Chapter 2

Getting Started with AutoCAD MEP

Learning Objectives

After completing this chapter, you will be able to:

- *Understand the workflow path*
- *Use the Project Browser*
- *Understand the concept of space*
- *Specify the space object settings*
- *Work with space styles and tools*
- *Understand the concept of zones*
- *Switch Workspaces in MEP*

INTRODUCTION

AutoCAD MEP, a software based on AutoCAD platform, is used to design, draft, and document electrical, mechanical, and piping system of buildings. The first step while creating such a system is to create a project. Thereafter drawings are added to this project to represent various components of the building like electrical system, ducts, and so on. These drawings are then arranged according to the workflow of the project.

WORKFLOW

Workflow is a sequence of connected steps required to create a specific type of system. It is dependent on the system to be created. For example, for an HVAC system, the workflow is shown in Figure 2-1. The steps involved in this workflow are discussed next.

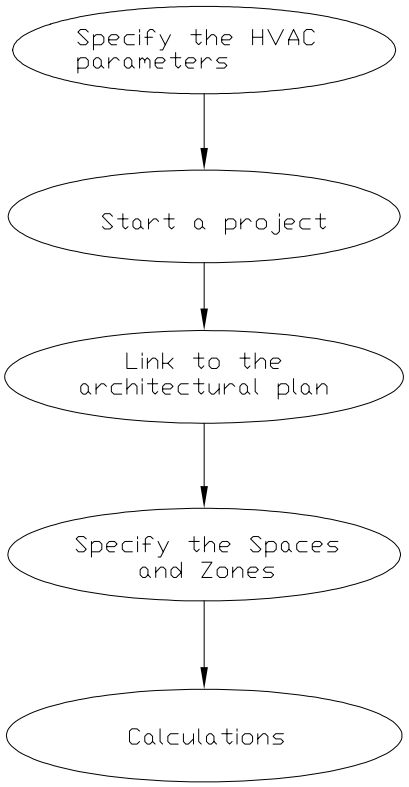

Figure 2-1 *Workflow for an HVAC system in AutoCAD MEP*

Specifying the HVAC Parameters

In this step, you need to specify all the parameters required to create an HVAC system. Some of the parameters are duct size, duct rise and drop, flow rate, cut length, and so on. On the basis of these parameters, the hierarchy of drawings in project will be decided.

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Starting a Project

In this step, you need to create a project file to link the drawings of a system to each other. For example, the drawings related to HVAC system will be interlinked and will be in the same project. As a result, you can easily manipulate the parameters of the system.

Linking System File to the Architectural Plan

To create an HVAC system, you need to have an architectural plan. In this step, you will link the HVAC system file to the architectural plan file using the **PROJECT NAVIGATOR**. After the completion of this step, you can reroute the HVAC lines according to the architectural plan.

Specifying Spaces and Zones

In this step, you need to create spaces and zones using the tools available in AutoCAD MEP. These spaces are used for exporting the building information related to the heating and cooling loads. The spaces are further divided into zones which represent the actual heating and cooling loads.

Calculating Loads

In this step, you need to calculate the heating and cooling loads for the building. These calculations are performed by using the analysis tools available in AutoCAD MEP.



Note

In this textbook, the global unit system is followed, therefore you need to start AutoCAD MEP 2020 by double-clicking on the AutoCAD MEP 2020 - English (Global) icon available on the desktop.

PROJECT BROWSER

The **Project Browser** is used to manage project files. A project file contains the record of drawing files related to a category. For example, a building project file may have a record of drawing files related to piping, electrical, and different types of floors. You can create a new project file by using the options available in the **Project Browser**. Also, you can configure an existing project file. The **Project Browser** can be invoked by entering the **PROJECTBROWSER** command at the command prompt or by using the **Application** Menu. To invoke it from the **Application** Menu, hover the cursor on the **Open** option in the menu; a flyout will be displayed. Choose the **Project** button from the flyout; the **Project Browser** will be displayed, as shown in Figure 2-2.

In the **Project Browser**, the list of projects available in the selected directory is displayed in the left pane of the **Project Browser**. To change the current directory, click on **My Projects** from the left area of the dialog box; a drop-down list will be displayed having shortcuts to some common directories such as Documents and Desktop. Using these shortcuts, browse to the desired directory and select the category as the current directory; all the projects available in the selected directory will be displayed in the left pane of the **Project Browser**. In addition to the existing projects, you can also create a new project file by using the options available in the **Project Browser**. The procedure to create a new project file is discussed next.

Creating a New Project File

A new project file can be created by using the **New Project** tool available at the bottom left corner of the **Project Browser**. On choosing this tool, the **Add Project** dialog box will be displayed, as shown in Figure 2-3.

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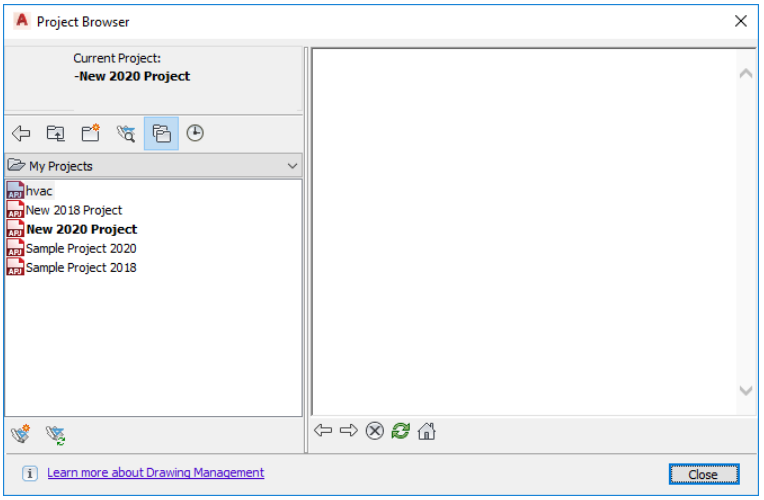

Figure 2-2 *The* ***Project Browser***

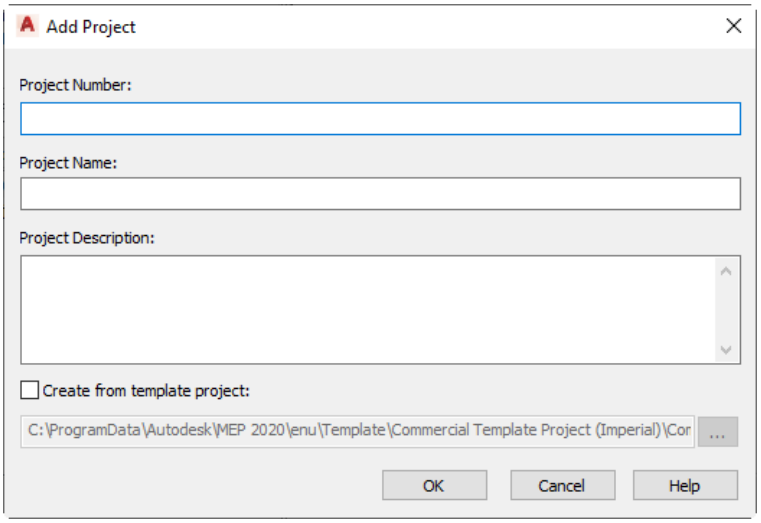

Figure 2-3 *The* ***Add Project*** *dialog box*

There are three edit boxes available in this dialog box namely: **Project Number**, **Project Name**, and **Project Description**. The **Project Number** edit box is used to specify a unique number for the project file. The **Project Name** edit box is used to specify the name for the project file. The **Project Description** edit box is used to specify the description about the project file. You can use any of standard templates for the project. To do so, select the **Create from template project** check box from the **Add Project** dialog box if not already selected; the edit box below the check box will be activated. Next, choose the **Browse** button available next to the edit box activated; the **Select Project** dialog box will be displayed, as shown in Figure 2-4.

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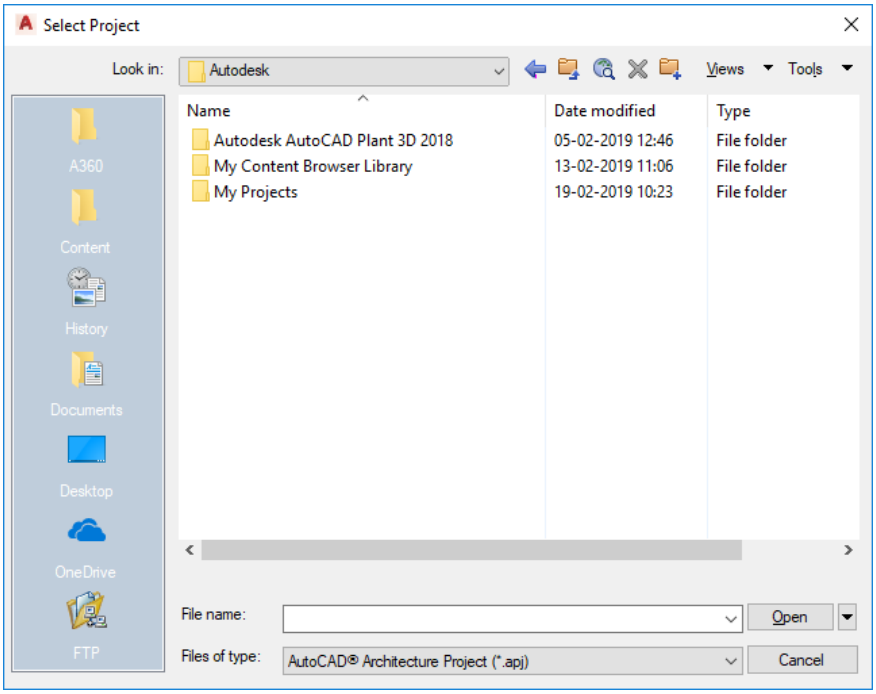

Figure 2-4 *The* ***Select Project*** *dialog box*

Browse to the location where template files are stored and then choose the **Open** button after selecting the desired template file. The selected template file will be used for the current project. Note that in this textbook, the standard template used is *Commercial Template Project (Metric).apj*. To select the template, browse to the location *C:\ProgramData\Autodesk\MEP 2020\enu\Template\Commercial Template Project (Metric)* and then select the *Commercial Template Project (Metric)* template file. Next, choose the **Open** button; the path of the selected file will be added to the edit box displayed below the **Create from template project** check box. Specify the name of project in the **Project Name** edit box and choose the **OK** button from the **Add Project** dialog box; a project file with the specified name will be created and also a copy of drawing files in the template project will be created in the new project folder. The extension of the project file is *.apt*. Now, close the **Project Browser** by choosing the **Close** button. On closing the **Project Browser**, the **PROJECT NAVIGATOR** will be displayed, refer to Figure 2-5.

