

RISA Revit Structure 2010 Link

Version 8.0 - General Reference



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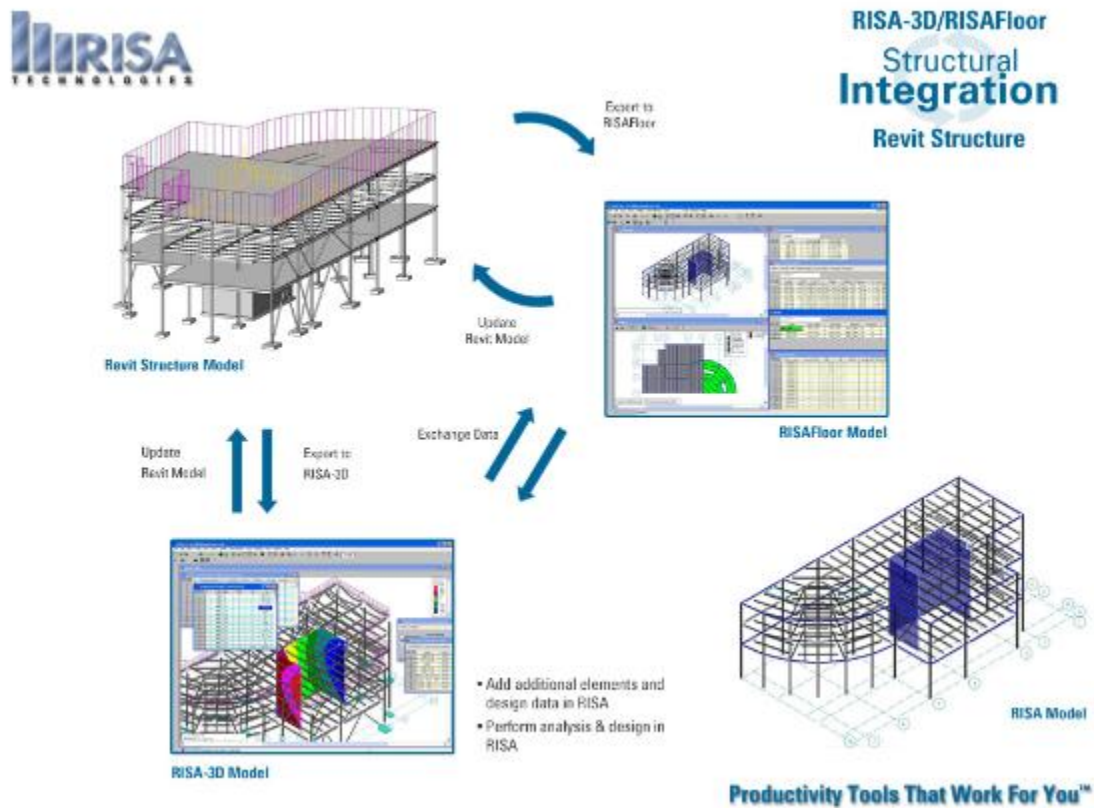
Introduction

Revit Structure users can now leverage the full power of Building Information Modeling by synchronizing their Revit Structure models with RISA-3D and RISA Floor. As an Autodesk Authorized Developer, RISA Technologies has created a full-fledged bi-directional exchange link with Revit Structure.

New models can be created in either REVIT Structure or RISA software using the information available in the other program. All geometric and design information including materials, family instances, walls, slabs, openings, grid lines, boundary conditions, footings, loads and load combinations can be created / updated / deleted in either of the two programs using the information available in the other program.

The new exchange file method allows continuity of data flow throughout the exchange cycle. Users can add new elements and/or additional design to the RISA model and these changes will be retained in RISA while round-tripping.

The robust Excel based XML mapping file provides the capability to customize the processing of shapes, materials and load cases. A log file is created during every export / import operation giving a synopsis on the number of elements translated and errors/warnings encountered.



Why Revit Structure and RISA ?

Imagine relocating a stairwell in an office building – re-framing, redesigning, updating drawings. In the past, a task like this would have taken hours. Likely you would re-frame plans and hand mark-ups to the draftsman. While new framing was making its way onto the plans, you'd manually update the analytical model, rerun the analysis/design, then pour over the results. With a new design in hand, you'd tag new sizes on the updated plans, spending more time than you'd like cutting sections.

With Revit Structure, you're already ahead of the curve. Every change – be it new framing, sizes, decks, notes – is automatically updated on all drawings in your set. Even sections! If only the same were true for your analysis software. With the latest versions of RISA programs and Revit Structure it is! Now you have the full power of RISA programs behind every step you make with Revit Structure. Export the entire Revit Structure model, or just a selected subset, to either of the RISA programs. Perform static or dynamic analyses, moving load analyses, vibration loading, live load reduction, automatically generate seismic and wind forces, design elements using provisions from various countries and tie the results back to your Revit Structure model. See the results...on the drawings and in your project budget.

Install the RISA-Revit Structure Link Component

You already have Revit Structure and at least one RISA program in the office. In order to take full advantage of both programs you'll need to install the RISA-Revit Structure Link Component.

1. Login to Windows – your account must allow registry access privileges
2. Exit out of Revit Structure and all RISA programs
3. Locate the Link Component installation file in one of three locations
 - o Autodesk® Revit® Structure installation CD
 - o Autodesk® Buzzsaw® website
 - o RISA Technologies website
http://www.risatech.com/partners/prt_revit.html
4. Run the self-executing installation file RISAREvitLink2010.exe

The RISA-Revit Link will be installed in a new subfolder (RISA Revit Link) within the RISA installation directory.

In addition, the installation routine modifies the Revit.ini file to include the RISA-Revit Structure Link. This file is located in the Revit Structure program directory (default C:\Program Files\Autodesk Revit Structure 2010\Program\). Modifying the INI file helps in creating the Revit Structure menu commands for the link. An example of this modification is contained in the Revit_ini.txt file.

Version Information

Component Information

RevitRISAComponentVersion 8.0

Compatibility Information

Product	Version
REVIT Structure	2010
RISA-3D	8.0.3 or Higher
RISA Floor	4.0.3 or Higher

Download Links

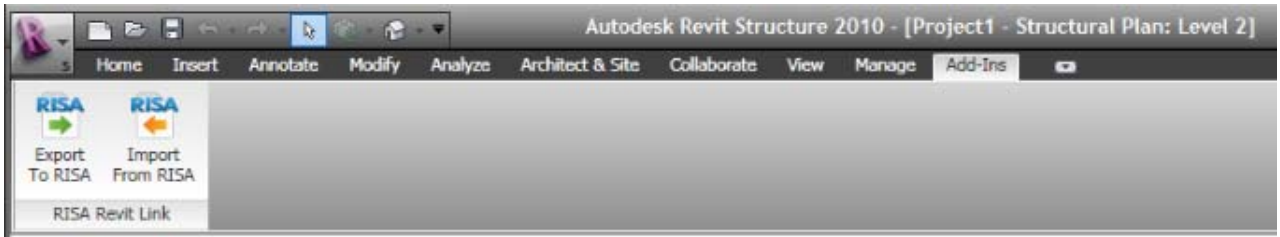
RevitRISAComponent www.risatech.com/partner/revit_structure.asp
REVIT Structure www.autodesk.com
RISA – 3D www.risatech.com/risa-3d.asp
RISAFloor www.risatech.com/risafloor.asp

Getting Started

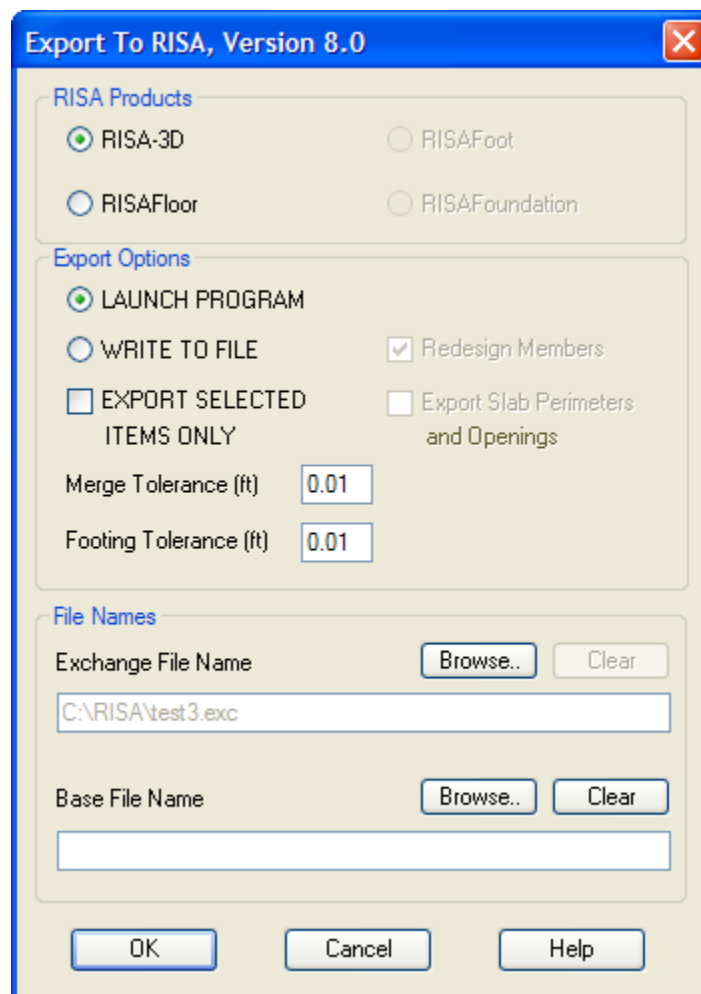
Export Revit Structure Model to RISA-3D or RISAFloor

In Revit Structure, to export your model to any RISA program, save your model and open a 3-D view then go to:

Add-Ins > Export to RISA...



The Export Window will appear (below) with several options



RISA Products

The **RISA Products** section is used to select a RISA Program (*default is RISA-3D*)

Export Options

Launch Program / Write to File

Launch Program will create a new RISA model and launch the RISA program. In contrast, **Write To File** will save the model to a file that can later be opened in RISA.

The **Export Selected Items Only** checkbox will create the model using only the currently selected elements in Revit Structure. When unchecked, the entire Revit Structure analytical model is exported.

The user has the option of exporting only those elements currently selected in the Revit Structure model. This can be useful when analyzing a substructure such as a series of frames or a truss, for instance, without exporting the entire model.

Tolerances

The user can specify a **Merge Tolerance** and a **Footing Tolerance** value. The Merge Tolerance value is provided to take into account the discrepancies while modeling in Revit Structure. Any points/ elements/ loads defined within this tolerance limit will be snapped to the same location. Footings located within this tolerance distance of a column will be snapped back to the column node in RISA. Footings outside of the tolerance distance will be ignored.

Redesign Members

In RISA Floor, there is also an option to 'Redesign Members'. If this option is checked, the corresponding design list is automatically selected as the 'Shape Type' for each column and beam in the structure. This facilitates their design in RISA Floor. If this option is not checked, the shape names are explicitly exported to RISA Floor.

Export Slab Perimeters and Openings

Finally, there is an option to export 'Slabs and Opening Perimeters'. If checked, it instructs the link to run around all defined decks and openings in Revit Structure and find a closed polygon of supporting framing around them. If closed framing polygon is found, it automatically creates slab perimeters and openings in RISA Floor.

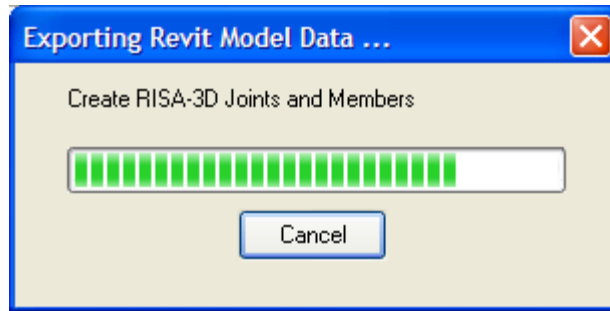
File Names

Here, the engineer selects a RISA program to accept model data from Revit Structure, with the option of either exporting directly to RISA or writing to a file. By default, the Link Component will write an exchange and base files in the default RISA directory (typically C:\RISA) using the same Revit filename.

The **Exchange File Name** designates whether you want to use an existing exchange file or specify a new exchange file name.

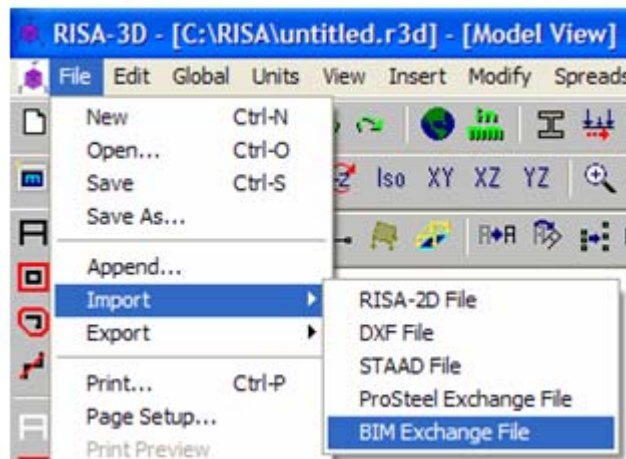
The **Base File Name** selects an existing base file. Leave this entry blank to create a new base file.

