STRUCTURAL CALCULATIONS

SL1750 PANEL

Zimmerman Metals, Inc.
Over 60 years of Quality Workmanship and Service

201 East 58th Avenue, Denver CO 80216
303/294-0180 fax:303/292-5013 800/247-4202

STRUCTURAL CALCULATIONS FOR:
12" WIDE X 24 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
ZIMMERMAN METALS, INC.
201 E. 58TH Ave.
Denver, Colorado 80216

Prepared By:

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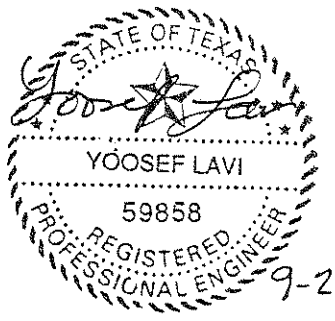


9-22-97

P. 1-17

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	12 in.	1	297	237	193	141	108	85	68	56
		2	232	150	105	77	59	46	37	31
		3	268	174	122	89	68	54	43	36

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	12 in.	1	325	209	146	107	83	66	54	45
		2	343	274	229	184	142	114	93	77
		3	375	300	237	175	134	107	87	73

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

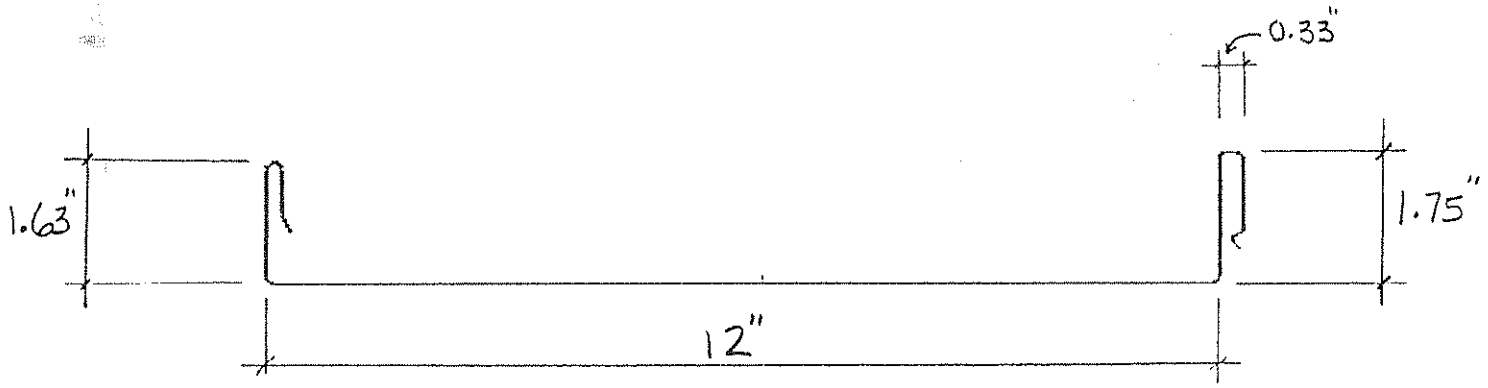
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 24 GA. (0.0239")

FY: 40 KSI

CFS Version 2.20

Section: SL171224
Rev. Date 09-19-1997
Rev. Time 17:57:55
Rev. by YL

YOOSEF LAVI, P.E.
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DALLAS, TEXAS 75243
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Section Input

Yield (Fy)	40.000	Unit Weight	3.4000
Ultimate (Fu)	55.000	One Inch =	1.0000
Modulus (E)	29500.000	Cw Override	0.0000
		J Override	0.0000

Part 1 Thickness 0.0239 24 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole Distance	
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0400	No	0.00	0.000	0.345
0.208	180.000	0.0800	No	0.00	0.000	0.075
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
12.000	0.000	0.0800	No	0.00	0.000	6.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.194	205.000	0.0600	No	0.00	0.000	0.097
0.190	-50.000	0.0600	No	0.00	0.000	0.095

Full Section Properties

Area	0.42599	Wt.	1.44837	Width	17.82384
Ix	0.12242	rx	0.53608	Ixy	0.09333
Sx(t)	0.08677	y(t)	1.41086	Alpha	-89.3598
Sx(b)	0.36098	y(b)	0.33914		
Iy	8.47350	ry	4.45997	Xo	0.17301
Sy(l)	1.35734	x(l)	6.24273	Yo	-0.90286
Sy(r)	1.39749	x(r)	6.06337	jx	-0.24941
				jy	10.44831
I1	8.47454	r1	4.46024		
I2	0.12138	r2	0.53379		
Ic	8.59592	rc	4.49207	Cw	2.96788
Io	8.95592	ro	4.58517	J	0.00008111

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	3.1164	Maxo	2.6232	Mayo	21.5826
Ae	0.14933	Ixe	0.12242	Iye	6.58857
		Sxe(t)	0.08677	Sye(l)	1.32312
Tension		Sxe(b)	0.36098	Sye(r)	0.89928
Ta	10.4624				
		Negative Moment		Negative Moment	
		Maxo	1.4577	Mayo	18.8100
Shear		Ixe	0.05733	Iye	6.10066
Vay	1.0473	Sxe(t)	0.06074	Sye(l)	0.78375
Vax	0.0000	Sxe(b)	0.07112	Sye(r)	1.34905

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.448 \cdot psf$	Panel Weight
$M_{tc} := 2623 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1458 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ BENDING

$$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ SHEAR

$$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ WEB CRIPPLING

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{s_i}	W_{c_i}
2·ft	435.7·lb·ft^{-2}	1·10^{3}·lb·ft^{-2}	296.6·lb·ft^{-2}
2.5·ft	278.3·lb·ft^{-2}	836.2·lb·ft^{-2}	237·lb·ft^{-2}
3·ft	192.8·lb·ft^{-2}	696.6·lb·ft^{-2}	197.2·lb·ft^{-2}
3.5·ft	141.3·lb·ft^{-2}	596.8·lb·ft^{-2}	168.8·lb·ft^{-2}
4·ft	107.8·lb·ft^{-2}	522.1·lb·ft^{-2}	147.6·lb·ft^{-2}
4.5·ft	84.9·lb·ft^{-2}	463.9·lb·ft^{-2}	131·lb·ft^{-2}
5·ft	68.5·lb·ft^{-2}	417.4·lb·ft^{-2}	117.8·lb·ft^{-2}
5.5·ft	56.4·lb·ft^{-2}	379.3·lb·ft^{-2}	106.9·lb·ft^{-2}

L_i	WLL_i
2·ft	297·lb·ft^{-2}
2.5·ft	237·lb·ft^{-2}
3·ft	193·lb·ft^{-2}
3.5·ft	141·lb·ft^{-2}
4·ft	108·lb·ft^{-2}
4.5·ft	85·lb·ft^{-2}
5·ft	68·lb·ft^{-2}
5.5·ft	56·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.448 \cdot psf$	Panel Weight
$M_{tc} := 2623 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1458 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports

$$W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} = \left[\frac{1}{\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

W_{b_i}
$241.6 \cdot lb \cdot ft^{-2}$
$154.1 \cdot lb \cdot ft^{-2}$
$106.6 \cdot lb \cdot ft^{-2}$
$77.9 \cdot lb \cdot ft^{-2}$
$59.3 \cdot lb \cdot ft^{-2}$
$46.6 \cdot lb \cdot ft^{-2}$
$37.4 \cdot lb \cdot ft^{-2}$
$30.7 \cdot lb \cdot ft^{-2}$

W_{sb_i}
$232.1 \cdot lb \cdot ft^{-2}$
$150.1 \cdot lb \cdot ft^{-2}$
$104.7 \cdot lb \cdot ft^{-2}$
$76.9 \cdot lb \cdot ft^{-2}$
$58.7 \cdot lb \cdot ft^{-2}$
$46.2 \cdot lb \cdot ft^{-2}$
$37.2 \cdot lb \cdot ft^{-2}$
$30.5 \cdot lb \cdot ft^{-2}$

W_{c_i}
$256.6 \cdot lb \cdot ft^{-2}$
$205.2 \cdot lb \cdot ft^{-2}$
$170.9 \cdot lb \cdot ft^{-2}$
$146.4 \cdot lb \cdot ft^{-2}$
$128 \cdot lb \cdot ft^{-2}$
$113.7 \cdot lb \cdot ft^{-2}$
$102.3 \cdot lb \cdot ft^{-2}$
$92.9 \cdot lb \cdot ft^{-2}$

W_{so_i}
$836.4 \cdot lb \cdot ft^{-2}$
$668.9 \cdot lb \cdot ft^{-2}$
$557.2 \cdot lb \cdot ft^{-2}$
$477.5 \cdot lb \cdot ft^{-2}$
$417.6 \cdot lb \cdot ft^{-2}$
$371.1 \cdot lb \cdot ft^{-2}$
$333.9 \cdot lb \cdot ft^{-2}$
$303.4 \cdot lb \cdot ft^{-2}$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$232 \cdot lb \cdot ft^{-2}$
$150 \cdot lb \cdot ft^{-2}$
$105 \cdot lb \cdot ft^{-2}$
$77 \cdot lb \cdot ft^{-2}$
$59 \cdot lb \cdot ft^{-2}$
$46 \cdot lb \cdot ft^{-2}$
$37 \cdot lb \cdot ft^{-2}$
$31 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.448 \cdot psf$	Panel Weight
$M_{tc} := 2623 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1458 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	282·lb·ft^{-2}	267.9·lb·ft^{-2}	280.6·lb·ft^{-2}	861.2·lb·ft^{-2}
2.5·ft	179.9·lb·ft^{-2}	174·lb·ft^{-2}	224.4·lb·ft^{-2}	688.8·lb·ft^{-2}
3·ft	124.4·lb·ft^{-2}	121.5·lb·ft^{-2}	186.9·lb·ft^{-2}	573.8·lb·ft^{-2}
3.5·ft	90.9·lb·ft^{-2}	89.4·lb·ft^{-2}	160.1·lb·ft^{-2}	491.6·lb·ft^{-2}
4·ft	69.2·lb·ft^{-2}	68.3·lb·ft^{-2}	140·lb·ft^{-2}	430·lb·ft^{-2}
4.5·ft	54.3·lb·ft^{-2}	53.8·lb·ft^{-2}	124.4·lb·ft^{-2}	382.1·lb·ft^{-2}
5·ft	43.7·lb·ft^{-2}	43.3·lb·ft^{-2}	111.9·lb·ft^{-2}	343.8·lb·ft^{-2}
5.5·ft	35.8·lb·ft^{-2}	35.6·lb·ft^{-2}	101.6·lb·ft^{-2}	312.4·lb·ft^{-2}

L_i	WLL_i
2·ft	268·lb·ft^{-2}
2.5·ft	174·lb·ft^{-2}
3·ft	122·lb·ft^{-2}
3.5·ft	89·lb·ft^{-2}
4·ft	68·lb·ft^{-2}
4.5·ft	54·lb·ft^{-2}
5·ft	43·lb·ft^{-2}
5.5·ft	36·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.448 \cdot psf$	Panel Weight
$M_{tc} := 2623 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1458 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i	WLL_i
2·ft	$325 \cdot lb \cdot ft^{-2}$
2.5·ft	$209 \cdot lb \cdot ft^{-2}$
3·ft	$146 \cdot lb \cdot ft^{-2}$
3.5·ft	$107 \cdot lb \cdot ft^{-2}$
4·ft	$83 \cdot lb \cdot ft^{-2}$
4.5·ft	$66 \cdot lb \cdot ft^{-2}$
5·ft	$54 \cdot lb \cdot ft^{-2}$
5.5·ft	$45 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.448 \cdot psf$	Panel Weight
$M_{tc} := 2623 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1458 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports

$$W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

W_{b_i}
$434.6 \cdot lb \cdot ft^{-2}$
$279.1 \cdot lb \cdot ft^{-2}$
$194.6 \cdot lb \cdot ft^{-2}$
$143.6 \cdot lb \cdot ft^{-2}$
$110.6 \cdot lb \cdot ft^{-2}$
$87.8 \cdot lb \cdot ft^{-2}$
$71.4 \cdot lb \cdot ft^{-2}$
$59.3 \cdot lb \cdot ft^{-2}$

W_{sb_i}
$388.7 \cdot lb \cdot ft^{-2}$
$259.4 \cdot lb \cdot ft^{-2}$
$184.8 \cdot lb \cdot ft^{-2}$
$138.1 \cdot lb \cdot ft^{-2}$
$107.1 \cdot lb \cdot ft^{-2}$
$85.5 \cdot lb \cdot ft^{-2}$
$69.8 \cdot lb \cdot ft^{-2}$
$58.2 \cdot lb \cdot ft^{-2}$

W_{c_i}
$257.8 \cdot lb \cdot ft^{-2}$
$206.3 \cdot lb \cdot ft^{-2}$
$172 \cdot lb \cdot ft^{-2}$
$147.6 \cdot lb \cdot ft^{-2}$
$129.2 \cdot lb \cdot ft^{-2}$
$114.9 \cdot lb \cdot ft^{-2}$
$103.5 \cdot lb \cdot ft^{-2}$
$94.1 \cdot lb \cdot ft^{-2}$

W_{so_i}
$838.8 \cdot lb \cdot ft^{-2}$
$671.2 \cdot lb \cdot ft^{-2}$
$559.6 \cdot lb \cdot ft^{-2}$
$479.8 \cdot lb \cdot ft^{-2}$
$420 \cdot lb \cdot ft^{-2}$
$373.4 \cdot lb \cdot ft^{-2}$
$336.2 \cdot lb \cdot ft^{-2}$
$305.7 \cdot lb \cdot ft^{-2}$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$343 \cdot lb \cdot ft^{-2}$
$274 \cdot lb \cdot ft^{-2}$
$229 \cdot lb \cdot ft^{-2}$
$184 \cdot lb \cdot ft^{-2}$
$142 \cdot lb \cdot ft^{-2}$
$114 \cdot lb \cdot ft^{-2}$
$93 \cdot lb \cdot ft^{-2}$
$77 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.448 \cdot psf$	Panel Weight
$M_{tc} := 2623 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1458 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	397.2·lb·ft^{-2}	440.4·lb·ft^{-2}	281.9·lb·ft^{-2}	863.6·lb·ft^{-2}
2.5·ft	255.1·lb·ft^{-2}	296.5·lb·ft^{-2}	225.7·lb·ft^{-2}	691.1·lb·ft^{-2}
3·ft	177.9·lb·ft^{-2}	212.4·lb·ft^{-2}	188.2·lb·ft^{-2}	576.2·lb·ft^{-2}
3.5·ft	131.3·lb·ft^{-2}	159.3·lb·ft^{-2}	161.4·lb·ft^{-2}	494·lb·ft^{-2}
4·ft	101.1·lb·ft^{-2}	123.8·lb·ft^{-2}	141.3·lb·ft^{-2}	432.4·lb·ft^{-2}
4.5·ft	80.4·lb·ft^{-2}	99·lb·ft^{-2}	125.6·lb·ft^{-2}	384.5·lb·ft^{-2}
5·ft	65.5·lb·ft^{-2}	81·lb·ft^{-2}	113.1·lb·ft^{-2}	346.2·lb·ft^{-2}
5.5·ft	54.6·lb·ft^{-2}	67.5·lb·ft^{-2}	102.9·lb·ft^{-2}	314.8·lb·ft^{-2}

