RISA Technologies

Using RISA to Design a Building from Foundation to Roof

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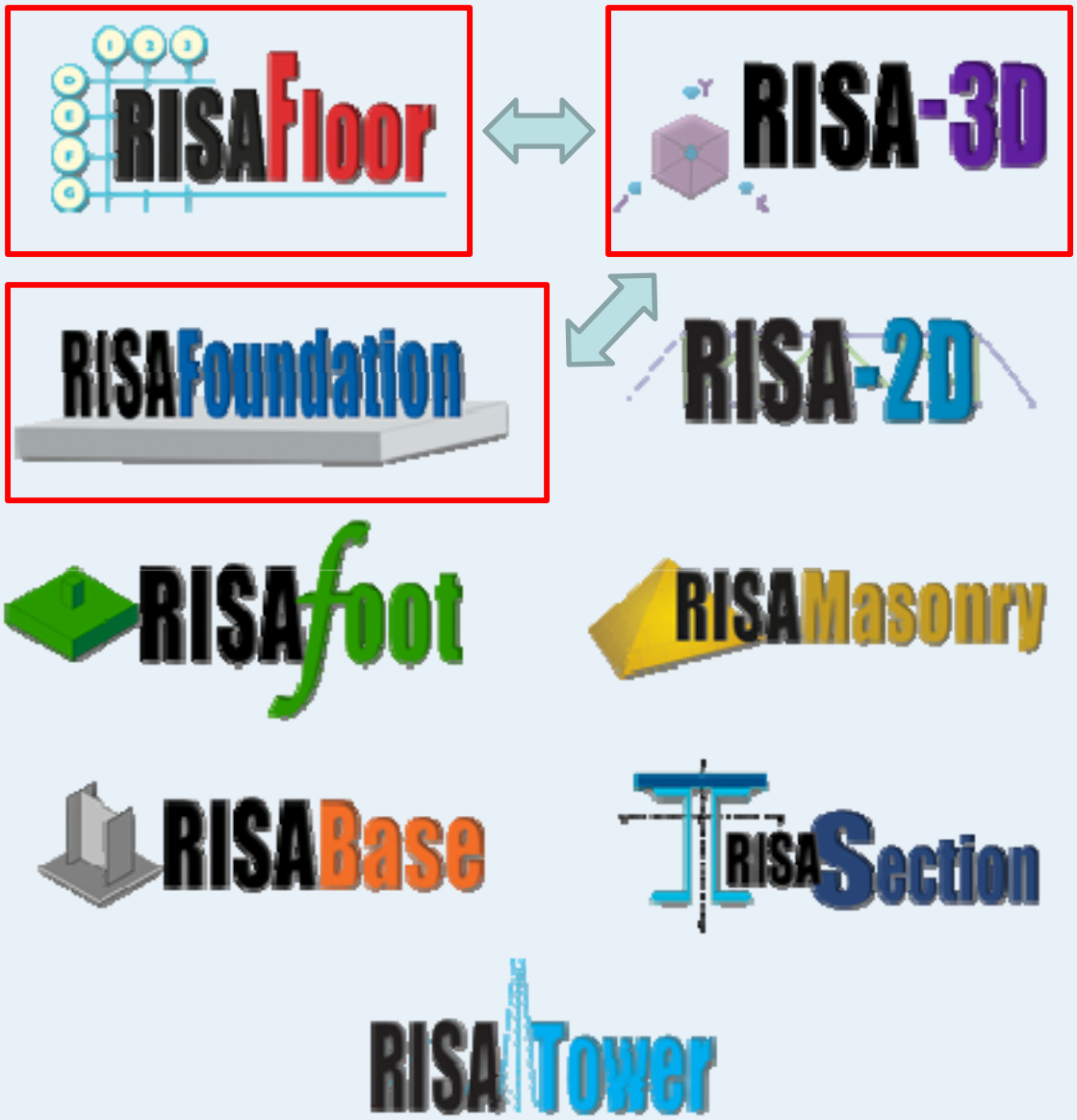
RISA TECHNOLOGIES


RISAFloor
RISA-3D
RISAFoundation
RISA-2D
RISAfoot
RISAMasonry
RISABase
RISASection
RISATower