When you click "OK", the Link Component will create a RISA exchange file from the current Revit structure model. For larger models, this may take a few moments – you should see a progress bar similar to the one below.



If the *WRITE TO FILE* option is selected, the engineer will need to manually import the exchange file into the RISA program. To do this in the RISA program, select:

File > Import > BIM Exchange File



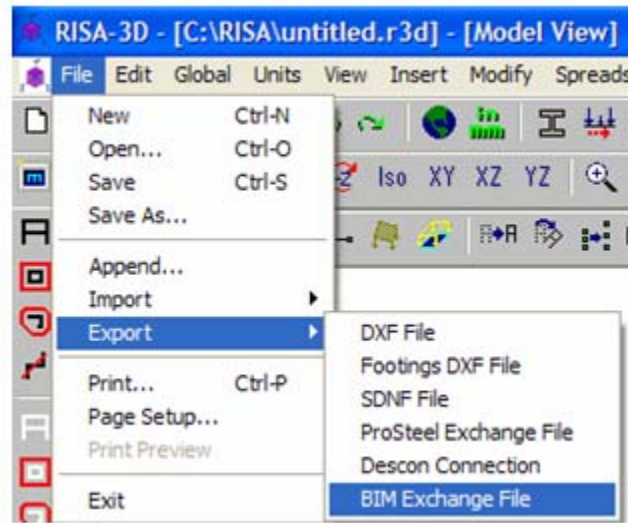
After importing the BIM Exchange File, RISA automatically creates a corresponding .r3d / .rfl base file (depending on the RISA program) in the working directory. This base file can be saved to any directory location – it's path is correctly written to the exchange file during BIM Exchange File export (see next section).

Update From RISA-3D or RISFloor to Revit Structure

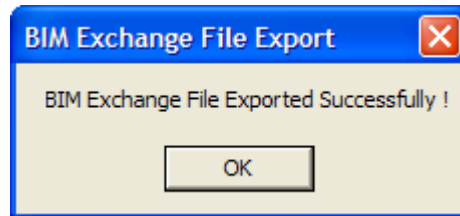
Be sure to save your work in the RISA program. Performing *Save* or *Save As...* will save your changes to the base file, but will not create an exchange file. To update the existing exchange file (or create a new one), you must export a BIM Exchange File.

To do this in the RISA program, select:

File > Export > BIM Exchange File



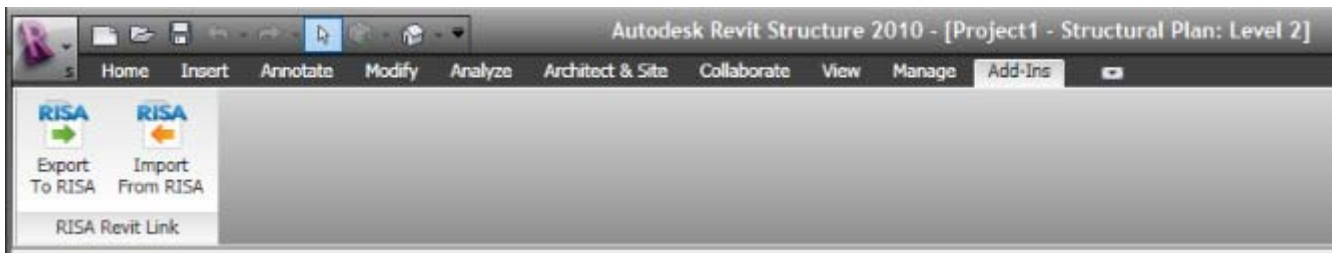
If the exchange file was created successfully, an export confirmation dialog appears.



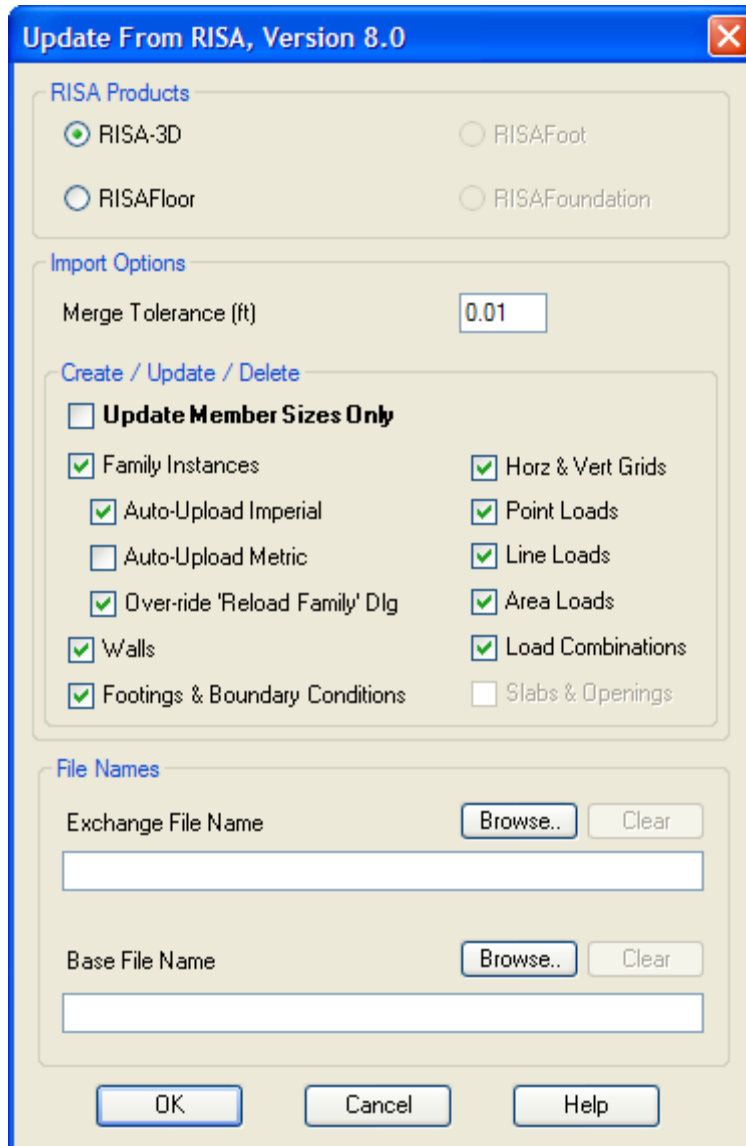
Note:

- The default BIM import/export directory can be set using the Tools > Preferences menu of the RISA program. Go back to Revit Structure and import your changes from the RISA program.:

Tools > External Tools > Import from RISA...



The Update From RISA Window will appear (below) with several options



RISA Products

The **RISA Products** section is used to select a RISA Program (*default is RISA-3D*)

Import Options

Merge Tolerance

The user can specify a **Merge Tolerance**. The Merge Tolerance value is provided to take into account the discrepancies while modeling in Revit Structure. Any points/ elements/ loads defined within this tolerance limit will be snapped to the same location.

Create / Update / Delete

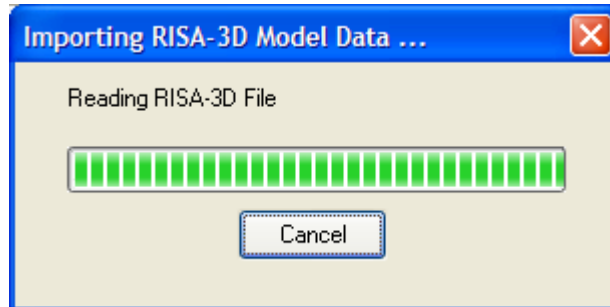
Select RISA elements to be imported back to RevitRevit Structure.

File Names

The **Exchange File Name** specifies the target RISA exchange file.

If the exchange file has a corresponding **Base File**, then it would automatically be shown in this text box.

When you click “OK”, the Component Link scans the RISA file and creates, updates and deletes selected elements in Revit Structure. As before during Export, a progress bar will appear while importing larger models.



Data Exchange

REVIT Structure TO RISA-3D

Grid Lines

Horizontal and vertical lines are supported along with their labels. While grid lines in REVIT Structure have their own finite start and end location, RISA-3D's grid lines in each direction span between the most extreme grid points in the respective opposite direction.

Columns, Beams, and Braces

Family instances with structural usages of column, beam, and braces are supported. The following properties are supported; rotate angle, material type, family type name, start release code, end release code, structural type, and element ID. Redesign Lists for all members created from REVIT Structure elements are set to "None".

In-Place Families

In-place families are supported. In-place families with multiple curves or non-linear curves are supported. In order to export/import member information (member shape name, rotate angle, material type, start-end release etc.), the individual members constituting an in-place family must be defined as individual family instances (Components).

In all other cases, ie, lines, massings etc. only geometry information will be exported. No information would be updated in this case.

Footings

Family instances with structural usage of footing are supported. The length, width, and thickness properties of the footing are supported. The footing location point must be at the same location as a RISA-3D joint. Examples of this would be at the base of a column, beam, brace, or wall corner location. Footings defined without being attached to the structure will not be brought into RISA-3D. Physical material properties and rebar data are not brought into RISA-3D at this time. Footing rotations applied in REVIT Structure will be supported if they are aligned with the rotation of the column.

Boundary Conditions

Point Boundary conditions are supported. The X, Y, Z translation and rotation are supported. If the boundary condition is specified as a spring, then the spring modulus is also supported.

Pinned end conditions are automatically added to the bottom of each column stack. A column stack consists of all columns lying in the same vertical line. If the bottom of a column stack intersects a beam/ girder or a wall, then no end condition is assigned in this case.

Pinned end conditions are also automatically added to walls having no elements below or intersecting their lowermost surface. If the lowermost surface of the wall intersects with a beam or the top of another wall, or any column or brace lies below it, then the automatic assignment of end conditions is not carried out.

Structural Walls

Structural walls of all types except "Non Bearing" are supported. REVIT Structure walls are transformed into 4 node plate elements in RISA-3D. For a wall polygon with more than four edges defined in REVIT Structure, its bounding rectangle

would be created as a wall panel in RISA-3D. The wall thickness is translated into the wall panel thickness. Structural walls are transferred to RISA as 'General Material' wall panels.

Materials

All steel, concrete and wood materials defined in REVIT Structure are translated into corresponding RISA materials. Any other materials (generic etc.), if associated with the walls in the current project are also read into RISA-3D. Materials associated with walls are specifically generated under the 'General' Material category to match the internal defaults in RISA-3D. However, the properties of these wall-specific materials might be specified to match any material type.

All Materials use the Material Spreadsheet on the Mapping File. If a mapping is found on the Materials Spreadsheet of the Mapping File, the material properties are preserved in RISA software. If no mapping is found in the mapping file, then new materials are created in RISA-3D using the name and material properties available in REVIT Structure.

Load Cases

Load Cases are directly translated into RISA-3D Basic Load Cases. Load case labels are brought over and used to assign all the REVIT Structure loads into the proper RISA-3D basic load cases. REVIT Structure Load Case Natures are not currently translated into RISA-3D categories.

Load Combinations

Load Combinations are directly translated into RISA-3D Load Combinations. Load Combination Labels, Load Case references, Load Case factors are all considered. The combination type is brought over as the RISA-3D solve or envelope flag. The combination state is brought over as the RISA-3D service flag. REVIT Structure Load combinations are flagged to apply to all materials.

Load Combinations inside other Load Combinations are translated into RISA 3D. Please note that RISA 3D supports linking only up till one level deep. Any further linking would not be brought over into RISA 3D.

Point Loads

REVIT Structure point loads are translated into either RISA-3D joint loads or RISA-3D member point loads, depending on whether the REVIT Structure point load is placed on a joint or on a member. Point loads that are not located on either a joint or a member are not translated.

The local coordinate system flag is not being considered at this time as it appears to have no affect on the loads within REVIT Structure.

Line Loads

REVIT Structure line loads are brought over as RISA-3D member distributed loads. Any part of a REVIT Structure line load that is co-incident with a member will be translated. REVIT Structure load do NOT have to start and end on the member's ends, and can be fully within or outside the member's start and end points. Line loads that span multiple members will have the appropriate part of the load applied to each member. The local coordinate system flag is not being considered at this time as it appears to have no affect on the loads within REVIT Structure.

Area Loads

REVIT Structure area loads are translated into either 3 or 4 point RISA-3D member area loads. Any area loads with more than 4 points are not currently considered. The local coordinate system flag is not being considered at this time as it appears to have no affect on the loads within REVIT Structure.

RISA-3D TO REVIT Structure

Grid Lines

Horizontal and vertical grid lines are supported along with their labels. All grid lines that are horizontal or vertical are overwritten, where as all others are preserved.