L_i	WLL_i
2·ft	375·lb·ft^{-2}
2.5·ft	300·lb·ft^{-2}
3·ft	237·lb·ft^{-2}
3.5·ft	175·lb·ft^{-2}
4·ft	134·lb·ft^{-2}
4.5·ft	107·lb·ft^{-2}
5·ft	87·lb·ft^{-2}
5.5·ft	73·lb·ft^{-2}

STRUCTURAL CALCULATIONS FOR:
12" WIDE X 22 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
ZIMMERMAN METALS, INC.
201 E. 58TH Ave.
Denver, Colorado 80216

Prepared By:

YOOSEF LAVI, P.E.
Consulting Engineer
9550 Forest Lane, Suite 108
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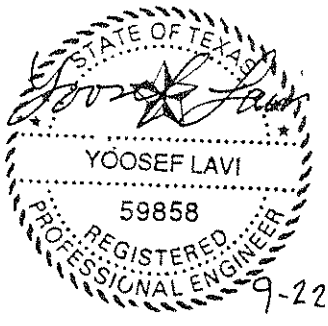
(214)-340-0049



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P. 1-17

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	12 in.	1	490	360	249	183	139	110	89	73
		2	303	196	137	100	77	60	49	40
		3	350	227	159	117	89	70	57	46

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	12 in.	1	424	272	190	140	108	86	70	58
		2	498	398	319	238	184	147	120	100
		3	544	436	308	227	175	139	113	94

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

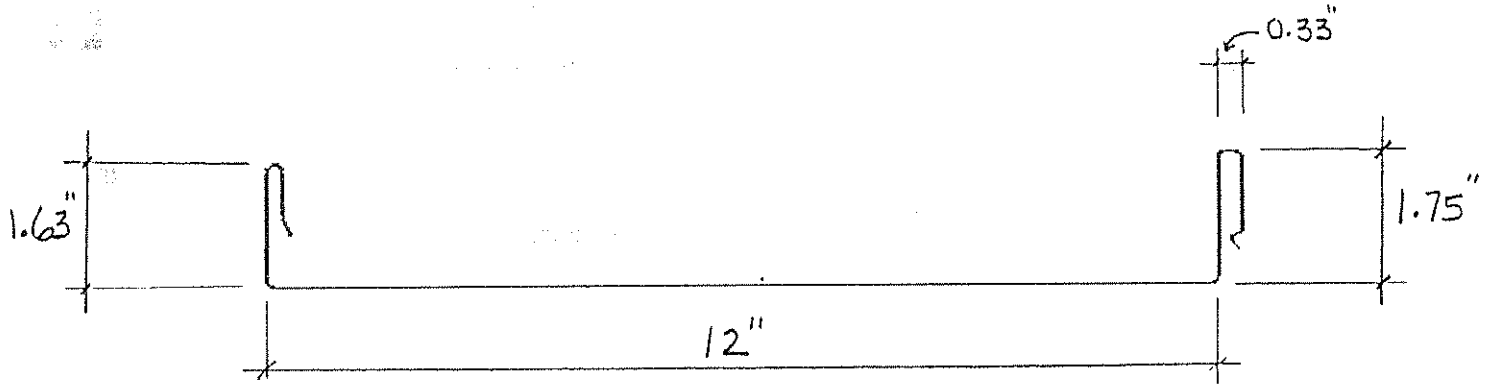
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 22 GA. (0.0299")

FY: 40 KSI

CFS Version 2.20

Section: SL171222
Rev. Date 09-19-1997
Rev. Time 17:56:40
Rev. by YL

YOOSEF LAVI, P.E.
9550 FOREST LANE, SUITE 108
DALLAS, TEXAS 75243
Phone (214) 340-0049
Fax (214) 340-0067

Section Input

Yield	(Fy)	40.000	Unit Weight	3.4000
Ultimate	(Fu)	55.000	One Inch =	1.0000
Modulus	(E)	29500.000	Cw Override	0.0000
			J Override	0.0000

Part 1 Thickness 0.0299 22 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole	Distance
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0800	No	0.00	0.000	0.345
0.220	180.000	0.0800	No	0.00	0.000	0.104
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
12.000	0.000	0.0800	No	0.00	0.000	6.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.213	205.000	0.0600	No	0.00	0.000	0.097
0.210	-50.000	0.0600	No	0.00	0.000	0.105

Full Section Properties

Area	0.5327	Wt.	1.8111	Width	17.8153
Ix	0.1514	rx	0.5331	Ixy	0.1142
Sx(t)	0.1074	y(t)	1.4098	Alpha	-89.3725
Sx(b)	0.4449	y(b)	0.3402		
Iy	10.5795	ry	4.4566	Xo	0.1512
Sy(l)	1.6934	x(l)	6.2475	Yo	-0.8981
Sy(r)	1.7479	x(r)	6.0526	jx	-0.2309
				jy	10.4654
I1	10.5807	r1	4.4568		
I2	0.1501	r2	0.5309		
Ic	10.7308	rc	4.4883	Cw	3.6771
Io	11.1727	ro	4.5798	J	0.0001587

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	4.3474	Maxo	3.3881	Mayo	30.0618
Ae	0.2083	Ixe	0.1514	Iye	8.8033
		Sxe(t)	0.1074	Sye(l)	1.6699
Tension		Sxe(b)	0.4449	Sye(r)	1.2526
Ta	13.1430				
		Negative Moment		Negative Moment	
		Maxo	1.9003	Mayo	26.1525
Shear		Ixe	0.0782	Iye	8.1896
Vay	1.4067	Sxe(t)	0.0792	Sye(l)	1.0897
Vax	0.0000	Sxe(b)	0.1025	Sye(r)	1.7116

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.811 \cdot psf$	Panel Weight
$M_{tc} := 3388 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1900 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ BENDING

$$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ SHEAR

$$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ WEB CRIPPLING

$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{s_i}	W_{c_i}
2·ft	$562.9 \cdot lb \cdot ft^{-2}$	$1.4 \cdot 10^3 \cdot lb \cdot ft^{-2}$	$490.2 \cdot lb \cdot ft^{-2}$
2.5·ft	$359.6 \cdot lb \cdot ft^{-2}$	$1.1 \cdot 10^3 \cdot lb \cdot ft^{-2}$	$391.8 \cdot lb \cdot ft^{-2}$
3·ft	$249.2 \cdot lb \cdot ft^{-2}$	$935.5 \cdot lb \cdot ft^{-2}$	$326.2 \cdot lb \cdot ft^{-2}$
3.5·ft	$182.6 \cdot lb \cdot ft^{-2}$	$801.6 \cdot lb \cdot ft^{-2}$	$279.3 \cdot lb \cdot ft^{-2}$
4·ft	$139.4 \cdot lb \cdot ft^{-2}$	$701.2 \cdot lb \cdot ft^{-2}$	$244.2 \cdot lb \cdot ft^{-2}$
4.5·ft	$109.7 \cdot lb \cdot ft^{-2}$	$623.1 \cdot lb \cdot ft^{-2}$	$216.9 \cdot lb \cdot ft^{-2}$
5·ft	$88.5 \cdot lb \cdot ft^{-2}$	$560.6 \cdot lb \cdot ft^{-2}$	$195 \cdot lb \cdot ft^{-2}$
5.5·ft	$72.9 \cdot lb \cdot ft^{-2}$	$509.5 \cdot lb \cdot ft^{-2}$	$177.1 \cdot lb \cdot ft^{-2}$

L_i	WLL_i
2·ft	$490 \cdot lb \cdot ft^{-2}$
2.5·ft	$360 \cdot lb \cdot ft^{-2}$
3·ft	$249 \cdot lb \cdot ft^{-2}$
3.5·ft	$183 \cdot lb \cdot ft^{-2}$
4·ft	$139 \cdot lb \cdot ft^{-2}$
4.5·ft	$110 \cdot lb \cdot ft^{-2}$
5·ft	$89 \cdot lb \cdot ft^{-2}$
5.5·ft	$73 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.811 \cdot psf$	Panel Weight
$M_{tc} := 3388 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1900 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports

$$W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	$314.9\cdot lb\cdot ft^{-2}$	$303.2\cdot lb\cdot ft^{-2}$	$372.9\cdot lb\cdot ft^{-2}$	$1.1\cdot 10^{3}\cdot lb\cdot ft^{-2}$
2.5·ft	$200.9\cdot lb\cdot ft^{-2}$	$196\cdot lb\cdot ft^{-2}$	$298.2\cdot lb\cdot ft^{-2}$	$898.4\cdot lb\cdot ft^{-2}$
3·ft	$138.9\cdot lb\cdot ft^{-2}$	$136.6\cdot lb\cdot ft^{-2}$	$248.3\cdot lb\cdot ft^{-2}$	$748.4\cdot lb\cdot ft^{-2}$
3.5·ft	$101.6\cdot lb\cdot ft^{-2}$	$100.3\cdot lb\cdot ft^{-2}$	$212.8\cdot lb\cdot ft^{-2}$	$641.3\cdot lb\cdot ft^{-2}$
4·ft	$77.4\cdot lb\cdot ft^{-2}$	$76.6\cdot lb\cdot ft^{-2}$	$186.1\cdot lb\cdot ft^{-2}$	$561\cdot lb\cdot ft^{-2}$
4.5·ft	$60.7\cdot lb\cdot ft^{-2}$	$60.3\cdot lb\cdot ft^{-2}$	$165.3\cdot lb\cdot ft^{-2}$	$498.5\cdot lb\cdot ft^{-2}$
5·ft	$48.9\cdot lb\cdot ft^{-2}$	$48.6\cdot lb\cdot ft^{-2}$	$148.7\cdot lb\cdot ft^{-2}$	$448.5\cdot lb\cdot ft^{-2}$
5.5·ft	$40.1\cdot lb\cdot ft^{-2}$	$39.9\cdot lb\cdot ft^{-2}$	$135.1\cdot lb\cdot ft^{-2}$	$407.6\cdot lb\cdot ft^{-2}$

L_i	WLL_i
2·ft	$303\cdot lb\cdot ft^{-2}$
2.5·ft	$196\cdot lb\cdot ft^{-2}$
3·ft	$137\cdot lb\cdot ft^{-2}$
3.5·ft	$100\cdot lb\cdot ft^{-2}$
4·ft	$77\cdot lb\cdot ft^{-2}$
4.5·ft	$60\cdot lb\cdot ft^{-2}$
5·ft	$49\cdot lb\cdot ft^{-2}$
5.5·ft	$40\cdot lb\cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.811 \cdot psf$	Panel Weight
$M_{tc} := 3388 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1900 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 937 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i}) \qquad W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$$

$$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i}) \qquad W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	$367.6 \cdot lb \cdot ft^{-2}$	$350.2 \cdot lb \cdot ft^{-2}$	$409.1 \cdot lb \cdot ft^{-2}$	$1.2 \cdot 10^3 \cdot lb \cdot ft^{-2}$
2.5·ft	$234.5 \cdot lb \cdot ft^{-2}$	$227.2 \cdot lb \cdot ft^{-2}$	$327.1 \cdot lb \cdot ft^{-2}$	$925 \cdot lb \cdot ft^{-2}$
3·ft	$162.2 \cdot lb \cdot ft^{-2}$	$158.7 \cdot lb \cdot ft^{-2}$	$272.5 \cdot lb \cdot ft^{-2}$	$770.6 \cdot lb \cdot ft^{-2}$
3.5·ft	$118.6 \cdot lb \cdot ft^{-2}$	$116.7 \cdot lb \cdot ft^{-2}$	$233.4 \cdot lb \cdot ft^{-2}$	$660.3 \cdot lb \cdot ft^{-2}$
4·ft	$90.3 \cdot lb \cdot ft^{-2}$	$89.2 \cdot lb \cdot ft^{-2}$	$204.2 \cdot lb \cdot ft^{-2}$	$577.6 \cdot lb \cdot ft^{-2}$
4.5·ft	$70.9 \cdot lb \cdot ft^{-2}$	$70.2 \cdot lb \cdot ft^{-2}$	$181.4 \cdot lb \cdot ft^{-2}$	$513.2 \cdot lb \cdot ft^{-2}$
5·ft	$57 \cdot lb \cdot ft^{-2}$	$56.6 \cdot lb \cdot ft^{-2}$	$163.2 \cdot lb \cdot ft^{-2}$	$461.8 \cdot lb \cdot ft^{-2}$
5.5·ft	$46.8 \cdot lb \cdot ft^{-2}$	$46.5 \cdot lb \cdot ft^{-2}$	$148.3 \cdot lb \cdot ft^{-2}$	$419.7 \cdot lb \cdot ft^{-2}$

L_i	WLL_i
2·ft	$350 \cdot lb \cdot ft^{-2}$
2.5·ft	$227 \cdot lb \cdot ft^{-2}$
3·ft	$159 \cdot lb \cdot ft^{-2}$
3.5·ft	$117 \cdot lb \cdot ft^{-2}$
4·ft	$89 \cdot lb \cdot ft^{-2}$
4.5·ft	$70 \cdot lb \cdot ft^{-2}$
5·ft	$57 \cdot lb \cdot ft^{-2}$
5.5·ft	$46 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$	Panel Width
$w_{dlp} := 1.811 \cdot psf$	Panel Weight
$M_{tc} := 3388 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1900 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i	WLL_i
2·ft	$424 \cdot lb \cdot ft^{-2}$
2.5·ft	$272 \cdot lb \cdot ft^{-2}$
3·ft	$190 \cdot lb \cdot ft^{-2}$
3.5·ft	$140 \cdot lb \cdot ft^{-2}$
4·ft	$108 \cdot lb \cdot ft^{-2}$
4.5·ft	$86 \cdot lb \cdot ft^{-2}$
5·ft	$70 \cdot lb \cdot ft^{-2}$
5.5·ft	$58 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$ Panel Width

$w_{dlp} := 1.811 \cdot psf$ Panel Weight

$M_{tc} := 3388 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1900 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1406 \cdot lb$ Allowable Shear

$P_{ae} := 492 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 934 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$ Bending between supports $W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

W_{b_i}
$566.2 \cdot lb \cdot ft^{-2}$
$363.2 \cdot lb \cdot ft^{-2}$
$252.8 \cdot lb \cdot ft^{-2}$
$186.2 \cdot lb \cdot ft^{-2}$
$143 \cdot lb \cdot ft^{-2}$
$113.4 \cdot lb \cdot ft^{-2}$
$92.2 \cdot lb \cdot ft^{-2}$
$76.5 \cdot lb \cdot ft^{-2}$

W_{sb_i}
$506.1 \cdot lb \cdot ft^{-2}$
$336.9 \cdot lb \cdot ft^{-2}$
$239.6 \cdot lb \cdot ft^{-2}$
$178.9 \cdot lb \cdot ft^{-2}$
$138.6 \cdot lb \cdot ft^{-2}$
$110.6 \cdot lb \cdot ft^{-2}$
$90.3 \cdot lb \cdot ft^{-2}$
$75.2 \cdot lb \cdot ft^{-2}$

W_{c_i}
$374.3 \cdot lb \cdot ft^{-2}$
$299.6 \cdot lb \cdot ft^{-2}$
$249.8 \cdot lb \cdot ft^{-2}$
$214.2 \cdot lb \cdot ft^{-2}$
$187.5 \cdot lb \cdot ft^{-2}$
$166.8 \cdot lb \cdot ft^{-2}$
$150.2 \cdot lb \cdot ft^{-2}$
$136.6 \cdot lb \cdot ft^{-2}$

