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# BRS REVIT “HOW-TO” MANUAL

Last revision: October 20, MMXX

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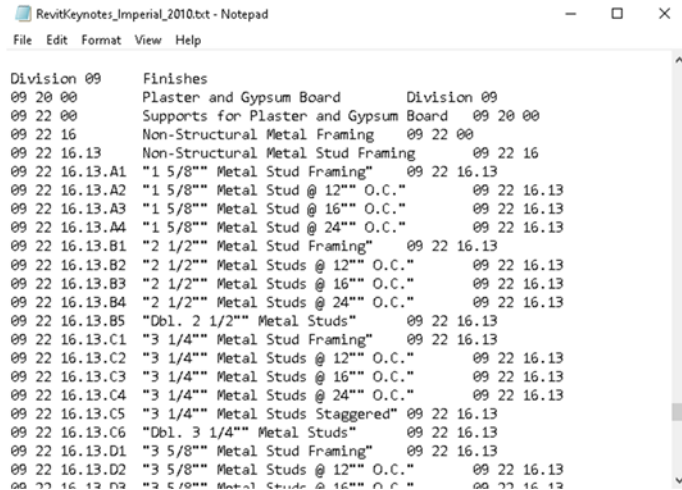
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## KEYNOTES & REFERENCE NOTES

The original intent of keynoting in Autodesk Revit is to refer to a specific section of the project's specifications manual. The OOTB (out-of-the-box) keynoting file is shown on the right. This method has been altered by having two distinct types of keynotes for a project in a single file: "Keynotes" and "Reference Notes". Reference Notes are composed of six digits and used to direct the contractor to a specific section of the specifications. Keynotes are composed of four digits and used for specific, written and narrative detail notes. All of the data for these notes are in a single, "hybrid", tab-delimited TXT file.



Division	Finishes
09 20 00	Plaster and Gypsum Board
09 22 00	Supports for Plaster and Gypsum Board
09 22 16	Non-Structural Metal Framing
09 22 16.13	Non-Structural Metal Stud Framing
09 22 16.13.A1	"1 5/8"" Metal Stud Framing"
09 22 16.13.A2	"1 5/8"" Metal Stud @ 12"" O.C."
09 22 16.13.A3	"1 5/8"" Metal Stud @ 16"" O.C."
09 22 16.13.A4	"1 5/8"" Metal Stud @ 24"" O.C."
09 22 16.13.B1	"2 1/2"" Metal Stud Framing"
09 22 16.13.B2	"2 1/2"" Metal Studs @ 12"" O.C."
09 22 16.13.B3	"2 1/2"" Metal Studs @ 16"" O.C."
09 22 16.13.B4	"2 1/2"" Metal Studs @ 24"" O.C."
09 22 16.13.B5	"Dbl. 2 1/2"" Metal Studs"
09 22 16.13.C1	"3 1/4"" Metal Stud Framing"
09 22 16.13.C2	"3 1/4"" Metal Studs @ 12"" O.C."
09 22 16.13.C3	"3 1/4"" Metal Studs @ 16"" O.C."
09 22 16.13.C4	"3 1/4"" Metal Studs @ 24"" O.C."
09 22 16.13.C5	"3 1/4"" Metal Studs Staggered"
09 22 16.13.C6	"Dbl. 3 1/4"" Metal Studs"
09 22 16.13.D1	"3 5/8"" Metal Stud Framing"
09 22 16.13.D2	"3 5/8"" Metal Stud @ 12"" O.C."
09 22 16.13.D3	"3 5/8"" Metal Stud @ 16"" O.C."

There are two keynote tag families in the Revit template: the Reference Note tag is a rectangle that displays the six-digit keynote; the Keynote tag is elliptical and displays a four digit keynote for specific, narrative detail notes. Note: both are "keynotes" in Autodesk Revit – they have been named separately to distinguish one from the other. The two keynote schedules use filters to display either four digit or six digit keynotes from the same file.

There are three types of keynote schedules in the Revit template:

- 1) The Reference Note schedules on each documentation sheet display the six-digit Reference notes used on that sheet.
- 2) Reference Note schedules that show all of the Reference Notes used in the entire project are filtered by CSI (Construction Specification Institute) MasterFormat Division and make a Master Keynote List that is a set of specifications in the drawing set and/or they mirror the separate project specifications manual.
- 3) Keynote schedules on sheet views display the four-digit Keynotes added to the drawings for direction/clarity.

The use of filters in the keynote schedules allows two, separate lists on each sheet. The Keynote schedule only shows keynotes with a dash, i.e. 09-01, 05-53, etc. Like the reference notes, they are numbered by CSI MasterFormat division. The Reference Note schedule shows only six digit keynotes which do not have any dashes, i.e. 05 15 A4, 06 19 G7, etc.

There is a "Detail Ghost" detail component to use for drafting views that are composed of lines and filled regions.

The Master Keynote file has been coordinated with the BRS Material Library as well as all of the details in the BRS Detail Library. **COPY** this file to your project folder and replace the "XXXXX" with your project number. After copying and renaming this file, open Revit. Go to the Annotation tab, select the Keynote pull-down menu and select "Settings". Select "Browse" and direct your Revit project model file to your now project-specific keynoting file.

You can customize the keynoting file for your project using Notepad or Microsoft Excel (be sure to save it as a tab-delimited file). When opening in MS Excel, select "delimited" (or "Next" because delimited is the default), select "tab" (or "Next" because tab is the default) then select "Text" under column data format.

For the time being, there is a keynoting master file available that uses only the four-digit keynoting. This is essentially blank and is for use by those that are more comfortable with 2D CAD.

## PROJECT PHASING

The BRS Revit Template is primarily set-up for new projects with regards to project phasing (while there are views and sheets set-up for a remodel). For remodel projects and/or projects with multiple phases, follow these procedures:

- 1) Duplicate views and rename them as “Existing”, “Demo” and “New”
- 2) For the Existing view, set the phase to **Existing** and the Phase Filter to **Show All**
- 3) For the Demo view, set the Phase to **New Construction** and the Phase Filter to **Show Previous + Demo**
- 4) For the New view, set the Phase to **New Construction** and the Phase Filter to **Show Previous + New**

The “**Management**” phase is after any new construction in terms of time and is used for *studies* or *reference*.

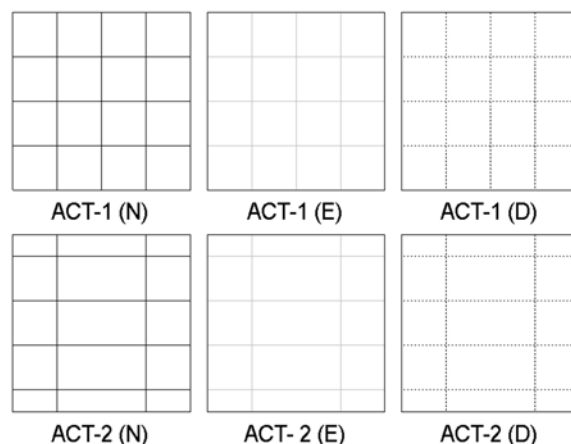
If you have a CAD file for the existing space for a remodel project, follow these procedures:

- 1) Go to an “Existing” view (see above)
- 2) **LINK** the CAD file to the view, **Origin-to-Origin** and be sure to select **Current View Only**
- 3) Use Visibility Graphics and Imported Categories to change the CAD file’s layers to a color of your choice
- 4) Set the view to **Wireframe**
- 5) Trace-over the walls and other elements with the appropriate Revit families

Note: All objects created in this view will be on the Existing Phase

Remember – Demolition is NOT a phase! All elements are either created or demolished in any particular phase. This is especially important when you have a multiple-phase project. When in a demolition view, do not add objects in this view – new items can only be seen in the New Construction or the next phase – they will “disappear” and show-up on the New Construction (or next) phase view. Add all new objects in the “New” view(s).

The Ceiling system family is unique in that it employs model patterns to show acoustical ceiling tile and these patterns will not change when the model object is phased. Materials and patterns have been created and are in the BRS Template to properly display Existing, Demo or New ACT (acoustical ceiling tile) ceilings. These objects still need to be created in and Existing phase for existing; demolished in the Demo view and created in the New Construction views for new ceilings. ***The materials and the phases need to be coordinated for ceilings (e.g.; when demolishing an existing ceiling – be sure to change its material type to demo as well).***



## USING THE DETAIL LIBRARY

Standard details and other items are imported from the BRS Detail Library file. For the time being, there is a single file that contains details as well as legends and other views. To utilize the library, follow this procedure:

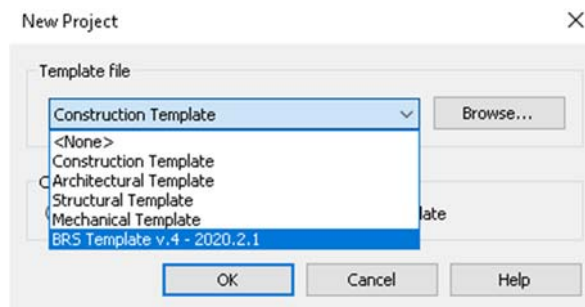
- 1) While in the Revit model project file, go to the **Insert** ribbon and select the **Insert from File** pull-down menu, then select **Insert Views from File**
- 2) Browse to the BRS Revit folder and find the Detail Library and select it
- 3) The next dialog box will show all of the details and other views included in the Revit Detail Library. You can select any or all of the views to use in your project. There is a preview of each detail (except for schedules and legends). If not, select Preview Selection. When finished, select "OK".
- 4) All of the selected views will be added to your project.

