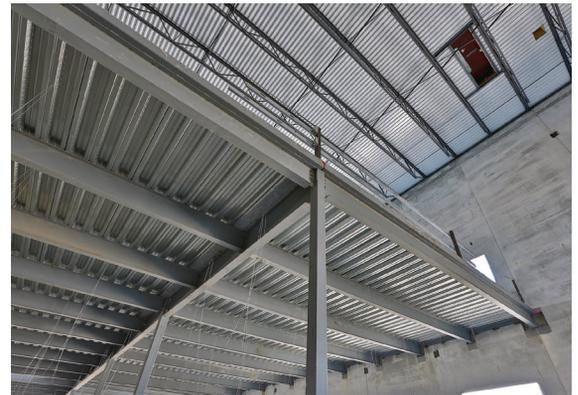


Data Centers and Warehouses

Engineering for Flexibility and Speed to Market



When specifying steel joists, joist girders and decking, here are three ways to build speed into the project while assuring long-term flexibility for the building owner.

1. Specify a KCS Joist

KCS-Series joists are modified K-Series joists built to address constant shear and moment resulting from gravity loads along their spans. KCS joists are designed for compression in the top chord and tension in the bottom chord as well as constant positive and negative shear in the web members to account for varying load locations and potential stress reversals no matter where shear may occur within the joist. All web members, except the end diagonal webs of a KCS joist, are engineered to resist 100 percent of the published shear capacity applied in tension or compression. The result is a very strong joist engineered to support RTU and other mechanical loads at any panel point along the joist.

KCS-Series joists are ideal for data centers and warehouses with multiple loads by way of conveyors, catwalks and suspended equipment. The cost of a joist will be higher due to the increased steel content. But, in addition to the avoidance of prolonged RFIs and potential project delays, the specification of KCS-Series joists gives the building owner the flexibility to, at a later date, add or move loads along the joist span.

2. Show Uplift Forces

Show Net Uplift: RFI delays can be avoided by clearly specifying the uplift per the factors shown in Figure 1:

A) indicate the wind uplift pressures required for the design of the steel joists and joist girders separately; B) indicate whether wind uplift is net or gross; and C) state whether the wind uplift values were determined using LRFD or ASD load combinations. Unless the structural drawings specifically state the joists are to be designed using LRFD or ASD, the joist manufacturer may use either.

It is helpful for the structural drawings to include a note indicating the roof dead load used to calculate the net wind uplift in case the manufacturer needs to convert from LRFD net pressure to ASD or vice versa. Generally, the full design dead load is not used to determine the design net wind uplift, since that dead

ZONE	JOIST GIRDER	
	NET UPLIFT / ASD	NET UPLIFT / ASD
1	15 PSF	10 PSF
2	20 PSF	14 PSF
3	20 PSF	14 PSF

- A) Indicate uplift for joists and joist girders separately
 B) Indicate whether uplift is net or gross
 C) Indicate whether uplift is ASD or LRFD

Figure 1. Uplift forces.

load includes allowances for equipment and other incidental loads that may not be present at all areas of the roof or for the life of the building. Net uplift pressures on warehouse projects are typically specified using service level (ASD) net uplift, but the joist engineer can't assume this. An incorrect assumption can lead to overdesign or, even worse, an underdesigned joist and joist girder system.

Show Uplift Zones: If the uplift values are given for different "zones" (i.e., interior, perimeter, corner), then a diagram of the zones, including the dimensioned widths of each zone, must be provided on the structural drawings, as shown in Figure 2. Do not simply show an undefined "a" dimension, as it is a code-level determination that should be made by the specifying engineer while specifying the uplift.

3. Guide the Sequencing

Efficient joist and deck sequencing go hand-in-hand with efficient data center and warehouse construction. Larger projects can have well more than 100 sequences. By collaborating early with the specifying engineer and erector, the sequences often can be reduced by 50 percent or more. Multiple cranes operating simultaneously can be aligned with joist and deck sequencing to opposite ends of the building, thus keeping two erection crews moving efficiently toward the middle. As happens on projects, when the sequencing changes, it's relatively easy to adjust—provided the organized joist and deck sections do not change (e.g., SEQ 1 = column lines 1-8).

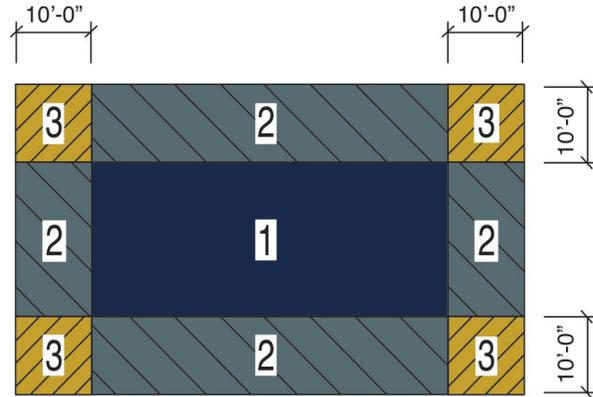


Figure 2. Uplift zones.

Too often, this is not how it goes, as many erectors can report. Without a clear sequencing plan upfront, the joists and deck will arrive in bulk. The erector will lose time shaking out each truck, sorting and transporting the correct pieces to the appropriate locations of the building. Sequencing also can be disrupted by decisions made late, after the joist drawings are submitted for approval. When these changes to earlier planned sequencing occur, joist and deck delivery time is disrupted. Pieces must be manually pulled, re-organized and re-identified. The disruption also impacts other project stakeholders, including the owner, as re-sequencing elevates the potential for material supply errors, inefficient erection, delayed occupancy and lost revenue.



Steel Building Systems Solve Your Top 5 Design Challenges in Warehouses and Data Centers

Go big with your next warehouse or data center project. Design spaces that optimize storage capacity. Used together, steel joists and long-span floor and deck systems enable you to create expansive interiors that maximize usable space while addressing flexibility, speed to market, utility integration, performance and sustainability. Expand the possibilities of your next warehouse or data center project.



Get the Top 5 Guide - newmill.com/warehouse