Columns, Beams, and Braces

Members with 'Type' set to Column, Beam or Brace are supported. These elements are created if they are not existent in the current REVIT Structure project. If an existing element is found, its geometry and properties are updated. If an element was deleted in RISA, it would be automatically removed from the REVIT Structure project. The geometry, location, shape name, rotation, material information and function of family instances can be updated from RISA to REVIT Structure.

RISA-3D shape names are mapped to families corresponding to shapes in REVIT Structure via the shape mapping file. If a family corresponding to a particular shape is not already existent in the current project and the auto-load option is checked on the Import Dialog, then the link will run through all available REVIT Structure families. If a match is found for the newly imported shape, then the corresponding family would be automatically loaded in the project.

If a shape name is in both a Column and Beam family in the REVIT Structure project, then it would be distinguished by the presence of the "Column" keyword in the Column family and "Framing" keyword in the Framing Family.

Footings

The link would create, update and delete isolated footings in REVIT Structure. The location, max length, max width, and max thickness entered in RISA-3D would be used to update the location and properties of footings in REVIT Structure. The footing size obtained after solution in RISA 3D will be sent back to REVIT Structure.

Boundary Conditions

Point Boundary conditions are supported. The X, Y, Z translation and rotation are supported. If the boundary condition is specified as a spring, then the spring modulus is also supported. Boundary conditions would be created, updated and deleted from RISA to REVIT Structure.

Structural Walls

Wall panels and openings in RISA are transferred to REVIT as structural walls. RISA wall panels must be rectangular, oriented vertically, and can only have four corner nodes. Wall panels and openings are created, updated and deleted from RISA to REVIT Structure. Vertical plates in RISA will also transfer as structural walls in REVIT.

The material associated with the walls in RISA software are mapped over as 'WallType' in REVIT Structure. 'WallType's are mapped over using the Material Mapping Spreadsheet in the Mapping File. If a mapping does not exist in the mapping file, the link will try to map the name as it exists in RISA software. If however, this name is not found in REVIT Structure, "Generic" wall types would be used. If an existing "Generic" WallType is not found, a new "Generic" WallType is created. If a WallType exists and holds a valid material, the properties of this material would be updated using the properties of the wall panel in RISA software.

Materials

All steel, concrete and wood materials available in RISA software are translated to REVIT Structure Materials. Any other materials (generic etc.), would be updated only if they are associated with a 'WallType'. Materials are created, updated and deleted from RISA to REVIT Structure.

Materials are mapped over using the Material Mapping Spreadsheet in the Mapping File. If a mapping exists in the mapping file, it would be used when transferring data from RISA to REVIT Structure. If not, the original RISA name would be used to create new materials in REVIT Structure. Material properties would be updated if the 'MaterialType' is set to steel, concrete or wood.

Load Cases

RISA 3D Basic Load Cases are brought over as REVIT Structure Load Cases. The BLC label in RISA 3D is used as the Name of Load Cases in REVIT Structure. Load Categories are not updated at this time. Load Cases are created, updated and deleted from RISA to REVIT Structure.

Load Combinations

Load Combinations are directly translated into REVIT Structure Load Combinations. Load Combination Labels, Load Case references, Load Case factors are all supported. The combination type and combination state are also brought over from RISA to REVIT Structure. Load Combination information is over-written from RISA-3D to REVIT Structure, ie, existing Load Combinations, if any, in a particular REVIT Structure project would be deleted, and new load combinations would be created from the information obtained from RISA-3D.

Point Loads

RISA-3D joint loads and point loads are brought in as REVIT Structure point loads. All properties including magnitude, direction and location are translated. These elements are created if they are not existent in the current REVIT Structure project. If an existing element is found, its geometry and properties are updated. If an element was deleted in RISA, it would be automatically removed from the REVIT Structure project.

Line Loads

RISA-3D distributed loads are brought into REVIT Structure as line loads. All properties including magnitude, direction and location are translated. Line load information is over-written from RISA-3D to REVIT Structure, ie, existing line loads, if any, in a particular REVIT Structure project would be deleted, and new line loads would be created from the information obtained from RISA. This is done to support line loads spanning multiple members in REVIT Structure.

Area Loads

3 or 4 noded Area Loads are brought over from RISA-3D to REVIT Structure. All properties including magnitude, direction and location are translated. Area load information for 3 or 4 noded loads is over-written from RISA-3D to REVIT Structure, ie, existing area loads, if any, in a particular REVIT Structure project would be deleted, and new area loads would be created from the information obtained from RISA. Area loads which are not 3 or 4 noded would be preserved in REVIT Structure.

REVIT Structure TO RISAFloor

Floor/ Level Information

REVIT Structure Levels are brought in as Floors in RISA Floor. Level name and elevation are the properties that are supported for various Levels.

Grids

Horizontal and vertical lines are supported along with their labels. While grid lines in REVIT Structure have their own finite start and end location, RISA Floor’s grid lines in each direction span between the most extreme grid points in the respective opposite direction.

Beams, Columns, and Braces

Family instances with structural usages of column, beam, and braces are supported. While Columns and Beams are brought in as RISA Floor elements, Braces are brought in as supplemental RISA-3D elements.

The following properties are supported; rotate angle, material type, family type name, start release code, end release code, structural type, and element ID. Material type and physical material properties are also supported. End reactions, uniform studs and camber information is also brought into RISA Floor for beam elements. The user has an option to export explicit shape names or redesign lists to RISA Floor. If the ‘Redesign Members’ option is checked on the Export Dialog, then Redesign Lists for all members created from REVIT Structure elements are set to the first matching redesign list available in RISA Floor. In case, the family type name is not recognized by RISA Floor, it is changed to a 1x1 rectangular concrete section.

Revit beams that are sloped can be brought into RISAFloor, however it must be the highest elevation floor of the model.

RISA Floor supports pinned and fixed end conditions for beams. Hence, only the following four cases should be specified in REVIT Structure :

End Conditions	Fx	Fy	Fz	Mx	My	Mz	Fx	Fy	Fz	Mx	My	Mz
FIXED-FIXED	0	0	0	0	0	0	0	0	0	0	0	0
PINNED-PINNED	0	0	0	0	1	1	0	0	0	0	1	1
FIXED-PINNED	0	0	0	0	0	0	0	0	0	0	1	1
PINNED-FIXED	0	0	0	0	1	1	0	0	0	0	0	0

If any other combinations are specified in REVIT Structure, the releases would be automatically snapped to the closest match amongst the above mentioned cases. The changes would be made to the RISA Floor model only and would not be replicated to the REVIT Structure model.

If the ‘Analyze As’ field of a beam or column is set to “Lateral”, then it would be brought in as a Lateral Element. If set to “Gravity”, it would be brought in as a gravity member. Braces are always brought in as lateral elements. All columns sharing a node with a lateral beam or lateral wall are automatically converted to Lateral. Along with this, all column stacks that have bracings in the bay between them are also automatically converted to lateral. Any element having a lateral loading will also be converted to lateral.

Cantilever Beams

If either the “Moment Connection Start” or “Moment Connection End” fields of a beam are set to “Cantilever Moment”, then the beam would be brought in as a Cantilever in RISA Floor. If both are specified as “Cantilever Moment”, then the beam would not be brought into RISA Floor, as this case is practically impossible. The Cantilever beam must have a co-linear beam attached to its cantilever end. Also, the properties of the Cantilever beam should be identical to those of the co-linear beam. This is to be consistent with the default procedure of creating cantilevers in RISA Floor.

In-Place Families

In-place families for beams/framings are supported. In-place families with multiple curves or non-linear curves are supported. In order to export/import member information (member shape name, rotate angle, material type, start-end release etc.), the individual members constituting an in-place family must be defined as individual family instances (Components).

In all other cases, ie, lines, massings etc. only geometry information will be exported. No information would be updated in this case.

Physical / Multi-Level Columns

If a column spans along multiple levels in REVIT Structure, it will be exported as a physical column to RISA Floor. In RISA Floor, all floors/ levels through which this column passes will have a corresponding entry for this column, and a corresponding column stack will be added to the RISA Floor model. The offset associated with the actual top level of the column is also read and converted appropriately as splice level elevation for relevant columns within the column stack. The actual top level offset cannot be entered as a negative number. If so, it would be automatically converted to zero. The splice type is also read in for Steel members.

Actual base level offsets are read for only the bottommost columns in each column stack. For all other columns, the base offsets are automatically calculated in RISA Floor to match with the top offsets of other columns in the same stack. The base offset for the bottommost columns can be provided as a positive distance from any level. This provides flexibility to model structures on uneven terrains like in hilly areas.

The link will also automatically create splices if the following properties differ for columns in the same column stack: Shape Name, Material Type, Material Offset, Function and/or rotation angle.

Walls

Wall Elements are supported for RISA Floor. Wall Thickness, openings and function are the properties that are supported. Material Type and physical material properties are also supported. If the 'Structural Usage' flag is set to 'Shear' or 'Combined' for Walls, then it is exported as a lateral element into RISA Floor. In all other cases, walls are exported as Gravity elements.

For a wall polygon with more than four edges defined in REVIT Structure, an attempt would be made to create a wall around its bounding rectangle in RISA Floor. For walls in REVIT Structure with internal columns will be split up in RISA Floor in order to carry the loads accurately.

Area Load Definition

Each individually defined area load in REVIT Structure will have its own definition under "Area Load Definition" in RISA Floor. However, if more than one set of loops are defined under the same area load in REVIT Structure, then only one area load definition corresponding to all loops will be created. All load magnitudes will be listed under the respective category (Refer to Load Case Mapping).

Deck Definitions

Each individually defined deck/slab will have its own definition under "Deck Definitions" in RISA Floor. At present REVIT Structure provides the name of the deck, its thickness, deck direction, concrete strength, weight of concrete and Elastic modulus. All other properties are being defaulted to those of standard Composite Decks in RISA Floor.

Materials

All steel, concrete and wood materials defined in REVIT Structure are translated into corresponding RISA materials. Any other materials (generic etc.), if associated with the walls in the current project are also read into RISA-3D. Materials associated with walls are specifically generated under the 'General' Material category to match the internal defaults in RISA-3D. However, the properties of these wall-specific materials might be specified to match any material type.

All Materials use the Material Mapping File. If a mapping is found on the Materials Spreadsheet of the Mapping File, the material properties are preserved in RISA software. If no mapping is found in the mapping file, then new materials are created in RISA-3D using the name and material properties available in REVIT Structure.

Load Combinations

RISA Floor has an independent set of values for its load cases and the load categories that it uses for its load combinations. However, in both RISA-3D and REVIT Structure, the same load cases are used in Load Combinations.

To allow REVIT Structure load combinations to be translated to RISA Floor, a special mapping algorithm has been embedded in the link. As its first step, it maps REVIT Structure load cases into RISA Floor load cases using the mapping file. Following this step, it uses the following table to convert RISA Floor load cases into RISA Floor load categories. Wherever, more than one load cases are mapped into one category, the maximum value of the factor amongst all load cases is used as the factor for the category.

Load Comb Category	Load Case Name
DLPre	DL PreComp > 0 , DL PostComp <= 0
DL	DL PostComp >= 0
LL	LL and/or LL-Reduce
LLS	LLS and/or LLS-Reduce
RLL	RLL and/or RLL-Reduce
SL	SL
SLN	SLN
RL	RL
OL1	OL1
OL2	OL2
OL3	OL3
OL4	OL4

A ‘Pre Dead Load’ Load Combination is automatically generated in RISA Floor. The loading factor for ‘Pre Dead Load’ Load Case is calculated as the maximum factor used for ‘Dead Load’ from all specified Load Combinations. Along with this, if the user does not specify any Load Combinations, two other load combinations are added by default. These are ‘1.0 x Dead Load’ and ‘1.0 x Dead Load + 1.0 x Live Load’.

Point Loads

REVIT Structure point loads are translated into RISA Floor point loads. Point loads can be placed anywhere on the structure, and it is not necessary for these loads to lie on top of any element. The local coordinate system flag is not being considered at this time as it appears to have no affect on the loads within REVIT Structure.

Line Loads

REVIT Structure line loads are brought over as RISA Floor line loads. Line loads can be placed anywhere on the structure, and it is not necessary for these loads to coincide with any element. The local coordinate system flag is not being considered at this time as it appears to have no affect on the loads within REVIT Structure.

Area Loads

REVIT Structure area loads are brought into RISA Floor. Polygon area loads and multi-loop area loads are supported in RISA Floor. The user can define the area load edges anywhere on the structure and it is not mandatory for these loads to coincide with any elements on the structure.

Decks / Slab Perimeter

REVIT Structure Decks/slabs are brought in as RISA-Floor Decks. Polygon decks/slabs are supported in RISA-Floor. The user can define the decks/slabs anywhere on the structure and it is not mandatory for them to coincide with any element on the structure. At solution time, decks in RISA Floor will be automatically clipped to lie within the defined slab perimeters.

There is an option to create 'Slab Perimeters' automatically while going from REVIT Structure to RISA Floor. If this option is checked on the Export Dialog, then an attempt is made to create slab perimeters. The link searches for a closed polygon of framing inside each defined deck/slab polygon. If a closed polygon of framing is found, slab edges are created on the sides of this closed polygon. Perpendicular distance from the mid point of each slab edge to the actual slab/deck outside this edge gives the value of overhang for that particular slab edge. In this way, different values of overhang can be specified for each slab edge of the same slab perimeter.