Total Building Design

Today's Agenda

- Laying out your building in RISAFloor
  - Modeling in RISAFloor
  - Importing from DXF
  - Importing from Revit Structure
- Design Criteria
- Loads
  - Uniform Area Loads
  - Snow loading-Tapered Area Loads
  - Point Loads & Distributed Line Loads
- Columns & Walls
  - Defining Splices in Columns
  - Wall Openings
- Parent & Child Relationships
- Rigid versus Flexible Diaphragms
- RISA-3D Lateral Loads

Total Building Design

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- Laying out the building geometry
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- RISA-3D Lateral Loads
- RISAFoundation

RISA TECHNOLOGIES

Laying out the Building Geometry

- Drawing the model in RISAFloor
  - First → “Supports”: Columns & Walls
  - Then Beam systems

- Import your model from a Drawing
  - DXF format
  - Plan Level - Floor by Floor

- Import your model from Revit Structure
  - ENTIRE model is Imported

Columns

Column are modeled as **Column Stacks**
which occupy a particular “plan”
location within the building model.

Single Story Stack

Column Stacks

	Stack Label	Project Grid	Z [ft]	X [ft]	Lift No.	Length [ft]	Bot El. [ft]	Top El. [ft]	Shape	Material	Function	Design Rules
1	CS1 (A-1)	A-1	0	0	1	30	0	30	Wide Flange	A36 Gr.36	Gravity	Default
2	CS2 (B-1)	B-1	0	10	1	30	0	30	Wide Flange	A36 Gr.36	Gravity	Default
3	CS3 (C-1)	C-1	0	20	1	30	0	30	Wide Flange	A36 Gr.36	Gravity	Default
4	CS4 (A-2)	A-2	10	0	1	30	0	30	Wide Flange	A36 Gr.36	Gravity	Default
5	CS5 (B-2)	B-2	10	10	1	30	0	30	Wide Flange	A36 Gr.36	Gravity	Default
6	CS6 (C-2)	C-2	10	20	1	13.133	0	13.133	Wide Flange	A36 Gr.36	Gravity	Default
7					2	16.867	13.133	30	Wide Flange	A36 Gr.36	Gravity	Default
8	CS7 (A-3)	A-3	20	0	1	30	0	30	Wide Flange	A36 Gr.36	Gravity	Default

Multiple Story Stack

Columns

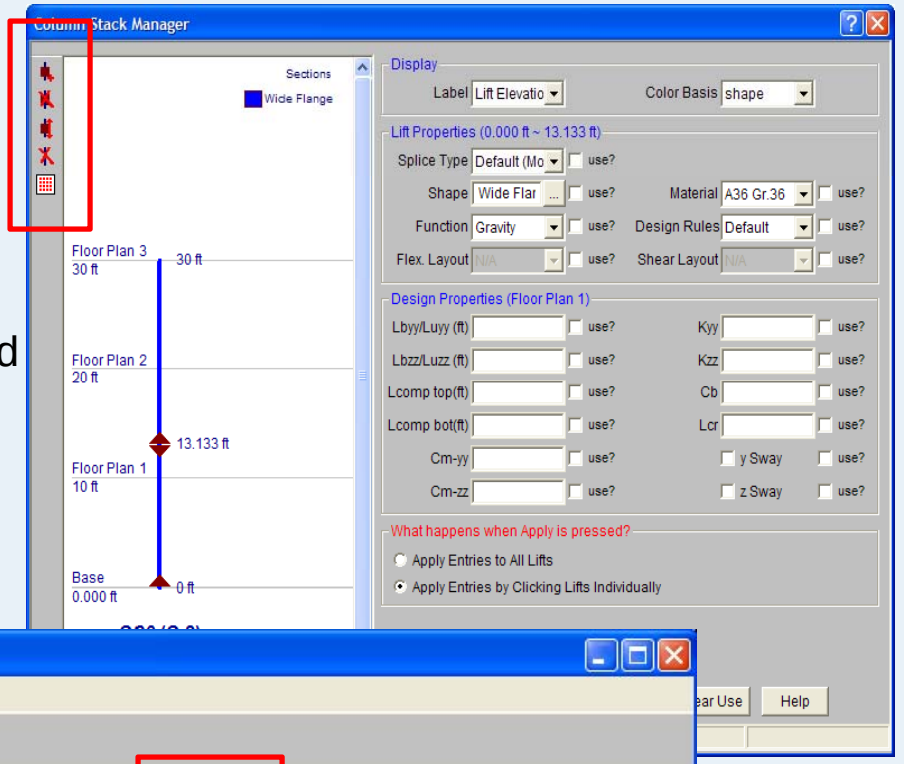
View the **Column Stacks** graphically by double clicking on the column to open the **Column Stack Manager**