W_{so_i}
$1.1 \cdot 10^3 \cdot lb \cdot ft^{-2}$
$901.3 \cdot lb \cdot ft^{-2}$
$751.3 \cdot lb \cdot ft^{-2}$
$644.2 \cdot lb \cdot ft^{-2}$
$563.8 \cdot lb \cdot ft^{-2}$
$501.4 \cdot lb \cdot ft^{-2}$
$451.4 \cdot lb \cdot ft^{-2}$
$410.5 \cdot lb \cdot ft^{-2}$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$498 \cdot lb \cdot ft^{-2}$
$398 \cdot lb \cdot ft^{-2}$
$319 \cdot lb \cdot ft^{-2}$
$238 \cdot lb \cdot ft^{-2}$
$184 \cdot lb \cdot ft^{-2}$
$147 \cdot lb \cdot ft^{-2}$
$120 \cdot lb \cdot ft^{-2}$
$100 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 12" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 12 \cdot in$ Panel Width

$w_{dlp} := 1.811 \cdot psf$ Panel Weight

$M_{tc} := 3388 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1900 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1406 \cdot lb$ Allowable Shear

$P_{ae} := 492 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 934 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending between supports $W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	517.5·lb·ft^{-2}	574.4·lb·ft^{-2}	409.4·lb·ft^{-2}	$1.2 \cdot 10^3$·lb·ft^{-2}
2.5·ft	332.3·lb·ft^{-2}	385.6·lb·ft^{-2}	327.7·lb·ft^{-2}	928·lb·ft^{-2}
3·ft	231.6·lb·ft^{-2}	275.7·lb·ft^{-2}	273.2·lb·ft^{-2}	773.6·lb·ft^{-2}
3.5·ft	171·lb·ft^{-2}	206.5·lb·ft^{-2}	234.3·lb·ft^{-2}	663.3·lb·ft^{-2}
4·ft	131.6·lb·ft^{-2}	160.4·lb·ft^{-2}	205.1·lb·ft^{-2}	580.6·lb·ft^{-2}
4.5·ft	104.6·lb·ft^{-2}	128.2·lb·ft^{-2}	182.4·lb·ft^{-2}	516.2·lb·ft^{-2}
5·ft	85.3·lb·ft^{-2}	104.8·lb·ft^{-2}	164.2·lb·ft^{-2}	464.8·lb·ft^{-2}
5.5·ft	71·lb·ft^{-2}	87.3·lb·ft^{-2}	149.4·lb·ft^{-2}	422.6·lb·ft^{-2}

L_i	WLL_i
2·ft	544·lb·ft^{-2}
2.5·ft	436·lb·ft^{-2}
3·ft	308·lb·ft^{-2}
3.5·ft	227·lb·ft^{-2}
4·ft	175·lb·ft^{-2}
4.5·ft	139·lb·ft^{-2}
5·ft	113·lb·ft^{-2}
5.5·ft	94·lb·ft^{-2}

STRUCTURAL CALCULATIONS FOR:
16" WIDE X 24 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
ZIMMERMAN METALS, INC.
201 E. 58TH Ave.
Denver, Colorado 80216

Prepared By:

YOOSEF LAVI, P.E.
Consulting Engineer
9550 Forest Lane, Suite 108
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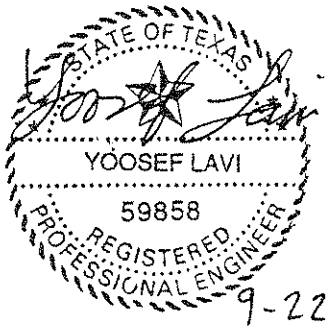

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P. 1-17

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	16 in.	1	222	177	148	108	83	65	52	43
		2	174	112	78	57	44	34	28	23
		3	201	130	91	67	51	40	32	26

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	16 in.	1	244	157	110	81	62	50	41	34
		2	257	206	172	141	110	88	72	60
		3	281	225	178	132	101	81	66	55

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

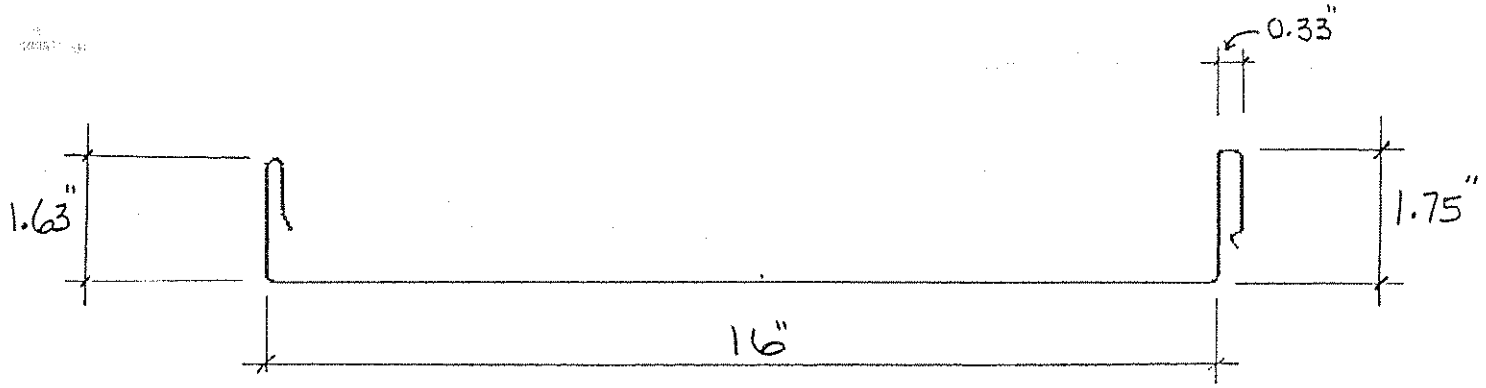
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 24 GA. (0.0239")

FY: 40 KSI

CFS Version 2.20

Section: SL171624
Rev. Date 09-19-1997
Rev. Time 17:58:07
Rev. by YL

YOOSEF LAVI, P.E.
9550 FOREST LANE, SUITE 108
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Section Input

Yield	(Fy)	40.000	Unit Weight	3.4000
Ultimate	(Fu)	55.000	One Inch =	1.0000
Modulus	(E)	29500.000	Cw Override	0.0000
			J Override	0.0000

Part 1 Thickness 0.0239 24 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole	Distance
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0400	No	0.00	0.000	0.345
0.208	180.000	0.0800	No	0.00	0.000	0.075
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
16.000	0.000	0.0800	No	0.00	0.000	8.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.194	205.000	0.0600	No	0.00	0.000	0.097
0.190	-50.000	0.0600	No	0.00	0.000	0.095

Full Section Properties

Area	0.5216	Wt.	1.7734	Width	21.8238
Ix	0.1308	rx	0.5007	Ixy	0.1285
Sx(t)	0.0889	y(t)	1.4708	Alpha	-89.5661
Sx(b)	0.4685	y(b)	0.2792		
Iy	17.0924	ry	5.7245	Xo	0.4281
Sy(l)	2.0705	x(l)	8.2550	Yo	-0.7760
Sy(r)	2.1230	x(r)	8.0511	jx	-0.5025
				jy	17.8343
I1	17.0934	r1	5.7247		
I2	0.1298	r2	0.4989		
Ic	17.2232	rc	5.7464	Cw	5.8887
Io	17.6329	ro	5.8143	J	0.0000993

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	3.1200	Maxo	2.6881	Mayo	28.7624
Ae	0.1495	Ixe	0.1308	Iye	12.1711
		Sxe(t)	0.0889	Sye(l)	1.9790
Tension		Sxe(b)	0.4685	Sye(r)	1.1984
Ta	12.7568				
		Negative Moment		Negative Moment	
		Maxo	1.4599	Mayo	25.0585
Shear		Ixe	0.0575	Iye	11.1881
Vay	1.0473	Sxe(t)	0.0608	Sye(l)	1.0441
Vax	0.0000	Sxe(b)	0.0714	Sye(r)	2.0012

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.333 \cdot psf$	Panel Weight
$M_{tc} := 2688 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1459 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ BENDING

$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$ SHEAR

$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$ WEB CRIPPLING

$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{s_i}	W_{c_i}
2·ft	334.7·lb·ft^{-2}	783.9·lb·ft^{-2}	222.2·lb·ft^{-2}
2.5·ft	213.7·lb·ft^{-2}	626.9·lb·ft^{-2}	177.5·lb·ft^{-2}
3·ft	148·lb·ft^{-2}	522.2·lb·ft^{-2}	147.7·lb·ft^{-2}
3.5·ft	108.4·lb·ft^{-2}	447.4·lb·ft^{-2}	126.4·lb·ft^{-2}
4·ft	82.7·lb·ft^{-2}	391.3·lb·ft^{-2}	110.4·lb·ft^{-2}
4.5·ft	65·lb·ft^{-2}	347.7·lb·ft^{-2}	98·lb·ft^{-2}
5·ft	52.4·lb·ft^{-2}	312.8·lb·ft^{-2}	88.1·lb·ft^{-2}
5.5·ft	43.1·lb·ft^{-2}	284.2·lb·ft^{-2}	79.9·lb·ft^{-2}

L_i	WLL_i
2·ft	222·lb·ft^{-2}
2.5·ft	177·lb·ft^{-2}
3·ft	148·lb·ft^{-2}
3.5·ft	108·lb·ft^{-2}
4·ft	83·lb·ft^{-2}
4.5·ft	65·lb·ft^{-2}
5·ft	52·lb·ft^{-2}
5.5·ft	43·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.334 \cdot psf$	Panel Weight
$M_{tc} := 2688 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1459 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$ Bending between supports $W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	181·lb·ft^{-2}	173.9·lb·ft^{-2}	192.4·lb·ft^{-2}	627.1·lb·ft^{-2}
2.5·ft	115.4·lb·ft^{-2}	112.4·lb·ft^{-2}	153.8·lb·ft^{-2}	501.5·lb·ft^{-2}
3·ft	79.7·lb·ft^{-2}	78.3·lb·ft^{-2}	128.1·lb·ft^{-2}	417.7·lb·ft^{-2}
3.5·ft	58.2·lb·ft^{-2}	57.5·lb·ft^{-2}	109.7·lb·ft^{-2}	357.9·lb·ft^{-2}
4·ft	44.3·lb·ft^{-2}	43.8·lb·ft^{-2}	95.9·lb·ft^{-2}	313·lb·ft^{-2}
4.5·ft	34.7·lb·ft^{-2}	34.4·lb·ft^{-2}	85.2·lb·ft^{-2}	278.1·lb·ft^{-2}
5·ft	27.8·lb·ft^{-2}	27.7·lb·ft^{-2}	76.6·lb·ft^{-2}	250.2·lb·ft^{-2}
5.5·ft	22.8·lb·ft^{-2}	22.7·lb·ft^{-2}	69.6·lb·ft^{-2}	227.4·lb·ft^{-2}

L_i	WLL_i
2·ft	174·lb·ft^{-2}
2.5·ft	112·lb·ft^{-2}
3·ft	78·lb·ft^{-2}
3.5·ft	57·lb·ft^{-2}
4·ft	44·lb·ft^{-2}
4.5·ft	34·lb·ft^{-2}
5·ft	28·lb·ft^{-2}
5.5·ft	23·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$ Panel Width

$w_{dlp} := 1.334 \cdot psf$ Panel Weight

$M_{tc} := 2688 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1459 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1047 \cdot lb$ Allowable Shear

$P_{ae} := 298 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 643 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending between supports $W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	211.4·lb·ft^{-2}	200.8·lb·ft^{-2}	210.4·lb·ft^{-2}	645.7·lb·ft^{-2}
2.5·ft	134.7·lb·ft^{-2}	130.3·lb·ft^{-2}	168.2·lb·ft^{-2}	516.4·lb·ft^{-2}
3·ft	93.1·lb·ft^{-2}	90.9·lb·ft^{-2}	140.1·lb·ft^{-2}	430.1·lb·ft^{-2}
3.5·ft	68·lb·ft^{-2}	66.8·lb·ft^{-2}	120·lb·ft^{-2}	368.5·lb·ft^{-2}
4·ft	51.7·lb·ft^{-2}	51·lb·ft^{-2}	104.9·lb·ft^{-2}	322.3·lb·ft^{-2}
4.5·ft	40.5·lb·ft^{-2}	40.1·lb·ft^{-2}	93.2·lb·ft^{-2}	286.4·lb·ft^{-2}
5·ft	32.5·lb·ft^{-2}	32.2·lb·ft^{-2}	83.8·lb·ft^{-2}	257.6·lb·ft^{-2}
5.5·ft	26.6·lb·ft^{-2}	26.4·lb·ft^{-2}	76.1·lb·ft^{-2}	234.1·lb·ft^{-2}

L_i	WLL_i
2·ft	201·lb·ft^{-2}
2.5·ft	130·lb·ft^{-2}
3·ft	91·lb·ft^{-2}
3.5·ft	67·lb·ft^{-2}
4·ft	51·lb·ft^{-2}
4.5·ft	40·lb·ft^{-2}
5·ft	32·lb·ft^{-2}
5.5·ft	26·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.333 \cdot psf$	Panel Weight
$M_{tc} := 2688 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1459 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i	WLL_i
2·ft	$244 \cdot lb \cdot ft^{-2}$
2.5·ft	$157 \cdot lb \cdot ft^{-2}$
3·ft	$110 \cdot lb \cdot ft^{-2}$
3.5·ft	$81 \cdot lb \cdot ft^{-2}$
4·ft	$62 \cdot lb \cdot ft^{-2}$
4.5·ft	$50 \cdot lb \cdot ft^{-2}$
5·ft	$41 \cdot lb \cdot ft^{-2}$
5.5·ft	$34 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$ Panel Width

$w_{dlp} := 1.333 \cdot psf$ Panel Weight

$M_{tc} := 2688 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1459 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1047 \cdot lb$ Allowable Shear

$P_{ae} := 298 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 643 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$ Bending between supports $W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	326.6·lb·ft^{-2}	297.3·lb·ft^{-2}	193.4·lb·ft^{-2}	629.3·lb·ft^{-2}
2.5·ft	209.9·lb·ft^{-2}	198.8·lb·ft^{-2}	154.9·lb·ft^{-2}	503.6·lb·ft^{-2}
3·ft	146.5·lb·ft^{-2}	141.8·lb·ft^{-2}	129.1·lb·ft^{-2}	419.9·lb·ft^{-2}
3.5·ft	108.2·lb·ft^{-2}	106.1·lb·ft^{-2}	110.8·lb·ft^{-2}	360·lb·ft^{-2}
4·ft	83.4·lb·ft^{-2}	82.4·lb·ft^{-2}	97·lb·ft^{-2}	315.2·lb·ft^{-2}
4.5·ft	66.4·lb·ft^{-2}	65.8·lb·ft^{-2}	86.3·lb·ft^{-2}	280.3·lb·ft^{-2}
5·ft	54.2·lb·ft^{-2}	53.8·lb·ft^{-2}	77.7·lb·ft^{-2}	252.3·lb·ft^{-2}
5.5·ft	45.2·lb·ft^{-2}	44.9·lb·ft^{-2}	70.7·lb·ft^{-2}	229.5·lb·ft^{-2}

L_i	WLL_i
2·ft	257·lb·ft^{-2}
2.5·ft	206·lb·ft^{-2}
3·ft	172·lb·ft^{-2}
3.5·ft	141·lb·ft^{-2}
4·ft	110·lb·ft^{-2}
4.5·ft	88·lb·ft^{-2}
5·ft	72·lb·ft^{-2}
5.5·ft	60·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$ Panel Width

