



Aluminum Design Calculations
For
Knotwood Version 3 Battens

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DESIGN CODES AND STANDARDS

The following codes and standards, including all specifications referenced within, apply to the design and construction of this project:

- ASCE 7-16, MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
- IBC 2018, INTERNATIONAL BUILDING CODE
- AA ADM-2015, ALUMINUM DESIGN MANUAL
- ANSI/AISC 360-16, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS
- AISI S100-16, NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS
- TMS 402/602-16, BUILDING CODE REQUIREMENTS AND SPECIFICATION FOR MASONRY STRUCTURES
- ACI 318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
- ANSI/AWC NDS-2015, NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION

GENERAL NOTES

1. Contractor to verify all dimensions in the field prior to installation. Do not scale off drawings.
2. All members shall be saw cut in field as required.
3. No splices shall be permitted unless indicated otherwise on the drawings.
4. Touch up all scratches with dealer provided colors to match.
5. Welding is not permitted, unless otherwise indicated on the drawings.
6. The contents show the application of aluminum framing components only. The installing contractor is to refer to the project documents for additional requirements.
7. Dimensions herein are for engineering purposes only and must be reviewed for the purpose of approval. All conditions are subject to approval and to field verification prior to fabrication or installation.
8. Before ordering, fabricating or erecting any material, make any necessary surveys and measurements to verify that in place work has been built according to the contract documents and are within acceptable tolerances. This includes the original buildings and all additions thereto. Notify the Architect/Engineer and owner's representatives of any discrepancies prior to construction.
9. Temporary bracing of the system and safety during construction is solely the responsibility of the contractor. Temporary bracing of the system shall remain in place until the system is totally in place. Contractor shall coordinate locations of temporary bracing with other contractors. Refer to drawings for additional criteria.
10. This submittal is subject to the review and approval of the project Architect/Engineer of record prior to installation.

DESIGN LOADS

Design Loads:

The maximum live/wind/snow/seismic loads are determined below based on ASD allowable stresses per the ADM.

1. Dead Loads (Self-Weight Only):

- | | |
|---------------------------|--|
| a. KEB20050FV3/KEB5050MV3 | $W_{selfB50200V3} := 2.76 \text{ plf}$ |
| b. KEB15050FV3/KEB5050MV3 | $W_{selfB50150V3} := 2.01 \text{ plf}$ |
| c. KEB10050FV3/KEB5050MV3 | $W_{selfB50100V3} := 1.60 \text{ plf}$ |
| d. KEB5050FV3/KEB5050MV3 | $W_{selfB5050V3} := 1.04 \text{ plf}$ |

2. Live Loads:

- a. See Calculations Below for Max Allowable Point and Distributed Loads.

3. Wind Loads:

- a. See Calculations Below for Max Allowable Point and Distributed Loads.

4. Snow Loads:

- a. See Calculations Below for Max Allowable Point and Distributed Loads.

5. Seismic Loads:

- a. See Calculations Below for Max Allowable Point and Distributed Loads.

DESIGN CALCULATIONS

Methodology:

When checking Aluminum Components (balustrades, battens, cladding, etc.), the applied loads are compared to allowable tension and shear strengths per the Aluminum Association (AA) Aluminum Design Manual (ADM), American Institute of Steel Construction (AISC) Specification for Structural Steel Buildings (AISC 360), American Iron and Steel Institute (AISI) North American Specification for the Design of Cold-Formed Steel Structural Members (AISI S100), The Masonry Society (TMS) Building Code Requirements and Specification for Masonry Structures (TMS 402/602), American Concrete Institute (ACI) Building Code Requirements for Structural Concrete (ACI 318), & American Wood Council (AWC) National Design Specification for Wood Construction (AWC NDS).

These calculations are not a substitute for any NOA or FBPA required testing for product approval.

Miscellaneous:

The drawings and models shown within the calculation sheets are not meant to be used for fabrication nor performing work. They are for illustrative purposes only to assist in the preparation of the calculations and may not accurately represent the actual work to be performed.

Fastener Requirements:

Self-Tapping Metal Screws - #10 Minimum.
Galvanized Unless Noted Otherwise
Aluminum Where Noted At High/Salt Exposure

Materials Requirements:

Knotwood Battens:
Aluminum Alloy 6063-T6: $F_y=25 \text{ ksi (MIN)}$ $F_u=30 \text{ ksi (MIN)}$

Material Allowable Stress:

Per the ADM Tables 2-19 to 2-21:

Bending Stress:

$$F_{ab6063T6} := 15.2 \text{ ksi}$$

Aluminum Modulus of Elasticity:

$$E := 10100 \text{ ksi}$$

Shear Stress:

$$S_{2x8V3} := \frac{(7.89 - 2(0.079))}{0.079} = 97.9 \quad \text{Use:} \quad F_{av2x8V3} := \frac{38665 \text{ ksi}}{S_{2x8V3}^2} = 4.0 \text{ ksi} \quad (2x8V3 \text{ Batten})$$

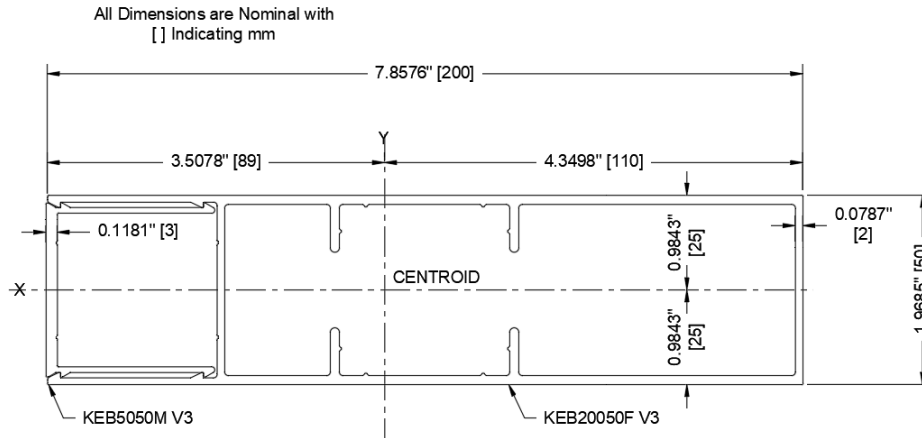
$$S_{2x6V3} := \frac{(5.89 - 2(0.071))}{0.071} = 81.0 \quad \text{Use:} \quad F_{av2x6V3} := \frac{38665 \text{ ksi}}{S_{2x6V3}^2} = 5.9 \text{ ksi} \quad (2x6V3 \text{ Batten})$$

$$S_{2x4V3} := \frac{(3.94 - 2(0.071))}{0.071} = 53.5 \quad \text{Use:} \quad F_{av2x4V3} := 9.1 \text{ ksi} \quad (2x4V3 \text{ Batten})$$

$$S_{2x2V3} := \frac{(1.97 - 2(0.071))}{0.071} = 25.7 \quad \text{Use:} \quad F_{av2x2V3} := 9.1 \text{ ksi} \quad (2x2V3 \text{ Batten})$$

Material Section Properties:

2x8 Batten KEB20050V3:



$$I_{xB50200V3} := 1.606 \text{ in}^4 \quad (I_x \text{ found per AutoCAD}) \quad I_{yB50200V3} := 14.566 \text{ in}^4 \quad (I_y \text{ found per AutoCAD})$$

$$Y_{xB50200V3} := 0.9843 \text{ in}$$

$$Y_{yB50200V3} := 4.35 \text{ in}$$

$$S_{xB50200V3} := \frac{I_{xB50200V3}}{Y_{xB50200V3}} = 1.63 \text{ in}^3$$

$$S_{yB50200V3} := \frac{I_{yB50200V3}}{Y_{yB50200V3}} = 3.35 \text{ in}^3$$

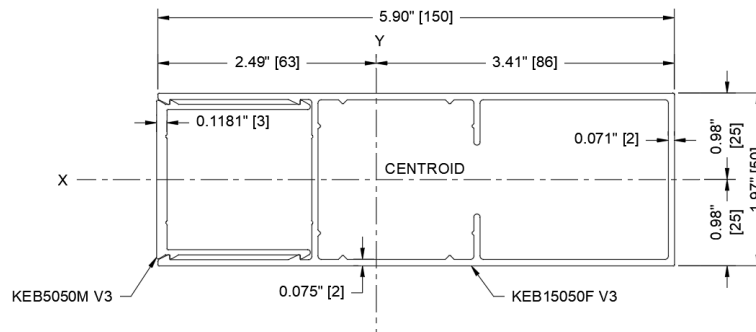
$$A_{webB50200xV3} := 7.86 \text{ in} \cdot 0.0787 \text{ in} = 0.6 \text{ in}^2$$

$$A_{webB50200yV3} := 1.97 \text{ in} \cdot 0.0787 \text{ in} = 0.2 \text{ in}^2$$

$$A_{B50200V3} := 2.30 \text{ in}^2$$

2x6 Batten KEB15050V3:

All Dimensions are Nominal



$$I_{xB50150V3} := 1.103 \text{ in}^4 \quad (I_x \text{ found per AutoCAD})$$

$$I_{yB50150V3} := 6.193 \text{ in}^4 \quad (I_y \text{ found per AutoCAD})$$

$$Y_{xB50150V3} := 0.9843 \text{ in}$$

$$Y_{yB50150V3} := 3.41 \text{ in}$$

$$S_{xB50150V3} := \frac{I_{xB50150V3}}{Y_{xB50150V3}} = 1.12 \text{ in}^3$$

$$S_{yB50150V3} := \frac{I_{yB50150V3}}{Y_{yB50150V3}} = 1.82 \text{ in}^3$$

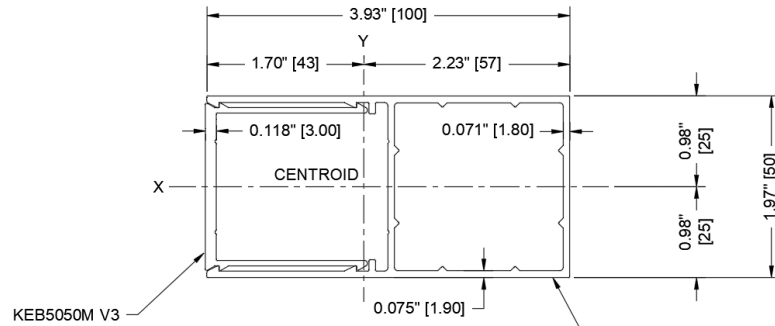
$$A_{webB50150xV3} := 5.99 \text{ in} \cdot 0.076 \text{ in} = 0.5 \text{ in}^2$$

$$A_{webB50150yV3} := 2 \text{ in} \cdot 0.072 \text{ in} = 0.1 \text{ in}^2$$

$$A_{B50150V3} := 1.68 \text{ in}^2$$

2x4 Batten KEB10050V3:

All Dimensions are Nominal with
[] Indicating mm



$$I_{xB50100V3} := 0.817 \text{ in}^4 \quad (\text{I}_x \text{ found per AutoCAD}) \quad I_{yB50100V3} := 2.228 \text{ in}^4 \quad (\text{I}_y \text{ found per AutoCAD})$$

$$y_{xB50100V3} := 0.9843 \text{ in}$$

$$y_{yB50100V3} := 2.25 \text{ in}$$

$$S_{xB50100V3} := \frac{I_{xB50100V3}}{y_{xB50100V3}} = 0.83 \text{ in}^3$$

$$S_{yB50100V3} := \frac{I_{yB50100V3}}{y_{yB50100V3}} = 0.99 \text{ in}^3$$

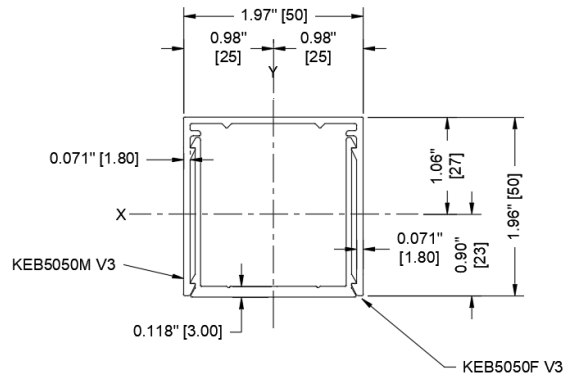
$$A_{webB50100xV3} := 3.93 \text{ in} \cdot 0.76 \text{ in} = 3.0 \text{ in}^2$$

$$A_{webB50100yV3} := 2 \text{ in} \cdot 0.072 \text{ in} = 0.1 \text{ in}^2$$

$$A_{B50100V3} := 1.33 \text{ in}^2$$

2x2 Batten KEB5050V3:

All Dimensions are Nominal with
[] Indicating mm



$$I_{xB5050V3} := 0.5152 \text{ in}^4 \quad (\text{I}_{xx} \text{ found per AutoCAD}) \quad I_{yB5050V3} := 0.5362 \text{ in}^4 \quad (\text{I}_{yy} \text{ found per AutoCAD})$$

$$y_{xB5050V3} := 1.07 \text{ in}$$

$$y_{yB5050V3} := 1.00 \text{ in}$$

$$S_{xB5050V3} := \frac{I_{xB5050V3}}{y_{xB5050V3}} = 0.48 \text{ in}^3$$

$$S_{yB5050V3} := \frac{I_{yB5050V3}}{y_{yB5050V3}} = 0.54 \text{ in}^3$$

$$A_{webB5050xV3} := 2 \text{ in} \cdot 0.072 \text{ in} = 0.1 \text{ in}^2$$

$$A_{webB5050yV3} := 2 \text{ in} \cdot 0.072 \text{ in} = 0.1 \text{ in}^2$$

$$A_{B5050V3} := 0.868 \text{ in}^2$$

Vertical Batten Calculations

Check 2x2V3 Batten (KEB5050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{\text{selfB5050V3}} = ? \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB5050V3} = 0.5 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{\text{MaxSA}} := F_{ab6063T6} \cdot S_{xB5050V3} = 7.3 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x2V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{\text{MaxSA}} := F_{av2x2V3} \cdot 2 \cdot A_{\text{webB5050xV3}} = ? \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Load Strong Axis:

$$w_{8ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(8 \text{ ft})^2} = 76.2 \text{ plf}$$

$$w_{9ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(9 \text{ ft})^2} = 60.2 \text{ plf}$$

$$w_{10ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(10 \text{ ft})^2} = 48.8 \text{ plf}$$

$$w_{11ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(11 \text{ ft})^2} = 40.3 \text{ plf}$$

$$w_{12ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(12 \text{ ft})^2} = 33.9 \text{ plf}$$

$$w_{13ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(13 \text{ ft})^2} = 28.9 \text{ plf}$$

$$w_{14ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(14 \text{ ft})^2} = 24.9 \text{ plf}$$

$$w_{15ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(15 \text{ ft})^2} = 21.7 \text{ plf}$$

$$w_{16ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(16 \text{ ft})^2} = 19.1 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{\text{Max8ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{8 \text{ ft}} = 305 \text{ lbf}$$

$$P_{\text{Max9ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{9 \text{ ft}} = 271 \text{ lbf}$$

$$P_{\text{Max10ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{10 \text{ ft}} = 244 \text{ lbf}$$

$$P_{\text{Max11ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{11 \text{ ft}} = 222 \text{ lbf}$$

$$P_{\text{Max12ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{12 \text{ ft}} = 203 \text{ lbf}$$

$$P_{\text{Max13ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{13 \text{ ft}} = 188 \text{ lbf}$$

$$P_{\text{Max14ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{14 \text{ ft}} = 174 \text{ lbf}$$

$$P_{\text{Max15ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{15 \text{ ft}} = 163 \text{ lbf}$$

$$P_{\text{Max16ft}} := \frac{M_{\text{MaxSA}} \cdot 4}{16 \text{ ft}} = 152 \text{ lbf}$$

$$w_{17ft} := \frac{M_{MaxSA} \cdot 8}{(17 \text{ ft})^2} = 16.9 \text{ plf}$$

$$P_{Max17ft} := \frac{M_{MaxSA} \cdot 4}{17 \text{ ft}} = 144 \text{ lbf}$$

Max Distributed Load For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = 90.3 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = 63.4 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = 46.3 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = 34.8 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = 26.8 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = 21.1 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = 16.9 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = 13.7 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = 11.3 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = 9.4 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = 451.7 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = 356.9 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = 289.1 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = 238.9 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = 200.8 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = 171.1 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = 147.5 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = 128.5 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = 112.9 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = 100.0 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Load Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} = 304.9 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} = 135.5 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} = 76.2 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} = 48.8 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} = 33.9 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} = 24.9 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA}}{2 \text{ ft}} = 305 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA}}{3 \text{ ft}} = 203 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA}}{4 \text{ ft}} = 152 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA}}{5 \text{ ft}} = 122 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA}}{6 \text{ ft}} = 102 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA}}{7 \text{ ft}} = 87 \text{ lbf}$$

Max Distributed Load For Deflection - Strong Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = 1204.5 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = 356.9 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = 150.6 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = 77.1 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = 44.6 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = 28.1 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = 903.4 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = 401.5 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = 225.8 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = 144.5 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = 100.4 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = 73.7 \text{ lbf}$$

Span Table Summary - Strong Axis 2x2V3:

	Span	Max Distributed (plf)	Max Point	
SA2x2 :=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	
				$\begin{bmatrix} 8.0 \text{ ft} & 76.2 & 304.9 \text{ lbf} \\ 9.0 \text{ ft} & 60.2 & 271.1 \text{ lbf} \\ 10.0 \text{ ft} & 46.3 & 244.0 \text{ lbf} \\ 11.0 \text{ ft} & 34.8 & 221.8 \text{ lbf} \\ 12.0 \text{ ft} & 26.8 & 200.8 \text{ lbf} \\ 13.0 \text{ ft} & 21.1 & 171.1 \text{ lbf} \\ 14.0 \text{ ft} & 16.9 & 147.5 \text{ lbf} \\ 15.0 \text{ ft} & 13.7 & 128.5 \text{ lbf} \\ 16.0 \text{ ft} & 11.3 & 112.9 \text{ lbf} \\ 17.0 \text{ ft} & 9.4 & 100.0 \text{ lbf} \end{bmatrix}$

	Span	Max Distributed (plf)	Max Point	
SA2x2C :=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	
				$\begin{bmatrix} 2.0 \text{ ft} & 304.9 & 304.9 \text{ lbf} \\ 3.0 \text{ ft} & 135.5 & 203.3 \text{ lbf} \\ 4.0 \text{ ft} & 76.2 & 152.5 \text{ lbf} \\ 5.0 \text{ ft} & 48.8 & 122.0 \text{ lbf} \\ 6.0 \text{ ft} & 33.9 & 100.4 \text{ lbf} \\ 7.0 \text{ ft} & 24.9 & 73.7 \text{ lbf} \end{bmatrix}$

Check 2x2V3 Batten (KEB5050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB5050V3} = 1.0 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB5050V3} = 0.5 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{yB5050V3} = 8.2 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Weak Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x2V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x2V3} \cdot 2 \cdot A_{webB5050yV3} = 2.6 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} = ? \text{ plf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{M_{MaxWA} \cdot 4}{8 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max9ft} := \frac{M_{MaxWA} \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max10ft} := \frac{M_{MaxWA} \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max11ft} := \frac{M_{MaxWA} \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max12ft} := \frac{M_{MaxWA} \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max13ft} := \frac{M_{MaxWA} \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max14ft} := \frac{M_{MaxWA} \cdot 4}{14 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max15ft} := \frac{M_{MaxWA} \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max16ft} := \frac{M_{MaxWA} \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max17ft} := \frac{M_{MaxWA} \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = ? \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = ? \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = ? \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = ? \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = ? \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = ? \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = ? \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = ? \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = ? \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = ? \text{ plf}$$

Max Point Load For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = ? \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} = ? \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = ? \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = ? \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = ? \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = ? \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = ? \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = ? \text{ plf}$$

Max Point Load For Deflection - Weak Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = ? \text{ lbf}$$

Span Table Summary - Weak Axis 2x2V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
WA2x2:=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	
				$\begin{bmatrix} 8.0 \text{ ft} & 84.9 & 339.6 \text{ lbf} \\ 9.0 \text{ ft} & 66.0 & 301.9 \text{ lbf} \\ 10.0 \text{ ft} & 48.1 & 271.7 \text{ lbf} \\ 11.0 \text{ ft} & 36.2 & 247.0 \text{ lbf} \\ 12.0 \text{ ft} & 27.9 & 208.9 \text{ lbf} \\ 13.0 \text{ ft} & 21.9 & 178.0 \text{ lbf} \\ 14.0 \text{ ft} & 17.5 & 153.5 \text{ lbf} \\ 15.0 \text{ ft} & 14.3 & 133.7 \text{ lbf} \\ 16.0 \text{ ft} & 11.8 & 117.5 \text{ lbf} \\ 17.0 \text{ ft} & 9.8 & 104.1 \text{ lbf} \end{bmatrix}$

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
WA2x2C:=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	
				$\begin{bmatrix} 2.0 \text{ ft} & 339.6 & 339.6 \text{ lbf} \\ 3.0 \text{ ft} & 150.9 & 226.4 \text{ lbf} \\ 4.0 \text{ ft} & 84.9 & 169.8 \text{ lbf} \\ 5.0 \text{ ft} & 54.3 & 135.8 \text{ lbf} \\ 6.0 \text{ ft} & 37.7 & 104.5 \text{ lbf} \\ 7.0 \text{ ft} & 27.7 & 76.8 \text{ lbf} \end{bmatrix}$

Check 2x4V3 Batten (KEB510050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 100 \text{ mm} = 3.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{\text{self}B50100V3} = 1.6 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB50100V3} = 2.2 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{\text{MaxSA}} := F_{ab6063T6} \cdot S_{yB50100V3} = 15.1 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x4V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{\text{MaxSA}} := F_{av2x4V3} \cdot 2 \cdot A_{\text{web}B50100xV3} = 54.4 \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Strong Axis:

$$w_{8ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(8 \text{ ft})^2} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(9 \text{ ft})^2} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(10 \text{ ft})^2} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(11 \text{ ft})^2} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(12 \text{ ft})^2} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(13 \text{ ft})^2} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(14 \text{ ft})^2} = ? \text{ plf}$$

$$w_{15ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(15 \text{ ft})^2} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(16 \text{ ft})^2} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(17 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{\text{Max}8ft} := \frac{M_{\text{MaxSA}} \cdot 4}{8 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}9ft} := \frac{M_{\text{MaxSA}} \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}10ft} := \frac{M_{\text{MaxSA}} \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}11ft} := \frac{M_{\text{MaxSA}} \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}12ft} := \frac{M_{\text{MaxSA}} \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}13ft} := \frac{M_{\text{MaxSA}} \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}14ft} := \frac{M_{\text{MaxSA}} \cdot 4}{14 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}15ft} := \frac{M_{\text{MaxSA}} \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}16ft} := \frac{M_{\text{MaxSA}} \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max}17ft} := \frac{M_{\text{MaxSA}} \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = ? \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = 274.4 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = ? \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = ? \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = ? \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = ? \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = ? \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = ? \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = ? \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = ? \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = ? \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} = ? \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = ? \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = ? \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = ? \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = ? \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = ? \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = ? \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = ? \text{ lbf}$$

