Autodesk®
3ds Max® Design 2015
Fundamentals

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Chapter 3

Assembling Project Files

In this chapter you learn about file linking and importing. You learn how to create new presets and to modify them as required. You also learn to incorporate objects or other scene files into the current scene by externally referencing them.
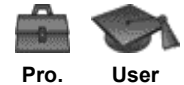
This chapter contains the following topics:

- **Data Linking and Importing**
- **Linking Files**
- **References**

3.1 Data Linking and Importing

Autodesk Certification Topics & Objectives

Pro.　**User**

Data Management/Interoperability

*   Differentiate common file types and usages　　　✓
*   Use the import feature to import model data　　　✓

Learning Objectives

*   Understand the difference between File Linking and File Importing in the Autodesk 3ds Max Design software.
*   Understand how to edit the linked data files.

While the Autodesk® 3ds Max® Design software has a robust 2D and 3D modeling system, many users find it most efficient to link or import some or all of their design data from other applications. This is especially the case if the bulk of the design work is completed in other Autodesk software, such as AutoCAD®, Autodesk® Revit® Architecture, AutoCAD® Architecture, or Autodesk® Inventor®. Sometimes this linked or imported data is complete before it is brought into the Autodesk 3ds Max Design software, while in other cases simplified data is brought in as a starting point and additional modeling is required.

Linking vs. Importing

In the Autodesk 3ds Max Design 2014 software, files can be either linked or imported using the **File Link** and **Import** tools. The files that can be linked are: .DWG, .DXF, .FBX, and .RVT. A large variety of file types can be imported into the Autodesk 3ds Max 2015 software including Autodesk® Inventor® files (.IPT, .IAM), Autodesk® Alias® .Wire files and the Autodesk® Showcase® .APF (Autodesk Packet File), LandXML and DEM data files, and Adobe Illustrator (.AI) files.

The difference between linked and imported geometry is that linked geometry remains connected to the source file. If the source file is edited, the Autodesk 3ds Max Design Scene can be updated to show those changes, similar to how changes to an AutoCAD XREF can be reloaded. Imported geometry maintains no connection to the source file.

- If a source .DWG, .DXF, .FBX, or .RVT file is likely to change (or you would prefer to make changes in the .DWG, .DXF, .FBX, or .RVT directly), then **File Linking** might be the best way to incorporate this data into the Autodesk 3ds Max Design software.

- **Importing** might be faster than linking when bringing a lot of data into the Autodesk 3ds Max Design software. Complex geometry, such as 3D faces from large Land Desktop terrain models, might be faster to re-import (especially through LandXML) than to update through a file link.

- File links and imports are launched by clicking (as shown in Figure 3–1): expand ![MXD], expand Import, and select **Link Revit/Link FBX/Link AutoCAD** or expand ![MXD], expand Import, and select **Import**.
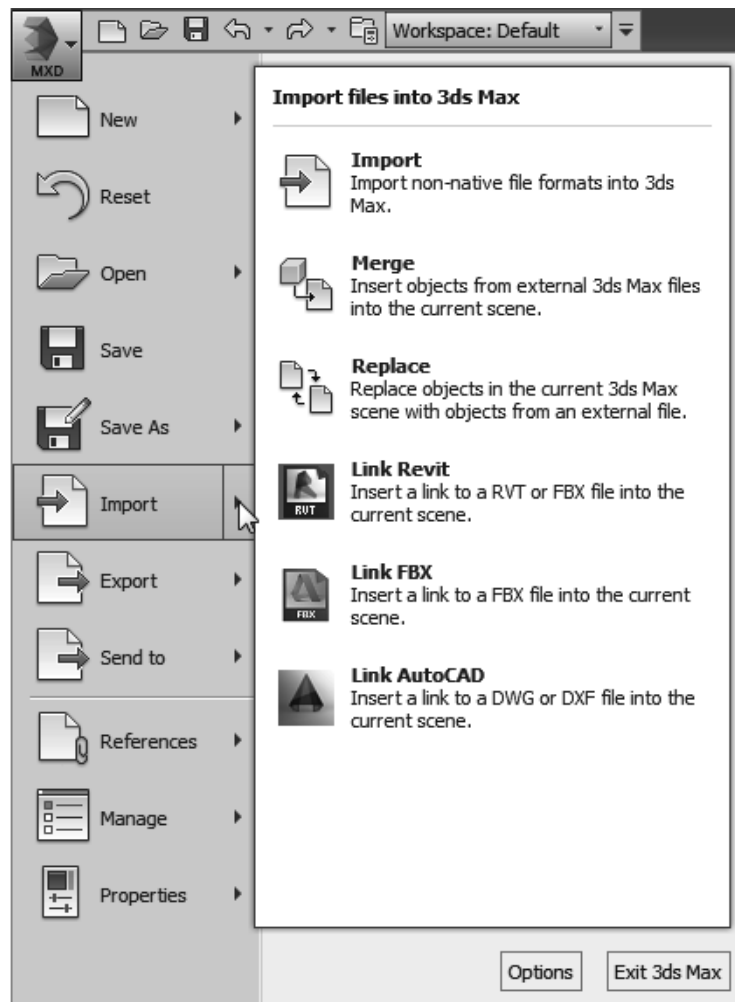

Figure 3–1

Editing Linked Data

- Linked geometry can be edited but not directly deleted from a scene file. Alternatively, the layer on which the objects are placed might be ignored during a reload or set to **Hide** in the Layer dialog box.

- Edits applied to linked geometry (such as through modifiers) are automatically re-applied after a link is updated. Some complex modifications might not apply as expected, however, if the source geometry is changed dramatically be sure to verify. You should always review your geometry carefully after a link is updated.

- Links to drawing files are not bi-directional, so that changes you might make to the data in the Autodesk 3ds Max Design software do not update the original .DWG, .FBX, .DXF, or .RVT file.

- Linked files can also be bound, where the geometry stays in the scene file as-is but the connection to the source file is dropped.

Importing

- To import a .DWG from the Autodesk Revit software, it is recommended to export from the Autodesk Revit software using the **Export as ACIS solids** option. This will also create a better geometry than the other option (polymesh). Also it's not obvious, but you must have a 3D View active to export to DWG.

- The FBX importer is an independent plug-in that is frequently updated. There is a **Web Update** button in the FBX Import dialog box. Using this button, you can check for web updates, download the latest updates, and install those. Close 3ds Max when you do the install.

Merging Autodesk 3ds Max Design Scene Files

Objects already saved in Autodesk 3ds Max Design scenes (.MAX files) are imported into the current scene using the **Merge** option (>**Import>Merge**) and not the **Import** option. Merging files is a one-directional transfer that does not maintain any connection between the two files. Using the **Merge** option, you can either load only a few objects from a scene or you can load a complete scene into the current one.

Practice 3a

Estimated time for completion: 20 minutes

Ground Surfaces using Civil View

Learning Objective

- Open a Civil3D data file in a scene file using Civil View.

In this practice you will open a .VSP3D file for importing ground surfaces. Civil View is available only in the Autodesk 3ds Max Design software. If you are using the Autodesk 3ds Max software skip this practice.

You must set the paths to locate the External files and Xrefs used in the practice. If you have not done this already, return to the **Introduction to Autodesk 3ds Max Design** chapter and complete Task 1 to Task 3 of the **Organizing Folders and Working with the Interface** practice. You only have to set the user paths once.

Task 1 - Initialize Civil View.

It is recommended that you import 3D ground surfaces from Civil/Survey products, such as AutoCAD Civil 3D or Land Desktop using the vsp3d data format. The import process involves using Civil View in Autodesk 3ds Max Design.

You only have to initialize Civil View once.

1. In the Menu bar, select **Civil View>Initialize Civil View** to initialize Civil View. If you have already initialized Civil View, go to Step 5.

2. In the Initialize Autodesk Civil View dialog box, set the *System Unit* to **Feet** because the civil project that you will be opening uses Feet as its unit of measurement. Verify that **Don't warn me about System Units again** is selected.

3. In the *Select a Country Resource Kit* area, select **US IMPERIAL** and verify that *Start Mode for Civil View* is set to **Manual**. Click [OK]. In the Information dialog box, click [OK].

4. Exit and then restart the Autodesk 3ds Max Design software.

5. Start Civil View by selecting **Civil View>Start Civil View**.

Hint: Starting Civil View

Once you have initialized Civil View, the next time you launch the Autodesk 3ds Max Design software, you need to start Civil View because *Start Mode for Civil View* is set as **Manual**. You can change this setting later and set it so that Civil View starts when you launch the Autodesk 3ds Max Design software. In the Civil View Preferences dialog box, in the *General* tab, select **Automatically start Civil View?** as shown in Figure 3–2.
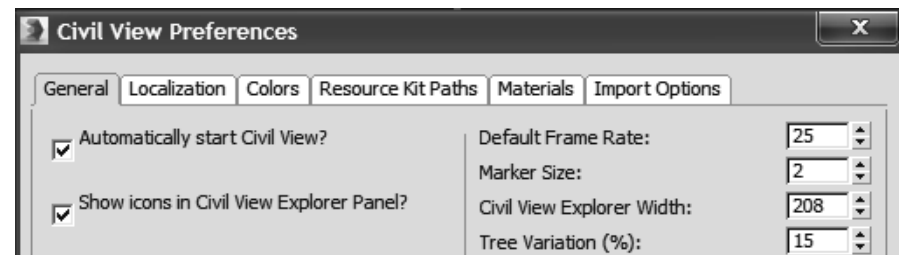
Figure 3–2

6. Open **Civil Base XRef.max** from your *Class Files\scenes* folder. If a dialog box opens prompting you that there is a Mismatch, click OK to accept the default values. If prompted, click OK to accept the file's **Unit Scale**. This is an empty max file in which the System Unit Scale has been set to **1 Unit=1.0 Feet**.

7. In the Menu bar, select C**ivil View>Geometry Import>Civil 3D (VSP 3D) File**, as shown in Figure 3–3.
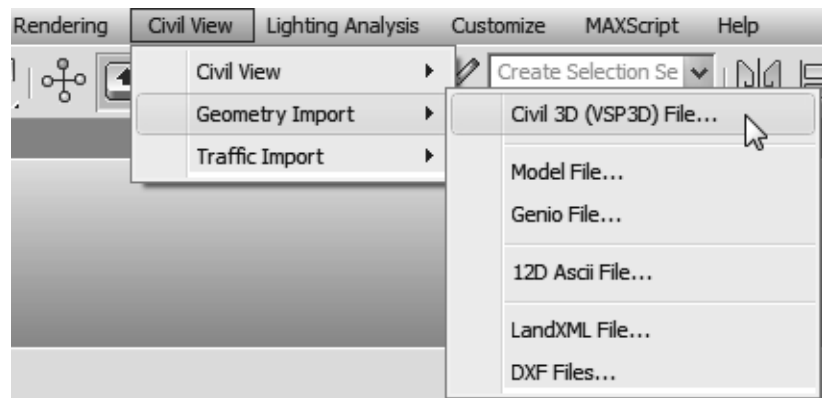
Figure 3–3

8. In the Civil 3D Import Panel dialog box, click Open . In the Select a VSP3D File dialog box, browse to your *Class files\Import* folder (if required) and open **Civil surfaces.vsp3d** file.

The objects listed include surfaces, site/ grading featurelines, corridor (surfaces, baselines, featurelines etc.),and point groups, etc.