$w_{dlp} := 1.333 \cdot psf$ Panel Weight

$M_{tc} := 2688 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1459 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1047 \cdot lb$ Allowable Shear

$P_{ae} := 298 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 643 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending between supports $W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	298.5·lb·ft^{-2}	336.5·lb·ft^{-2}	211.5·lb·ft^{-2}	647.9·lb·ft^{-2}
2.5·ft	191.8·lb·ft^{-2}	227·lb·ft^{-2}	169.3·lb·ft^{-2}	518.6·lb·ft^{-2}
3·ft	133.9·lb·ft^{-2}	162.9·lb·ft^{-2}	141.2·lb·ft^{-2}	432.3·lb·ft^{-2}
3.5·ft	98.9·lb·ft^{-2}	122.3·lb·ft^{-2}	121.1·lb·ft^{-2}	370.7·lb·ft^{-2}
4·ft	76.3·lb·ft^{-2}	95.2·lb·ft^{-2}	106.1·lb·ft^{-2}	324.5·lb·ft^{-2}
4.5·ft	60.7·lb·ft^{-2}	76.2·lb·ft^{-2}	94.3·lb·ft^{-2}	288.6·lb·ft^{-2}
5·ft	49.6·lb·ft^{-2}	62.4·lb·ft^{-2}	85·lb·ft^{-2}	259.8·lb·ft^{-2}
5.5·ft	41.4·lb·ft^{-2}	52.1·lb·ft^{-2}	77.3·lb·ft^{-2}	236.3·lb·ft^{-2}

L_i	WLL_i
2·ft	281·lb·ft^{-2}
2.5·ft	225·lb·ft^{-2}
3·ft	178·lb·ft^{-2}
3.5·ft	132·lb·ft^{-2}
4·ft	101·lb·ft^{-2}
4.5·ft	81·lb·ft^{-2}
5·ft	66·lb·ft^{-2}
5.5·ft	55·lb·ft^{-2}

STRUCTURAL CALCULATIONS FOR:
16" WIDE X 22 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
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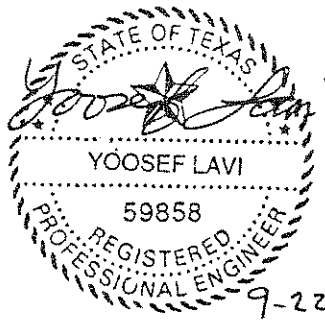

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ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	16 in.	1	367	276	191	140	107	84	68	56
		2	228	147	102	75	57	45	36	30
		3	263	170	119	87	67	52	42	35

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	16 in.	1	319	205	143	106	81	65	53	44
		2	374	299	245	183	142	113	93	77
		3	409	327	232	172	132	105	86	72

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

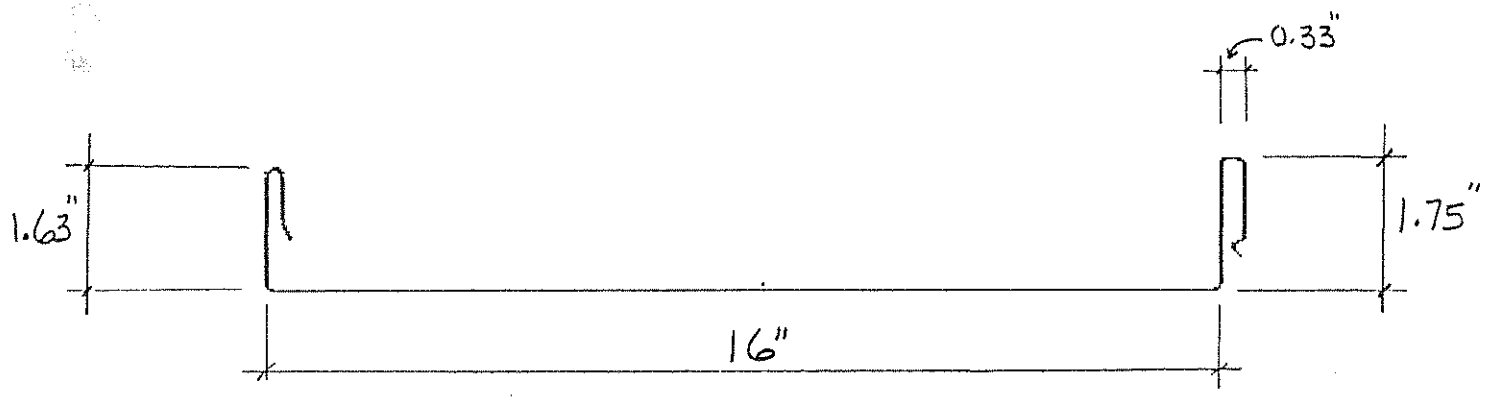
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



- ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 22 GA. (0.0299")

FY: 40 KSI

CFS Version 2.20

Section: SL171622
Rev. Date 09-19-1997
Rev. Time 17:57:00
Rev. by YL

YOOSEF LAVI, P.E.
9550 FOREST LANE, SUITE 108
DALLAS, TEXAS 75243
Phone (214) 340-0049
Fax (214) 340-0067

Section Input

Yield	(Fy)	40.000	Unit Weight	3.4000
Ultimate	(Fu)	55.000	One Inch =	1.0000
Modulus	(E)	29500.000	Cw Override	0.0000
			J Override	0.0000

Part 1 Thickness 0.0299 22 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole	Distance
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0800	No	0.00	0.000	0.345
0.220	180.000	0.0800	No	0.00	0.000	0.104
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
16.000	0.000	0.0800	No	0.00	0.000	8.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.213	205.000	0.0600	No	0.00	0.000	0.097
0.210	-50.000	0.0600	No	0.00	0.000	0.105

Full Section Properties

Area	0.6523	Wt.	2.2177	Width	21.8153
Ix	0.1617	rx	0.4979	Ixy	0.1575
Sx(t)	0.1101	y(t)	1.4694	Alpha	-89.5741
Sx(b)	0.5764	y(b)	0.2806		
Iy	21.3509	ry	5.7213	Xo	0.3993
Sy(l)	2.5848	x(l)	8.2603	Yo	-0.7718
Sy(r)	2.6556	x(r)	8.0398	jx	-0.4769
				jy	17.8824
I1	21.3521	r1	5.7214		
I2	0.1606	r2	0.4961		
Ic	21.5126	rc	5.7429	Cw	7.2938
Io	22.0052	ro	5.8083	J	0.0001944

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	4.3544	Maxo	3.4727	Mayo	40.0154
Ae	0.2087	Ixe	0.1617	Iye	16.3323
		Sxe(t)	0.1101	Sye(l)	2.5109
Tension		Sxe(b)	0.5764	Sye(r)	1.6673
Ta	16.0134				
		Negative Moment		Negative Moment	
		Maxo	1.9045	Mayo	34.8171
Shear		Ixe	0.0785	Iye	15.0710
Vay	1.4067	Sxe(t)	0.0794	Sye(l)	1.4507
Vax	0.0000	Sxe(b)	0.1032	Sye(r)	2.5495

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.667 \cdot psf$	Panel Weight
$M_{tc} := 3472 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1904 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ BENDING

$$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ SHEAR

$$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ WEB CRIPPLING

$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{s_i}	W_{c_i}
2·ft	$432.3 \cdot lb \cdot ft^{-2}$	$1.1 \cdot 10^3 \cdot lb \cdot ft^{-2}$	$367.3 \cdot lb \cdot ft^{-2}$
2.5·ft	$276.1 \cdot lb \cdot ft^{-2}$	$841.9 \cdot lb \cdot ft^{-2}$	$293.5 \cdot lb \cdot ft^{-2}$
3·ft	$191.2 \cdot lb \cdot ft^{-2}$	$701.3 \cdot lb \cdot ft^{-2}$	$244.3 \cdot lb \cdot ft^{-2}$
3.5·ft	$140 \cdot lb \cdot ft^{-2}$	$600.9 \cdot lb \cdot ft^{-2}$	$209.2 \cdot lb \cdot ft^{-2}$
4·ft	$106.8 \cdot lb \cdot ft^{-2}$	$525.6 \cdot lb \cdot ft^{-2}$	$182.8 \cdot lb \cdot ft^{-2}$
4.5·ft	$84.1 \cdot lb \cdot ft^{-2}$	$467 \cdot lb \cdot ft^{-2}$	$162.3 \cdot lb \cdot ft^{-2}$
5·ft	$67.8 \cdot lb \cdot ft^{-2}$	$420.1 \cdot lb \cdot ft^{-2}$	$145.9 \cdot lb \cdot ft^{-2}$
5.5·ft	$55.7 \cdot lb \cdot ft^{-2}$	$381.8 \cdot lb \cdot ft^{-2}$	$132.5 \cdot lb \cdot ft^{-2}$

L_i	WLL_i
2·ft	$367 \cdot lb \cdot ft^{-2}$
2.5·ft	$276 \cdot lb \cdot ft^{-2}$
3·ft	$191 \cdot lb \cdot ft^{-2}$
3.5·ft	$140 \cdot lb \cdot ft^{-2}$
4·ft	$107 \cdot lb \cdot ft^{-2}$
4.5·ft	$84 \cdot lb \cdot ft^{-2}$
5·ft	$68 \cdot lb \cdot ft^{-2}$
5.5·ft	$56 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL-SL1750, 16" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.667 \cdot psf$	Panel Weight
$M_{tc} := 3472 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1904 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$ Bending between supports $W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	236.3·lb·ft^{-2}	227.5·lb·ft^{-2}	279.5·lb·ft^{-2}	842.3·lb·ft^{-2}
2.5·ft	150.7·lb·ft^{-2}	147·lb·ft^{-2}	223.5·lb·ft^{-2}	673.5·lb·ft^{-2}
3·ft	104.1·lb·ft^{-2}	102.4·lb·ft^{-2}	186.1·lb·ft^{-2}	561.1·lb·ft^{-2}
3.5·ft	76·lb·ft^{-2}	75.1·lb·ft^{-2}	159.4·lb·ft^{-2}	480.7·lb·ft^{-2}
4·ft	57.8·lb·ft^{-2}	57.3·lb·ft^{-2}	139.4·lb·ft^{-2}	420.5·lb·ft^{-2}
4.5·ft	45.3·lb·ft^{-2}	45·lb·ft^{-2}	123.9·lb·ft^{-2}	373.6·lb·ft^{-2}
5·ft	36.4·lb·ft^{-2}	36.2·lb·ft^{-2}	111.4·lb·ft^{-2}	336.1·lb·ft^{-2}
5.5·ft	29.8·lb·ft^{-2}	29.7·lb·ft^{-2}	101.2·lb·ft^{-2}	305.4·lb·ft^{-2}

L_i	WLL_i
2·ft	228·lb·ft^{-2}
2.5·ft	147·lb·ft^{-2}
3·ft	102·lb·ft^{-2}
3.5·ft	75·lb·ft^{-2}
4·ft	57·lb·ft^{-2}
4.5·ft	45·lb·ft^{-2}
5·ft	36·lb·ft^{-2}
5.5·ft	30·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.667 \cdot psf$	Panel Weight
$M_{tc} := 3472 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1904 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 937 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	275.9·lb·ft^{-2}	262.9·lb·ft^{-2}	306.7·lb·ft^{-2}	867.2·lb·ft^{-2}
2.5·ft	175.9·lb·ft^{-2}	170.4·lb·ft^{-2}	245.2·lb·ft^{-2}	693.5·lb·ft^{-2}
3·ft	121.5·lb·ft^{-2}	118.9·lb·ft^{-2}	204.2·lb·ft^{-2}	577.7·lb·ft^{-2}
3.5·ft	88.8·lb·ft^{-2}	87.4·lb·ft^{-2}	174.9·lb·ft^{-2}	495·lb·ft^{-2}
4·ft	67.5·lb·ft^{-2}	66.7·lb·ft^{-2}	153·lb·ft^{-2}	432.9·lb·ft^{-2}
4.5·ft	52.9·lb·ft^{-2}	52.4·lb·ft^{-2}	135.9·lb·ft^{-2}	384.7·lb·ft^{-2}
5·ft	42.5·lb·ft^{-2}	42.2·lb·ft^{-2}	122.2·lb·ft^{-2}	346.1·lb·ft^{-2}
5.5·ft	34.8·lb·ft^{-2}	34.6·lb·ft^{-2}	111.1·lb·ft^{-2}	314.5·lb·ft^{-2}

L_i	WLL_i
2·ft	263·lb·ft^{-2}
2.5·ft	170·lb·ft^{-2}
3·ft	119·lb·ft^{-2}
3.5·ft	87·lb·ft^{-2}
4·ft	67·lb·ft^{-2}
4.5·ft	52·lb·ft^{-2}
5·ft	42·lb·ft^{-2}
5.5·ft	35·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$ Panel Width

$w_{dlp} := 1.667 \cdot psf$ Panel Weight

$M_{tc} := 3472 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1904 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1406 \cdot lb$ Allowable Shear

$P_{ae} := 492 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 934 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$319 \cdot lb \cdot ft^{-2}$
$205 \cdot lb \cdot ft^{-2}$
$143 \cdot lb \cdot ft^{-2}$
$106 \cdot lb \cdot ft^{-2}$
$81 \cdot lb \cdot ft^{-2}$
$65 \cdot lb \cdot ft^{-2}$
$53 \cdot lb \cdot ft^{-2}$
$44 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.667 \cdot psf$	Panel Weight
$M_{tc} := 3472 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1904 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports $$W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only $$W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior $$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i}) \qquad W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$$

$$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i}) \qquad W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$ ALLOWABLE LOAD

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

W_{b_i}
$426.1 \cdot lb \cdot ft^{-2}$
$273.8 \cdot lb \cdot ft^{-2}$
$191 \cdot lb \cdot ft^{-2}$
$141.1 \cdot lb \cdot ft^{-2}$
$108.7 \cdot lb \cdot ft^{-2}$
$86.5 \cdot lb \cdot ft^{-2}$
$70.7 \cdot lb \cdot ft^{-2}$
$58.9 \cdot lb \cdot ft^{-2}$

W_{sb_i}
$387.2 \cdot lb \cdot ft^{-2}$
$258.2 \cdot lb \cdot ft^{-2}$
$183.9 \cdot lb \cdot ft^{-2}$
$137.5 \cdot lb \cdot ft^{-2}$
$106.6 \cdot lb \cdot ft^{-2}$
$85.1 \cdot lb \cdot ft^{-2}$
$69.6 \cdot lb \cdot ft^{-2}$
$58 \cdot lb \cdot ft^{-2}$

W_{c_i}
$280.9 \cdot lb \cdot ft^{-2}$
$224.8 \cdot lb \cdot ft^{-2}$
$187.5 \cdot lb \cdot ft^{-2}$
$160.8 \cdot lb \cdot ft^{-2}$
$140.8 \cdot lb \cdot ft^{-2}$
$125.2 \cdot lb \cdot ft^{-2}$
$112.7 \cdot lb \cdot ft^{-2}$
$102.6 \cdot lb \cdot ft^{-2}$