Span Table Summary - Strong Axis 2x4V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
SA2x4 :=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	
				$\begin{bmatrix} 8.0 \text{ ft} & 156.8 & 627.1 \text{ lbf} \\ 9.0 \text{ ft} & 123.9 & 557.5 \text{ lbf} \\ 10.0 \text{ ft} & 100.3 & 501.7 \text{ lbf} \\ 11.0 \text{ ft} & 82.9 & 456.1 \text{ lbf} \\ 12.0 \text{ ft} & 69.7 & 418.1 \text{ lbf} \\ 13.0 \text{ ft} & 59.4 & 385.9 \text{ lbf} \\ 14.0 \text{ ft} & 51.2 & 358.4 \text{ lbf} \\ 15.0 \text{ ft} & 44.6 & 334.5 \text{ lbf} \\ 16.0 \text{ ft} & 39.2 & 313.6 \text{ lbf} \\ 17.0 \text{ ft} & 34.7 & 295.1 \text{ lbf} \end{bmatrix}$

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
SA2x4C :=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	
				$\begin{bmatrix} 2.0 \text{ ft} & 627.1 & 627.1 \text{ lbf} \\ 3.0 \text{ ft} & 278.7 & 418.1 \text{ lbf} \\ 4.0 \text{ ft} & 156.8 & 313.6 \text{ lbf} \\ 5.0 \text{ ft} & 100.3 & 250.9 \text{ lbf} \\ 6.0 \text{ ft} & 69.7 & 209.0 \text{ lbf} \\ 7.0 \text{ ft} & 51.2 & 179.2 \text{ lbf} \end{bmatrix}$

Check 2x4V3 Batten (KEB10050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 100 \text{ mm} = 3.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50100V3} = 1.6 \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB50100V3} = (3.9 \cdot 10^{-5}) \text{ ft}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{xB50100V3} = 12.6 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x4V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x4V3} \cdot 2 \cdot A_{webB50100xV3} = 54.4 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} = ? \text{ plf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{M_{MaxWA} \cdot 4}{8 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max9ft} := \frac{M_{MaxWA} \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max10ft} := \frac{M_{MaxWA} \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max11ft} := \frac{M_{MaxWA} \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max12ft} := \frac{M_{MaxWA} \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max13ft} := \frac{M_{MaxWA} \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max14ft} := \frac{M_{MaxWA} \cdot 4}{14 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max15ft} := \frac{M_{MaxWA} \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max16ft} := \frac{M_{MaxWA} \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max17ft} := \frac{M_{MaxWA} \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = 143.3 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = ? \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = ? \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = ? \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = ? \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = ? \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = ? \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = ? \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = ? \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = ? \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = ? \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} = 525.7 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = ? \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = ? \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = ? \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = ? \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = ? \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = ? \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = ? \text{ lbf}$$

Span Table Summary - Weak Axis 2x4V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																															
WA2x4:=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=																														
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$																															
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$																															
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$																															
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$																															
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$																															
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$																															
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$																															
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$																															
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$																															
				<table><tr><td>8.0 ft</td><td>131.4</td><td>525.7 lbf</td></tr><tr><td>9.0 ft</td><td>100.6</td><td>467.3 lbf</td></tr><tr><td>10.0 ft</td><td>73.3</td><td>420.5 lbf</td></tr><tr><td>11.0 ft</td><td>55.1</td><td>378.9 lbf</td></tr><tr><td>12.0 ft</td><td>42.4</td><td>318.4 lbf</td></tr><tr><td>13.0 ft</td><td>33.4</td><td>271.3 lbf</td></tr><tr><td>14.0 ft</td><td>26.7</td><td>233.9 lbf</td></tr><tr><td>15.0 ft</td><td>21.7</td><td>203.7 lbf</td></tr><tr><td>16.0 ft</td><td>17.9</td><td>179.1 lbf</td></tr><tr><td>17.0 ft</td><td>14.9</td><td>158.6 lbf</td></tr></table>	8.0 ft	131.4	525.7 lbf	9.0 ft	100.6	467.3 lbf	10.0 ft	73.3	420.5 lbf	11.0 ft	55.1	378.9 lbf	12.0 ft	42.4	318.4 lbf	13.0 ft	33.4	271.3 lbf	14.0 ft	26.7	233.9 lbf	15.0 ft	21.7	203.7 lbf	16.0 ft	17.9	179.1 lbf	17.0 ft	14.9	158.6 lbf
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17.0 ft	14.9	158.6 lbf																																

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																		
WA2x4C:=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=																	
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$																		
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$																		
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$																		
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$																		
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$																		
					<table><tr><td>2.0 ft</td><td>525.7</td><td>525.7 lbf</td></tr><tr><td>3.0 ft</td><td>233.6</td><td>350.5 lbf</td></tr><tr><td>4.0 ft</td><td>131.4</td><td>262.8 lbf</td></tr><tr><td>5.0 ft</td><td>84.1</td><td>210.3 lbf</td></tr><tr><td>6.0 ft</td><td>58.4</td><td>159.2 lbf</td></tr><tr><td>7.0 ft</td><td>42.9</td><td>116.9 lbf</td></tr></table>	2.0 ft	525.7	525.7 lbf	3.0 ft	233.6	350.5 lbf	4.0 ft	131.4	262.8 lbf	5.0 ft	84.1	210.3 lbf	6.0 ft	58.4	159.2 lbf	7.0 ft
2.0 ft	525.7	525.7 lbf																			
3.0 ft	233.6	350.5 lbf																			
4.0 ft	131.4	262.8 lbf																			
5.0 ft	84.1	210.3 lbf																			
6.0 ft	58.4	159.2 lbf																			
7.0 ft	42.9	116.9 lbf																			

Check 2x6V3 Batten (KEB15050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 150 \text{ mm} = 5.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50150V3} = 2.0 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB50150V3} = 6.2 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxSA} := F_{ab6063T6} \cdot S_{yB50150V3} = 27.6 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x6V3} = 5.9 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxSA} := F_{av2x6V3} \cdot 2 \cdot A_{webB50150xV3} = 5.4 \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Strong Axis:

$$w_{8ft} := \frac{M_{MaxSA} \cdot 8}{(8 \text{ ft})^2} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxSA} \cdot 8}{(9 \text{ ft})^2} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxSA} \cdot 8}{(10 \text{ ft})^2} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxSA} \cdot 8}{(11 \text{ ft})^2} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxSA} \cdot 8}{(12 \text{ ft})^2} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxSA} \cdot 8}{(13 \text{ ft})^2} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxSA} \cdot 8}{(14 \text{ ft})^2} = ? \text{ plf}$$

$$w_{15ft} := \frac{M_{MaxSA} \cdot 8}{(15 \text{ ft})^2} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxSA} \cdot 8}{(16 \text{ ft})^2} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxSA} \cdot 8}{(17 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max8ft} := \frac{M_{MaxSA} \cdot 4}{8 \text{ ft}} = 1150 \text{ lbf}$$

$$P_{Max9ft} := \frac{M_{MaxSA} \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max10ft} := \frac{M_{MaxSA} \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max11ft} := \frac{M_{MaxSA} \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max12ft} := \frac{M_{MaxSA} \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max13ft} := \frac{M_{MaxSA} \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max14ft} := \frac{M_{MaxSA} \cdot 4}{14 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max15ft} := \frac{M_{MaxSA} \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max16ft} := \frac{M_{MaxSA} \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max17ft} := \frac{M_{MaxSA} \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = 1085.9 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = 762.7 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = 556.0 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = 417.7 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = 321.8 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = 253.1 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = 202.6 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = 164.7 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = 135.7 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = 113.2 \text{ plf}$$

$$w_{18ft\Delta} := \frac{\frac{18 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (18 \text{ ft})^4} = 95.3 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = 5429.6 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = 4290.1 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = 3475.0 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = 2871.9 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = 2413.2 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = 2056.2 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = 1772.9 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = 1544.4 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = 1357.4 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = 1202.4 \text{ lbf}$$

$$P_{Max18ft\Delta} := \frac{\frac{18 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(18 \text{ ft})^3} = 1072.5 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} = ? \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = 14479.0 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = 4290.1 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = 1809.9 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = 926.7 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = 536.3 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = 337.7 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = 10859.3 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = 4826.3 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = 2714.8 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = 1737.5 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = 1206.6 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = 886.5 \text{ lbf}$$

Span Table Summary - Strong Axis 2x6V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
SA2x6:=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	
				$\begin{bmatrix} 8.0 \text{ ft} & 287.6 & 1150.2 \text{ lbf} \\ 9.0 \text{ ft} & 227.2 & 1022.4 \text{ lbf} \\ 10.0 \text{ ft} & 184.0 & 920.2 \text{ lbf} \\ 11.0 \text{ ft} & 152.1 & 836.5 \text{ lbf} \\ 12.0 \text{ ft} & 127.8 & 766.8 \text{ lbf} \\ 13.0 \text{ ft} & 108.9 & 707.8 \text{ lbf} \\ 14.0 \text{ ft} & 93.9 & 657.3 \text{ lbf} \\ 15.0 \text{ ft} & 81.8 & 613.4 \text{ lbf} \\ 16.0 \text{ ft} & 71.9 & 575.1 \text{ lbf} \\ 17.0 \text{ ft} & 63.7 & 541.3 \text{ lbf} \end{bmatrix}$

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
SA2x6C:=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	
				$\begin{bmatrix} 2.0 \text{ ft} & 1150.2 & 1150.2 \text{ lbf} \\ 3.0 \text{ ft} & 511.2 & 766.8 \text{ lbf} \\ 4.0 \text{ ft} & 287.6 & 575.1 \text{ lbf} \\ 5.0 \text{ ft} & 184.0 & 460.1 \text{ lbf} \\ 6.0 \text{ ft} & 127.8 & 383.4 \text{ lbf} \\ 7.0 \text{ ft} & 93.9 & 328.6 \text{ lbf} \end{bmatrix}$

Check 2x6V3 Batten (KEB15050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 150 \text{ mm} = 5.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50150V3} = 2.0 \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB50150V3} = 1.1 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{xB50150V3} = 17.0 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Weak Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x6V3} = 5.9 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x6V3} \cdot 2 \cdot A_{webB50150xV3} = 5.4 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} = ? \text{ plf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{M_{MaxWA} \cdot 4}{8 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max9ft} := \frac{M_{MaxWA} \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max10ft} := \frac{M_{MaxWA} \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max11ft} := \frac{M_{MaxWA} \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max12ft} := \frac{M_{MaxWA} \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max13ft} := \frac{M_{MaxWA} \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max14ft} := \frac{M_{MaxWA} \cdot 4}{14 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max15ft} := \frac{M_{MaxWA} \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max16ft} := \frac{M_{MaxWA} \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max17ft} := \frac{M_{MaxWA} \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = ? \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = ? \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = ? \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = ? \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = ? \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = ? \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = ? \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = ? \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = ? \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = ? \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = ? \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = ? \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} = ? \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = ? \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = ? \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = ? \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = ? \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = ? \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = ? \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = ? \text{ lbf}$$

Span Table Summary - Weak Axis 2x6V3:

<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	
9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	

WA2x6:=

8.0 ft	177.4	709.7 lbf
9.0 ft	135.8	630.9 lbf
10.0 ft	99.0	567.8 lbf
11.0 ft	74.4	511.5 lbf
12.0 ft	57.3	429.8 lbf
13.0 ft	45.1	366.2 lbf
14.0 ft	36.1	315.8 lbf
15.0 ft	29.3	275.1 lbf
16.0 ft	24.2	241.8 lbf
17.0 ft	20.2	214.2 lbf

<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	
3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	

WA2x6C:=

2.0 ft	709.7	709.7 lbf
3.0 ft	315.4	473.1 lbf
4.0 ft	177.4	354.9 lbf
5.0 ft	113.6	283.9 lbf
6.0 ft	78.9	214.9 lbf
7.0 ft	57.9	157.9 lbf