Revit decks that are sloped can be brought into RISAFloor, however it must be the highest elevation floor of the model.

Openings

If the 'Export Slab Perimeter and Openings' option is checked on the Export Dialog, then openings will be brought into RISA Floor. An attempt would be made to find the supporting framing for each opening edge. If a closed polygon of framing is found around the opening, then the opening edges would be automatically snapped to it. Perpendicular distance from the mid point of each opening edge to the actual opening inside the framing polygon gives the value of overhang for that particular opening edge. In this way, different values of overhang can be specified for each opening edge. If no such closed framing polygon is found around the actual opening, then the opening would be brought in as-is from REVIT Structure. This will produce an error during solution time in RISA Floor.

RISAFloor TO REVIT Structure

Floor/ Level Information

RISA Floor layouts are brought into REVIT Structure as Levels. Level name and elevation are the properties that are supported for various Levels. Every layout must have a unique name and elevation value.

Grid Lines

Horizontal and vertical grid lines are supported along with their labels. Any grid lines that are horizontal or vertical are overwritten, where as all others are preserved.

Columns, Beams, and Braces

RISA Floor Columns and Beams are supported. Columns, Beams and Braces defined in RISA-3D running under RISA Floor are also supported. These elements are created if they are not existent in the current REVIT Structure project. If an existing element is found, its geometry and properties are updated. If an element was deleted in RISA, it would be automatically removed from the REVIT Structure project. The geometry, location, shape name, rotation, material information and function of family instances can be updated from RISA to REVIT Structure.

RISA shape names are mapped to families corresponding to shapes in REVIT Structure via the shape mapping file. If a family corresponding to a particular shape is not already existent in the current project and the auto-load option is checked on

the Import Dialog, then the link will run through all available REVIT Structure families. If a match is found for the newly imported shape, then the corresponding family would be automatically loaded in the project.

If a shape name is in both a Column and Beam family in the REVIT Structure project, then it would be distinguished by the presence of the “Column” keyword in the Column family and “Framing” keyword in the Framing Family.

Cantilever Beams

If either the “Moment Connection Start” or “Moment Connection End” fields of a beam are set to “Cantilever Moment”, then the beam is considered as a cantilever beam by the link. If however, both are specified as “Cantilever Moment”, then the beam is not considered as a cantilever, as this case is practically impossible. The Cantilever beam must have a co-linear beam attached to its cantilever end.

Existing cantilever beams in REVIT Structure are first deleted, then new cantilever beams are created using information from RISA Floor. The properties of the Cantilever beam would be updated identical to its co-linear beam. This is to be consistent with the default procedure of creating cantilevers in RISA Floor.

Physical / Multi-Level Columns

Each physical piece in every Column Stack in RISA Floor is exported to REVIT Structure at the same location where it exists in RISA Floor. The link would automatically break column stacks in REVIT Structure, according to the splice elevation entered on the Column/ Floor Spreadsheet. The Top and Bottom Offsets of Physical columns is automatically updated by the link. The bottom offsets for the bottommost columns can extend to any distance above/below the Base Elevation. The Column Splice Type (Moment / Shear) is not updated at this time from RISA Floor to REVIT Structure.

Walls

RISA Floor walls and openings are supported. Walls are created, updated and deleted from RISA to REVIT Structure.

The material associated with the Walls in RISA software are mapped over as ‘WallType’ in REVIT Structure. ‘WallType’s are mapped over using the Material Mapping Spreadsheet in the Mapping File. If a mapping does not exist in the mapping file, the link will try to map the name as it exists in RISA software. If however, this name is not found in REVIT Structure, “Generic” wall types would be used. If an existing “Generic” WallType is not found, a new “Generic” WallType is created. If a WallType exists and holds a valid material, the properties of this material would be updated using the properties of the material associated with the Wall in RISA software.

Area Load Definition

Area Load Definitions allow multiple loads under different load cases. Please note that REVIT Structure does not follow this pattern. Only one load case can be assigned to one load. If more than one loads cases are defined for one load in RISA Floor, then only one of these values would be sent to REVIT Structure. The order of selection of the load case and load value would be as follows : LL, DL PostComp, DL PreComp, OL1, OL2, OL3, OL4, Dyn Mass and VL.

Deck Definitions

Deck definitions are converted to ‘FloorType’ in REVIT Structure. Only those deck definitions that are referenced by Decks in RISA Floor would be created / updated in REVIT Structure. The name of the deck, its thickness, deck direction, concrete strength, weight of concrete and Elastic modulus are being supported.

The link will try to map RISA Floor Deck Definitions to REVIT Structure ‘FloorType’ using the name of the Deck Definition used in RISA Floor or a unique internal ID (used to reference the same ‘FloorType’ during multiple round-trips). If successful, it will update the information stored in the ‘FloorType’. If however, no mapping is found by name or ID in REVIT Structure, “Generic” FloorTypes would be used. If an existing “Generic” FloorType is not found, a new “Generic” FloorType would be created. If a FloorType exists and holds a valid material, the properties of this material would be updated using the properties stored in the Deck Definition.

Materials

All steel, concrete and wood materials available in RISA software are translated to REVIT Structure Materials. Any other materials (generic etc.), would be updated only if they are associated with a 'WallType'. Materials are created, updated and deleted from RISA to REVIT Structure.

Materials are mapped over using the Material Mapping Spreadsheet in the Mapping File. If a mapping exists in the mapping file, it would be used when transferring data from RISA to REVIT Structure. If not, the original RISA name would be used to create new materials in REVIT Structure. Material properties would be updated if the 'MaterialType' is set to steel, concrete or wood.

Till REVIT Structure 2008, wood materials do not have 'MaterialType' set to 'Wood'. Hence, material properties for wood materials would not be updated automatically. The way to update Wood properties is to manually set 'MaterialType' to 'Wood' in REVIT Structure before updating from RISA software.

Point Loads

RISA Floor joint loads and point loads are brought in as REVIT Structure point loads. All properties including magnitude, direction and location are translated. These elements are created if they are not existent in the current REVIT Structure project. If an existing element is found, its geometry and properties are updated. If an element was deleted in RISA, it would be automatically removed from the REVIT Structure project. Refer to Load Case Mapping for more information on Load Cases.

Line Loads

RISA Floor line loads are brought in as REVIT Structure line loads. All properties including magnitude, direction and location are translated. These elements are created if they are not existent in the current REVIT Structure project. If an existing element is found, its geometry and properties are updated. If an element was deleted in RISA, it would be automatically removed from the REVIT Structure project. Refer to Load Case Mapping for more information on Load Cases.

Area Loads

RISA Floor area loads are brought into REVIT Structure as area loads. All properties including magnitude, direction and location are translated. RISA Floor area loads can have any shape and geometry. Area load information is over-written from RISA Floor to REVIT Structure, ie, existing area loads, if any, in a particular REVIT Structure project would be deleted, and new area loads would be created from the information obtained from RISA Floor. Refer to Load Case Mapping for more information on Load Cases.

Slabs and Openings

RISA Floor supports two different element types, ie, 'Slab Perimeter' and 'Deck', where as there is only one element, 'Slab' in REVIT Structure. In order to keep data consistent during multiple round-trip operations, RISA Floor 'Decks' are mapped over as REVIT Structure 'Slabs'. However, default decks would not be brought over into REVIT Structure. Each 'Deck' should be explicitly drawn in RISA Floor, in order to be send it to REVIT Structure.

'Slab Perimeter' from RISA Floor is never interpreted / created as a 'Slab' in REVIT Structure. Any openings that are drawn in RISA Floor must overlap explicitly defined 'Decks' in RISA Floor in order to be updated in REVIT Structure.

'Slab' and 'Opening' elements associated with 'Slab' elements in REVIT Structure are over-written from RISA Floor to REVIT Structure, ie, existing elements, if any, in a particular REVIT Structure project would be deleted and new elements would be created from the information obtained from RISA Floor.

Mapping Files

The link provides additional functionality for user-defined mapping of shape names, materials and RISAFloor Load Cases. This mapping is not mandatory for the functioning of the link, however its use is recommended to customize the import and export operations.

The Excel based XML mapping file, "RISA_Revit_Mapping_File.xml" is copied during the RevitRISAComponent Installation. The mapping file can be present either in the same location as the DLL or in the folder where RISA software is installed. The component will search the DLL location first and the RISA software folder second. The installation routine will place it, by default, in the same folder as the component DLL.

Shape Mapping

This spreadsheet consists of three columns : "RISA ShapeName", "REVIT ShapeName" and "ShapeType". By default it is filled with the mapping for all AISC Hot Rolled Shapes. A couple of examples have been appended at the end of the list for demonstration purposes. Any other shapes can be added at any time to this spreadsheet.

The link would first look for a mapping on this spreadsheet. If not found, it will try to process the shape using internal algorithms as mentioned below. If no processing is possible, then the shape name would be transferred 'as is' from one software to the other.

In cases when a mapping is not found in the shape mapping file, or concrete and wood shapes there is an internal algorithm being mapped during export from REVIT Structure to RISA software. For updating concrete shapes during import using this algorithm, the user must follow the general conventions for naming in REVIT Structure. For example, rectangular concrete shapes must be named in the format 'a x b' and circular shapes must be named in the format 'c" '. Where a, b, and c are the width, depth and diameter respectively. It is important to note however, that REVIT Structure stores rectangular concrete shape names as 'width x depth' where as RISA-3D stores these names as 'depth x width'. This behavior is being accounted for in the internal mapping algorithm. Wood shapes can be updated during import only through the shape mapping file.

The following 'Shape Types' should be used in the Shape Mapping File.

Hot Rolled	
WF_SHAPE	Wide Flange
TUBE_SHAPE	Tube
PIPE_SHAPE	Pipe
CHANNEL_SHAPE	Channel
WT_SHAPE	WT
DBL_L_SHAPE	Double L
SNGL_L_SHAPE	Single L
RECT_SHAPE	Rectangular
BAR_SHAPE	Bar
TAP_WF_SHAPE	Tapered Wide Flange
Wood	
NDS_SHAPE	Rectangular
NDS_ROUND_SHAPE	Round

Concrete	
CRECT_SHAPE	Rectangular
CRND_SHAPE	Round
CL_SHAPE	L Shape
CT_SHAPE	T Shape
Joists	
KJOIST_SHAPE	K Joist
LHJOIST_SHAPE	LH Joist
DLHJOIST_SHAPE	DLH Joist
SLHJOIST_SHAPE	SLH Joist
KCSJOIST_SHAPE	KCS Joist
JOISTGIRDER_SHAPE	Joist Girder
WOOD_JOIST_SHAPE	Wood Joist

Material Mapping

This spreadsheet consists of three columns : “RISA MaterialName”, “REVIT MaterialName” and “MaterialType”. By default it is filled with a logical mapping for all default materials and ‘WallType’ that exist in REVIT Structure. Any other mappings can be added at any time to this spreadsheet.

REVIT Structure to RISA

If the mapping for a particular material or ‘WallType’ exists on the mapping spreadsheet, it would be mapped over with the RISA name mentioned on the spreadsheet. In this case, the material properties would be preserved in RISA, and would not be over-written from REVIT Structure to RISA.

If a mapping is not found in the mapping file, the material or ‘WallType’ would be mapped with the same name as that in REVIT Structure to RISA Software. In the first transfer, the wall type and material properties are created from REVIT Structure to RISA. During updates if the mapping can not be found, the material properties will not be over-written.

RISA to REVIT Structure

All materials in RISA would first parse through the mapping file. If a mapping is found on the Material mapping spreadsheet or the name is the same in REVIT Structure and RISA, then the properties of the referenced material in REVIT Structure would be updated.

If a mapping is not found in the mapping file and the name of the material is not same in the two software, then an internal algorithm using internal IDs is also used to map materials. This algorithm is relevant only during multiple round-trip operations and would be rarely applicable.

If a material is not found in REVIT Structure, then a new material is created using the name and properties coming over from RISA software. Please note that Material Properties for wood materials would be updated only if ‘MaterialType’ of existing Wood Materials is set to ‘Wood’. In REVIT Structure 2008, the default for ‘Wood’ Materials is set to ‘Unassigned’.

The material associated with the Wall panels in RISA software are mapped over as ‘WallType’ in REVIT Structure. If a mapping does not exist in the mapping file, the link will try to map the name as it exists in RISA software. If however, this name is not found in REVIT Structure, “Generic” wall types would be used. If an existing “Generic” WallType is not found,

a new “Generic” WallType is created. If a WallType exists and holds a valid material, the properties of this material would be updated using the properties of the material associated with the Wall panel in RISA software.

Available Material Types in RISA Software	
CONCRETE_MATL	Concrete Material (Family Instances)
HOT_ROLLED_STEEL_MATL	Steel Material (Family Instances)
NDS_WOOD_MATL	Wood Material (Family Instances)
GENERAL_MATL	General Material (WallTypes)

Note:

- RISA MaterialName should NEVER be more than 19 characters in length.
- There must be one to one mapping for Materials between the two programs, ie, more than one REVIT Structure material should not map to the same RISA Material.

