RISA Webinar Q&A

Flexible Diaphragms in RISAFloor and RISA-3D

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Q: Can RISA Floor design bar joists just like he's showing wood joists?
A: RISAFloor can design both open web steel joists and wood i-joists.

Q: I don't have the API joist schedules under RISA_Wood_Schedules. Can you please send those excel spreadsheets.
A: These tables are automatically installed with the RISAFloor v5.0.0 or v5.0.1 updates. I would recommend installing these updates to ensure you have all of the updated databases. You can send a request for electronic installation information to RISA's License Department at **license@risatech.com**

Q: Would changing the function of roof or floor joists to lateral cause loads to be distributed differently to our shearwalls?
A: For a flexible diaphragm system, changing the joists to be Lateral will not change the lateral load distribution. It will affect the overall stiffness of the RISA-3D model but this will only effect the load distribution in a rigid diaphragm system.

Q: Would it be possible to create one model to run both a flexible and a rigid analysis, or would it be recommended that we create two models for each different analysis?
A: You cannot run both a rigid and flexible analysis in the same run. You can either switch between the two analysis options or create two separate models.

Q: What is the effect if there is no ceiling diaphragm (i.e., vaulted ceiling)?
A: The program will assume a diaphragm is present. If you don't have one then you will need to do the flexible diaphragm load attribution manually as we don't have an automated process.

Q: Can you explain a little bit more why there needs to be a ceiling diaphragm? Typically this will be sheetrock sheathing on ceiling joists and is not an allowed diaphragm in SDC C and D.
A: The "ceiling diaphragm" is usually not considered the gypsum board, but rather it is achieved through the bridging, blocking, or bracing between truss bottom chords or ceiling joists (depending on roof framing styles). Ceiling diaphragms are not an exact science in traditional wood construction, and are often overlooked in hand calc methods, however they are important in transferring wall wind loads to the lateral framing lines in a finite element analysis model.

Q: Are there any plans to revise the program to distribute the load as if there was not a diaphragm at the ceiling level?
A: If no ceiling diaphragm is present then it is necessary to model the roof sheathing to carry the wall wind loads out to the lateral framing lines. This would be a semi-rigid diaphragm, and at this time is something that you must manually model. For more information check out our **semi-rigid diaphragm technical article** at our **RISA News** blog.

Q: Do you have any specific recommendations for modeling a pre-fabricated wood truss roof in place of this ridge beam/roof joist/ceiling joist condition?

A: You can use the Structure Generate option within RISA-3D (available from the Insert pull down menu) to create these trusses. You simply enter the dimensions and the program will generate the truss geometry.

Q: If the flexible diaphragm is purely a load distribution tool, a ceiling diaphragm would act identically to a sloped roof diaphragm, wouldn't it?

A: The biggest question regarding sloped diaphragms is whether the wall wind loads travel "up" the sheathing to the ridge beam, only to travel back down to the framing lines. The ceiling diaphragm bypasses this unusual load path concept.

Q: We want to confirm that the ceiling joists are NOT required to run 3D/Floor. In many instances architects do not want a flat ceiling but rather want a cathedral ceiling. Our understanding is the ceiling joists were added by the presenter solely to reduce the bulge in the exterior walls due to thrust from the rafters and that the model will still be valid without them. Our approach in practice would be to increase the bending stiffness of the ridge beam to reduce the bulge (or add posts along its length if architecture allows). With the addition of ceiling joists the ridge is not a structural "beam" for analysis purposes and thus will not collect gravity loads but rather the "board" component of a truss type roof.

A: Ceiling Joists are not required to solve the model. However, the program's "Flexible Diaphragm" will assume that something in that horizontal plane is transferring the upper portion of the wall wind loads to the shear walls parallel to the wind. You do not need to model anything. You just need to be comfortable with the load distribution presented by the transient area loads. If you anticipate that the wall wind loads will travel all the way up the roof sheathing to the ridge beams and then down to the shear walls, then you can model a semi rigid diaphragm instead of a flexible diaphragm.

Q: When the diagonals were added to the roof plane to mimic the diaphragm stiffness of the plywood sheathing, the axial load in the diagonal closest to the collecting shear wall should be checked, not the diagonal nearer the center of the diaphragm because the total shear is greatest at the wall. The axial force in the diagonal should be translated by the engineer into a shear force per linear foot in the plywood to properly verify that the plywood is adequate.

A: That is correct. I just clicked on a given diagonal for the example. However, the most appropriate diagonal would be one near the end. And, yes, you could easily translate that axial force into a shear per linear foot to hand calc check against the plywood.

Q: When the shear walls were modeled it was explained that it should be modeled in short segments rather than one long segment so a hold down will be placed more frequently. Depending on the size of openings in the wall, hold downs are placed only at the ends of walls and not along its length, particularly if the wall is being analyzed as a perforated wall.

A: If the wall will be constructed as one long wall without breaks then it is appropriate to model it as one long wall with a hold-down only at the far ends.

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