Currently, there are many details with two different versions: One with Reference Notes and Keynotes and another with text notes. The details with text notes are for users more comfortable in 2D CAD. After importing the details into your project, delete the version not needed.

## PROJECT MODEL STARTUP

### REVIT OPTIONS

Setup (if not already setup): Open Revit and go to **File** and click on **Options**. Select the **General** page and set the **Save Reminder Interval** (your preference) and the **Synchronize with Central Reminder Interval** (your preference). Select the **File Locations** page and add the BRS Revit template: select the green "+" to add the BRS template to a list including the default OOTB (out-of-the-box) templates. Navigate to: Z:\BRS Revit\00 BRS Company Files\03 BRS Template Files. Use the default path for user files, family template files and point clouds.



### CREATE PROJECT MODEL

Open Revit and select **File**, then select **New** and then **Project**. Select the BRS template and Revit will create a new project model file. Once the Start-Up/Save-to-Central View is on the screen, go to the **Collaborate** tab and select **Collaborate**. You will be prompted to **Save the Model and Continue** (or don't save the model and cancel). When saving, navigate to the proper project folder and save it with a unique name that includes: 1) the project number, 2) the words "central model" and 3) the version of Revit, e.g. \_20. You will then be prompted to select **Within Your Network** (for a LAN or WAN) or **in BIM 360 Document Management** (if using BIM 360). Worksharing has been enabled and then it is time to set-up the Worksets according to your project's **BIM Execution Plan**. The minimum number of worksets is generally one for each discipline and the defaults are *Shared Levels and Grids* and *Workset1*.

The worksets can be edited throughout the project at any time – just be sure to manage them properly. At first the worksets are editable and represented by the “Yes” in the editable category. This category should say “No” at all times unless a Workset needs to be checked-out by a team member. This editable status will automatically update to “No” once the setup process is complete. This may sound redundant, but you will then **Save As** the project model file to finalize the transformation to a central model file. You will then **Close** and **Re-Open** the central model file to create a **Local** model file to begin working. From this point forward, make sure you have the proper Workset selected when working.

## PROJECT KEYNOTE FILE

When starting a new project, go to the BRS Revit folder (Z:\BRS Revit\00 BRS Company Files\02 BRS Keynote Files) and **COPY** a keynote file and then paste it into the appropriate folder for your project. Rename the file by replacing the “XXXXX” with your project number. When in Autodesk Revit, go to the **Annotation** tab, select the Keynote pull-down menu and select “**Settings**”. Select “**Browse**” and direct your Revit project model file to your project-specific keynoting file.

## BIM EXECUTION PLAN

Before the consultants are brought-in, meet with the PM (Project Manager) and the BIM Manager to start the BIM Execution Plan document. You will need input from the consultants to complete the document. If a BIM Addendum is part of the governing contract documents, the BIM Execution Plan is an enforceable contract – if not, it is a suggestion and no one will be required to follow any part of it.

## BIM KICK-OFF MEETING

Meet with the design team to go-over the BIM Execution Plan. Who is involved in the meeting will depend on the project delivery method. If it is design-bid-build, meet with the engineering consultants. If it is design-build, CM at Risk or CM as Agency, meet with the consulting engineers, the general contractor and the subcontractors.

## OVERALL PLANS, COMPOSITE PLANS & KEY PLANS

Composite Floor Plans / Roof Plans / Ceiling Plans are used to generate enlarged or area plans by copying them using the **Duplicate as Dependent** command. This produces dependent copies that will be placed on the sheets (the Composite Plan itself will not be placed on any sheets). Each of the duplicated views is cropped to show part of the Composite Plan. Any annotation or detailing on the Composite Plan will be shown in the separate, duplicated and dependent views (they are all part of one, large view).

When Composite Plans are used, Matchlines and View References are used to show how the plans are connected. To create a Matchline, first make sure that the crop regions are shown in the Composite Plan then go to the **View** tab, **Sheet Composition Panel** and select **Matchline**. After the duplicate-dependent views are placed on sheets, you can place **View References** by going to the **Annotation** tab, **Tag** panel and select **View Reference**.

A separate Overall Plan can be used to show the entire Floor/Roof/Ceiling Plan at a scale that will fit on the document sheets and/or a separate Key Plan can be used.

If a **Key Plan** is used in conjunction with or instead of an Overall Plan, follow this procedure: Export the Composite Floor Plan with the Matchlines visible to an AutoCAD .DWG file. Start a new Generic Annotation file, save as a Key Plan and insert the exported CAD file. Because this is an annotation family, you will need to scale the plan so that it



will fit on the document sheet. You can scale numerically by using an equation, e.g. “=1/96” for a 1/8” = 1’-0” scale. Trace an outline of the building footprint and then use Filled Regions to show the different duplicate dependent views of the Composite Plan. Delete the .DWG file. Assign new Type Parameters to the Filled Regions to make them visible for the different areas:



- ❖ Click on the small button next to the Graphics / Visible parameter for each filled region.
- ❖ Click on the icon on the lower, left side of the dialog box to create a new parameter
- ❖ Name it according to the area for the filled region, make sure that it is a Type Parameter
- ❖ After assigning a view visibility parameter to each of the filled regions, create family types by going to the **Modify** tab, on the properties panel select the **Family Types** icon
- ❖ Create a new family type (click on similar icon to creating new parameter) for each filled region / area.
- ❖ Check / Un-check the visibility parameters for each Family Type as needed.

This new Generic Annotation Family can now be placed on the document sheets and the proper Type selected for that sheet (e.g.: “Area A” for an “Area A” Floor/Roof/Ceiling Plan). This Generic Annotation family can then be copied and pasted aligned to selected document sheets.

## PROJECT BROWSER ORGANIZATION

The plan View Naming Format is basic: **Level – Content – Purpose**; e.g. 01 – Floor Plan – DOC is a level 1 floor plan for documentation; 05 – Floor Plan – WORK is a level 5 floor plan working view. The purpose designated in the view name mirrors the parameter that organizes the views in the browser. Elevation views (both interior and exterior) are similar except they are not specific to a particular level (usually): e.g. East Elevation – DOC.

All views are created and used for a specific purpose in a BIM project. The browser has all views organized by that purpose by using a View Type Parameter under “Other” called “Purpose”. New purposes can be created as needed. The views in the BRS Revit template are:

- ❖ **Control** – these views are used for Global Parameters, locked dimensions, etc.
- ❖ **Coordination** – views used to coordinate with consultants and/or export to different formats
- ❖ **Document** – these are the only views to be placed on sheets and generally use a View Template
- ❖ **Management** – are views for the “management” phase: in the future after New Construction phase(s). This is to isolate some elements and views that are used solely for reference or for studies
- ❖ **Work** – these are the views used for modeling and do not need to conform to any standard other than the modeler’s preferences. These are never placed on sheets and they never use a View Template.

View Types have been created and are also part of the way views are organized in the browser. These can be renamed and new types can be added as needed. The **View Types** are coordinated with the **View Templates**. Examples:

- ❖ **Floor Plan – Overall** view type uses a **Floor Plan – Overall** view template
- ❖ **Building Elevation** view type uses the **Elevation – Exterior** view template

Documentation sheets are organized in the Project Browser by their **Sheet Group** parameter – this determines their order in the Sheet Index on the project’s Cover Sheet as well as how they are displayed in the Project Browser.

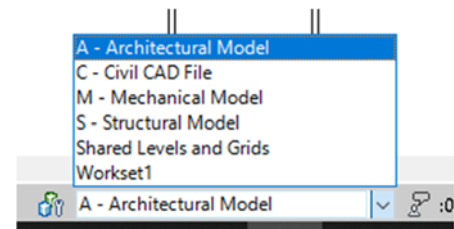
## WORKSHARING & WORKSETS

Before enabling Worksets the project team should establish who will work on the model and what each team member will be responsible for. For example: team member 1 – the shell, team member 2 – the core, team member 3 – furniture and cabinets, etc. For large projects, break the modeling into separate, linked models. For example: shell, core, interiors.

Create additional Worksets to control visibility of linked models and/or model elements to increase the overall performance of the model(s). For example: you may create a Workset for furniture when furniture is turned-off in most of the views by default. This Workset's visibility can be controlled with View Templates or by using View Graphics (VG).

**Periodically, open the central model file with the Audit option selected and then save the file. If corrupted elements are encountered during the audit, they are deleted if possible and the user is notified.**

Make your Workset active by selecting it from the list at the bottom of the screen. Add or modify elements accordingly, making sure to switch to the proper Workset as you go. Whenever a user touches an element in the model object they become the “borrower” of that object and no one else can modify it until that user relinquishes it by syncing their local model file with the central model file.