9. In the Civil 3D Import Panel dialog box, a list of objects that are in the AutoCAD Civil 3D file are listed. In the left pane, select **Surfaces [9]** to display all of the surfaces in the right pane. Select **Building Pad**, hold down <Shift>, and select **Parking Lot Surface** to highlight the first seven surfaces. Select the checkbox for Building Pad to select all seven highlighted surfaces, as shown in Figure 3–4. You can select them individually as well.
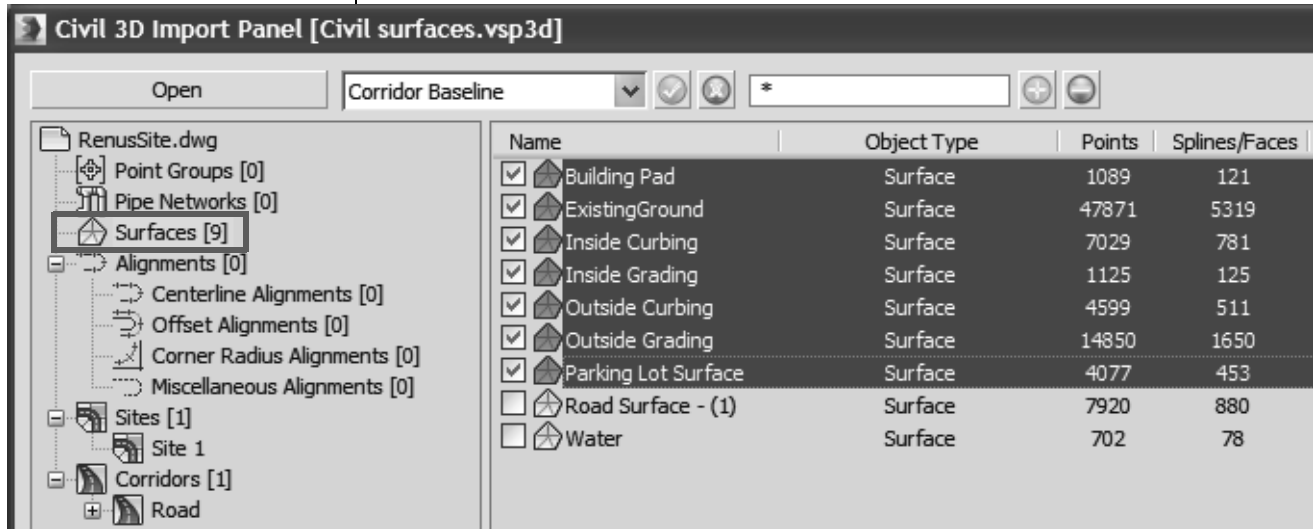
Figure 3–4

10. You will select the corridor surfaces and the baseline. In the left pane, select **Corridors [1]** and in the right pane, select **PrimaryAccess**, **Region(1)**, **Region(2)**, and **Region(3)**, as shown in Figure 3–5.
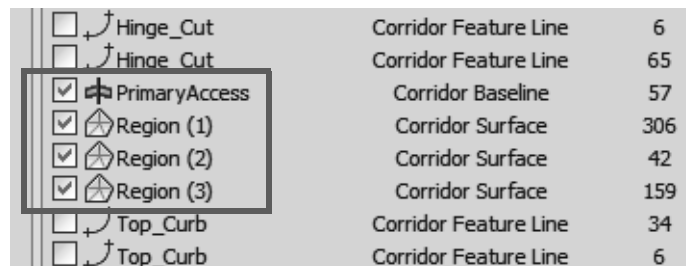
Figure 3–5

11. Click [OK]. In the Civil View Information, click

[Yes] to accept the global shift values.

12. You did not select any feature interpretation. Click [Yes] to proceed without a feature interpretation style.

It takes a few minutes to load the file.

13. In the Warning dialog box, click `OK`. In the Error dialog box, click `OK`.

14. The ground surfaces, building pad, corridor, and parking lot are displayed in all of the viewports. If not, click ⊞ (Zoom Extents All). Note that only the corridor displays the surface material and that the rest of the surfaces display a checkerboard material.

15. In the Menu bar, select **Civil View>Civil View>Civil View Explorer** to open the Civil & View Explorer. Dock it along the left side of the screen by right-clicking on the title bar and selecting **Dock>Left**.

16. Verify that the *Civil Explorer* tab is open. Expand **Civil View Objects>Imported Objects**, if not already expanded. Select **Surfaces** and note that the corridor is selected in the viewports, and the Object List rollout opens. In the Object List rollout, note that all of the surfaces are listed, as shown in Figure 3–6.
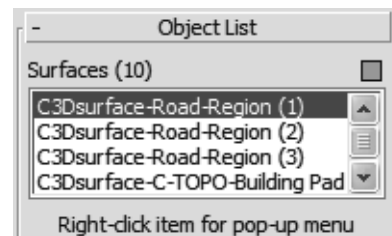
Figure 3–6

A material is not required for the first three corridor regions.

17. In the Object List rollout, select **C3Dsurface-C-TOPO-Building Pad**. In the Surface Parameters rollout, select the *Statistics* tab and note that in the *Face Selection Sets*, in *By Material ID*, **[31] Ground Type 4** has been assigned, as shown in Figure 3–8.
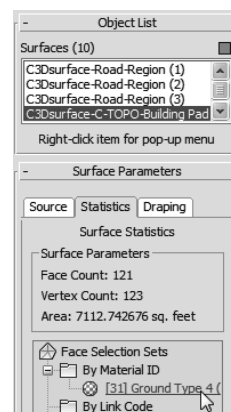
Figure 3–7

The complete list might not be visible in the Explorer. Hover the cursor in empty space in the information area until it displays as a hand cursor. Grab and slide the Explorer panel up or down to display all of the information.

18. Right-click on [31] Ground Type 4 and select **Modify Material ID Assignment**, as shown in Figure 3–8.
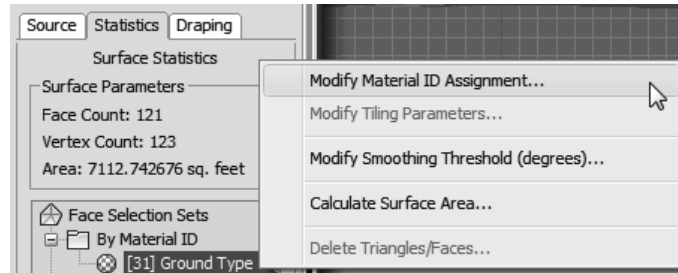

Figure 3–8

19. Click [Yes] in the Warning dialog box.

20. In the Modify material channel dialog box, select [**22**]

Concrete Type 1 as shown in Figure 3–9. Click [OK].
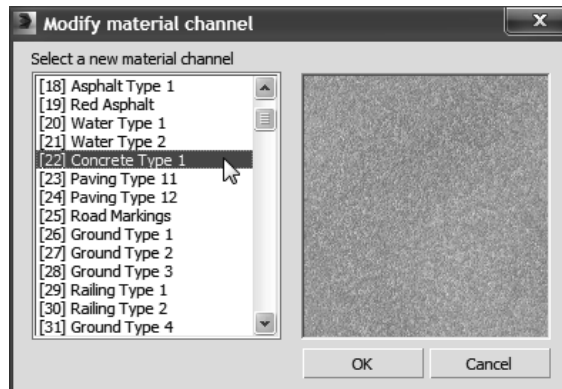
Figure 3–9

21. In the Perspective viewport, use **Zoom** and **Pan** to zoom into the building pad. Note how the new material is applied.

22. If required, select **Surfaces** again and in the Object List rollout, select **C3Dsurface-C-TOPO-Existing Ground**. In the Surface Parameters rollout, select the *Statistics* tab, right-click on [31] Ground Type 4, and select **Modify Material ID Assignment**. In the Warning dialog box, click [Yes].

23. In the Modify material channel dialog box, select [**28**] **Ground Type 3** and click [OK]. In the Perspective viewport, note that the new ground type material is applied to the ground surface.

24. Similarly, for the other surfaces, apply the material types as follows. A material is not required for the first three corridor regions.

- C3Dsurface-C-TOPO-Inside Curbing: [**38] Concrete Type 3**
- C3Dsurface-C-TOPO-Inside Grading: [**28] Ground Type 3**
- C3Dsurface-C-TOPO-Outside Curbing: [**38] Concrete Type 3**
- C3Dsurface-C-TOPO-Outside Grading: [**28] Ground Type 3**
- C3Dsurface-C-TOPO-Parking Lot Surface:[**39] Asphalt Type 4**

25. Close the Civil View Explorer.

26. Click ⊞ (Zoom Extents All). In the Perspective view, the scene displays as shown in Figure 3–10.
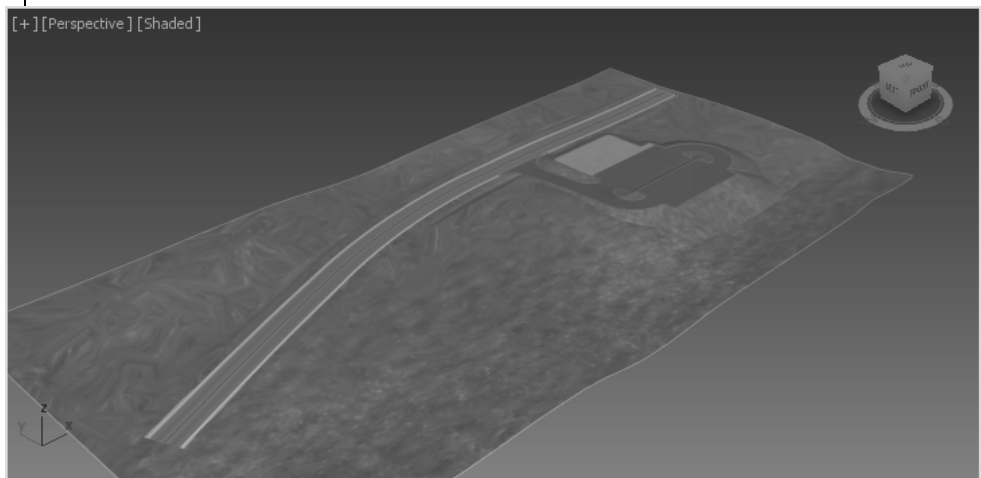
Figure 3–10

27. Save your work as **MyCivil Base XRef.max**.

3.2 Linking Files

Autodesk Certification Topics & Objectives
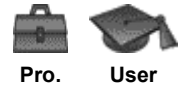
Pro.   User

Data Management/Interoperability

- Differentiate common file types and usages   ✓
- Use the import feature to import model data   ✓

Learning Objectives

- Combine entities from .DWG, .DXF, .FBX, and .RVT files into the current Autodesk 3ds Max Design scene.
- Understand how to link AutoCAD DWG/DXF files and understand the working of the provided options.
- Understand how to link Generic FBX files and the Autodesk Revit RVT/FBX files and understand the working of the provided options.
- Create and modify the presets using the respective File Link Settings dialog box.

File linking is useful when you are working on a visualization project and know that all design decisions have not been made. If a source file is likely to change (or you want to make changes in the .DWG, .DXF, .FBX, or RVT directly), **File Linking** might be the best way to incorporate this data into the Autodesk 3ds Max Design software as the scene can be updated to display those changes. You can link files using the Manage Links dialog box that can be opened as follows:

- [MXD]>Import>Link Revit: Links the .RVT files from the Autodesk Revit Architecture software.

- [MXD]>Import>Link FBX: Links the .FBX files that can be created in the Autodesk Revit, Autodesk MotionBuilder, Autodesk Maya, and Autodesk Mudbox software.

- [MXD]>Import>Link AutoCAD: Links the .DWG and .DXF files from the AutoCAD software.

You need to open the file to link and the Manage Links dialog box opens in which you can select the settings. You can also open the Manage Links dialog box by expanding , expanding References, and selecting **Manage Links**.

Linking DWG Files

When linking or importing AutoCAD .DWG or .DXF files, it is efficient to combine multiple, related objects together into a single Autodesk 3ds Max Design object to control their display and visibility.

*   In CAD data files it is common to have large numbers of objects since most of these objects can be effectively managed by a handful of layer settings and object properties.

*   The detail involved when creating a 3D visualization usually requires a lot more information, often applied through object properties and modifiers. This can make dealing with thousands of similar, related entities in the Autodesk 3ds Max Design software very cumbersome. For example, a 2D architectural AutoCAD floor plan made up of individual line segments might be much easier to work with as a single, combined spline object. If you are planning to create 3D objects from these splines it is necessary to combine them into a single line.

When multiple entities are combined into compound Autodesk 3ds Max Design shapes (2D objects) and meshes (3D objects), you can still access and adjust the original geometry in the Sub-object level of Modifiers, such as **Edit Spline**, **Edit Mesh**, and **Edit Poly**.

Therefore combining individual entities does not mean giving up editing control of the original geometry.

Objects or portions of objects can even be detached to form new objects, if necessary.

*   Modifiers like **Edit Spline**, **Edit Mesh**, and **Edit Poly** can be used to edit the imported and linked geometry in addition to regularly created splines and primitives in the Autodesk 3ds Max Design software.

Linking FBX and RVT Files

Autodesk has put a lot of work recently into making the Autodesk Revit and Autodesk 3ds Max Design software work better together. The Autodesk Revit and Autodesk 3ds Max software share mental ray renderer and both the products use the Autodesk Material Library materials.

