Autodesk FBX-Based Revit Architecture 2009 to Autodesk 3ds Max Design 2009 Workflow

Written by:
Brian S. Russell,
Associate AIA,
Integrated Practice Manager
AYERS/SAINT/GROSS

Corey Rubadue,
Senior Associate
AYERS/SAINT/GROSS

Overview

This white paper is for architects, designers, engineers, and visualization specialists who need to move data from Revit® Architecture 2009 software to Autodesk® 3ds Max® Design 2009 software to further explore, validate, or communicate their designs.

Revit Architecture software has quickly become one of the top choices for professionals when it comes to creating building- information models, and 3ds Max software has been a leading choice for architectural visualization for more than a decade. As architectural firms move from traditional 2D-based computer-aided design (CAD) drafting workflows to creating building-information models in Revit Architecture, it is important to be able to effectively move data from Revit Architecture to 3ds Max Design for advanced visualization. The Autodesk® FBX® software open-standard, platform-independent 3D file format gives you access to content authored in any software package supporting the FBX file format.

This document describes the workflow for transferring files from Revit Architecture 2009 to Autodesk 3ds Max Design 2009, using the FBX workflow. It focuses on the methodology for successfully moving 3D scene meshes from Revit Architecture into 3ds Max Design, complete with material assignments. It outlines the FBX control options and techniques that affect how objects are translated, discusses common challenges, and offers tips and tricks to address those challenges.

- For more information about Revit Architecture, visit www.autodesk.com/revit.
- For more information about 3ds Max Design, visit www.autodesk.com/3dsmaxdesign.
- For more information about FBX, visit www.autodesk.com/fbx.
- For more information about design visualization, visit www.autodesk.com/designvisualization.

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Workflow

The architectural community has adopted Revit Architecture software with breathtaking speed. Successful workflows in a Revit environment are as varied as the firms that are implementing them. While some users model in 3D and construct every piece of furniture ready for export to 3ds Max Design, other users adopt a modified approach and utilize both 3D elements and 2D symbols. Some users include AutoCAD® or AutoCAD® Architecture software in their workflow to complement their building-information modeling (BIM) workflow with details and sections.

To facilitate data transfer and reduce downstream errors, it is recommended that you do as much preparation as possible in Revit Architecture before moving the file to 3ds Max for visualization.

Foundation

Revit Architecture is a design tool that brings intelligence to the 2D and 3D objects in a scene. Because it is purpose-built for building-information modeling (BIM), any change you make, anytime, anywhere is automatically coordinated throughout your project. Designs and documentation stay coordinated, consistent, and complete. This alone makes it easy for users to work as much as possible within a building information model.

Once a building has been modeled in Revit Architecture, it is important to establish a 3D view. Revit Architecture will not allow you to export FBX models from a 2D view. Any standard 3D view or camera view from Revit Architecture will construct a camera object in the FBX file. If you need to export a 2D view, you should use the DWG™ workflow.[1]

Revit Architecture does not contain layers. The FBX file format will import all objects at the element level. Therefore, it is important to note that information exported from Revit may be controlled through Visibility settings in your 3D view or Camera view.

To access the Help documentation for FBX in 3ds Max Design, go to Help > Additional Help and choose FBX Plug-in Help.

Visibility Control from Revit Architecture

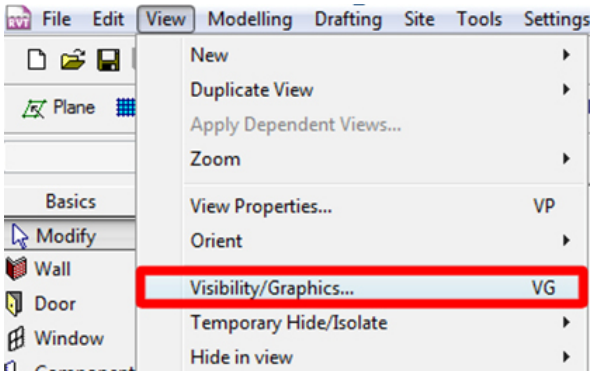
Visibility overrides take the place of a traditional CAD-based layering system in Revit Architecture. Instead of layers, Revit Architecture software utilizes a combination of visibility control (the ability to override an object's appearance in a view) and the ability to hide single or multiple objects in a view. To control what is displayed in your camera or view, simply turn on what you want to see and turn off what you do not.

Another significant note here, the more geometry you have turned on in a view, the larger the file size for export. If you find that you are having issues exporting your view, try turning off unnecessary objects in the view.

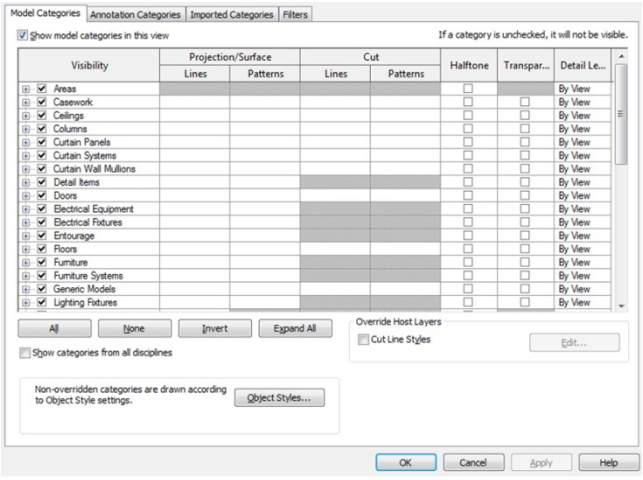
Only objects that are visible in your current view will be exported.

Let us have a look at the Visibility/Graphics workflow:

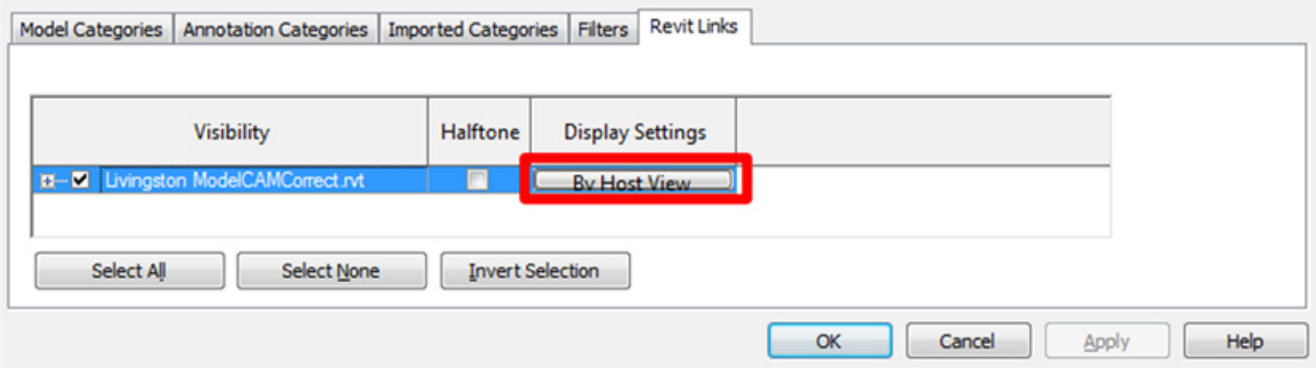
1. First, from any 3D or Camera view, go to View > Visibility/Graphics.