## BEST PRACTICES

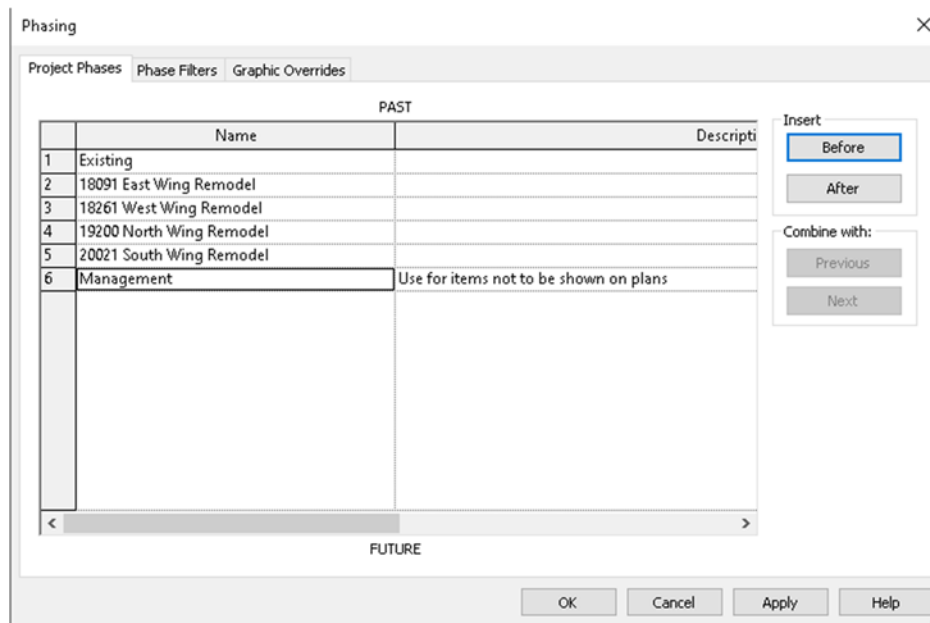
- ❖ Verify that the same Revit build is installed on all of the computers that share Worksets
- ❖ Periodically save to central with the Compact Central File (slow) options selected. The process of compacting rewrites the entire file and removes obsolete parts in order to save space.
- ❖ Ensure that a sufficient number of backups are being created. At a minimum, you should have at least one backup for each member of your Worksharing team in order to increase the likelihood that each team member's data is saved as part of the backups.

## TECHNICAL SOLUTIONS:

- Issue: one member of the design team is not in the office and you want to work on a Workset that they have not relinquished.
  - Your “User Name” is also your Autodesk User ID. Make sure that the absent team member is signed-out of their Autodesk account. Also make sure that you are the only one opening the central model file.
  - Select File, then Options. On the General tab of the Options dialog box, enter the user name of the absent user (the absent user's Autodesk User ID).
  - Open the central file, save to central and relinquish all Worksets. Reset the absent user name (Autodesk User ID) to that of the computer workstation you are using.
  - The simplest of all solutions: make sure that you ALWAYS relinquish your active Worksets when exiting Autodesk Revit.
- Issue: the central model file cannot be opened because it is corrupt, a power outage during a save, disk segment failure, etc.
  - Find the most recent and up-to-date local file – turn it into a central file by selecting “Save As” – overwriting the corrupted file.

## ONE MODEL WITH MULTIPLE REMODEL PROJECTS

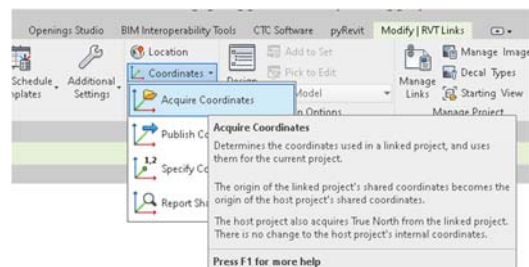
A model that has multiple remodels and/or tenant improvements is a **Composite Model**. Begin each subsequent remodel / tenant improvement by modifying the phases of the Composite Model, paying close attention to the chronological order of the project construction: go to the **Manager** tab and select **Phases**. Create a new phase for the project before the Management phase but after the last “New Construction” phase. In this case, all “New Construction” phases will be named according to the project number of that remodel project. The new project phase will do the same.



Create and name views that use the current project number and are phased as New, Existing and Demo (see Project Phasing for view settings). As usual, model any existing items to remain in the “Existing” view; demolish existing objects in the “Demo” view and model all new elements in the “New” view. Only create sections or elevations for working/modeling purposes: construction documents will not be created in this (Composite) model and drafting views will not be inserted or created in this model!

## SEPARATE PROJECT MODEL FILES FOR EACH REMODEL / T.I.

- 1) Start your new remodel project with the BRS Revit template.
- 2) Link the Composite Model (Insert tab, Link Revit) origin-to-origin and then pin it.
- 3) Select the linked model and go to the **Manage** tab and select **Coordinates** from the **Project Location** pallet and choose to **Acquire the Coordinates** of the linked model.
- 4) **Copy / Monitor** the Levels and Grids and then turn the levels and grids from the linked model OFF (in all views except working views).
- 5) Select the linked model and in the Properties, **Edit Type** – make sure that the “Room Bounding” box is checked.
- 6) In the same dialog box, select Phase Mapping – Edit and set the Existing phase of this new project model file to equal the project phase of the linked model.



- 7) Cut sections, place callouts & elevations, create drafting views, etc. to create the documentation of the remodel / tenant improvement project.

## ARCHIVE THE COMPOSITE MODEL

The Composite Model should be archived after each remodel / project phase. When doing so, remember to either:

- ❖ Bind the linked model to the Remodel Project file or
- ❖ Re-path the linked model to the archived version of the Composite Model

## ARCHIVING REVIT MODELS

Archive copies of the project model(s) should be made at major milestones or events that include, but are not limited to, the completion of each design phase, prior to making major client-requested changes and revisions, Revit version or build upgrades. These project model archives are in addition to deliverables, i.e. .PDF's.

Before archiving, all team members need to sync their local models with the central model(s), relinquish all and exit the project. The procedure for creating an archive of the project model(s) is as follows:

- 1) In Windows Explorer, find the central model file (do not open).
- 2) Copy (Ctrl-C) and Paste (Ctrl-V) the central model file to your desktop.
- 3) Open Revit and then open the central model file on your desktop. When doing so, make sure that ***“Detach from Central”*** is selected. Also select ***“Detach and Preserve Worksets”*** when prompted.
- 4) Save-As to the project's milestones archive folder and rename the file by replacing “central” with “archive” and include the date.
- 5) Delete the file from your desktop.

For the final archive of a completed project, use the following steps:

- 1) Start Revit and open the central model. Select each linked model and select ***Bind Link*** under the Link palette of the Modify | RVT Links tab.
- 2) Go to the ***Manage*** tab and ***Purge Unused*** (repeat as many times as necessary to delete all unused items).
- 3) Save and exit then proceed to archive the model (see above).

## CONSTRUCTION ADMINISTRATION IN REVIT

### 1. Setup Revision in Revit

- Go to the Manage tab and select the ***Additional Settings*** pull-down menu; select ***Sheet Issues / Revisions***
- For the first revision, all that is needed is a date and description (Addendum # / RFI # / ASI #)
- Numbering is ***By Project*** (radio button on right side of the dialog box).
- For additional revisions, select ***Add***
  - Set the previous revision as “Issued” (check box)
  - Change the *Show* field for that revision from “Tag and Cloud” to “Tag” (pull-down menu selection)

### 2. Make Changes

- Make changes that need to be made to all current sheets and views in the project document sheets, cloud and tag all instances. If sketches are being issued, see instructions below.

- The BRS Revit template has an alternate Sheet Index that displays revisions if needed.

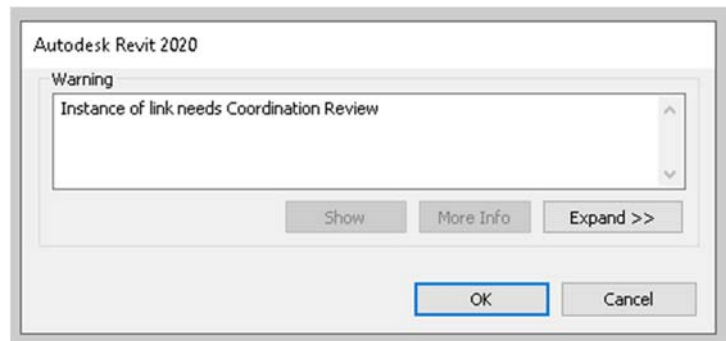
### 3. Sketches

- Go to the **View** tab and the **Sheet Composition** palette and select **Sheet**. Select sketch titleblock.
- Uncheck the box next to “Appears in Sheet List” in the sheet view’s properties (so the sketch does not appear in the Sheet Index on the Cover Sheet).
- Change the **Sheet Group** parameter to something like 98 – ADDENDUMS; 97 – RFI’S; or 96 – ASI’s. This will move it to be easily found in the Project Browser.
- If you are using part of a view that is already in the document drawing set:
  - Find the view in the Project Browser; right-click and select “**Duplicate with Detailing**” and re-name the view appropriately (Addendum 1, RFI 1, etc.).
  - Change the **View Purpose** parameter appropriately (RFI #1, ADDENDUM #2, etc.), this makes it easy to find in the Project Browser.
  - Add the view to the sheet view with the sketch title block. Make the Crop Region Visible and edit to fit within the confines of the sketch’s titleblock.
  - Cloud and tag the sketch so the revision appears on the sketch’s titleblock revision schedule.

## REVIEW WARNINGS FOR MONITORED ELEMENTS

If warnings have been generated by changes to elements, you can perform a coordination review and address them and use comments to communicate the appropriate action.