Check 2x8V3 Batten (KEB20050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 200 \text{ mm} = 7.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50200V3} = 2.8 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB50200V3} = 14.6 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxSA} := F_{ab6063T6} \cdot S_{yB50200V3} = 50.9 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x8V3} = 4.0 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxSA} := F_{av2x8V3} \cdot 2 \cdot A_{webB50200yV3} = 1.3 \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Strong Axis:

$$w_{8ft} := \frac{M_{MaxSA} \cdot 8}{(8 \text{ ft})^2} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxSA} \cdot 8}{(9 \text{ ft})^2} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxSA} \cdot 8}{(10 \text{ ft})^2} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxSA} \cdot 8}{(11 \text{ ft})^2} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxSA} \cdot 8}{(12 \text{ ft})^2} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxSA} \cdot 8}{(13 \text{ ft})^2} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxSA} \cdot 8}{(14 \text{ ft})^2} = ? \text{ plf}$$

$$w_{15ft} := \frac{M_{MaxSA} \cdot 8}{(15 \text{ ft})^2} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxSA} \cdot 8}{(16 \text{ ft})^2} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxSA} \cdot 8}{(17 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max8ft} := \frac{M_{MaxSA} \cdot 4}{8 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max9ft} := \frac{M_{MaxSA} \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max10ft} := \frac{M_{MaxSA} \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max11ft} := \frac{M_{MaxSA} \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max12ft} := \frac{M_{MaxSA} \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max13ft} := \frac{M_{MaxSA} \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max14ft} := \frac{M_{MaxSA} \cdot 4}{14 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max15ft} := \frac{M_{MaxSA} \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max16ft} := \frac{M_{MaxSA} \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max17ft} := \frac{M_{MaxSA} \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = 2554.1 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = 1793.8 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = 1307.7 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = 982.5 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = 756.8 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = 595.2 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = 476.6 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = 387.5 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = 319.3 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = 266.2 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = 12770.5 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = 10090.3 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = 8173.1 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = 6754.7 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = 5675.8 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = 4836.2 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = 4170.0 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = 3632.5 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = 3192.6 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = 2828.1 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} = ? \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = 34054.8 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = 10090.3 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = 4256.8 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = 2179.5 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = 1261.3 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = 794.3 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = 25541.1 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = 11351.6 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = 6385.3 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = 4086.6 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = 2837.9 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = 2085.0 \text{ lbf}$$

Span Table Summary - Strong Axis 2x8V3:

	Span	Max Distributed (plf)	Max Point	
SA2x8 :=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	
				$\begin{bmatrix} 8.0 \text{ ft} & 530.2 & 2120.7 & \text{lbft} \\ 9.0 \text{ ft} & 418.9 & 1885.1 & \text{lbft} \\ 10.0 \text{ ft} & 339.3 & 1696.6 & \text{lbft} \\ 11.0 \text{ ft} & 280.4 & 1542.3 & \text{lbft} \\ 12.0 \text{ ft} & 235.6 & 1413.8 & \text{lbft} \\ 13.0 \text{ ft} & 200.8 & 1305.1 & \text{lbft} \\ 14.0 \text{ ft} & 173.1 & 1211.8 & \text{lbft} \\ 15.0 \text{ ft} & 150.8 & 1131.1 & \text{lbft} \\ 16.0 \text{ ft} & 132.5 & 1060.4 & \text{lbft} \\ 17.0 \text{ ft} & 117.4 & 998.0 & \text{lbft} \end{bmatrix}$

	Span	Max Distributed (plf)	Max Point	
SA2x8C :=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	
				$\begin{bmatrix} 2.0 \text{ ft} & 2120.7 & 2120.7 & \text{lbft} \\ 3.0 \text{ ft} & 942.5 & 1413.8 & \text{lbft} \\ 4.0 \text{ ft} & 530.2 & 1060.4 & \text{lbft} \\ 5.0 \text{ ft} & 339.3 & 848.3 & \text{lbft} \\ 6.0 \text{ ft} & 235.6 & 706.9 & \text{lbft} \\ 7.0 \text{ ft} & 173.1 & 605.9 & \text{lbft} \end{bmatrix}$

Check 2x8 Batten (KEB20050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 200 \text{ mm} = 7.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50200V3} = 2.8 \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB50200V3} = 1.6 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{xB50200V3} = 24.8 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Weak Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x8V3} = 4.0 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x8V3} \cdot 2 \cdot A_{webB50200xV3} = 5.0 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} = ? \text{ plf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{M_{MaxWA} \cdot 4}{8 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max9ft} := \frac{M_{MaxWA} \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max10ft} := \frac{M_{MaxWA} \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max11ft} := \frac{M_{MaxWA} \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max12ft} := \frac{M_{MaxWA} \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max13ft} := \frac{M_{MaxWA} \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max14ft} := \frac{M_{MaxWA} \cdot 4}{14 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max15ft} := \frac{M_{MaxWA} \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max16ft} := \frac{M_{MaxWA} \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max17ft} := \frac{M_{MaxWA} \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = ? \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = ? \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = ? \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = ? \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = ? \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = ? \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = ? \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = ? \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = ? \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = ? \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = ? \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} = ? \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} = ? \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = ? \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = ? \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = ? \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = ? \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = ? \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = ? \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = ? \text{ lbf}$$

Span Table Summary - Weak Axis 2x8V3:

Span	Max Distributed (plf)	Max Point
8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$
9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$
10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$
11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$
12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$
13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$
14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$
15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$
16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$
17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$

WA2x8 :=

8.0 ft	258.3	1033.4 lbf
9.0 ft	197.8	918.5 lbf
10.0 ft	144.2	826.7 lbf
11.0 ft	108.3	744.7 lbf
12.0 ft	83.4	625.8 lbf
13.0 ft	65.6	533.2 lbf
14.0 ft	52.5	459.8 lbf
15.0 ft	42.7	400.5 lbf
16.0 ft	35.2	352.0 lbf
17.0 ft	29.3	311.8 lbf

Span	Max Distributed (plf)	Max Point
2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$
3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$
4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$
5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$
6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$
7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$

WA2x8C :=

2.0 ft	1033.4	1033.4 lbf
3.0 ft	459.3	688.9 lbf
4.0 ft	258.3	516.7 lbf
5.0 ft	165.3	413.3 lbf
6.0 ft	114.8	312.9 lbf
7.0 ft	84.4	229.9 lbf

Horizontal Batten Calculations

Check 2x2V3 Batten (KEB5050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{\text{selfB5050V3}} = 1.0 \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB5050V3} = 0.5 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{\text{MaxSA}} := F_{ab6063T6} \cdot S_{xB5050V3} = 7.3 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x2V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{\text{MaxSA}} := F_{av2x2V3} \cdot 2 \cdot A_{\text{webB5050xV3}} = 2.6 \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Load Strong Axis:

$$w_{8ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{9ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{10ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{11ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{12ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{13ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{14ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{\text{Max8ft}} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max9ft}} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (9 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max10ft}} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (10 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max11ft}} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (11 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max12ft}} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (12 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max13ft}} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (13 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = ? \text{ lbf}$$

$$P_{\text{Max14ft}} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (14 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 167 \text{ lbf}$$

$$w_{15ft} := \frac{M_{MaxSA} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxSA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxSA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$P_{Max15ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (15 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (16 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (17 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = ? \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = 63.4 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = ? \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = ? \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = ? \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = ? \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = ? \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = ? \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = ? \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = ? \text{ plf}$$

Max Point Loads For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = ? \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Load Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = ? \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = ? \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = ? \text{ lbf}$$

Max Distributed Load For Deflection - Strong Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = ? \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = 356.9 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = 150.6 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = 77.1 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = 44.6 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = 28.1 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = ? \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = 401.5 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = 225.8 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = 144.5 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = 100.4 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = 73.7 \text{ lbf}$$

Span Table Summary - Strong Axis 2x2V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
SA2x2 :=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	
				$\begin{bmatrix} 8.0 \text{ ft} & 75.2 & 300.8 \text{ lbf} \\ 9.0 \text{ ft} & 59.2 & 266.4 \text{ lbf} \\ 10.0 \text{ ft} & 46.3 & 238.8 \text{ lbf} \\ 11.0 \text{ ft} & 34.8 & 216.1 \text{ lbf} \\ 12.0 \text{ ft} & 26.8 & 197.1 \text{ lbf} \\ 13.0 \text{ ft} & 21.1 & 171.1 \text{ lbf} \\ 14.0 \text{ ft} & 16.9 & 147.5 \text{ lbf} \\ 15.0 \text{ ft} & 13.7 & 128.5 \text{ lbf} \\ 16.0 \text{ ft} & 11.3 & 112.9 \text{ lbf} \\ 17.0 \text{ ft} & 9.4 & 100.0 \text{ lbf} \end{bmatrix}$

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
SA2x2C :=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	
				$\begin{bmatrix} 2.0 \text{ ft} & 303.9 & 303.9 \text{ lbf} \\ 3.0 \text{ ft} & 134.5 & 201.7 \text{ lbf} \\ 4.0 \text{ ft} & 75.2 & 150.4 \text{ lbf} \\ 5.0 \text{ ft} & 47.8 & 119.4 \text{ lbf} \\ 6.0 \text{ ft} & 32.8 & 98.5 \text{ lbf} \\ 7.0 \text{ ft} & 23.9 & 73.7 \text{ lbf} \end{bmatrix}$

Check 2x2V3 Batten (KEB5050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB5050V3} = 1.0 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB5050V3} = 0.5 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{yB5050V3} = 8.2 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Weak Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x2V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x2V3} \cdot 2 \cdot A_{webB5050V3} = 2.6 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = 83.9 \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = 66.0 \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = 53.3 \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = 43.9 \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = 36.7 \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = 31.1 \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = 26.7 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = 335 \text{ lbf}$$

$$P_{Max9ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = 298 \text{ lbf}$$

$$P_{Max10ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = 268 \text{ lbf}$$

$$P_{Max11ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = 244 \text{ lbf}$$

$$P_{Max12ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = 224 \text{ lbf}$$

$$P_{Max13ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = 206 \text{ lbf}$$

$$P_{Max14ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 192 \text{ lbf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = 23.1 \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = 20.2 \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = 17.8 \text{ plf}$$

$$P_{Max15ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = 179 \text{ lbf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = 168 \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = 158 \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = 94.0 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = 66.0 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = 48.1 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = 36.2 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = 27.9 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = 21.9 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = 17.5 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = 14.3 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = 11.8 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = 9.8 \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = 470.1 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = 371.4 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = 300.9 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = 248.7 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = 208.9 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = 178.0 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = 153.5 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = 133.7 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = 117.5 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = 104.1 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = 338.6 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = 149.9 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = 83.9 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = 53.3 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = 36.7 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = 26.7 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = 339 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = 225 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = 168 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = 133 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = 110 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = 93 \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftC\Delta} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = 1253.6 \text{ plf}$$

$$w_{3ftC\Delta} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = 371.4 \text{ plf}$$

$$w_{4ftC\Delta} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = 156.7 \text{ plf}$$

$$w_{5ftC\Delta} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = 80.2 \text{ plf}$$

$$w_{6ftC\Delta} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = 46.4 \text{ plf}$$

$$w_{7ftC\Delta} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = 29.2 \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max2ftC\Delta} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = 940.2 \text{ lbf}$$

$$P_{Max3ftC\Delta} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = 417.9 \text{ lbf}$$

$$P_{Max4ftC\Delta} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = 235.1 \text{ lbf}$$

$$P_{Max5ftC\Delta} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = 150.4 \text{ lbf}$$

$$P_{Max6ftC\Delta} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = 104.5 \text{ lbf}$$

$$P_{Max7ftC\Delta} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = 76.8 \text{ lbf}$$