The .RVT and .FBX file format supports the Autodesk Material Library and also supports the import of photometric lights, both interior artificial lights and exterior daylight systems. The disadvantage is that sometimes the file size can become very large and it is impossible to import a project in a single file. You can use a section box in the **3D View** in the Autodesk Revit software to limit the amount of the scene you are exporting at a specific time.

Manage Links Options

The Manage Links dialog box (shown in Figure 3–11) contains the following tabs:
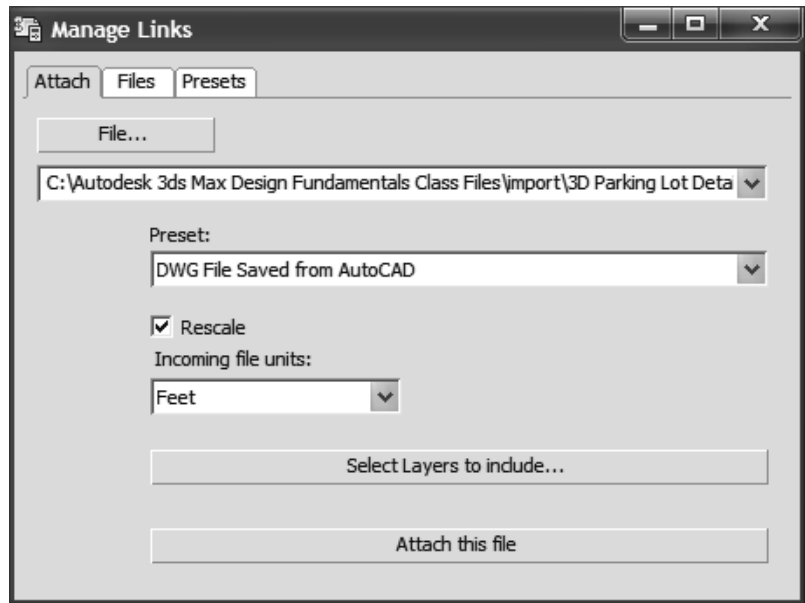
Figure 3–11

Attach Tab

You can open a file (.DWG, .DXF, .FBX, or .RVT) for linking using

[File...] which opens the Open dialog box. The selected filename and its path display in the File drop-down list. If the file that you selected is a .RVT file with more than one camera view, you are prompted to select a camera view. You can select the preset settings in the Preset drop-down list. The Presets listed here can be created or modified using the *Presets* tab. You can set the units by selecting them in the Incoming file units

drop-down list. [Select Layers to include...] is only available with .DWG and .DXF file types and enables you to select the layers

that you want to be included with the drawing file. [Attach this file] links the selected file with the specified preset settings to the current Autodesk 3ds Max Design scene.

Files Tab

The *Files* tab displays a list of files that are linked to the current scene. An icon in front of the filename indicates its current status. If the linked file has been modified, is displayed with the linked filename. indicates that the linked file is unchanged and does

not have any errors. Highlight a file to make [Reload...], [Detach...],

and [Bind...] available.

- [Reload...]: When the original file has been changed, use the **Reload** option to display the changes in the current scene.

- [Detach...]: Use when you want to remove the link with the original file. This option removes all geometry associated with the linked file.

- [Bind...]: Removes the link with the original file, but the geometry stays in the current scene, although the link between the original file is broken. Changes made to the original linked file cannot be reloaded.

Presets Tab

Many options are available before files are linked to your current scene. These options are configured and saved as **Presets** and can be used when linking files at a later stage. Many of these options require trial and error to find the most appropriate settings. You can link a file and then reload (or detach and relink) with different settings until you achieve the required results. If you are linking a file for the first time, you should create a new preset.

The *Presets* tab lists all existing presets and contains options for creating new presets, modifying existing presets, copying existing presets, renaming and deleting them. You need to select a preset for the **Modify**, **Copy**, **Rename**, and **Delete** options to be available, as shown in Figure 3–12. If no preset is selected, **Copy** is replaced by **New** and is the only available option.
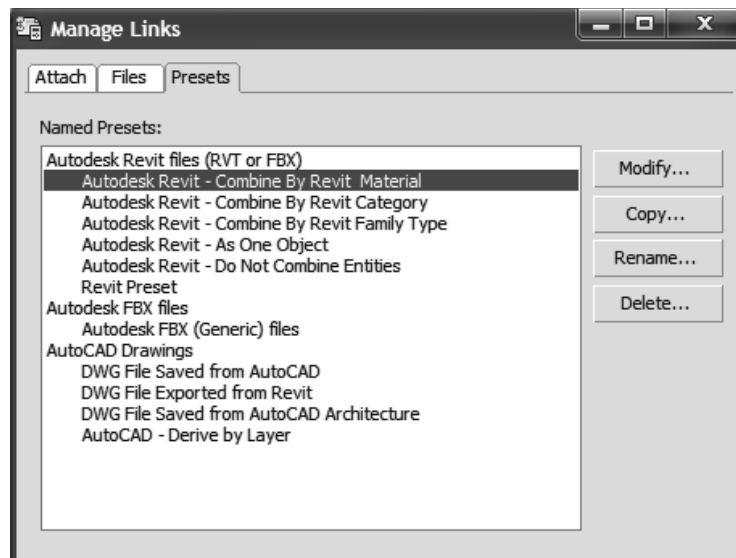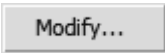
Figure 3–12

Depending on the type of preset selected (.RVT, .FBX, or

.DWG), clicking [Modify...] opens a specific File Link Settings dialog box. This dialog box enables you to define the way you want the geometry to be linked, what portions of the file are to be modified on **Reload**, and how the geometry is combined.

File Link Settings: DWG Files

In the Manage Links dialog box, in the *Presets* tab, selecting an AutoCAD DWG file preset and clicking [Modify...] opens the File Link Settings: DWG Files dialog box, as shown in Figure 3–13.
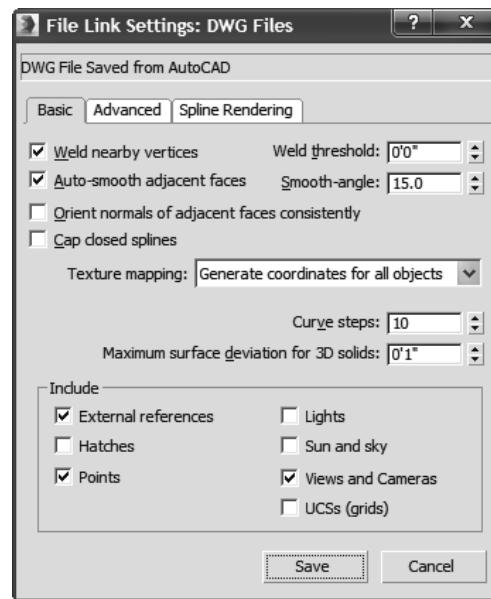
Figure 3–13

Basic Tab

The options available in the *Basic* tab are:

- **Weld nearby vertices** and **Weld threshold:** Welding joins together vertices of the same object that fall within the weld threshold. If the objects are joined by layer, this option removes duplicate vertices so that the adjacent 2D objects on the same layer are automatically combined into splines. Adjacent 3D objects that are welded become faces in a single mesh that share common vertices. Welding is essential for combining multiple CAD entities into a smaller number of Autodesk 3ds Max Design objects. Welding is often necessary for the **Auto-smooth** option to be effective and manually adjust smoothing through smoothing groups.

- **Auto-smooth adjacent face** and **Smooth-angle:** Auto-smooth enables adjacent faces in the same 3D mesh to display smooth if the angles of separation between their face normals (a directional vector perpendicular to the face) is equal to or less than the Smooth-angle. Otherwise the adjacent faces have a faceted edge between them. This is the same smoothing process used in the Edit Mesh and Edit Poly modifiers. You can adjust smoothing later if you still encounter smoothing issues after import.

- **Orient normals of adjacent faces consistently:** This option attempts to coordinate the face normals of linked objects. This option should be left off by default unless some faces of your 3D objects are missing after the link.

- **Cap closed splines:** This option automatically assigns an Extrude modifier to all closed 2D geometry (e.g., circles and closed polylines).

- **Texture mapping:** Texture mapping is used to locate texture maps on objects. The **Generate coordinates on-demand** option links objects without adding any texture mapping at all, instead adding the mapping when it is first called for by the Autodesk 3ds Max Design software. This option enables a faster link but might cause some discrepancies between the mapping generated in the Autodesk 3ds Max Design software and any mapping that might have been present in the original drawing file. The other option, **Generate coordinates for all objects**, adds texture mapping to all objects at the time of the link, matching any that might have existed in the original drawing file.

- **Curve steps:** This setting defines the number of segments to subdivide each 2D curve segment into if they are later extruded in the Autodesk 3ds Max Design software. This setting applies to circles, arcs, polyline curves, spines, and similar curved objects.

- **Maximum surface deviation for 3D solids:** This setting defines the allowed deviation distance from a parametric AutoCAD 3D curve (such as a curved AutoCAD extrusion) and the resulting Autodesk 3ds Max Design mesh. The lower the value, the more a 3D curve is subdivided. This option is necessary because although the AutoCAD software and some vertical applications support true 3D curves, the Autodesk 3ds Max Design software does not. In the Autodesk 3ds Max Design software all 3D curves must be segmented, though geometry can appear perfectly smooth if it is assigned to appropriate smoothing groups. It is common practice to set this value very low, (0.01) when importing work with smooth curves.

- **Include area options:** These options enable you to select the type of objects to be brought into the Autodesk 3ds Max Design software. Cleared (not selected) object types are ignored during the link. Note that the **Lights** option only brings in Lights from AutoCAD drawings pre-2007. If you are trying to bring in Lights from the 2009 line of CAD products, the Lights do not come in, even if the **Lights** option is on. The exception to this is if you have Sun and Sky checked, a daylight system is created based on the information in the incoming DWG file from the Autodesk Revit 2009 software.

Advanced Tab

The *Advanced* tab (shown in Figure 3–14), controls the import of AutoCAD primitives and the effect of scene materials while importing.
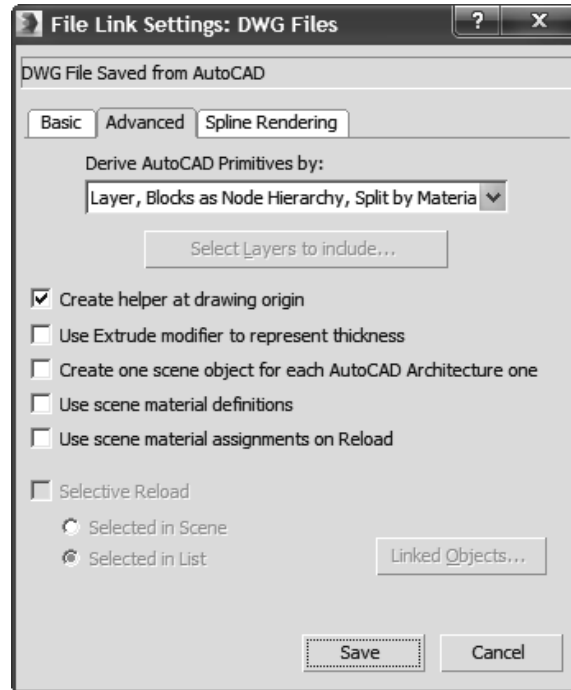
Figure 3–14

The options available in the *Advanced* tab are:
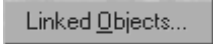
• **Derive AutoCAD Primitives by:** This option controls how AutoCAD objects are combined when linked. This setting does not apply to some vertical application objects such as those in AutoCAD Architecture.

Layer	Creates one object for each AutoCAD layer. Each AutoCAD block links as a single object called a VIZBlock. The Autodesk 3ds Max Design software might not translate AutoCAD block materials correctly if a block contains objects with different materials applied.
Layer, Blocks as Node Hierarchy	This option is similar to **Layer**, but it preserves material assignments in linked AutoCAD blocks. It structures each as a hierarchy of objects rather than single objects.
Layer, Blocks as Node Hierarchy, Split by Material	This option works similarly to the one above but takes into account drawings that have more than one material applied to objects on the same layer. With this option separate hierarchies are created for each material type on each layer, to better preserve the AutoCAD material assignments. New users should consider using this as their default link option.