If a wall and family instance in REVIT Structure reference the same material, then the same material would be created as two different materials in RISA. One entry would be created under Steel, Concrete or Wood Materials which would be referenced by the family instance. The other entry would be created under General Materials which would be referenced by the Walls (REVIT walls currently reference General Material in RISA software and you can manually change the material type in RISA).

- If a change is made to the properties of this material, then the change should be made at both places for consistency. If this is not done, then the properties of the last material transferred would dominate.

RISAFloor Load Case Mapping

This spreadsheet consists of three columns : “RISA LoadCaseName”, “REVIT LoadCaseName” and “LoadCaseType”. By default it is filled with a logical mapping for all default Load Cases that exist in REVIT Structure. Any other mappings can be added at any time to this spreadsheet.

The reason why this mapping is essential for RISA Floor is that RISA Floor has specific load cases and user defined load cases cannot be added to the program. On the contrary, RISA-3D supports user defined Load Cases and hence, it does not require Load Case Mapping.

REVIT Structure to RISA

The Load Case of every load that is sent from REVIT Structure to RISA is parsed through the Load Case Mapping Spreadsheet. If an entry is found on the Load Case Spreadsheet, it is used to find out the associated RISA Floor Load Case Name. If an entry is not found on the Mapping Spreadsheet for that particular Load Case, then the name from REVIT Structure is used.

The name obtained at the end of the mapping process (either from the Mapping file, or otherwise) is matched up against existing RISA Floor categories. If a match is found, then the load is converted under the found load case in RISA Floor. If however, a match isn’t found, the load is transferred under the ‘OL4’ category in RISA Floor.

The “LoadCaseType” is used to distinguish between RISA Floor loads and RISA-3D loads under RISA Floor. Any load cases defined with the “Lateral” keyword as the “LoadCaseType” would be converted into RISA-3D loads and load cases, where as all other load cases would be converted into RISA Floor loads and load cases.

RISA to REVIT Structure

The Load Case of every load that is sent from RISA Floor to REVIT Structure is parsed through the Load Case Mapping Spreadsheet. If an entry is found on the Load Case Spreadsheet, it is used to find out the associated REVIT Structure Load

Case Name. If an entry is not found on the Mapping Spreadsheet for that particular Load Case, then the name from RISA Floor is used as is in REVIT Structure.

The name obtained at the end of the mapping process (either from the Mapping file, or otherwise) is matched up against existing REVIT Structure load cases. If a match is found, then the load is converted under the found load case in REVIT Structure. If not found, a new load case is created in REVIT Structure.

Available Load Cases in RISA Floor	
DL PreComp	Pre Composite Dead Load
DL PostComp	Post Composite Dead Load
LL- Non	Live Load
LL-Reduce	Reducible Live Load
LLS - Non	Live Load Special
LLS-Reduce	Reducible Live Load Special
RLL- Non	Roof Live Load
RLL-Reduce	Reducible Roof Live Load
SL	Snow Load
SLN	Non Shedding Snow Load
RL	Rain Load
OL1	Other Load 1
OL2	Other Load 2
OL3	Other Load 3
OL4	Other Load 4
Dyn Mass	Dynamic Mass
VLL	Vibration Load

Note:

- RISA Load Case Names should NEVER be more than 11 characters in length.
- A load case mapping must exist to map loads to RISA-3D running under RISA Floor to REVIT Structure or visa versa.

Two Way Interaction

A two file methodology has been implemented to preserve the elements that are added within RISA Software along with the elements being brought over from REVIT Structure. A base file created by the RISA program would contain all the information about the structure, including new additions or modifications to properties made in RISA software that are not directly possible in REVIT Structure. An exchange file that is created by REVIT Structure will contain all information that is being exported from REVIT Structure to RISA software. While updating data from RISA to REVIT Structure, the two file methodology helps in deleting elements in REVIT Structure that have been deleted in RISA.

The overall data has been primarily divided into two subsets :

1. **Merge Subset:** It refers to the data that is present in REVIT Structure and also in RISA Software. Common examples of this data are beams, columns, footings, materials etc. This data can be added and modified in both REVIT Structure and RISA Software. The changes to this data can be made in either REVIT Structure or RISA Software.
2. **Preserve Subset:** It refers to the data that is present in only RISA Software. Common examples of this data are design rules, hot rolled section sets, diaphragms, moving loads etc.

Please refer to the 'RISA-REVIT Round Trip' spreadsheet for detailed information on the elements and data members that would be merged or preserved while import and export operations between the two programs.

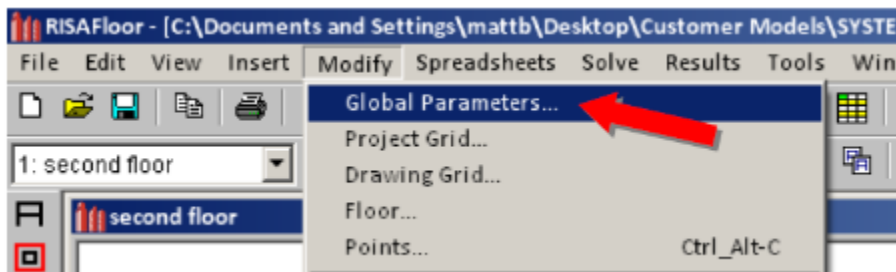
Common Tips

- The base file contains all the data, ie, the data transferred from REVIT Structure along with the new data that is created explicitly in RISA. This file can be opened without the exchange file or the REVIT Structure file at any time from within the RISA programs.
- The exchange file contains only the data that is transferred from REVIT Structure. Opening this file using the 'BIM File Import' Option on the RISA File Menu will merge the data available in this file with the base file referenced inside this file, and save the merged data into the base file. Finally it will open the new base file.
- The base file must be exported to the corresponding exchange file, using the 'BIM File Export' Option available on the RISA File Menu before importing the file back into REVIT Structure.
- The base file must be exported atleast once from RISA before a second export is made from REVIT Structure to the same exchange file. This helps in hooking up the base file to the exchange file. Alternatively, the base file name should be manually selected during the second or any consequent export operation from REVIT Structure to RISA. Once the base file name is established using either of the above two methods, the programs always remember it all consequent import or export operations.
- Saving the REVIT Structure File atleast once after an export or import operation helps it to remember the names of the exchange and base files chosen during these operations.
- Not selecting a base file name during an export operation from REVIT Structure (or entering a brand new base file name) is an indication to the link to create a brand new base file. Even if there has been a previously associated base file, all associations will be broken, and a new base file will be written.

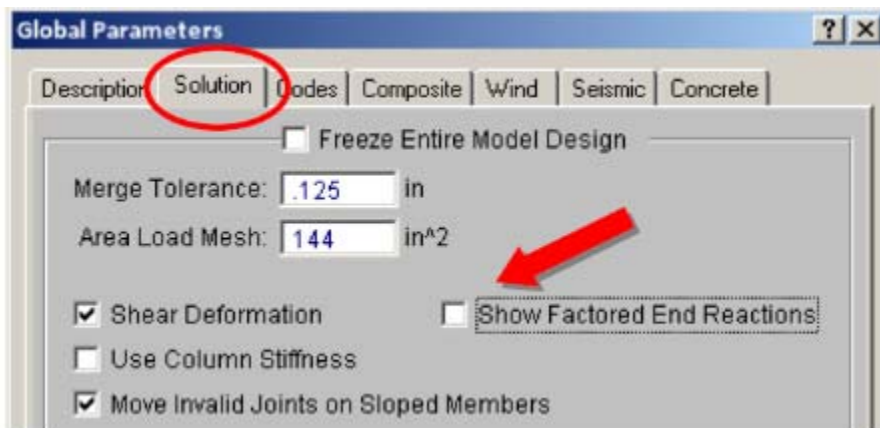
Showing RISA End Reactions

This document shows you how to display your RISAFloor end reactions in Revit. Prior to doing this you need to install the RISA Reaction Tags into your Revit project. You can find the steps to do this [Installing RISA Tags to Existing Projects](#).

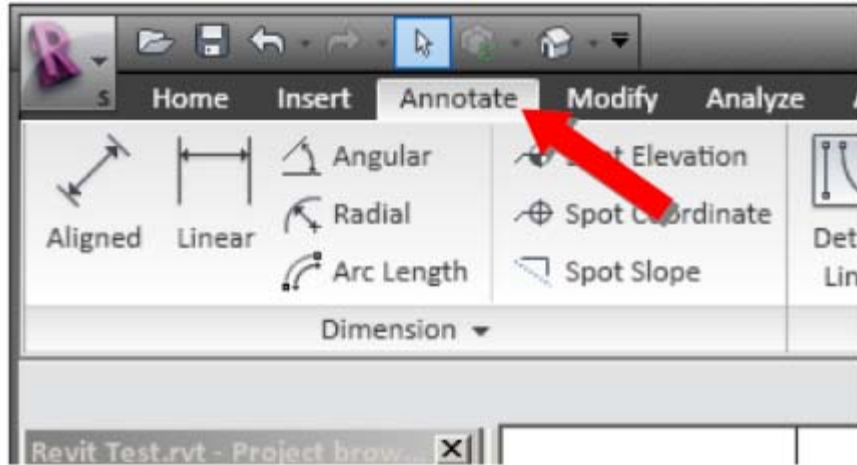
1. Ensure that you have already Installed your RISA Reaction Tags in Revit (see above)
2. Within RISAFloor go to the Modify menu and select Global Parameters



3. Click on the Solution Tab. The check box that says Show Factored End Reactions will specify whether or not your reactions are exported to Revit as Factored or Unfactored. Set your preference, then click OK



4. Solve your model, then go to the File menu and click Save. When prompted, specify that you would like to Save Results.
5. Refer to the general RISA Revit link [instructions](#) on how to export a BIM Exchange file and import your RISA Model into Revit
6. Go to a Structural Framing Plan view in Revit
7. Click on the Annotate tab at the top of the screen



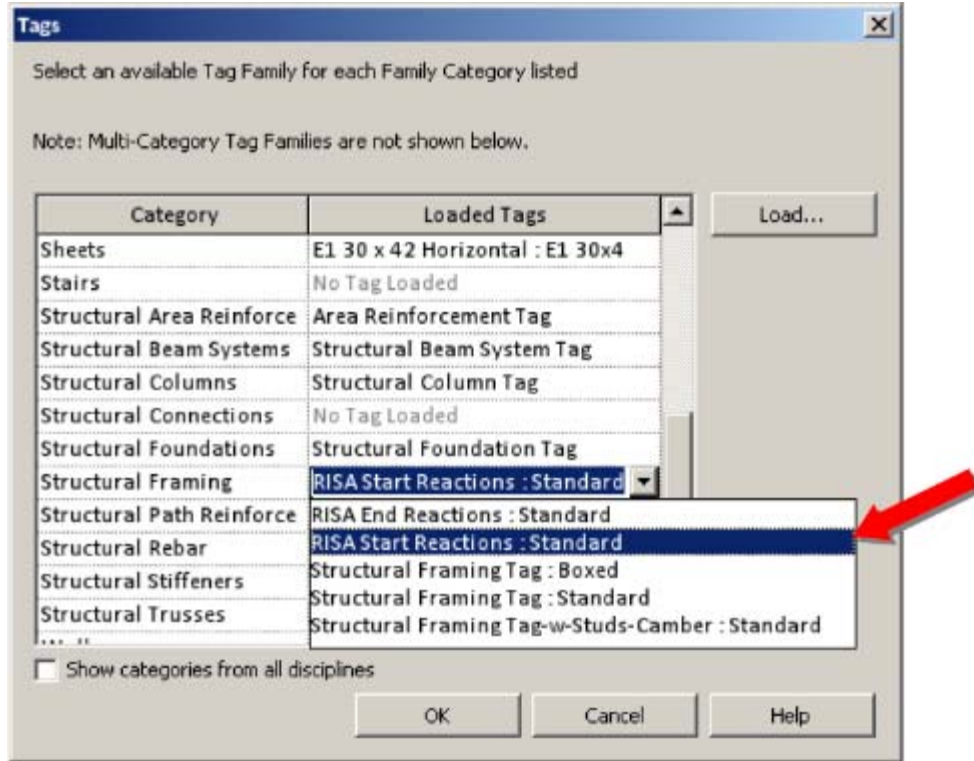
8. Click on the Tag button on the top of the screen