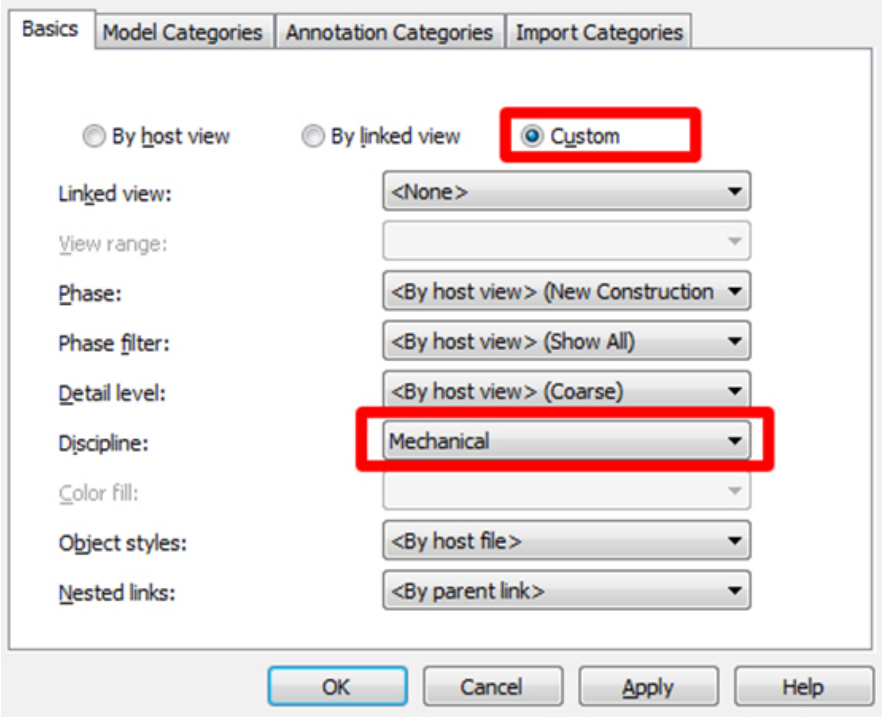
2. The Visibility/Graphics Override command window will appear. It is important to note that Visibility/Graphics Overrides work on a per-view basis only, the changes you make to this view will not appear in any other 3D or Camera view.



3. Once in the Visibility/Graphics Override command window, you can uncheck any category you would like to hide in this view. Generally, 3D elements reside under Model Categories, 2D elements fall under Annotation categories, and Linked files fall under Imported Categories. If you have a linked Revit model, you will find it under Revit Links.

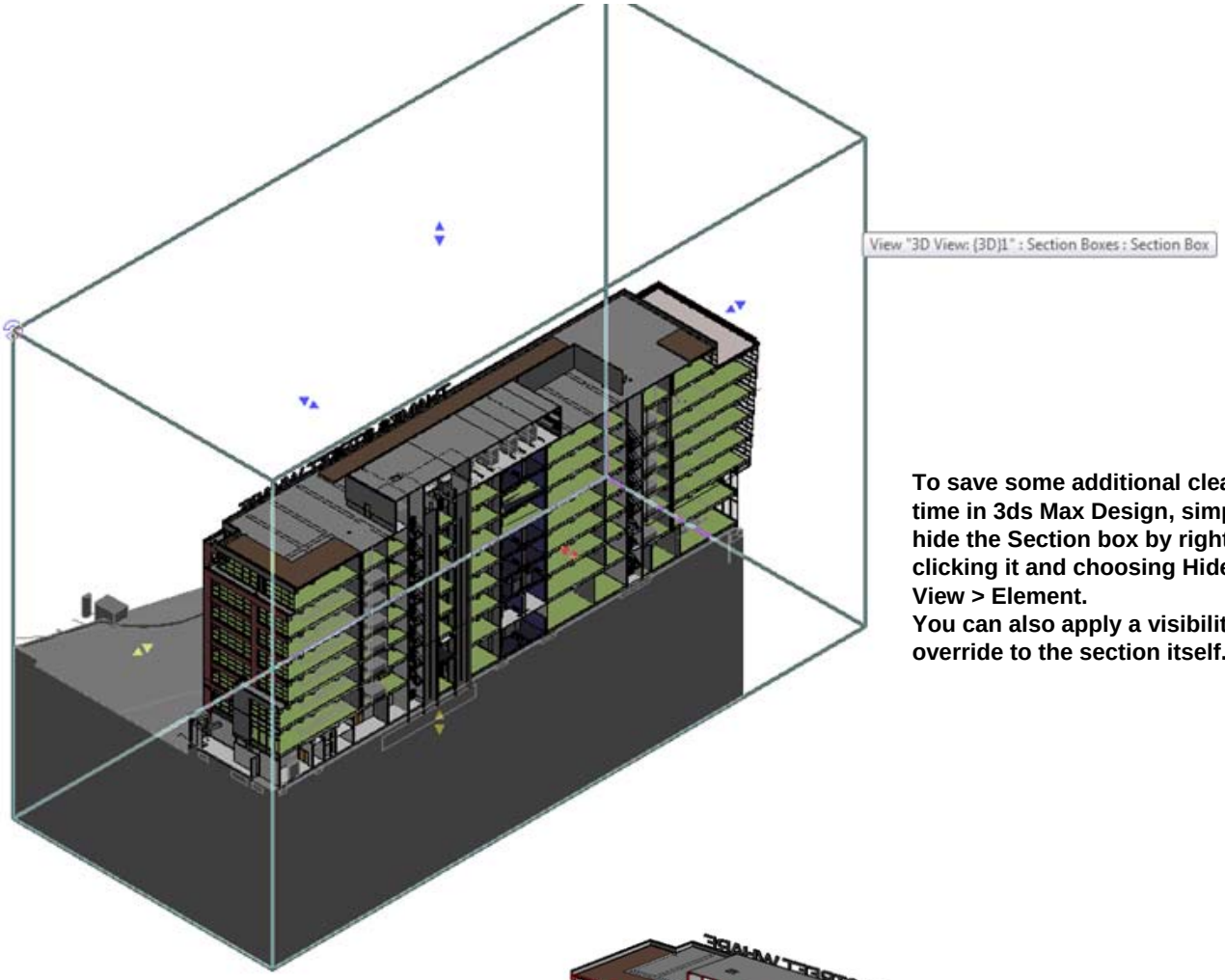


4. The Revit Links category allows you to use the current graphic overrides or individually override settings in the linked file to suit your needs.



