Appendix H: Roof Joist Selection

$$D_{roof} := 19.8 \ psf \qquad Snow := 23.1 \ psf \qquad L := 8 \ ft$$

$$LCC_1 := 1.4 \cdot D_{roof} = 27.72 \ psf$$

$$LCC_2 := 1.2 \cdot D_{roof} + 0.5 \cdot Snow = 35.31 \ psf$$

$$LCC_3 := 1.2 \cdot D_{roof} + 1.6 \cdot Snow = 60.72 \ psf \qquad \text{*Largest}$$

$$w_u := LCC_3 \cdot L = 485.76 \ plf$$

Table H1. Open-web steel joist selection based on the "STANDARD LRFD LOAD TABLE" in the 2013 Vulcraft Steel Joists and Joist Girders (pg. 47-49)

Selection	W_u	WT
	(plf)	(plf)
"22k9"	546	10.2
"20k9"	493	10.1
"18k10"	523	11.6
"24k7"	496	9.0
"28k6"	523	8.9

*Lightest

Add Self:
$$w_{RJ1} := w_u + WT(4) = 0.495 \ klf$$

Deflection:
$$L_{RJ1} := 35 \ ft \qquad E := 29000 \ ksi \qquad w_{RED} := 275 \ \text{plf}$$

$$\Delta_{ALL} := \frac{L_{RJ1}}{240} = 1.75 \ in$$

Equation to approximate gross moment of inertia found on pg. 45 of the Vulcraft document.

$$I_J := 26.767 \cdot w_{RED} \cdot (35 - 0.33)^3 \cdot (10^{-6}) = 306.757 \ in^4$$

$VM\Delta$
Case 1

$$\Delta_{ACT} := \frac{\left(5 \cdot 184.8 \ plf \cdot (35 \ ft)^4\right)}{384 \cdot E \cdot (I_J \cdot in^4)} = 0.701 \ in \ < \ \Delta_{ALL} = 1.75 \ in \qquad \text{OK}$$

∴ **Use W28k6, A992 steel for RJ1**
with 3 rows of bridging