Entity, Blocks as Node Hierarchy	This option includes all non-blocks as separate, individual objects. Blocks are preserved as hierarchies, however, organized by layer.
Color	Combines AutoCAD objects by color. All objects of one color are joined in as a single object, regardless of layer.
Entity	This option does not combine AutoCAD objects at all. Instead, each AutoCAD object becomes an individual object. The use of this option is discouraged except for simple drawing files.
One Object	This option combines all AutoCAD objects into a single Autodesk 3ds Max Design object. For example, this is useful when linking a drawing file that contains many thousand AutoCAD 3D faces on different layers that you intend to use in the Autodesk 3ds Max Design software.

- **Create helper at drawing origin:** This option adds an origin point helper at the origin of the current coordinate system. All of the linked geometry is part of a hierarchy parented by this helper, so all of the linked objects can be repositioned as one by transforming the helper.

- **Use Extrude modifier to represent thickness:** When linking 2D AutoCAD objects with a non-zero thickness value, these objects translate into the Autodesk 3ds Max Design software as a 3D mesh when this option is disabled. When enabled, objects translate as 2D objects with a parametric extrude modifier. The resulting geometry is the same but when this option is enabled the extrusion properties (such as height) can be modified after the link or import using the modifier stack.

- **Create one scene object for each AutoCAD Architecture one:** With this option off, AutoCAD Architecture (formerly ADT) and AutoCAD MEP objects are subdivided into separate objects by material. It is recommended to leave this option as cleared, since AutoCAD Architecture objects often contain more than one material. Linking each AutoCAD Architecture object as a single Autodesk 3ds Max Design object would require you to configure Multi/Sub-Object materials to show different materials on different parts of the same object.

- **Use scene material definitions:** When left as cleared, the Autodesk 3ds Max Design software includes the current state of any material applied to the linked objects in the AutoCAD software. When selected, if the current scene has a material with the same exact name as the AutoCAD material, then the scene material is used instead.

- **Use scene material assignments on Reload:** When left as cleared, the Autodesk 3ds Max Design software re-loads the current state of any AutoCAD materials present in the drawing file when the link is updated. When enabled, the Autodesk 3ds Max Design software maintains the current state of any materials in the scene file after a link is updated. If you intend to adjust linked materials in the Autodesk 3ds Max Design software then you should enable this option. If you intend to perform your material adjustments in the AutoCAD software you should not.

- **Selective Reload:** Enables you to reload a subset of the original file. If you select this option, you can select objects to reload by selecting them in the scene or by selecting them from a list. If you select **Selected in List**, and click

  Linked Objects... a list is displayed.

Spline Rendering Tab

The options present in the *Spline Rendering* tab (shown in Figure 3–15), enable linear objects (2D and 3D lines, polylines, etc.) to display as extruded 3D objects in the viewports or rendering. Normally splines cannot be rendered because they do not have surface area to interact with scene lighting. These options enable splines to link into the Autodesk 3ds Max Design software as 3D linear objects with a cross-sectional radius or a rectangular length and width. This provides the surface area for rendering.
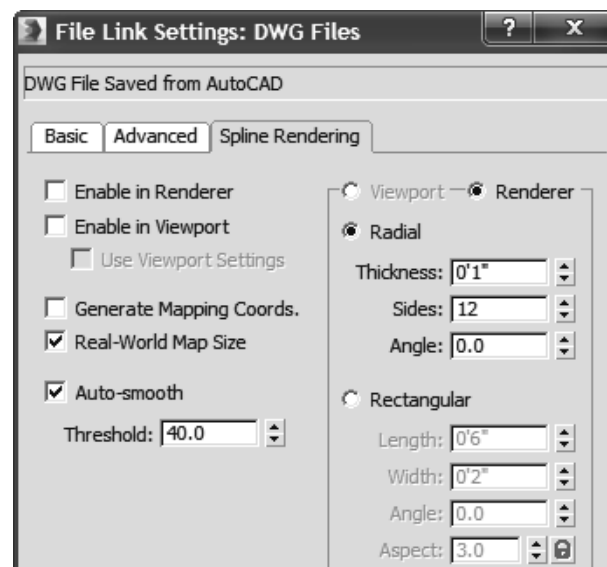
Figure 3–15

- If splines are to be rendered with materials then smoothing, mapping coordinates, and/or real-world map size are often important.

- When enabled, all of the splines linked with this setting are renderable, and all have the same cross-section geometry.

- If you want to make only certain 2D objects renderable (or want some to render differently than others) you could alternately apply a Renderable Spline modifier directly to those objects after linking, as shown on the right in Figure 3–16.
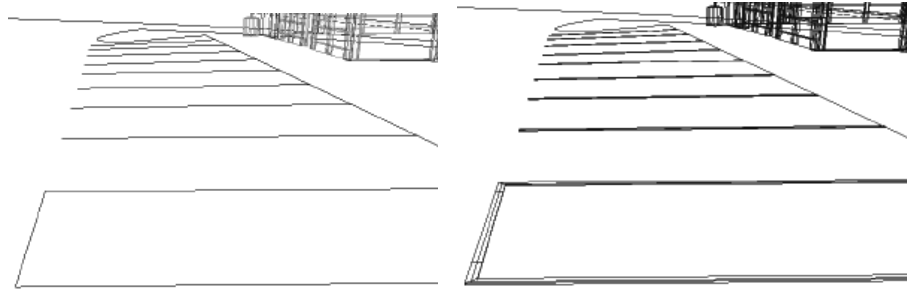
Figure 3–16
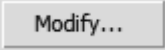
Hint: Hierarchies and File Linking

Autodesk 3ds Max Design Hierarchies are collections of objects linked together into parent/child relationships where transforms applied to a parent are automatically passed on to its children. Connecting multiple objects in a hierarchical chain can enable sophisticated animations in the Autodesk 3ds Max Design software, such as the motion of jointed robotic arms.

In the case of the **hierarchy** file link options, incoming AutoCAD blocks are brought into the Autodesk 3ds Max Design software as multiple objects so that they can maintain multiple material assignments from the AutoCAD software. They display together with a **Block/Style Parent** object, enabling you to transform the block as a unit by selecting the parent. The parent object itself does not have any geometry and does not render. Most modifiers (such as Substitute) must be applied to the objects in the hierarchy rather than the parent.

File Link Settings: Revit Files (RVT or FBX)

In the Manage Links dialog box, in the *Presets* tab, selecting an Autodesk Revit file and clicking [Modify...] opens the File Link Settings: Revit Files (RVT or FBX) dialog box, as shown in Figure 3–17.
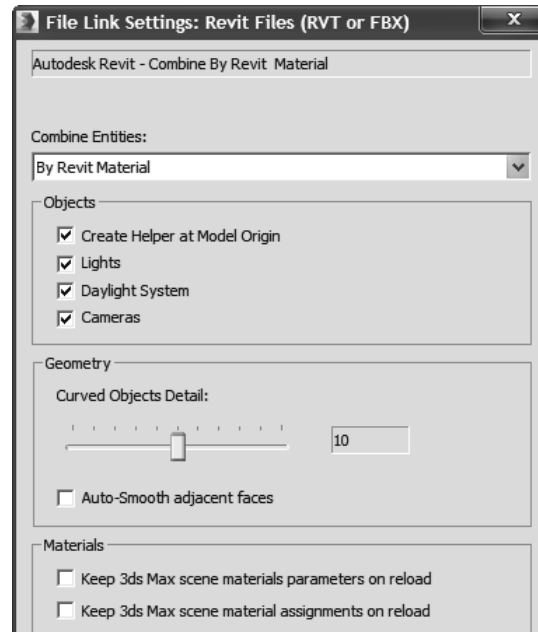
Figure 3–17

In the Manage Links dialog box, in the *Presets* tab, you can also select Autodesk FBX (Generic) file preset and click [Modify...]. This opens the File Link Settings: FBX Files dialog box, as shown in Figure 3–18. This dialog box is similar to the Autodesk Revit Files (.RVT and .FBX) without a *Geometry* area for controlling the segments and smoothing the linked geometry.
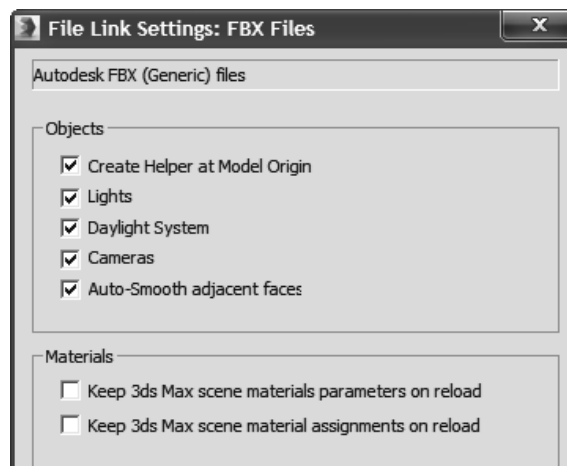
Figure 3–18

The options available in the File Link Settings: Revit Files (RVT or FBX) dialog box are:

- **Combine Entities list:** This option enables you to select the Autodesk Revit entities that you want to combine, as shown in Figure 3–19. For example, if you select **By Revit Material**, all of the entities that have the same material are linked in the current Autodesk 3ds Max scene as a single object. It is recommended that you combine entities as it reduces the number of objects.

Combine Entities:

By Revit Material

By Revit Material
By Revit Category
By Revit Family Type
As One Object
Do Not Combine
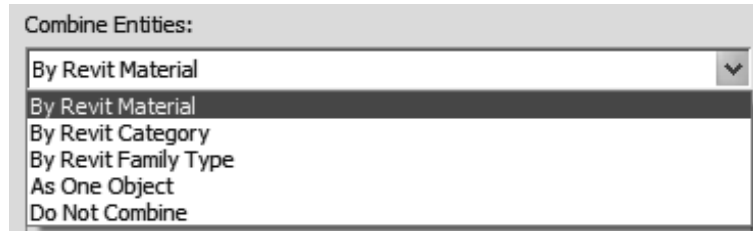
Figure 3–19

- *Objects* area: The selected options in this area are linked from the .RVT file to your current scene. If the .RVT file or .FBX file contains photometric lights, interior artificial lights, cameras, and exterior daylight systems, you can select the associated options in the File Link Settings dialog box. While linking the daylight system from the .RVT/.FBX file, the Autodesk 3ds Max Design software recommends that you toggle on the exposure control, as shown in Figure 3–20.

Daylight System Creation   x

You are creating a Daylight system.

It is recommended that you use the mr Photographic Exposure Control set to an Exposure Value of EV = 15. Exposure Control settings can be adjusted from the Environment & Effects dialog.

Would you like to change this now?

Yes   No

Do not show this message anymore (for this session)

Figure 3–20

- *Geometry* area: In this area, you can set the number of segments for your curved entities and apply auto-smoothing to them.

- *Materials* area: The options in this area enable you to control the material definitions and assignment settings.

Practice 3b

Linking an AutoCAD DWG

Learning Objectives
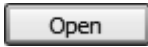
- Create a preset to link an AutoCAD .DWG file and reposition the file using the Helper object.
- Revise the link settings and reload the linked file.

Estimated time for completion: 20 minutes

In this practice you will link AutoCAD geometry to represent the parking lot details, such as pavement markings and other details. The 3D markings were created by projecting 2D lines to the elevation of a terrain model.

You must set the paths to locate the External files and Xrefs used in the practice. If you have not done this already, return to the **Introduction to Autodesk 3ds Max Design** chapter and complete Task 1 to Task 3 of the **Organizing Folders and Working with the Interface** practice. You only have to set the user paths once.

Task 1 - Link an AutoCAD .DWG File.

1. Continue working in the file **MyCivil Base Xref.max** or open **Civil Base.max** from your *Class Files* folder.

If a dialog box opens prompting you about a File Load: Mismatch, click [OK] to accept the default values.
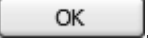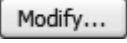
2. Expand [MXD], expand Import, and select **Link AutoCAD**. In the Open dialog box, browse and open the *import* subfolder in your *Class Files* folder. Select **3D Parking Lot Detail.dwg** and click [Open].