Section Detail

In your visualization workflow you may have need for a section detail. Revit Architecture software can aid you through the use of a Section box. Any modeled elements within the Section Box will be clipped by any of the six sides of the box.



To save some additional cleanup time in 3ds Max Design, simply hide the Section box by right-clicking it and choosing Hide in View > Element.
You can also apply a visibility override to the section itself.

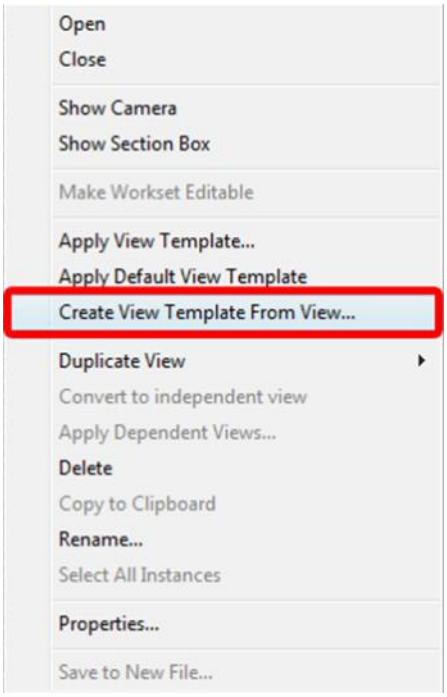
Here is an example of a red Poche at the cut plane. A quick way to achieve this override is to change the view to Coarse level of detail. Adjust the color of the Poche through Materials > Poche.

Creating a View Template

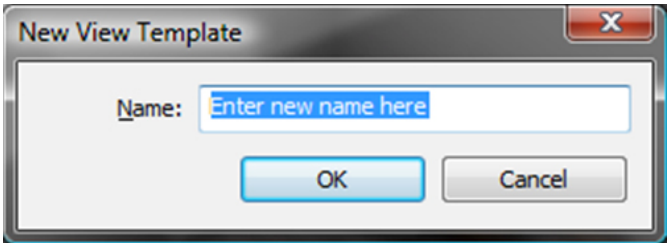
There are several purpose-built tools in Revit Architecture software to aid you in the development of a standard workflow. View Templates allow you to save your visibility settings, which can later be applied to other 3D views. This section describes view templates and the power of utilizing them throughout your project.

To access the View Template dialog:

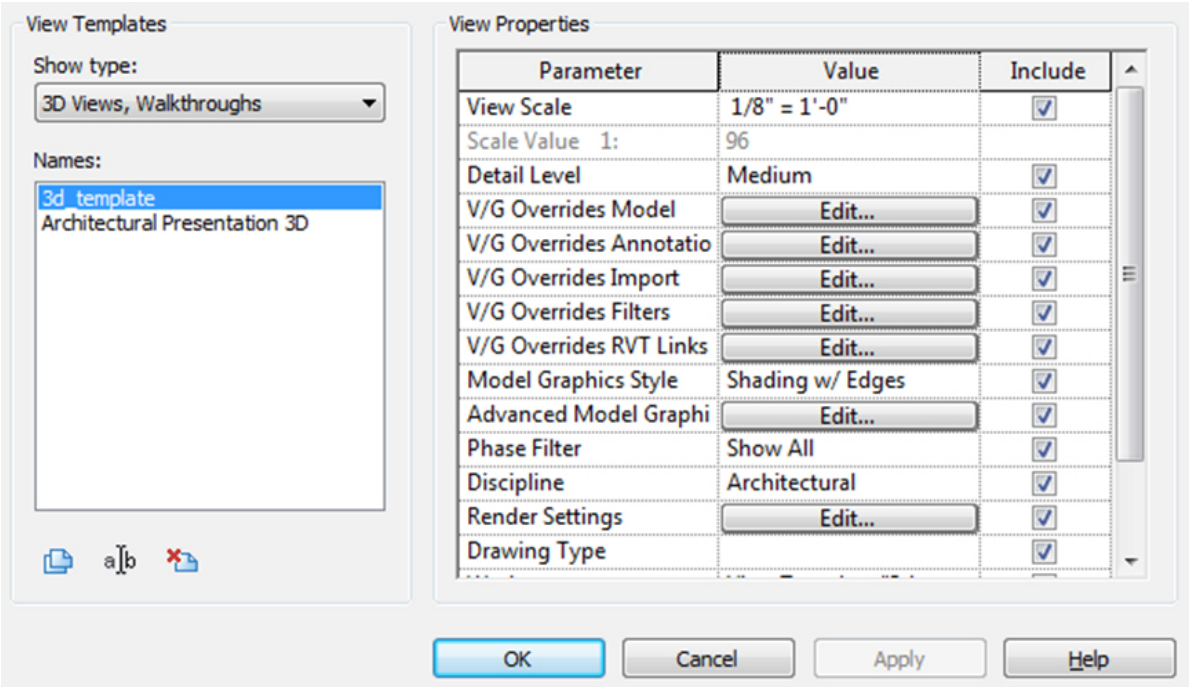
1. Right-click on your view in the project browser > choose "Create View Template From View…"



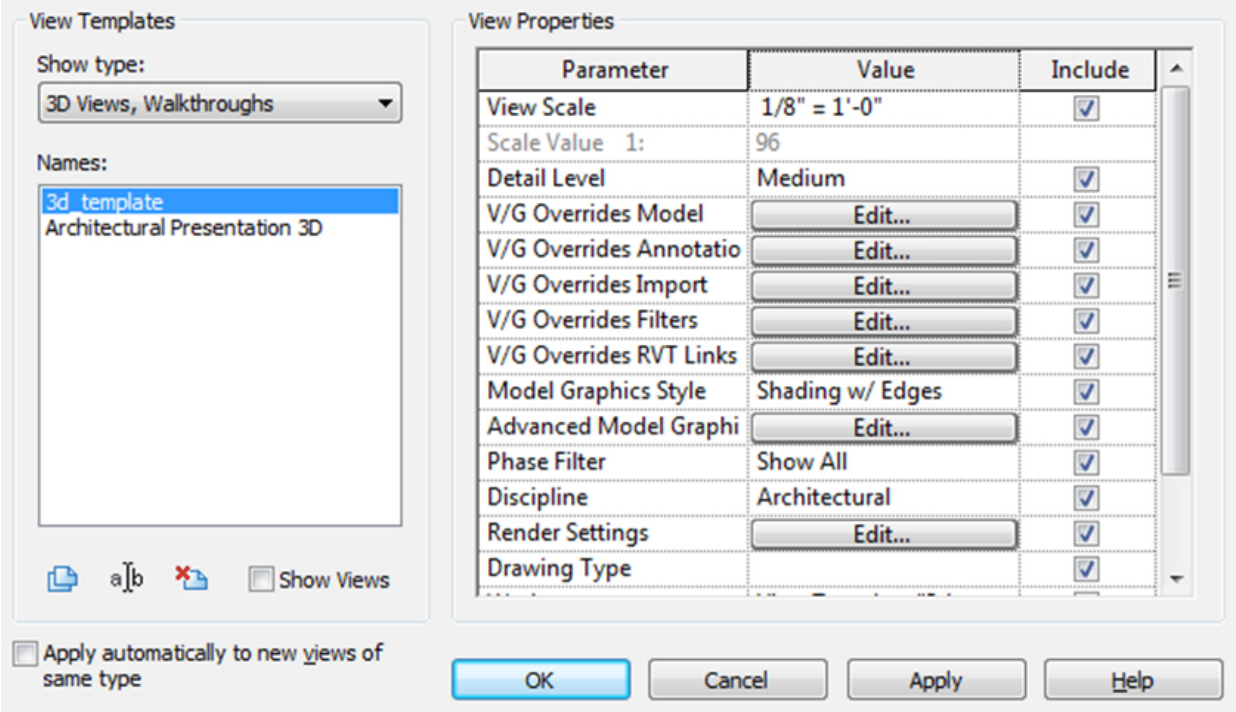
2. The New View Template prompt will come up and ask you to name the template. Try to use a naming convention that is easily recognizable and, if possible, keep the title short. This will allow you to find the template later when you apply it to another view.