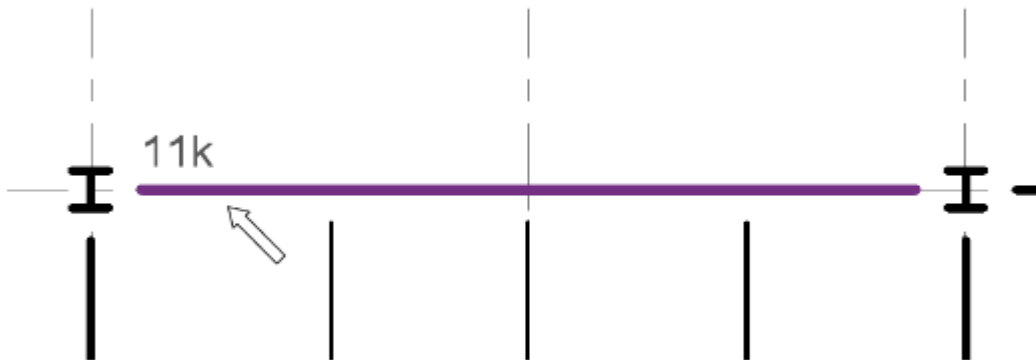
9. In the upper left corner of the screen, Uncheck the box that says Leader then click the Tags button



10. Within the Tags dialog, scroll down and find the Structural Framing Category. Click on the drop down in the Loaded Tags column and select RISA Start Reactions. Then click OK



11. Hover over a beam and you will see the reaction tag appear at the “Start” end of the beam. Left click once to apply that tag. You can do this to all of your beams:

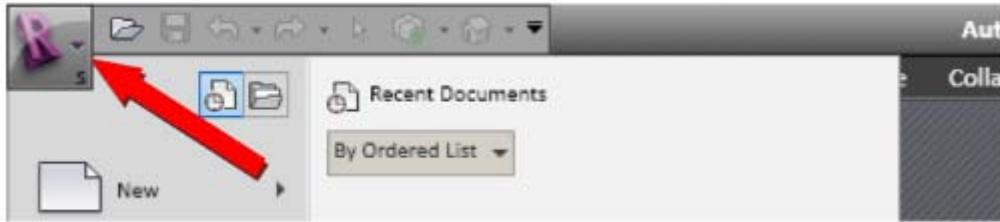


12. Repeat Steps 9 through 11 to tag the “End” reactions.

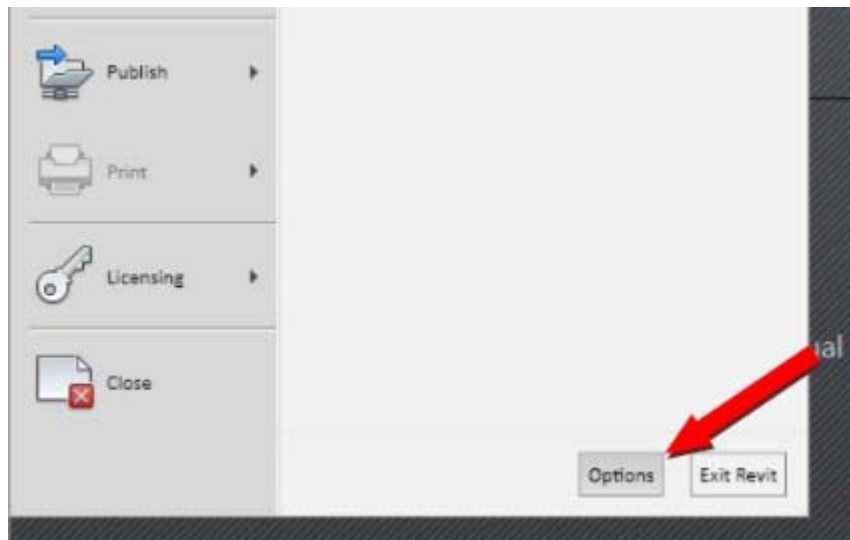
Installing RISA Reaction Tags

This is a one-time process that will add the RISA reaction tags to your Revit defaults. This will ensure that these tags come pre-loaded in all new Revit models you create. To add reaction tags to a model that was created prior to performing this installation, see [Installing Reaction Tags to Existing Projects](#)

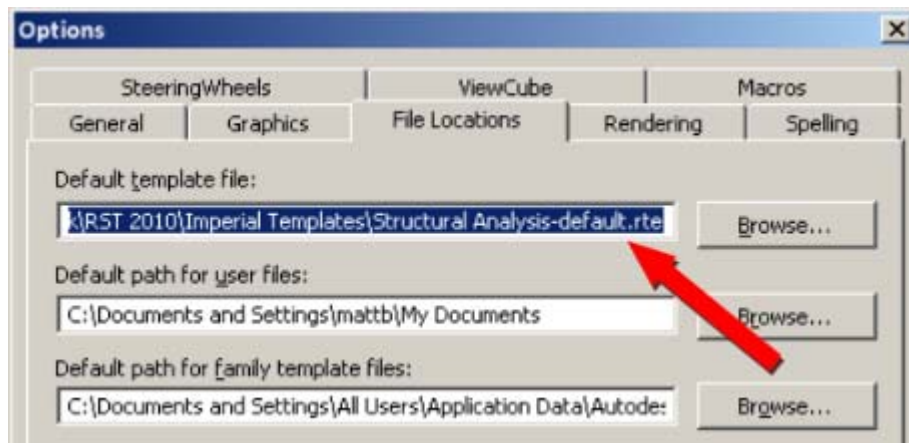
1. Install the RISAREvit link (Version 8.0)
2. Open **Revit Structure 2010**, and Close any projects that open with it
3. Click on the **Application Menu** at the top left corner of the screen, as shown below:



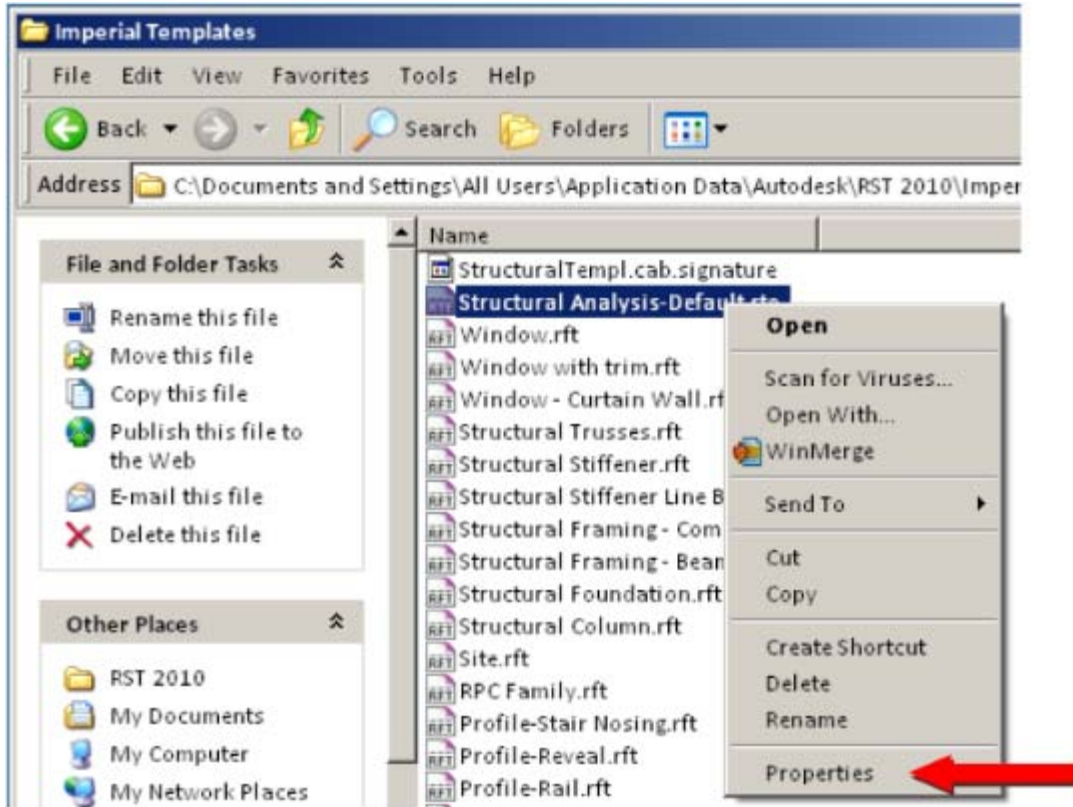
4. Click on the Options button in the lower right corner of the Application Menu, as shown below:



5. Go to the **File Locations** tab within the **Options** dialog. Take note of the **Default Template File path**, write it down or copy the text to a temporary location. Click on **Cancel** to exit the **Options** dialog.



6. Using **Windows Explorer**, navigate to the location of your **Default Template File** (From Step 5). If this file resides in a network location, ensure that you have write permissions for it. Right click on the file and select **Properties**

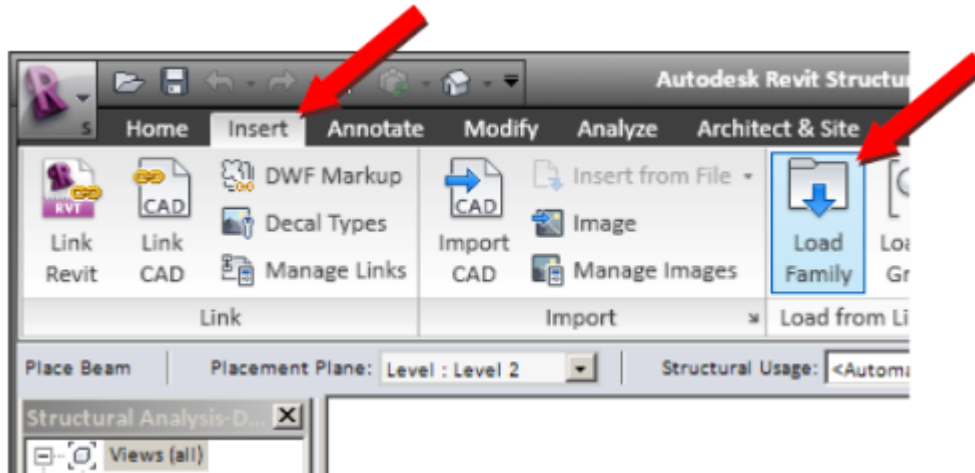


7. Within the Properties dialog make sure that the box marked Read Only is unchecked. Then click OK

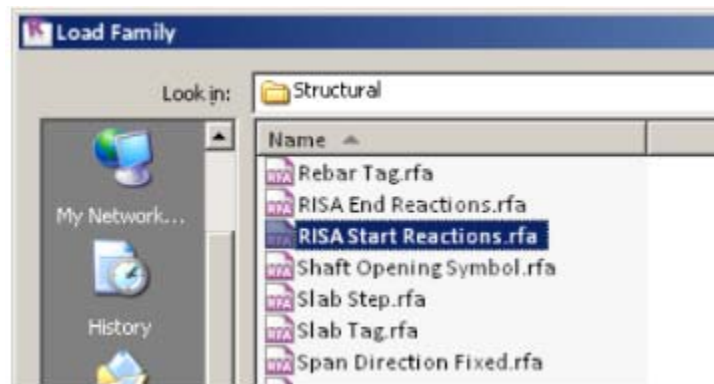


8. Double click on the Default Template File to open it within Revit

9. Click on the Insert Tab at the top of the screen, then click on the Load Family Button that appears on the tool ribbon.



10. Within the Load Family dialog, go to the Annotations folder, and then the Structural folder within. Here you will find a file called RISA Start Reactions.rfa. Click on this file and click the Open button.



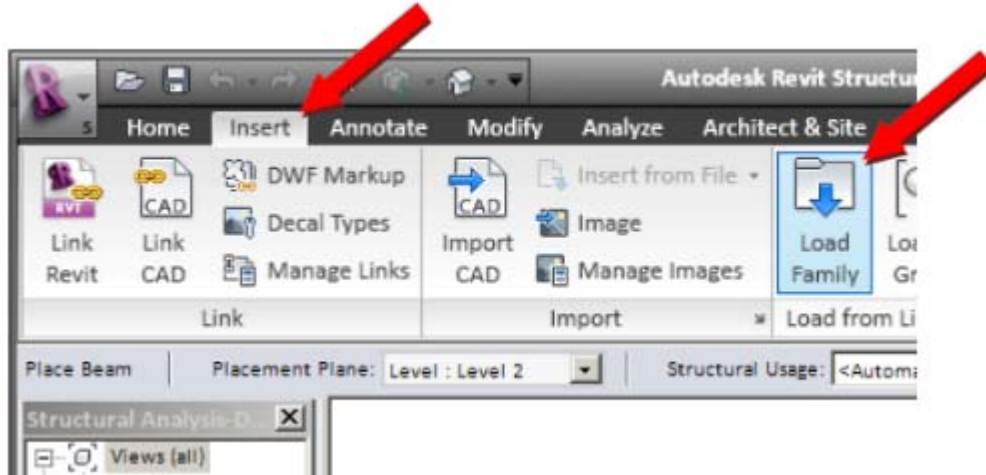
11. Repeat Steps 9 and 10 to load the file RISA End Reactions.rfa

12. From the Application Menu in the upper left corner click Save and Exit Revit.

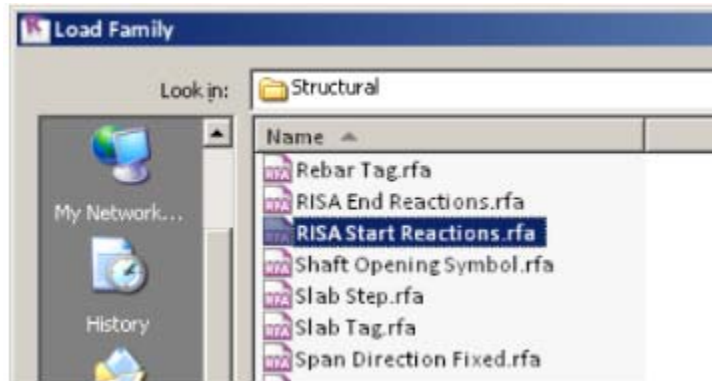
Installing RISA Reaction Tags to Existing Projects

This process will help you add reaction tags to Revit projects that were existing prior to completing the instructions on [Installing RISA Reaction Tags](#).