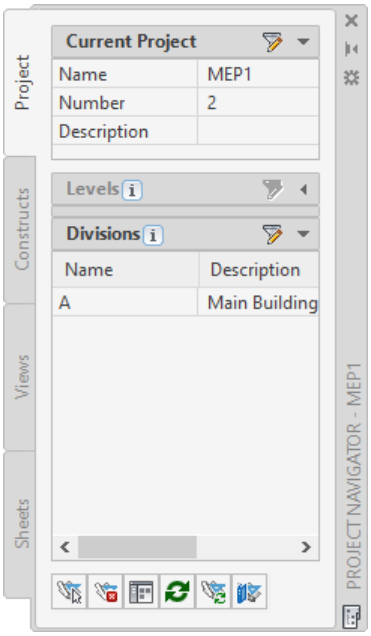

Figure 2-5 *The* ***PROJECT NAVIGATOR***

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PROJECT NAVIGATOR

The **PROJECT NAVIGATOR** is used to navigate the drawing files of a project. Using the **PROJECT NAVIGATOR**, you can edit or create building drawings and other documentation data. The **PROJECT NAVIGATOR** has four tabs: **Project**, **Constructs**, **Views**, and **Sheets**. These tabs are discussed next.

Project Tab

The **Project** tab has three areas. These areas display the information about project name, number of levels in the building, and divisions of building of the project. The tools available at the bottom of the **PROJECT NAVIGATOR** are used to configure the project. The areas and the options available in the **Project** tab are discussed next.

Current Project

The **Current Project** area is used to store the project file name, project file number, and description of the project.

Levels

The **Levels** area contains information of various levels used in the project file. In case of AutoCAD MEP, level refers to floor. In this area, level names are displayed in the **Name** column and their corresponding height values are displayed in the **Elevation** column.

Divisions Area

The **Divisions** area contains information of various divisions of the building. A division of the building refers to its different segments and each segment contains its own name.

Project Browser



The **Project Browser** tool is used to invoke the **Project Browser** dialog box. This dialog box has already been discussed.

Close Current Project



The **Close Current Project** tool is used to close the current project file as well as the **PROJECT NAVIGATOR**. The tool palette opened in the current project will also get closed.

Content Browser



The **Content Browser** tool is used to display the content browser library of catalogs that allows you to store, share and exchange the AutoCAD Architecture contents, tools, and tool palettes. When you invoke the **Contents Browser** tool, the **Autodesk Content Browser 2020** window is displayed. as shown in Figure 2-6. By default, the items provided by the Autodesk supplied tools catalogs will be displayed in the **Autodesk Content Browser 2020** window. You can also create your own tools catalogs and can also copy other tool catalogs into your catalog library. The existing catalog library or website links also can be added into the **Autodesk Content Browser 2020** window. To create new catalog or to add an existing library, choose the **Click to add or create a catalog** button available in the bottom left corner of the dialog box; the **Add Catalog** dialog box will be displayed. Using this dialog box you can add or create new catalogs. When you double-click on the any of the standard catalogs in the **Autodesk Content Browser 2020** window, different catagories related to that catalog will be displayed, refer to Figure 2-7.

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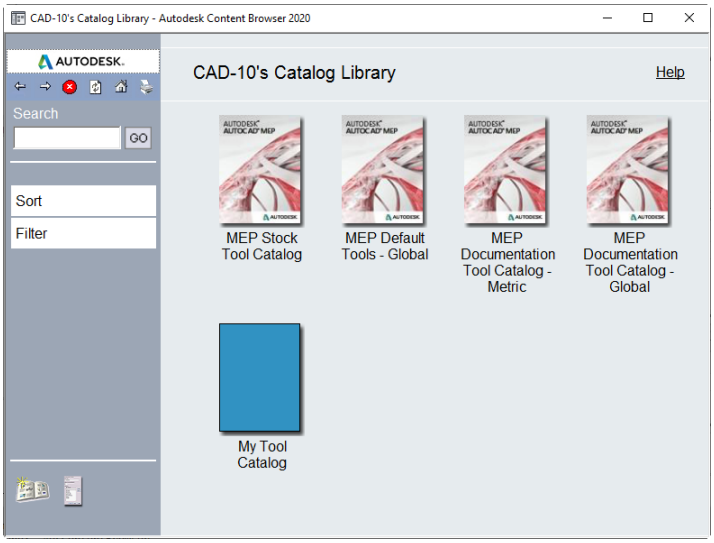

Figure 2-6 *The* ***Autodesk Content Browser 2020*** *window*

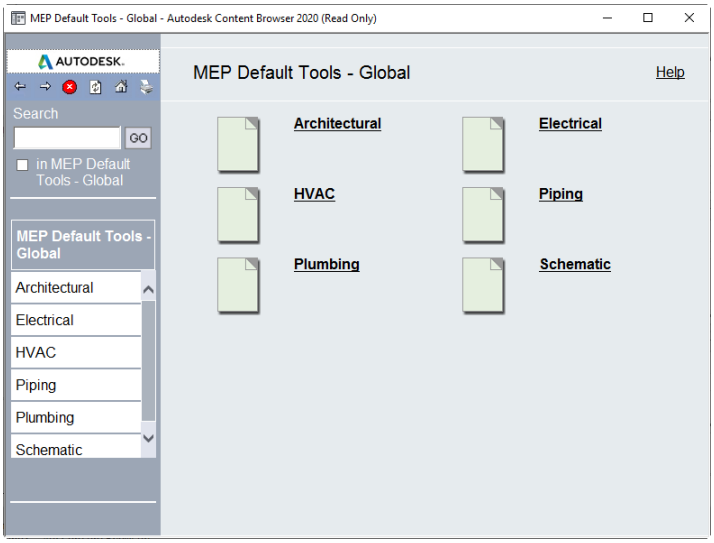

Figure 2-7 *The* ***Autodesk Content Browser 2020*** *window displaying component categories*

When you click on any of the categories shown in Figure 2-7, the palettes related to that category will be displayed in the **Autodesk Content Browser** window, refer to Figure 2-8. When you click on any of the palettes shown in Figure 2-8; the components related to that palette will be displayed in the **Autodesk Content Browser 2020** window, refer to Figure 2-9. You can import any of the components tool available in **Autodesk Content Browser 2020** to the **TOOL PALETTES**. To do so, press and hold the left mouse button on the icon of the component and then drag it to the **TOOL PALETTES**. The component will be placed in the **TOOL PALETTES**.

Note

The ***Tool Palettes*** *will be displayed only when you are in the Drawing environment.*

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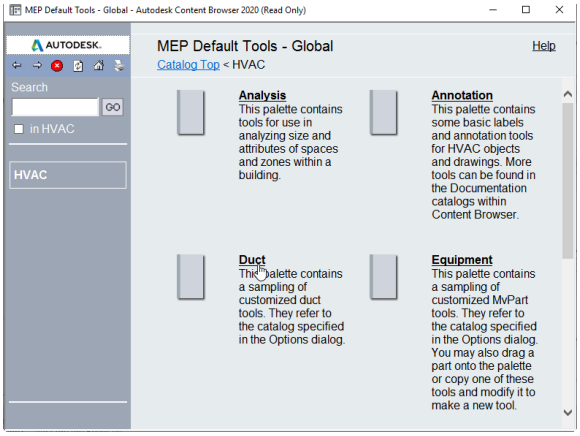

Figure 2-8 *The* ***Autodesk Content Browser 2020*** *window displaying component palettes*

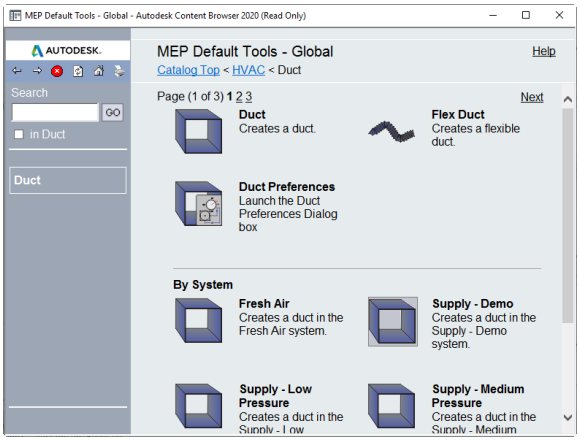

Figure 2-9 *The* ***Autodesk Content Browser 2020*** *window displaying component categories*

Synchronize Projects

The **Synchronize Projects** tool is used to synchronize the current project with the AEC project standards. To synchronize the project, choose the **Synchronize Projects** tool available at the bottom of the **PROJECT NAVIGATOR**. On doing so, the **Analyzing Project Drawings** window will be displayed showing the progress of synchronization of drawing files. When all the drawing files are synchronized to the AEC Project standards, the **Synchronize Project with Project Standards** dialog box will be displayed, refer to Figure 2-10. The upper half of the dialog box shows the objects in the drawing file of the project that do not match with the AEC Project standards and can be updated from the standards. The lower half shows the files that are not present in the project standards and can be skipped or ignored while synchronizing the project by selecting the appropriate option from the **Action** drop-down list.

The drawing files available in the current project are displayed in the **Host Drawing** column of this dialog box. For every file, the status for the availability of the updated version is displayed in the **Status** column of the dialog box. You can synchronize the drawing files which show **Newer Version** in their **Status** column. To synchronize a drawing file, click on its corresponding field in

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the **Action** column; a drop-down list will be displayed, refer to Figure 2-10. Select the **Update from Standard** option from the drop-down list; the selected file will be synchronized. Similarly, you can synchronize more than one file at a time by pressing and holding the CTRL key while selecting the files.