3. After naming the file, the View Templates dialog will come up. Here you can save your settings and make any last minute adjustments.



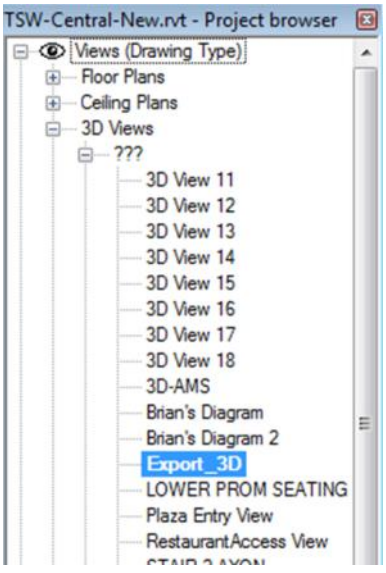
4. Once saved, you can now apply this template across multiple 3D views. To clarify; this does not contain camera or view orientation. View Templates only allow you to change the visibility of what you see in your view. To apply a view template to another view, you need only right-click the view in the project browser > Select Apply View Template. Once the Apply View Template dialog comes up, select the view template that you named and saved earlier.



Exporting to FBX

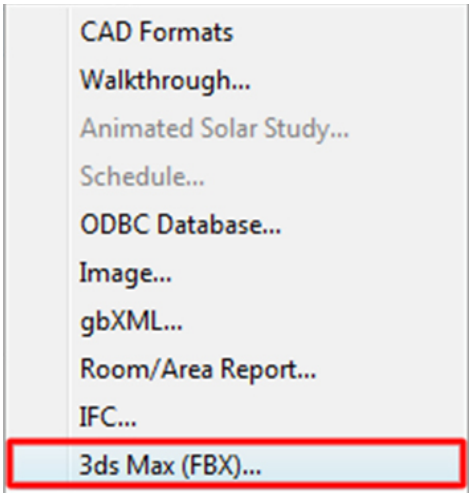
The process of exporting an FBX file from Revit Architecture software is seamless. Double check to make sure anything that you did not want to appear is turned off in your respective views. For larger Revit models, it is best to turn on only what is necessary to reduce file size and speed up export.

To begin, proceed as follows:

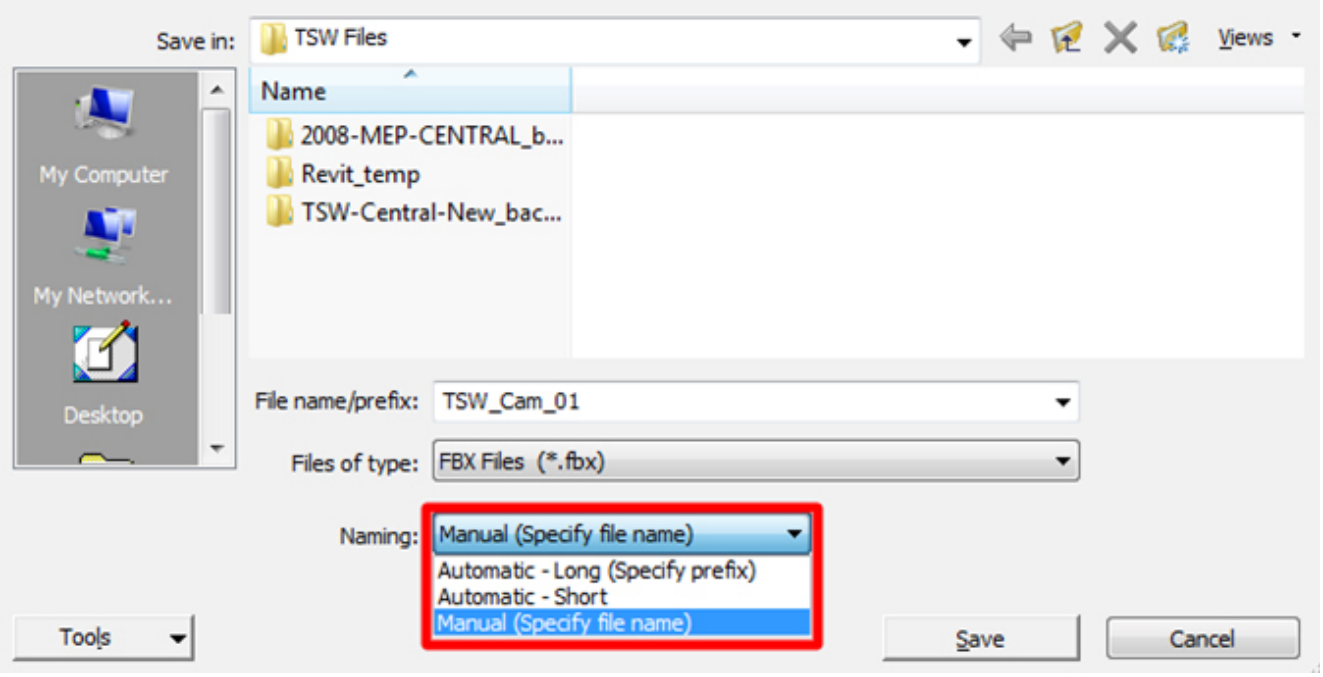


1. Make sure the view you want to export is active in Revit Architecture. Active views show as bold text in the Project Browser.

2. Navigate to the Menu Bar and choose: File > Export > 3ds Max (FBX)



3 The FBX Export dialog gives you three choices for naming your file. Automatic-Long (Specify Prefix), Automatic-Short, and Manual (Specify file name). Generally, the Manual option is preferable. This will eliminate a potentially long filename and the use of the characters {}, which might be a challenge for some file systems if you are on a network with multiple operating systems.



