RISA Technologies

Using RISAFloor for Commercial Building Design

Deborah Brisbin, P.E.

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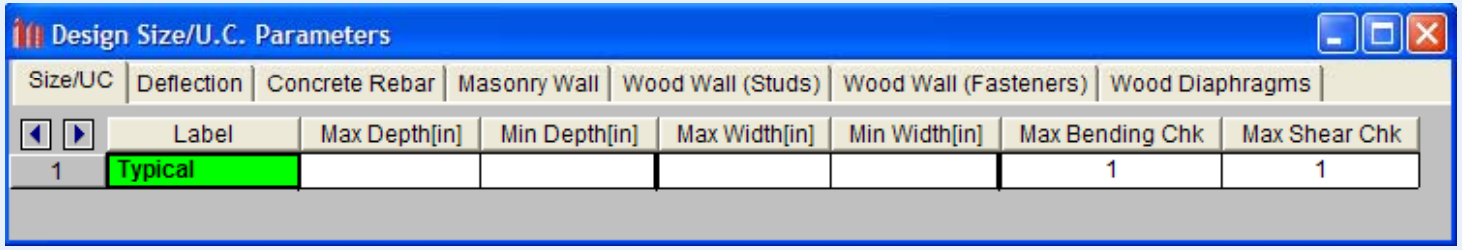
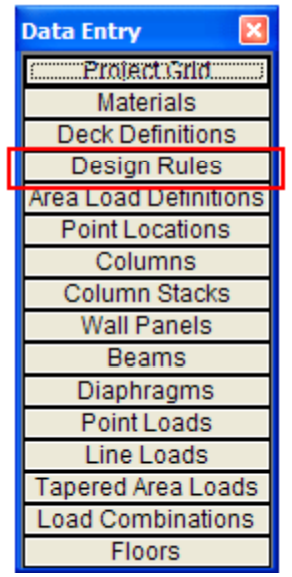
Commercial Buildings

Today's Agenda

- Design Criteria to optimize your beam selection
- Joist Design and Joist Girders
- Sloping Roofs
- Composite Design
- Vibration Analysis
- Using all of the RISAFloor features to build a Commercial Building

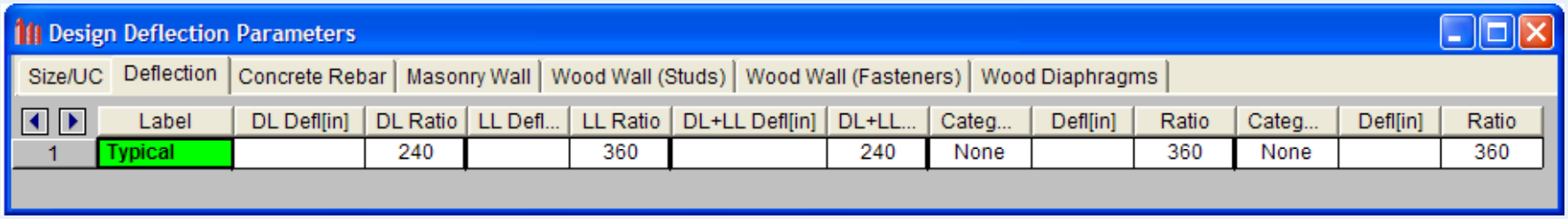
Design Criteria- Design Rules





Control your member design based on:

- Depth
- Width
- Maximum Code Check



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

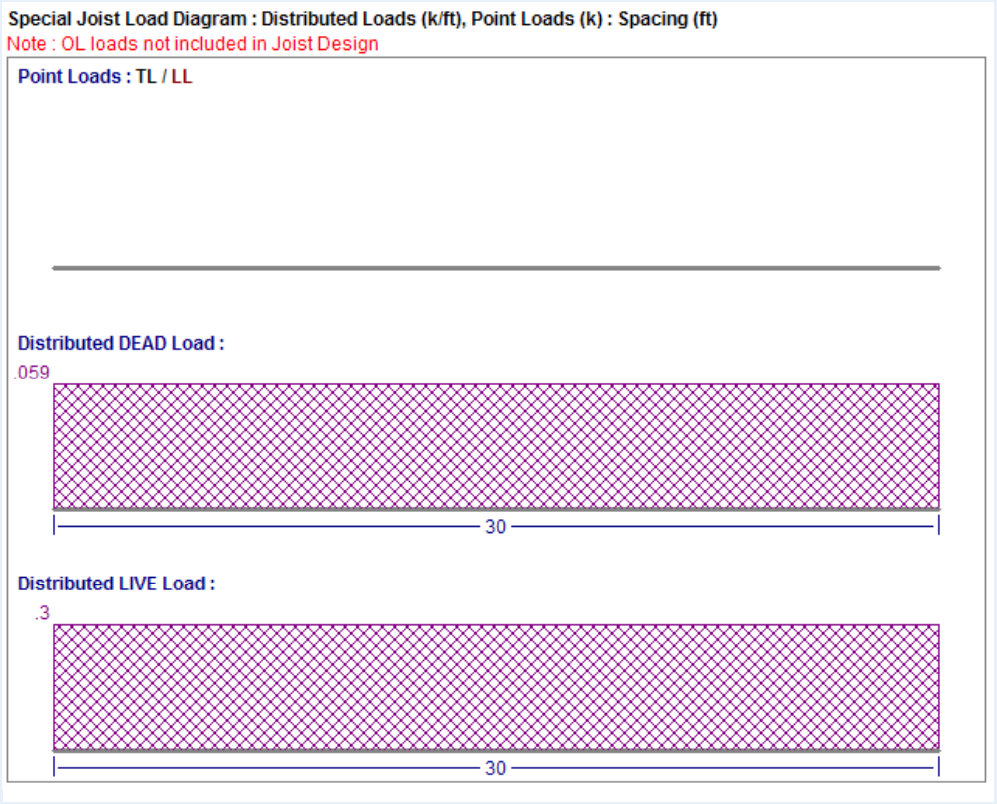
Joists : Loading

- Uniform Dead Load, UDL
- Uniform Live Load, ULL includes:
  LL, LLS, RLL, SL, SLN, RL
- Uniform Total Load, UTL
  = UDL + ULL

Important Notes:

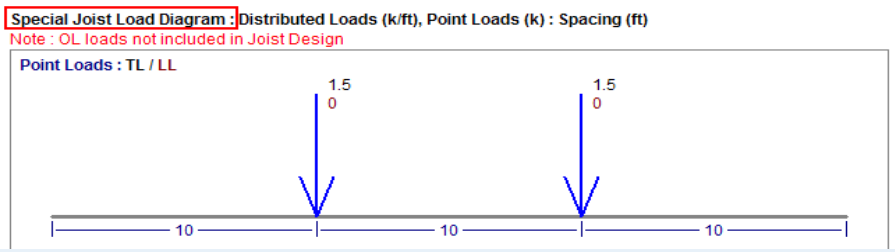
✓ None of the Uniform loads include the Other Load category