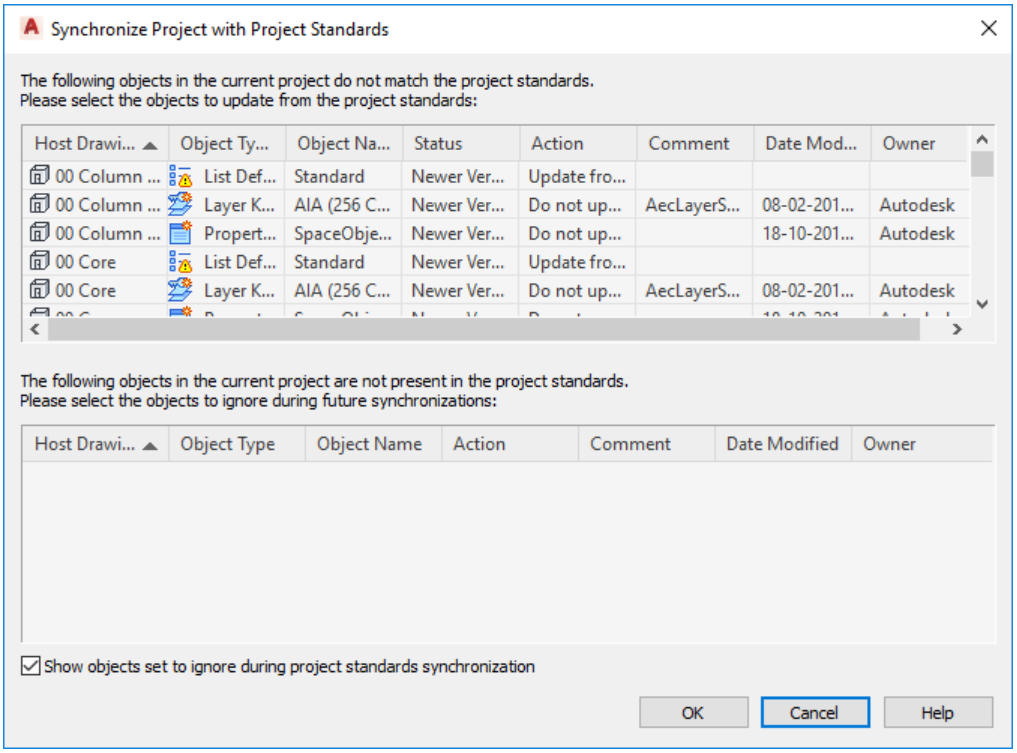

Figure 2-10 *The* ***Synchronize Project with Project Standards*** *dialog box*

Configure Project Standards

The **Configure Project Standards** tool is used to set up the project standard. These project standards are used to synchronize the project drawings. When you choose this tool, the **Configure AEC Project Standards** dialog box will be displayed, refer to Figure 2-11. The **Standard Styles** tab is chosen by default in the dialog box. You can standardize any of the objects available in the **Objects** list of this tab by selecting the check box corresponding to the object in the dialog box. If you choose the **Synchronization** tab, three radio buttons will be displayed: **Automatic**, **Semi-automatic**, and **Manual**.

The **Manual** radio button is selected by default. As a result, project drawings will not be synchronized with the project standards automatically and you would need to synchronize them manually. If you select the **Semi-automatic** radio button, the project standards will be applied only when the project drawing is opened. Also, you will be prompted to apply project standard on each opened project drawing. If you select the **Automatic** radio button, the project standards will be applied on each opened drawing without any prompt. Using the options in the **AutoCAD Standards** tab, you can load any AutoCAD Standard file to apply it as a standard on the project drawings.

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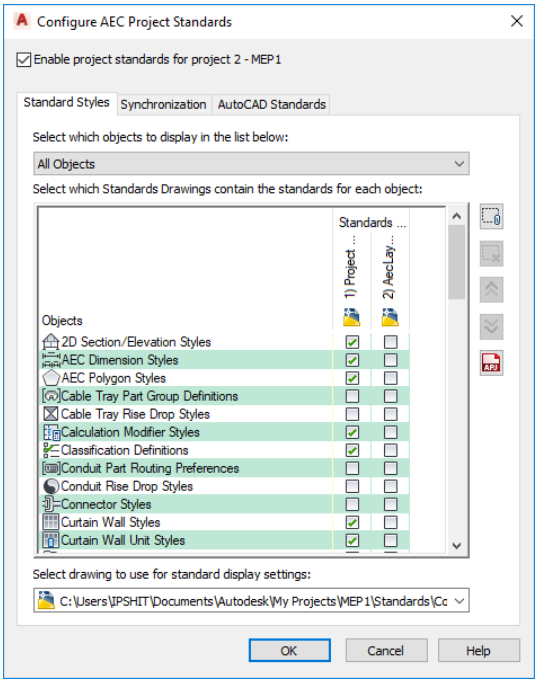

*Figure 2-11 The **Configure AEC Project Standards** dialog box*

Constructs Tab

The options in the **Constructs** tab are used to modify the drawing files available in the project. On choosing the **Constructs** tab, the **PROJECT NAVIGATOR** will be modified, as shown in Figure 2-12. Some of the options in this tab have already been discussed. The remaining options available in this tab are discussed next.

Constructs Area

The **Constructs** area has all the drawings of the current project arranged in a tree structure. In the tree, the drawing files are divided into two main categories: **Constructs** and **Elements**, which are further categorized according to their purpose/function. For example, the architectural drawings are stored in the Architectural category. You can open any of the drawings available in these folders by double-clicking on it.

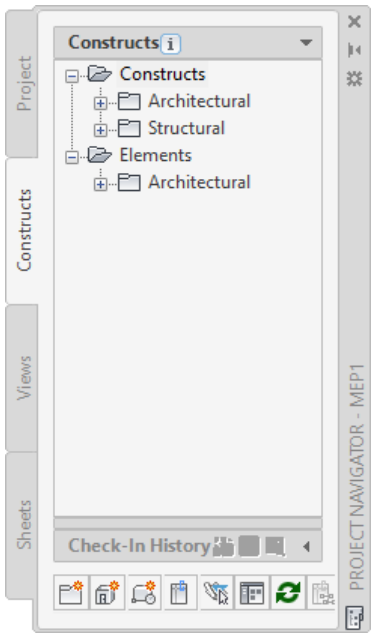

*Figure 2-12 The **PROJECT NAVIGATOR** with the **Constructs** tab chosen*

Add Category



The **Add Category** tool is used to add a new category in the **PROJECT NAVIGATOR** to

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categorize the drawing files according to their usage. To do so, select a node from the **Constructs** rollout of the **PROJECT NAVIGATOR** and then choose the **Add Category** tool; the category will be added under the selected node.

Add Construct

The **Add Construct** tool is used to add a new construction in the project. When you choose this tool, the **Add Construct** dialog box will be displayed, as shown in Figure 2-13. You can add description about the new construct, change the name, edit category, and change the template using the fields available in the dialog box. In this dialog box, check boxes corresponding to each level of floor in the building are available in the **Assignments** area. Select the check boxes corresponding to the levels to which you want to add the construction. If you select multiple check boxes in this dialog box, then the objects created in the construction will span between the levels selected. Therefore, it is recommended to select only one check box. You can open the newly created construct by using the **Open in drawing editor** check box. When you select this check box and choose the **OK** button, the **Add Construct** dialog box will close and the newly created construction will open in AutoCAD MEP for editing.

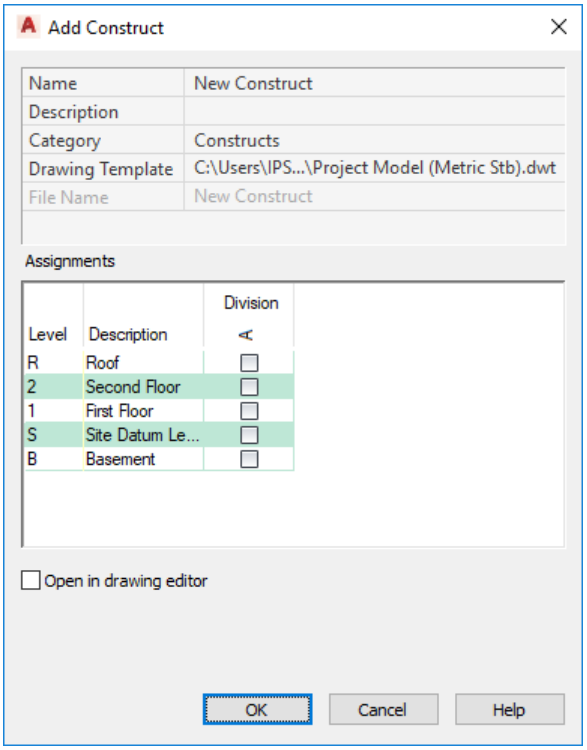

Figure 2-13 *The* ***Add Construct*** *dialog box*

Add Element

The **Add Element** tool is used to add a new element to the project. When you choose this tool, the **Add Element** dialog box will be displayed. Enter the required details in this dialog box and choose the **OK** button; a new element is added to the **Elements** category. You can edit the newly added element by selecting the **Open in drawing editor** check box.

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Show External References

The **Show External References** tool is used to display external references for any drawing in the current project. When you select a drawing in the **PROJECT NAVIGATOR** and choose this button, the **External References** dialog box will be displayed. In the **Details** area of this dialog box, the information about the selected drawing is displayed, refer to Figure 2-14.

Views Tab

The options in the **Views** tab are used to add, modify, or delete a general, a detail, or a section view in the project. On choosing this tab, the **PROJECT NAVIGATOR** will be modified, refer to Figure 2-15. Some of the options in this tab have already been discussed. The remaining options in this tab are discussed next.

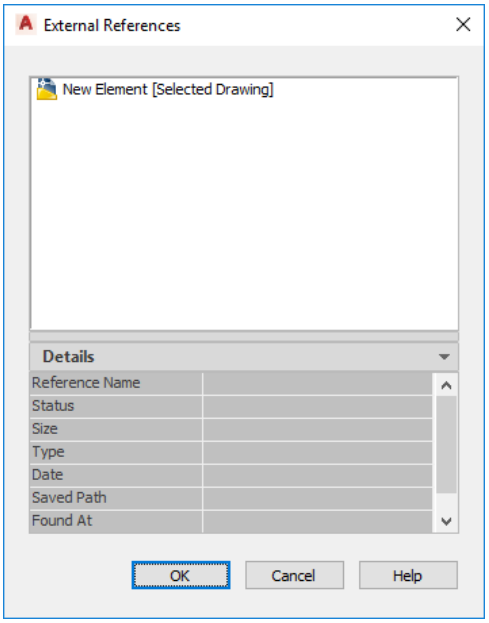

Figure 2-14 *The **External References** dialog box*



Figure 2-15 *The **PROJECT NAVIGATOR** with the **Views** tab chosen*

Views Area

In this area, different views of the project drawings are displayed in a tree structure. These views are divided into different categories on the basis of their application areas. For example, all the drawings related to interior of the building are available in the **Interiors** category in the **Views** tree. You can open any of the drawing views by double-clicking on it.

Add View

There are three types of views that can be added to the **View** area: General view, Section/Elevation view, and Detail view. The **Add View** tool is used to add a new view to the **View** area. On choosing the **Add View** tool, the **Add View** dialog box will be displayed, as shown in Figure 2-16.