W_{so_i}
$844.9 \cdot lb \cdot ft^{-2}$
$676.2 \cdot lb \cdot ft^{-2}$
$563.7 \cdot lb \cdot ft^{-2}$
$483.4 \cdot lb \cdot ft^{-2}$
$423.1 \cdot lb \cdot ft^{-2}$
$376.3 \cdot lb \cdot ft^{-2}$
$338.8 \cdot lb \cdot ft^{-2}$
$308.1 \cdot lb \cdot ft^{-2}$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$374 \cdot lb \cdot ft^{-2}$
$299 \cdot lb \cdot ft^{-2}$
$245 \cdot lb \cdot ft^{-2}$
$183 \cdot lb \cdot ft^{-2}$
$142 \cdot lb \cdot ft^{-2}$
$113 \cdot lb \cdot ft^{-2}$
$93 \cdot lb \cdot ft^{-2}$
$77 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 16" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 16 \cdot in$	Panel Width
$w_{dlp} := 1.667 \cdot psf$	Panel Weight
$M_{tc} := 3472 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1904 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	389.5·lb·ft^{-2}	439·lb·ft^{-2}	307.2·lb·ft^{-2}	870·lb·ft^{-2}
2.5·ft	250.2·lb·ft^{-2}	295.3·lb·ft^{-2}	245.9·lb·ft^{-2}	696.3·lb·ft^{-2}
3·ft	174.6·lb·ft^{-2}	211.5·lb·ft^{-2}	205·lb·ft^{-2}	580.5·lb·ft^{-2}
3.5·ft	129·lb·ft^{-2}	158.6·lb·ft^{-2}	175.8·lb·ft^{-2}	497.7·lb·ft^{-2}
4·ft	99.4·lb·ft^{-2}	123.3·lb·ft^{-2}	153.9·lb·ft^{-2}	435.7·lb·ft^{-2}
4.5·ft	79.1·lb·ft^{-2}	98.6·lb·ft^{-2}	136.9·lb·ft^{-2}	387.4·lb·ft^{-2}
5·ft	64.6·lb·ft^{-2}	80.7·lb·ft^{-2}	123.3·lb·ft^{-2}	348.8·lb·ft^{-2}
5.5·ft	53.8·lb·ft^{-2}	67.4·lb·ft^{-2}	112.2·lb·ft^{-2}	317.2·lb·ft^{-2}

L_i	WLL_i
2·ft	409·lb·ft^{-2}
2.5·ft	327·lb·ft^{-2}
3·ft	232·lb·ft^{-2}
3.5·ft	172·lb·ft^{-2}
4·ft	132·lb·ft^{-2}
4.5·ft	105·lb·ft^{-2}
5·ft	86·lb·ft^{-2}
5.5·ft	72·lb·ft^{-2}

STRUCTURAL CALCULATIONS FOR:
18" WIDE X 24 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
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Prepared By:

YOOSEF LAVI, P.E.
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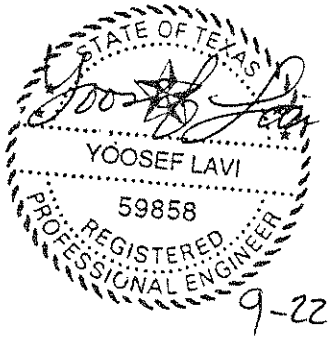

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P. 1-17

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	18 in.	1	197	158	131	97	74	58	47	39
		2	155	100	70	51	39	31	25	20
		3	179	116	81	59	45	36	29	23

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	18 in.	1	217	140	98	72	56	44	36	30
		2	229	183	153	127	98	79	64	54
		3	250	200	159	117	90	72	59	49

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

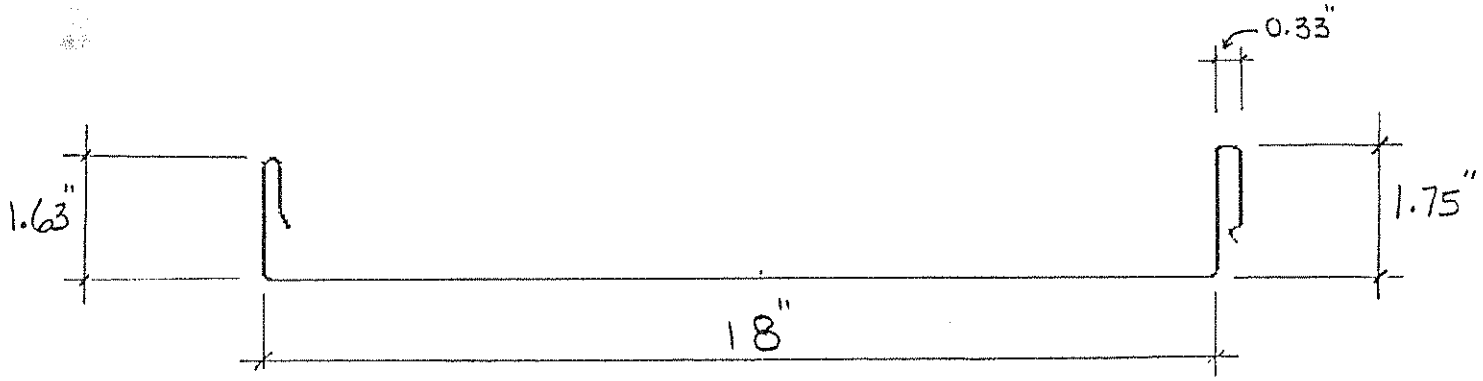
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 24 GA. (0.0239")

FY: 40 KSI

CFS Version 2.20

Section: SL171824
Rev. Date 09-19-1997
Rev. Time 17:58:25
Rev. by YL

YOOSEF LAVI, P.E.
9550 FOREST LANE, SUITE 108
DALLAS, TEXAS 75243
Phone (214) 340-0049
Fax (214) 340-0067

Section Input

Yield	(Fy)	40.000	Unit Weight	3.4000
Ultimate	(Fu)	55.000	One Inch =	1.0000
Modulus	(E)	29500.000	Cw Override	0.0000
			J Override	0.0000

Part 1 Thickness 0.0239 24 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole Distance	
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0400	No	0.00	0.000	0.345
0.208	180.000	0.0800	No	0.00	0.000	0.075
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
18.000	0.000	0.0800	No	0.00	0.000	9.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.194	205.000	0.0600	No	0.00	0.000	0.097
0.190	-50.000	0.0600	No	0.00	0.000	0.095

Full Section Properties

Area	0.5694	Wt.	1.9359	Width	23.8238
Ix	0.1339	rx	0.4850	Ixy	0.1462
Sx(t)	0.0897	y(t)	1.4933	Alpha	-89.6323
Sx(b)	0.5216	y(b)	0.2567		
Iy	22.9188	ry	6.3444	Xo	0.5626
Sy(l)	2.4751	x(l)	9.2596	Yo	-0.7254
Sy(r)	2.5335	x(r)	9.0465	jx	-0.6354
				jy	22.3622
I1	22.9197	r1	6.3445		
I2	0.1330	r2	0.4833		
Ic	23.0527	rc	6.3629	Cw	7.7776
Io	23.5326	ro	6.4288	J	0.0001084

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	3.1212	Maxo	2.7111	Mayo	32.3597
Ae	0.1496	Ixe	0.1339	Iye	15.6557
		Sxe(t)	0.0897	Sye(l)	2.3385
Tension		Sxe(b)	0.5216	Sye(r)	1.3483
Ta	13.9040				
		Negative Moment		Negative Moment	
		Maxo	1.4607	Mayo	28.1828
Shear		Ixe	0.0575	Iye	14.3471
Vay	1.0473	Sxe(t)	0.0609	Sye(l)	1.1743
Vax	0.0000	Sxe(b)	0.0715	Sye(r)	2.3565

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.293 \cdot psf$	Panel Weight
$M_{tc} := 2711 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1460 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ BENDING

$$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ SHEAR

$$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ WEB CRIPPLING

$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{s_i}	W_{c_i}
2·ft	299.9·lb·ft^{-2}	696.7·lb·ft^{-2}	197.4·lb·ft^{-2}
2.5·ft	191.5·lb·ft^{-2}	557.1·lb·ft^{-2}	157.6·lb·ft^{-2}
3·ft	132.6·lb·ft^{-2}	464·lb·ft^{-2}	131.2·lb·ft^{-2}
3.5·ft	97.1·lb·ft^{-2}	397.6·lb·ft^{-2}	112.2·lb·ft^{-2}
4·ft	74·lb·ft^{-2}	347.7·lb·ft^{-2}	98·lb·ft^{-2}
4.5·ft	58.2·lb·ft^{-2}	308.9·lb·ft^{-2}	87·lb·ft^{-2}
5·ft	46.9·lb·ft^{-2}	277.9·lb·ft^{-2}	78.2·lb·ft^{-2}
5.5·ft	38.5·lb·ft^{-2}	252.5·lb·ft^{-2}	70.9·lb·ft^{-2}

L_i	WLL_i
2·ft	197·lb·ft^{-2}
2.5·ft	158·lb·ft^{-2}
3·ft	131·lb·ft^{-2}
3.5·ft	97·lb·ft^{-2}
4·ft	74·lb·ft^{-2}
4.5·ft	58·lb·ft^{-2}
5·ft	47·lb·ft^{-2}
5.5·ft	39·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$ Panel Width

$w_{dlp} := 1.293 \cdot psf$ Panel Weight

$M_{tc} := 2711 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1460 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1047 \cdot lb$ Allowable Shear

$P_{ae} := 298 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 643 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$ Bending between supports $W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	160.9·lb·ft^{-2}	154.6·lb·ft^{-2}	170.9·lb·ft^{-2}	557.4·lb·ft^{-2}
2.5·ft	102.5·lb·ft^{-2}	99.9·lb·ft^{-2}	136.7·lb·ft^{-2}	445.7·lb·ft^{-2}
3·ft	70.8·lb·ft^{-2}	69.6·lb·ft^{-2}	113.8·lb·ft^{-2}	371.2·lb·ft^{-2}
3.5·ft	51.7·lb·ft^{-2}	51·lb·ft^{-2}	97.5·lb·ft^{-2}	318.1·lb·ft^{-2}
4·ft	39.3·lb·ft^{-2}	38.9·lb·ft^{-2}	85.2·lb·ft^{-2}	278.2·lb·ft^{-2}
4.5·ft	30.8·lb·ft^{-2}	30.5·lb·ft^{-2}	75.7·lb·ft^{-2}	247.1·lb·ft^{-2}
5·ft	24.7·lb·ft^{-2}	24.5·lb·ft^{-2}	68.1·lb·ft^{-2}	222.3·lb·ft^{-2}
5.5·ft	20.2·lb·ft^{-2}	20.1·lb·ft^{-2}	61.8·lb·ft^{-2}	202·lb·ft^{-2}

L_i	WLL_i
2·ft	155·lb·ft^{-2}
2.5·ft	100·lb·ft^{-2}
3·ft	70·lb·ft^{-2}
3.5·ft	51·lb·ft^{-2}
4·ft	39·lb·ft^{-2}
4.5·ft	31·lb·ft^{-2}
5·ft	25·lb·ft^{-2}
5.5·ft	20·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.293 \cdot psf$	Panel Weight
$M_{tc} := 2711 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1460 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	187.9·lb·ft^{-2}	178.5·lb·ft^{-2}	187·lb·ft^{-2}	573.9·lb·ft^{-2}
2.5·ft	119.7·lb·ft^{-2}	115.8·lb·ft^{-2}	149.4·lb·ft^{-2}	458.9·lb·ft^{-2}
3·ft	82.7·lb·ft^{-2}	80.8·lb·ft^{-2}	124.4·lb·ft^{-2}	382.2·lb·ft^{-2}
3.5·ft	60.3·lb·ft^{-2}	59.3·lb·ft^{-2}	106.6·lb·ft^{-2}	327.5·lb·ft^{-2}
4·ft	45.8·lb·ft^{-2}	45.2·lb·ft^{-2}	93.2·lb·ft^{-2}	286.4·lb·ft^{-2}
4.5·ft	35.9·lb·ft^{-2}	35.5·lb·ft^{-2}	82.8·lb·ft^{-2}	254.5·lb·ft^{-2}
5·ft	28.8·lb·ft^{-2}	28.6·lb·ft^{-2}	74.4·lb·ft^{-2}	228.9·lb·ft^{-2}
5.5·ft	23.5·lb·ft^{-2}	23.4·lb·ft^{-2}	67.6·lb·ft^{-2}	208·lb·ft^{-2}

L_i	WLL_i
2·ft	179·lb·ft^{-2}
2.5·ft	116·lb·ft^{-2}
3·ft	81·lb·ft^{-2}
3.5·ft	59·lb·ft^{-2}
4·ft	45·lb·ft^{-2}
4.5·ft	36·lb·ft^{-2}
5·ft	29·lb·ft^{-2}
5.5·ft	23·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.293 \cdot psf$	Panel Weight
$M_{tc} := 2711 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1460 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$217 \cdot lb \cdot ft^{-2}$
$140 \cdot lb \cdot ft^{-2}$
$98 \cdot lb \cdot ft^{-2}$
$72 \cdot lb \cdot ft^{-2}$
$56 \cdot lb \cdot ft^{-2}$
$44 \cdot lb \cdot ft^{-2}$
$36 \cdot lb \cdot ft^{-2}$
$30 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.293 \cdot psf$	Panel Weight
$M_{tc} := 2711 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1460 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports $$W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only $$W_{sb_i} := \left[\frac{1}{\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior $$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i}) \qquad W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$$

$$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i}) \qquad W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	290.7·lb·ft^{-2}	266.1·lb·ft^{-2}	172·lb·ft^{-2}	559.4·lb·ft^{-2}
2.5·ft	186.9·lb·ft^{-2}	178.1·lb·ft^{-2}	137.7·lb·ft^{-2}	447.8·lb·ft^{-2}
3·ft	130.5·lb·ft^{-2}	127.1·lb·ft^{-2}	114.8·lb·ft^{-2}	373.3·lb·ft^{-2}
3.5·ft	96.5·lb·ft^{-2}	95.1·lb·ft^{-2}	98.5·lb·ft^{-2}	320.1·lb·ft^{-2}
4·ft	74.4·lb·ft^{-2}	73.9·lb·ft^{-2}	86.3·lb·ft^{-2}	280.2·lb·ft^{-2}
4.5·ft	59.3·lb·ft^{-2}	59.1·lb·ft^{-2}	76.7·lb·ft^{-2}	249.2·lb·ft^{-2}
5·ft	48.4·lb·ft^{-2}	48.3·lb·ft^{-2}	69.1·lb·ft^{-2}	224.4·lb·ft^{-2}
5.5·ft	40.4·lb·ft^{-2}	40.3·lb·ft^{-2}	62.9·lb·ft^{-2}	204.1·lb·ft^{-2}

L_i	WLL_i
2·ft	229·lb·ft^{-2}
2.5·ft	183·lb·ft^{-2}
3·ft	153·lb·ft^{-2}
3.5·ft	127·lb·ft^{-2}
4·ft	98·lb·ft^{-2}
4.5·ft	79·lb·ft^{-2}
5·ft	64·lb·ft^{-2}
5.5·ft	54·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$ Panel Width

$w_{dlp} := 1.293 \cdot psf$ Panel Weight

$M_{tc} := 2711 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1460 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1047 \cdot lb$ Allowable Shear