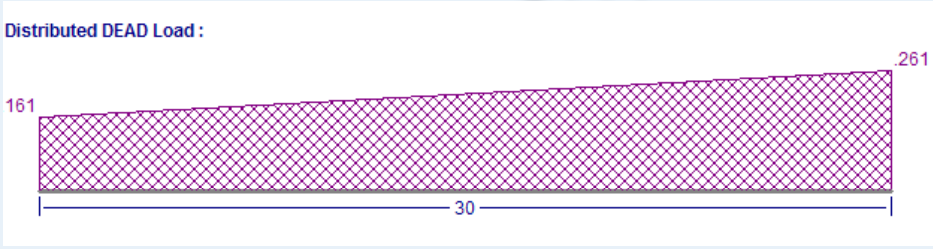
✓ Load combinations are not used to create UDL, ULL or UTL



Total Joist Load: 88.5% Capacity
Actual UDL = .059k/ft Actual ULL = .3k/ft Actual UTL = .359k/ft Total Load Capacity = .405k/ft

Joists : Special Loading

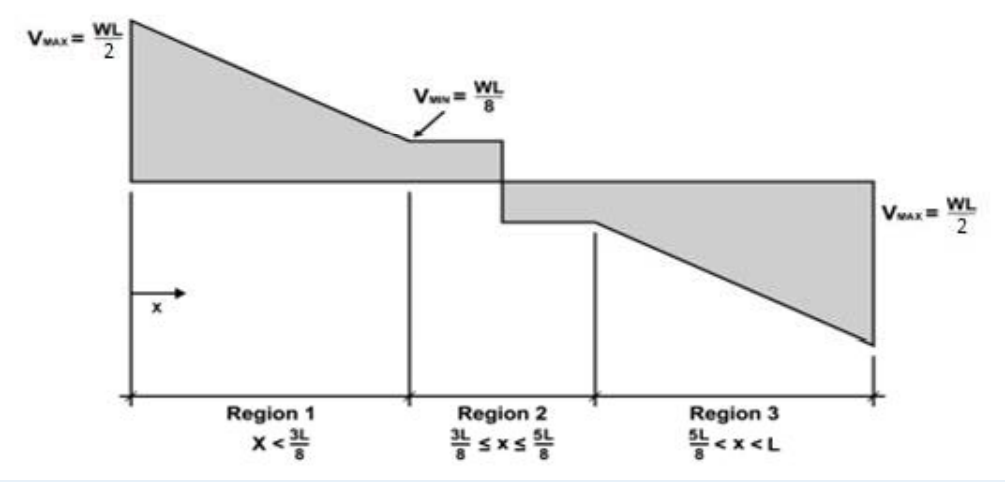




Any Non-Uniform Loading= SPECIAL JOIST (SP)

The design is based on the capacity shear envelope of the joist under a standard uniform load. (Grey outline).