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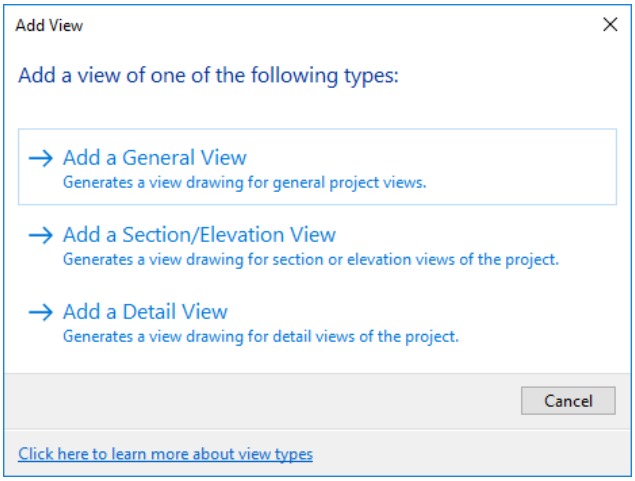

Figure 2-16 *The* ***Add View*** *dialog box*

There are three options available in this dialog box: **Add a General View**, **Add a Section/Elevation View**, and **Add a Detail View**. On choosing an option, the respective dialog box will be displayed. For example, when you choose the **Add a General View** option, the **Add General View** dialog box will be displayed, as shown in Figure 2-17.

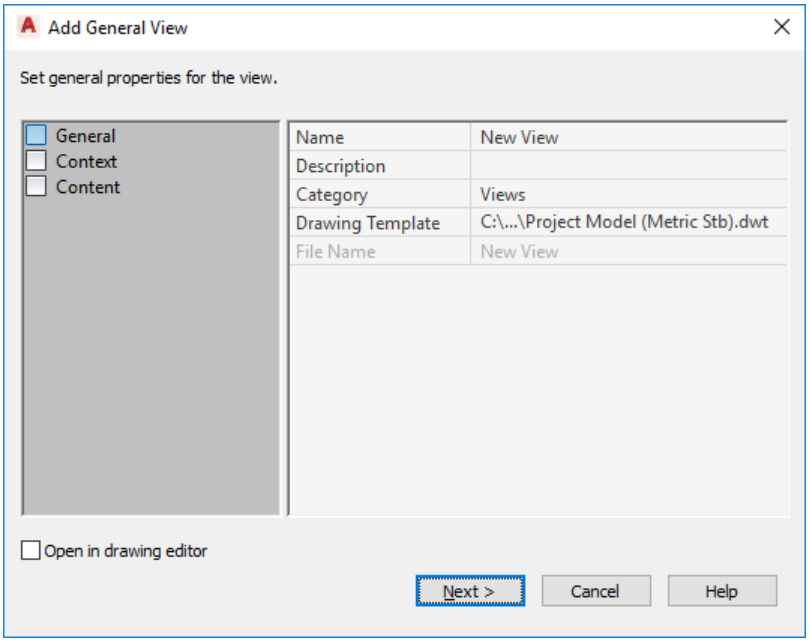

Figure 2-17 *The* ***Add General View*** *dialog box*

Using the options available in this dialog box, you can set the general properties of the view. Three pages are available in this dialog box: **General**, **Context**, and **Content**. The **General** page is displayed by default in this dialog box. In this page, you need to enter the general information about the view. After entering the general information, choose the **Next** button; the **Context** page will be displayed, refer to Figure 2-18.

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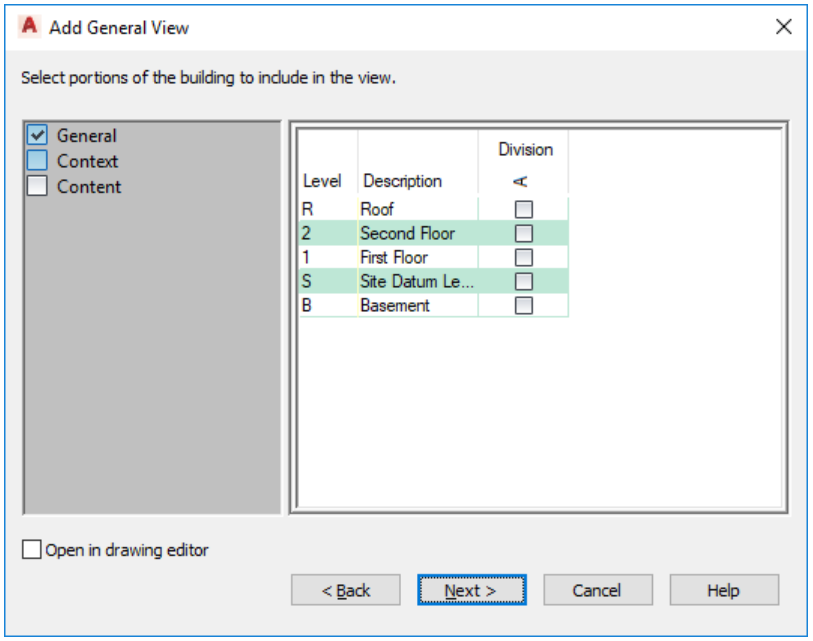

Figure 2-18 *The* ***Add General View*** *dialog box with the* ***Context*** *page displayed*

On this page, you can select the portions of the building that you want to include in the current view. To do so, you can select the check boxes corresponding to the portions of the building required to be included in the current view. After selecting the check boxes, choose the **Next** button; the **Content** page will be displayed, refer to Figure 2-19.

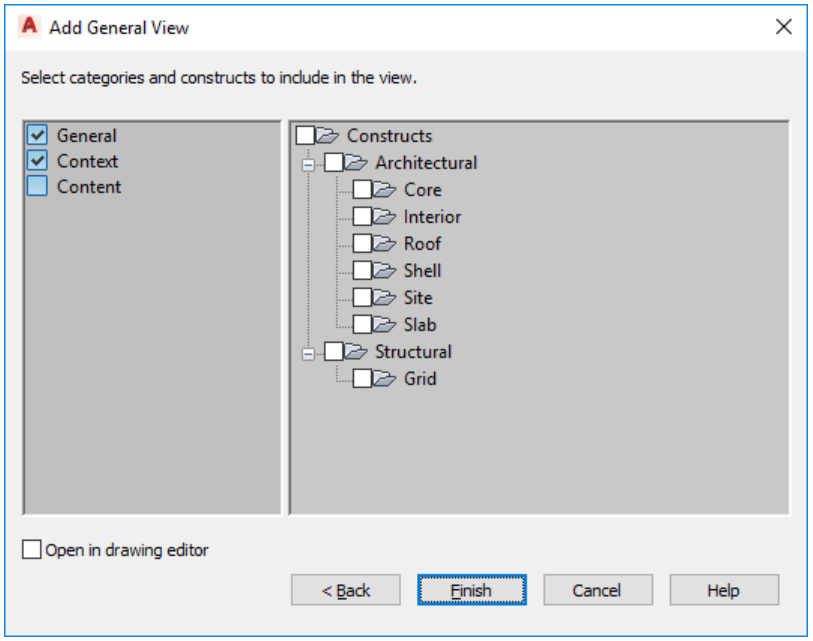

Figure 2-19 *The* ***Add General View*** *dialog box with the* ***Content*** *page displayed*

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In this page, you can select the check boxes corresponding to those elements that you want to display in the current view. After specifying the required parameters, choose the **Finish** button to exit the dialog box. The newly created view will be displayed in the **Views** area of the **PROJECT NAVIGATOR**.

Regenerate View

The **Regenerate View** button is used to regenerate all the views so that you can get the updated version of the drawing views. This tool is also used to update the reference of the views.

Repath Xref

The **Repath Xref** tool is used to reconnect the external references whose names or locations have been changed.

Sheets Tab

On choosing this tab, the **PROJECT NAVIGATOR** will be modified, refer to Figure 2-20. The options in the **Sheets** tab are used to add, modify, or delete the sheets available in the project. Some of the options in this dialog box have already been discussed. The remaining options are discussed next.

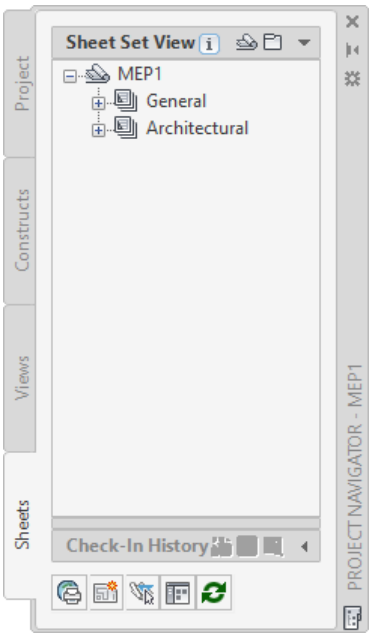

***Figure 2-20** The **PROJECT NAVIGATOR** with the **Sheets** tab chosen*

Sheet Set View Area

All the drawing sheets available in the current project are displayed in the **Sheet Set View** area in a tree structure. You can open any of the drawing sheets by double-clicking on it.

Add Sheet

The **Add Sheet** tool is used to add a new sheet in the project. To do so, choose this tool; the **New Sheet** dialog box will be displayed, as shown in Figure 2-21. In this dialog box, you need to specify the sheet number, sheet title, and file name in their respective edit boxes. On specifying the sheet number and the sheet title in the edit boxes, a default file name is displayed in the **File name** edit box. You can change this file name or retain it. The folder path and the template path for the current sheet are displayed in the **Folder path** and **Sheet template** fields, respectively. These fields cannot be modified in this dialog box. After specifying the required parameters, choose the **OK** button from this dialog box; the newly created sheet will be added in the project and will be displayed at the bottom of the list in the **PROJECT NAVIGATOR**. You can edit this sheet by double-clicking on it.

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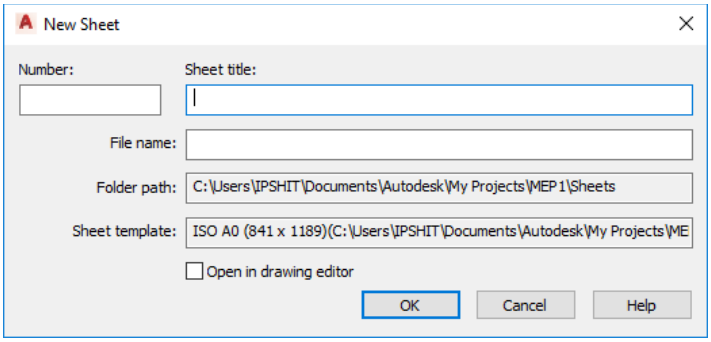

Figure 2-21 *The* ***New Sheet*** *dialog box*

Publish

The **Publish** tool is used to publish the complete sheet set in DWF file format. To publish a sheet set, choose the **Publish** tool from the **PROJECT NAVIGATOR**; the **AutoCAD MEP 2020** message box will be displayed, as shown in Figure 2-22. Choose the **OK** button from this message box; the **Specify DWFx File** dialog box will be displayed, as shown in Figure 2-23. Choose the **Select** button from this dialog box; the **Publish Job Progress** message box will be displayed.