4 Once the file is named, save it by selecting Save. Revit Architecture will now begin to generate the FBX output. Depending on the size of your model, and what you have visible, this should be a quick process.

FBX Output from Revit Architecture

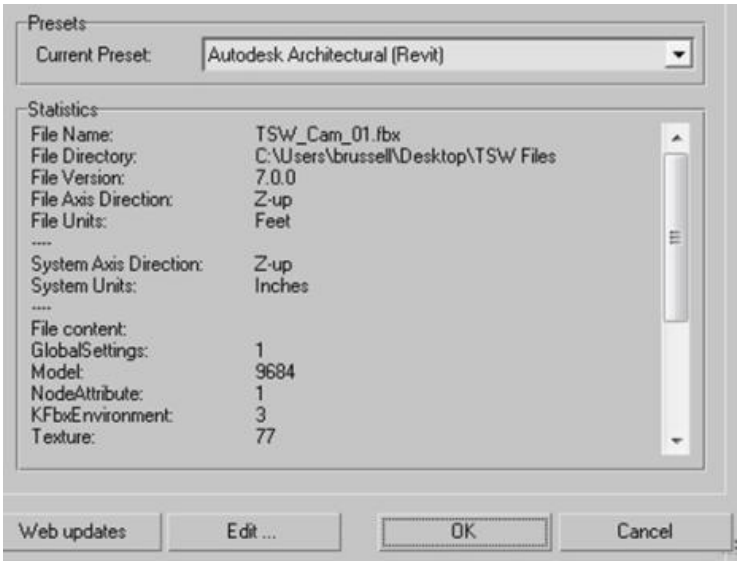
The FBX import process creates a separate folder, sharing the same name as the FBX file but with the .fbm file designation, in the directory to which you exported the FBX file from Revit Architecture. This folder includes environment information as well as embedded images in use by ProMaterials™ technology (a quick glance into this folder will show you sub directories with associated maps for your materials and environments).This folder will be used by 3ds Max Design, so if you save the scene in 3ds Max and move the file to a different directory, be sure to move the .fbm folder as well. Do not delete this folder, as it may be required throughout the lifecycle of your project. Regardless, the contents of the .fbm folder remain embedded within the original Revit Architecture-exported FBX file.

Importing FBX Files into 3ds Max

Importing FBX files to 3ds Max is just as seamless, and has additional options to aid you in file translation if necessary. As a starting point, here is a default import template for Revit files which uses the new Recognize™ scene-loading technology.

1. To import an FBX file, go to File >Import > Select the FBX file you want to import and then select Open.

2. The FBX Import dialog box will appear, and the Autodesk Architectural (Revit) template should be loaded by default. Otherwise, select the presets dropdown menu at the top of the FBX window and choose the Autodesk Architectural (Revit) option. This option can then be edited to include or exclude cameras (included by default), or to change units from Imperial to Metric. We discuss these processes under "*Advanced import settings for FBX files*". When you are ready to import, click Open.

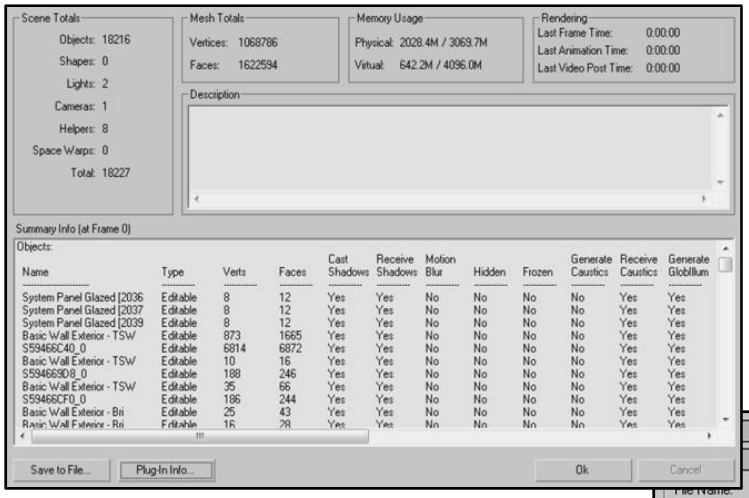


Note: If the <Show UI> option is unchecked in the FBX Import dialog box, the user interface will NOT be visible. Hold down the SHIFT key during import to restore the user interface visibility.

3. While the FBX transfer is processing, you may follow the progress at the bottom of your screen. Transfer time varies on file size and model complexity. Because we elected to turn off anything we did not need in our Revit views, this should be a quick import.

View Summary Information

Now that your file is imported, you can view the summary information for your model. The Summary Info dialog will give you "at a glance" statistics for the model and materials.

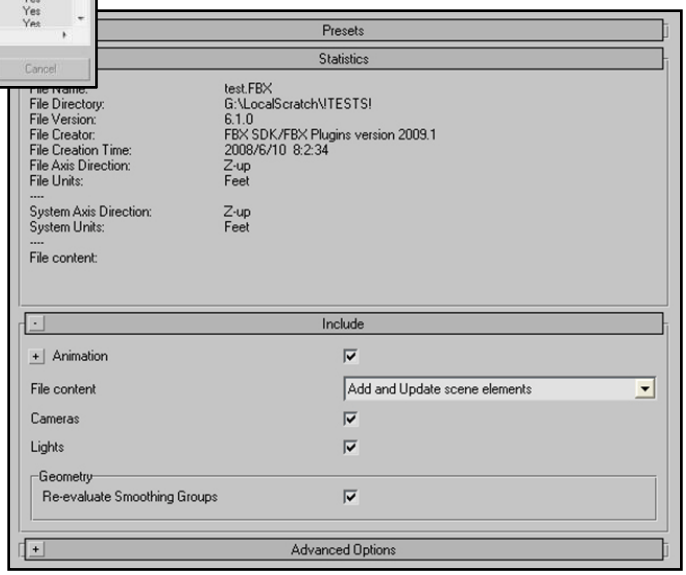


To view them, go to File > Summary Info. There is also an option at the bottom of the dialog to export the file.

Advanced Import Settings for FBX Files

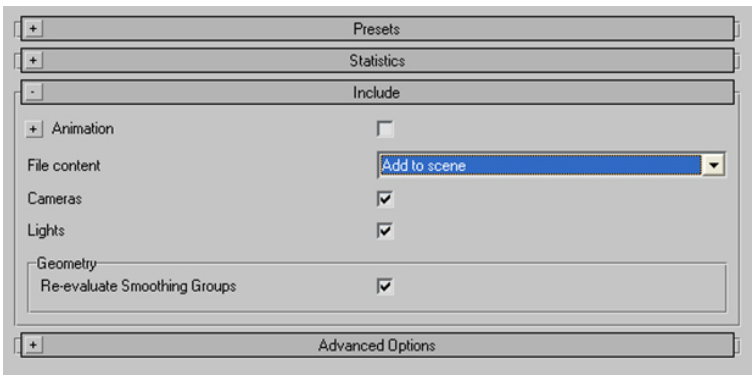
Depending on your workflow, you may need to go a little deeper into the FBX settings to attain the desired results. This section explains individual options for the 3ds Max plug-in, and how they are related to Revit-based FBX exports. To access the 3ds Max FBX plug-in options, first you need to select the Autodesk Media & Entertainment preset.

