

Investigate two framing options: Option I - joists span 30', Option II - joists span 36'
 This bay framing study is done for joists (sheets 16-17), interior floor girders (sheets 18-22), and interior fill beams (sheet 23-24). Comparison bays are priced out (sheet 25) to select economical bay framing

JOIST SELECTION ^a PER VULCRAFT STEEL JOISTS AND JOIST GIRDERS MANUAL

ROOF JOIST SELECTION

TYPICAL BAY

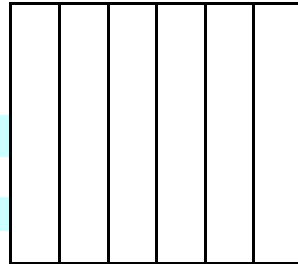
30 x 36 ft Bays

Length - (ft)

30

Number of Joists

5



Center to Center Joist Spacing = 6.0 (ft) (trial assumption)

DL = 25.5 (lb/ft²)

LL = 20.0 (lb/ft²)

W_{DL} = 153.0 (lb/ft)

W_{LL} = 120.0 (lb/ft)

Applied Load - Wu = 273.0 (lb/ft)

Total Bay Width

36

From Vulcraft Manual p. 109

Live Load Deflection Check -
 Wt. < 11 lb/ft Assumed on sheet 6, OK

JOIST	20K 4	
ALLOWABLE LOAD (total)	274	(lb/ft)
ALLOWABLE LOAD (live)	179	(lb/ft)
WEIGHT	7.3	(lb/ft)
Total Weight Per Bay	1095	lb
Cost Per Ton ^b	\$1,500.0	
Total Cost	\$821.25	

FLOOR JOIST SELECTION

TYPICAL BAY

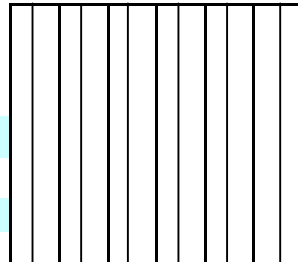
30 x 36 ft Bays

Length - (ft)

30

Number of Joists

11



Center to Center Joist Spacing = 3.0 (ft) (trial assumption)

DL = 56.5 (lb/ft²)

LL = 80.0 (lb/ft²)

W_{DL} = 169.5 (lb/ft)

W_{LL} = 240.0 (lb/ft)

Applied Load - Wu = 409.5 (lb/ft)

Total Bay Width

36

From Vulcraft Manual p. 109

Live Load Deflection Check -
 Wt. < 11 lb/ft Assumed on sheet 6, OK

JOIST	26K 6	
ALLOWABLE LOAD (total)	441	(lb/ft)
ALLOWABLE LOAD (live)	377	(lb/ft)
WEIGHT	8.8	(lb/ft)
Total Weight Per Bay	2904	lb
Cost Per Ton ^b	\$1,500.0	
Total Cost	\$2,178.00	

Lab Note: Joists should also be checked for vibration, due to human activity. If gone unchecked vibrations can be uncomfortable for the building occupants. Partitions act as dampers to reduce the amount of vibration in a floor system, it is negligible.

a -- use allowable stress design for joists

b -- costs per ton in place obtained from local fabricator

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JOIST SELECTION ^a PER VULCRAFT STEEL JOISTS AND JOIST GIRDERS MANUAL

ROOF JOIST SELECTION

TYPICAL BAY

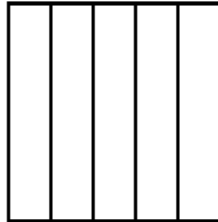
36 x 30 ft Bays

Length - (ft)

36

Number of Joists

4



6 6 6 6 6 30

Center to Center Joist Spacing = 6.0 (ft) (trial assumption)

DL = 25.5 (lb/ft²)

LL = 20.0 (lb/ft²)

W_{DL} = 153.0 (lb/ft)

W_{LL} = 120.0 (lb/ft)

Applied Load - Wu = 273.0 (lb/ft)

Total Bay Width

From Vulcraft Manual

p. 109

Live Load Deflection Check -
 Wt. < 11 lb/ft Assumed on sheet 7, OK

JOIST	24K6	
ALLOWABLE LOAD (total)	281	(lb/ft)
ALLOWABLE LOAD (live)	183	(lb/ft)
WEIGHT	8.3	(lb/ft)
Total Weight Per Bay	1195.2	lb
Cost Per Ton ^b	\$1,500.0	
Total Cost	\$896.40	