3. The Manage Links dialog box opens with the path and the filename displayed, as shown Figure 3–21.
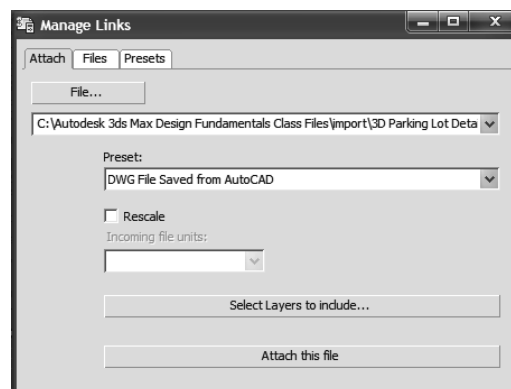
Figure 3–21

If no preset is selected, only [New...] is available.

4. You will configure and save a link preset before linking the drawing file. Select the *Presets* tab and click [New...] to create a new preset.

5. In the New Settings Preset dialog box, set *New Name* as **AutoCAD – Derive by Layer**. Note that the *Format* is selected as **AutoCAD Drawings**. Click [OK].

6. Now you will modify the preset settings. In the Manage Links dialog box, select the newly created preset, **AutoCAD – Derive by Layer**, as shown in Figure 3–22. Note that the **Modify**, **Copy**, **Rename**, and **Delete** options are now available. Click [Modify...].

Manage Links

Attach | Files | Presets

Named Presets:

Autodesk Revit files (RVT or FBX)
    Autodesk Revit - Combine By Revit Material
    Autodesk Revit - Combine By Revit Category
    Autodesk Revit - Combine By Revit Family Type
    Autodesk Revit - As One Object
    Autodesk Revit - Do Not Combine Entities
    Revit Preset
Autodesk FBX files
    Autodesk FBX (Generic) files
AutoCAD Drawings
    DWG File Saved from AutoCAD
    DWG File Exported from Revit
    DWG File Saved from AutoCAD Architecture
    AutoCAD - Derive by Layer

[Modify...]
[Copy...]
[Rename...]
[Delete...]

Figure 3–22

*The **Create Helper at drawing origin** option adds a helper object at the origin of the linked file.*

7. In the File Link Settings: DWG Files dialog box, in the *Basic* tab, set the link options, as shown on the left in Figure 3–23. Select the *Advanced* tab. Select **Create helper at drawing origin** and leave all of the other options as their defaults, as shown on the right in Figure 3–23.
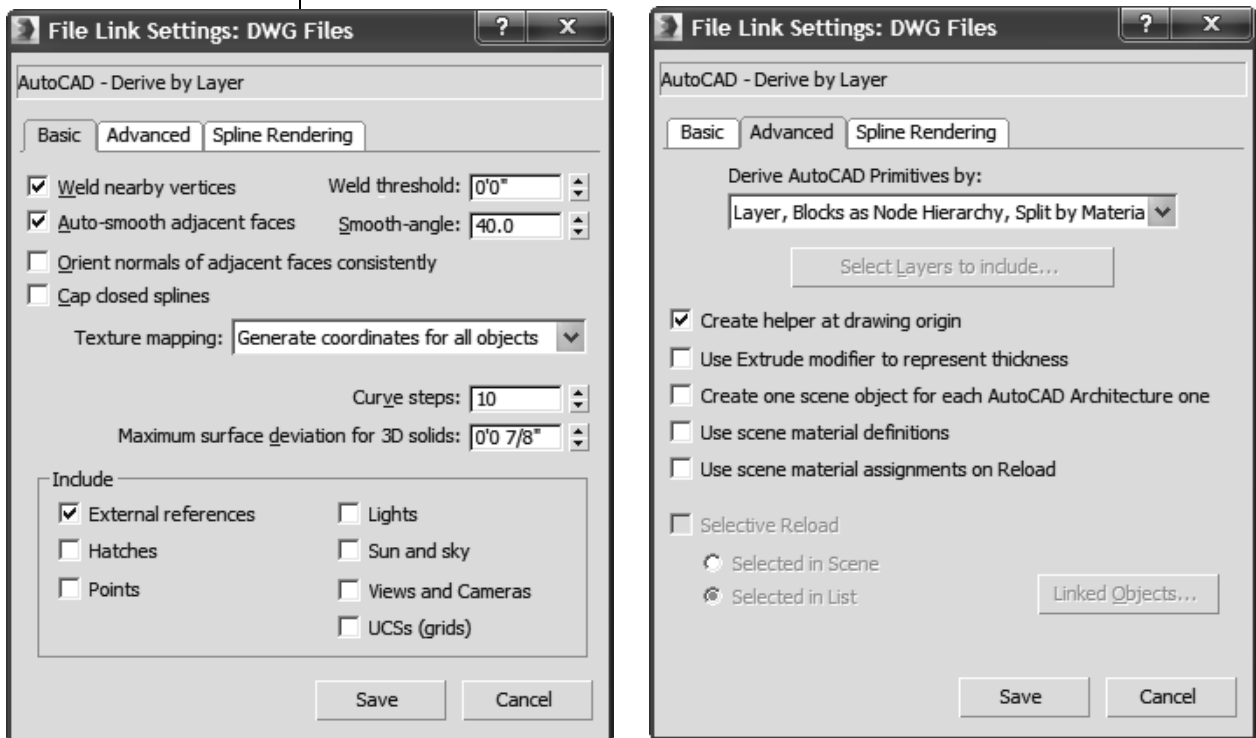
Figure 3–23

8. Select the *Spline Rendering* tab and verify that the link options are set as shown in Figure 3–24.

Figure 3–24

9. Click Save .
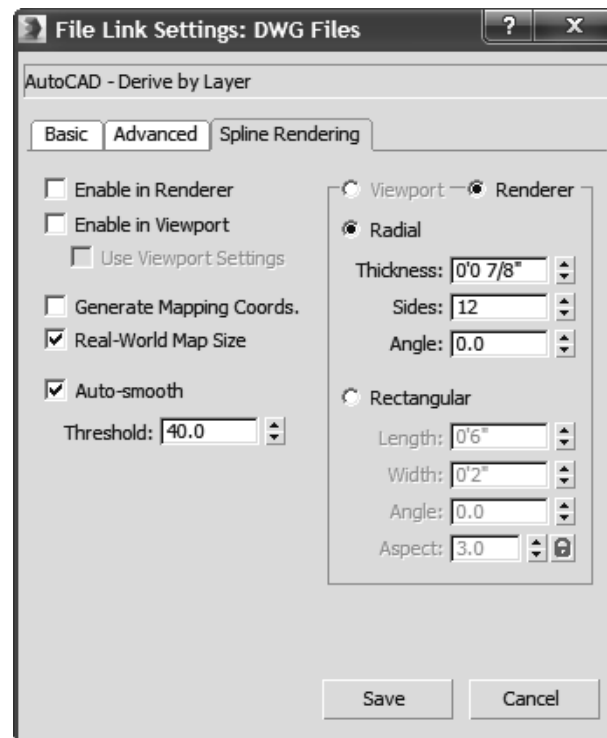
10. In the Manage Links dialog box, select the *Attach* tab. Set *Preset* to **AutoCAD – Derive by Layer**, as shown in Figure 3–25. Click [Select Layers to include...].
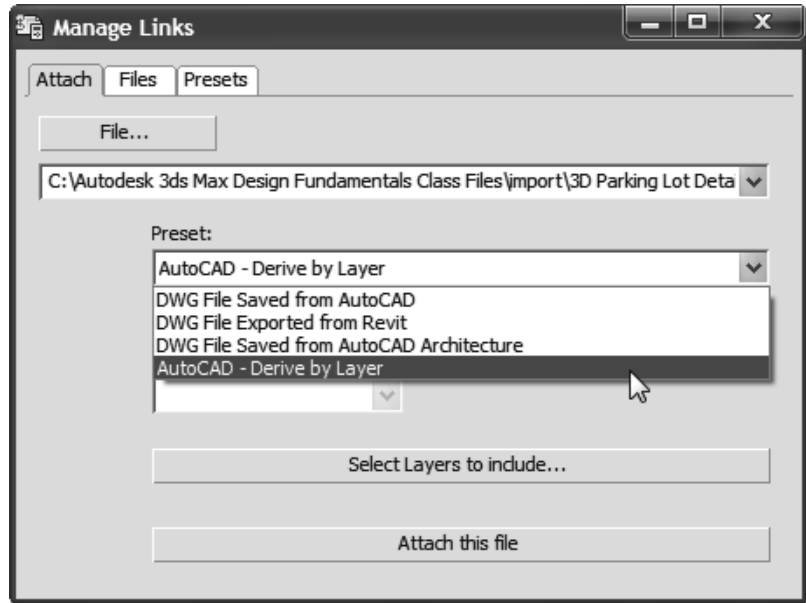
Figure 3–25

11. In the Select Layers dialog box, select **Select from list**. Select **0** and **DEFPOINTS** to clear them, leaving rest of the layers selected, as shown in Figure 3–26. Click [OK].
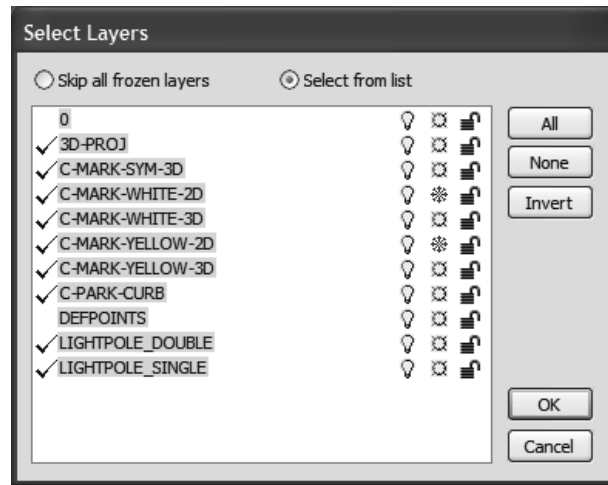
Figure 3–26

12. In the Manage Links dialog box, click [Attach this file]. Note that the parking lot details have been added to the scene, but are located far away from the origin, as shown in the Top viewport in Figure 3–27. Close the Manage Links dialog box.
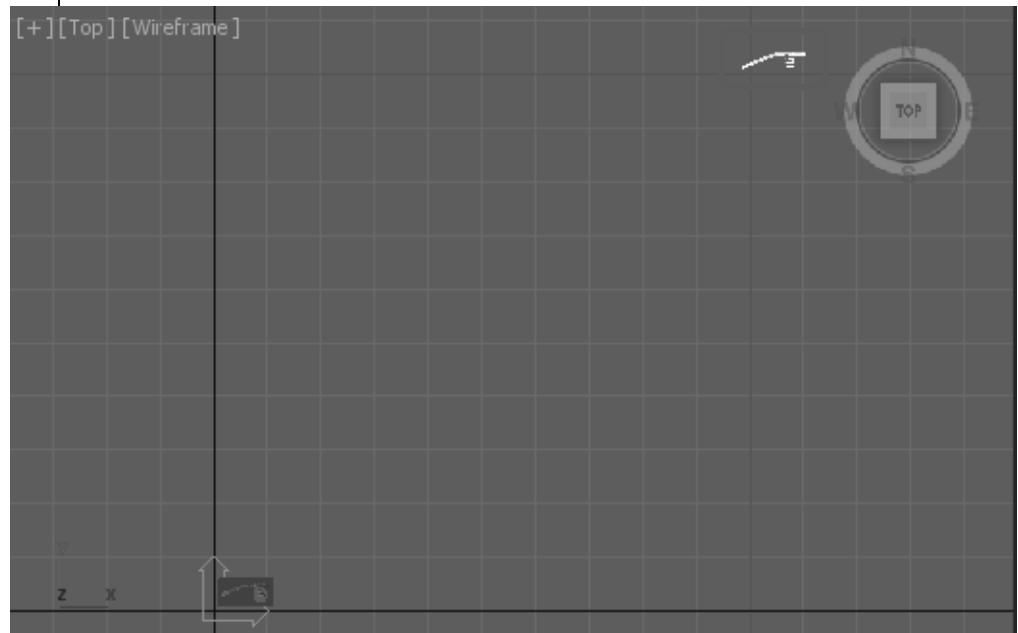
Figure 3–27

Task 2 - Relocate the Linked Geometry.

You might need to start Civil View, if it is not set to open automatically.

1. You need to move the parking lot details by the global shift values in Civil View. In the Menu Bar, select **Civil View>Civil View>Civil View Explorer**.