Span Table Summary - Weak Axis 2x2V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																															
WA2x2:=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=																														
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$																															
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$																															
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$																															
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$																															
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$																															
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$																															
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$																															
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$																															
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$																															
				<table><tr><td>8.0 ft</td><td>83.9</td><td>335.4 lbf</td></tr><tr><td>9.0 ft</td><td>66.0</td><td>298.2 lbf</td></tr><tr><td>10.0 ft</td><td>48.1</td><td>268.3 lbf</td></tr><tr><td>11.0 ft</td><td>36.2</td><td>244.0 lbf</td></tr><tr><td>12.0 ft</td><td>27.9</td><td>208.9 lbf</td></tr><tr><td>13.0 ft</td><td>21.9</td><td>178.0 lbf</td></tr><tr><td>14.0 ft</td><td>17.5</td><td>153.5 lbf</td></tr><tr><td>15.0 ft</td><td>14.3</td><td>133.7 lbf</td></tr><tr><td>16.0 ft</td><td>11.8</td><td>117.5 lbf</td></tr><tr><td>17.0 ft</td><td>9.8</td><td>104.1 lbf</td></tr></table>	8.0 ft	83.9	335.4 lbf	9.0 ft	66.0	298.2 lbf	10.0 ft	48.1	268.3 lbf	11.0 ft	36.2	244.0 lbf	12.0 ft	27.9	208.9 lbf	13.0 ft	21.9	178.0 lbf	14.0 ft	17.5	153.5 lbf	15.0 ft	14.3	133.7 lbf	16.0 ft	11.8	117.5 lbf	17.0 ft	9.8	104.1 lbf
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	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																		
WA2x2C:=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=																	
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$																		
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$																		
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$																		
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$																		
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$																		
					<table><tr><td>2.0 ft</td><td>338.6</td><td>338.6 lbf</td></tr><tr><td>3.0 ft</td><td>149.9</td><td>224.8 lbf</td></tr><tr><td>4.0 ft</td><td>83.9</td><td>167.7 lbf</td></tr><tr><td>5.0 ft</td><td>53.3</td><td>133.2 lbf</td></tr><tr><td>6.0 ft</td><td>36.7</td><td>104.5 lbf</td></tr><tr><td>7.0 ft</td><td>26.7</td><td>76.8 lbf</td></tr></table>	2.0 ft	338.6	338.6 lbf	3.0 ft	149.9	224.8 lbf	4.0 ft	83.9	167.7 lbf	5.0 ft	53.3	133.2 lbf	6.0 ft	36.7	104.5 lbf	7.0 ft
2.0 ft	338.6	338.6 lbf																			
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5.0 ft	53.3	133.2 lbf																			
6.0 ft	36.7	104.5 lbf																			
7.0 ft	26.7	76.8 lbf																			

Check 2x4V3 Batten (KEB10050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 100 \text{ mm} = 3.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{\text{self}B50100V3} = 1.6 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB50100V3} = 2.2 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{\text{MaxSA}} := F_{ab6063T6} \cdot S_{yB50100V3} = 15.1 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x4V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{\text{MaxSA}} := F_{av2x4V3} \cdot 2 \cdot A_{\text{web}B50100xV3} = 54.4 \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Load Strong Axis:

$$w_{8ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = 155.2 \text{ plf}$$

$$w_{9ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = 122.3 \text{ plf}$$

$$w_{10ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = 98.7 \text{ plf}$$

$$w_{11ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = 81.3 \text{ plf}$$

$$w_{12ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = 68.1 \text{ plf}$$

$$w_{13ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = 57.8 \text{ plf}$$

$$w_{14ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = 49.6 \text{ plf}$$

$$w_{15ft} := \frac{M_{\text{MaxSA}} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = 43.0 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{\text{Max}8ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = 621 \text{ lbf}$$

$$P_{\text{Max}9ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (9 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = 550 \text{ lbf}$$

$$P_{\text{Max}10ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (10 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = 494 \text{ lbf}$$

$$P_{\text{Max}11ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (11 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = 447 \text{ lbf}$$

$$P_{\text{Max}12ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (12 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = 408 \text{ lbf}$$

$$P_{\text{Max}13ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (13 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = 376 \text{ lbf}$$

$$P_{\text{Max}14ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (14 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 347 \text{ lbf}$$

$$P_{\text{Max}15ft} := \frac{\left(M_{\text{MaxSA}} - \frac{w_{DL} \cdot (15 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = 322 \text{ lbf}$$

$$w_{16ft} := \frac{M_{MaxSA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = 37.6 \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxSA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = 33.1 \text{ plf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (16 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = 301 \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (17 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = 282 \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = 390.7 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = 274.4 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = 200.0 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = 150.3 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = 115.8 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = 91.0 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = 72.9 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = 59.3 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = 48.8 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = 40.7 \text{ plf}$$

Max Point Loads For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = 1953.4 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = 1543.4 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = 1250.2 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = 1033.2 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = 868.2 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = 739.7 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = 637.8 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = 555.6 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = 488.3 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = 432.6 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Load Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = 625.5 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = 277.1 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = 155.2 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = 98.7 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = 68.1 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = 49.6 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = 626 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = 416 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = 310 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = 247 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = 204 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = 174 \text{ lbf}$$

Max Distributed Load For Deflection - Strong Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = 5209.0 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = 1543.4 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = 651.1 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = 333.4 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = 192.9 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = 121.5 \text{ plf}$$

Max Point Load For Deflection - Strong Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = 3906.7 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = 1736.3 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = 976.7 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = 625.1 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = 434.1 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = 318.9 \text{ lbf}$$

Span Table Summary - Strong Axis 2x4V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																															
SA2x4 :=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=																														
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$																															
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$																															
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$																															
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$																															
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$																															
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$																															
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$																															
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$																															
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$																															
				<table><tr><td>8.0 ft</td><td>155.2</td><td>620.7 lbf</td></tr><tr><td>9.0 ft</td><td>122.3</td><td>550.3 lbf</td></tr><tr><td>10.0 ft</td><td>98.7</td><td>493.7 lbf</td></tr><tr><td>11.0 ft</td><td>81.3</td><td>447.3 lbf</td></tr><tr><td>12.0 ft</td><td>68.1</td><td>408.5 lbf</td></tr><tr><td>13.0 ft</td><td>57.8</td><td>375.5 lbf</td></tr><tr><td>14.0 ft</td><td>49.6</td><td>347.2 lbf</td></tr><tr><td>15.0 ft</td><td>43.0</td><td>322.5 lbf</td></tr><tr><td>16.0 ft</td><td>37.6</td><td>300.8 lbf</td></tr><tr><td>17.0 ft</td><td>33.1</td><td>281.5 lbf</td></tr></table>	8.0 ft	155.2	620.7 lbf	9.0 ft	122.3	550.3 lbf	10.0 ft	98.7	493.7 lbf	11.0 ft	81.3	447.3 lbf	12.0 ft	68.1	408.5 lbf	13.0 ft	57.8	375.5 lbf	14.0 ft	49.6	347.2 lbf	15.0 ft	43.0	322.5 lbf	16.0 ft	37.6	300.8 lbf	17.0 ft	33.1	281.5 lbf
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	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																		
SA2x4C:=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=																	
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$																		
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$																		
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$																		
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$																		
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$																		
					<table><tr><td>2.0 ft</td><td>625.5</td><td>625.5 lbf</td></tr><tr><td>3.0 ft</td><td>277.1</td><td>415.7 lbf</td></tr><tr><td>4.0 ft</td><td>155.2</td><td>310.4 lbf</td></tr><tr><td>5.0 ft</td><td>98.7</td><td>246.9 lbf</td></tr><tr><td>6.0 ft</td><td>68.1</td><td>204.2 lbf</td></tr><tr><td>7.0 ft</td><td>49.6</td><td>173.6 lbf</td></tr></table>	2.0 ft	625.5	625.5 lbf	3.0 ft	277.1	415.7 lbf	4.0 ft	155.2	310.4 lbf	5.0 ft	98.7	246.9 lbf	6.0 ft	68.1	204.2 lbf	7.0 ft
2.0 ft	625.5	625.5 lbf																			
3.0 ft	277.1	415.7 lbf																			
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5.0 ft	98.7	246.9 lbf																			
6.0 ft	68.1	204.2 lbf																			
7.0 ft	49.6	173.6 lbf																			

Check 2x4V3 Batten (KEB10050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 100 \text{ mm} = 3.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50100V3} = 1.6 \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB50100V3} = 0.8 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{xB50100V3} = 12.6 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Weak Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x4V3} = 9.1 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x4V3} \cdot 2 \cdot A_{webB50100yV3} = 2.6 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = 129.8 \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = 102.2 \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = 82.5 \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = 67.9 \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = 56.8 \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = 48.2 \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = 41.3 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = 519 \text{ lbf}$$

$$P_{Max9ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (9 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = 460 \text{ lbf}$$

$$P_{Max10ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (10 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = 413 \text{ lbf}$$

$$P_{Max11ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (11 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = 374 \text{ lbf}$$

$$P_{Max12ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (12 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = 341 \text{ lbf}$$

$$P_{Max13ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (13 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = 313 \text{ lbf}$$

$$P_{Max14ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (14 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 289 \text{ lbf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = 35.8 \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = 31.3 \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = 27.5 \text{ plf}$$

$$P_{Max15ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (15 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = 268 \text{ lbf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (16 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = 250 \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (17 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = 234 \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = 143.3 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = 100.6 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = 73.3 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = 55.1 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = 42.4 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = 33.4 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = 26.7 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = 21.7 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = 17.9 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = 14.9 \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = 716.3 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = 566.0 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = 458.4 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = 378.9 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = 318.4 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = 271.3 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = 233.9 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = 203.7 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = 179.1 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = 158.6 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = 524.1 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = 232.0 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = 129.8 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = 82.5 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = 56.8 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = 41.3 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = 524 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = 348 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = 260 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = 206 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = 170 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = 145 \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = 1910.1 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = 566.0 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = 238.8 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = 122.2 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = 70.7 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = 44.6 \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = 1432.6 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = 636.7 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = 358.1 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = 229.2 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = 159.2 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = 116.9 \text{ lbf}$$

Span Table Summary - Weak Axis 2x4V3:

<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	
9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	

WA2x4 :=

8.0 ft	129.8	519.3	lbf
9.0 ft	100.6	460.1	lbf
10.0 ft	73.3	412.5	lbf
11.0 ft	55.1	373.5	lbf
12.0 ft	42.4	318.4	lbf
13.0 ft	33.4	271.3	lbf
14.0 ft	26.7	233.9	lbf
15.0 ft	21.7	203.7	lbf
16.0 ft	17.9	179.1	lbf
17.0 ft	14.9	158.6	lbf

<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>	
2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	
3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	

WA2x4C :=

2.0 ft	524.1	524.1	lbf
3.0 ft	232.0	348.1	lbf
4.0 ft	129.8	259.6	lbf
5.0 ft	82.5	206.3	lbf
6.0 ft	56.8	159.2	lbf
7.0 ft	41.3	116.9	lbf

Check 2x6V3 Batten (KEB15050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 150 \text{ mm} = 5.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50150V3} = 2.0 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB50150V3} = 6.2 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxSA} := F_{ab6063T6} \cdot S_{yB50150V3} = 27.6 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x6V3} = 5.9 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxSA} := F_{av2x6V3} \cdot 2 \cdot A_{webB50150xV3} = 5.4 \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Load Strong Axis:

$$w_{8ft} := \frac{M_{MaxSA} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = 285.5 \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxSA} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = 225.2 \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxSA} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = 182.0 \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxSA} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = 150.1 \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxSA} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = 125.8 \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxSA} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = 106.9 \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxSA} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = 91.9 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max8ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = 1142 \text{ lbf}$$

$$P_{Max9ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (9 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = 1013 \text{ lbf}$$

$$P_{Max10ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (10 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = 910 \text{ lbf}$$

$$P_{Max11ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (11 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = 825 \text{ lbf}$$

$$P_{Max12ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (12 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = 755 \text{ lbf}$$

$$P_{Max13ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (13 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = 695 \text{ lbf}$$

$$P_{Max14ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (14 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 643 \text{ lbf}$$

$$w_{15ft} := \frac{M_{MaxSA} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = 79.8 \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxSA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = 69.9 \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxSA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = 61.7 \text{ plf}$$

$$P_{Max15ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (15 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = 598 \text{ lbf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (16 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = 559 \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (17 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = 524 \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = 1085.9 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = 762.7 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = 556.0 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = 417.7 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = 321.8 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = 253.1 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = 202.6 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = 164.7 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = 135.7 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = 113.2 \text{ plf}$$