Calculations from
Designing with Vulcraft: Steel Joists, Girders and Steel Deck

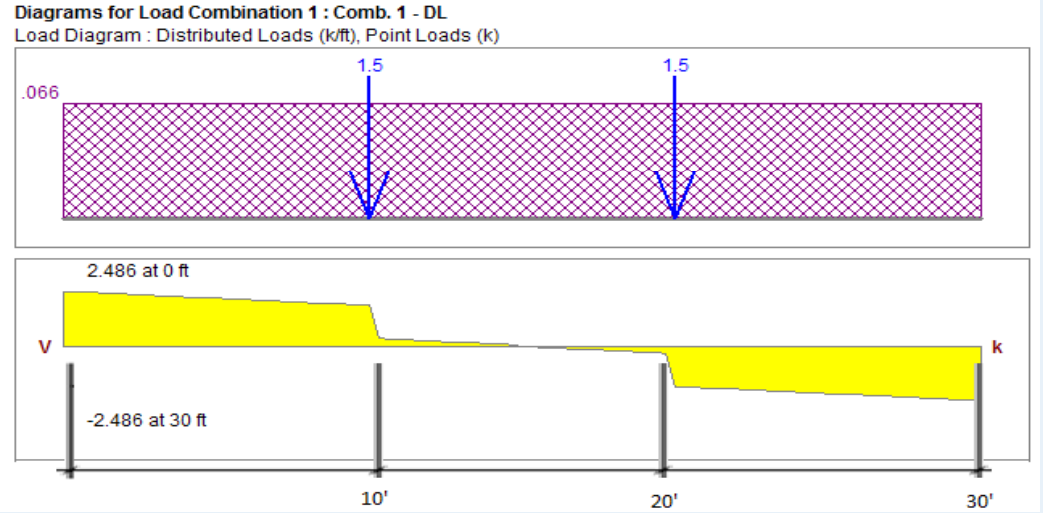


Joists : Special Loading

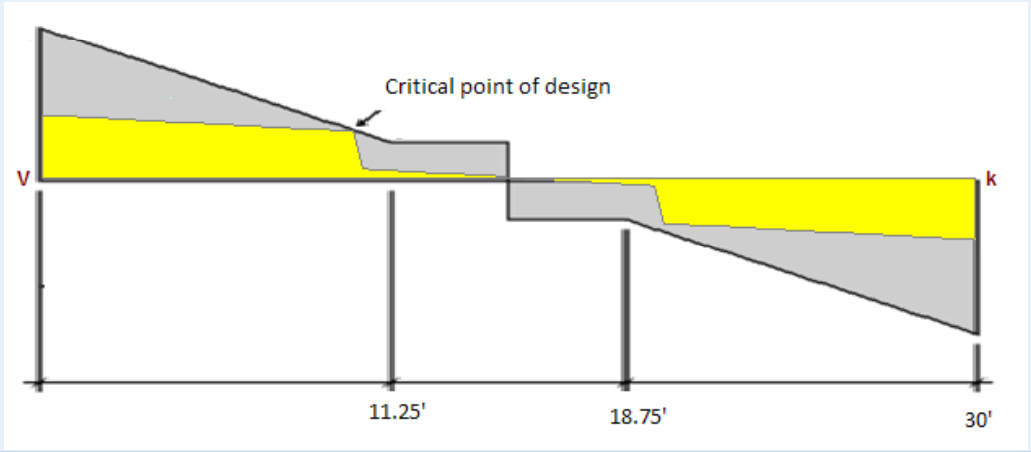
Special Joist loading

Length = 30 feet

Point loads at 1/3 points

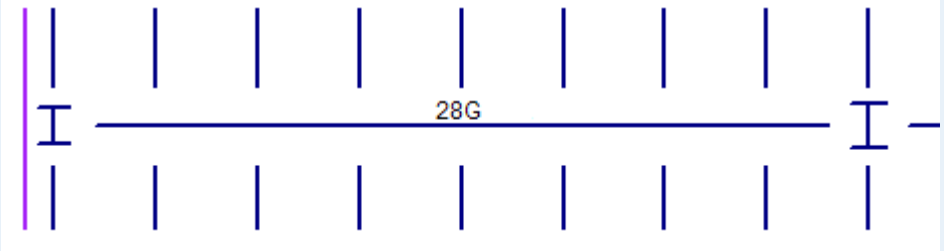


Max Shear is not the Critical Point of design



Joists Girders

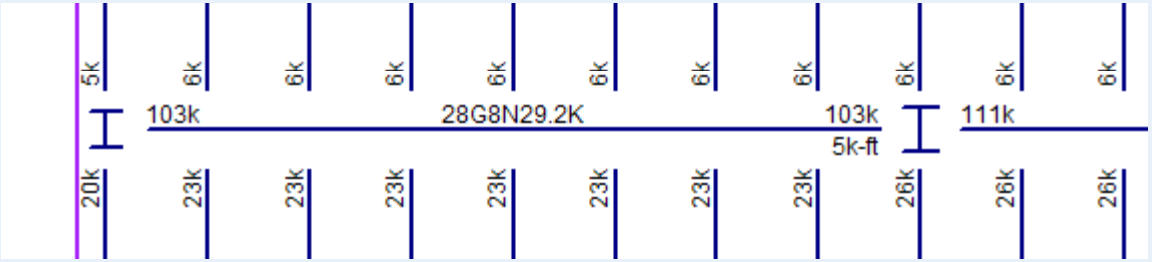
Girders are called out based on the assumed depth



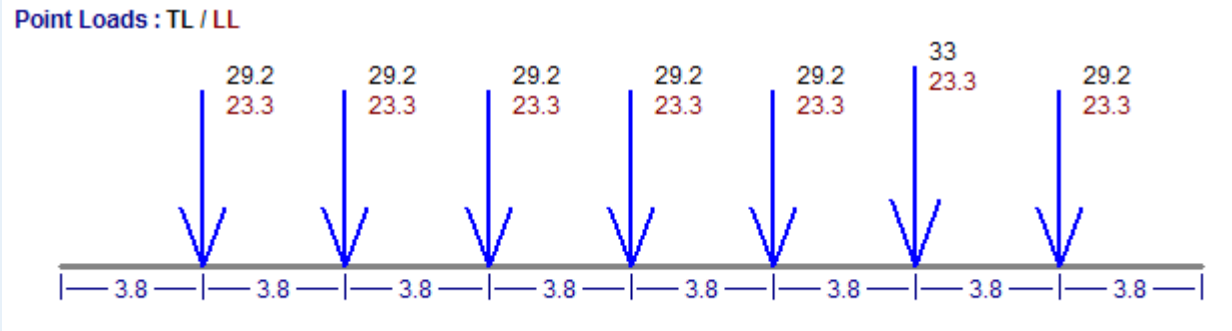
28G refers to the DEPTH of the Joist Girder (28”)

8N corresponds to the NUMBER of equally spaced concentrated loads

29.2K refers to the MAGNITUDE of the concentrated loads
(23 kips + 6 kips = 29 kips)



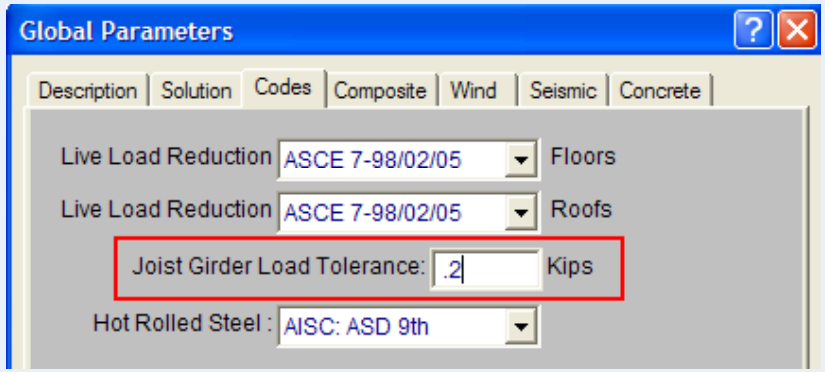
Joists Girders- Special



Non-Uniform Point loads→ Special Joist Girders

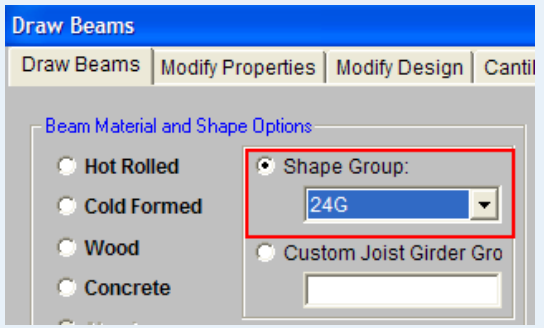
Joist Girder Load Tolerance sets the maximum load variation to be allowed when specifying that standard joist girder call-out.

When the load variation exceeds this, the call-out will switch to “Special”

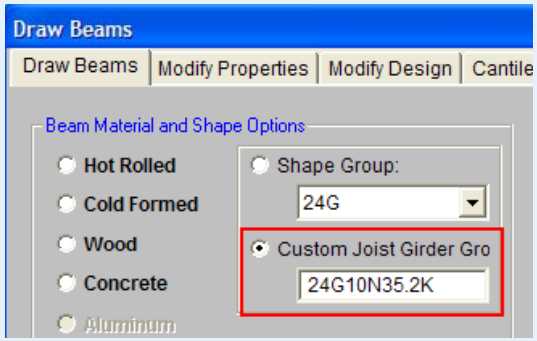


Joists Girders- Moment of Inertia

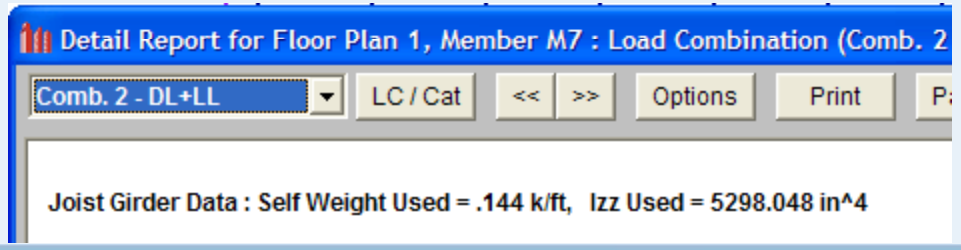
Given: Depth only
Estimated Moment of Inertia:
Izz = .027*2.*4*(beam length/12)*JG depth