$P_{ae} := 298 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 643 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending between supports $W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	265.7·lb·ft^{-2}	301·lb·ft^{-2}	188.1·lb·ft^{-2}	576·lb·ft^{-2}
2.5·ft	170.8·lb·ft^{-2}	203.3·lb·ft^{-2}	150.6·lb·ft^{-2}	461·lb·ft^{-2}
3·ft	119.3·lb·ft^{-2}	145.9·lb·ft^{-2}	125.6·lb·ft^{-2}	384.4·lb·ft^{-2}
3.5·ft	88.2·lb·ft^{-2}	109.7·lb·ft^{-2}	107.7·lb·ft^{-2}	329.6·lb·ft^{-2}
4·ft	68·lb·ft^{-2}	85.4·lb·ft^{-2}	94.3·lb·ft^{-2}	288.5·lb·ft^{-2}
4.5·ft	54.2·lb·ft^{-2}	68.4·lb·ft^{-2}	83.9·lb·ft^{-2}	256.6·lb·ft^{-2}
5·ft	44.3·lb·ft^{-2}	56·lb·ft^{-2}	75.6·lb·ft^{-2}	231·lb·ft^{-2}
5.5·ft	37·lb·ft^{-2}	46.8·lb·ft^{-2}	68.8·lb·ft^{-2}	210.1·lb·ft^{-2}

L_i	WLL_i
2·ft	250·lb·ft^{-2}
2.5·ft	200·lb·ft^{-2}
3·ft	159·lb·ft^{-2}
3.5·ft	117·lb·ft^{-2}
4·ft	90·lb·ft^{-2}
4.5·ft	72·lb·ft^{-2}
5·ft	59·lb·ft^{-2}
5.5·ft	49·lb·ft^{-2}

STRUCTURAL CALCULATIONS FOR:
18" WIDE X 22 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
ZIMMERMAN METALS, INC.
201 E. 58TH Ave.
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Prepared By:

YOOSEF LAVI, P.E.
Consulting Engineer
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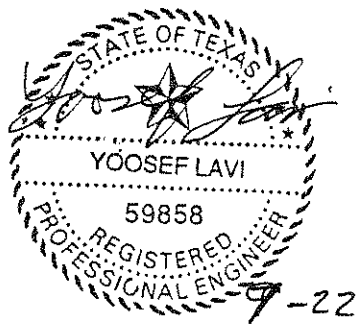
Dallas, Texas 75243
(214)-340-0049



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P. 1-17

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	18 in.	1	326	247	171	125	96	75	61	50
		2	202	131	91	67	51	40	32	26
		3	234	151	106	78	59	46	37	31

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	18 in.	1	284	182	127	94	73	58	47	39
		2	332	266	219	164	127	102	83	69
		3	363	291	207	153	118	94	77	64

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

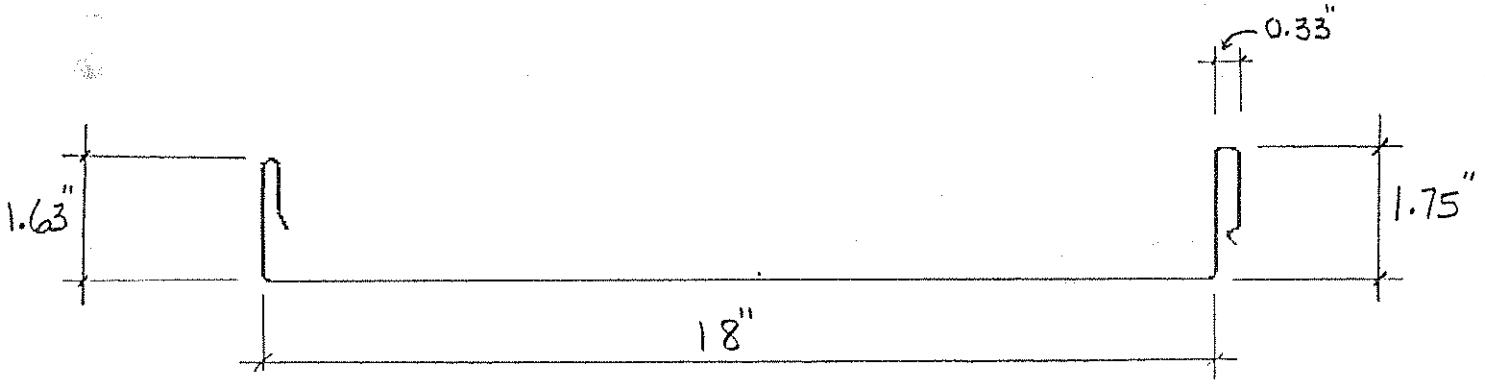
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 22 GA. (0.0299")

FY: 40 KSI

CFS Version 2.20

Section: SL171822
Rev. Date 09-19-1997
Rev. Time 17:57:20
Rev. by YL

YOOSEF LAVI, P.E.
9550 FOREST LANE, SUITE 108
DALLAS, TEXAS 75243
Phone (214) 340-0049
Fax (214) 340-0067

Section Input

Yield	(Fy)	40.000	Unit Weight	3.4000
Ultimate	(Fu)	55.000	One Inch =	1.0000
Modulus	(E)	29500.000	Cw Override	0.0000
			J Override	0.0000

Part 1 Thickness 0.0299 22 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole Distance	
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0800	No	0.00	0.000	0.345
0.220	180.000	0.0800	No	0.00	0.000	0.104
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
18.000	0.000	0.0800	No	0.00	0.000	9.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.213	205.000	0.0600	No	0.00	0.000	0.097
0.210	-50.000	0.0600	No	0.00	0.000	0.105

Full Section Properties

Area	0.7121	Wt.	2.4211	Width	23.8153
Ix	0.1656	rx	0.4822	Ixy	0.1795
Sx(t)	0.1110	y(t)	1.4917	Alpha	-89.6388
Sx(b)	0.6411	y(b)	0.2583		
Iy	28.6336	ry	6.3412	Xo	0.5305
Sy(l)	3.0905	x(l)	9.2650	Yo	-0.7215
Sy(r)	3.1692	x(r)	9.0351	jx	-0.6063
				jy	22.4302
I1	28.6347	r1	6.3414		
I2	0.1645	r2	0.4806		
Ic	28.7992	rc	6.3595	Cw	9.6323
Io	29.3702	ro	6.4223	J	0.0002122

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	4.3568	Maxo	3.5026	Mayo	45.0125
Ae	0.2088	Ixe	0.1656	Iye	21.0465
		Sxe(t)	0.1110	Sye(l)	2.9733
Tension		Sxe(b)	0.6411	Sye(r)	1.8755
Ta	17.4486				
		Negative Moment		Negative Moment	
		Maxo	1.9055	Mayo	39.1530
Shear		Ixe	0.0786	Iye	19.3542
Vay	1.4067	Sxe(t)	0.0794	Sye(l)	1.6314
Vax	0.0000	Sxe(b)	0.1034	Sye(r)	3.0070

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.614 \cdot psf$	Panel Weight
$M_{tc} := 3502 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1905 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ BENDING

$$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ SHEAR

$$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ WEB CRIPPLING

$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{s_i}	W_{c_i}
2·ft	387.5·lb·ft^{-2}	935.7·lb·ft^{-2}	326.4·lb·ft^{-2}
2.5·ft	247.4·lb·ft^{-2}	748.3·lb·ft^{-2}	260.8·lb·ft^{-2}
3·ft	171.3·lb·ft^{-2}	623.3·lb·ft^{-2}	217.1·lb·ft^{-2}
3.5·ft	125.4·lb·ft^{-2}	534·lb·ft^{-2}	185.8·lb·ft^{-2}
4·ft	95.7·lb·ft^{-2}	467.1·lb·ft^{-2}	162.4·lb·ft^{-2}
4.5·ft	75.2·lb·ft^{-2}	415·lb·ft^{-2}	144.2·lb·ft^{-2}
5·ft	60.6·lb·ft^{-2}	373.3·lb·ft^{-2}	129.6·lb·ft^{-2}
5.5·ft	49.8·lb·ft^{-2}	339.2·lb·ft^{-2}	117.7·lb·ft^{-2}

L_i	WLL_i
2·ft	326·lb·ft^{-2}
2.5·ft	247·lb·ft^{-2}
3·ft	171·lb·ft^{-2}
3.5·ft	125·lb·ft^{-2}
4·ft	96·lb·ft^{-2}
4.5·ft	75·lb·ft^{-2}
5·ft	61·lb·ft^{-2}
5.5·ft	50·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.614 \cdot psf$	Panel Weight
$M_{tc} := 3502 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1905 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports

$$W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	210.1·lb·ft^{-2}	202.2·lb·ft^{-2}	248.4·lb·ft^{-2}	748.6·lb·ft^{-2}
2.5·ft	133.9·lb·ft^{-2}	130.6·lb·ft^{-2}	198.6·lb·ft^{-2}	598.6·lb·ft^{-2}
3·ft	92.5·lb·ft^{-2}	90.9·lb·ft^{-2}	165.4·lb·ft^{-2}	498.6·lb·ft^{-2}
3.5·ft	67.5·lb·ft^{-2}	66.7·lb·ft^{-2}	141.7·lb·ft^{-2}	427.2·lb·ft^{-2}
4·ft	51.3·lb·ft^{-2}	50.8·lb·ft^{-2}	123.9·lb·ft^{-2}	373.6·lb·ft^{-2}
4.5·ft	40.2·lb·ft^{-2}	39.9·lb·ft^{-2}	110.1·lb·ft^{-2}	332·lb·ft^{-2}
5·ft	32.3·lb·ft^{-2}	32.1·lb·ft^{-2}	99·lb·ft^{-2}	298.7·lb·ft^{-2}
5.5·ft	26.4·lb·ft^{-2}	26.3·lb·ft^{-2}	89.9·lb·ft^{-2}	271.4·lb·ft^{-2}

L_i	WLL_i
2·ft	202·lb·ft^{-2}
2.5·ft	131·lb·ft^{-2}
3·ft	91·lb·ft^{-2}
3.5·ft	67·lb·ft^{-2}
4·ft	51·lb·ft^{-2}
4.5·ft	40·lb·ft^{-2}
5·ft	32·lb·ft^{-2}
5.5·ft	26·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.614 \cdot psf$	Panel Weight
$M_{tc} := 3502 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1905 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 937 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	245.2·lb·ft^{-2}	233.6·lb·ft^{-2}	272.6·lb·ft^{-2}	770.8·lb·ft^{-2}
2.5·ft	156.3·lb·ft^{-2}	151.4·lb·ft^{-2}	217.9·lb·ft^{-2}	616.4·lb·ft^{-2}
3·ft	107.9·lb·ft^{-2}	105.6·lb·ft^{-2}	181.5·lb·ft^{-2}	513.4·lb·ft^{-2}
3.5·ft	78.8·lb·ft^{-2}	77.5·lb·ft^{-2}	155.4·lb·ft^{-2}	439.9·lb·ft^{-2}
4·ft	59.9·lb·ft^{-2}	59.2·lb·ft^{-2}	135.9·lb·ft^{-2}	384.7·lb·ft^{-2}
4.5·ft	46.9·lb·ft^{-2}	46.5·lb·ft^{-2}	120.7·lb·ft^{-2}	341.8·lb·ft^{-2}
5·ft	37.7·lb·ft^{-2}	37.4·lb·ft^{-2}	108.6·lb·ft^{-2}	307.5·lb·ft^{-2}
5.5·ft	30.8·lb·ft^{-2}	30.6·lb·ft^{-2}	98.7·lb·ft^{-2}	279.4·lb·ft^{-2}

L_i	WLL_i
2·ft	234·lb·ft^{-2}
2.5·ft	151·lb·ft^{-2}
3·ft	106·lb·ft^{-2}
3.5·ft	78·lb·ft^{-2}
4·ft	59·lb·ft^{-2}
4.5·ft	46·lb·ft^{-2}
5·ft	37·lb·ft^{-2}
5.5·ft	31·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.614 \cdot psf$	Panel Weight
$M_{tc} := 3502 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1905 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i	WLL_i
2·ft	$284 \cdot lb \cdot ft^{-2}$
2.5·ft	$182 \cdot lb \cdot ft^{-2}$
3·ft	$127 \cdot lb \cdot ft^{-2}$
3.5·ft	$94 \cdot lb \cdot ft^{-2}$
4·ft	$73 \cdot lb \cdot ft^{-2}$
4.5·ft	$58 \cdot lb \cdot ft^{-2}$
5·ft	$47 \cdot lb \cdot ft^{-2}$
5.5·ft	$39 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$ Panel Width

$w_{dlp} := 1.614 \cdot psf$ Panel Weight

$M_{tc} := 3502 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1905 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1406 \cdot lb$ Allowable Shear

$P_{ae} := 492 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 934 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$ Bending between supports $W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	379.2·lb·ft^{-2}	346.6·lb·ft^{-2}	249.7·lb·ft^{-2}	751.2·lb·ft^{-2}
2.5·ft	243.7·lb·ft^{-2}	231.3·lb·ft^{-2}	199.9·lb·ft^{-2}	601.2·lb·ft^{-2}
3·ft	170.1·lb·ft^{-2}	164.8·lb·ft^{-2}	166.7·lb·ft^{-2}	501.2·lb·ft^{-2}
3.5·ft	125.7·lb·ft^{-2}	123.3·lb·ft^{-2}	143·lb·ft^{-2}	429.8·lb·ft^{-2}
4·ft	96.9·lb·ft^{-2}	95.6·lb·ft^{-2}	125.2·lb·ft^{-2}	376.2·lb·ft^{-2}
4.5·ft	77.2·lb·ft^{-2}	76.4·lb·ft^{-2}	111.3·lb·ft^{-2}	334.6·lb·ft^{-2}
5·ft	63.1·lb·ft^{-2}	62.5·lb·ft^{-2}	100.3·lb·ft^{-2}	301.2·lb·ft^{-2}
5.5·ft	52.6·lb·ft^{-2}	52.1·lb·ft^{-2}	91.2·lb·ft^{-2}	274·lb·ft^{-2}

L_i	WLL_i
2·ft	332·lb·ft^{-2}
2.5·ft	266·lb·ft^{-2}
3·ft	219·lb·ft^{-2}
3.5·ft	164·lb·ft^{-2}
4·ft	127·lb·ft^{-2}
4.5·ft	102·lb·ft^{-2}
5·ft	83·lb·ft^{-2}
5.5·ft	69·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 18" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 18 \cdot in$	Panel Width
$w_{dlp} := 1.614 \cdot psf$	Panel Weight
$M_{tc} := 3502 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1905 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports $$W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only $$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior $$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i}) \qquad W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$$

$$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i}) \qquad W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	346.6·lb·ft^{-2}	392.8·lb·ft^{-2}	273.1·lb·ft^{-2}	773.4·lb·ft^{-2}
2.5·ft	222.8·lb·ft^{-2}	264.5·lb·ft^{-2}	218.6·lb·ft^{-2}	619·lb·ft^{-2}
3·ft	155.5·lb·ft^{-2}	189.5·lb·ft^{-2}	182.3·lb·ft^{-2}	516.1·lb·ft^{-2}
3.5·ft	114.9·lb·ft^{-2}	142.2·lb·ft^{-2}	156.4·lb·ft^{-2}	442.5·lb·ft^{-2}
4·ft	88.6·lb·ft^{-2}	110.6·lb·ft^{-2}	136.9·lb·ft^{-2}	387.4·lb·ft^{-2}
4.5·ft	70.6·lb·ft^{-2}	88.5·lb·ft^{-2}	121.8·lb·ft^{-2}	344.5·lb·ft^{-2}
5·ft	57.7·lb·ft^{-2}	72.5·lb·ft^{-2}	109.7·lb·ft^{-2}	310.2·lb·ft^{-2}
5.5·ft	48.1·lb·ft^{-2}	60.5·lb·ft^{-2}	99.8·lb·ft^{-2}	282.1·lb·ft^{-2}