1. Open your existing Revit 2010 project
2. Click on the Insert Tab at the top of the screen, then click on the Load Family Button that appears on the tool ribbon.



3. Within the Load Family dialog, go to the Annotations folder, and then the Structural folder within. Here you will find one a file called RISA Start Reactions.rfa. Click on this file and click the Open button.



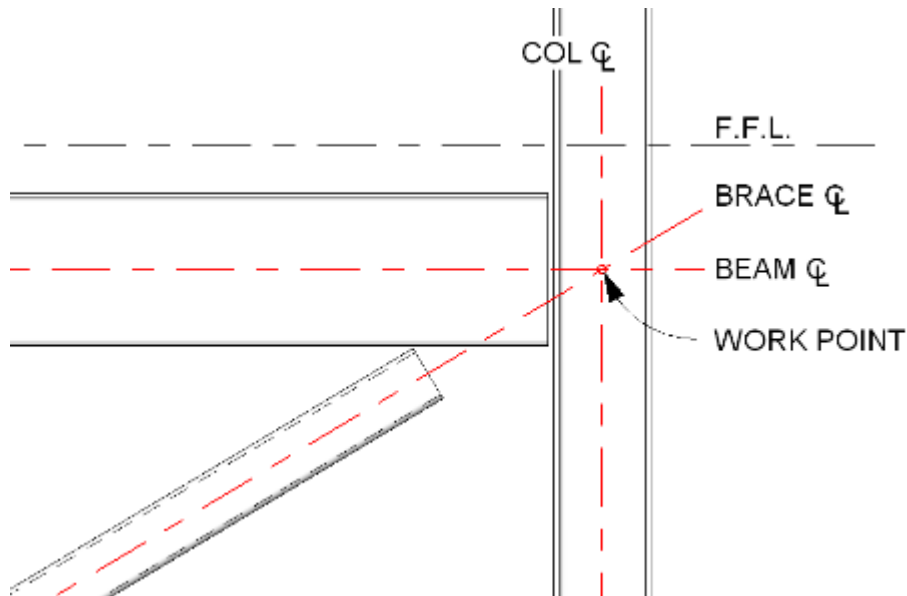
4. Repeat Steps 2 and 3 to load the file RISA End Reactions.rfa

Modeling Tips

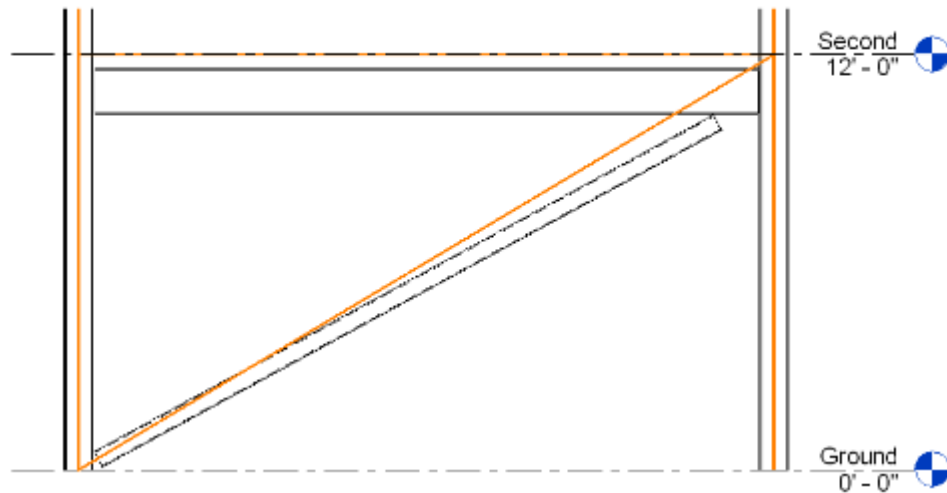
Split X-Bracing

Occasionally you may need to use X-Bracing in your building that consists of three or four split legs. For these occasions it is critical that your Revit model and drawings reflect the condition to be built, however this physical model may not agree with the analytical model that you use for RISA. The discrepancy is caused by an inherent assumption that engineers make when modeling structures, namely that the analytical beams all exist at the same elevation. In reality, if we take the centerlines of every beam as analytical members then a W24 would have its analytical member at a different elevation than a W12, assuming that these models would be top-justified in real life for a floor system.

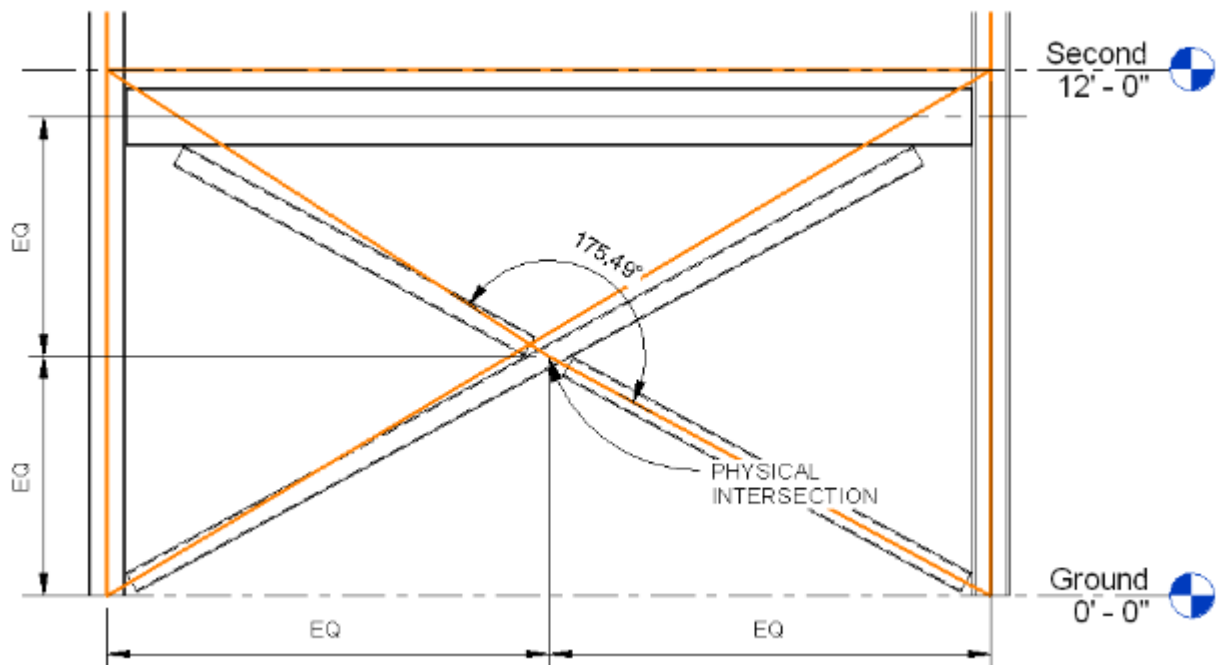
Below is an image illustrating how the brace is ideally modeled analytically, and how it should theoretically be detailed (as a true concentric connection)



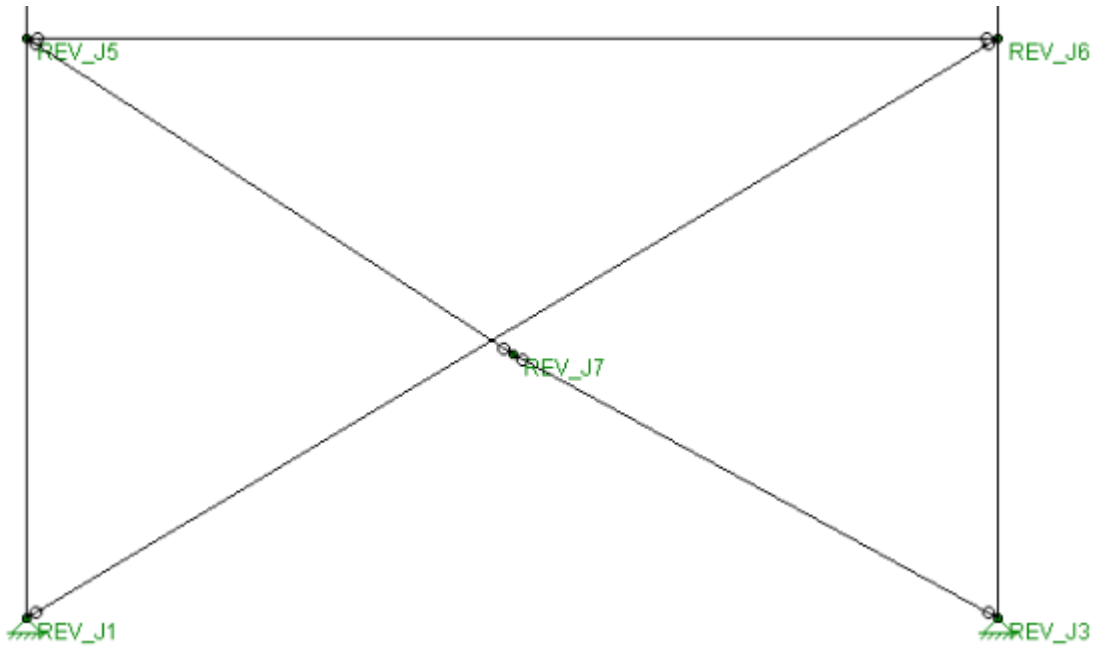
As you can see, the analytical centerlines of the beam, column, and brace all meet at the same location (called the Work Point). This eliminates any eccentricity in the connection, thereby eliminating unintended moments in the beam or column. The problem comes in when you export this model to RISA:



In order to rectify the location of the analytical beam lines, they are all assumed to occur at the Second Floor elevation. The physical model for the brace (shown as the black linework) is modeled in its intended location for construction, but the analytical model for the brace is a different angle since it must connect to the beam at the second floor. It is common to model the second X-brace as two pieces, but if you model them from their workpoints to the physical center of the first brace, you will get what you see below:

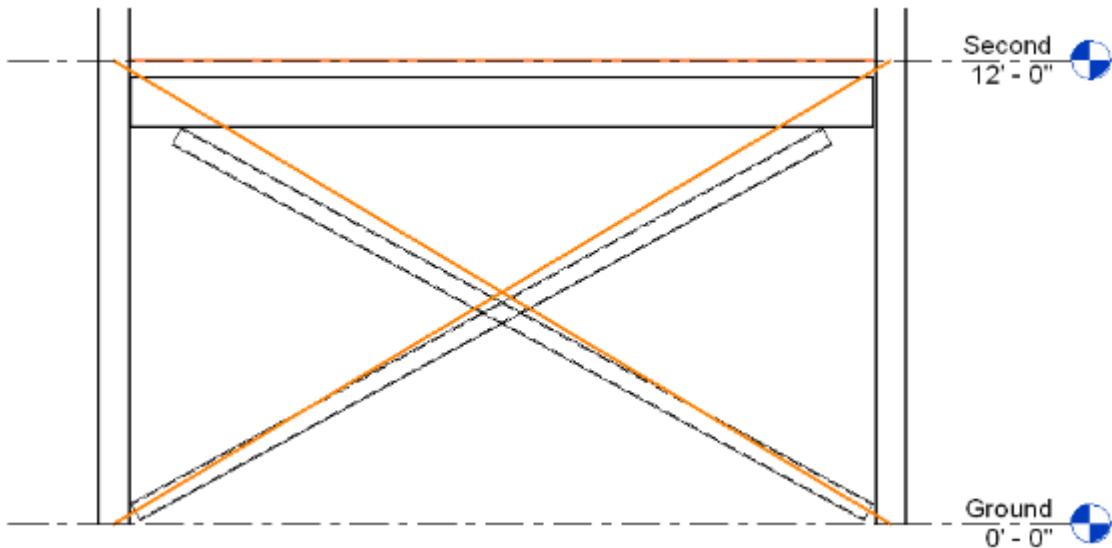


Revit requires that at least one end of each brace has both the analytical line and the physical member in the same location. As such, the analytical lines for the two separate braces intersect at the physical midpoint of the first brace, not at the analytical midpoint of the first brace. The physical model is absolutely correct, but the analytical model is wrong, and when imported into RISA it will look like below:



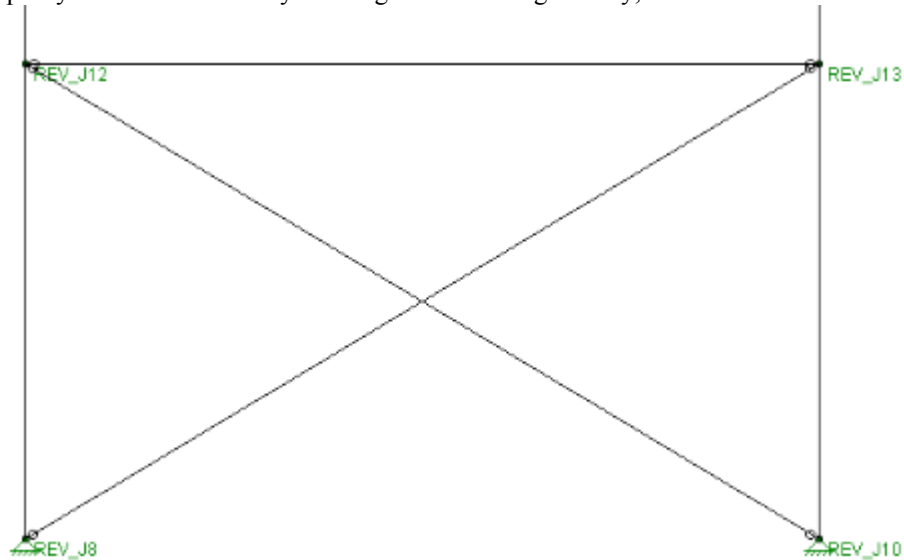
This will obviously result in undesired behavior in the RISA model, as the braces do not connect to each other. Note that the members in RISA line up perfectly with the analytical model from Revit, not the physical model. There is a solution to this issue. Although it is not a perfect solution, it is the best known work-around to get both correct construction drawings and a correct RISA model from one Revit model. To do this, follow the steps below:

1. Draw both of your braces as full length, intersecting/overlapping each other. This will give you the correct physical and analytical geometry for



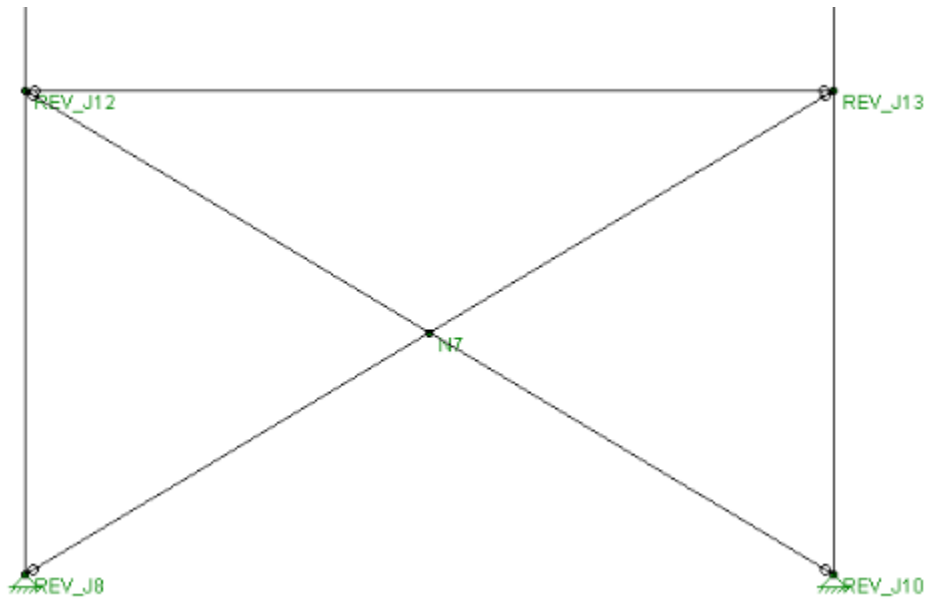
both.

2. When you export your model to RISA you will get the correct geometry, but no connection between your



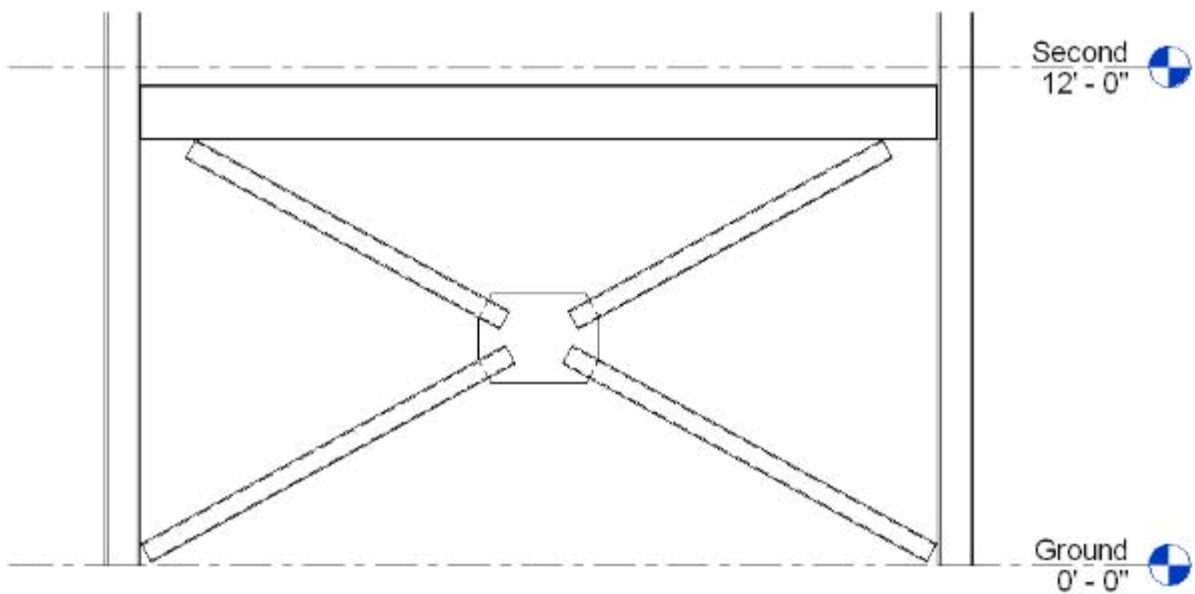
braces.

3. Add a joint between your braces either by graphically drawing one, or by performing a model merge for intersecting members.



4. Your model will now solve correctly in RISA, but you need to modify your Revit model so that the braces are shown correctly on your construction drawings. After setting up your framing elevation in Revit, draw a masking region around the brace intersection:

5. The masking region will hide the intersection on your drawings. You can then use Detail Lines to sketch the connection as you actually want it. Note that your gusset plate isn't modeled, so it won't appear in the 3D Revit model, nor will it be picked up during clash detection.



Additional Tips

1. The Redesign Lists that are used by RISA-3D for shape optimization can be edited by the user to limit the redesign sizes to match the existent families in REVIT Structure.
2. In order to preserve Material properties in RISA software, provide a mapping for that particular material in the Mapping File.
3. Level Names should NEVER be more than 32 characters in REVIT Structure.
4. Two levels should must never have the same name or elevation in either REVIT Structure or RISA Floor.
5. At least one 'WallType' and one 'FloorType' with the name 'Generic – xx"' (Imperial) ; 'Generic – xxmm' (Metric) must be present to create new 'WallType' and 'FloorType'. By default these are present in REVIT Structure.

RISAFloor

1. RISA Floor allows multiple loads under different load cases to be assigned to any particular point load, line load or area load definition. Please note that REVIT Structure does not follow this pattern. Only one load case can be assigned to one load. If more than one loads cases are defined for one load in RISA Floor, then only one of these values would be sent to REVIT Structure. The order of selection of the load case and load value would be selected in the following order : LL, DL PostComp, DL PreComp, OL1, OL2, OL3, OL4, Dyn Mass and VL.
2. A model must be solved, or 'explicit shapes' must be specified in RISA Floor in order to create or update the model in REVIT Structure. Save the results in RISAFloor before exporting the BIM exchange file in order to retain the designed shape.
3. Default splice elevation must be set correctly for each floor on the Floor Spreadsheet in RISA Floor. Some older files (before Physical Columns) might not have this value set correctly (might have 0.0). This value needs to be updated before creating / updating REVIT Structure models.

SLAB PERIMETERS and OPENINGS

RISA Floor supports two different element types, ie, 'Slab Perimeter' and 'Deck', where as there is only one element type, 'Slab' in REVIT. In order to keep data consistent during multiple round-trip operations, RISA Floor 'Decks' are mapped over as REVIT 'Slabs'. The link also provides an option to automatically create 'Slab Perimeters' when starting the models in REVIT. In this case, a slab perimeter is stitched around all defined 'Slabs' in REVIT.

The following work flow is recommended for consistency of data :

1. Starting a model in RISA : Define your slab perimeter and decks in RISA Floor. While importing this model into REVIT, CHECK the 'Slabs and Openings' checkbox (CHECKED by default). This would bring in RISA Floor 'Decks' as REVIT 'Slabs' ; and RISA Floor 'Openings' as REVIT 'Openings'. When sending back this information from REVIT to RISA Floor, UNCHECK the 'Slab and Openings' checkbox (UNCHECKED by default). This would preserve the slab perimeters and openings that were already defined in RISA Floor. It would still update the deck information from REVIT to RISA Floor (properties and geometry).
2. Starting a model in REVIT : Define your 'Slabs' and 'Openings' in REVIT. Make sure that each 'Slab' contains a closed framing circuit inside itself. For openings, make sure that each opening is contained within a closed framing circuit. When sending this information to RISA Floor, CHECK the 'Slab and Openings' checkbox (UNCHECKED by default). This would automatically create the slab perimeter and opening perimeters in RISA Floor. It would also bring in 'Slab' properties as 'Deck' properties in RISA Floor. The 'Deck' would be extended all the way to the slab perimeters in RISA Floor. When importing this model back into REVIT Structure, you may or may not check the 'Slab and opening' checkbox. The result in both cases would be the same.

Limitations

REVIT Structure to RISA 3D

- REVIT Structure Grid Elements that are not horizontal or vertical lines are not supported.
- REVIT Structure Area Loads that have more than 4 nodes are not supported.
- Footing Rebar data are not considered in the translation at this time.

RISA-3D to REVIT Structure

- In-place families and curved family instances are not updated from RISA to REVIT Structure.
- Member Structural Type is not updated from RISA to REVIT Structure.
- Wall Top and Bottom Constraints are not updated from RISA to REVIT Structure.
- Loads sent to REVIT Structure must be defined in Global directions in RISA-3D. Loads defined with respect to Local axis would not be sent back to REVIT Structure.
- For Load Combination inside another Load Combination mapping, the LC used in another LC must be defined above the LC in which it is used.

REVIT Structure to RISA 3D

- REVIT Structure Grid Elements that are not horizontal or vertical lines are not supported.
- RISA Floor supports Floors with absolute elevation greater than or equal to zero feet. Any floor with a negative absolute elevation would not be brought into RISA Floor from REVIT Structure.

RISA Floor to REVIT Structure

- In-place families and curved family instances are not updated from RISA to REVIT Structure.
- Wall Top and Bottom Constraints are not updated from RISA to REVIT Structure.
- Load Combinations are not being brought back from RISA Floor to REVIT Structure. This is due to two separate values for load cases and load categories used in RISA Floor. A direct mapping is lacking between the two programs which can lead to data loss.
- Splice Type is not updated at this time from RISA Floor to REVIT Structure.
- Default Decks and openings drawn on default decks are not created from RISA Floor to REVIT Structure. Decks must be drawn explicitly to send them into REVIT Structure.

Technical Support

There is no charge for technical support for all licensed owners of the **current** version of RISA-3D and/or RISA Floor . Technical support is very important to the staff at RISA Technologies. We want our users to be able to reach us when they are having difficulties with the program. However, this service is not to be used as a way to avoid learning the program or learning how to do structural modeling in general. **Hours:** 9AM to 5PM Pacific Standard Time, Monday through Friday

For all modeling support questions, please be prepared to send us your model-input file via e-mail / ftp or postal mail. We often will need to have your model in hand to debug a problem or answer your questions.

E-Mail: support@risatech.com: This method is the **best** way to send us a model you would like help with. Most e-mail packages support the attachment of files. Make sure you tell us your name, company name, serial number, phone number, and give a decent problem description. If you have multiple members, plates, or load combinations, make sure you specify which ones to look at.

Fax Support: (949) 951-5848: When a sketch would aid a problem description, this can be a good way to send your request. Please indicate "URGENT" on your fax if you need assistance ASAP. Provided on the next page is a form you can print to FAX your questions to us. Please provide us with a FAX number for our response.

Phone Support: (949) 951-5815: Feel free to call, especially if you need a quick answer and your question is not model specific and therefore doesn't require us to look at your file.

Snail (Postal) Mail to RISA Technologies: This method works fine as long as you can wait for the postal service. If you don't have e-mail, then this is the only way to send us the model that you need help with. Most people who are in a rush will send a floppy disk via overnight mail (e-mail is a lot cheaper and faster, though).
