayed in the Item view, as shown in Figure 2-14.



### Note

You can toggle between the table and image view in the Item view of the **RASTER DESIGN** palette only if you have selected the **Image Insertions** view option from the Image view drop-down list in the Management toolbar.

As discussed earlier, you can manage the inserted images in the drawing using the options in the **Image Insertions** view and **Image Data** view of the **RASTER DESIGN** palette. These options are discussed next.



*Figure 2-13* Shortcut menu displayed on right clicking in the Item view of the **RASTER DESIGN** palette

## Image Insertions View

To display the **Image Insertions** view, choose the **Image Insertions** option from the Image view drop-down list in the **RASTER DESIGN** palette. In this view, you can display the table or image preview in the Item view as discussed earlier.

You can also use this view for managing image insertions and their color maps. To do so, expand the drawing name node in the **RASTER DESIGN** palette; the tree view will display a list of images inserted in the current drawing, refer to Figure 2-14. Next, right click on the required image name; a shortcut menu will be displayed, as shown in Figure 2-15. The various options in this shortcut menu are discussed next.

## Properties Option

You can choose the **Properties** option from the shortcut menu to display the properties of the selected image in the **PROPERTIES** palette. Figure 2-16 displays the **PROPERTIES** palette showing properties of a raster image.

## Edit Color Map Option

You can choose the **Edit Color Map** option from the shortcut menu to edit the color map for the selected image. To do so, ensure that the **Image Insertions** option is selected in the Image view drop-down list of the **RASTER DESIGN** palette. Next, right-click on the required image; a shortcut menu will be displayed, refer to Figure 2-15. Choose the **Edit Color Map** option from the shortcut menu; the **Image Adjust** dialog box will be displayed, as shown in Figure 2-17. You can specify various image parameters using the options in this dialog box.

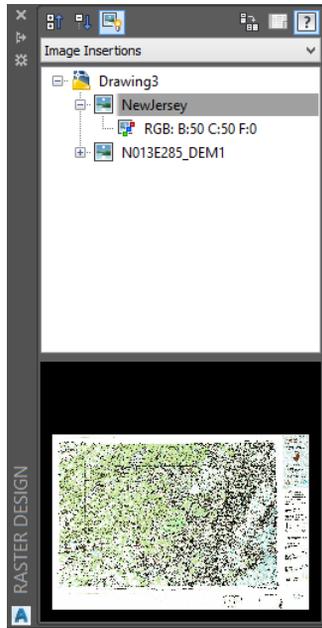


Figure 2-14 The Item view in the **RASTER DESIGN** palette displaying the preview of the selected image

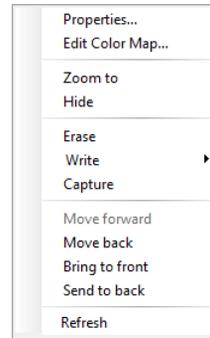


Figure 2-15 The shortcut menu displayed in the **Image Insertions** view of the **RASTER DESIGN** palette

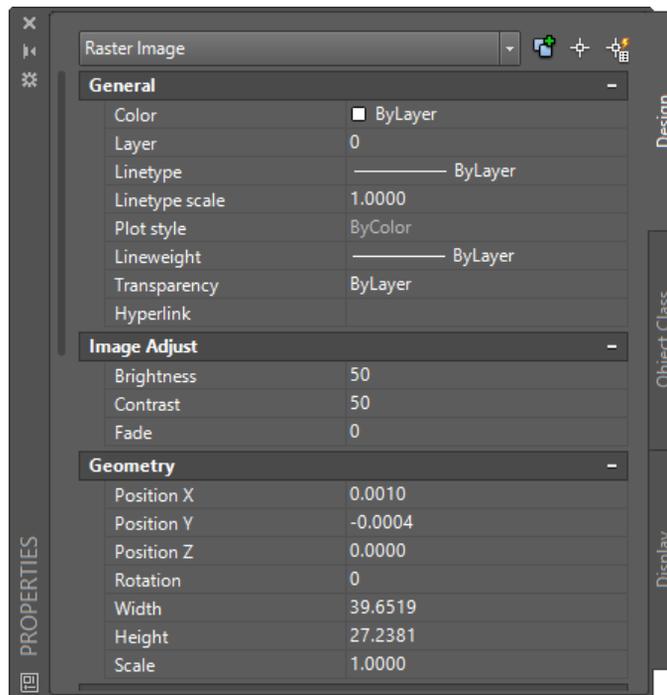


Figure 2-16 The **PROPERTIES** palette

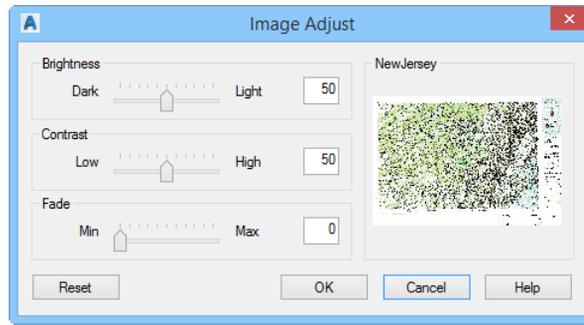


Figure 2-17 The *Image Adjust* dialog box

### Image Adjust dialog box

Using the options in this dialog box, you can adjust the brightness, contrast, and fade values of the inserted image. You can adjust the image brightness by moving the **Brightness** slider; refer to Figure 2-17. Moving the slider toward the **Dark** end will reduce the brightness. To increase the brightness, move the slider toward the **Light** end of the slider. You can also specify the brightness value by entering the required value in the corresponding edit box. Similarly, you can adjust the **Contrast** and **Fade** values of the image by using the **Contrast** and **Fade** slider in the dialog box.

On specifying the required parameters, choose the **OK** button; the specified adjustments will be applied to the image in the drawing. To reset the image adjustment parameters to the default settings, choose the **Reset** button in the **Image Adjust** dialog box; the values will be reset to default.

You can also edit the color of a bitonal image. To do so, insert a bitonal image in the drawing. Choose the **Edit Color Map** option from the shortcut menu; the **Select Color** dialog box will be displayed, as shown in Figure 2-18. You can set the color in the image using the options in this dialog box.

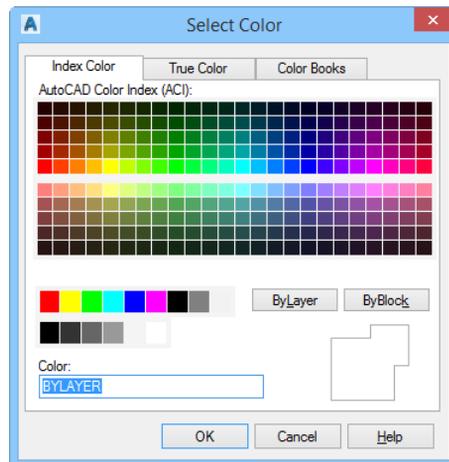


Figure 2-18 The *Select Color* dialog box

### Select Color dialog box

In this dialog box, you can specify the required color by selecting it from the **AutoCAD Color Index (ACI)** palette in the **Index Color** tab, refer to Figure 2-18.