Splices are Column Segments can be viewed

Columns Spreadsheet

OR

Added Graphically



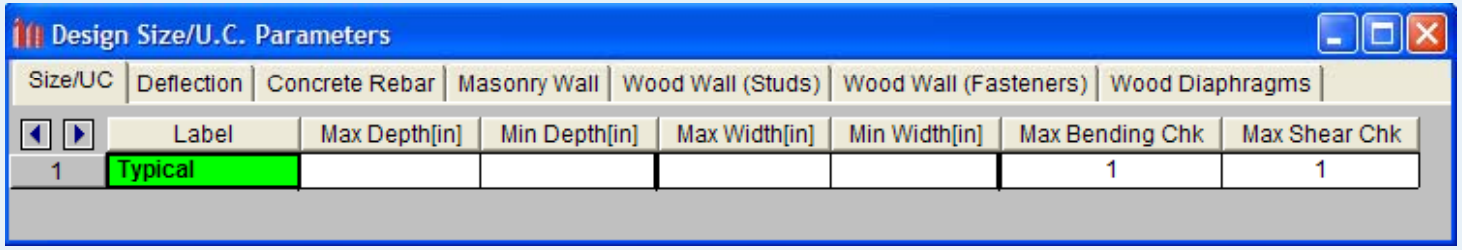
Columns

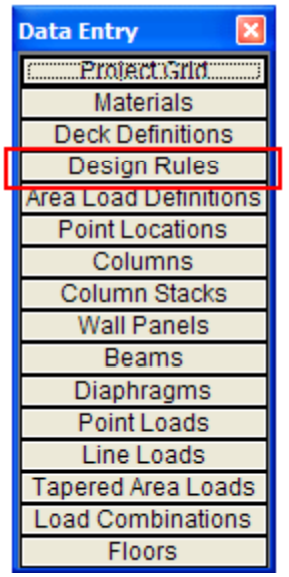
Column Primary Data | Steel/Wood | Concrete | Detailing

2: Floor Plan 2

	Label	Point	Shape	Material	Function	Angle (deg)	Orient Point	Splice	Distance ...	Splice Type	Parapet Heigh...
1	L1_CS1 (A-1)	N1	Wide Flange	A36 Gr.36	Gravity			☐			NA
2	L1_CS2 (B-1)	N2	Wide Flange	A36 Gr.36	Gravity			☐			NA
3	L1_CS3 (C-1)	N3	Wide Flange	A36 Gr.36	Gravity			☐			NA
4	L1_CS4 (A-2)	N4	Wide Flange	A36 Gr.36	Gravity			☐			NA
5	L1_CS5 (B-2)	N5	Wide Flange	A36 Gr.36	Gravity			☐			NA
6	L2_CS6 (C-2)	N6	Wide Flange	A36 Gr.36	Gravity			☑	6.867	Default (Moment	NA
7	L1_CS7 (A-3)	N7	Wide Flange	A36 Gr.36	Gravity			☐			NA

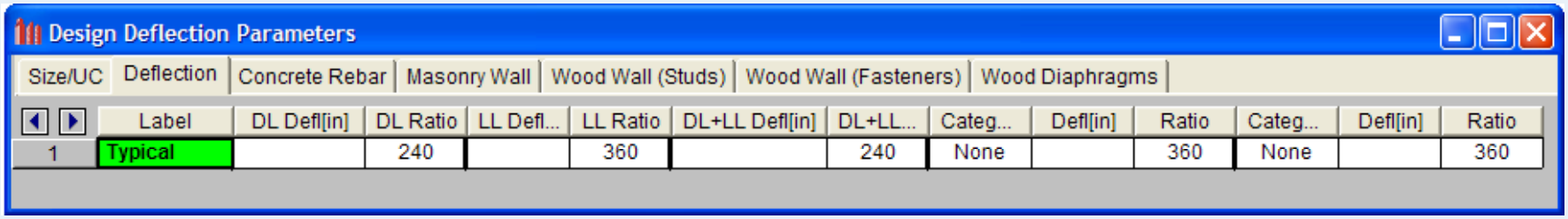
Design Criteria- Design Rules





Control your member design based on:

- Depth
- Width
- Maximum Code Check



Control the Deflection using DL, LL, or DL+LL Ratios or Maximums

Area Loads

- Area Loads are Automatically Applied based on the Floors Spreadsheet

Floors

	Label	Elevation[ft]	Area Load Default	Deck Default	Deck Angl...	Parent	Inacti...	Splic...	Splic...
1	Floor Plan 1	10	Public	Flat Slab	0	None	☐	10	Moment
2	Floor Plan 2	20	Office	Metal Deck	0	None	☐	7.5	Moment
3	Floor Plan 3	30	Roof	Metal Deck	0	None	☐	7.5	Moment

- Default Area Loads defined in the Area Loads Definitions Spreadsheet

Uniform Area Loads

Standard | Other

	Label	Addit...	PreDL[ksf]	PostDL[ksf]	LL[ksf]	LL Type	VL[ksf]	Dyn Load[ksf]
1	Office	☐		.01	.08	LL-Reduce	.011	.075
2	Storage	☐		.01	.125	LLS-Non	.011	.175
3	Public	☐		.01	.1	LL-Non	.004	.075
4	Add Piping	☑		.02		LL-Non	.011	

Additive Check box – Otherwise loads replace each other
PreDL, Post DL - Pre and Post composite Dead Loads
LL Type- LL - Live Load (Reducible on Non-Reducible),
RLL - Roof Live Load (Reducible on Non-Reducible)
SL - Snow Load
SLN - Non Shedding Snow Load
RL - Rain Load
Vibration Live Loads- used to check floor vibration per AISC Design Guide 11
Dyn Load- Dynamic Mass- the load used for Seismic weight above and beyond the self weight – PreDL and PostDL are NOT included.

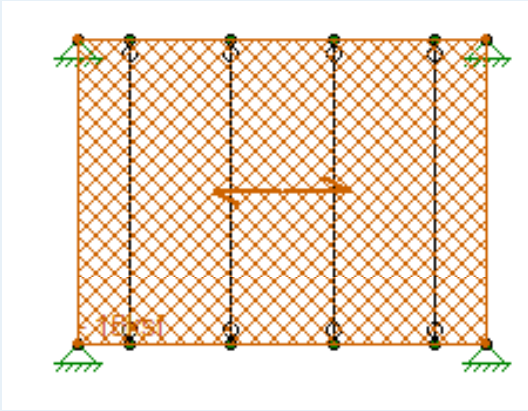
Area Loads

- One Way or Two Way Load Attribution defined in the Deck Definitions Spreadsheet- Loads tab

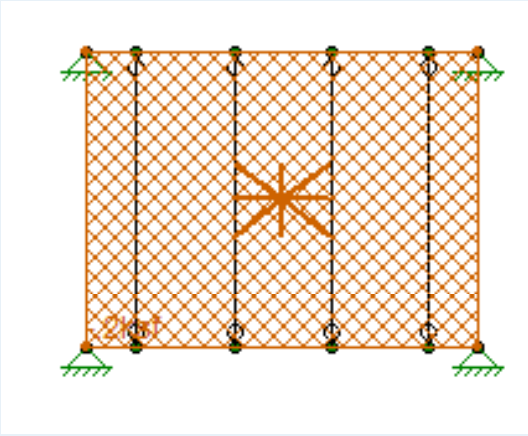
Deck Loads

General | Composite | Loads

	Label	Two Way	Self Wt [ksf]	Const DL [ksf]	Const LL [ksf]
1	Flat Slab	☐	.075	0	.02
2	Composite Deck	☐	.05	0	.02
3	Metal Deck	☐	.003	0	.02
4	Wood	☐	.003	0	.02