Max Point Loads For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = 5429.6 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = 4290.1 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = 3475.0 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = 2871.9 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = 2413.2 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = 2056.2 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = 1772.9 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = 1544.4 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = 1357.4 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = 1202.4 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = 1148.2 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = 509.2 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = 285.5 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = 182.0 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = 125.8 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = 91.9 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = 1148 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = 764 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = 571 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = 455 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = 377 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = 322 \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{2ftC\Delta} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = 14479.0 \text{ plf}$$

$$w_{3ftC\Delta} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = 4290.1 \text{ plf}$$

$$w_{4ftC\Delta} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = 1809.9 \text{ plf}$$

$$w_{5ftC\Delta} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = 926.7 \text{ plf}$$

$$w_{6ftC\Delta} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = 536.3 \text{ plf}$$

$$w_{7ftC\Delta} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = 337.7 \text{ plf}$$

Max Point Loads For Deflection - Strong Axis:

$$P_{Max2ftC\Delta} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = 10859.3 \text{ lbf}$$

$$P_{Max3ftC\Delta} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = 4826.3 \text{ lbf}$$

$$P_{Max4ftC\Delta} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = 2714.8 \text{ lbf}$$

$$P_{Max5ftC\Delta} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = 1737.5 \text{ lbf}$$

$$P_{Max6ftC\Delta} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = 1206.6 \text{ lbf}$$

$$P_{Max7ftC\Delta} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = 886.5 \text{ lbf}$$

Span Table Summary - Strong Axis 2x6V3:

<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>
8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$
9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$
10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$
11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$
12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$
13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$
14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$
15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$
16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$
17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																	
SA2x6C :=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftCD})}{plf} \min(P_{Max2ftC}, P_{Max2ftCD})$																		
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftCD})}{plf} \min(P_{Max3ftC}, P_{Max3ftCD})$																		
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftCD})}{plf} \min(P_{Max4ftC}, P_{Max4ftCD})$																		
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftCD})}{plf} \min(P_{Max5ftC}, P_{Max5ftCD})$																		
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftCD})}{plf} \min(P_{Max6ftC}, P_{Max6ftCD})$																		
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftCD})}{plf} \min(P_{Max7ftC}, P_{Max7ftCD})$																		
			<table><tr><td>2.0 ft</td><td>1148.2</td><td>1148.2 lb/ft</td></tr><tr><td>3.0 ft</td><td>509.2</td><td>763.8 lb/ft</td></tr><tr><td>4.0 ft</td><td>285.5</td><td>571.1 lb/ft</td></tr><tr><td>5.0 ft</td><td>182.0</td><td>455.1 lb/ft</td></tr><tr><td>6.0 ft</td><td>125.8</td><td>377.4 lb/ft</td></tr><tr><td>7.0 ft</td><td>91.9</td><td>321.6 lb/ft</td></tr></table>	2.0 ft	1148.2	1148.2 lb/ft	3.0 ft	509.2	763.8 lb/ft	4.0 ft	285.5	571.1 lb/ft	5.0 ft	182.0	455.1 lb/ft	6.0 ft	125.8	377.4 lb/ft	7.0 ft	91.9
2.0 ft	1148.2	1148.2 lb/ft																		
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5.0 ft	182.0	455.1 lb/ft																		
6.0 ft	125.8	377.4 lb/ft																		
7.0 ft	91.9	321.6 lb/ft																		

Check 2x6V3 Batten (KEB15050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 150 \text{ mm} = 5.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50150V3} = 2.0 \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB50150V3} = 1.1 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{xB50150V3} = 17.0 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Weak Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x6V3} = 5.9 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x6V3} \cdot 2 \cdot A_{webB50150V3} = 1.7 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = 175.4 \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = 138.2 \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = 111.5 \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = 91.8 \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = 76.8 \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = 65.2 \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = 55.9 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = 702 \text{ lbf}$$

$$P_{Max9ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (9 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = 622 \text{ lbf}$$

$$P_{Max10ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (10 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = 558 \text{ lbf}$$

$$P_{Max11ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (11 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = 505 \text{ lbf}$$

$$P_{Max12ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (12 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = 461 \text{ lbf}$$

$$P_{Max13ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (13 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = 424 \text{ lbf}$$

$$P_{Max14ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (14 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 391 \text{ lbf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = 48.5 \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = 42.3 \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = 37.3 \text{ plf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = 193.4 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = 135.8 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = 99.0 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = 74.4 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = 57.3 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = 45.1 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = 36.1 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = 29.3 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = 24.2 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = 20.2 \text{ plf}$$

$$P_{Max15ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (15 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = 363 \text{ lbf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (16 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = 339 \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (17 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = 317 \text{ lbf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = 967.0 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = 764.1 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = 618.9 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = 511.5 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = 429.8 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = 366.2 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = 315.8 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = 275.1 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = 241.8 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = 214.2 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = 707.7 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = 313.4 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = 175.4 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = 111.5 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = 76.8 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = 55.9 \text{ plf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = 2578.8 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = 764.1 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = 322.3 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = 165.0 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = 95.5 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = 60.1 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = 708 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = 470 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = 351 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = 279 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = 231 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = 196 \text{ lbf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = 1934.1 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = 859.6 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = 483.5 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = 309.5 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = 214.9 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = 157.9 \text{ lbf}$$

Span Table Summary - Weak Axis 2x6V3:

	Span	Max Distributed (plf)	Max Point	
WA2x6:=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$	
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$	
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$	
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$	
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$	
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$	
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$	
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$	
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$	
	8.0 ft	175.4	701.7 lbf	
	9.0 ft	135.8	621.8 lbf	
	10.0 ft	99.0	557.7 lbf	
	11.0 ft	74.4	505.1 lbf	
	12.0 ft	57.3	429.8 lbf	
	13.0 ft	45.1	366.2 lbf	
	14.0 ft	36.1	315.8 lbf	
	15.0 ft	29.3	275.1 lbf	
	16.0 ft	24.2	241.8 lbf	
	17.0 ft	20.2	214.2 lbf	

	Span	Max Distributed (plf)	Max Point	
WA2x6C:=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$	
	4 ft	$\frac{\min(w_{4ftC}, w_{4ftC\Delta})}{plf}$	$\min(P_{Max4ftC}, P_{Max4ftC\Delta})$	
	5 ft	$\frac{\min(w_{5ftC}, w_{5ftC\Delta})}{plf}$	$\min(P_{Max5ftC}, P_{Max5ftC\Delta})$	
	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$	
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$	
	2.0 ft	707.7	707.7 lbf	
	3.0 ft	313.4	470.1 lbf	
	4.0 ft	175.4	350.8 lbf	
	5.0 ft	111.5	278.9 lbf	
	6.0 ft	76.8	214.9 lbf	
	7.0 ft	55.9	157.9 lbf	

Check 2x8V3 Batten (KEB20050FV3/KEB5050MV3 - 6063-T6) - Strong Axis:

$$d_b := 200 \text{ mm} = 7.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50200V3} = 2.8 \text{ plf} \quad \text{Self Weight of Member} \quad I_y := I_{yB50200V3} = 14.6 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxSA} := F_{ab6063T6} \cdot S_{yB50200V3} = 50.9 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Strong Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x8V3} = 4.0 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxSA} := F_{av2x8V3} \cdot 2 \cdot A_{webB50200xV3} = 5.0 \text{ kip}$$

Max Shear Allowed for Batten - Strong Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Load Strong Axis:

$$w_{8ft} := \frac{M_{MaxSA} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = 527.4 \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxSA} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = 416.1 \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxSA} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = 336.6 \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxSA} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = 277.7 \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxSA} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = 232.9 \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxSA} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = 198.0 \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxSA} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = 170.4 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max8ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = 2110 \text{ lbf}$$

$$P_{Max9ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (9 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = 1873 \text{ lbf}$$

$$P_{Max10ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (10 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = 1683 \text{ lbf}$$

$$P_{Max11ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (11 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = 1527 \text{ lbf}$$

$$P_{Max12ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (12 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = 1397 \text{ lbf}$$

$$P_{Max13ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (13 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = 1287 \text{ lbf}$$

$$P_{Max14ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (14 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 1193 \text{ lbf}$$

$$w_{15ft} := \frac{M_{MaxSA} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = 148.0 \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxSA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = 129.8 \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxSA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = 114.7 \text{ plf}$$

$$P_{Max15ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (15 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = 1110 \text{ lbf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (16 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = 1038 \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxSA} - \frac{w_{DL} \cdot (17 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = 975 \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (8 \text{ ft})^4} = 2554.1 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (9 \text{ ft})^4} = 1793.8 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (10 \text{ ft})^4} = 1307.7 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (11 \text{ ft})^4} = 982.5 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (12 \text{ ft})^4} = 756.8 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (13 \text{ ft})^4} = 595.2 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (14 \text{ ft})^4} = 476.6 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (15 \text{ ft})^4} = 387.5 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (16 \text{ ft})^4} = 319.3 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_y}{5 \cdot (17 \text{ ft})^4} = 266.2 \text{ plf}$$

Max Point Loads For Deflection - Strong Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(8 \text{ ft})^3} = 12770.5 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(9 \text{ ft})^3} = 10090.3 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(10 \text{ ft})^3} = 8173.1 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(11 \text{ ft})^3} = 6754.7 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(12 \text{ ft})^3} = 5675.8 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(13 \text{ ft})^3} = 4836.2 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(14 \text{ ft})^3} = 4170.0 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(15 \text{ ft})^3} = 3632.5 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(16 \text{ ft})^3} = 3192.6 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_y}{(17 \text{ ft})^3} = 2828.1 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Strong Axis:

$$w_{2ftC} := \frac{M_{MaxSA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = 2118.0 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxSA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = 939.8 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxSA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = 527.4 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxSA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = 336.6 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxSA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = 232.9 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxSA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = 170.4 \text{ plf}$$

Max Point Loads Strong Axis:

$$P_{Max2ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = 2118 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = 1410 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = 1055 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = 841 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = 699 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxSA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = 596 \text{ lbf}$$

Max Distributed Loads For Deflection - Strong Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(2 \text{ ft})^4} = 34054.8 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(3 \text{ ft})^4} = 10090.3 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(4 \text{ ft})^4} = 4256.8 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(5 \text{ ft})^4} = 2179.5 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(6 \text{ ft})^4} = 1261.3 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_y}{(7 \text{ ft})^4} = 794.3 \text{ plf}$$

Max Point Loads For Deflection - Strong Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(2 \text{ ft})^3} = 25541.1 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(3 \text{ ft})^3} = 11351.6 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(4 \text{ ft})^3} = 6385.3 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(5 \text{ ft})^3} = 4086.6 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(6 \text{ ft})^3} = 2837.9 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_y}{(7 \text{ ft})^3} = 2085.0 \text{ lbf}$$

Span Table Summary - Strong Axis 2x8V3:

	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																																									
SA2x8:=	8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{plf}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$	=																																								
	9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{plf}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$																																									
	10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{plf}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$																																									
	11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{plf}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$																																									
	12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{plf}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$																																									
	13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{plf}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$																																									
	14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{plf}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$																																									
	15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{plf}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$																																									
	16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{plf}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$																																									
	17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{plf}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$																																									
				<table><tr><td>8.0 ft</td><td>527.4</td><td>2109.7</td><td>lbf</td></tr><tr><td>9.0 ft</td><td>416.1</td><td>1872.7</td><td>lbf</td></tr><tr><td>10.0 ft</td><td>336.6</td><td>1682.8</td><td>lbf</td></tr><tr><td>11.0 ft</td><td>277.7</td><td>1527.2</td><td>lbf</td></tr><tr><td>12.0 ft</td><td>232.9</td><td>1397.3</td><td>lbf</td></tr><tr><td>13.0 ft</td><td>198.0</td><td>1287.1</td><td>lbf</td></tr><tr><td>14.0 ft</td><td>170.4</td><td>1192.5</td><td>lbf</td></tr><tr><td>15.0 ft</td><td>148.0</td><td>1110.4</td><td>lbf</td></tr><tr><td>16.0 ft</td><td>129.8</td><td>1038.3</td><td>lbf</td></tr><tr><td>17.0 ft</td><td>114.7</td><td>974.5</td><td>lbf</td></tr></table>	8.0 ft	527.4	2109.7	lbf	9.0 ft	416.1	1872.7	lbf	10.0 ft	336.6	1682.8	lbf	11.0 ft	277.7	1527.2	lbf	12.0 ft	232.9	1397.3	lbf	13.0 ft	198.0	1287.1	lbf	14.0 ft	170.4	1192.5	lbf	15.0 ft	148.0	1110.4	lbf	16.0 ft	129.8	1038.3	lbf	17.0 ft	114.7	974.5	lbf
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	<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>																								
SA2x8C :=	2 ft	$\frac{\min(w_{2ftC}, w_{2ftC\Delta})}{plf}$	$\min(P_{Max2ftC}, P_{Max2ftC\Delta})$	=																							
	3 ft	$\frac{\min(w_{3ftC}, w_{3ftC\Delta})}{plf}$	$\min(P_{Max3ftC}, P_{Max3ftC\Delta})$																								
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	6 ft	$\frac{\min(w_{6ftC}, w_{6ftC\Delta})}{plf}$	$\min(P_{Max6ftC}, P_{Max6ftC\Delta})$																								
	7 ft	$\frac{\min(w_{7ftC}, w_{7ftC\Delta})}{plf}$	$\min(P_{Max7ftC}, P_{Max7ftC\Delta})$																								
					<table><tr><td>2.0 ft</td><td>2118.0</td><td>2118.0</td><td>lbf</td></tr><tr><td>3.0 ft</td><td>939.8</td><td>1409.7</td><td>lbf</td></tr><tr><td>4.0 ft</td><td>527.4</td><td>1054.8</td><td>lbf</td></tr><tr><td>5.0 ft</td><td>336.6</td><td>841.4</td><td>lbf</td></tr><tr><td>6.0 ft</td><td>232.9</td><td>698.6</td><td>lbf</td></tr><tr><td>7.0 ft</td><td>170.4</td><td>596.3</td><td>lbf</td></tr></table>	2.0 ft	2118.0	2118.0	lbf	3.0 ft	939.8	1409.7	lbf	4.0 ft	527.4	1054.8	lbf	5.0 ft	336.6	841.4	lbf	6.0 ft	232.9	698.6	lbf	7.0 ft	170.4
2.0 ft	2118.0	2118.0	lbf																								
3.0 ft	939.8	1409.7	lbf																								
4.0 ft	527.4	1054.8	lbf																								
5.0 ft	336.6	841.4	lbf																								
6.0 ft	232.9	698.6	lbf																								
7.0 ft	170.4	596.3	lbf																								

Check 2x8V3 Batten (KEB20050FV3/KEB5050MV3 - 6063-T6) - Weak Axis:

$$d_b := 200 \text{ mm} = 7.9 \text{ in} \quad \text{Depth of Member} \quad s_b := 50 \text{ mm} = 2.0 \text{ in} \quad \text{Width of Member}$$

$$w_{DL} := w_{selfB50200V3} = 2.8 \text{ plf} \quad \text{Self Weight of Member} \quad I_x := I_{xB50200V3} = 1.6 \text{ in}^4$$

Max allowable moments and shear considering batten simply supported between 2 supports. Note, dead load does not cause bending in this orientation.

Maximum Allowable Batten Moment:

Strong axis bending:

$$F_{ab6063T6} = 15.2 \text{ ksi}$$

Max Allowable Bending Stress per ADM

$$M_{MaxWA} := F_{ab6063T6} \cdot S_{xB50200V3} = 24.8 \text{ kip} \cdot \text{in}$$

Max Moment Allowed for Batten - Weak Axis Bending

Maximum Allowable Batten Shear:

$$F_{av2x8V3} = 4.0 \text{ ksi}$$

Max Allowable Shear Stress per ADM

$$V_{MaxWA} := F_{av2x8V3} \cdot 2 \cdot A_{webB50200V3} = 1.3 \text{ kip}$$

Max Shear Allowed for Batten - Weak Axis

Note, Bending Controls so Shear is Not shown in Checks Below.

Maximum Allowable Design Pressures For Different Spans:

Maximum Allowable Loads for Simply Supported Battens:

Max Distributed Loads Weak Axis:

$$w_{8ft} := \frac{M_{MaxWA} \cdot 8}{(8 \text{ ft})^2} - w_{DL} = 255.6 \text{ plf}$$

$$w_{9ft} := \frac{M_{MaxWA} \cdot 8}{(9 \text{ ft})^2} - w_{DL} = 201.4 \text{ plf}$$

$$w_{10ft} := \frac{M_{MaxWA} \cdot 8}{(10 \text{ ft})^2} - w_{DL} = 162.6 \text{ plf}$$

$$w_{11ft} := \frac{M_{MaxWA} \cdot 8}{(11 \text{ ft})^2} - w_{DL} = 133.9 \text{ plf}$$

$$w_{12ft} := \frac{M_{MaxWA} \cdot 8}{(12 \text{ ft})^2} - w_{DL} = 112.1 \text{ plf}$$

$$w_{13ft} := \frac{M_{MaxWA} \cdot 8}{(13 \text{ ft})^2} - w_{DL} = 95.1 \text{ plf}$$

$$w_{14ft} := \frac{M_{MaxWA} \cdot 8}{(14 \text{ ft})^2} - w_{DL} = 81.6 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max8ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (8 \text{ ft})^2}{8} \right) \cdot 4}{8 \text{ ft}} = 1022 \text{ lbf}$$

$$P_{Max9ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (9 \text{ ft})^2}{8} \right) \cdot 4}{9 \text{ ft}} = 906 \text{ lbf}$$

$$P_{Max10ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (10 \text{ ft})^2}{8} \right) \cdot 4}{10 \text{ ft}} = 813 \text{ lbf}$$

$$P_{Max11ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (11 \text{ ft})^2}{8} \right) \cdot 4}{11 \text{ ft}} = 736 \text{ lbf}$$

$$P_{Max12ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (12 \text{ ft})^2}{8} \right) \cdot 4}{12 \text{ ft}} = 672 \text{ lbf}$$

$$P_{Max13ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (13 \text{ ft})^2}{8} \right) \cdot 4}{13 \text{ ft}} = 618 \text{ lbf}$$

$$P_{Max14ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (14 \text{ ft})^2}{8} \right) \cdot 4}{14 \text{ ft}} = 571 \text{ lbf}$$

$$w_{15ft} := \frac{M_{MaxWA} \cdot 8}{(15 \text{ ft})^2} - w_{DL} = 70.7 \text{ plf}$$

$$w_{16ft} := \frac{M_{MaxWA} \cdot 8}{(16 \text{ ft})^2} - w_{DL} = 61.8 \text{ plf}$$

$$w_{17ft} := \frac{M_{MaxWA} \cdot 8}{(17 \text{ ft})^2} - w_{DL} = 54.5 \text{ plf}$$

$$P_{Max15ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (15 \text{ ft})^2}{8} \right) \cdot 4}{15 \text{ ft}} = 530 \text{ lbf}$$

$$P_{Max16ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (16 \text{ ft})^2}{8} \right) \cdot 4}{16 \text{ ft}} = 495 \text{ lbf}$$

$$P_{Max17ft} := \frac{\left(M_{MaxWA} - \frac{w_{DL} \cdot (17 \text{ ft})^2}{8} \right) \cdot 4}{17 \text{ ft}} = 463 \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (8 \text{ ft})^4} = 281.6 \text{ plf}$$

$$w_{9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (9 \text{ ft})^4} = 197.8 \text{ plf}$$

$$w_{10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (10 \text{ ft})^4} = 144.2 \text{ plf}$$

$$w_{11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (11 \text{ ft})^4} = 108.3 \text{ plf}$$

$$w_{12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (12 \text{ ft})^4} = 83.4 \text{ plf}$$

$$w_{13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (13 \text{ ft})^4} = 65.6 \text{ plf}$$

$$w_{14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (14 \text{ ft})^4} = 52.5 \text{ plf}$$

$$w_{15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (15 \text{ ft})^4} = 42.7 \text{ plf}$$

$$w_{16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (16 \text{ ft})^4} = 35.2 \text{ plf}$$

$$w_{17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 384 \cdot E \cdot I_x}{5 \cdot (17 \text{ ft})^4} = 29.3 \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max8ft\Delta} := \frac{\frac{8 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(8 \text{ ft})^3} = 1408.0 \text{ lbf}$$

$$P_{Max9ft\Delta} := \frac{\frac{9 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(9 \text{ ft})^3} = 1112.5 \text{ lbf}$$

$$P_{Max10ft\Delta} := \frac{\frac{10 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(10 \text{ ft})^3} = 901.1 \text{ lbf}$$

$$P_{Max11ft\Delta} := \frac{\frac{11 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(11 \text{ ft})^3} = 744.7 \text{ lbf}$$

$$P_{Max12ft\Delta} := \frac{\frac{12 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(12 \text{ ft})^3} = 625.8 \text{ lbf}$$

$$P_{Max13ft\Delta} := \frac{\frac{13 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(13 \text{ ft})^3} = 533.2 \text{ lbf}$$

$$P_{Max14ft\Delta} := \frac{\frac{14 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(14 \text{ ft})^3} = 459.8 \text{ lbf}$$

$$P_{Max15ft\Delta} := \frac{\frac{15 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(15 \text{ ft})^3} = 400.5 \text{ lbf}$$

$$P_{Max16ft\Delta} := \frac{\frac{16 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(16 \text{ ft})^3} = 352.0 \text{ lbf}$$

$$P_{Max17ft\Delta} := \frac{\frac{17 \text{ ft}}{60} \cdot 48 \cdot E \cdot I_x}{(17 \text{ ft})^3} = 311.8 \text{ lbf}$$

Maximum Allowable Design Pressures For Cantilevered Battens:

Maximum Allowable Loads for Cantilevered Battens:

Max Distributed Loads Weak Axis:

$$w_{2ftC} := \frac{M_{MaxWA} \cdot 2}{(2 \text{ ft})^2} - w_{DL} = 1030.6 \text{ plf}$$

$$w_{3ftC} := \frac{M_{MaxWA} \cdot 2}{(3 \text{ ft})^2} - w_{DL} = 456.5 \text{ plf}$$

$$w_{4ftC} := \frac{M_{MaxWA} \cdot 2}{(4 \text{ ft})^2} - w_{DL} = 255.6 \text{ plf}$$

$$w_{5ftC} := \frac{M_{MaxWA} \cdot 2}{(5 \text{ ft})^2} - w_{DL} = 162.6 \text{ plf}$$

$$w_{6ftC} := \frac{M_{MaxWA} \cdot 2}{(6 \text{ ft})^2} - w_{DL} = 112.1 \text{ plf}$$

$$w_{7ftC} := \frac{M_{MaxWA} \cdot 2}{(7 \text{ ft})^2} - w_{DL} = 81.6 \text{ plf}$$