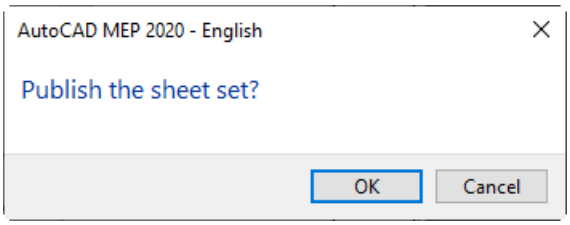

Figure 2-22 *The* ***AutoCAD MEP 2020*** *message box*

This message box shows the progress of plotting/publishing of the drawing sheets. When the process of publishing completes, the **Plot and Publish Job Complete** message will be displayed at the bottom right corner and the plot file will be created at the location specified in the **Specify DWF File** dialog box. To view the details of the plot file, click on the **Click to view plot and publish details** link in the message box displayed at the bottom right corner of the application window; the **Plot and Publish Details** dialog box will be displayed with the details of the plot file.

STYLES BROWSER

The **STYLES BROWSER** palette is used to import the styles and system definition to current drawing. This palette is invoked automatically when you start a new project. You can also invoke it manually by choosing **Home > Build > Tools** drop-down **> Styles Browser** or by typing **STYLESBROWSER** in the command prompt. You can also override the style or definition of an existing object in the drawing area by using this palette.

The options/drop-downs available in the **STYLES BROWSER** palette, refer to Figure 2-24, are discussed next.

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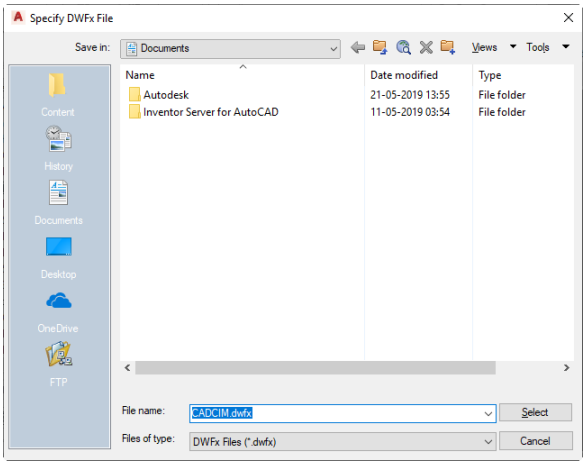

Figure 2-23 *The* ***Specify DWFx File*** *dialog box*

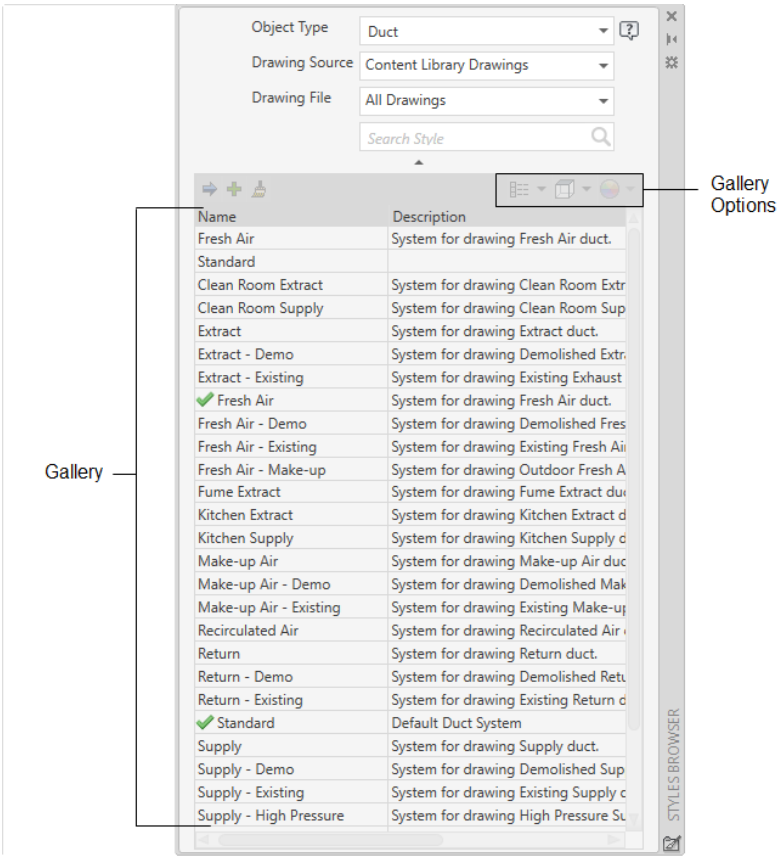

Figure 2-24 *The* ***STYLES BROWSER*** *palette*

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Object Type

Using the options in this drop-down, you can select different type of objects for which you can choose different styles or definitions. The objects types available in this drop-down are **Architectural Objects**, **Documentation Objects**, **Multi-Purpose Objects**, **Electrical Objects**, **HVAC Objects**, **Piping Objects**, **Plumbing Objects**, and **Schematic Objects**. You can select an object from it, apply the desired style from the gallery of **STYLES BROWSER** palette and double-click on it to start the drawing with selected style.

Drawing Source

You can select the drawing source for different object styles or definitions by using this drop-down list. Options available in this drop-down list are discussed next.

Content Library Drawings

When this option is selected, all available styles or definitions for the selected object will be displayed in the gallery.

Project Standard Drawings

When this option is selected, the project standard styles or definitions for the selected object will be displayed in the gallery.

Currently Open Drawings

When this option is selected, the styles or definitions that are available for the currently open drawings will be displayed.

Drawing File

The options available in this drop-down list filter the object styles or definitions for an object depending upon the option selected from the **Drawing Source** drop-down list. The options available in this drop-down list are **All Drawings**, **Current Drawing**, and **All Without Current Drawing**. For example, if you select the **Current Drawing** option, only the object styles for currently open drawing will be displayed in gallery. Similarly, if you select the **All Without Current Drawing** option, all object styles excluding the style for currently open drawing will be displayed in gallery.

Search Style

You can search for an object style or definition by typing its name in the **Search Style** edit box. The search results of styles or definitions will be displayed in the gallery of the **STYLES BROWSER** palette. The results displayed will also depend on the options selected in the drop-down list in the **STYLES BROWSER** palette.

Import Styles



This button is used to directly start the drawing by importing the object styles or definitions which are not available in the current drawing. To import an object style or definition, select them from the gallery and then choose the **Import Styles** button; a green check mark will be displayed adjacent to selected style or definition. This green check mark indicates that the selected style will be imported to the current drawing.

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Add object



This button is used to directly start the drawing without importing the object styles or definitions to the current drawing. To do so, select the object style from the gallery and choose the **Add object** button and start drawing in the drawing area. On choosing the desired style or definition, a green check mark will be displayed adjacent to selected style or definition. This green check mark indicates that the selected style is imported to the current drawing.

Apply style to selection



This button is used to override the object styles or definitions for the selected object from the drawing area. To override a style or definition, select the object from the drawing area. Next, select a different style or definition for that object from the gallery and choose the **Apply style to selection** button; the selected style or definition will override the existing style.

Gallery Options

These options are available at the right side of the **Apply style to selection** button, refer to Figure 2-24. By using these options, you can change the preview size, view direction, and background color of the styles available in the gallery.

SPACE

Space is an entity used in AutoCAD MEP to find out technical information about a specific section of an architectural drawing of a project. For example, if you want to make a specific section of a drawing as an office, then you need to assign corresponding space style to that section. The properties of that office such as area, airflow, height, equipment, and load are stored in the space style. To assign a space style to an area, first you need to create a space. The method to create a space is discussed next.

Creating Spaces



To create a space, choose the **Space** tool from the **Space** drop-down in the **Build** panel of the **Home** tab of the **Architecture** workspace. This tool is also available in the other workspaces. You can invoke this tool from any of the workspaces by entering the **SPACEADD** command at the command prompt. On invoking the **Space** tool, the **PROPERTIES** palette will also be displayed. By default, the **Rectangle** option is selected in the command prompt. Note that when you invoke the **Space** tool by entering the command at the command prompt, a default-sized space will be attached to the cursor automatically without selecting any option. You need to select **Create type** from the command prompt. On doing so, different options will be displayed. Select the **Insert** option; a space of default size will be attached to the cursor. You need to click in the drawing area to specify the position of the space. As soon as you specify the position of space, you will be prompted to specify the rotation value for the space. Specify the rotation value; the space will be positioned at the defined point. The command prompt using the **SPACEADD** command for creating the space is given next.

Start corner or [Name/STyle/Create type/Height]: **C**
Set create type [Insert/Polygon/Generate] <Rectangle>: **I**
Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: *Enter the co-ordinates of the insertion point or click in the drawing area.*

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Rotation or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch/Undo] <0>: *Enter the rotation angle of the space.*
Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch/Undo]: *Press ENTER to exit the tool or select an option.*

The options available in the Command prompt are discussed next.

Name

The **Name** option is used to define a name for the space created by using the **SPACEADD** command. By default, the **Space** name is assigned to the newly created space.

STyle

The **STyle** option is used to change the style of the space. By default, the **Standard** style is selected. You can change the space style by using the **SPACESTYLE** command or by using the **STYLES BROWSER**. This command will be discussed later in this chapter.

Create type

The **Create type** option is used to change the type of space to be created. The space to be created can be a rectangle, a polygon, or it can be associative to the boundary objects. The command prompt after selecting the **Create type** option is given next.

Start corner or [Name/STyle/Create type/Height]: **C**
Set create type [Insert/Polygon/Generate] <Rectangle>:

According to the above command prompt, there are four options to create a space. These options are discussed next.

Insert: If you select the **Create type** command from the command prompt, a list of options will be displayed. Choose the **Insert** option or press I and then press the ENTER key; the space will be created according to the target dimensions specified. Figure 2-25 shows a space created by using the **Insert** option. The Command prompt for creating a space by using the **Insert** option is given next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: *Specify the insertion point.*
Rotation or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch/Undo] <default value>: *Specify the rotation value for the space, or press ENTER to accept the default values.*
Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch/Undo]: *Press ENTER to exit the tool or select an option.*

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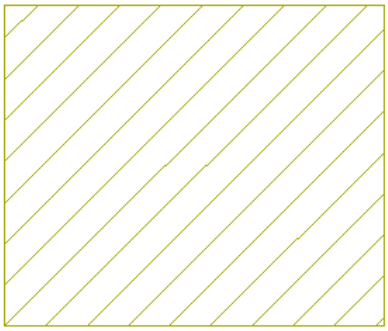

Figure 2-25 *The space created by using the* ***Insert*** *option*

Polygon: By choosing this option, you can create a polygonal space by manually defining the segments of the polygon. You can create a polygon type space either by using the arcs or by using the lines. Figure 2-26 shows the polygon type space created by using the arcs and Figure 2-27 shows the polygon type space created by using the lines.