In the **True Color** tab of this dialog box, you can also manually define and assign a color using the **Hue Saturation Luminance (HSL)** or the **Red Green Blue (RGB)** color model.

In the **Color Books** tab of this dialog box, you can specify color using third-party color books or user-defined color books.

Select the required color from the **Select Color** dialog box and then choose the **OK** button; the dialog box will be closed and the selected color will be assigned to the bitonal raster.

### Zoom to Option

You can choose the **Zoom to** option from the shortcut menu to zoom to the extents of the selected image.

### Hide/Show

You can choose the **Hide** option from the shortcut menu to switch off the display of the selected image in the drawing. On choosing this option the selected image will be hidden in the drawing. To display a hidden image, invoke the shortcut menu and then choose the **Show** option from it; the selected image will display in the drawing.



#### Note

*Hiding an image will not detach (remove) the raster image from the drawing. The **Hide** option simply turns off the display of the image in the drawing.*

### Erase Option

You can choose the **Erase** option from the shortcut menu to erase the selected image from the current drawing. On doing so, the selected image and its frame will be deleted from the current drawing and from the Tree view of the **RASTER DESIGN** palette.

If you have selected the **Always detach** radio button in the **User Preferences** tab of the **AutoCAD Raster Design Options** dialog box, then on choosing the **Erase** option in the shortcut menu, the erased image will be automatically detached from the drawing. On the other hand, if you have selected the **Ask before detach** radio button in the **AutoCAD Raster Design Options** dialog box then on choosing the **Erase** option in the shortcut menu, you will be prompted to specify whether you want to detach the erased image. If you choose not to detach the erased image, then selected image will be deleted from the drawing and from the Tree view of the **Raster Design** palette, but the Tree view of the **Image Data** view will display an unreferenced data definition.

### Write Option

You can use the **Write** option in the shortcut menu, refer to Figure 2-15, to save or export the selected image. To do so, choose the **Write** option from the shortcut menu; a cascading menu will be displayed. Choose the required option from this cascading menu to save or export the selected image.

## Capture Option

If you are unable to save or export an image, you can capture a snapshot of the image.

To do so, choose the **Capture** option from the shortcut menu; the AutoCAD Raster Design will capture the snapshot of the selected image and will also insert it into the current drawing as a new insertion. Now you can save or export this snapshot as a new image. Note that, you can also capture the snapshot of the selected image using the **Capture** tool from the **Insert & Write** panel in the **Raster Tools** tab. 

## Image Display Order Options

The shortcut menu also provides various display order options such as **Move forward**, **Move back**, **Bring to front**, and **Send to back**, refer to Figure 2-15. You can use these options to manage the display order of the selected image.

## Image Data

The **Image Data** view, refer to Figure 2-19, displays the data-centric view of the rasters in the **RASTER DESIGN** palette. You can invoke the **Image Data** view by selecting the **Image Data** option from the Image view drop-down list in the **RASTER DESIGN** palette. This view is best suited for working with image data definition and creating new image insertions. The Tree view for the **Image Data** view displays various objects and their symbols as given in Table 2-1.

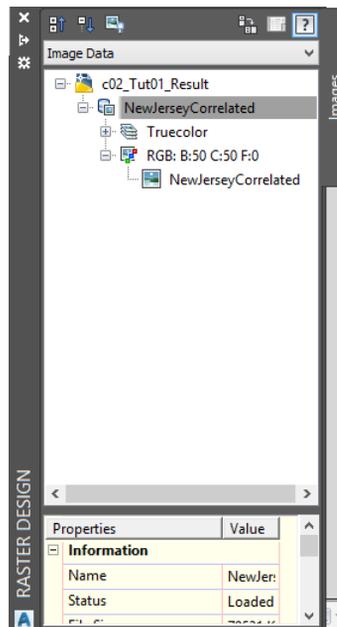
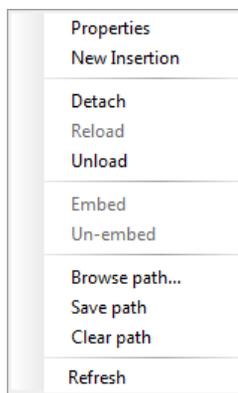


Figure 2-19 The **Image Data** view in the **RASTER DESIGN** palette

*Table 2-1 Symbols and their description in the **Image Data** view*

	<b>Image data definition</b>
	<b>Band group</b>
	<b>Band group metadata</b>
	<b>Data band</b>
	<b>Color map</b>
	<b>Image insertion</b>

To perform an action such as creating a new image insertion or detaching an image in the **Image Data** view, right click on the required image in the Tree view; a shortcut menu will be displayed, as shown in Figure 2-20. Next, you can select the required option from the shortcut menu. The options in this shortcut menu are discussed next.



*Figure 2-20 The shortcut menu displayed in the **Image Data** view of the **RASTER DESIGN** palette*

### **Properties Option**

You can choose the **Properties** option from the shortcut menu to invoke the **Data Definition** dialog box. This dialog box displays the data definition information for the selected image insertion, refer to Figure 2-21.

### **New Insertion Option**

You can choose this option from the shortcut menu to create a new insertion for the selected raster image. On choosing this option, based on the type of raster selected in the Tree view, AutoCAD Raster Design will directly create a new insertion or will prompt you to specify additional parameters for creating the insertion. The new insertion is also displayed as a node in the Tree view of the **RASTER DESIGN** palette.

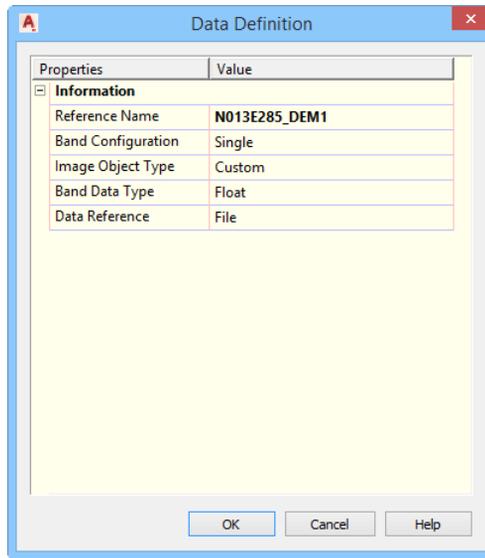


Figure 2-21 The **Data Definition** dialog box

### Detach Option

You can completely remove the image along with its data definition from the current drawing by choosing the **Detach** option from the shortcut menu. On doing so, the selected image is completely removed from the drawing and also from the **RASTER DESIGN** palette.

### Unload/Reload Options

You can choose the **Unload** option from the shortcut menu to remove the selected image from the display. Unloading an image will remove the image from the display. To reload the unloaded image, you can choose the **Reload** option from the shortcut menu.

### Browse path Option

You can invoke the **Choose a New Directory** dialog box by choosing this option from the shortcut menu. Using the options in this dialog box you can navigate to a different source file and open it.