This will expose all import options.



Since the Revit FBX Exporter does not currently support animation, disable the "Animation" option in order to optimize the import operation. The "File content" option should be set to "Add to scene" for Revit to 3ds Max workflows.

- Cameras are enabled and imported by default. FBX imports camera settings, but not render settings. Currently, only one camera (current view) is exported from Revit Architecture 2009. You may need to modify the Revit-based camera upon import to 3ds Max. We will cover cameras in more detail later in this document. If you do not want to import the camera, disable this option.



- Lights are also enabled and imported by default. Photometric light types coming into Autodesk 3ds Max Design 2009 from the Revit Architecture 2009 are currently supported. If you do not want to import lights, disable this option.

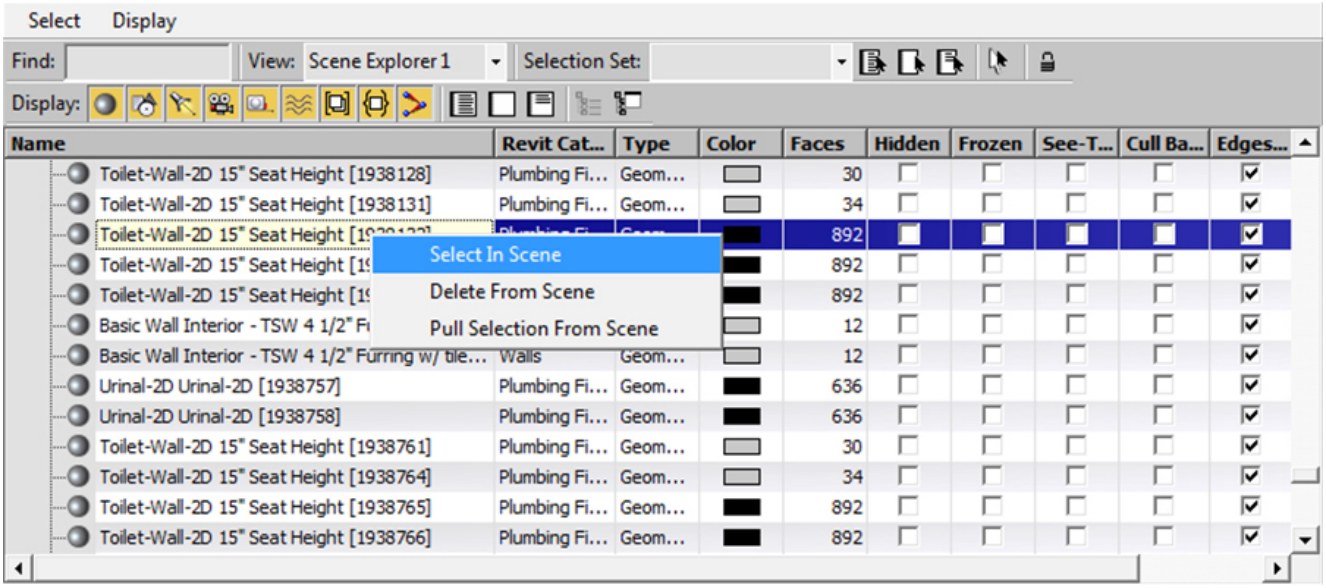
- Note on Units: The FBX plug-in will automatically convert the Revit Units into the System Units used in 3ds Max. If these unit systems are identical, no conversion is applied. Simply choose what system units you wish to use in 3ds Max, then import. The plug-in will automatically apply a conversion, if needed.

Best Practices

Here are some helpful tips for creating best practices in your workflow:

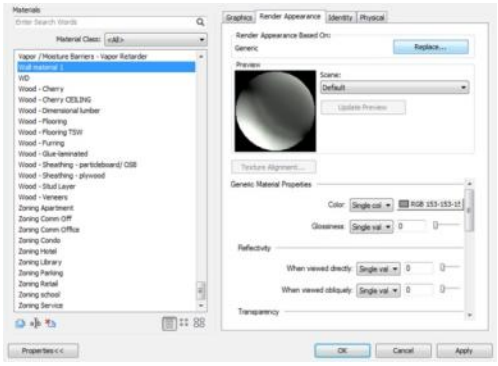
1. Do most of the modeling work in Revit Architecture. This allows you to maintain the integrity of your document set, while still giving you the ability to export for advanced visualization purposes.

2. Explore your scene using the Scene Manager in 3ds Max Design 2009. To locate it, go to Tools > New Scene Explorer. This will open an instance of the Scene Manager that will give you elemental control over your model. This is useful for both visibility and selecting specific geometry in your model. Another great benefit, the metadata is organized as Revit Architecture specific columns, making it easy to find your objects by Revit Family or Type.



3. Use the Select by Name command. To access this go to Edit > Select by> Name. This is a quick way to select several objects in your scene at once.

4. Use Select Similar Command. This is another great way to speed up your workflow. This tool can be accessed by going to Edit > Select Similar, or by right-clicking in your viewport > Select Similar. For this tool to be active, you must have an object selected.
5. Fine tune Autodesk ProMaterials in 3dsMax Design. ProMaterials are designed for mental ray® software and they model materials commonly used for construction, design, and environmental applications. They correspond to Revit Architecture materials, so they provide a way to share surface and material information.