L_i	WLL_i
2·ft	363·lb·ft^{-2}
2.5·ft	291·lb·ft^{-2}
3·ft	207·lb·ft^{-2}
3.5·ft	153·lb·ft^{-2}
4·ft	118·lb·ft^{-2}
4.5·ft	94·lb·ft^{-2}
5·ft	77·lb·ft^{-2}
5.5·ft	64·lb·ft^{-2}

STRUCTURAL CALCULATIONS FOR:
20" WIDE X 24 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
ZIMMERMAN METALS, INC.
201 E. 58TH Ave.
Denver, Colorado 80216

Prepared By:

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Consulting Engineer
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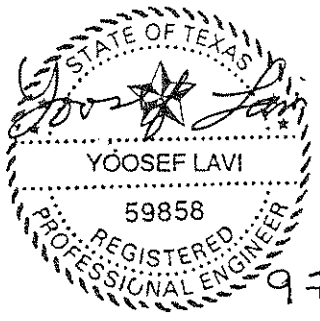

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P. 1-17

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	20 in.	1	178	137	95	69	53	41	33	27
		2	139	90	63	46	35	27	22	18
		3	161	104	73	53	41	32	26	21

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
24 GA Steel	20 in.	1	196	126	88	65	50	40	33	27
		2	206	165	124	93	72	57	47	39
		3	225	180	143	106	82	65	53	44

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

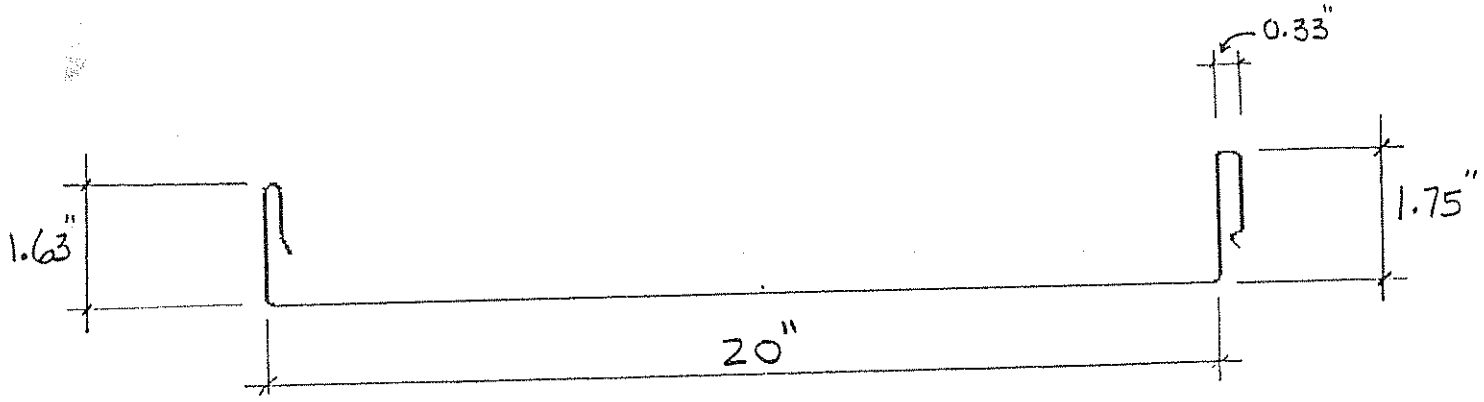
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 24 GA. (0.0239")

FY: 40 KSI

CFS Version 2.20

Section: SL172024
Rev. Date 09-19-1997
Rev. Time 17:58:42
Rev. by YL

YOOSEF LAVI, P.E.
9550 FOREST LANE, SUITE 108
DALLAS, TEXAS 75243
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Section Input

Yield	(Fy)	40.000	Unit Weight	3.4000
Ultimate	(Fu)	55.000	One Inch =	1.0000
Modulus	(E)	29500.000	Cw Override	0.0000
			J Override	0.0000

Part 1 Thickness 0.0239 24 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole Distance	
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0400	No	0.00	0.000	0.345
0.208	180.000	0.0800	No	0.00	0.000	0.075
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
20.000	0.000	0.0800	No	0.00	0.000	10.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.194	205.000	0.0600	No	0.00	0.000	0.097
0.190	-50.000	0.0600	No	0.00	0.000	0.095

Full Section Properties

Area	0.6172	Wt.	2.0984	Width	25.8238
Ix	0.1366	rx	0.4704	Ixy	0.1641
Sx(t)	0.0903	y(t)	1.5122	Alpha	-89.6839
Sx(b)	0.5743	y(b)	0.2378		
Iy	29.8839	ry	6.9584	Xo	0.7006
Sy(l)	2.9117	x(l)	10.2635	Yo	-0.6812
Sy(r)	2.9757	x(r)	10.0426	jx	-0.7715
				jy	27.4459
I1	29.8849	r1	6.9585		
I2	0.1357	r2	0.4688		
Ic	30.0205	rc	6.9743	Cw	9.9609
Io	30.6098	ro	7.0424	J	0.0001175

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	3.1222	Maxo	2.1573	Mayo	35.9614
Ae	0.1496	Ixe	0.1360	Iye	19.6128
		Sxe(t)	0.0899	Sye(l)	2.7176
Tension		Sxe(b)	0.5743	Sye(r)	1.4984
Ta	15.0512				
		Negative Moment		Negative Moment	
		Maxo	1.4613	Mayo	31.3079
Shear		Ixe	0.0576	Iye	17.9242
Vay	1.0473	Sxe(t)	0.0609	Sye(l)	1.3045
Vax	0.0000	Sxe(b)	0.0716	Sye(r)	2.7300

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$ Panel Width

$w_{dlp} := 1.256 \cdot psf$ Panel Weight

$M_{tc} := 2157 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1461 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1047 \cdot lb$ Allowable Shear

$P_{ae} := 298 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 643 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ BENDING

$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$ SHEAR

$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$ WEB CRIPPLING

$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

W_{b_i}
$214.4 \cdot lb \cdot ft^{-2}$
$136.8 \cdot lb \cdot ft^{-2}$
$94.6 \cdot lb \cdot ft^{-2}$
$69.2 \cdot lb \cdot ft^{-2}$
$52.7 \cdot lb \cdot ft^{-2}$
$41.4 \cdot lb \cdot ft^{-2}$
$33.3 \cdot lb \cdot ft^{-2}$
$27.3 \cdot lb \cdot ft^{-2}$

W_{s_i}
$626.9 \cdot lb \cdot ft^{-2}$
$501.3 \cdot lb \cdot ft^{-2}$
$417.5 \cdot lb \cdot ft^{-2}$
$357.7 \cdot lb \cdot ft^{-2}$
$312.8 \cdot lb \cdot ft^{-2}$
$277.9 \cdot lb \cdot ft^{-2}$
$250 \cdot lb \cdot ft^{-2}$
$227.2 \cdot lb \cdot ft^{-2}$

W_{c_i}
$177.5 \cdot lb \cdot ft^{-2}$
$141.8 \cdot lb \cdot ft^{-2}$
$117.9 \cdot lb \cdot ft^{-2}$
$100.9 \cdot lb \cdot ft^{-2}$
$88.1 \cdot lb \cdot ft^{-2}$
$78.2 \cdot lb \cdot ft^{-2}$
$70.3 \cdot lb \cdot ft^{-2}$
$63.8 \cdot lb \cdot ft^{-2}$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$178 \cdot lb \cdot ft^{-2}$
$137 \cdot lb \cdot ft^{-2}$
$95 \cdot lb \cdot ft^{-2}$
$69 \cdot lb \cdot ft^{-2}$
$53 \cdot lb \cdot ft^{-2}$
$41 \cdot lb \cdot ft^{-2}$
$33 \cdot lb \cdot ft^{-2}$
$27 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.256 \cdot psf$	Panel Weight
$M_{tc} := 2157 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1461 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports

$$W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

W_{b_i}
$144.8 \cdot lb \cdot ft^{-2}$
$92.2 \cdot lb \cdot ft^{-2}$
$63.7 \cdot lb \cdot ft^{-2}$
$46.5 \cdot lb \cdot ft^{-2}$
$35.3 \cdot lb \cdot ft^{-2}$
$27.6 \cdot lb \cdot ft^{-2}$
$22.1 \cdot lb \cdot ft^{-2}$
$18.1 \cdot lb \cdot ft^{-2}$

W_{sb_i}
$139.2 \cdot lb \cdot ft^{-2}$
$89.9 \cdot lb \cdot ft^{-2}$
$62.6 \cdot lb \cdot ft^{-2}$
$45.9 \cdot lb \cdot ft^{-2}$
$34.9 \cdot lb \cdot ft^{-2}$
$27.4 \cdot lb \cdot ft^{-2}$
$22 \cdot lb \cdot ft^{-2}$
$18 \cdot lb \cdot ft^{-2}$

W_{c_i}
$153.8 \cdot lb \cdot ft^{-2}$
$123 \cdot lb \cdot ft^{-2}$
$102.4 \cdot lb \cdot ft^{-2}$
$87.7 \cdot lb \cdot ft^{-2}$
$76.7 \cdot lb \cdot ft^{-2}$
$68.1 \cdot lb \cdot ft^{-2}$
$61.2 \cdot lb \cdot ft^{-2}$
$55.6 \cdot lb \cdot ft^{-2}$

W_{so_i}
$501.6 \cdot lb \cdot ft^{-2}$
$401 \cdot lb \cdot ft^{-2}$
$334 \cdot lb \cdot ft^{-2}$
$286.2 \cdot lb \cdot ft^{-2}$
$250.3 \cdot lb \cdot ft^{-2}$
$222.4 \cdot lb \cdot ft^{-2}$
$200 \cdot lb \cdot ft^{-2}$
$181.7 \cdot lb \cdot ft^{-2}$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$139 \cdot lb \cdot ft^{-2}$
$90 \cdot lb \cdot ft^{-2}$
$63 \cdot lb \cdot ft^{-2}$
$46 \cdot lb \cdot ft^{-2}$
$35 \cdot lb \cdot ft^{-2}$
$27 \cdot lb \cdot ft^{-2}$
$22 \cdot lb \cdot ft^{-2}$
$18 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.256 \cdot psf$	Panel Weight
$M_{tc} := 2157 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1461 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports

$$W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	169.1·lb·ft^{-2}	160.7·lb·ft^{-2}	168.2·lb·ft^{-2}	516.4·lb·ft^{-2}
2.5·ft	107.7·lb·ft^{-2}	104.2·lb·ft^{-2}	134.5·lb·ft^{-2}	412.9·lb·ft^{-2}
3·ft	74.3·lb·ft^{-2}	72.6·lb·ft^{-2}	112·lb·ft^{-2}	343.9·lb·ft^{-2}
3.5·ft	54.2·lb·ft^{-2}	53.3·lb·ft^{-2}	95.9·lb·ft^{-2}	294.7·lb·ft^{-2}
4·ft	41.2·lb·ft^{-2}	40.6·lb·ft^{-2}	83.8·lb·ft^{-2}	257.7·lb·ft^{-2}
4.5·ft	32.2·lb·ft^{-2}	31.9·lb·ft^{-2}	74.5·lb·ft^{-2}	228.9·lb·ft^{-2}
5·ft	25.8·lb·ft^{-2}	25.6·lb·ft^{-2}	67·lb·ft^{-2}	206·lb·ft^{-2}
5.5·ft	21.1·lb·ft^{-2}	20.9·lb·ft^{-2}	60.8·lb·ft^{-2}	187.1·lb·ft^{-2}

L_i	WLL_i
2·ft	161·lb·ft^{-2}
2.5·ft	104·lb·ft^{-2}
3·ft	73·lb·ft^{-2}
3.5·ft	53·lb·ft^{-2}
4·ft	41·lb·ft^{-2}
4.5·ft	32·lb·ft^{-2}
5·ft	26·lb·ft^{-2}
5.5·ft	21·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 24 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.256 \cdot psf$	Panel Weight
$M_{tc} := 2157 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1461 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i	WLL_i
2·ft	$196 \cdot lb \cdot ft^{-2}$
2.5·ft	$126 \cdot lb \cdot ft^{-2}$
3·ft	$88 \cdot lb \cdot ft^{-2}$
3.5·ft	$65 \cdot lb \cdot ft^{-2}$
4·ft	$50 \cdot lb \cdot ft^{-2}$
4.5·ft	$40 \cdot lb \cdot ft^{-2}$
5·ft	$33 \cdot lb \cdot ft^{-2}$
5.5·ft	$27 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 24 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$ Panel Width

$w_{dlp} := 1.256 \cdot psf$ Panel Weight

$M_{tc} := 2157 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1461 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1047 \cdot lb$ Allowable Shear

$P_{ae} := 298 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 643 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$ Bending between supports $W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	217·lb·ft^{-2}	199.2·lb·ft^{-2}	154.8·lb·ft^{-2}	503.6·lb·ft^{-2}
2.5·ft	139.3·lb·ft^{-2}	131.7·lb·ft^{-2}	124·lb·ft^{-2}	403.1·lb·ft^{-2}
3·ft	97.1·lb·ft^{-2}	93.3·lb·ft^{-2}	103.4·lb·ft^{-2}	336·lb·ft^{-2}
3.5·ft	71.7·lb·ft^{-2}	69.6·lb·ft^{-2}	88.7·lb·ft^{-2}	288.2·lb·ft^{-2}
4·ft	55.2·lb·ft^{-2}	53.9·lb·ft^{-2}	77.7·lb·ft^{-2}	252.3·lb·ft^{-2}
4.5·ft	43.9·lb·ft^{-2}	43·lb·ft^{-2}	69.1·lb·ft^{-2}	224.4·lb·ft^{-2}
5·ft	35.8·lb·ft^{-2}	35.2·lb·ft^{-2}	62.2·lb·ft^{-2}	202·lb·ft^{-2}
5.5·ft	29.8·lb·ft^{-2}	29.4·lb·ft^{-2}	56.6·lb·ft^{-2}	183.8·lb·ft^{-2}

L_i	WLL_i
2·ft	206·lb·ft^{-2}
2.5·ft	165·lb·ft^{-2}
3·ft	124·lb·ft^{-2}
3.5·ft	93·lb·ft^{-2}
4·ft	72·lb·ft^{-2}
4.5·ft	57·lb·ft^{-2}
5·ft	47·lb·ft^{-2}
5.5·ft	39·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 24 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.256 \cdot psf$	Panel Weight
$M_{tc} := 2157 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1461 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1047 \cdot lb$	Allowable Shear
$P_{ae} := 298 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 643 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports $$W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only $$W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior $$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i}) \qquad W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$$

$$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i}) \qquad W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	239.5·lb·ft^{-2}	227.5·lb·ft^{-2}	169.3·lb·ft^{-2}	518.5·lb·ft^{-2}
2.5·ft	154·lb·ft^{-2}	151.4·lb·ft^{-2}	135.6·lb·ft^{-2}	415·lb·ft^{-2}
3·ft	107.6·lb·ft^{-2}	107.7·lb·ft^{-2}	113.1·lb·ft^{-2}	346·lb·ft^{-2}
3.5·ft	79.6·lb·ft^{-2}	80.5·lb·ft^{-2}	97·lb·ft^{-2}	296.7·lb·ft^{-2}
4·ft	61.4·lb·ft^{-2}	62.5·lb·ft^{-2}	84.9·lb·ft^{-2}	259.8·lb·ft^{-2}
4.5·ft	48.9·lb·ft^{-2}	50·lb·ft^{-2}	75.6·lb·ft^{-2}	231·lb·ft^{-2}
5·ft	40·lb·ft^{-2}	40.9·lb·ft^{-2}	68.1·lb·ft^{-2}	208·lb·ft^{-2}
5.5·ft	33.4·lb·ft^{-2}	34.2·lb·ft^{-2}	61.9·lb·ft^{-2}	189.2·lb·ft^{-2}