One Way Load



Two Way Load

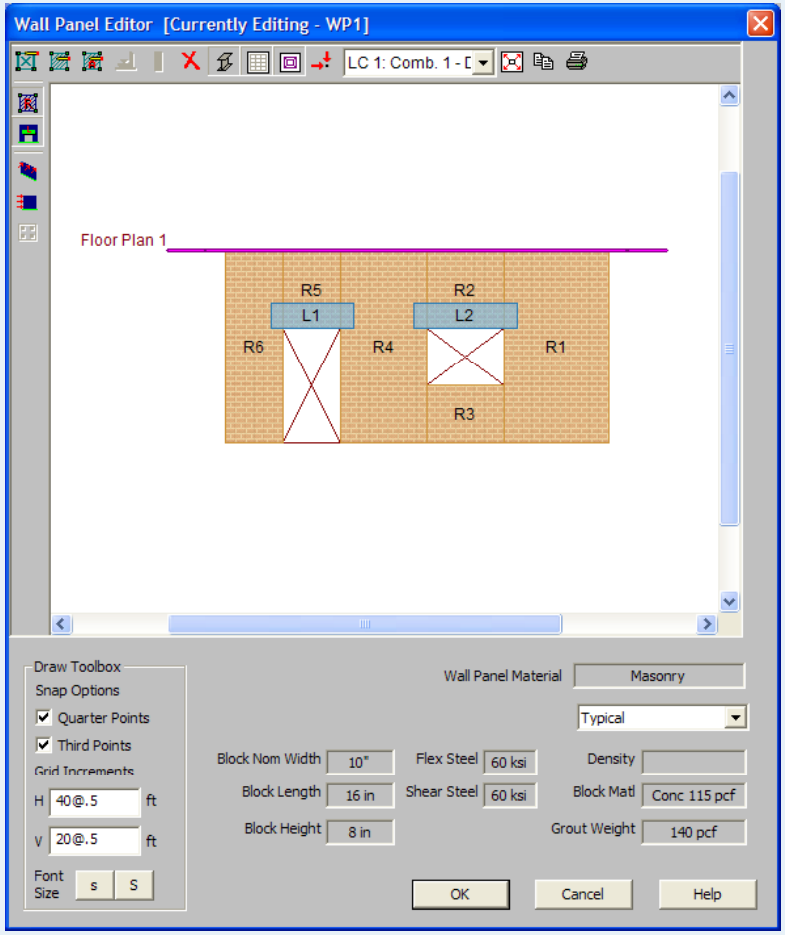
Walls

Material: Wood
Masonry
General(Concrete,
CF Steel, etc.)

Type: Gravity
Lateral (also Gravity loads)

Openings: Doors
Windows

Regions needed for Design (Piers)



Parent & Child Relationships

Parent Floor is the Original Floor

Child Floor is a COPY of the Parent Floor

Floors

	Label	Elevation[ft]	Area Load Default	Deck Default	Deck Angl...	Parent	Inacti...	Splic...	Splic...
1	Basement	10	Office	Flat Slab	90	None	☐	10	Moment
2	1st Floor	25	Office	Composite Deck	90	None	☐	15	Moment
3	2nd Floor	35	Office	Composite Deck	90	1st Floor	☐	10	Moment
4	3rd Floor	45	Office	Composite Deck	90	1st Floor	☐	10	Moment
5	4th Floor	55	Office	Composite Deck	90	None	☐	10	Moment
6	5th Floor	65	Office	Composite Deck	90	None	☐	10	Moment
7	Roof	75	Office	Metal Deck	90	None	☐	10	Moment

All Geometry & Loads on the Parent floor = Child Floor

All Geometry & Loads on the Child floor ≠ Parent Floor

Note: You can Detach Parent from Child but there is no return.

Diaphragms

Diaphragms are defined in RISAFloor as you add the Slab or Deck edge.

Rigid Diaphragms:

RISAFloor uses Membrane Rigid Diaphragms:

The Lateral loads are distributed the In-Plane Lateral Loads, while allowing for the beams and frames to take out of plane vertical loads.

Diaphragm spreadsheet available in RISA-3D:

Floor Diaphragms

	Elevati...	Mass[k]	Mass MOI[k*ft^2]	Center of Mass[ft]	Plus X Ecc...	Minus X E...	Plus Z Ecc...	Minus Z Ecce...	Inactive	Diaphragm	Type
1	75	693.7761	1.04105e+6	54.9304, 35.997	%5	%5	%5	%5	☐	D12	Flexible
2	75	693.7761	1.04105e+6	54.9304, 128.003	%5	%5	%5	%5	☐	D13	Flexible
3	65	1084.2192	1.62978e+6	55.0058, 35.9961	%5	%5	%5	%5	☐	D10	Rigid
4	65	1084.2192	1.62978e+6	55.0058, 128.0039	%5	%5	%5	%5	☐	D11	Rigid
5	55	1084.2192	1.62978e+6	55.0058, 35.9961	%5	%5	%5	%5	☐	D8	Rigid
6	55	1084.2192	1.62978e+6	55.0058, 128.0039	%5	%5	%5	%5	☐	D9	Rigid
7	45	1084.2192	1.62978e+6	55.0058, 35.9961	%5	%5	%5	%5	☐	D6	Rigid