Given: Depth, number and magnitude of point loads
Estimated Moment of Inertia:
Izz = .027*Joist spacing*Point load*(beam length/12)*JG depth

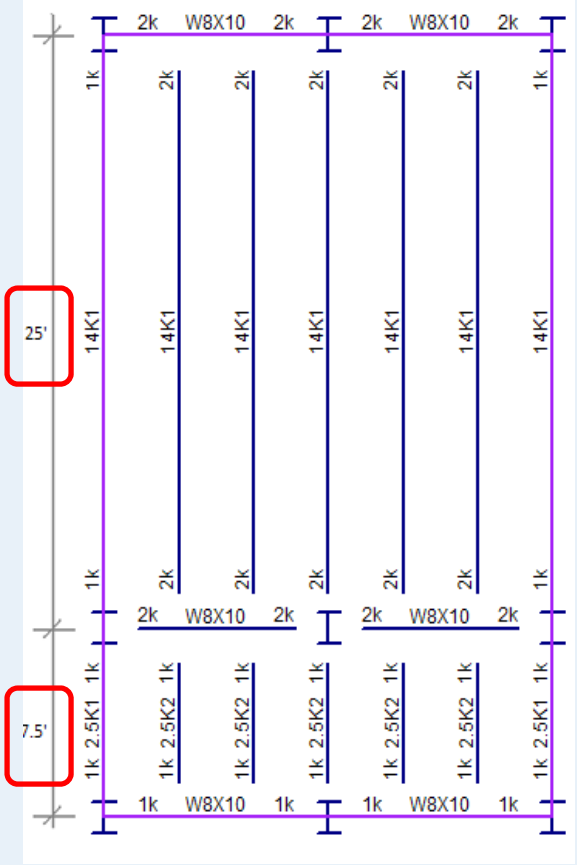


Reported in Detail Report



Common Questions

How are my joists selected?



What is the criteria for Joist selection?

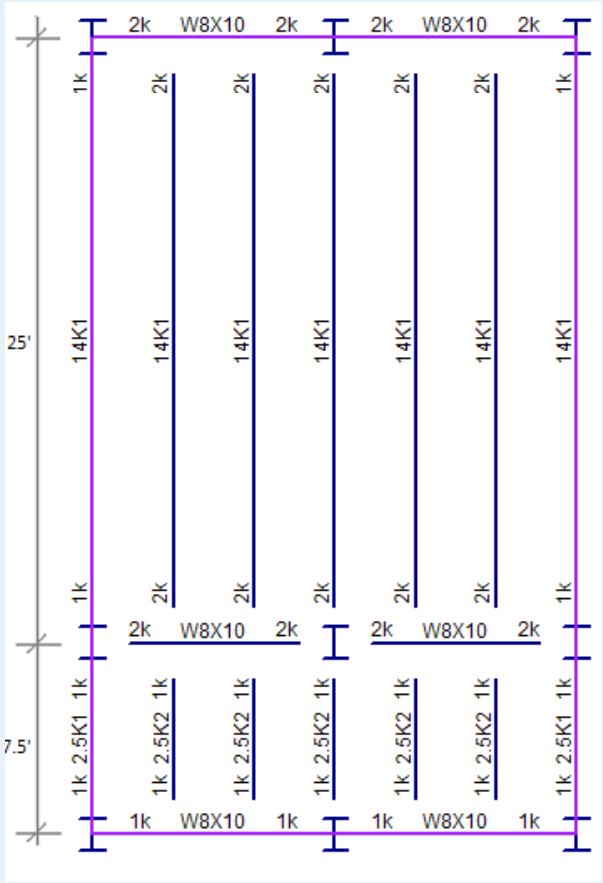
1) Span
2) Capacity
3) Joist Weight

How did a 2.5K2 get selected?

Spans below 8’ are not available on the K-Joist table.
4’ – 8’: 2.5” K-Series Joists Substitutes used.

Common Questions

How are my joists selected?



Total Joist Load: 64% Capacity
Actual UDL = .049k/ft Actual ULL = .067k/ft Actual UTL = .115k/ft Total Load Capacity = .18k/ft