### Save path Option

Using this option, you can save the path of the file.

### Clear path Option

You can choose the **Clear path** option from the shortcut menu to delete the saved path from the selected data definition.

## CORRELATING INSERTED IMAGES

Images inserted without specifying correlation parameters may result in placing of those images at improper location or even with incorrect scale. Sometimes, images such as scanned maps or aerial photos are distorted which may lead to incorrect results. The use of raster images inserted at the correct location and scale is more important in applications such as Geographical Information

Systems (GIS), as it requires georeferenced data for performing spatial analysis. It is therefore required that you perform image rectification so that the image is placed at the required location with the correct scale value and is free of any distortion. This can be achieved by performing various raster operations such as move, scale, and rotate. AutoCAD Raster Design also provides the **Rubber Sheet** tool using which you can georeference a raster image file for further use.

Correlating raster images can be a simple process using a single image correlation operation such as scaling or moving raster image or it can be done using a complex procedure that requires the use of multiple image correlating operations. The various methods in AutoCAD Raster Design used for correlating images are discussed next.

## Displacing an Image

**Ribbon:** Raster Tools > Correlate > Displace  
**Command:** IDISPLACE



In situations where raster image is not inserted at a required location in the drawing, you can use the **Displace** tool to move and adjust image to the required location. Note that, using the **Displace** tool will not alter the scale and rotation of the image in the drawing.

To move an image in the drawing, choose the **Displace** tool from the **Correlate** panel of the **Raster Tools** tab; you will be prompted to specify the base point for the raster image to be moved. Click at the required location to specify the base point for the image; you will be prompted to specify the destination point for moving the raster image. Click on the drawing to specify the displacement point; the selected raster image will be moved to the specified point. Figure 2-22 shows the schematic representation of moving the inserted image using the **Displace** tool.



### Note

*If a drawing contains more than one raster image, AutoCAD Raster Design will prompt you to select the raster to be moved, scaled, and matched.*

## Scaling an Image

**Ribbon:** Raster Tools > Correlate > Scale  
**Command:** ISCALE



You can use the **Scale** tool to change the scale of the inserted image. You can set the scale of an image to your desired scale value. Note that using the **Scale** tool will not change the rotation of the image in the drawing.

To change the scale of the selected image, choose the **Scale** tool from the **Correlate** panel in the **Raster Tools** tab; you will be prompted to specify the base point of the image. Click to specify the base point. Next, you will be prompted to specify the source distance. Specify the source distance by clicking on the image and then press enter. Alternatively, you can specify the source distance by clicking two points in the drawing. On specifying the source distance you will be prompted to specify the destination distance. Specify the destination distance at the Command prompt area; the image will be scaled as per the specified parameters, refer to Figure 2-23.

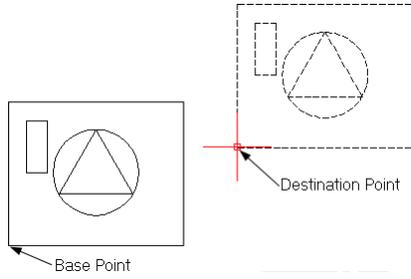


Figure 2-22 Moving the raster image

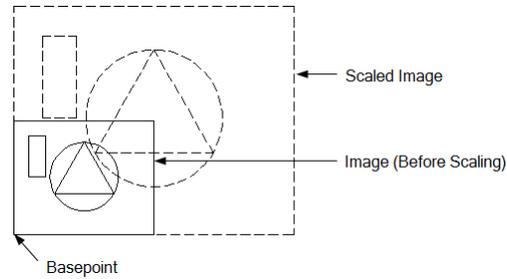


Figure 2-23 Scaling the raster image

## Matching Image Points

**Ribbon:** Raster Tools > Correlate > Match  
**Command:** IMATCH



You can use the **Match** tool to correlate a raster image by matching points between two images or between an image and the vector (CAD) data in the drawing. The **Match** tool moves, rotates, and scales the selected raster images so that the points specified on the source image coincide with the points specified on the destination data.

To correlate a raster image using the **Match** tool, choose it from the **Correlate** panel of the **Raster Tools** tab; you will be prompted to specify the source point 1 on the raster to be correlated. Click on the required point to specify the first source point; you will be prompted to specify the destination point corresponding to the first point. Click on the drawing to specify the destination point; you will be prompted to specify the second source point. Select the second source point by clicking on the required point on the raster to be correlated; you will be prompted to specify the corresponding destination point. Click on the drawing to specify the destination point; the selected raster will be moved, scaled, and rotated so that the specified source and destination points match each other. Figure 2-24 shows the process of correlating a raster image using the **Match** tool.

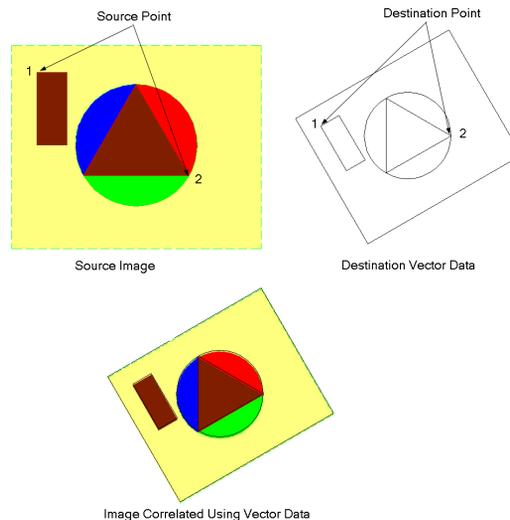


Figure 2-24 Correlating the raster image using the **Match** tool

## Rubbersheeting an Image

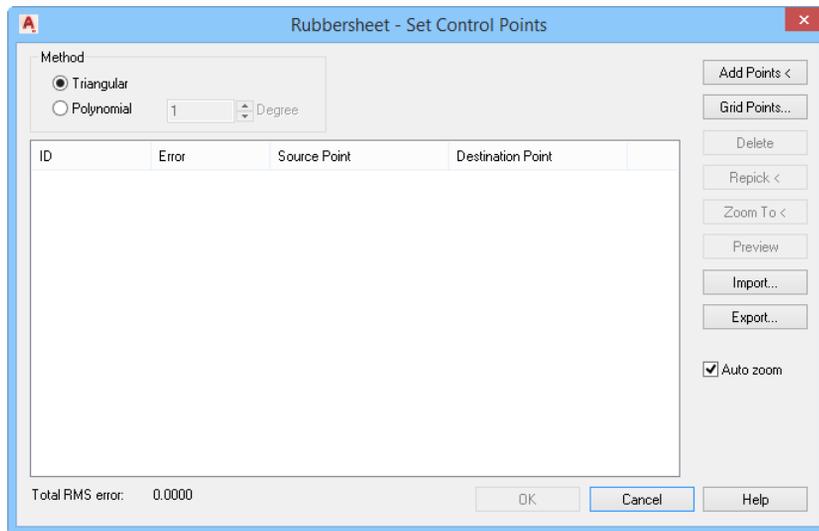
**Ribbon:** Raster Tools > Correlate > Rubber Sheet  
**Command:** IRSHEET



Sometimes you need to correct your raster images to remove distortion from the image. Distortion in the image can be parallax error, lens distortion, and unevenness of the terrain. Rubbersheet uses control points to match the source point and destination point in the drawing to remove such distortion.