The **Eccentricity** is used to used to defined the amount of accidental eccentricity used for the calculation of your seismic loads.

Note: These eccentricities are ignored for flexible diaphragms.

Diaphragms

Flexible Diaphragms:
Distributes lateral loads directly to the **Lateral** members

- RISAFloor/RISA-3D will analyze all flexible diaphragms

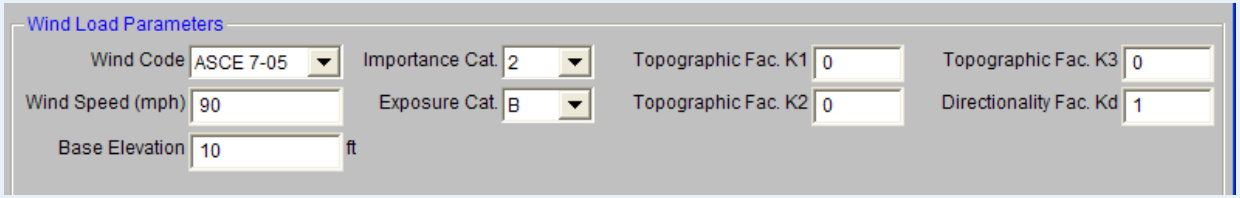
- RISAFloor/RISA-3D will designs Wood Flexible Diaphragms 
  - ➢ You must define a Diaphragm Region in order to get design
  - ➢ Diaphragm regions are rectangular in shape, and must be oriented along the principal X and Z axes.
  - ➢ RISA-3D will provide nailing patterns and panel thickness required with Chord Forces.

NAIL SPACING SCHEDULE

Zone	Location (ft)	Label	Lines	Framing Width (in)	Boundary (in)	Cont Edge (in)	Other Edge (in)
A	0	C1/3B_3_S1_3/8_8d@2/3/1	1	3	2	2	3
B	.871	C1/3B_3_S1_3/8_8d@4/6/1	1	3	4	4	6
D	0	C1/3B_3_S1_3/8_8d@2/3/1	1	3	2	2	3
E	36.871	C1/3B_3_S1_3/8_8d@4/6/1	1	3	4	4	6
F	51.653	C1/3B_3_S1_3/8_8d@6/6/1	1	3	6	6	6

RISA-3D Lateral Loads

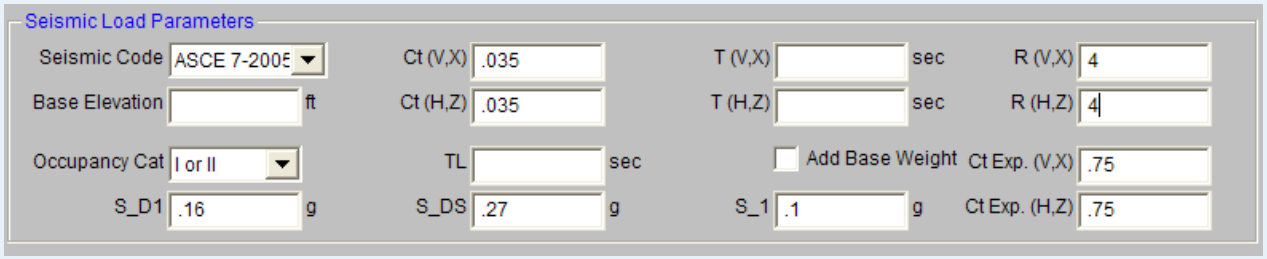
RISA calculates the Wind Load Force for EACH diaphragm:



Wind Generation Floor Force/Stress Results

Floor Level	qz (ksf)	Windward Pres. (ksf)	Leeward Pres. X (ksf)	Leeward Pres. Z (ksf)	Force X (k)	Force Z (k)
2nd Floor	.012	.008	.005	.005	5.663	5.055