If you get a warning, have a 3D view open and go to the **Collaborate** tab, **Coordinate** panel, **Coordination Review** drop-down menu and select one of the two following options: “Use Current Project” to review warnings for elements within the current model or “Select Link” to review warnings for elements monitored in a linked model – then select the linked model from a view.



Once the Coordination Review dialog displays, it will list warnings for the monitored elements for the current (host) model and the linked model(s). You can select the tabs to check for any comments from team members who worked on the linked model(s). Expand items in the Message column until you can see what’s in the Action column. Selecting the individual warnings should highlight the elements in the model, if they are still not seen, click on the “Show” button. For each item, specify the appropriate action – such as:

- ❖ Postpone
- ❖ Reject
- ❖ Accept Difference
- ❖ (Modify, Rename, Move) i.e.: “Move Level “LEVEL 2”
- ❖ New Elements – Ignore / Copy
- ❖ Do Nothing

(Optional) Create a Coordination Review Report: click on the “Create Report” button. This will generate an .HTML file. You can also add comments to be seen by the design team when models have been updated.

## RUNNING AN INTERFERENCE CHECK IN REVIT

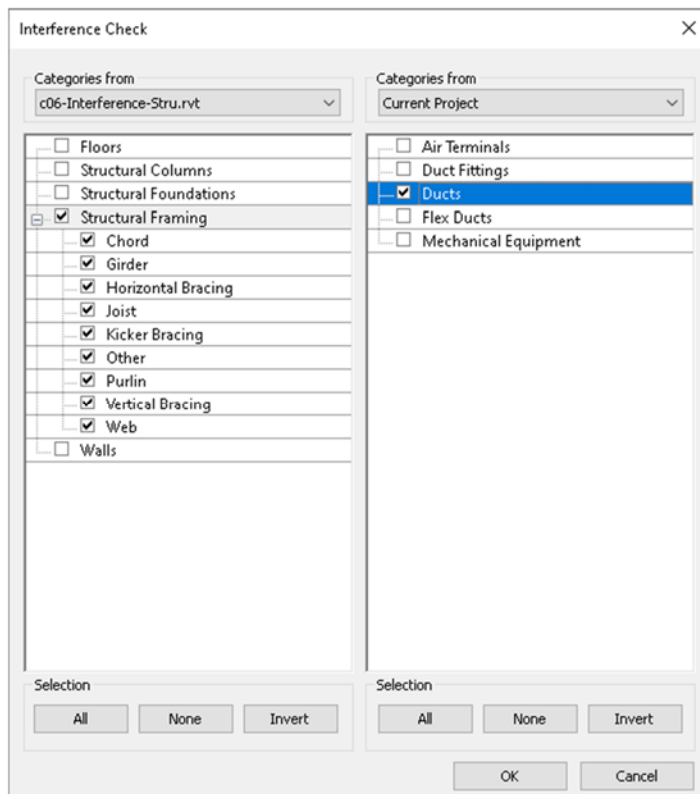
In addition to asset management, digital fabrication and cost estimation, 3D coordination is one of the most important uses of BIM. It has enormous potential to reduce construction costs by resolving the interferences of building elements and exposing opportunities for alternate trade scheduling or prefabrication. Interference checking is also known as *clash detection* or *spatial coordination*.

The **Interference Check** tool in Autodesk Revit is a basic 3D coordination tool. It can be used within a single project model or between linked models. For more powerful clash-detection, use Autodesk **Navisworks Manage**, which is a multi-format model-reviewing tool with various modules supporting phasing simulation, visualization and clash detection. Some of the benefits of using Navisworks for interference-checking over Revit include: automated views of each clash, grouping of related clashes, enhanced reporting, clash-resolution tracking and markup capabilities. Revit models can be opened directly in Navisworks or exported to the Navisworks format. Revit allows you to link Navisworks files as an option for interoperability when working with others who are not producing Revit content. While Navisworks files are typically incorporated near the end of the construction document phase, Autodesk **Formit** can be integrated at the beginning of the project design process. Formit is an early design tool that is very similar to SketchUp.

To run an interference check / clash detection between linked models in Revit, follow this procedure:

Open the architectural model and navigate to the **Collaboration** tab, select the **Interference Check** pull-down.

If you have already run an interference check, you can select **Show Last Report**, otherwise; select **Run Interference Check**. This opens the Interference Check dialog box.



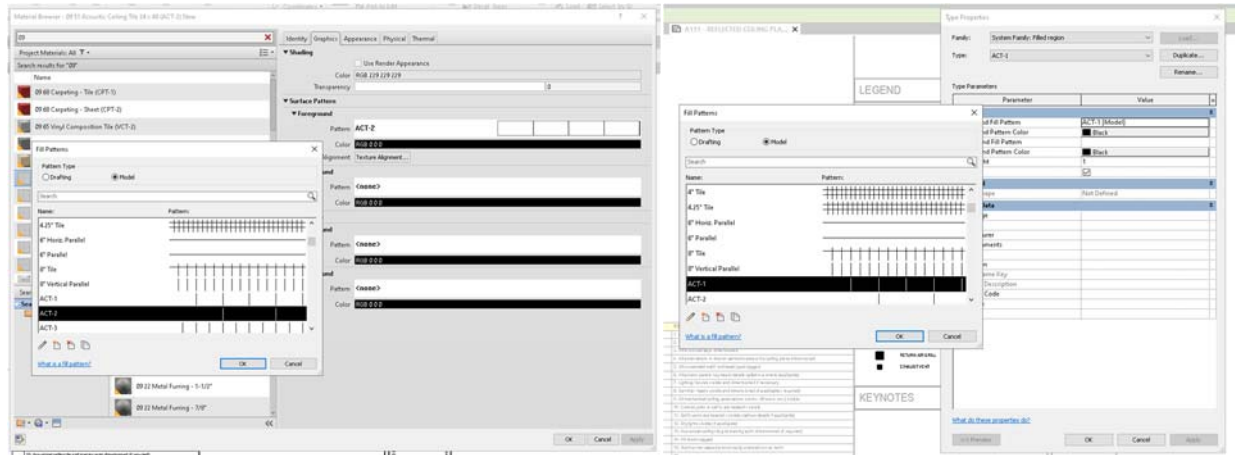
At the top you have the *Categories from* pull down menus where you can select the model. You can select two different linked models or you can set it up to look for interferences in the same model.

Below that, you can select some or all of the items to run an interference check between the items on the left side and the items on the right side. After you have made your selections, hit “OK”. This generates an **Interference Report**.

If you have a 3D view open, as you select the interfering items in the list, they will highlight in your model view. You can select which “side” to view from the pull-down menu at the top of the dialog box (e.g. structural items clashing with ducts or ducts clashing with structural items). You can review these interferences in a meeting or you can publish an HTML file to share the Interference Report with the design team.

## PRODUCING LEGENDS TO MATCH MATERIALS

Often patterns are used to differentiate various materials shown in plan and elevation views. The patterns associated with those materials need to be re-used for a legend. In the example below you will see that the material “ACT-1” is using a pattern called “ACT-1” which is also used for a filled region called “ACT-1” – all are named “ACT-1” for easy coordination.



## SCHEDULES FOR COST ESTIMATES

Using an information-rich model, we can leverage the data in the elements for many different purposes. One of those purposes would be cost estimating. A schedule in Autodesk Revit is an active view – just like plans, sections or elevations. In the case of schedules, the model’s data is displayed in a form that can be filtered, grouped and sorted. To make a schedule work for cost estimates, costs will be determined by quantity, square feet, linear feet, square yards, cubic yards, etc. depending on what you are scheduling / estimating.

You need two parameters to estimate costs in Autodesk Revit:

- ❖ Unit Cost (currency)
- ❖ Total Cost (formula) example for square feet:  **$(Area / 1 SF) * Unit Cost$**

The **Unit Cost** parameter has a currency value. You can have separate prices for material, labor, overhead and profit; or you can have just one overall unit cost.

The **Total Cost** will be a formula that multiplies the unit cost by the number of units. If you’re using any method of measurement other than quantity, your formula has to convert the units (linear feet, square feet, square yards, and cubic yards) into simple numbers.

In the two examples, you can see that the cost for walls has been calculated. One is using length (LF / linear feet) and the other using area (SF / square feet). You can get the unit costs from many different sources, RS Means being the most popular however; local subcontractors are your best source.