The image correlation tools such as the **Displace**, **Match**, and **Scale** are useful in correlating images but are unable to remove distortion in the image. You can use the **Rubber Sheet** tool in AutoCAD Raster Design to correlate the inserted raster image in the drawing. Using this tool for image correlation, you can rectify most of the distortions in an image.

To correlate a raster image, choose the **Rubber Sheet** tool from the **Correlate** panel of the **Raster Tools** tab; the **Rubbersheet - Set Control Points** dialog box will be displayed, as shown in Figure 2-25.



*Figure 2-25 The Rubbersheet - Set Control Points dialog box*

Using the options in this dialog box, you can specify the set of points that provide the matching points between the image and the drawing. These matching points, known as control points, can be selected by picking source and destination points in the drawing. They can also be specified by using a grid of destination points. After specifying the control points, you will have to select the method of image transformation. AutoCAD Raster Design offers two methods for image transformation: **Triangular** method and **Polynomial** method. On selecting the transformation method, AutoCAD Raster Design will use the specified control points and selected image transformation method to rubbersheet the image.

The options in the **Rubbersheet - Set Control Points** dialog box are discussed next.

## Method Area

The **Method** area in the **Rubbersheet - Set Control Points** dialog box contains options for selecting the image transformation method. As explained earlier, AutoCAD Raster Design can transform an image using the Triangular or Polynomial transformation method. To choose the Triangular image transformation method, select the **Triangular** radio button in this area or choose the **Polynomial** radio button to use the Polynomial image transformation method. These transformation methods are briefly discussed next.

### Triangular Image Transformation

In the Triangular image transformation method, AutoCAD Raster Design creates triangular regions within the raster image using the control points specified by the user. To create the triangular regions, AutoCAD Raster Design uses the Denaulay Triangulation method. Next, transformation is applied to each triangular area resulting in a more accurate transformation than the polynomial image transformation method.

This method applies transformation to only that part of the image which lies within the area defined by the Denaulays triangulation. The portion of the image lying outside the triangulation is not transformed. As a result, AutoCAD Raster Design discards the image data outside the triangulated area which leads to the loss of data. To minimise the loss of data, ensure that the control points are placed as close to the image extents as possible.

### Polynomial Image Transformation

The Polynomial image transformation method transforms the entire image by matching the source and destination points as close as possible. As the transformation is applied on the entire image, this method does not result in loss of image data. However, this method does not always result in perfectly matched source and destination points. The positional error between the actual destination point (destination point on transformed image) and the destination point specified by the user is given by:

$$\text{Positional error} = \sqrt{(\Delta x + \Delta y)}$$

You can specify the polynomial degree in the **Degree** edit box corresponding to the **Polynomial** radio button. You have to specify more numbers of control points in the entire image if higher polynomial order is selected. The minimum number of control points for polynomial orders are as follows:

Polynomial Orders	Minimum Number of Control Points
1	3
2	6
3	10
4	15
5	21



#### Note

The **Degree** edit box will be activated only when you select the **Polynomial** radio button and had specified minimum six control points.

Note that, a higher polynomial degree will increase the positional accuracy of the image points at the matching locations (source point and destination points).

## Add Points

You can choose the **Add Points** button to specify the control points by selecting the source and destination points. On choosing this button, the **Rubbersheet - Set Control Points** dialog box will be closed and you will be prompted to select the first source point. Select the source point on the image by clicking at the required point; you will be prompted to specify the destination point for the selected source point. Click on the required location in the drawing; you will be prompted to select the next source point. Continue specifying the required number of control points. To end specifying control points, press ENTER; the **Rubbersheet - Set Control Points** dialog box will displayed.

Note that the control point table in the dialog box displays ID of the control points, coordinates of the source and destination points in the control point, and positional error of the control points. Figure 2-26 displays a list of control points in the **Rubbersheet - Set Control Points** dialog box.

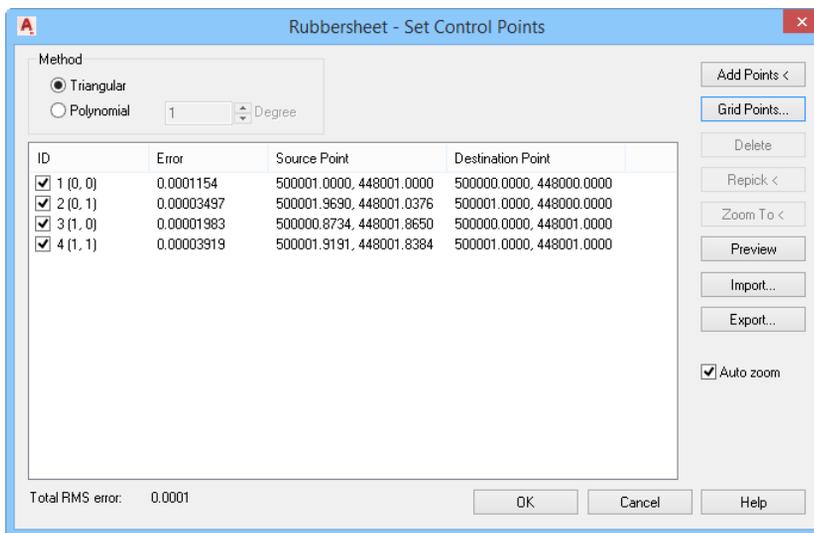


Figure 2-26 The **Rubbersheet - Set Control Points** dialog box displaying list of control points

## Grid Points

You can choose the **Grid Points** button from the **Rubbersheet - Set Control Points** dialog box to invoke the **Grid Parameters** dialog box, as shown in Figure 2-27. Using the options in this dialog box, you can create a grid of destination points and then use them to specify the control points for image transformation.

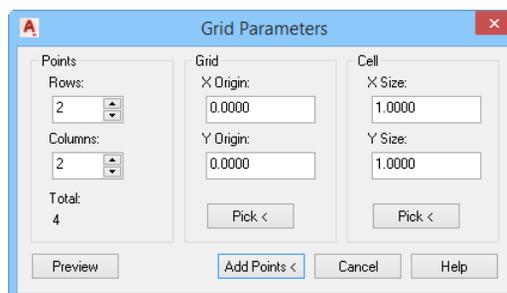


Figure 2-27 The **Grid Parameters** dialog box

### Specifying the Control Points Using the Grid of Destination Points

In this dialog box, specify the required number of rows and columns in the **Rows** and **Columns** edit boxes, respectively. Note that on doing so, the **Total** option below the **Column** edit will display the total number of control points.