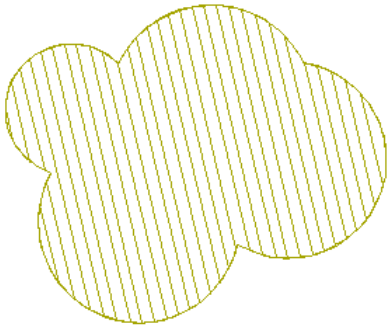

Figure 2-26 *The polygon type space created by using arcs*

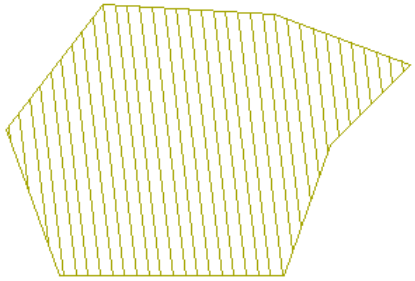

Figure 2-27 *The polygon type space created by using lines*

Generate: On choosing this option, the space created will be associative to the boundary objects. If you do not have any object with its space boundaries defined or with a valid space boundary, then the **Analyzing Potential Spaces** dialog box will be displayed, as shown in Figure 2-28. You can use all the visible objects to create a bounding space by choosing the **Use all visible objects to bound spaces** option from the dialog box. You can also select an object to create the bound space. To do so, choose the **Select objects that should bound spaces** option from the dialog box.

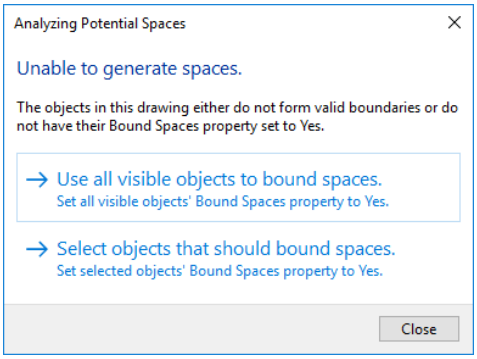

Figure 2-28 *The* ***Analyzing Potential Spaces*** *dialog box*

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After selecting the **Create type** option from the command prompt, select the **Insert** option. The following options appear in the command bar.

Length

The **Length** option is used to change the length of the space to be created. By default, the target dimension of the space style is used as the length of the space. The Command prompt to change the length is given next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **L**
Length <default value>: *Enter the desired value of length.*

WIdth

The **WIdth** option is used to change the width of the space to be created. By default, the target dimension of space style is used as the width of the space. The Command prompt to change the width is given next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **WI**
Length <default value>: *Enter the desired value of width.*

Height

The **Height** option is used to change the height of the space to be created. By default, the target dimension of space style is used as the height of the space. The Command prompt to change the height is given next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **H**
Length <default value>: *Enter the desired value of height.*

MOve

The **MOve** option is used to move the space created. This option is available only if you have chosen **Insert** from the **Create type** options. After moving the space, you can also rotate the space by a specified angle. The Command prompt to move the space is given next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **MO**
Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: *Specify the insertion point by clicking or entering the coordinates.*
Rotation or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch/Undo] <0>: *Specify the rotation angle by clicking or entering the value, and press ENTER.*

SIze

The **SIze** option is used to specify the size of the space to be created. This option is available only if you have selected **Insert** from the **Create type** option. The command prompt for specifying the size of the space is given next.

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Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **SI**
Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: *Specify the insertion point by clicking or entering the coordinates.*
New size or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch/Undo] <default value>: *Specify the insertion point by clicking or entering the dimensions.*
Rotation or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch/Undo] <0>: *Specify the rotation angle by clicking or entering the value.*

Drag point

The **Drag point** option is used to change the orientation of the space to be created. This option is available only if you have selected **Insert** from the **Create type** options. The command prompt to change the orientation of the space is given next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **D**
Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: *Enter **D** again if you want to change the orientation or press ENTER to exit.*

MAtch

The **MAtch** option is used to match the style of the newly created space with an existing space. This option is available only if you have selected **Insert** from the **Create type** options. The Command prompt to change the orientation of the space is given next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **MA**

Select a space to match: *Select the space created earlier to use its properties for new space.*
Match [Style/Length/Width/Height] <All>: *Enter any of the options available in the prompt to match the properties. By default, the **All** option is selected, so all the properties of selected space are copied in the new space. Now, click in the drawing area to place it.*

Arc

This option is used to create an arc in a polygon type space. The **Arc** option is available only when **Polygon** is selected from the **Create type** options. The command prompt to create a polygon type space using an arc is discussed next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **C**
Set create type [Rectangle/Polygon/Generate] <Insert>:**P**
Start point or [Name/STyle/Create type/Height/Arc]:**A**
Start point or [Name/STyle/Create type/Height/Line]: *Specify the first point of the arc.*
Second point or [Name/STyle/Create type/Height/Line/Undo]: *Specify the second point of the arc.*
Next point or [Name/STyle/Create type/Height/Line/Undo]: *Specify the third point to complete the arc.*
Second point or [Name/STyle/CReate type/Height/Line/Close/Ortho/Undo]: *Specify the next point.*
Next point or [Name/STyle/CReate type/Height/Line/Close/Ortho/Undo]: *Specify the next point or enter C to close the arc for creating the space.*

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Line

This option is used to create a polygon by using the line. The **Line** option is available only when **Polygon** is selected from the **Create type** options and then **Arc** is chosen in the next prompt. The Command prompt to create a polygon type space using lines is discussed next.

Insertion point or [Name/STyle/Create type/Length/WIdth/Height/MOve/SIze/Drag point/MAtch]: **C**
Set create type [Rectangle/Polygon/Generate] <Insert>: **P**
Start point or [Name/STyle/Create type/Height/Arc]: **A**
Start point or [Name/STyle/Create type/Height/Line]: **L**
Start point or [Name/STyle/Create type/Height/Arc]: *Specify the start point of the polygon.*
Next point or [Name/STyle/Create type/Height/Arc/Undo]: *Specify the end point of the first line of the polygon.*
Next point or [Name/STyle/Create type/Height/Arc/Ortho/Undo]: *Specify the end point of the second line of the polygon.*
Next point or [Name/STyle/CReate type/Height/Arc/Close/Ortho/Undo]: *Specify the next point or enter C to close the polygon.*

Editing Spaces

You can perform various editing operations on the created spaces. For example, you can change the space style or divide a space. When you select a space from the drawing area, the **Space** contextual tab will be available in the **Ribbon**, refer to Figure 2-29. The options in this tab are discussed next.

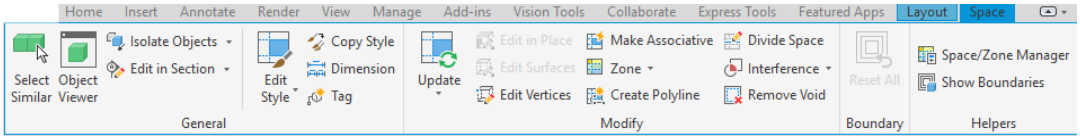

Figure 2-29 *The* ***Space*** *contextual tab*

Select Similar



The **Select Similar** tool is used to select all those components from the drawing area which have the same style and layer as the selected object. The objects with the same style and properties but different layers will not be selected by this tool.

Object Viewer



The **Object Viewer** tool is used to display the selected object in a separate 3D preview window. When you choose this tool, the **Object Viewer** dialog will be displayed with selected object, as shown in Figure 2-30.

Various tools such as **Parallel**, **Perspective**, and **Zoom Window** are in the main toolbar of this dialog box. These tools are used to change the display of view.

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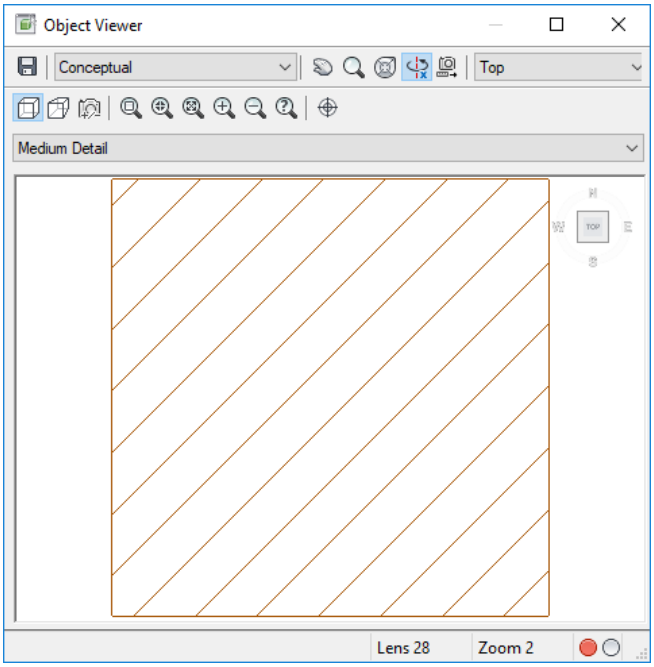

*Figure 2-30 The **Object Viewer** dialog box*

Isolate Objects Drop-down

This drop-down is available in the **General** panel of the **Space** contextual tab of the **Ribbon**. The tools in this drop-down are used to control the visibility of the objects. These tools are discussed next.

Isolate Objects

This tool is used to hide all the deselected objects from the drawing area.

Hide Objects

This tool is used to hide the selected objects from the drawing area.

End Isolation

This tool is used to display all the hidden objects.

Edit in Section

This drop-down is available in the **General** panel of the **Space** contextual tab in the **Ribbon**. The tools in this drop-down are used to edit the space created. These tools are discussed next.

Edit in Section

This tool is used to edit an object in a predefined section.

Edit in Elevation

This tool is used to edit the space at a certain elevation distance from the selected reference.

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Edit in Plan

This tool is used to edit the space at certain plan distance from the selected reference.

Edit Style

This drop-down is available in the **General** panel of the **Space** contextual tab in the **Ribbon**. The tools in this drop-down are used to modify the style of the space. These tools are discussed next.

Edit Style



By using the options in this dialog box, you can change different properties of the selected space such as length and width of the space, target area, and various offset values. When you choose this tool, the **Space Style Properties - Standard** dialog box will be displayed, as shown in Figure 2-31. Using the options in the dialog box, you can modify the style of the selected space.