A	B	C	D	E
Type Mark	Family and Type	Area	Unit Cost - Walls	Total Cost - Walls
WT-1	Basic Wall: Exterior - Brick and CMU on MTL.	10,040.25 SF	\$1.00	\$10,040.25
WT-2	Basic Wall: Generic - 8" Masonry	3,370.24 SF	\$1.00	\$3,370.24
WT-3	Basic Wall: Interior - 4 7/8" Partition (1-hr)	2,427.42 SF	\$1.00	\$2,427.42
WT-4	Basic Wall: Interior - 5" Partition (2-hr)	809.00 SF	\$1.00	\$809.00
test wall type	Basic Wall: SUPER DUPER WALL	1,000.00 SF	\$1.00	\$1,000.00
CW-1	Curtain Wall: Storefront	3,536.00 SF	\$1.00	\$3,536.00
		21,182.91 SF		\$21,182.91

A	B	C	D	E
Type Mark	Family and Type	Length	Unit Cost - Walls	Total Cost - Walls
WT-1	Basic Wall: Exterior - Brick and CMU on MTL.	361.38 LF	\$1.00	\$361.38
WT-2	Basic Wall: Generic - 8" Masonry	179.53 LF	\$1.00	\$179.53
WT-3	Basic Wall: Interior - 4 7/8" Partition (1-hr)	179.11 LF	\$1.00	\$179.11
WT-4	Basic Wall: Interior - 5" Partition (2-hr)	56.49 LF	\$1.00	\$56.49
test wall type	Basic Wall: SUPER DUPER WALL	100.00 LF	\$1.00	\$100.00
CW-1	Curtain Wall: Storefront	302.00 LF	\$1.00	\$302.00
		1178.51 LF		\$1,178.51

## LINKING CONSULTANT MODELS

Generally, it is the architect who sets the Shared Coordinates for a project with a **Site Model** that is carefully coordinated with a civil engineer's design file(s). The Site Model only has: 1) Typography which is modeled from the civil engineer's CAD file and 2) Building Pads for the building models that will be acquiring their coordinates from the Site Model. For a tried-and-true process, see the BRS BIM documents "**BRS Building & Site Coordination**". Be sure to share the "**Linking the Architectural Building Model**" document with your consultant(s).

- 1) Go to the **Insert** tab and select **Link Revit**
- 2) Browse to find the appropriate model and link by **Auto – Internal Origin to Internal Origin**
- 3) Go to the **Collaboration** tab and select **Copy/Monitor**
- 4) Choose **Select Link** and then select the linked model
- 5) Select **Options** from the ribbon
  - a. Under the Grids tab, change the New Type to match the Original Type
  - b. Under the Columns tab, change the New Type to match the Original Type. Also check the box for Split Columns by Level
  - c. Under the Floors tab change the New Type to match the Original Type or Copy original Type
  - d. Select OK to close
- 6) Select **Copy** from the ribbon and then choose all of the Grids, Columns and Floors you wish to monitor – this copies all of the objects into your model and they will be monitored against the corresponding linked model objects. Once finished, select "**Finish**" (the green checkmark).

## IFC (INDUSTRY FOUNDATION CLASS) MODELS

Industry Foundation Class (IFC) is a data model standard developed by *buildingSMART International* to support interoperability in the building industry. It is also known as a "vendor neutral" model format. The IFC model specification is currently in the process of becoming the International Standards Organization (ISO) standard as ISO/PAS 16739. Government agencies are requiring IFC format deliverables for publicly funded building projects because of their ease of interoperability. Before importing an IFC, create a workset specifically for it and verify that it contains the geometric data needed.

### OPENING & VIEWING IFC FILES:

- ❖ With Revit open, go the **File** tab and select **Open** then select **IFC Options**. From this dialog box, you can select the BRS template to use for the IFC file (if one is not selected, a default will be – the first template listed under *File Locations* in *Revit Options*). In the same dialog box, you can select the IFC Class Mapping File – a text file that assigns Revit categories to IFC classes and types (the default is on your hard drive).
- ❖ You can also view IFC models in several programs that can be downloaded at no cost: *DDS-CAD Open BIM Viewer* (dds-cad.net); *Solibri Model Viewer* (solibri.com); *IFC Viewer* (ifcbrowser.com); *Tekla BIMsight* (tekla.com).

### LINKING IFC FILES:

After you link an IFC file to your Revit model, the IFC file will be listed in the following locations: 1) Project Browser, Revit Links node; 2) Manage Links dialog, IFC tab; 3) Visibility/Graphics (VG) dialog, Revit Links tab. Go to the **Insert** tab and select **Link IFC** from the **Link** panel. In the **Open IFC** dialog box, browse to find the IFC file to select and



open. When you do so, Revit uses the IFC file to create these files to essentially link a new, Revit model based on the IFC file to your host model:

- ❖ An intermediate Revit model file named <IFC file name>ifc.rvt
- ❖ A log file named <IFC file name>ifc log.html
- ❖ A shared parameters file named <IFC file name> ifc.sharedparameters.txt

Once an IFC file is linked to your model, you can use them as a reference to:

- ❖ Run dimension strings (note: only faces – no reference planes, center lines or non-geometric elements)
- ❖ Snap to IFC-based elements
- ❖ Align elements in your Revit model with IFC-based elements
- ❖ Use as a host for face-based families (note: but not for wall, roof, floor-based families)
- ❖ Tag IFC elements
- ❖ Define room boundaries (note: except curtain walls – use Room Separation Lines). Be sure to set the Type Properties of the linked IFC file to recognize room boundaries by selecting *Room Bounding*.

Note: Revit uses the IFC file to create an intermediate IFC-based Revit model. DO NOT directly modify the intermediate IFC –based Revit model!

## PHASING

The phase of an IFC model is determined by the **Starting View** of the template used during the IFC Import/Link operation. It may be necessary to create a template special for linking an IFC file with a properly phased starting view depending on how your project is phased. The BRS template starting view is a sheet view which is not phased.

## EXPORTING

Autodesk Revit has some default exporters OOTB (out-of-the-box). The schema of the currently released standard is **IFC4** however, many still use **IFC2x3**. There are some draw-backs to using this, e.g. the structural grids do not export to IFC and these can be very beneficial for the coordination process. There is an exporter that has been developed and improved by Autodesk and *SourceForge.net* that anyone can download the source code for. This will enable you to customize the export process. An excellent resource for IFC interoperability is the *buildingSMART* alliance web page for *Common Building Information Model Files*. You can download sample files as well as a configuration guide with additional instructions related to customizing IFC exports from Revit. You can save IFC mappings to a text file for use in other projects.

## COORDINATION MODELS

As an alternative to using IFC files, a consultant's model can be opened in Autodesk Navisworks to generate a Coordination Model. This creates a NWD or NWC file to be used as a reference in your Revit project model. NWD and NWC files are native file formats of Autodesk Navisworks. Similar to the use of IFC files, this feature is useful when a team from another discipline does not use Revit for modeling. By loading an updated Coordination Model on a regular basis (usually weekly – see your BIM Execution Plan) you minimize the risk of clashes saving time and money. This method can be used in the design, pre-construction and construction phases of a project. If a Navisworks file has not been created, follow this simple procedure: **1)** open Navisworks, **2)** open the 3D CAD file, **3)** save-as an NWD file. If you have a NWD (or its corresponding NWC) file, follow this procedure to link the model file:

- ❖ Create a workset specifically for the linked model
- ❖ Go to the **Insert** tab and select **Coordination Model** from the **Link** panel.
- ❖ In the Coordination Model dialog, select **Add**
- ❖ Navigate to the NWD or NWC file, select it and click on **Open**
- ❖ Select either Origin-to-Origin or by Shared Coordinates as appropriate
- ❖ After selecting **OK**, the linked model will display in the currently active view
- ❖ You may need to select the linked model, move it to the desired location and pin it in place

After linking the Coordination Model, you can:

- ❖ Display it in all 3D and 2D views, including plans, sections and elevations and it will print as part of those views
- ❖ Define the phasing of the Coordination Model, add to a workset, pin so that it is not inadvertently moved
- ❖ Define the transparency of the Coordination Model (to distinguish it from the Revit model)
- ❖ Unload to temporarily remove it from the mode to improve performance – when it is reloaded, it will reload to the same position. It can also be reloaded to reflect recent updates
- ❖ Place multiple instances as well as duplicate and mirror instances

**Note:** because textures are not included in the Coordination Model, it cannot be rendered as part of a Revit view.

## SCOPE BOXES

Scope Boxes are used to uniformly control the crop region of multiple views. These are especially helpful if your model has parts of a building footprint that are at angles more or less than 90° from the rest of the plan – you can use the scope box to have a separate Project North for that angled part of the building plan. It is also useful to manage the extents of levels and grids for any size project.

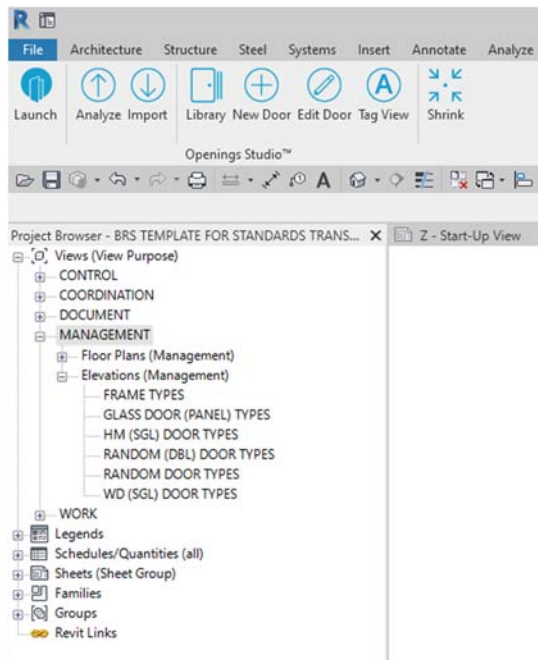
- ❖ To create Scope Boxes, first go to a Plan View. You can only create a Scope Box in a Plan View, however; you can edit the extents of the Scope Box in almost any type of view. Draw the Scope Boxes and rotate them as necessary.
- ❖ On the Options Bar, enter a name for your new Scope Box and specify a height (you can accept the defaults for these settings and edit them later).

## APPLYING SCOPE BOXES TO VIEWS

Take a look at the Instance Properties of your view. If there are Scope Boxes in your project, you can select them by name from a pull-down menu. You can also select multiple views in the Project Browser and assign a Scope Box in the same way. Remember, once a Scope Box is assigned, you cannot crop the view the other way.