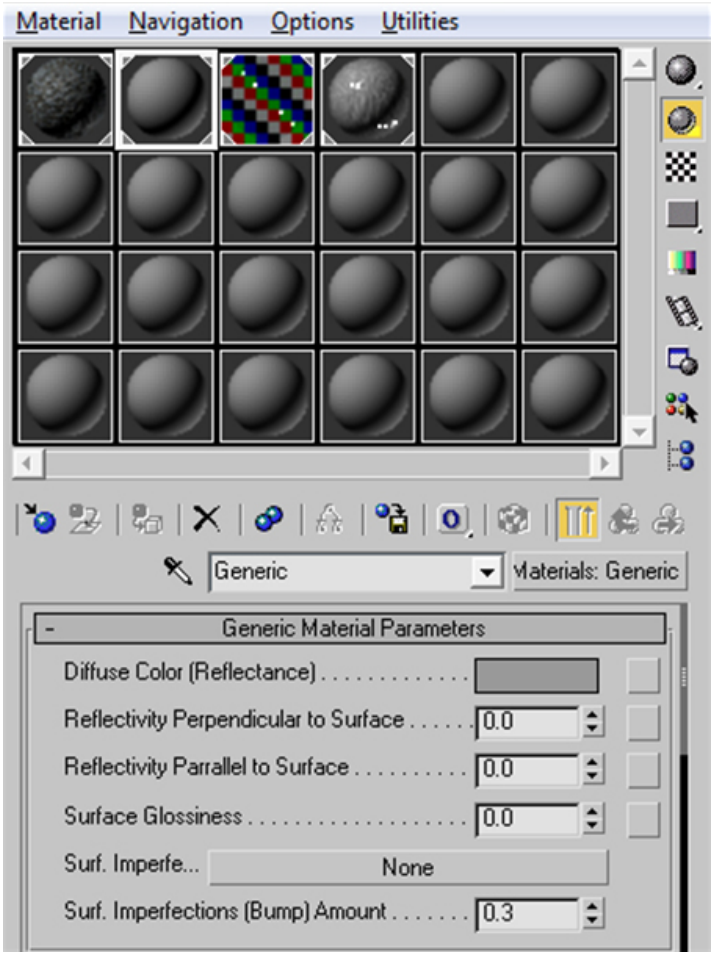


ProMaterials are based on the Architecture & Design material in 3ds Max Design. Similarly, they work best when used with physically accurate (photometric) lights, and geometry that is modeled in real-world units. On the other hand, the ProMaterials interface is much simpler than the Arch & Design material interface, and lets you achieve realistic, *physically correct* results with comparatively little effort.

6. Explore render appearances using the Material Editor. Bring up the Material Editor by using “m” on y eyboard, or selecting it from the. button.

   In the Material map browser, choose Browse from Scene to see a list of all materials in the scene. If you clear the Show Materials checkbox and just select Show Maps, you can see a list of any bitmaps used in the scene.

7. If necessary, refine objects in 3ds Max Design. FBX translates the Revit model into editable geometry. If you select an object in 3ds Max Design, you can now edit it just as you would any native 3ds Max Design geometry. Be aware that if you modify or construct any geometry, you can import it into Revit Architecture in DWG format but it will not have the intelligence found in native Revit Architecture objects.



Common Challenges

1. Cameras

- Multiple Cameras: Revit Architecture software exports only one camera to FBX, which corresponds to the active 3D view. This means that only the current Revit 3D view or camera will import into 3ds Max Design as a 3D camera view.
- Challenge—Camera Frame and Optical Center: The 3ds Max Design FBX plug-in does not support the cropping region and optical center of Revit cameras. However, the field of view (FOV) or perspective of the Revit cameras is correct in 3ds Max Design. So, this does not translate precisely in 3ds Max Design if you modify your Revit camera by resizing and/or offsetting the cropping region (frame) of your 3D view in Revit Architecture. This is caused by a combination of FBX not transporting the render resolution settings, and the limitation that the 3ds Max Design camera model does not support an optical center.
- Workaround: By adjusting the rendering output size first and, if necessary, the Lens through FOV in 3ds Max Design, you can generally get very close to your original Revit Architecture camera.

2. Massing objects

- Challenge: Massing objects in Revit Architecture are not supported, and do not export to FBX.

- Workaround: A quick solution is to use the “Building Maker” toolset (found under Massing) in Revit Architecture to quickly generate generic walls, floors and roofs from the mass. These objects are supported and will come into 3ds Max Design. Alternately, you can export your masses from Revit Architecture into 3ds Max Design through the DWG format.[1]

3. Upgrading materials in Revit Architecture 2009 from a previous version of Revit

    - Challenge: You want to know how to migrate AccuRender materials from a previous release of Revit to the new Revit Architecture 2009 materials.

    - Solution: To partially migrate materials from an earlier version of Revit to Revit 2009, you can modify the text file that controls the Revit Architecture 2009 material applied to AccuRender material when the file is upgraded. This allows you to map AccuRender materials to a 2009 equivalent.

      Locate the materialmapping.txt file on your machine. By default, this file is stored in the C:\Program Files\Revit Architecture 2009\Program directory.

      This file is read by Revit Architecture when you upgrade to an earlier RVT file to make a (partial) match from old rendering appearances. The first column of information is every AccuRender appearance that occurs in the Revit Architecture 2009 shipped content. On the other side of the tab is the internally understood new rendering appearance.

      For example:

      _accurender\Masonry\Stone\Rubble, River Rock Masonry-049

      "Masonry-049" corresponds to the “Stone Rubble River Rock” rendering appearance.

      This allows you to add additional lines to the file to represent custom materials that you may have made and used in previous versions of Revit Architecture. For example, if you created a custom material called "stone-2" in an earlier version and stored it in the user directory, you can add the following line to the materialmapping.txt file to map that material to Revit Architecture 2009 material:

      user\stone-2 Masonry-049

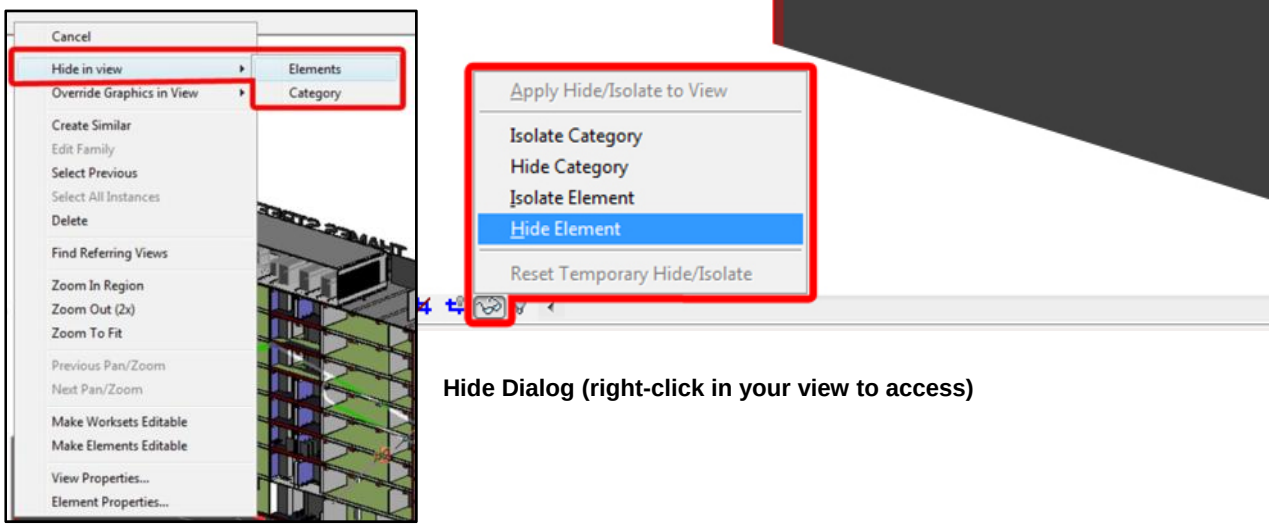
      Note: There needs to be a tab between “user\stone-2” and “Masonry-049."