2. In the Civil View Explorer, select **Scene Settings**, as shown on the left in Figure 3–28. In the Scene Settings rollout, note the *Global Import Shift* values for *X Shift* and *Y Shift (-9901)*, as shown on the right in Figure 3–28. You will use these values to move the linked .DWG file. Close the Civil View Explorer.
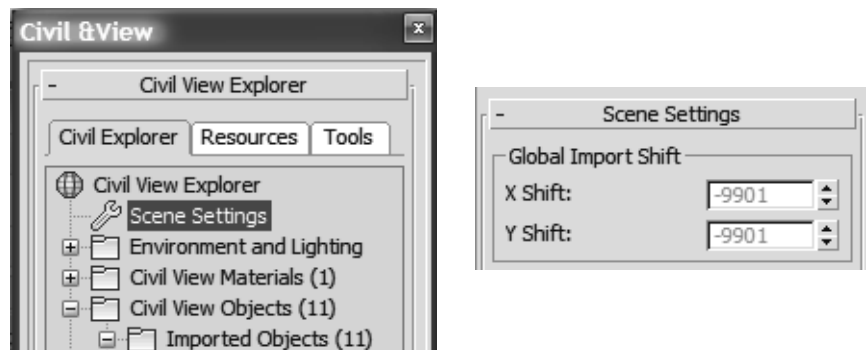
Figure 3–28

3. In the Main toolbar, click (Select and Move).

4. In the Scene Explorer, select the helper object (displayed next to name) **3D Parking Lot Detail.dwg**, or directly in the Top viewport, select the helper object (the **User Coordinate System** icon) for the linked .DWG file, which is located at the origin, as shown in Figure 3–29. Selecting the helper objects selects all of the objects in the linked file and enables you to modify them together.
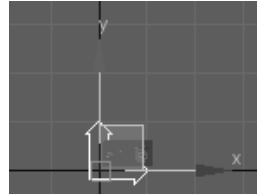
Figure 3–29

5. In the Status Bar, verify that (Absolute Mode Transform) is displayed. In the *X* edit box, enter **-9901'0".** Click in the *Y* edit box, enter **-9901'0"**, and press <Enter>, as shown in Figure 3–30.

Figure 3–30

6. Click (Zoom Extents All). Note how the parking lot details are placed exactly on the parking lot surface.

7. In the Perspective viewport, use (Zoom) and (Orbit) to zoom into the Parking lot area and tilt the view to display the area below the surfaces, as shown in Figure 3–31. Note that in addition to the 3D pavement markings, 2D line markings are imported through the link. A reload of this file would enable you to revise the link settings and/or to update the scene if the drawing is modified.
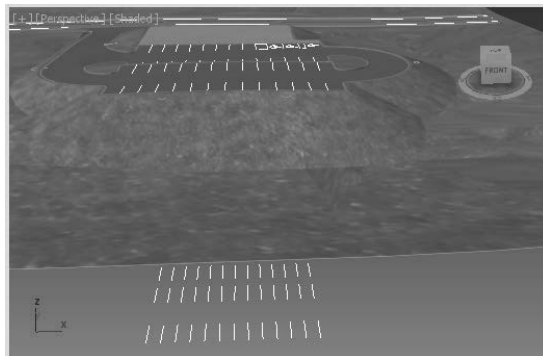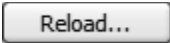
Figure 3–31
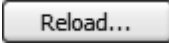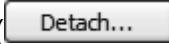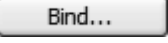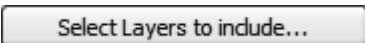
Task 3 - Revise the Link Settings.

1. Click ⬢ MXD >**References**>**Manage Links** to open the Manage Links dialog box.

2. In the Manage Links dialog box, select the *Files* tab and note that the linked file displays 🗈, indicating that the file has not changed. Verify that **Show Reload options** is selected, and click Reload... . (Detach... removes a linked drawing from the scene. Bind... inserts the drawing as is and removes the connection.)

3. The File Link Settings: DWG Files dialog box opens. In the *Advanced* tab, click Select Layers to include... . Click on all of the 2D layers, (**C-MARK-WHITE-2D**, **C-MARK-YELLOW-2D**, and the two **LIGHTPOLE** layers) to clear their selection, as shown in Figure 3–32.
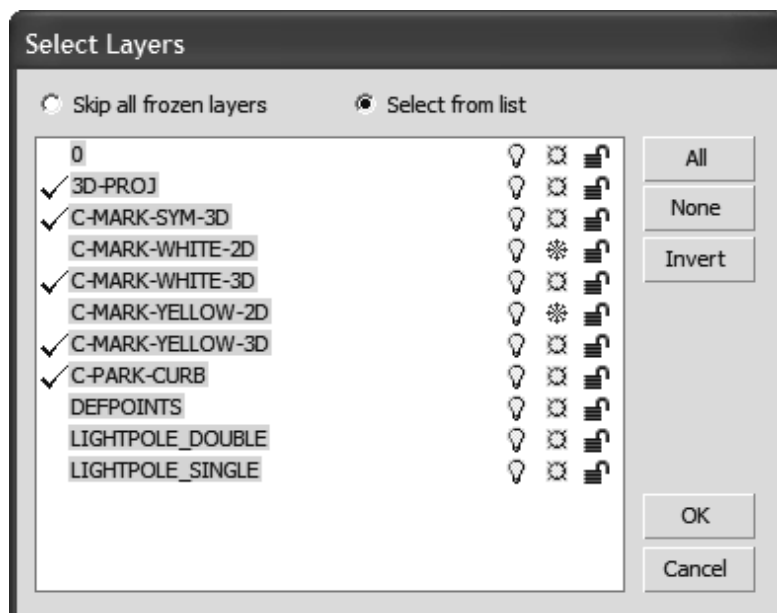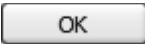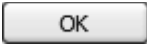
Figure 3–32

4. Click OK twice to close both dialog boxes. The 2D linework should no longer display, keeping the scene smaller. Close the Manage Links dialog box by clicking X .

5. Save your work as **MyCivil Base.max**.

Practice 3c

Linking and Reloading Autodesk Revit File

Learning Objectives

- Link an Autodesk Revit file to the current scene.
- Reposition the Autodesk Revit file using the Helper object.
- Incorporate the changes made to the original Autodesk Revit file into the current scene using **Reload**.

Estimated time for completion: 20 minutes

In this practice you will link a .RVT file and reload a modified version of the file.

You must set the paths to locate the External files and Xrefs used in the practice. If you have not done this already, return to the **Introduction to Autodesk 3ds Max Design** chapter and complete Task 1 to Task 3 of the **Organizing Folders and Working with the Interface** practice. You only have to set the user paths once.
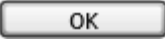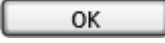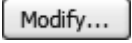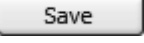
Task 1 - Link an Autodesk Revit (.RVT) file.

If a dialog box opens prompting you about a File Load: Mismatch, click [OK] to accept the default values.

1. Continue working in the file **MyCivil Base.max** or open **Civil Base Link.max** from your *Class Files* folder.

2. Expand [MXD], expand Import, and select **Link Revit**.

3. In the Open dialog box, in the *import* subfolder of your *Class Files* folder, select **Revit Building-1.rvt** and click [Open].

If there are multiple cameras in the .RVT file, the Select Revit View dialog box opens.

4. The Link Revit View dialog box opens indicating the progress of the file as it is loading (It might take a few minutes to load the file). Once loaded, the Select Revit View dialog box opens as shown in Figure 3–33.
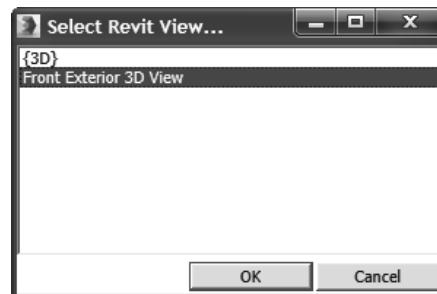
Figure 3–33

*The **Create Helper at Model Origin** option adds a helper object at the origin of the linked file. Selecting and applying transforms (move, rotate, or scale) to the helper object applies the transform to the linked geometry together.*

5. You need to select one camera view. Select **Front Exterior 3D View** and click [OK].

6. In the Manage Links dialog box, select the *Presets* tab.

7. Click [New...] to create a new preset. In the New Settings Preset dialog box, set *New Name* to **Revit Preset** and *Format* to **Autodesk Revit (*.rvt,*.fbx)**. Click [OK].

8. Select **Revit Preset** to highlight it and click [Modify...].

9. In the File Link Settings dialog box, in the Combine Entities drop-down list select **By Revit Category**. In the *Objects* area, clear **Lights** and **Daylight System**. Select **Create Helper at Model Origin** and **Cameras**. In the *Geometry* area, set *Curved Objects Detail* to **6**. Verify that both **Keep 3ds Max scene materials parameters on reload** and **Keep 3ds Max scene material assignments on reload** are cleared, as shown in Figure 3–34. Click [Save].
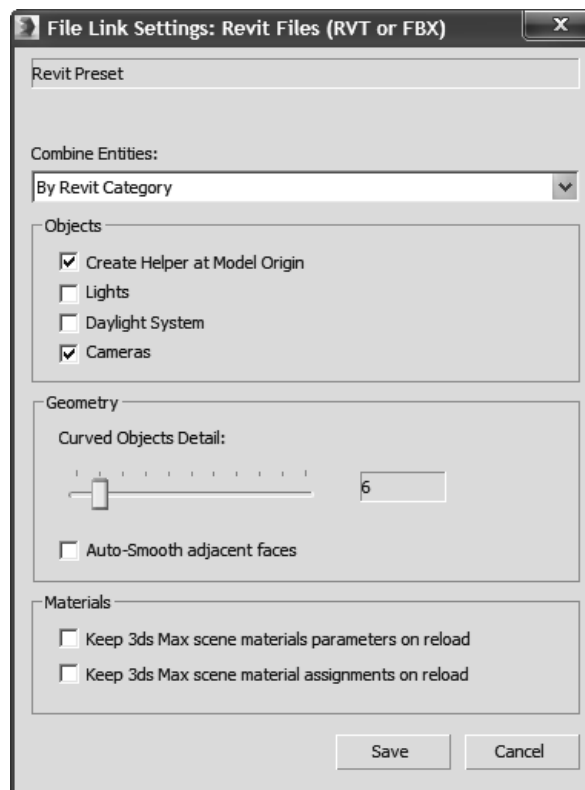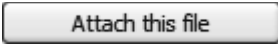
Figure 3–34

10. Select the *Attach* tab. Expand the Preset drop-down list and select **Revit Preset**.

11. Click [Attach this file]. (It might take a few minutes to load the file). Note that the Autodesk Revit building and camera are loaded at the 0,0,0 location in the viewports.

12. Close the Manage Links dialog box by clicking [x].

13. In the Scene Explorer toolbar, click ☐ (Display None) to clear any selection group and click ⌕ (Display Helpers). Locate and select **Revit Building-1.rvt**, as shown in Figure 3–35.
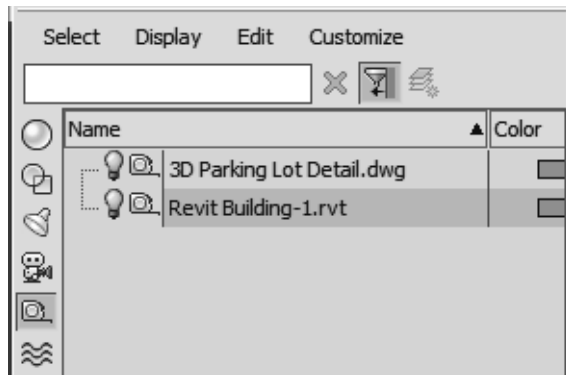
Figure 3–35

14. Right-click on the Top viewport to make it active (if not already active) and to maintain the selection. In the Main toolbar, click ⊹ (Select and Move). The Transform gizmo is displayed at the helper location, which is the origin of the linked Autodesk Revit file.

The position of the building pad from the origin has been calculated.

15. In the Status Bar, verify that ⊕ (Absolute Mode Transform) is displayed. In the *X* edit box, enter **800'0"**. Click in the *Y* edit box and enter **382'0"**. Click in the *Z* edit box, enter **154'6"**, and press <Enter>, as shown in Figure 3–36.
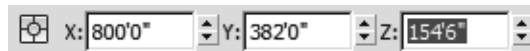
Figure 3–36

16. Click ⊞ (Zoom Extents All). Note how the building is placed on the building pad.

Grid has been hidden for clarity. Press <G>.