## APPLYING SCOPE BOXES TO DATUM ELEMENTS

Datum elements like Levels and Grids have their 3D extents locked, however; the 2D extents for that particular view can be modified (there is a gap between the 3D point intersecting with the Scope Box and the 2D point beyond). You can make this 2D extension uniform over multiple views by selecting these items and using *Propagate Extents*. This can be undone by right-clicking the datum element and selecting *Reset to 3D Extents*. You can control the visibility of datum elements in views where they intersect with a Scope Box. This visibility can be modified by selecting the Scope Box and then selecting *Views Visible* under its Properties (this does not work on multi-segment Grids – they do not have a Scope Box instance property).



## OPENINGS STUDIO™

This Add-In from ASSA ABLOY is used to: 1) create custom door families and 2) send your Revit model to ASSA ABLOY to have them specify your door hardware.

The Revit template already has 43 door families produced with Openings Studio and they can be viewed in the Management views of a “farm” with the various door families placed and tagged with Door Tags that read the Family Type (name). Note: you can delete the “farm” and the door families will remain in your project.

If you do not see what you are looking for, you can: 1) select a door family that closest resembles the type you are looking for and use Openings Studio to edit it or 2) use Openings Studio to create a new door family. In either case, you need to have the Add-In loaded into Revit – if you do not see an “Openings Studio” tab in Revit: follow the instructions on **Sheet A601**.

## DIGITAL MARKUPS

**Design Review** is an application that can be downloaded free of charge from Autodesk and used to markup, print and track changes to the 3D models and/or the 2D drawings. This is for a design review that is more informal than revisions. Files are exported, reviewed, marked-up for changes and those markups are imported into Revit to use for modifying the model and the drawing sheets. Using Revit and Design Review, you can use DWFX or DWF file formats.

### PUBLISHING TO DESIGN REVIEW

You can export to DWFX from any view except a Schedule by going to the Applications menu (File tab) and choosing **Export** then **DWF/DWFX**. The DWF Export Settings dialog will open and you can choose the Views/Sheets to export in addition to specifying how the results will be published.

### IMPORTING A DESIGN REVIEW MARKUP

The Design Review file that is being marked-up is linked to the Revit project model file in a similar way to other files: go to the **Insert** tab and select **DWF Markup** from the **Link** panel. Find the appropriate DWFX file and the **Link Markup Page to Revit Sheets** dialog appears. Here you can select all of the markups or only those for specific sheets. Markups can only be linked to sheets and the only graphics imported into Revit are the markups themselves. These graphics are automatically aligned, cannot be deleted and are pinned. You have several options to change the graphics of the markups to show that they have been reviewed:

- ❖ Change its graphic appearance: select the individual markup item, right-click and choose *By Element*, then select *Override Graphics*. Then, change it to the color of your choice to indicate that it is done.
- ❖ Hide it: right-click, and select *Hide in View*, and then *Element*
- ❖ Remove it (entirely) by removing the linked markup file
- ❖ You can modify the properties of the markup: change its status and/or add notes

## COLOR FILL LEGENDS

There are times in the design process when there is a need to portray spaces in a building in a different way from the ordinary documentation for construction. There may be a need to show design intent, departmental adjacencies and allocations. The tool for this is the Color Fill Legend. It allows you to assign different colors to almost any of the room or area properties within a view. Example: for a Department Area Plan, follow this procedure:

- 1) Add a department name for each room system family by entering data into the individual room's instance properties under Identity Data
- 2) Go to the **Annotate** tab and select **Add a Color Scheme Legend**. The Choose Space Type and Color Scheme dialog will appear. Select **Rooms** from the **Space Type** pull-down menu and select **Department** from the **Color Scheme** pull down menu.
- 3) On the **Architecture** tab, select the **Room and Area** pull-down menu to select **Color Schemes** – this will open the dialog to edit the Color Scheme. In this case, select **Rooms** from the **Category** pull-down menu and then select **Department** from the list of Color Schemes available (out-of-the-box). You can choose to include elements (Rooms) from links and edit the colors and/or Fill Patterns.
- 4) Create a Room Schedule and name it "Department Areas":
  - a. Add the fields Department, Areas and Levels
  - b. Go to the Filter tab and filter by Level
  - c. Go to the Sorting and Grouping tab and sort by Department. Also, uncheck Itemize Every Instance and select the Totals Only option under Grand Totals
  - d. Go to the Formatting tab and make the Area field Calculate Totals and make the Level field hidden
  - e. Go to the Appearance tab and choose to show/not show grid lines, a title or the headers of your new schedule, etc.

## USING 3D VIEWS

3D views can be used for many reasons, especially where 2D views can seem ambiguous. For this reason, there are some tools available in Revit to utilize these 3D views for construction documents to illustrate your building design. The types of views described here are in addition to and separate from analytical and photorealistic rendering views for presentations.

## ORIENTING TO OTHER VIEWS

Create a new 3D view or duplicated an existing one. Right click on the View Cube and you can see that there are several alignment options.

- ❖ **Orient to Other Views.** When aligned with a view, the orientation will match that view and a 3D section box will conform to that view's extents. The view can be changed from that point retaining the section box.
- ❖ **Orient to Direction.** These are similar to selecting edges of the View Cube for standard axonometric views
- ❖ **Orient to a Plane.** The can be a work plane or the face of a model element.

**Note:** when these views are placed on a sheet – they will align if they are the same scale.

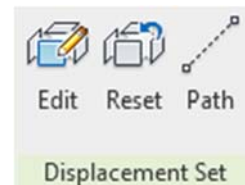
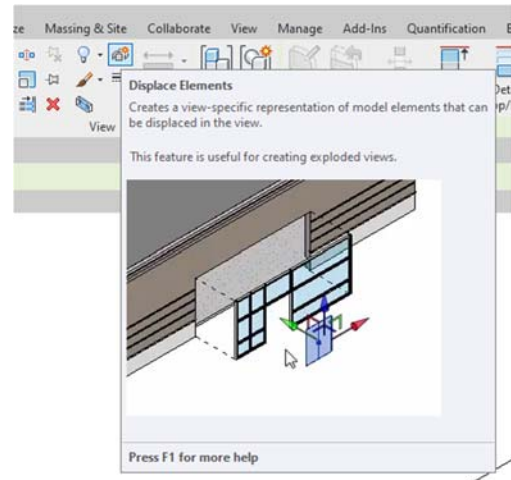
## ANNOTATING 3D VIEWS

You first need to **lock** the 3D view from the view shortcut bar at the bottom of the view before adding any annotations. You can then place text, keynotes and tags.

## CREATING “EXPLODED” AXONOMETRIC VIEWS

An “exploded” view is created by using the **Displace Elements** tool. Moving geometry with this tool is view specific and will not affect the rest of the model. Once this tool is used, you will have some editing options but first you need to select the item you would like to move. Once selected, the Modify tab for that item (or items) will become available. Find the **Displace Elements** tool in the upper right-hand corner of the View palette. After selecting this tool, you will see the red, green and blue 3D “gizmo” control tool near the element you have selected. You can select one or several elements at once. When “exploding” your model, you will see that the Displacement Set tools are available to:

- ❖ **Edit** – this function is similar to the editing of groups where you can add or delete items from your selection set. Removing items will send them back to their original location before the move made.
- ❖ **Reset** – undo the move made and replace the item in its original position.
- ❖ **Path** – will allow you to show the path of movement from the item’s original position to its new location with a thin, dashed line.



## WORKING WITH FORMIT

If you are using Autodesk Revit **2021** or later, then you have the ability to import Formit models. Autodesk Formit is a conceptual design tool similar to Trimble SketchUp, however; unlike SketchUp, it is interoperable with Revit. While SketchUp is plane-based, Formit is a solid-based modeler – this means that you can take Formit models directly to a 3D printer. Formit also has many tools available to include energy analysis, rendering and fly-through. Native Formit file format is AXM, and it is converted to an RFA (native Revit family file format) when imported into Revit. Selecting **Import Formit to RVT** will open a dialog where you select the file. If you go to **Convert RFA to Formit** and select **Convert RFA to Formit**, you can export a Revit family for use in Formit only if it is: Mass, Casework, Entourage, Furniture, Furniture System, Generic Model, Parking, Site or Specialty Equipment. After the exported RFA is modified in Formit, it can be imported as a new RFA (Revit family). If the **Reload Families** is selected, it will bring the family model back but any changes made in Formit will be lost.



Before importing a Formit model, have the Formit modeler use the Formit diagnostic features to see if there are any issues that may cause a problem in Revit. To perform this check, go to the **Diagnostics** tab and then to the **Visual Style** palette to make sure that the “**Watertight Issues**” and “**Back Faces**” tools are enabled. If there are any problems with their model, they will show-up as red in the view. These problems need to be resolved before importing into Revit. There are tools in Formit to resolve these issues. **Cover (CV)** to fix missing faces on solids or to delete “stray edges” (edges that do not enclose a region). If there are inside-out faces, right-click and select **Reverse Faces (FF)**. After the model is thoroughly checked, it is ready for import.