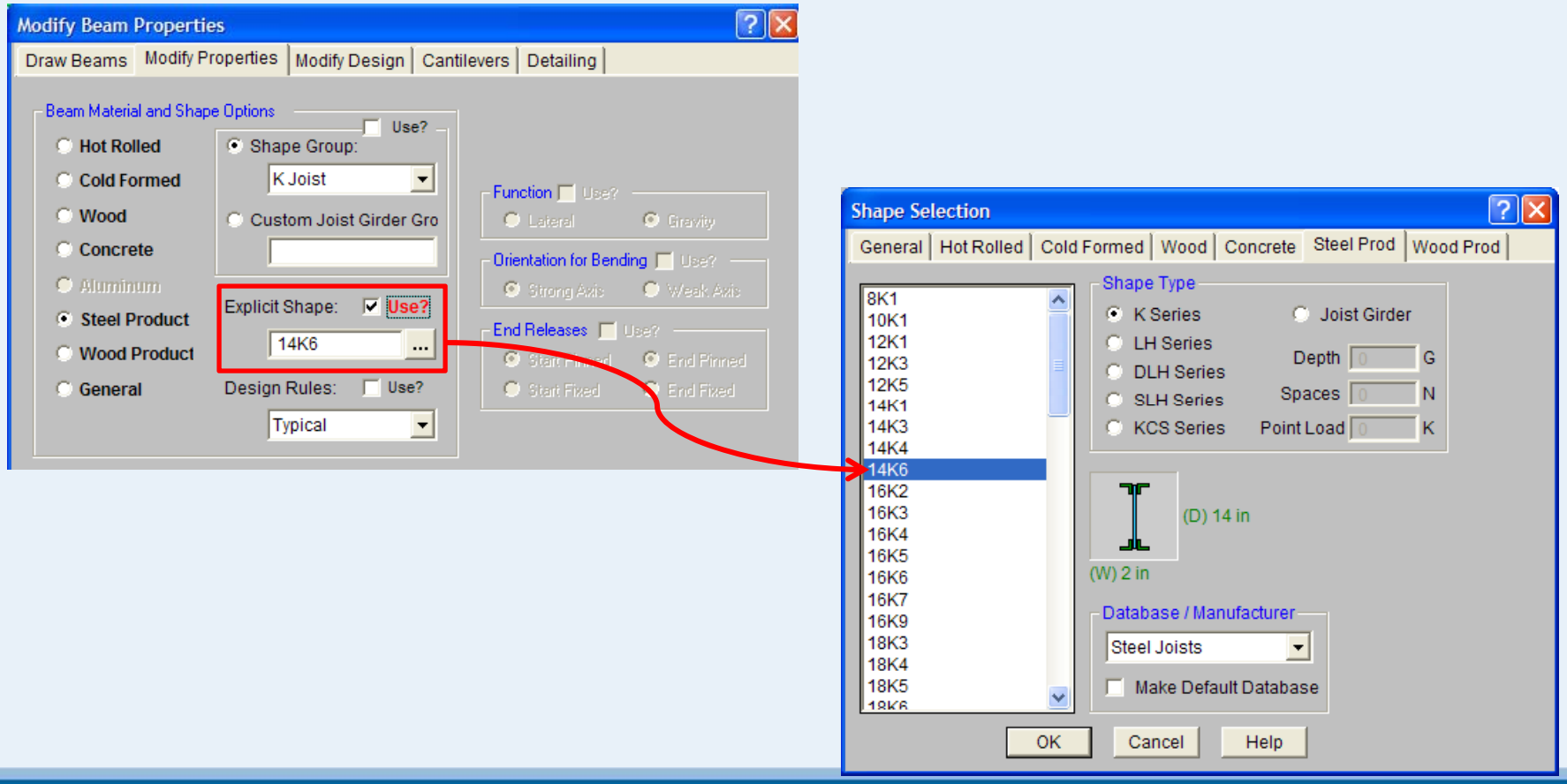
STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear I

Joist Designation	8K1	10K1	12K1	12K3	12K5	14K1	14K3	14K4	14K6	16K2	16K3
Depth (in.)	8	10	12	12	12	14	14	14	14	16	16
Approx. Wt (lbs./ft.)	5.1	5.0	5.0	5.7	7.1	5.2	6.0	6.7	7.7	5.5	6.3
Span (ft.) ↓											
8	550 550										
9	550 550										
10	550 480	550 550									
11	532 377	550 542									
12	444 288	550 455	550 550	550 550	550 550						
13	377 225	479 363	550 510	550 510	550 510						
14	324 179	412 289	500 425	550 463	550 463	550 550	550 550	550 550	550 550		
15	281 145	358 234	434 344	543 428	550 434	511 475	550 507	550 507	550 507		
16	246 119	313 192	380 282	476 351	550 396	448 390	550 467	550 467	550 467	550 550	550 550
17		277 159	336 234	420 291	550 366	395 324	495 404	550 443	550 443	512 488	550 526
18		246 134	299 197	374 245	507 317	352 272	441 339	530 397	550 408	456 409	508 456
19		221 113	266 167	335 207	454 269	315 230	395 287	475 336	550 383	408 347	455 386
20		199 97	241 142	302 177	409 230	284 197	356 246	428 287	525 347	368 297	410 330
21			218 123	273 153	370 198	257 170	322 212	388 248	475 299	333 255	371 285
22			199 106	249 132	337 172	234 147	293 184	353 215	432 259	303 222	337 247
23			181 93	227 116	308 150	214 128	268 160	322 188	395 226	277 194	308 216
24			166 81	208 101	282 132	196 113	245 141	295 165	362 199	254 170	283 189
25						180 100	226 124	272 145	334 175	234 150	260 167
26						166 88	209 110	251 129	308 156	216 133	240 148

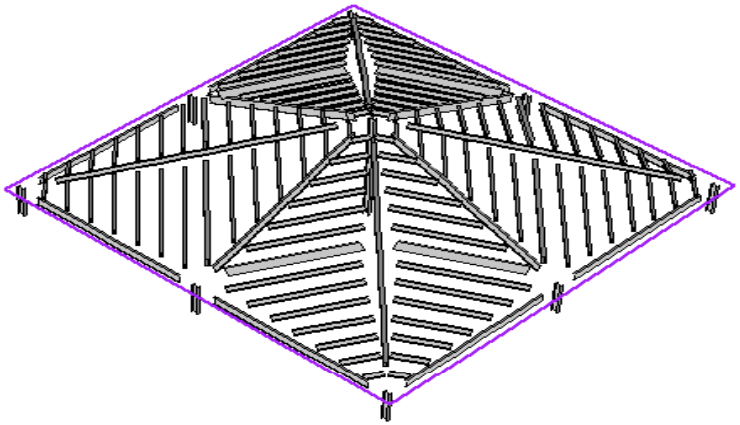
Actual UTL < Load Capacity (Black #)

Common Joist Questions

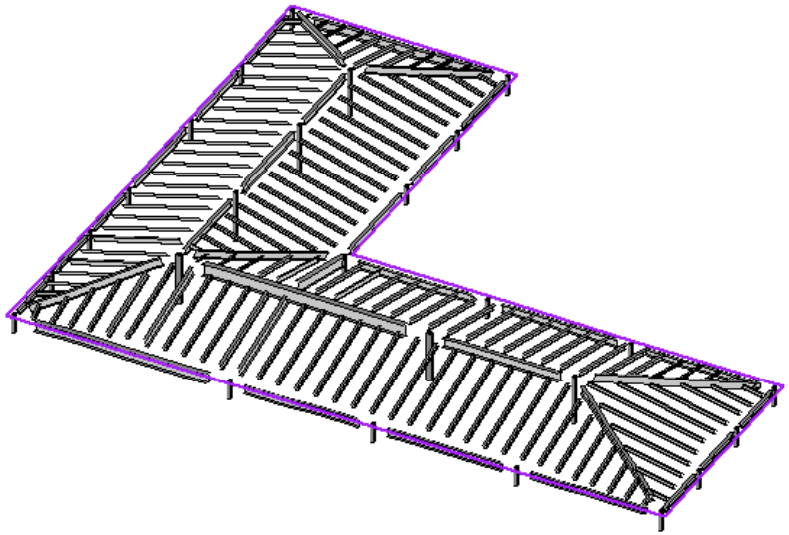
Can I analyze an existing joist?