Max Point Loads Weak Axis:

$$P_{Max2ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (2 \text{ ft})^2}{2}}{2 \text{ ft}} = 1031 \text{ lbf}$$

$$P_{Max3ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (3 \text{ ft})^2}{2}}{3 \text{ ft}} = 685 \text{ lbf}$$

$$P_{Max4ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (4 \text{ ft})^2}{2}}{4 \text{ ft}} = 511 \text{ lbf}$$

$$P_{Max5ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (5 \text{ ft})^2}{2}}{5 \text{ ft}} = 406 \text{ lbf}$$

$$P_{Max6ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (6 \text{ ft})^2}{2}}{6 \text{ ft}} = 336 \text{ lbf}$$

$$P_{Max7ftC} := \frac{M_{MaxWA} - \frac{w_{DL} \cdot (7 \text{ ft})^2}{2}}{7 \text{ ft}} = 286 \text{ lbf}$$

Max Distributed Loads For Deflection - Weak Axis:

$$w_{2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(2 \text{ ft})^4} = 3754.8 \text{ plf}$$

$$w_{3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(3 \text{ ft})^4} = 1112.5 \text{ plf}$$

$$w_{4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(4 \text{ ft})^4} = 469.3 \text{ plf}$$

$$w_{5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(5 \text{ ft})^4} = 240.3 \text{ plf}$$

$$w_{6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(6 \text{ ft})^4} = 139.1 \text{ plf}$$

$$w_{7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 8 \cdot E \cdot I_x}{(7 \text{ ft})^4} = 87.6 \text{ plf}$$

Max Point Loads For Deflection - Weak Axis:

$$P_{Max2ftCD} := \frac{\frac{2 \cdot 2 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(2 \text{ ft})^3} = 2816.1 \text{ lbf}$$

$$P_{Max3ftCD} := \frac{\frac{2 \cdot 3 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(3 \text{ ft})^3} = 1251.6 \text{ lbf}$$

$$P_{Max4ftCD} := \frac{\frac{2 \cdot 4 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(4 \text{ ft})^3} = 704.0 \text{ lbf}$$

$$P_{Max5ftCD} := \frac{\frac{2 \cdot 5 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(5 \text{ ft})^3} = 450.6 \text{ lbf}$$

$$P_{Max6ftCD} := \frac{\frac{2 \cdot 6 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(6 \text{ ft})^3} = 312.9 \text{ lbf}$$

$$P_{Max7ftCD} := \frac{\frac{2 \cdot 7 \text{ ft}}{60} \cdot 3 \cdot E \cdot I_x}{(7 \text{ ft})^3} = 229.9 \text{ lbf}$$

Span Table Summary - Weak Axis 2x8V3:

<u>Span</u>	<u>Max Distributed (plf)</u>	<u>Max Point</u>
8 ft	$\frac{\min(w_{8ft}, w_{8ft\Delta})}{\text{plf}}$	$\min(P_{Max8ft}, P_{Max8ft\Delta})$
9 ft	$\frac{\min(w_{9ft}, w_{9ft\Delta})}{\text{plf}}$	$\min(P_{Max9ft}, P_{Max9ft\Delta})$
10 ft	$\frac{\min(w_{10ft}, w_{10ft\Delta})}{\text{plf}}$	$\min(P_{Max10ft}, P_{Max10ft\Delta})$
11 ft	$\frac{\min(w_{11ft}, w_{11ft\Delta})}{\text{plf}}$	$\min(P_{Max11ft}, P_{Max11ft\Delta})$
12 ft	$\frac{\min(w_{12ft}, w_{12ft\Delta})}{\text{plf}}$	$\min(P_{Max12ft}, P_{Max12ft\Delta})$
13 ft	$\frac{\min(w_{13ft}, w_{13ft\Delta})}{\text{plf}}$	$\min(P_{Max13ft}, P_{Max13ft\Delta})$
14 ft	$\frac{\min(w_{14ft}, w_{14ft\Delta})}{\text{plf}}$	$\min(P_{Max14ft}, P_{Max14ft\Delta})$
15 ft	$\frac{\min(w_{15ft}, w_{15ft\Delta})}{\text{plf}}$	$\min(P_{Max15ft}, P_{Max15ft\Delta})$
16 ft	$\frac{\min(w_{16ft}, w_{16ft\Delta})}{\text{plf}}$	$\min(P_{Max16ft}, P_{Max16ft\Delta})$
17 ft	$\frac{\min(w_{17ft}, w_{17ft\Delta})}{\text{plf}}$	$\min(P_{Max17ft}, P_{Max17ft\Delta})$

Span

Max Distributed (plf)

Max Point

2 ft

min (w_{2ftC} , w_{2ftCD})

plf

min (P_{Max2ftC} , P_{Max2ftCD})

3 ft

min (w_{3ftC} , w_{3ftCD})

plf

min (P_{Max3ftC} , P_{Max3ftCD})

4 ft

min (w_{4ftC} , w_{4ftCD})

plf

min (P_{Max4ftC} , P_{Max4ftCD})

5 ft

min (w_{5ftC} , w_{5ftCD})

plf

min (P_{Max5ftC} , P_{Max5ftCD})

6 ft

min (w_{6ftC} , w_{6ftCD})

plf

min (P_{Max6ftC} , P_{Max6ftCD})

7 ft

min (w_{7ftC} , w_{7ftCD})

plf

min (P_{Max7ftC} , P_{Max7ftCD})

WA2x8C :=

=

2.0 ft

1030.6

1030.6

lbft

3.0 ft

456.5

684.8

lbft

4.0 ft

255.6

511.2

lbft

5.0 ft

162.6

406.4

lbft

6.0 ft

112.1

312.9

lbft

7.0 ft

81.6

229.9

lbft

Check Thermal Expansion of Batten:

Check the change in length due to change in temperature along the longest unrestrained length of the battens.

$$\Delta_t := 100 \text{ } ^\circ F$$

Max change in temperature considered.

$$\alpha := 0.0000142 \frac{\text{in}}{\text{in}} / ^\circ F$$

Aluminum Thermal Expansion Coefficient

$$E_A := 10100 \text{ ksi}$$

Aluminum Young's Modulus (6063-T6 Alloy)

$$L_O := 18.5 \text{ ft}$$

Max Length of Batten (Considering Max Unrestrained Span Length)

$$D := 0.21 \text{ in}$$

Diameter of Fastener

$$n := 2$$

Number of Fasteners

Find change in length from temperature change:

$$\Delta_l := \alpha \cdot \Delta_t \cdot L_O = 0.3 \text{ in}$$

Linear expansion due to change in temperature

$$L_{min1} := 2 \Delta_l + D = 0.8 \text{ in}$$

Min Slot Length with Slot at One End

$$L_{min2} := \frac{2 \Delta_l + 2 D}{2} = 0.5 \text{ in}$$

Min Slot Length with a Slots At Each End

Therefore, Provide Slots 1" Long at One End or 1/2" Long Slots at all Connections for Single Batten

APPENDIX 'A'

(TECHNICAL & PRODUCT DATA SHEETS)

Please be advised, the product data sheets contained in this appendix are included in this submission for their load capacities only, which are referenced in the attached calculations. PVE does not mandate that the contractor must use the exact products manufactured by the companies listed on said product data sheets. The contractor may substitute for any of the products contained in this appendix provided that the substituted products are equivalent or better than those listed in this appendix.

TABLE FROM 2015 ADM

Table 2-21
ALLOWABLE STRESSES F/Ω (k/in²) FOR BUILDING-TYPE STRUCTURES (UNWELDED)

<u>Axial Tension</u>	Section	F/Ω	6063 - T6 B221, B241, B429 0.000 to 1.000 in. thick	
axial tension stress on net effective area	D.2b	15.4		
axial tension stress on gross area	D.2a	15.2		
<u>Shear or torsion</u>				
Shear or torsion rupture	G, H.2	9.2	$F_{ty} =$	25 k/in ²
<u>Bearing</u>				
bolts or rivets on holes	J.3.6a, J.4.6	30.8	$F_{cy} =$	25 k/in ²
bolts on slots, pins on holes, flat surfaces	J.3.6b, J.6.5, J.8	20.5	$F_{tu} =$	30 k/in ²
screws in holes	J.5.5.1	20.0	$E =$	10,100 k/in ²
			$k_t =$	1

		λ	F/Ω for $\lambda \leq \lambda_1$	λ_1	F/Ω for $\lambda_1 < \lambda < \lambda_2$	λ_2	F/Ω for $\lambda \geq \lambda_2$
<u>Axial Compression</u> - member buckling	E.2	kL/r	15.2	18.2	$0.00022 \lambda^2 - 0.133\lambda + 17.5$	78	$51,352/\lambda^2$
<u>Flexure</u> - lateral-torsional buckling	F.4	see F.4.2		-	see F.4	78	$60,414/\lambda^2$
<u>Elements - Uniform Compression</u>							
flat elements supported on one edge in columns whose buckling axis is not an axis of symmetry	B.5.4.1	b/t	15.2	7.3	$19.0 - 0.530 \lambda$	15	$2,417/\lambda^2$
flat elements supported on one edge in all other columns and all beams	B.5.4.1	b/t	15.2	7.3	$19.0 - 0.530 \lambda$	12.6	$155/\lambda$
flat elements supported on both edges	B.5.4.2	b/t	15.2	22.8	$19.0 - 0.170\lambda$	39	$484/\lambda$
flat elements supported on both edges and with an intermediate stiffener	B.5.4.4	λ_s	15.2	18.2	$16.7 - 0.088\lambda$	78	$60,414/\lambda^2$
round hollow elements	B.5.4.5	R_b/t	15.2	31.2	$18.5 - 0.593 \lambda^{1/2}$	189	$3,776/(\lambda k_n)\dagger$
flat elements - direct strength method	B.5.4.6	λ_{eq}	15.2	36.5	$19.0 - 0.106\lambda$	63	$775/\lambda$
<u>Elements - Flexural Compression</u>							
flat elements supported on both edges	B.5.5.1	b/t	22.7	34.7	$27.9 - 0.150\lambda$	93	$1,298/\lambda$
flat elements supported on tension edge, compression edge free	B.5.5.2	b/t	22.7	6.5	$27.9 - 0.810\lambda$	23	$4,932/\lambda^2$
flat elements supported on both edges and with a longitudinal stiffener	B.5.5.3	b/t	22.7	77.8	$27.9 - 0.067\lambda$	208	$2,910/\lambda$
pipes and round tubes	B.5.5.4	R_b/t	$27.7 - 1.70\lambda^{1/2}$	70.0	$18.5 - 0.593\lambda^{1/2}$	189	$3,776/(\lambda k_n)\dagger$
flat elements - direct strength method	B.5.5.5	λ_{eq}	M_{np}/S_{xc}	36.5	see B.5.5.5	74	$696/\lambda$
<u>Elements - Shear</u>							
flat elements supported on both edges	G.2	b/t	9.1	38.7	$11.5 - 0.062\lambda$	76	$38,665/\lambda^2$
flat elements supported on one edge	G.3	b/t	9.1	16.1	$11.5 - 0.150\lambda$	32	$6,713/\lambda^2$
pipes and round or oval tubes	G.4	λ_p^*	9.1	72.2	$15.0 - 0.081\lambda$	76	$50,264/\lambda^2$
<u>Torsion</u> - pipes and round or oval tubes	H.2.1	λ_p^*	9.1	38.7	$11.5 - 0.062\lambda$	76	$38,665/\lambda^2$

$\lambda_p = 2.9(R_b/t)^{5/8}(L/R_b)^{1/4}$

$\dagger k_n = (1 + \lambda^{1/2}/35)^2$