## EXPORTING TO NAVISWORKS

Navisworks Cache files (.NWC) are exported to make a Federated Model. This is used primarily for clash detection as well as takeoffs and cost estimates. These same files can be used as Coordination Models by the design team (see “Coordination Models” this document). Sometimes, the Federated Model is made-up of “appended” native files: in this case, no exporting is necessary. If the Federated model will be created by appending files, it may be desirable to set-up Revit to export one specific view from Revit. This is done by using “**Navis**” or “**Navisworks**” in the 3D view’s name. Navisworks can be setup to automatically detect this view because of this naming convention.

At other times, the BRS BIM Execution Plan may require everyone to export .NWC files when they upload their models to share with the other designers. This may be because it may be beneficial to isolate parts of the design models or specific elements. Some examples are:

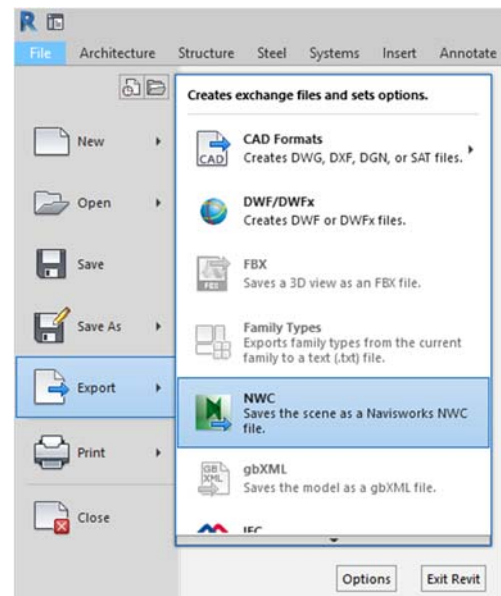
- ❖ Use Section Boxes for multiple 3D views to be imported into Navisworks. This could be used to make a separate model for each floor, or each wing or specific areas of the overall Full Design Model or specific systems or elements of individual Design Models.
- ❖ Use Visibility Graphics (VG) overrides to specify what will export. Elements that are turn-off / invisible to that specific view will not be exported.

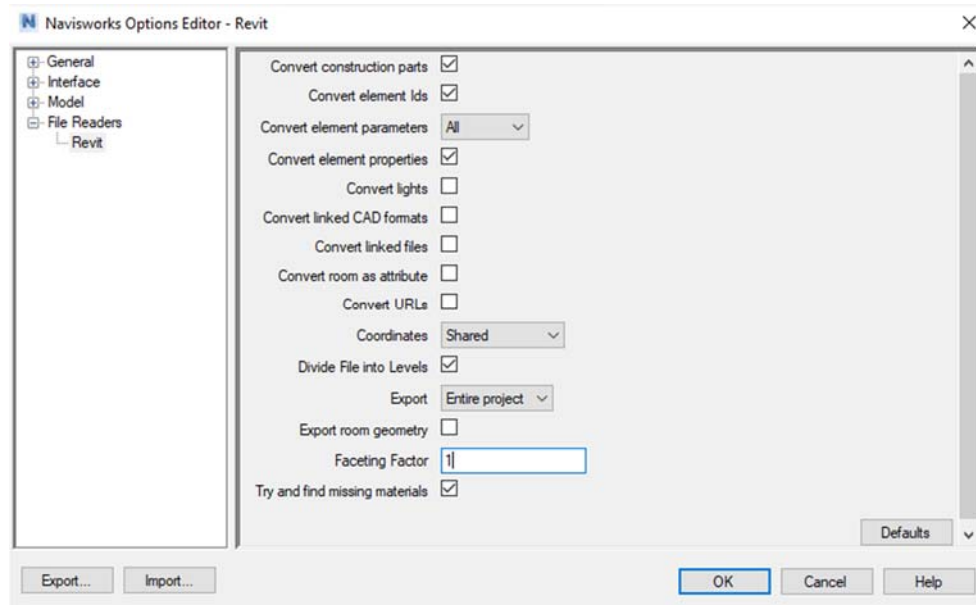
NWC files are 80% smaller in size than the native files. These exports provide interoperability with Revit in a similar way that .IFC files do. For programs that do not have the native file support in Autodesk Navisworks, there is an export utility made available free of charge from Autodesk. This utility allows you to install a plug-in to export the native Navisworks .NWC file.

### Appended NWC Files

This is the cache file format and is a smart technology inside Autodesk Navisworks that lets you open unchanged designs very quickly. Navisworks compares the NWC with its native file. If the NWC is newer, the model is loaded quickly. However, if the native file is newer; the NWC file is recreated and the changes are loaded into Autodesk Navisworks.

- ❖ There are two ways to export a .NWC from one or several 3D Views
  - Go to the **File** tab, select **Export** then select **NWC**.
  - Go to the Add-Ins tab, select **Navisworks** from the **External Tools** pull-down men
- ❖ When the **Export Scene As** dialog is open, you can select **Navisworks Settings** and make sure that the settings are correct. Use the default settings, setting as directed or use the setup shown below. Verify if Shared Coordinates are used. There may also be an XML file available with all of the proper settings (see below).
- ❖ In the **Export Scene As** dialog, enter the name for the Autodesk Navisworks file and browse to the desired storage location.
- ❖ Click **Save** to export the file.





It may be useful to export some elements as 2D CAD files, specifically; grid lines and room tags. This helps in navigating around in the Navisworks model.

There may have been some things created for the project's Revit models to export NWC files to Navisworks. Verify if these are setup and available:

- ❖ Export Options and viewpoints saved to an .XML file. With the Save Scene As dialog box visible (when exporting to an NWC) select Navisworks Settings then select Import. Browse to find the XML file.
- ❖ View Templates may have been setup for one or many 3D views to export from. These can be imported into your Revit Design Model by using Transfer Standards (Manage tab, Settings palette) from the Revit file with those View Templates.

## DISABLE ADD-INS

There may be occasions where you have tested an add-in and want to remove it afterwards. Revit may fail to launch or will crash due to some add-ins or add-in corruption. To disable add-ins – follow this procedure:

- ❖ Close Revit
- ❖ Locate this folder: *C:\ProgramData\Autodesk\Revit\Addins\[version of Revit]*
- ❖ Move the add-in files from the folder above to another location
- ❖ Launch Revit – the add-in(s) will be disabled

If you are having trouble finding the add-in you're looking for, try these locations:

- ❖ An alternate location of an add-in could be: *C:\ProgramData\Autodesk\ApplicationPlugins*
- ❖ Add-ins that may span multiple products/versions: *C:\Program Files\Autodesk\Revit [version]\AddIns*
  - This location is generally used for standard Revit files, but some older add-ins may still try to load into this location – use caution when editing or get direct technical support from Autodesk.

## REVIT TO INFRAWORKS

There may be an occasion where the site designer is using Autodesk Infraworks along with Civil 3D. To prepare a Revit model for export:

- ❖ **Specify the geographic location**

- Define where the Revit model is located in the physical world. See the BRS document “Building and Site Coordination”.
- The latitude and longitude values that you define for the project location are applied to the survey point in the Revit model and are used to position the geometry when the model is imported into Infraworks

- ❖ **Create a 3D view for import into Infraworks**

- Create a custom 3D view for transferring geometry to Infraworks
- By default, Infraworks looks for a Revit view to import in the following order:
  - A view named with the prefix “Navis”, e.g.; “Navis – coordination”. (see above)
  - The default 3D view, named {3D}
  - The last opened 3D view

## USING POINT CLOUDS

“Point Clouds” are the product of laser scanning. This process is also known as LIDAR (Light Detection and Ranging). Distances are recorded by illuminating a target with laser light and measuring the reflection with a sensor. This is what produces a 3D digital representation – a Point Cloud. These point clouds can be photorealistic to be used with VR (Virtual Reality) and can be edited and used for design and modeling in Autodesk Revit. Point clouds can be obtained by fixed scanners on a tripod or mobile scanners on a vehicle or drone. They can serve many purposes: industrial site layouts; infrastructure design and visualization; renovating/remodeling existing buildings; construction verification. A point cloud is used as a model object within Revit.

## AUTODESK RECAP PRO

“Recap” stands for “Reality Capture”, another term for LIDAR or laser scanning. This tool is also available through the company’s Autodesk subscription. Before these point clouds are used in Revit, they should be prepared in Autodesk Recap Pro in house or through a consultant. The workflow for Recap is as follows:

- ❖ **Capture** – the process of laser scanning. This produces large files (millions or billions of points)
- ❖ **Import** – individual scans are imported into Recap for Registration and Indexing
- ❖ **Register** – to align the individual point clouds with one another automatically or manually
- ❖ **Index** – convert the many laser scans into one point cloud model file in .RCP format
- ❖ **View, Edit, Annotate** – the indexed point cloud is edited by removing extraneous points, added annotation added for reference, measurements can be taken and views can be created and saved
- ❖ **Share** – produce the .RCP file to be imported into Revit

## IMPORTING A POINT CLOUD RCP MODEL

Go to the **Insert** tab, select **Point Cloud** and then locate the desired point cloud RCP file. Center-to-center, origin-to-origin, and shared coordinates can be used. You will be able to find the point cloud(s) in the Manage Links dialog. The visibility can be controlled with the Visibility Graphics Override (VG) dialog. On a work-shared project, the point cloud(s) should be on their own, separate workset(s).