FLOOR JOIST SELECTION

TYPICAL BAY

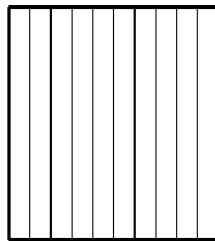
36 x 30 ft Bays

Length - (ft)

36

Number of Joists

9



3 ft C-to-C spacing 30.0

Center to Center Joist Spacing = 3.00 (ft) (trial assumption)

DL = 56.5 (lb/ft²)

LL = 80.0 (lb/ft²)

W_{DL} = 169.5 (lb/ft)

W_{LL} = 240.0 (lb/ft)

Applied Load - Wu = 409.5 (lb/ft)

Total Bay Width

From Vulcraft Manual

p. 109

Live Load Deflection Check -
 Wt. = 11 lb/ft Assumed on sheet 7, OK

JOIST	28K 9	
ALLOWABLE LOAD (total)	442	(lb/ft)
ALLOWABLE LOAD (live)	332	(lb/ft)
WEIGHT	11	(lb/ft)
Total Weight Per Bay	3564	lb
Cost Per Ton ^b	\$1,500.0	
Total Cost	\$2,673.00	

Lab Note: A big differential deflection between floor members can be a serviceability concern for building occupants. The deflection could lead to cracked architectural finishes or jammed doors. The difference in deflection between the joists and fill beams should be checked.

a -- use allowable stress design for joists

b -- costs per ton in place obtained from local fabricator

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FLOOR UNDERNEATH PENTHOUSE SELECTION

JOIST SELECTION ^a PER VULCRAFT STEEL JOISTS AND JOIST GIRDERS MANUAL

TYPICAL BAY

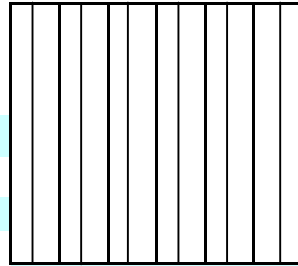
30 x 36 ft Bays

Length - (ft)

30

Number of Joists

11



3 ft C-toC spacing

Center to Center Joist Spacing = **3.0** (ft) (trial assumption)

DL = **100.0** (lb/ft²)

LL = **80.0** (lb/ft²)

W_{DL} = 300.0 (lb/ft)

W_{LL} = 240.0 (lb/ft)

Applied Load - Wu = **540.0** (lb/ft)

Total Bay Width

36

From Vulcraft Manual

p. 109

Live Load Deflection Check -
 Wt. < 11 lb/ft Assumed on sheet 7, OK

JOIST

26K 8

ALLOWABLE LOAD (total) **544** (lb/ft)

ALLOWABLE LOAD (live) **457** (lb/ft)

WEIGHT **10** (lb/ft)

Total Weight Per Bay **3300** lb

Cost Per Ton ^b **\$1,500.0**

Total Cost **\$2,475.00**

TYPICAL BAY

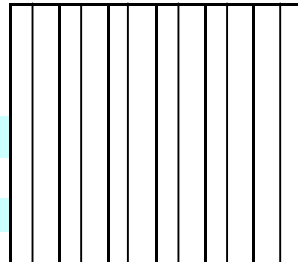
30 x 36 ft Bays

Length - (ft)

36

Number of Joists

11



2.5 ft C-to-C spacing

Center to Center Joist Spacing = **2.5** (ft) (trial assumption)

DL = **100.0** (lb/ft²)

LL = **80.0** (lb/ft²)

W_{DL} = 250.0 (lb/ft)

W_{LL} = 200.0 (lb/ft)

Applied Load - Wu = **450.0** (lb/ft)

Total Bay Width

30

From Vulcraft Manual

p. 109

Live Load Deflection Check -
 wt. = 12 lb/ft is close to 11 lb/ft assumed on sheet 7
 say ok!

JOIST

28k10

ALLOWABLE LOAD (total) **487** (lb/ft)

ALLOWABLE LOAD (live) **366** (lb/ft)

WEIGHT **12** (lb/ft)

Total Weight Per Bay **4752** lb

Cost Per Ton ^b **\$1,500.0**

Total Cost **\$3,564.00**

a -- use allowable stress design for joists

b -- costs per ton in place obtained from local fabricator

Red font indicates user input