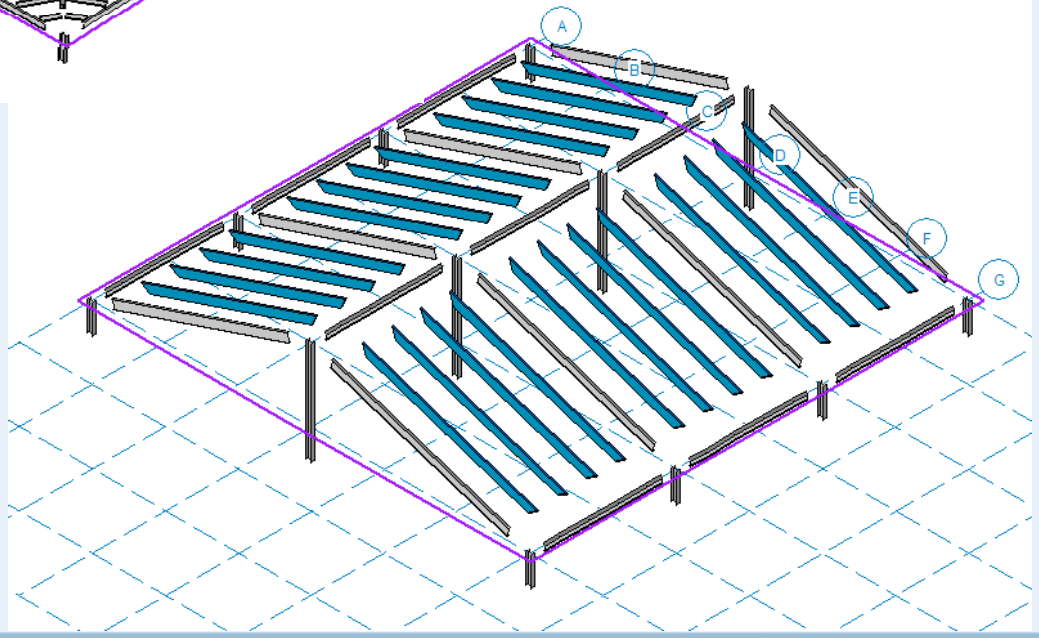


Sloping Roofs



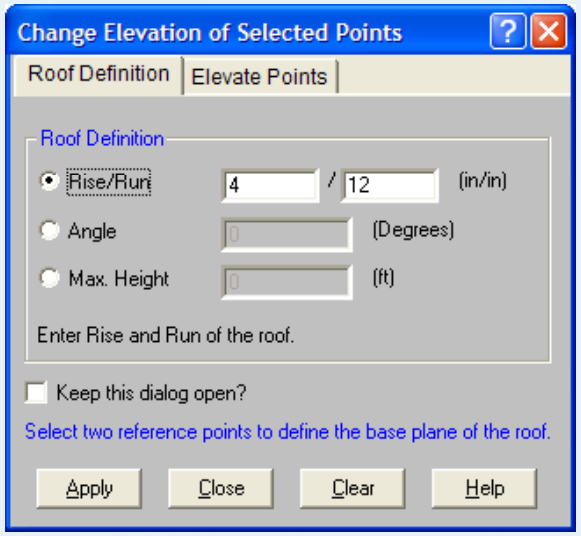
Slope the roof in any direction,
in multiple pitches or a single pitch.