      Now, when a file from an earlier version of Revit Architecture that contains a mapped AccuRender appearance in the materialmapping.txt file is opened in Revit Architecture 2009, that material will be automatically updated to the specified material.

4. Hidden Revit Architecture elements

- In Revit Architecture, you can “hide” and “temporarily hide” elements. The FBX plug-in exports “temporarily hidden” objects from Revit Architecture. Although they exist, these elements are not visible in 3ds Max Design since they are “hidden.” “Hidden” elements in Revit Architecture do not export and do not exist when you import your FBX into 3ds Max Design.

Temporary Hide/Isolate Dialog



Hide Dialog (right-click in your view to access)

5. Groups

- Challenge: Revit Architecture Groups have no 3ds Max Design equivalent, so the 3ds Max Design FBX plug-in ignores all Revit Architecture groups. For example, if you export lights within a Revit Architecture Light group, the 3ds Max Design FBX plug-in converts the lights but loses any grouping.
- Workaround: Select by name, and regroup in 3ds Max Design.

6. Project units

- Tip: Revit Architecture software calculates system units in Imperial units (Feet and fractional inches). When metric units are set as the “Project Units,” Revit Architecture dynamically converts the Imperial units to metric units in the user interface (UI). This means that FBX always exports in the actual system units, imperial (feet). There are no issues in working with metric units in Revit Architecture and 3ds Max Design, but this results in an imperial (feet) FBX file that automatically converts to metric (meters) on FBX import into 3ds Max Design. When you use an imperial (feet) project unit in Revit Architecture and feet system units in 3ds Max Design, no conversion is needed.

7. Daylight Portals (mr Sky Portals)

- Tip: Revit Architecture software uses daylight portals differently from 3ds Max Design. They exist in both applications but, because they are calculated differently at render time, the 3ds Max Design FBX plug-in does not import these daylight portals to 3ds Max Design. Doing so would result in low performance. This is because Revit Architecture systematically creates daylight portals for each individual window, and for each side of the window. This does not affect the rendering performance of Revit Architecture, since only windows relevant to the camera view are calculated at render time. However, 3ds Max Design renders all daylight portals systemically. Therefore, it is better to create one single mr Sky Portal for an entire wall of windows manually in 3ds Max Design as you would normally when you work in 3ds Max Design. This results in better performance and gives better visual results.

8. File Linking

- Challenge: 3ds Max Design FBX plug-in does not currently support a “File Link” workflow with Revit Architecture FBX exports.
- Workaround: By saving a 3ds Max Design (.max) file for each FBX export from Revit Architecture, and by utilizing the XRef Objects tool in 3ds Max Design, you can emulate the file link function in a master 3ds Max Design file (.max).
- For example:
    - Export a Revit Architecture scene as an FBX file (e.g. scene.fbx).
    - Import the FBX file (scene.fbx) into 3ds Max Design.
    - Name and save the file in 3ds Max Design (e.g. XREF.max).
    - Close the file or Reset the 3ds Max Design scene and choose the XREF OBJECTS operation (under File > XRef Objects...) to import the contents of the XREF.max file. Be sure to select all objects listed for import.
    - Once the XRef is complete, save and name your current file (e.g. MASTERFILE.max).
    - In Revit Architecture, should there be changes to the model, such as doors, windows, or walls changing position, Re-export the FBX file. Overwrite the original FBX file to keep things simple.
    - Import the new FBX file into a new 3ds Max Design file.
    - Name and save the new 3ds Max Design file, overwriting the original (XREF.max) file. Be sure to choose “Yes” to overwrite the existing file.
    - Open the master file (MASTERFILE.max) and all of the changes to the scene are automatically updated. Any changes to materials that have been performed in the master file (MASTERFILE.max) are reapplied to the adjusted objects, therefore maintaining a similar workflow to File Linking.
    - Should there be additional objects from the new Revit Architecture FBX file export, these WILL NOT come across automatically in the master file (MASTERFILE.max).
    - To bring in any new objects, you will need to go back into the XRef Objects dialog and choose the entire contents of the XREF.max file and then load them into the MASTERFILE.max file.
    - 3ds Max Design will recognize that there are duplicate names. Choose ‘Skip’ to the duplicate named objects and tick the checkbox ‘Apply to All Duplicates’.
    - This will bring in any additional objects from the Revit Architecture file.

What's new in 3ds Max Design 2009

Support for Sustainable Architectural Projects

One of the key technologies in Autodesk 3ds Max Design software is Exposure™ technology, a toolset, exclusive to this version of the product, for simulating and analyzing sun, sky, and artificial lighting. Exposure assists architects in evaluating light intensity, part of the process of analyzing indoor environmental quality for requirements such as LEED EQ Credit 8.1.

Precise Visual Feedback and Professional Final Renders

Reveal™ rendering technology is a system that streamlines iterative workflows by giving you very precise control over what is rendered, be it your entire scene minus a specific object, one given object, or a specific region of the Framebuffer. The rendered image Framebuffer contains a simplified set of tools to quickly validate changes in a render, by optionally filtering out objects, regions, and/or processes in order to balance quality, speed, and completeness. The release also contains a new ProMaterials library for mental ray software, which gives you manufacturer-related materials for creating design and building surfaces.

Revit 2009 Interoperability…and More

With 3ds Max Design, Autodesk takes a major leap forward with interoperability between 3ds Max Design and Revit Architecture software. The software's new FBX-based Recognize scene-loading technology lets you quickly and accurately import geometry, lights, materials, and cameras from your Revit Architecture scenes to 3ds Max Design. Interoperability has also been strengthened across the 3D line of Autodesk products through two new user interface and navigation toolsets: The ViewCube™ and SteeringWheels™ technologies.

Streamlined Mapping and Animation Workflows

Enjoy faster, more efficient workflows with the UV spline mapping tool, and enhanced Pelt and Relax functionality. Additionally, Biped now includes a more efficient workflow for rigging quadrupeds.

For more on what's new and demonstrations, please visit: www.autodesk.com/3dsmaxdesign.

About Ayers/Saint/Gross

Ayers|Saint|Gross, Inc. (ASG) is an internationally-recognized planning and design firm with a long and proven track record for successful planning and architectural design. Our clients include world-renowned institutions, corporations, developers and public agencies worldwide.

The firm is organized into several studios specializing in planning, architecture, interiors, landscape architecture, graphics and 3D visualization for commercial, higher education, and cultural clients. With over 130 professionals including architects, interior designers, landscape architects, urban planners, graphic designers, and digital illustrators, our diverse experience encompasses urban design, environmental analysis, master and site planning, architecture, visualization, landscape design, documentation, and construction administration for a broad range of projects.

For more information on Ayers/ Saint/ Gross, please visit www.asg-architects.com

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[1] There is a separate whitepaper that deals with moving data from Revit to 3ds Max via DWG. For more info please visit www.autodesk.com/designvisualization

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