Next, specify the x and y coordinates of the grid origin in the **X Origin** and **Y Origin** edit boxes, respectively. Alternatively, you can specify the grid origin by picking a point in the drawing. To do so, choose the **Pick** button in the **Grid** area of the dialog box. On choosing this button, the **Grid Parameters** dialog box will close and you will be prompted to specify the grid origin. Click on the required point in the drawing; the **Grid Parameters** dialog box will be displayed again. Note that the **X Origin** and **Y Origin** edit boxes in the dialog box now display the coordinates of the selected point.

Next, specify the values for the column and row spacing of the grid in the **X Size** and **Y Size** edit boxes, respectively. Alternatively, you can graphically specify the row and column spacing in the grid. To do so, choose the **Pick** button in the **Cell** area of the dialog box; the **Grid Parameters** dialog box will close and you will be prompted to specify the first corner point of the grid cell. Click on the drawing to specify the first corner point. On doing so, you will be prompted to specify the second corner point. Click on the drawing to specify the point. On doing so, the **Grid Parameters** dialog box will be displayed again. Note that the **X Size** and **Y Size** edit boxes in the dialog box will now display the values corresponding to the dimensions of the cell size specified graphically.

After specifying the parameters for creating the grid, you can preview the grid by choosing the **Preview** button. Next, to specify the control points using the points in the grid as the destination points, choose the **Add points** button in the **Grid Parameters** dialog box; the dialog box will close and you will be prompted to specify the source point corresponding to the selected destination point in the grid. Select the source point on the image by clicking on the required point; AutoCAD Raster design will select the next point in the grid and will prompt you to select the corresponding source point.

Continue specifying the source point for all the destination points in the grid. After the source points for the destination points in the grid are specified, the **Rubbersheet - Set Control Points** dialog box will be displayed again.

### Delete

You can choose the **Delete** button to remove (delete) a control point from the **Rubbersheet - Set Control Points** dialog box. Note that the **Delete** button will be activated only after you select a control point from the control point table.

### Repick

You can choose the **Repick** button to edit an existing control point. To do so, select the required control point from the control point table in the **Rubbersheet - Set Control Points** dialog box; the **Repick** button will be activated. Choose this button; the **Rubbersheet - Set Control Points** dialog box will be closed and you will be prompted to specify the source point for the selected control point. Click on the drawing to specify the source point for the control point; you will be prompted to specify the destination point for the control point. Click on the drawing to specify the destination point; the **Rubbersheet - Set Control Points** dialog box will be displayed with the updated source and destination point for the selected control point.

**Tip**

To edit multiple control points, select the required control points in the **Rubbersheet - Set Control Points** dialog box and then choose the **Repick** button. On doing so, you will be prompted to specify the source and destination points for the selected control points.

**Preview**

You can preview the result of rubbersheet by choosing the **Preview** button from the **Rubbersheet - Set Control Points** dialog box. On choosing the button, the dialog box will close and the preview of the rubbersheet will be displayed in the drawing window. To end the display of preview, press ENTER.

**Import**

You can import a set of control points that are saved in a text (.txt) file. To do so, choose the **Import** button from the **Rubbersheet - Set Control Points** dialog box; the **Import** dialog box will be displayed. Use the options in this dialog box to browse and choose the text file that contains list of the saved control points. Next, choose the **Open** button; the **Import** dialog box will close and list of control points will be displayed in the control points table of the **Rubbersheet - Set Control Points** dialog box.

**Export**

You can also save the control points that are specified in the control points table of the **Rubbersheet - Set Control Points** dialog box as a text file. To do so, choose the **Export** button; the **Export** dialog box will be displayed. In this box, specify the path and name of the text file into which you want to export the control points and then choose the **Export** button, the control points will be exported to the specified file.

**Auto zoom**

You can select the **Auto zoom** check box to enable AutoCAD Raster design to zoom to the selected control point on choosing the **Repick** button.

After specifying the required control points, choose the **OK** button; the **Rubbersheet - Set Control Points** dialog box will be closed and the image will be transformed using the specified options.

**TUTORIAL**

Before starting the tutorials, you need to download and save the tutorial files on your computer. To do so, follow the steps given below:

1. Navigate to C drive in your system and create a folder with the name *AutoCADRasterDesign2017*.
2. Download the *c02\_rd\_2017\_tut.zip* file from <http://www.cadcim.com>. The path of the file is as follows:  
*Textbooks > Civil/GIS > AutoCAD Raster Design > Exploring AutoCAD Raster Design 2017*

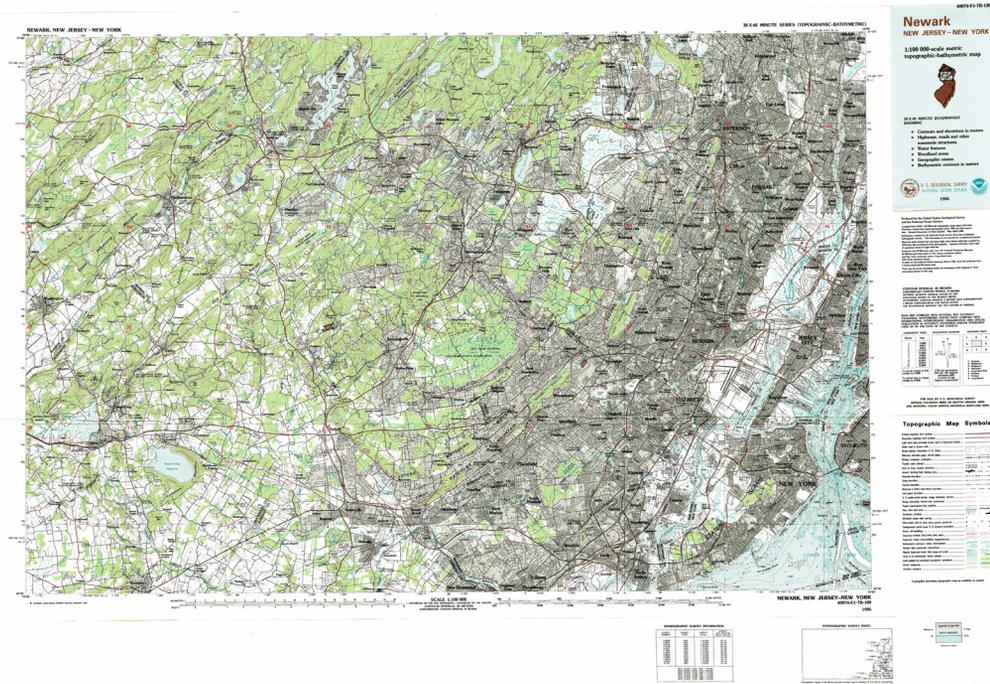
- Now, save and extract the downloaded folder at the following location:

*C:\AutoCADRasterDesign2017*

Notice that *c02\_rd\_2017\_tut* folder is created within the *AutoCADRasterDesign2017* folder.