17. In the Front viewport, use ⌕ (Zoom Region) and create a rectangular window around the building to only zoom into the building. Select the **Wireframe** Visual Style label and select **Realistic**. The building displays as shown in Figure 3–37.

Figure 3–37

18. In the Perspective viewport, use $\boxed{Q^{\pm}}$ (Zoom) and $\boxed{\text{⌖}}$ (Orbit) to zoom into the building and parking lot area, as shown in Figure 3–39.

19. In the Left viewport, select the **Wireframe** Visual Style label and select **Shaded**. Select the **Left** Point of View label, and select **Camera>3D View: Front Exterior 3D View**, as shown in Figure 3–38. The camera view that was selected when the Autodesk Revit file was linked displays.
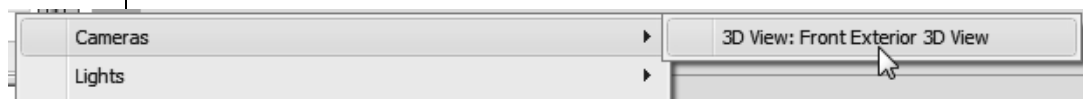

Figure 3–38

20. Use **Pan** to display the complete building in the Left viewport, as shown in Figure 3–39.
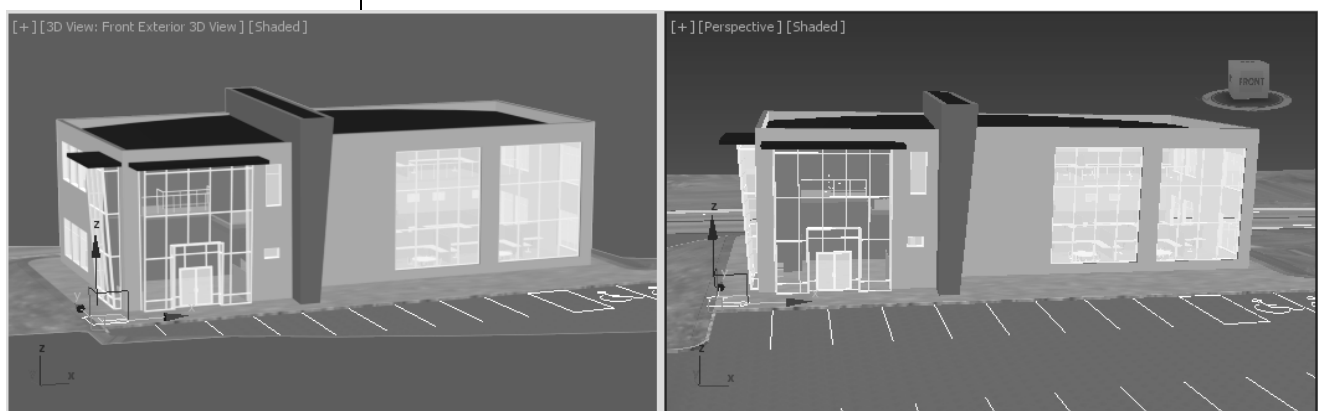
Figure 3–39

Task 2 - Reload the variation of the .RVT file.

Changes can be made in the source file and reloaded directly into the linked file in the Autodesk 3ds Max software. A variation to the .RVT linked file (windows have been added) has been included in your *Class Files\import* folder.

1. In Windows Explorer, open the *import* folder of your *Class Files* folder (*C:\Autodesk 3ds Max Design Fundamentals Class Files\ import*).

2. Select **Revit Building-1.rvt**, right-click and select **Rename**.

3. Rename the file as **Revit Building-1_ORIGINAL.rvt**.

4. Select Revit Building-2.rvt, right-click and select **Copy**. Paste a copy of this file into the same directory. Right-click on the copied file, select **Rename**, and rename the file as **Revit Building-1.rvt**. This must be the same name as the original file that was linked to indicate that the original linked file has changed.

5. Return to the Autodesk 3ds Max Design software. Click

   ![MXD icon]**>References>Manage Links** to open the Manage Links dialog box.

6. In the Manage Links dialog box, select the *Files* tab. Note that ▯ is displayed in front of the .RVT filename (as shown in Figure 3–40), indicating that changes have been made to the original linked file.

▯ indicates that the linked file has not changed and does not have any errors. ▯ indicates that the linked file has been modified.
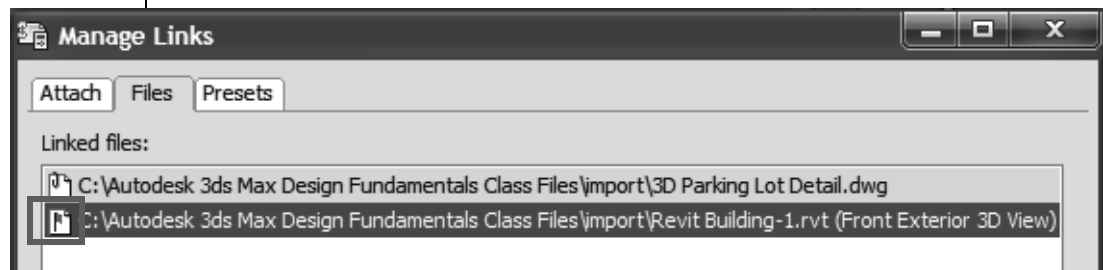
Figure 3–40

7. Select the complete path of **Revit Building -1.rvt**, if not already selected and click Reload... . The Link Revit View dialog box displays the progress of the file load.

8. In the File Link Settings dialog box, in the *Materials* area, select **Keep 3ds Max scene material assignments on reload** to keep the materials that have been applied in the Autodesk 3ds Max software. Click [OK]. The scene is refreshed with the new changes.

9. In the Manage Links dialog box, in the *Files* tab, the icon has changed to [ ], as shown in Figure 3–41. This indicates that there are no differences between the original file and the linked file.
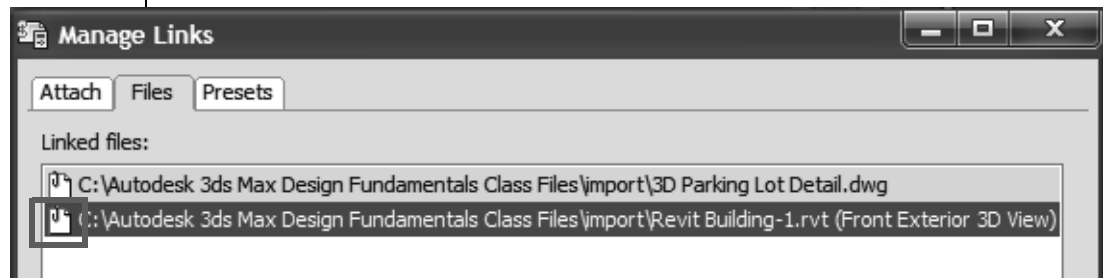

Figure 3–41

10. Close the Manage Links dialog box.

11. In the viewports, the modified building is displayed. Note that more windows have been added to the building, as shown in Figure 3–42.
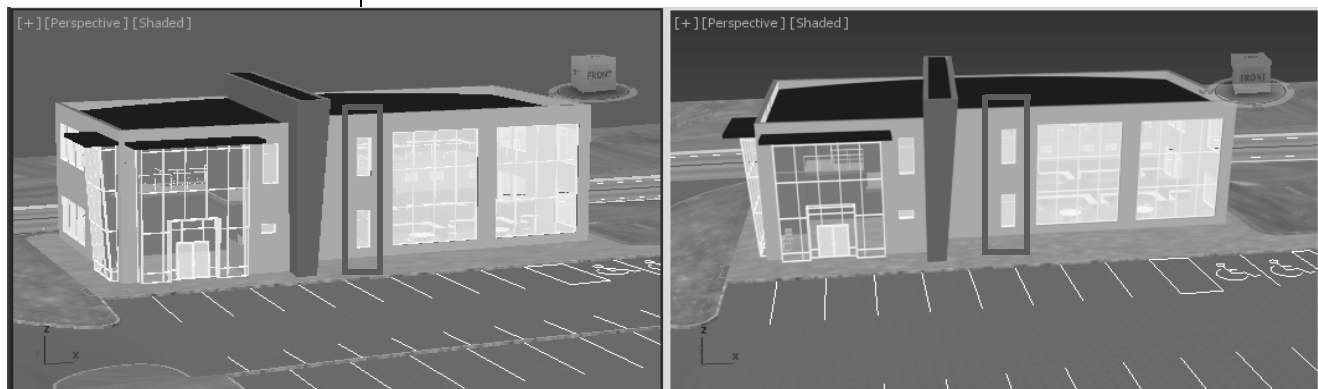
Figure 3–42

12. Save the file as **MyCivil Base Link.max**.

3.3 References

Learning Objectives

- Incorporate objects or other scene files into the current scene by externally referencing them.
- Manage data using the asset tracking systems.

External References (XRef)

Autodesk 3ds Max Design Scene files can also reference data from other scene files by expanding , expanding References, and selecting **XRef Objects** and expanding , expanding References, and selecting **XRef Scene**. The XREF data remains linked to the source (.MAX) scene file so that changes in the source file can be reflected in any scene that contains the XREF.

- External References are useful to break up large projects into more manageable pieces, permit more than one person to work on the same project at the same time in separate files, and to enable the same core scene geometry to be used in multiple files with different lighting conditions and/or animations.

- **XRef Scenes** bring in the entire scene. All of the XREF objects are non-selectable and cannot be modified.

- **XRef Objects** enable you to select individual objects (or all) from an XREF scene. These objects remain selectable and modifiable in the XREF scene file.

- You can snap to XREF and use XREF objects with AutoGrid. You can also use XREF objects as alignment targets and you can select an XREF object's coordinate system for object transformation. XREF support parameter wiring and you can XREF the controllers.

- In the Autodesk 3ds Max Design software, a referenced .DWG, .FBX, .DXF, or .RVT file is a linked file and not an XREF. An Autodesk 3ds Max Design XREF is a reference to the data in another .MAX scene file. Objects in scenes (.MAX) are imported into other . MAX scenes using the **Merge** option.

Data Management and Asset Tracking

In addition to merging and externally referencing other scene file geometry, the Autodesk 3ds Max Design software also enables you to manage your data through Data Management (DM) solutions, which are also referred to as Asset Tracking Systems (ATSs).

- DM solutions such as the Autodesk® Vault software enables you to store scene files and any supporting data (like material maps) in a single database repository.

- These systems can be accessed simultaneously by multiple users who might be assigned different rights based on their project responsibilities. Data can be checked out for editing by one individual at a time while still being referenced by other users. Users can see who is editing which portion of the project at any time.

- By centralizing the files in a DM system it is much easier to adjust paths for external files like image maps.

- Data files can be versioned through DM solutions, so that the older versions of files can be readily accessed, if needed.

- Asset Tracking is an important application for users working on complex projects in a multi-user environment. Working with these sophisticated solutions places their use outside the scope of an introductory-level course. For more information see *Asset Tracking* in the Autodesk 3ds Max Design Help files. Asset Tracking is available by expanding

  , expanding References, and selecting **Asset Tracking**.
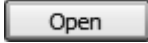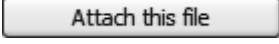
Practice 3d

XRef and Merge Objects

⊘ **Learning Objectives**

- Link an AutoCAD .DWG file to the current scene.
- Incorporate objects from another scene file into the current scene using **XREF**.
- Merge objects into the current scene file.

Estimated time for completion: 15 minutes

In this practice create a new scene file that will contain linked AutoCAD objects and XRef objects from the Civil Base scene.

You must set the paths to locate the External files and Xrefs used in the practice. If you have not done this already, return to the **Introduction to Autodesk 3ds Max Design** chapter and complete Task 1 to Task 3 of the **Organizing Folders and Working with the Interface** practice. You only have to set the user paths once.

Task 1 - Assemble the Data.

If an unsaved scene is open, you need to save or discard the changes to the scene.

1. Expand [MXD] and select **Reset**. Click [Yes] to reset the scene.

2. For this scene. set the System Unit Scale to **Inches**. Select **Customize>Units Setup**. In the dialog box, verify that *Display Unit Scale* is set to **US Standard**, **Feet w/Fractional Inches**, *Default Units* is set to **Inches**, and *Lighting Units* to **American**. Click [System Unit Setup]. In the System Unit Setup dialog box, set *System Unit Scale* to **Inches**. Click [OK] in both the dialog boxes.