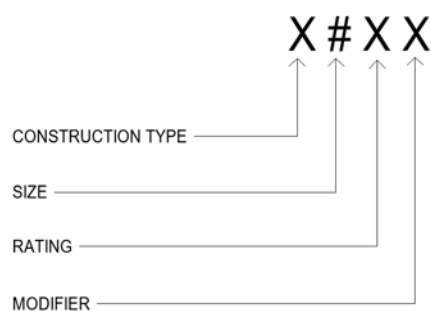


## CREATING GEOMETRY FROM POINT CLOUDS

A point cloud behaves the same way as many model objects used in Revit. They can be seen in plan views, 3D views and sections; they can be cut in plans, sections, with section boxes; they can be moved, copied, rotated and mirrored, etc. The snapping feature can be used on point cloud data to create various types of geometry. To toggle between the snaps, press the Tab key to cycle through what is available at your cursor's position.

- ❖ **Planar Snapping** – Revit detects planes that are perpendicular to the current work plane in plan, section or 3D view. These planes are detected with the cursor and become a reference until the view is zoomed in or out.
- ❖ **Direct Point Snapping** – you can snap to points in the cloud, however; this is a low priority in the snapping order. Planar snaps, if detected, will always be what are initially displayed.

## WALL SYSTEM FAMILY NAMING CONVENTION



The standard convention is used for all interior wall types – exterior wall type naming is similar beginning with (prefix) an “X” signifying the wall type is for an exterior wall.

Not all components of the wall such as drywall, air barriers, etc. need to be included in the naming of the wall family type.

The NTA/NTE notes on sheet G005 of the BRS Revit template include examples of the wall naming criteria.

- ❖ **Construction Type:** the primary material of the wall's framing / core. Examples: “C” for concrete; “M” for masonry; “S” for steel; “W” for wood; etc.
- ❖ **Size:** the depth of the wall's framing / core. A single number is used. Examples: “0” for 7/8”; “3” for 3-5/8”; “7” for ‘varies’; “12” for 1’-0”/12”; etc.
- ❖ **Rating:** the fire rating of the wall assembly. A single number is used for both rated and non-rated wall types. Examples: “1” for 1-hour; “4” for 4-hour; for non-rated wall types: “6” for drywall on both sides full height; etc.
- ❖ **Modifier:** this is used to describe the finishes, sheathing or other important aspects of the wall type family. Examples: “A” for acoustic rating; “T” for tile on one side and “TT” for tile on both sides; etc.

## DISCONNECTING AN API ADD-IN OR MACRO UPDATER

At one time or another, you may get a message for a “Missing Third Party Updater”. This will most often occur when opening a Revit model that was created on another PC using an add-in or extension that you do not have. This is most common with structural models and the updaters have names like *REXExtension: DReinfFootingspread*; *REXExtension: DReinfWall* and *REXExtension: DReinfColumn*. To fix this:

- ❖ Make sure that all local files are closed
- ❖ Open the central model with Audit and Detach selected
- ❖ When the missing third party update dialog appears, select “Do not warn about this updater again and continue working with the file”
- ❖ Save the model file as a new central model **with a different name**
- ❖ Close the file and then open in the usual manner, created in new local file with a different name

## ETRANSMIT

The eTransmit add-in for Revit enables you to copy a Revit model and dependent files and “package” them to a single folder and send to someone via the internet. This is technically an add-in but it comes built-in/included with Revit. When using eTransmit, these types of files cannot be included: 1) point clouds 2) shared parameter file 3) lookup tables 4) material rendering images 5) external references linked to CAD models and 6) external font files. This add-in has several uses:

- ❖ An alternate method of archiving (see “Archiving Revit Models”, pg. 12 this document)
- ❖ An alternate method of sharing and exchanging model files with consultants and/or clients
- ❖ A method to upgrade an older model

## BEST PRACTICES

- ❖ Include a transmittal report during the process, this will indicate the host model to the recipient
- ❖ Include an error report for the process – if one is generated, review it as you would during a manual upgrade. These will generally occur if you choose to upgrade the model file in the process. Problematic files will be included in the same folder as the error report
- ❖ Open the host model from the saved folder to test the file before sending it. Use the option to ‘Work with this model temporarily’. If you selected to upgrade the models, you may see errors that were not detected / reported and handled during the process

## WORKFLOW

- ❖ All models must be closed. The eTransmit panel is found on the Add-Ins tab (if you cannot see the Revit tabs, select to Home button at the upper-left corner next to the “R” or hit Ctrl-D on your keyboard)
- ❖ Select the model(s), a target directory, and file types.
- ❖ Choose the appropriate options, i.e.: save in active version or upgrade, purge unused families, etc.
- ❖ Send the model by e-mail or other method

## EDIT REVISION SCHEDULE

The Revision Schedule is unique. You can only edit the Fields, Sorting/Grouping, Formatting and Appearance by selecting it in the title block family’s browser and looking at the properties pallet. (You cannot select and open it as you would do with other schedules).

## EDIT BUILT-IN PARAMETERS

When you download a family, it may encounter what are called “built-in parameters”; these are parameters defined with code as part of the Revit API (Application Programming Interface) and you cannot edit them normally. This may be discovered when you want to change the family and a parameter does not appear in the Properties palette but it is does in the Type Properties dialog and you are unable to change its value. To edit this parameter, you will need to redefine the family and this parameter in the project model file twice:

- 1) Open the family and go to the Family Types editor (Create tab, Properties palette). When you select the parameter for editing (the pencil in the lower right-hand corner) the dialog box will be grayed-out and labeled as a Built-In Parameter. Close these dialog boxes.

- a. Go to the Family Category and Parameters dialog (Create tab, Properties palette) and change the Family Category to Generic.
  - b. Go back to the Family Types dialog, select the parameter for editing and you will see that it is no longer a Built-In parameter. At this time, change it from Type to Instance and close. Change the family back to its proper type; load the family into the project (overwrite the existing version and its parameter values).
- 2) You can now see the parameter is visible in the Properties palette when the family is selected but you still cannot edit the value.
  - a. Open the family for editing again. Go to the Family Types editor. When you select the parameter in question for editing, you will see that it has changed back into a Built-In Parameter. Close these dialog boxes.
  - b. Go to the Family Category and Parameters dialog (Create tab, Properties palette) and change the Family Category to Generic again.
  - c. Open the Family Types again, select the parameter for editing and you will see that it has changed so that you can edit it. Again – change it from a Type parameter to an Instance parameter. At this time, change the name of the parameter (add a “2” to the end for instance).
  - d. Change the family back from Generic to its proper Type. If you go back to the Family Types editor, you will see that you have a new, editable parameter, however; the Built-In parameter remains. You can verify that it is being used by looking for the dimension in the family that was using the Built-In Parameter and verify that it is now using your new, editable parameter (the name should match). Load the family into the project overwriting the version and parameter values.
- 3) Now, when you select the family and look at the Properties palette, you see your new parameter and you can change the value as desired.

## CENTRAL FILE MAINTENANCE (EXPRESS)

Keeping the Revit central file healthy is critical to keeping the project running smoothly and to avoid causing file corruption. Sometimes there isn't time for the complete file maintenance (which should be done when time permits). The more active a project is, the more often maintenance like this needs to be done.

- 1) Have all users synchronize and save to central, make sure all worksets are relinquished, close all the local files.
- 2) Have one user open the central model file: from the Open dialog box, check the boxes for Detach from Central and Audit.
- 3) Select “Yes” from the audit warning dialog box and then click the Open button.
- 4) Select Detach and Preserve Worksets from the Detach from Central dialog box.
- 5) This step is optional but recommended: archive the central model, see “Archiving Revit Models”
- 6) Go to the application menu and click on Save As to save-over the original central model file. If you select options, you will notice that Make this a Central Model after Save and Compact are grayed-out and pre-checked.
- 7) Go to the Collaborate tab and select the Synchronize with Central pull down and select Synchronize and Modify Settings. Check everything that can be checked, including Compact. You can add a comment if you like, this shows-up in History under Comments
- 8) After Save-As is complete, close the project

- 9) This step is CRITICAL: before users create new local files, make sure that they delete or archive/rename their old local model files and backup folders! (You do not want to risk pulling bad data from an old backup folder into the newly cleaned-up central model file).

## CENTRAL FILE MAINTENANCE (COMPLETE)

This method is like the faster Express method to keep your central model file healthy. Begin by following steps one (1) through six (6) of the Express File Maintenance and then:

- A) Go to the manage tab on the ribbon, click on the Purge Unused tool and from the subsequent dialog box, delete all or specify the items you want to delete and select OK.
- B) Review and fix Warnings (also found on the Manage tab).
  - a. If this icon is grayed out, you don't have any warnings to worry about.
  - b. To fix the warnings, select the Warnings icon and expand the warnings to review and resolve them individually.
- C) Check to make sure that items are on the correct workset. The easiest way to do this is to go to a 3D view with everything visible and then turn off all but one workset. For example, if you have the Furniture workset on and you see interior partitions, you know that those partitions need to be put on the proper workset. Depending on how large the model is, you may want to duplicate the 3D view and limit what is seen in those views with section boxes.
- D) Delete all unnecessary views. There is a schedule of views in the BRS template for this purpose.
- E) Verify that CAD file are linked rather than inserted into the model (preferably Current View Only).
- F) Go to the Manage tab, Additional Settings menu and select Line-styles. If there are any CAD line-styles, delete them (if possible).

Now, complete steps seven (7) through nine (9) of the Express Central File Maintenance (above).