## Tutorial 1 Insert and Rubbersheet Raster Image

In this tutorial, you will start the AutoCAD Raster Design application and then insert a raster image using the **Insert** tool. Figure 2-28 shows the raster image to be inserted. Next, you will specify the control points for rubbersheeting the raster image. You will also export list of the specified control points as a text file. **(Expected time: 30 min)**



*Figure 2-28 The Newark (New Jersey-New York) area toposheet*

The following steps are required to complete this tutorial:

- Start the base application and open the drawing file.
- Insert the raster image.
- Rubbersheet the raster image.
- Save the drawing file and the correlated raster image.

### Starting the Base Application and Opening the Drawing File

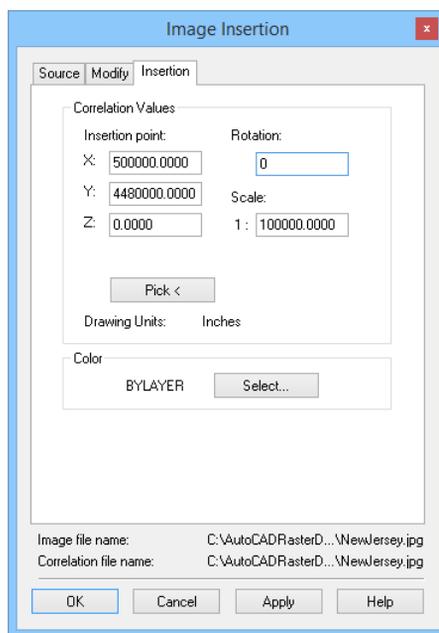
- Start AutoCAD Raster Design and then choose the **Open** button from the Application menu; the **Select File** dialog box is displayed.

- In this dialog box, browse to the location `C:\AutoCADRasterDesign2017\c02_rd_2017_tut\c02_tut01`, select the `c02_Tut01.dwg` file and then choose the **Open** button. Drawing file with **UTM27-18** coordinate system assigned is opened.

## Inserting the Raster Image

In this section you will learn to insert a raster image into the drawing using the **Insert** tool of AutoCAD Raster Design.

- Choose the **Insert** tool from the **Insert & Write** panel in the **Raster Tools** tab; the **Insert Image** dialog box is displayed. 
- In this dialog box, select the **Insertion dialog** radio button from the **Insert Options** area.
- Next, browse to the location `C:\AutoCADRasterDesign2017\c02_rd_2017_tut\c02_tut01` from **Look in** text box and then choose the `NewJersey.jpg` file.
- Next, choose the **Open** button; the **Insert Image** dialog box is closed and the **Image Insertion** dialog box is displayed.
- Ensure that the **Insertion** tab is chosen.
- In this dialog box, specify the correlation parameters, as shown in Figure 2-29.



*Figure 2-29 The Image Insertion dialog box with the parameters specified for image insertion*

- Choose the **OK** button; the **Image Insertion** dialog box is closed and the raster image is inserted in the drawing using the specified settings.

8. Next, enter **Z** in the Command prompt area and press ENTER; you are prompted to specify the zoom option.
9. Specify **E** and then press ENTER; the drawing will zoom to its extents.

Note that the raster image is a topomap of the New Jersey area. It also has various markings showing the map grid. You will use the intersection of the 10000 meter grid lines (labeled in red colored numbers) to specify the control points for transforming the raster image.



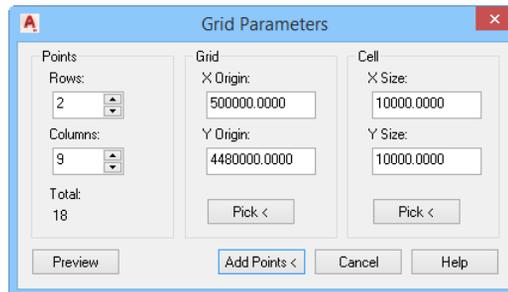
### Note

You can also use the **Extents** tool from the Navigation Bar to zoom to the extent of the drawing.  Extents

## Rubbersheeting the Raster Image

In this part of the tutorial, you will rubbersheet the raster image using the Polynomial image transformation method. Note that you will use the grid to specify the control points for transforming the image.

1. Choose the **Rubber Sheet** tool from the **Correlate** panel of the **Raster Tools** tab; the **Rubbersheet - Set Control Points** dialog box is displayed. 
2. Choose the **Grid Points** button; the **Rubbersheet - Set Control Points** dialog box is closed and the **Grid Parameters** dialog box is displayed.
3. In this dialog box, enter value for the different parameters in their corresponding edit boxes, as shown in Figure 2-30.



*Figure 2-30 The Grid Parameters dialog box with the parameters for creating grid*

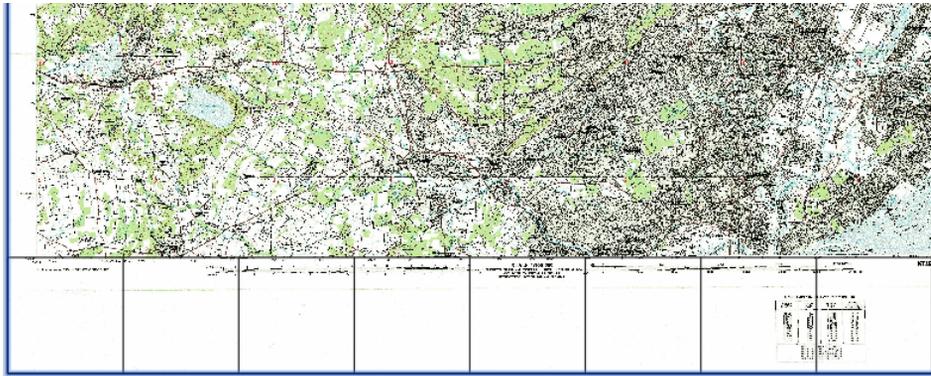
4. Next, choose the **Preview** button in the **Grid Parameters** dialog box; the dialog box is closed and preview of the grid is displayed in the drawing area as shown in Figure 2-31.



### Note

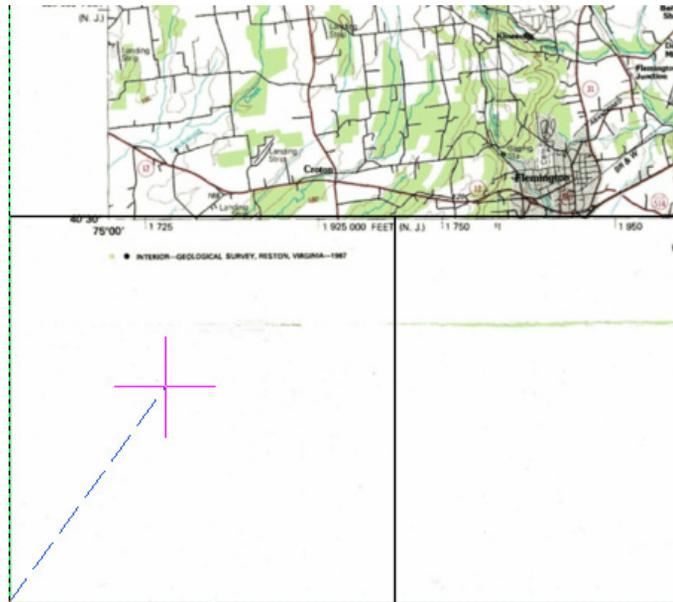
The grid is displayed in white color by default. You can change the grid color by choosing **Color of a layer** from the **AutoCAD Layers** panel of the **Home** tab.