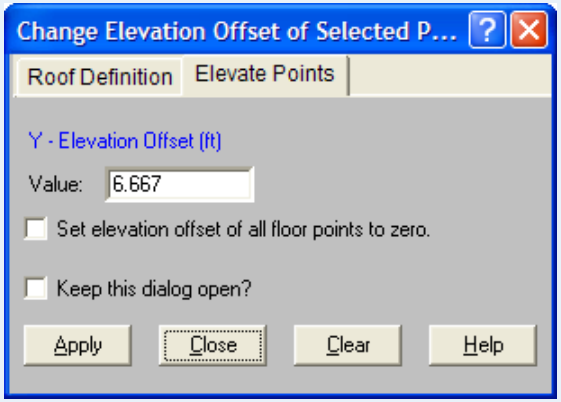


Sloping Roofs

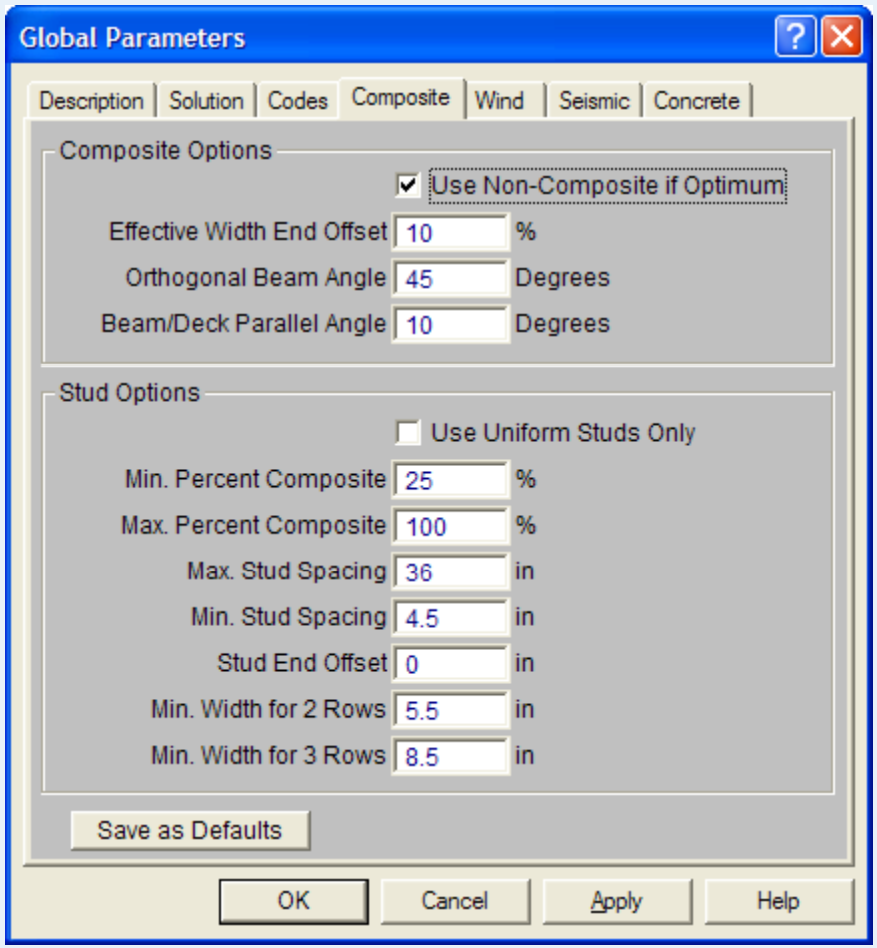
- Rise/Run
- Angle
- Max Height



Or Just Elevate the Points



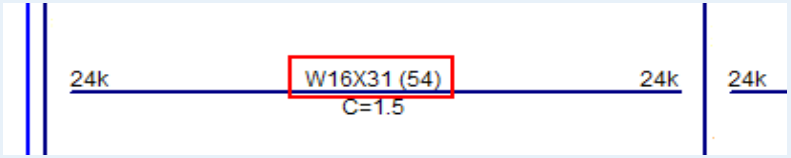
Composite Beam Design



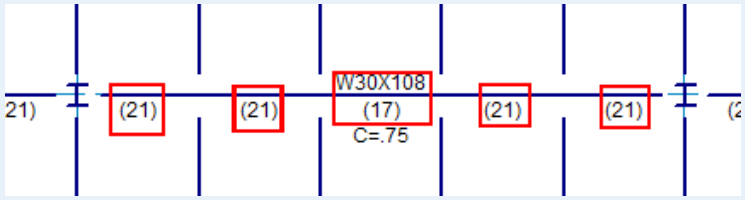
Control the Composite parameters in the Global Parameters

Composite Beam Design

- Uniform Studs (# Studs)



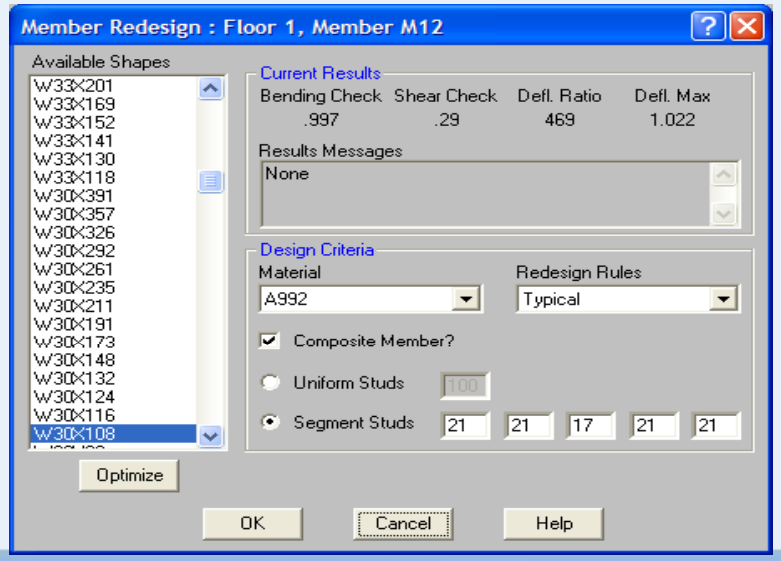
OR



- Segmented Studs
  (# Studs) shown at every Segment

OR

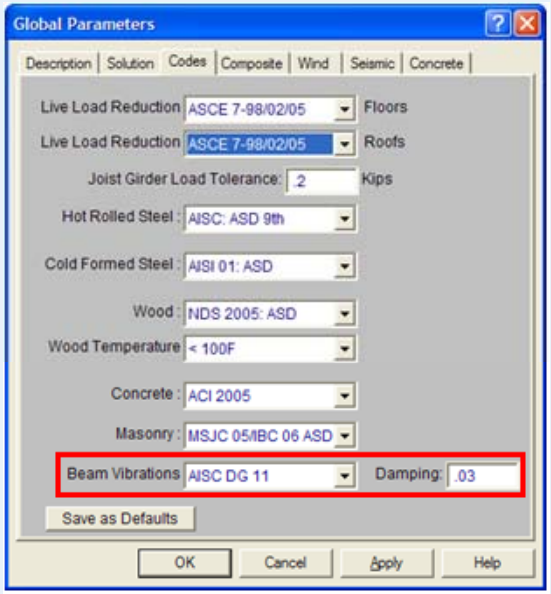
- Manually Change your Studs with the
  Redesign Tool



Vibration

- ✓ Based on the AISC Design Guide 11
- ✓ Total Vibration Loads applied =
  Self wt (members + deck) + Vibration Load (VL)

  VL = Superimposed Dead Load + Live Load
- ✓ Applied as a uniform distributed load
  (Section 3.3 of the AISC Design Guide)