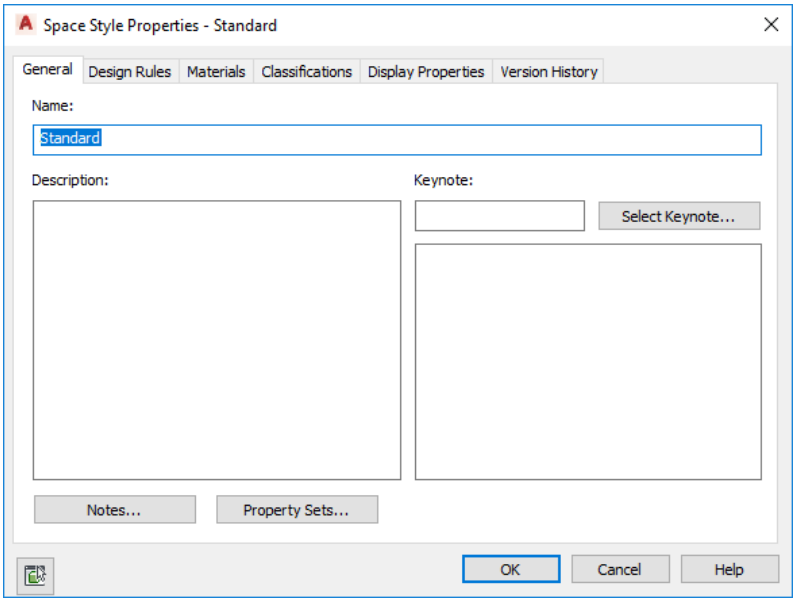

*Figure 2-31 The **Space Style Properties - Standard** dialog box*

Space Styles

When you choose this tool, the **Style Manager** dialog box will be displayed, as shown in Figure 2-32. The space styles available in the current drawing file are displayed in the left area of this dialog box under the **Space Styles** category. If you select any space style from this area, the options to change the space style will be displayed in the right area of the dialog box. These options are similar to the options displayed in the **Space Style Properties** dialog box.

Display Theme Styles



When you choose this tool, the **Style Manager** dialog box will be displayed, as shown in Figure 2-33. Various theme styles available in the drawing are displayed in the left area of this dialog box under the **Display Theme Styles** category. If you choose a

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theme style from this area, the options to change the properties of the selected theme are displayed in the right area. Using these options, you can change the properties of the selected theme such as title, text style, symbol, and so on.

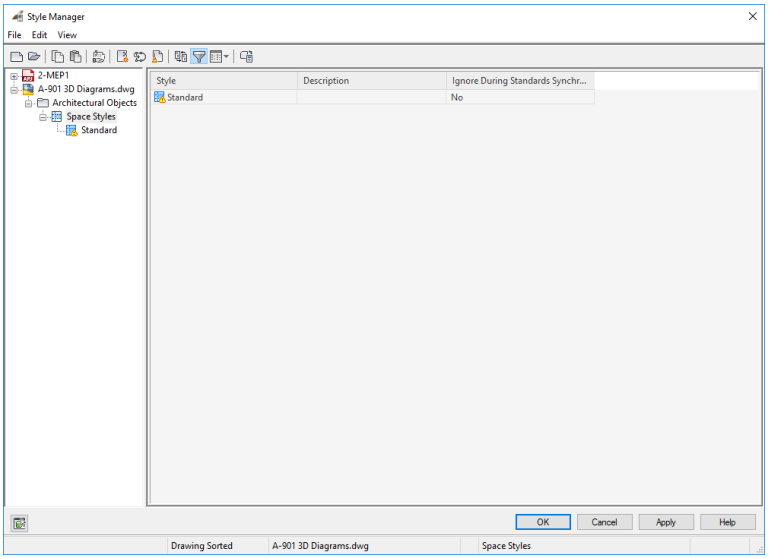

Figure 2-32 *The* ***Style Manager*** *dialog box*

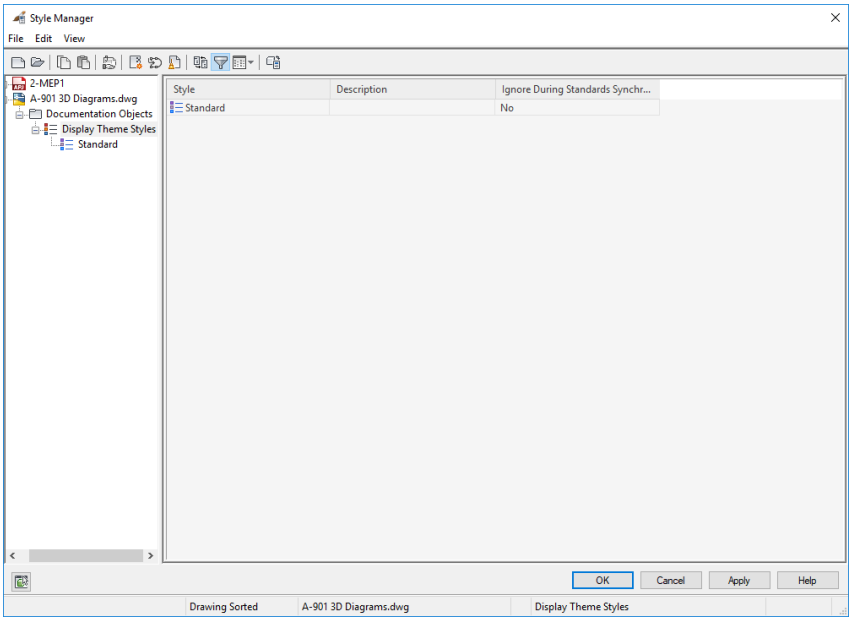

Figure 2-33 *The* ***Style Manager*** *dialog box with theme style options*

Zone Templates



The **Zone Templates** tool is used to change the properties of the selected zone template such as its contents, modifiers, and name. To do so, choose the **Zone Templates** tool; the **Style Manager** dialog box will be displayed, as shown Figure 2-34.

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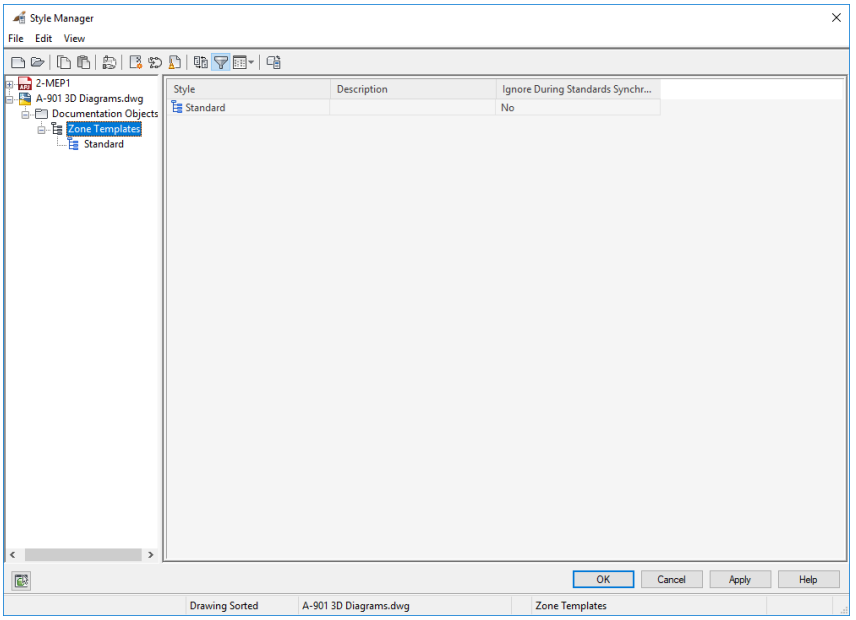

Figure 2-34 *The* ***Style Manager*** *dialog box with* ***Zone Templates*** *selected*

Various zone template styles available in the drawing are displayed in the left area of this dialog box under the **Zone Templates** category. When you choose a template style from the left area, the options to change the properties of the selected template style are displayed in the right area. Using these options, you can change the properties of the selected template style.

Similarly, you can change the zone style by using the **Zone Style** tool available in the same drop-down.

Copy Style

This tool is used to create a copy of the style of the selected object.

Dimension

This tool is used to add AEC dimension to an object. To add a dimension, choose this tool; the dimension will be attached to the cursor. Now, you can place the dimension at the desired location.

Tag

This tool is used to add a tag to the object. To add a tag, choose **Space > General > Tag** from the **Ribbon**; you will be prompted to select an object on which you want to add a tag. On selecting the object, the tag will be attached to the cursor. Now, place the tag at the desired location. When you click to place the tag, the **Edit Property Set Data** dialog box will be displayed, as shown in Figure 2-35.

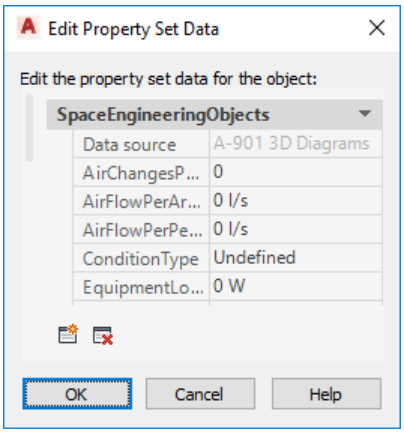

Figure 2-35 *The* ***Edit Property Set Data*** *dialog box*

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Using the fields available in this dialog box, you can change the properties of the tag for the selected object.

Update

This drop-down is available in the **Modify** panel. The tools available in this drop-down are used to update spaces. There are two tools available in this drop-down: **Selected Space** and **All Associative Spaces**. The **Selected Space** tool is used to update the selected space. The **All Associative Spaces** tool is used to update all the spaces associated with the selected space.

Edit in Place



This tool is used to edit an extruded 3D space when you are in Isometric orientation. To do so, choose **Space > Modify > Edit in Place** from the **Ribbon**; the **Edit in Place: Space Body Modifier** contextual tab will be displayed and the selected space will be converted into a free form space. Now, using the vertices and control points available in the free form space, you can edit the shape and size of the space. When you hover the cursor over the center point of a selected face, a contextual menu with the editing options will be attached to the cursor, refer to Figure 2-36.

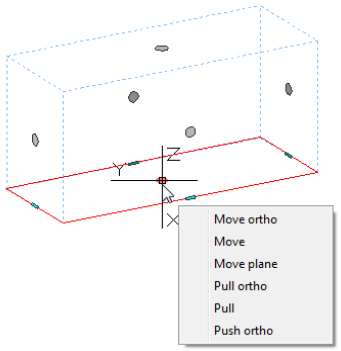

Figure 2-36 *The information box showing various editing options*

Edit Surfaces



This tool is used to edit only the faces of the space. Choose **Space > Modify > Edit Surfaces** from the **Ribbon**; the selected space will be converted into a free form space. Now, using the midpoints of edges, you can edit the faces of the selected space. Also, a plus icon will be displayed at the bottom face of the space, refer to Figure 2-37. Using this plus icon, you can add windows and doors to the selected space.