5. Press the ESC key to close the preview mode of the grid.  
Now you will specify the control points for rubbersheeting the raster image.



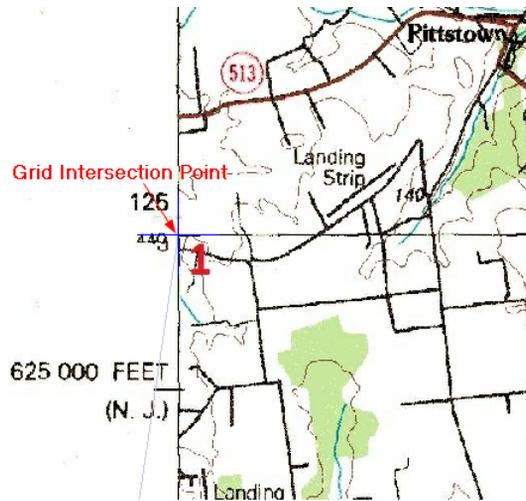
*Figure 2-31 The preview of the grid displayed in the drawing area*

6. Choose the **Add Points** button; the **Grid Parameters** dialog box is closed and you are prompted to specify the source point as 0,0. Notice that the destination point is at the bottom left corner of the grid and the cursor is attached to this point, as shown in Figure 2-32.



*Figure 2-32 The cursor attached to the destination point on the grid*

7. Move the cursor to the grid intersection 1 indicated by red color on the raster image. Figure 2-33 shows an enlarged view of the raster at grid intersection 1. Next, click on the intersection; the cursor now snaps to the next point on the grid and you are prompted to specify the source point for the selected point.



*Figure 2-33 The enlarged view of the raster image at grid intersection 1*



**Tip**

For precisely specifying the source point on the raster image, zoom in to the drawing. You can use the mouse roller to zoom in and out of the drawing.



**Note**

The source points should be specified with utmost care and precision as they affect the accuracy of the result while rubbersheeting.

8. Similarly, click on the grid intersection 2 on the raster, as shown in Figure 2-34; you will be prompted to specify the source point for the next grid point.



*Figure 2-34 The enlarged view of the raster image at grid intersection 2*

9. Continue specifying source points from grid intersection marked 3 to grid intersection marked 18. On specifying the 18th intersection point, the **Rubbersheet- Set Control Points** dialog box is displayed with specified control points, as shown in Figure 2-35.

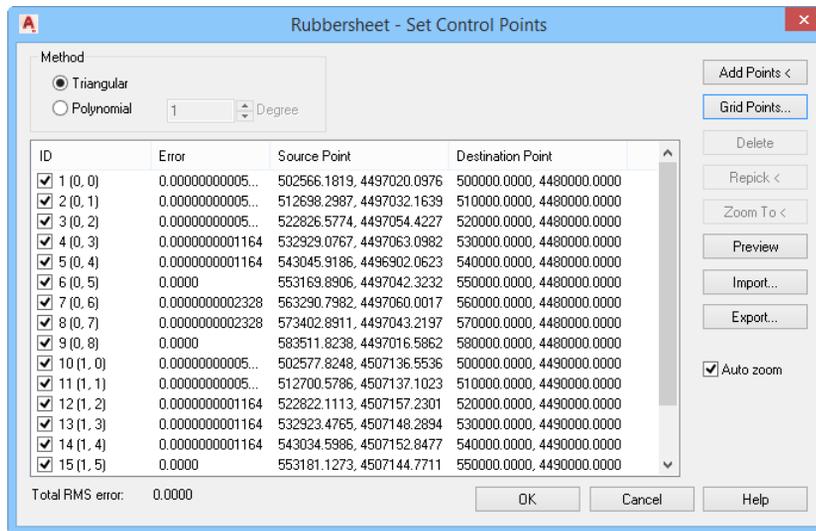


Figure 2-35 The *Rubbersheet - Set Control Points* dialog box with the list of specified control points

Note that the dialog box now displays the list of the control points and their parameters.



#### Note

The **Total RMS error** depends on the users precision on specifying the points in the image.

Next, you will export the specified control points as a text file.

10. Choose the **Export** button; the **Export** dialog box is displayed.
11. In this dialog box, browse to the location `C:\AutoCADRasterDesign2017\c02_rd_2017_tut\c02_tut01`.
12. Next, specify the name **NewJerseyControlPoints** in the **File name** edit box and then choose the **Export** button; the **Export** dialog box is closed and the control points are exported as a text file to the specified location and the **Rubbersheet - Set Control Points** dialog box is displayed.
13. In the **Rubbersheet - Set Control Points** dialog box, make sure that the **Polynomial** radio button is selected and then choose the **OK** button; the dialog box is closed and toposheet is rubbersheeted.



#### Note

The process of rubbersheeting is a resource intensive process and may take some time depending on the configuration of your computer. The progress of the process is displayed at the bottom right of the user interface.

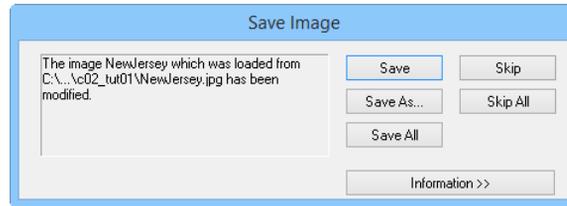
## Saving the File

1. Choose the **Save As** option from the **Application Menu**; the **Save Drawing As** dialog box is displayed.

- In this dialog box, browse to the following location:

*C:\AutoCADRasterDesign2017\c02\_rd\_2017\_tut\c02\_tut01*

- In the **File name** edit box, enter **c02\_Tut01\_Result**.
- Choose the **Save** button; the dialog box is closed and drawing file is saved with the name **c02\_Tut01\_Result.dwg** at the specified location. Also, the **Save Image** dialog box is displayed, as shown in Figure 2-36, informing you that the raster image in the drawing has been modified.