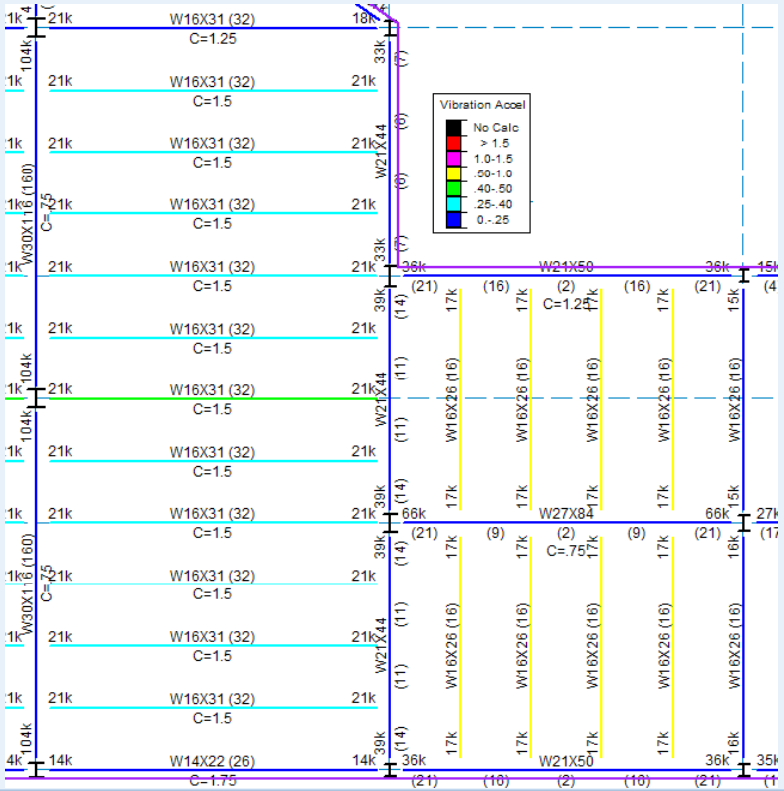
Uniform Area Loads

Standard | Other

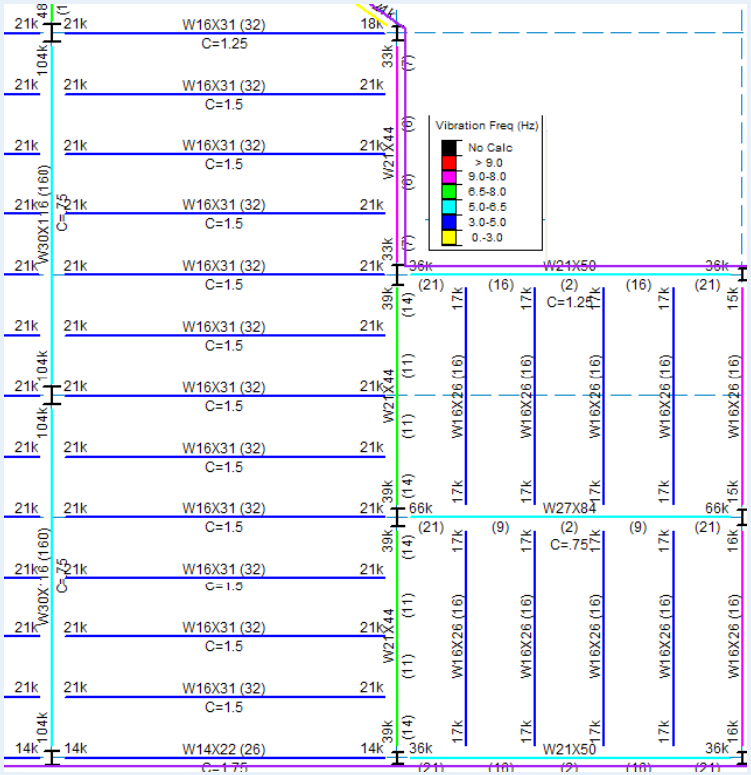
	Label	Addit...	PreDL[ksf]	PostDL[ksf]	LL[ksf]	LL Type	VL[ksf]	Dyn Load[ksf]
1	Office	☐		.01	.08	LL-Reduce	.011	.075
2	Storage	☐		.01	.125	LLS-Non	.011	.175
3	Public	☐		.01	.1	LL-Non	.004	.075
4	Add Piping	☑		.02		LL-Non	.011	

Vibration- Color Coded

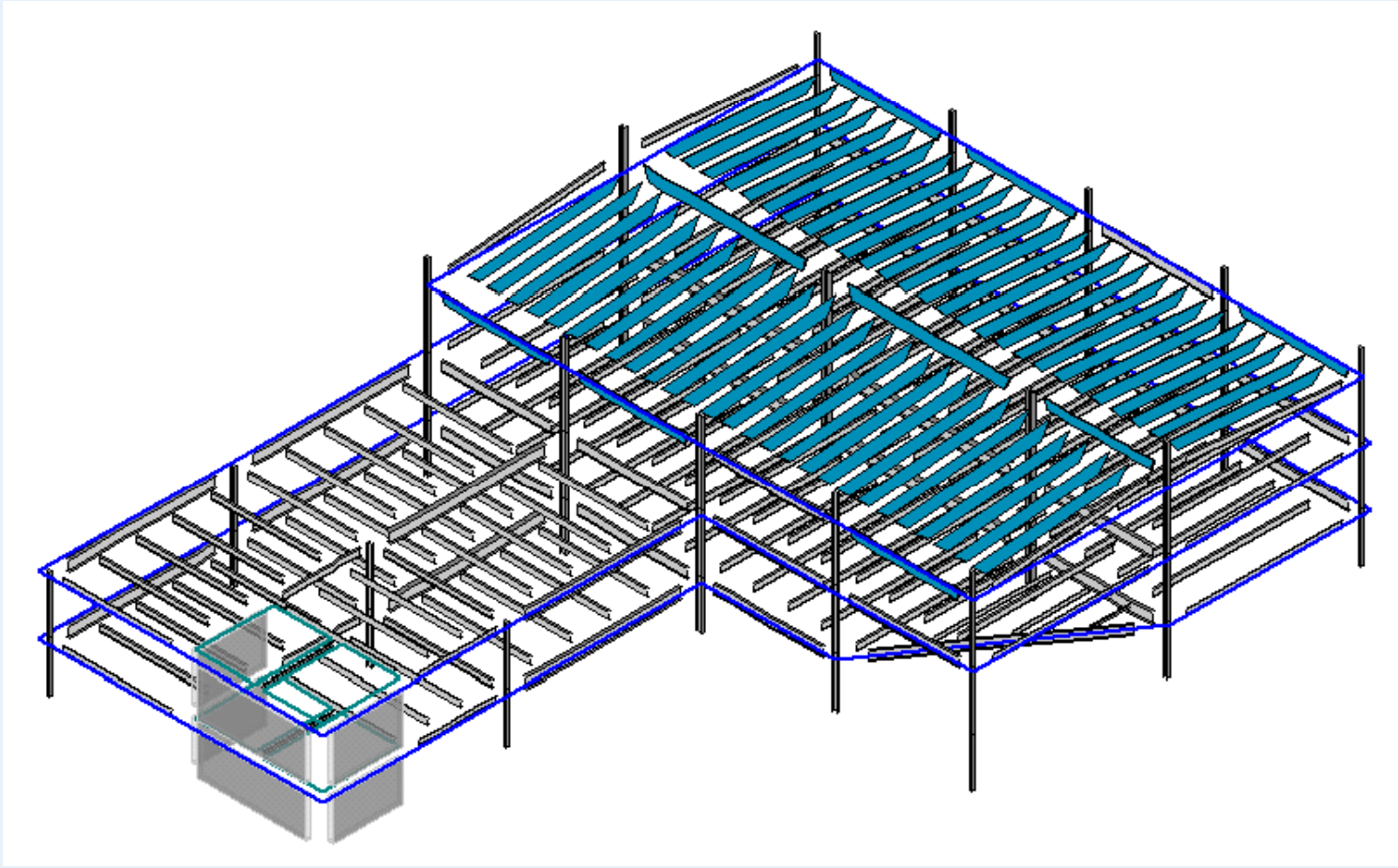
Based on Acceleration



Based on Frequency



Let's build a Commercial Building Model



Final Things to Consider About RISAFloor

- **Import and Export Geometry**
  - ✓ **Revit Structure**

    RISA has the most comprehensive link with Revit

    **** New Webinar**** **May 27, 2010**

    Complete Integration between RISA and Autodesk Revit Structure
  - ✓ **DXF**
- **One Model for both Gravity and Lateral Design**
  - ✓ **You can also design your foundation with RISAFoundation**

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

    Comprehensive Design of Shallow Foundations with RISAFoundation

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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!