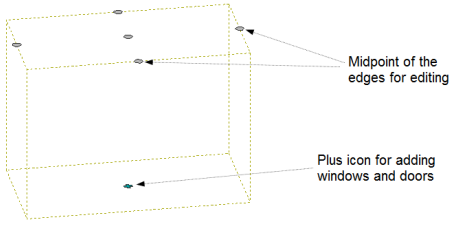

Figure 2-37 *Space with editing points*

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Edit Vertices



This tool is used to add a vertex to the selected edge. To do so, choose **Space > Modify > Edit Vertices** from the **Ribbon**; the vertex will be attached to the cursor and you will be prompted to click in the drawing area to add the vertex, refer to Figure 2-38. Next, click in the drawing area; the vertex will be added to the corresponding edge. To remove the vertex, press and hold the CTRL or SHIFT key and then click on the vertex to be removed.



Note

*To use the **Edit in Place**, **Edit Surfaces**, and **Edit Vertices** tools, you need to switch to isometric view.*

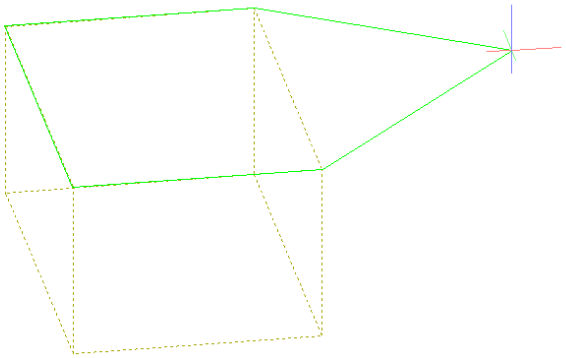

Figure 2-38 *Space with its vertex attached to the cursor*

Make Associative

This tool is used to make the bounding objects associative to the selected space. To do so, choose **Space > Modify > Make Associative** from the **Ribbon**; the objects bounding the space will become associative with it. Note that for making space associative with the object, the boundary of the object must enclose the selected space.

Create Polyline

This tool is used to create a polyline around the selected space. To create a polyline around a selected space, choose **Space > Modify > Create Polyline** from the **Ribbon**; a polyline will be created around the selected space.

Divide Space

The **Divide Space** tool is available in the **Modify** panel of the **Space** tab. This tool is used to divide the selected space by using a line.

Interference

The tools available in this drop-down are used to add or remove an interference condition from a selected space.

Remove Void

The **Remove Void** tool is used to remove a selected void from non-associative space. To remove the voids, select the **Remove Void** tool; you will be promted to select the void. Now select the void to be removed and press ENTER.

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Reset All

This option is used to revert all the changes taken place due to the grip editing of boundaries. To do so, choose **Space > Boundary > Reset All** from the **Ribbon** and select the spaces whose boundaries are to be reset to original state.

Space/Zone Manager

The **Space/Zone Manager** tool is available in the **Helpers** panel of the **Space** tab. This tool is used to change the properties of the selected space or zone.

Show Boundaries

The **Show Boundaries** tool is available in the **Helpers** panel of the **Space** tab. This tool is used to show only the objects in the drawing area that are currently defined as boundary objects. This tool is available only for associated spaces.

ZONE

A zone is a group of spaces which are used for a specific function; for example, a zone created for a specific temperature condition. You can create a zone or zones by using the **Zone** tool available in the **Space** drop-down of the **Build** panel in the **Home** tab of the **Ribbon**. When you choose this tool, a box will get attached to the cursor and you will be prompted to specify the location where the zone tag is to be inserted. Click in the drawing area; the zone will be created and name of the zone will be displayed along with the box. By default, **Zone** is displayed as the name for the created zone. You can change this name by using the **Name** field in the **PROPERTIES** palette. You can edit a zone by using the options available in the **Zone** contextual tab. The **Zone** contextual tab is displayed on selecting the zone. The options available in this tab have already been discussed this chapter.

WORKSPACES

A workspace is a combination of menus, toolbars, **Ribbon**, palettes, and control panels. It is used to represent a customized drawing environment based on the user requirement. In AutoCAD MEP, six default workspaces are available in the **Workspace Switching** flyout of the **Application Status Bar**, refer to Figure 2-39. These workspaces are **HVAC**, **Piping**, **Electrical**, **Plumbing**, **Schematic**, and **Architecture**.

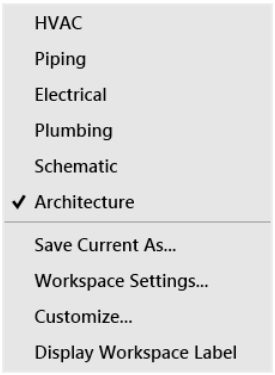

***Figure 2-39** The **Workspace Switching** flyout*

The options in the **Workspace Switching** flyout are discussed next.

HVAC

The tools in the **HVAC** workspace are used for designing heating, ventilation, and air conditioning system. Therefore, on invoking the **HVAC** workspace, the tools related to the HVAC design will be displayed.

Piping

The tools in the **Piping** workspace are used for routing and creating pipe lines in the building. To switch to this workspace, choose the **Piping** option from the **Workspace Switching** flyout;

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the options in the **Ribbon** and **TOOL PALETTES** will change according to the workspace. Note that some options for plumbing are also available in this workspace.

Electrical

The tools in the **Electrical** workspace are used for creating electrical circuits, panels, devices, equipment, and cable trays. To switch to this workspace, choose the **Electrical** option from the **Workspace Switching** flyout; the options in the **Ribbon** and **TOOL PALETTES** will change according to the workspace.

Plumbing

Tools available in this workspace are similar to the tools in the **Piping** workspace. The tools in this workspace are used for routing and creating plumbing lines in the building. To switch to this workspace, choose the **Plumbing** option from the **Workspace Switching** flyout; the options in the **Ribbon** and **TOOL PALETTES** will change according to the workspace. Some of the options for piping are also available in this workspace. Plumbing is concerned with the drainage and other water related applications, whereas piping has a broad application area such as gas supply and petroleum lines.

Schematic

Schematics is the symbolic representation of an object. Using the **Schematic** workspace, you can represent MEP objects in the form of symbols. Some of the tools available in this workspace are schematic lines and schematic symbols.

Architecture

The tools in the **Architecture** workspace are used to create architectural objects such as walls, doors, windows, and stairs. An architectural layout creates foundation for other domains such as piping, HVAC, electrical, and so on. To switch to this workspace, choose the **Architecture** option from the **Workspace Switching** flyout; the **Ribbon** and **TOOL PALETTES** will change accordingly.

You can switch between the workspaces anytime during designing by using the **Workspace Switching** flyout. Also, you can customize any of the workspaces by using the **Customize** tool available in the **Workspace Switching** flyout. This tool is discussed next.

Customize

The **Customize** tool is used to customize the user interface of AutoCAD MEP. On invoking this tool from the **Workspace Switching** flyout, the **Customize User Interface** dialog box will be displayed, as shown in Figure 2-40. The areas in this dialog box are discussed next.

Customization in All Files

The options in this area are used to select the customization file to be used for modification. Also, you can change the properties of the selected item from this area. On selecting an option from this area, the related properties are displayed in the **Properties** area available on the right of this dialog box.

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Command List

The options in this area are used to customize the selected command. On selecting a command from this area, the **Button Image** area is displayed at the top right corner of this dialog box. You can change the icon used for the selected button by using the options available in this area.

Properties

The options in this area are used to change the specifications of the selected option.

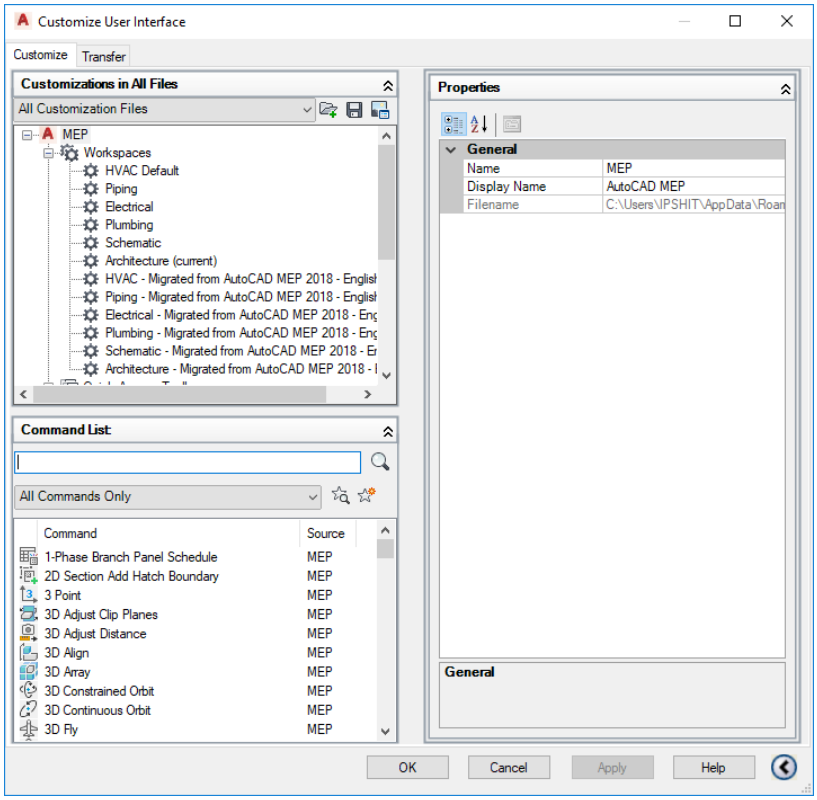

Figure 2-40 *The* ***Customize User Interface*** *dialog box*

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Self-Evaluation Test

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

1. In AutoCAD MEP, a level refers to a _____ .

2. The _____ tool is used to display the **Autodesk Content Browser** related to the current loaded project.

3. A zone is a division of _____ which is used for a specific function.

4. The _____ tool is used to add an instance of the selected object to the drawing.

5. The extension for AutoCAD MEP project files is *.apt*. (T/F)

6. You can create a category while changing the current directory of project files. (T/F)

7. The **PROJECT NAVIGATOR** is used to manage the drawing files of a project. (T/F)

Review Questions

Answer the following questions:

1. Schematics is the _____ representation of an object.

2. You can edit a 3D extruded space by using the _____ tool.

3. The **Synchronize Projects** tool is used to synchronize the current project with the previous project standards. (T/F)

4. You can create a space by using the **SPACEADD** command. (T/F)

5. The **Customize** tool is used to customize the user interface of AutoCAD MEP. (T/F)

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Answers to Self-Evaluation Test

1. floor, **2. Content Browser**, **3.** space, **4. Add Selected**, **5.** F, **6.** T, **7.** T