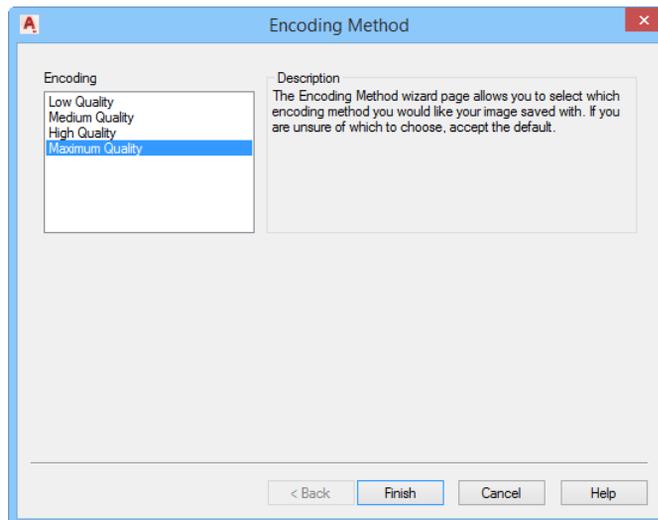


*Figure 2-36 The Save Image dialog box*

- Choose the **Save As** button from the dialog box; the **Save As** dialog is displayed.
- In this dialog box, browse to the following location:

*C:\AutoCADRasterDesign2017\c02\_rd\_2017\_tut\c02\_tut01*

- In the **File name** edit box, enter **NewJerseyCorrelated**.
- Ensure that the **JPEG File Interchange Format (\*.jpg, \*.jpeg)** option is selected from the **Files of types** drop-down list and then choose the **Save** button; the **Save As** dialog box is closed and the **Encoding Method** dialog box is displayed, as shown in Figure 2-37.



*Figure 2-37 The Encoding Method dialog box*

9. Choose the **Maximum Quality** option from the **Encoding** list in this dialog box and then choose the **Finish** button; the raster image is exported to the specified location.

### **Self-Evaluation Test**

Answer the following questions and then compare them to those given at the end of this chapter:

- Which of the following options can be chosen to insert a raster image into the drawing?
  - Quick insert**
  - Insertion wizard**
  - Insertion dialog**
  - All of the above
- Which of the following correlation methods result in the loss of image data due to image transformation?
  - Triangular**
  - Match**
  - Polynomial**
  - All of the above
- The second degree Polynomial image transformation method requires a minimum of \_\_\_\_\_ number of control points to transform a raster image.
- In the Triangular image transformation method, AutoCAD Raster design creates triangular regions using the \_\_\_\_\_ triangulation method.
- You can choose the \_\_\_\_\_ button from the **Rubbersheet - Set Control Points** dialog box to edit an existing control point.
- You can use the options in the **Grid Parameters** dialog box to specify the parameters for creating grid. (T/F)
- You can select the **Quick insert** radio button in the **Insert Image** dialog box to directly insert a selected image into the given drawing. (T/F)
- AutoCAD Raster design allows you to adjust the brightness, fade, and contrast of a raster image. (T/F)
- You can use the options in the **RASTER DESIGN** palette to manage the inserted rasters in your drawings. (T/F)
- You can choose the **Scale** tool from the **Correlate** panel of the **Raster Tools** tab to change the scale of the inserted image. (T/F)

## Review Questions

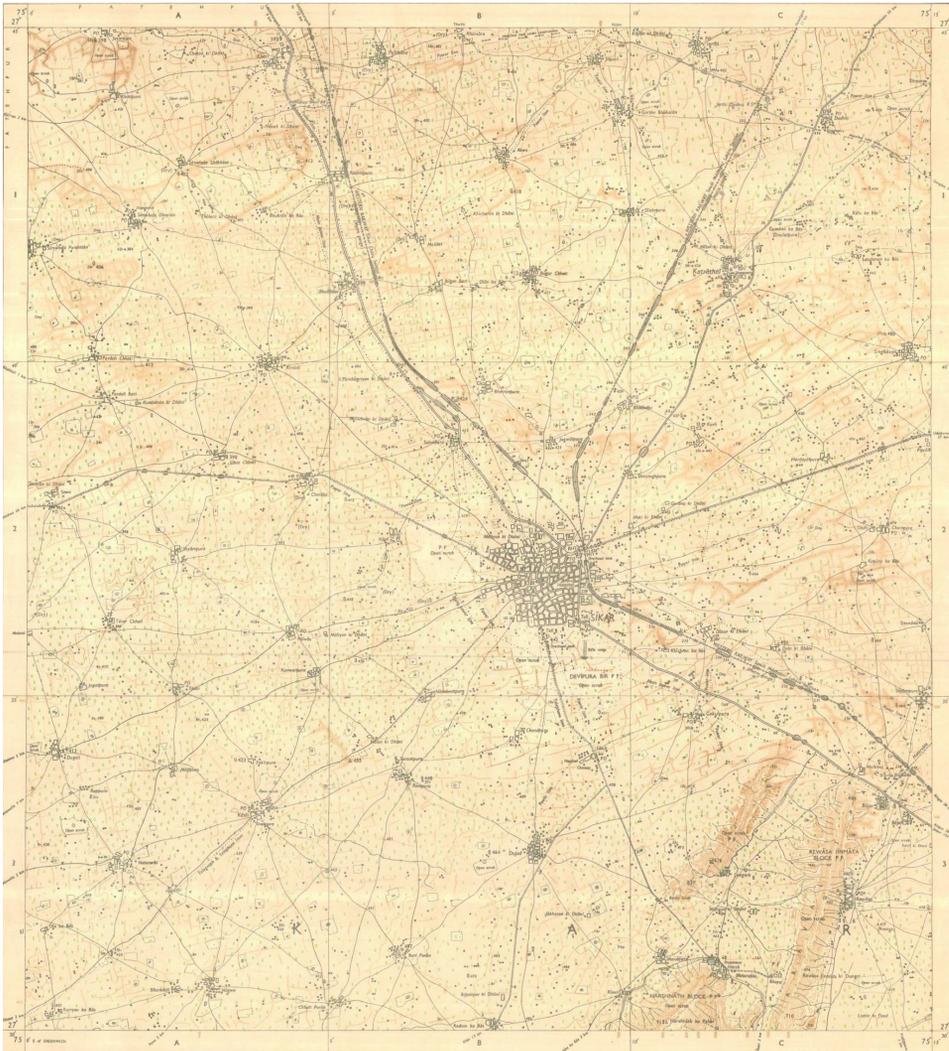
Answer the following questions:

1. The **RASTER DESIGN** palette display a list of images in the drawing in a \_\_\_\_\_ view.
2. To edit multiple control points in the **Rubbersheet - Set Control Points** dialog box you need to choose the \_\_\_\_\_ button.
3. You can save the control points as a text file by choosing the \_\_\_\_\_ button from the **Rubbersheet - Set Control Points** dialog box.
4. The **Item view** in the **RASTER DESIGN** palette displays the properties of the selected image in a table. (T/F)
5. You can use the **Pick** button from the **Grid Parameters** dialog box to specify the control points using the points in the grid as the destination points. (T/F)
6. AutoCAD Raster Design does not facilitate you to import control points that are defined in an external text (.txt) file. (T/F)
7. You need to select an image to scale by clicking on its image frame. (T/F)
8. You can select a point on the image frame by using the **Object Snap** option. (T/F)

## EXERCISE

### Exercise 1

Download the *c02\_rd\_2017\_exr.zip* from <http://www.cadcim.com> and rubbersheet the *exr\_2.jpg* raster image, refer to Figure 2-38. **(Expected time: 30 min)**



*Figure 2-38* Image on which rubbersheet has to be performed

**Answers to Self-Evaluation Test**

1. d, 2. a, 3. six, 4. Denaulay, 5. Repick <, 6. T, 7. T, 8. T, 9. T, 10. T