RISA calculates the Seismic Force for each diaphragm:

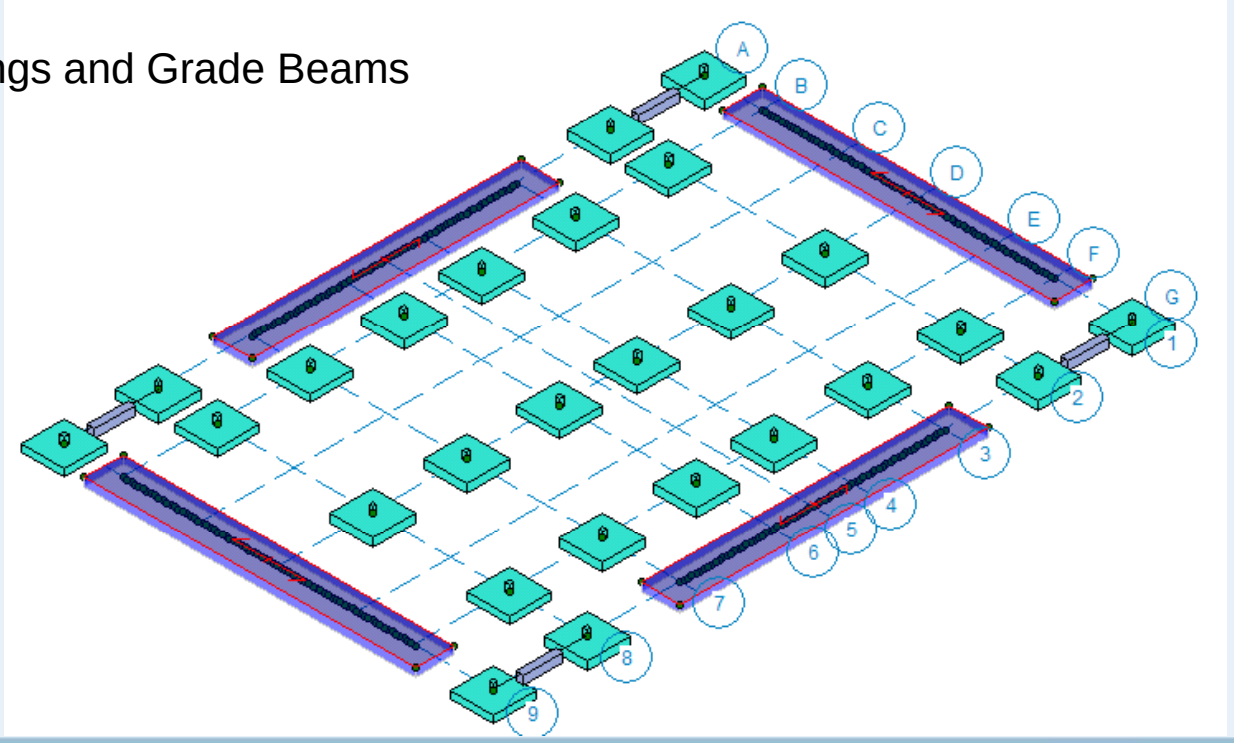


Seismic Generation Force Results

Floor Level	Height (ft)	Weight (k)	Force X (k)	Force Z (k)	CG X (ft)	CG Z (ft)
2nd Floor	10	148.127	5.38	5.38	41.253	59.918

RISAFoundation

- Loads from RISAFloor (Gravity) and RISA-3D (Lateral)
- Loads based on Categories
  From RISA-3D – you must define Load Categories
- Slabs, Footings and Grade Beams



Final Things to Consider About RISA Building System

- One Model for both Gravity and Lateral Design
  - One file means less data to manage
  - All changes to geometry apply to the entire structure
- Export the model to finish your Construction drawings
  - DXF – floor by floor
  - Revit Structure

Learn more in depth features about RISAFoundation

**** New Webinar**** **August 11, 2010**

Comprehensive Design of Shallow Foundations with RISAFoundation

RISA TECHNOLOGIES

Questions?

Please let us know if you have questions.

We will answer as many questions as time permits during the webinar.

Once the webinar is closed, we will post all Q&A's to our website: www.risatech.com

For further information, contact us at: info@risatech.com

THANK YOU!