3. Expand [MXD], expand References, and select **Manage Links**. In the *Attach* tab, click [File...]. In your *Class Files* folder>
import subfolder, select **Exterior AutoCAD Architectural Model.dwg**. Click [Open].

4. In the *Preset* drop-down list, select **AutoCAD – Derive by Layer** and click [Attach this file]. Once the file has been loaded, close the dialog box by clicking [x].

- The AutoCAD Architectural objects were not joined together by layer. Each was subdivided by material type into different objects. Materials previously assigned in AutoCAD Architecture were preserved on these separate objects.

5. Click (Maximize Viewport Toggle) or use <Alt>+<W> to display the four viewport view.

6. Click (Zoom Extents All) to display all of the objects in all of the viewports.

7. In the Front viewport, select all of the objects by creating a window around the objects. In the Main toolbar, in the *Named Selection Sets* field, enter **exterior AutoCAD Architectural building**, as shown in Figure 3–43 and press <Enter>.

Figure 3–43

You select objects to XREF rather than the entire scene because XREF scene objects cannot be selected or modified.
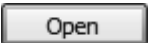
8. Expand , expand References, and select **XRef Objects**.

In the XRef Objects dialog box, click (Create XRef Record from File) as shown in Figure 3–44.

Figure 3–44

9. In the Open File dialog box, select **Parking Lot Detail.max** (*Class Files* folder>*import* subfolder) and click .

10. In the XRef Merge dialog box, click [All] (at the bottom of the dialog box) to select all of the objects, as shown in Figure 3–45. Click [OK].
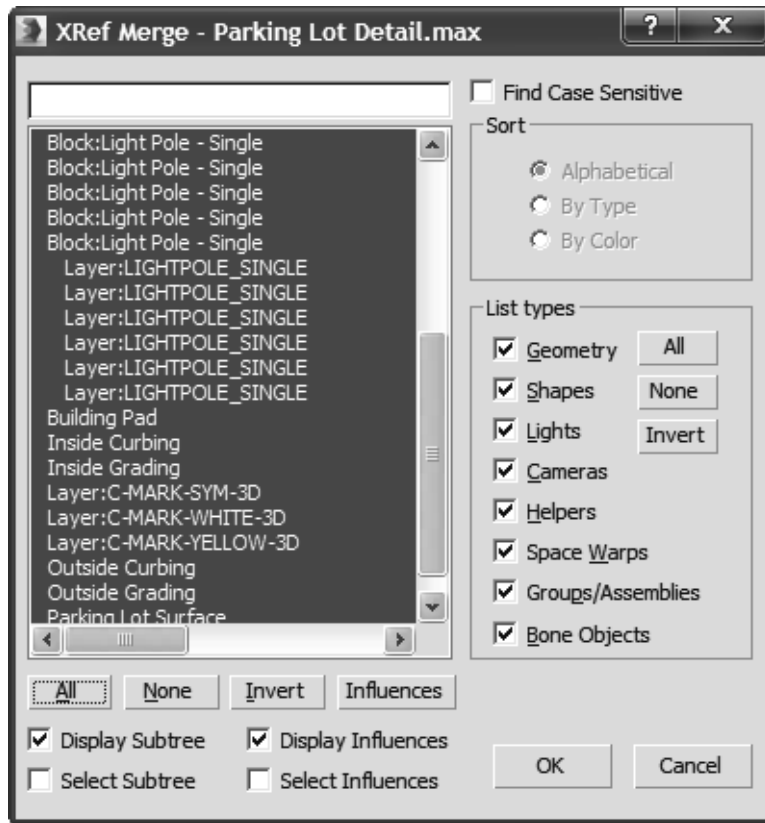
Figure 3–45

11. The Duplicate Material Name dialog box opens prompting you that there is an incoming material with the same name as an existing scene material. Select **Apply to All Duplicates**, as shown in Figure 3–46, to keep both materials and click [Auto-Rename Merged Material].
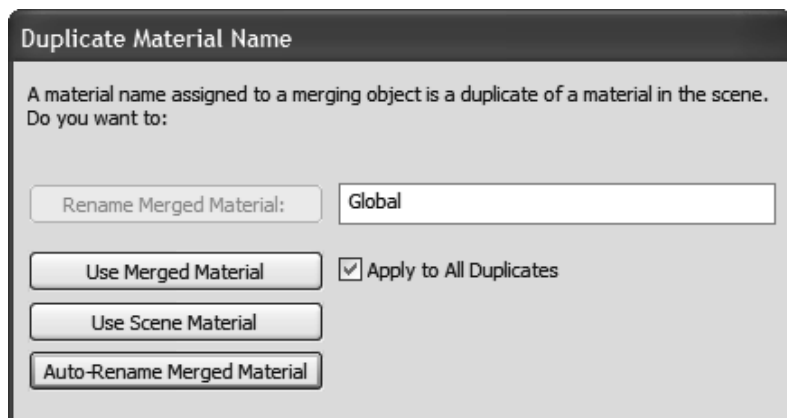

Figure 3–46

12. In the XRef Objects dialog box, note that the .MAX filename is displayed. Close the dialog box by clicking [X].

13. Click [icon] (Zoom Extents All). Note that the Civil Base objects are located far from the origin. This is a coordinate system discrepancy and not a scale issue. It is common for Architectural drawings to be based in a different coordinate system and scale than the accompanying Civil/Survey drawings.
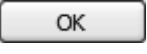
Task 2 - Coordinate the Data.

In this task you will relocate the Civil Base in the Architectural Data. To line up the data accurately you will need the exact coordinate translation and rotation. You can measure ahead of time in programs, such as AutoCAD by comparing the coordinates of points common to both files.

Alternatively, you can use the Scene Explorer to select all the XRef objects..

1. In the Main toolbar, click [icon] (Select by Name). In the Select From Scene dialog box, click [icon] (Display None) and click [icon] (Display Object XRefs). Select all of the XRef objects in the list (use <Ctrl>+<A> or use the cursor) and click [OK].

2. With only the XRef objects selected, select **Group>Group**.

3. In the Group dialog box, set the *Group name* to be **Site XRef** and click [OK].

4. In the Main toolbar, click [icon] (Select and Move). In the Reference Coordinate System, select **World**, as shown in Figure 3–47 and click [icon] (Use Transform Coordinate Center).

Figure 3–47

5. In the Status Bar, verify that [icon] (Absolute Mode) is displayed (which means it is enabled).

6. In the *Transform Type-in* area, set *X:* to **-197'4"**, *Y:* to **-30'0"**, and *Z:* to **-4'11"**, as shown in Figure 3–48, and press <Enter>. (The translation coordinates have already been measured in AutoCAD.)

X: -197'4"   Y: -30'0"   Z: -4'11"

Figure 3–48

7. In the Main toolbar, click (Select Object) to exit the **Move** transform operation.

8. Click (Zoom Extents All). In the Perspective viewport, use (Zoom), (Orbit), and **Pan** to zoom into the parking lot and building area (as shown in Figure 3–49), and verify the building is located on the building pad. Even though the XREF had a different Unit Scale (feet), it scaled correctly to the current scene (in inches).
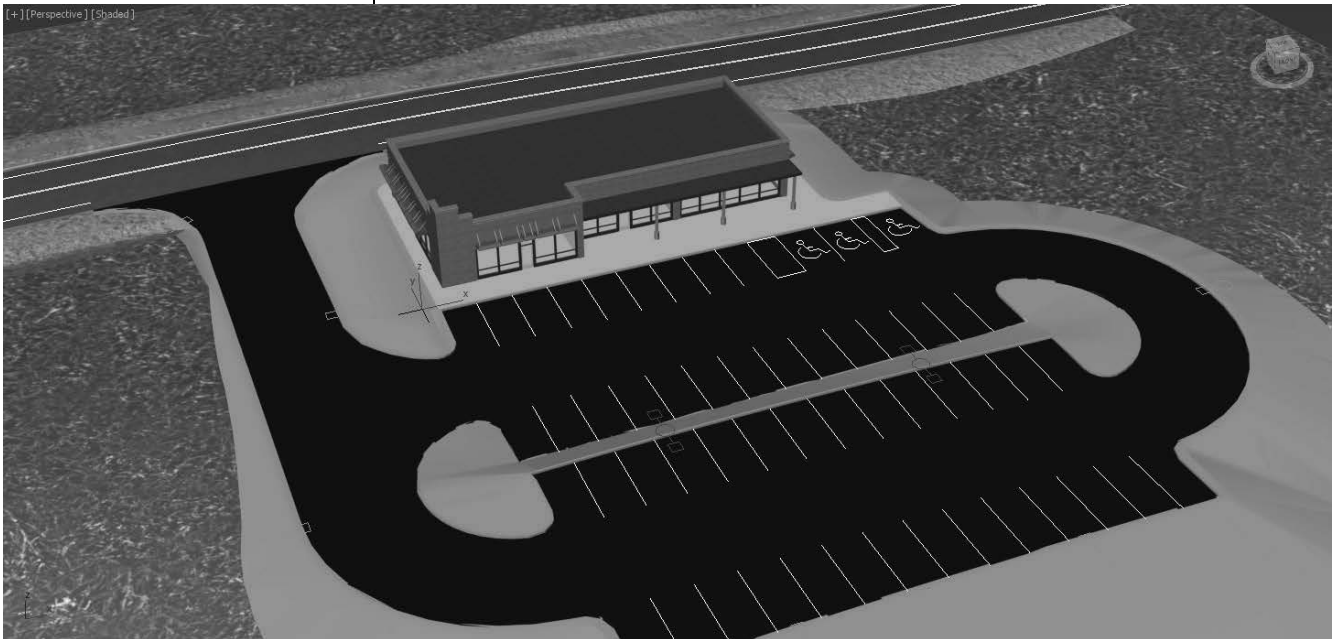

Figure 3–49

9. Save your work as **MyArchitectural Scene.max**.

Task 3 - Merging Objects.

In this task you will merge the light poles.

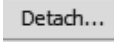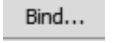1. Expand ![MXD] **>Import>Merge**. In the Merge File dialog box, select **Light Poles for Project1.max** from your *Class Files\scenes* folder. Click Open .

2. In the Merge dialog box, click All (bottom of the dialog box) to select all of the objects and click OK .

3. The Duplicate Name dialog box opens, prompting you that an object with the same name already exists in the scene. Select **Apply to all Duplicates** and click Auto-Rename .

4. The light poles are displayed in the scene, as shown in Figure 3–50.

Merge *enables both objects to have the same name,* Skip *ignores the incoming object, and* Delete Old *removes the original object.*

Figure 3–50

5. Save your work.

Chapter Review Questions

1. The following file types can be linked to the current Autodesk 3ds Max Design scene:

   a. .DWG, .OBJ, .APF, .FBX

   b. .DWG, .DXF, .FBX, .RVT

   c. .DWG, .DXF, .MAX, .RVT

   d. .DWG, .OBJ, .FBX, .RVT

2. In the Manage Links dialog box, in the *Files* tab, which of the following options do you use to remove the link with the original linked file but maintain its geometry in the current scene?

   a. Reload...

   b. Detach...

   c. Bind...

3. Which command do you use to combine objects from a saved Autodesk 3ds Max Design scene (.MAX file) into your current .MAX scene?

   a. **Import**

   b. **Link**

   c. **Open**

   d. **Merge**

4. While linking Autodesk Revit files in the current Autodesk 3ds Max scene, which of the following options are provided in the Combine Entities List? (Select all that apply.)

   a. By Revit Material

   b. By Revit Layer

   c. As One Object

   d. By Revit Camera

5. When an entire .MAX scene is brought into the current scene using **XREF Scenes**, the XREF objects are selectable but cannot be modified.

    a. True

    b. False

Command Summary

Button	Command	Location
	Absolute Mode	• **Status Bar**
N/A	Asset Tracking	• **Application Menu:** References
N/A	Import	• **Application Menu:** Import
N/A	Link AutoCAD	• **Application Menu:** Import
N/A	Link FBX	• **Application Menu:** Import
N/A	Link Revit	• **Application Menu:** Import
N/A	Manage Links	• **Application Menu:** References
N/A	Merge	• **Application Menu:** Import
	Select by Name	• **Main toolbar**
	Select Object	• **Main toolbar**
	Use Transform Coordinate Center	• **Main toolbar**
N/A	XRef Objects	• **Application Menu:** References
N/A	XRef Scene	• **Application Menu:** References