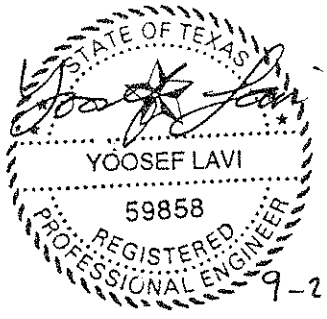
L_i	WLL_i
2·ft	225·lb·ft^{-2}
2.5·ft	180·lb·ft^{-2}
3·ft	143·lb·ft^{-2}
3.5·ft	106·lb·ft^{-2}
4·ft	82·lb·ft^{-2}
4.5·ft	65·lb·ft^{-2}
5·ft	53·lb·ft^{-2}
5.5·ft	44·lb·ft^{-2}

STRUCTURAL CALCULATIONS FOR:
20" WIDE X 22 GA STEEL
ZIMMERMAN METAL SL-1750 ROOF PANEL

Prepared For:
ZIMMERMAN METALS, INC.
201 E. 58TH Ave.
Denver, Colorado 80216

Prepared By:

YOOSEF LAVI, P.E.
Consulting Engineer
9550 Forest Lane, Suite 108
Dallas, Texas 75243
(214)-340-0049



9-22-97

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE LIVE LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	20 in.	1	294	224	155	114	87	68	55	45
		2	182	118	82	60	46	36	29	24
		3	210	136	95	70	53	42	34	27

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

ALLOWABLE LOAD TABLES FOR:
ZIMMERMAN METAL SL1750 ROOF PANEL

ALLOWABLE UPLIFT LOAD (PSF)

Panel Gage	Panel Width	# of Equal Spans	SPAN (FT.)							
			2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
22 GA Steel	20 in.	1	256	164	115	85	65	52	43	36
		2	299	239	199	149	115	92	75	63
		3	327	292	186	138	106	85	69	58

NOTES:

1. All calculations for panel properties have been made in accordance with 1996 edition of "Specification for Cold-Formed Steel Design Manual" published by American Iron and Steel Institute.

2. Values for 3 or more spans are based on 4 equal spans.

3. These load capacities are for the panel itself. Frames, purlins, clips, fasteners, panel interlocking and all supports must be designed to resist load imposed by the panel.

4. Materials:
   FY = 40 KSI for steel panels

5. All Loads are in PSF.

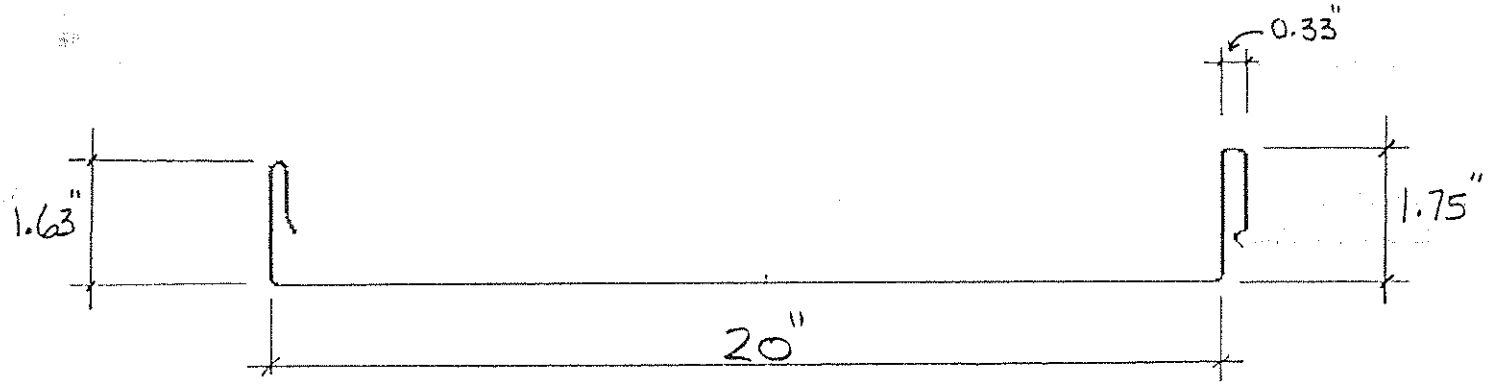
6. Minimum panel support bearing length = 3.00 in.

7. Loads shown are limited by L/180 deflection.

8. Above capacities have been increased by 33-1/3% as per AISI Sec. A4.4

9. **THESE UPLIFT LOAD TABLES ARE FOR PANEL CAPACITY ONLY. FULL SCALE TESTS SUCH AS ASTM E-1592 MUST BE CONDUCTED TO DETERMINE THE FULL CAPACITY OF THE PANEL SYSTEM INCLUDING CLIPS, AND PANEL INTERLOCKING SYSTEM.**

ZIMMERMAN METAL SL1750 ROOF PANEL



ALL INSIDE RAD. 0.08 U.N.O.

THICKNESS: 22 GA. (0.0299")

FY: 40 KSI

CFS Version 2.20

Section: SL172022
Rev. Date 09-19-1997
Rev. Time 17:55:48
Rev. by YL

YOOSEF LAVI, P.E.
9550 FOREST LANE, SUITE 108
DALLAS, TEXAS 75243
Phone (214) 340-0049
Fax (214) 340-0067

Section Input

Yield	(Fy)	40.000	Unit Weight	3.4000
Ultimate	(Fu)	55.000	One Inch =	1.0000
Modulus	(E)	29500.000	Cw Override	0.0000
			J Override	0.0000

Part 1 Thickness 0.0299 22 GAGE X=0.000, Y=0.000

Length	Angle	Radius	Web	k	Hole Distance	
0.270	115.000	0.0800	No	0.00	0.000	0.135
0.690	90.000	0.0800	No	0.00	0.000	0.345
0.220	180.000	0.0800	No	0.00	0.000	0.104
1.630	-90.000	0.0800	Sgl	0.00	0.000	0.815
20.000	0.000	0.0800	No	0.00	0.000	10.000
1.750	90.000	0.0800	Sgl	0.00	0.000	0.875
0.330	0.000	0.0800	No	0.00	0.000	0.165
1.060	-90.000	0.0800	No	0.00	0.000	0.530
0.213	205.000	0.0600	No	0.00	0.000	0.097
0.210	-50.000	0.0600	No	0.00	0.000	0.105

Full Section Properties

Area	0.7719	Wt.	2.6244	Width	25.8153
Ix	0.1689	rx	0.4677	Ixy	0.2015
Sx(t)	0.1118	y(t)	1.5106	Alpha	-89.6894
Sx(b)	0.7053	y(b)	0.2394		
Iy	37.3404	ry	6.9553	Xo	0.6652
Sy(l)	3.6362	x(l)	10.2691	Yo	-0.6775
Sy(r)	3.7225	x(r)	10.0310	jx	-0.7390
				jy	27.5368
I1	37.3415	r1	6.9554		
I2	0.1678	r2	0.4662		
Ic	37.5093	rc	6.9710	Cw	12.3354
Io	38.2051	ro	7.0354	J	0.0002300

Fully Braced Allowables

Compression		Positive Moment		Positive Moment	
Pao	4.3586	Maxo	3.5272	Mayo	50.0195
Ae	0.2089	Ixe	0.1689	Iye	26.4090
		Sxe(t)	0.1118	Sye(l)	3.4618
Tension		Sxe(b)	0.7053	Sye(r)	2.0841
Ta	18.8838				
		Negative Moment		Negative Moment	
		Maxo	1.9066	Mayo	43.4917
Shear		Ixe	0.0787	Iye	24.2107
Vay	1.4067	Sxe(t)	0.0794	Sye(l)	1.8122
Vax	0.0000	Sxe(b)	0.1035	Sye(r)	3.4886

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.571 \cdot psf$	Panel Weight
$M_{tc} := 3527 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1906 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ BENDING

$$W_{s_i} := \frac{V - V_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ SHEAR

$$W_{c_i} := \frac{P_{ae} - C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$ WEB CRIPPLING

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{s_i}	W_{c_i}
2·ft	351.1·lb·ft^{-2}	842·lb·ft^{-2}	293.6·lb·ft^{-2}
2.5·ft	224.2·lb·ft^{-2}	673.3·lb·ft^{-2}	234.6·lb·ft^{-2}
3·ft	155.2·lb·ft^{-2}	560.8·lb·ft^{-2}	195.2·lb·ft^{-2}
3.5·ft	113.6·lb·ft^{-2}	480.5·lb·ft^{-2}	167.1·lb·ft^{-2}
4·ft	86.6·lb·ft^{-2}	420.2·lb·ft^{-2}	146·lb·ft^{-2}
4.5·ft	68.1·lb·ft^{-2}	373.4·lb·ft^{-2}	129.6·lb·ft^{-2}
5·ft	54.9·lb·ft^{-2}	335.9·lb·ft^{-2}	116.5·lb·ft^{-2}
5.5·ft	45.1·lb·ft^{-2}	305.2·lb·ft^{-2}	105.8·lb·ft^{-2}

L_i	WLL_i
2·ft	294·lb·ft^{-2}
2.5·ft	224·lb·ft^{-2}
3·ft	155·lb·ft^{-2}
3.5·ft	114·lb·ft^{-2}
4·ft	87·lb·ft^{-2}
4.5·ft	68·lb·ft^{-2}
5·ft	55·lb·ft^{-2}
5.5·ft	45·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.571 \cdot psf$	Panel Weight
$M_{tc} := 3527 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1906 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports

$$W_{bs_i} := \frac{(8) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\frac{.625^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

W_{b_i}
$189 \cdot lb \cdot ft^{-2}$
$120.4 \cdot lb \cdot ft^{-2}$
$83.1 \cdot lb \cdot ft^{-2}$
$60.7 \cdot lb \cdot ft^{-2}$
$46.1 \cdot lb \cdot ft^{-2}$
$36.1 \cdot lb \cdot ft^{-2}$
$28.9 \cdot lb \cdot ft^{-2}$
$23.6 \cdot lb \cdot ft^{-2}$

W_{sb_i}
$182 \cdot lb \cdot ft^{-2}$
$117.5 \cdot lb \cdot ft^{-2}$
$81.7 \cdot lb \cdot ft^{-2}$
$59.9 \cdot lb \cdot ft^{-2}$
$45.7 \cdot lb \cdot ft^{-2}$
$35.8 \cdot lb \cdot ft^{-2}$
$28.8 \cdot lb \cdot ft^{-2}$
$23.5 \cdot lb \cdot ft^{-2}$

W_{c_i}
$223.5 \cdot lb \cdot ft^{-2}$
$178.7 \cdot lb \cdot ft^{-2}$
$148.8 \cdot lb \cdot ft^{-2}$
$127.5 \cdot lb \cdot ft^{-2}$
$111.5 \cdot lb \cdot ft^{-2}$
$99 \cdot lb \cdot ft^{-2}$
$89 \cdot lb \cdot ft^{-2}$
$80.9 \cdot lb \cdot ft^{-2}$

W_{so_i}
$673.6 \cdot lb \cdot ft^{-2}$
$538.6 \cdot lb \cdot ft^{-2}$
$448.7 \cdot lb \cdot ft^{-2}$
$384.4 \cdot lb \cdot ft^{-2}$
$336.2 \cdot lb \cdot ft^{-2}$
$298.7 \cdot lb \cdot ft^{-2}$
$268.7 \cdot lb \cdot ft^{-2}$
$244.2 \cdot lb \cdot ft^{-2}$

L_i
2·ft
2.5·ft
3·ft
3.5·ft
4·ft
4.5·ft
5·ft
5.5·ft

WLL_i
$182 \cdot lb \cdot ft^{-2}$
$118 \cdot lb \cdot ft^{-2}$
$82 \cdot lb \cdot ft^{-2}$
$60 \cdot lb \cdot ft^{-2}$
$46 \cdot lb \cdot ft^{-2}$
$36 \cdot lb \cdot ft^{-2}$
$29 \cdot lb \cdot ft^{-2}$
$24 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE LIVE LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.571 \cdot psf$	Panel Weight
$M_{tc} := 3527 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1906 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 937 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(13) \cdot (M_{tc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending between supports $$W_{bs_i} := \frac{(9.34) \cdot (M_{bc} - M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V - V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$$ Shear only $$W_{sb_i} := \left[\frac{1}{\frac{.607^2 \cdot (L_i)^2}{(V - V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{bc} - M_{dl_i})^2}} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} - C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior $$W_{ci_i} := \frac{P_{ai} - C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i})$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	$220.7 \cdot lb \cdot ft^{-2}$	$210.2 \cdot lb \cdot ft^{-2}$	$245.2 \cdot lb \cdot ft^{-2}$	$693.6 \cdot lb \cdot ft^{-2}$
2.5·ft	$140.6 \cdot lb \cdot ft^{-2}$	$136.2 \cdot lb \cdot ft^{-2}$	$196.1 \cdot lb \cdot ft^{-2}$	$554.6 \cdot lb \cdot ft^{-2}$
3·ft	$97.1 \cdot lb \cdot ft^{-2}$	$95 \cdot lb \cdot ft^{-2}$	$163.3 \cdot lb \cdot ft^{-2}$	$462 \cdot lb \cdot ft^{-2}$
3.5·ft	$70.8 \cdot lb \cdot ft^{-2}$	$69.7 \cdot lb \cdot ft^{-2}$	$139.8 \cdot lb \cdot ft^{-2}$	$395.8 \cdot lb \cdot ft^{-2}$
4·ft	$53.8 \cdot lb \cdot ft^{-2}$	$53.1 \cdot lb \cdot ft^{-2}$	$122.3 \cdot lb \cdot ft^{-2}$	$346.2 \cdot lb \cdot ft^{-2}$
4.5·ft	$42.1 \cdot lb \cdot ft^{-2}$	$41.7 \cdot lb \cdot ft^{-2}$	$108.6 \cdot lb \cdot ft^{-2}$	$307.5 \cdot lb \cdot ft^{-2}$
5·ft	$33.8 \cdot lb \cdot ft^{-2}$	$33.5 \cdot lb \cdot ft^{-2}$	$97.7 \cdot lb \cdot ft^{-2}$	$276.7 \cdot lb \cdot ft^{-2}$
5.5·ft	$27.6 \cdot lb \cdot ft^{-2}$	$27.4 \cdot lb \cdot ft^{-2}$	$88.7 \cdot lb \cdot ft^{-2}$	$251.4 \cdot lb \cdot ft^{-2}$

L_i	WLL_i
2·ft	$210 \cdot lb \cdot ft^{-2}$
2.5·ft	$136 \cdot lb \cdot ft^{-2}$
3·ft	$95 \cdot lb \cdot ft^{-2}$
3.5·ft	$70 \cdot lb \cdot ft^{-2}$
4·ft	$53 \cdot lb \cdot ft^{-2}$
4.5·ft	$42 \cdot lb \cdot ft^{-2}$
5·ft	$34 \cdot lb \cdot ft^{-2}$
5.5·ft	$27 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 22 GA., FY = 40 KSI

SIMPLE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.571 \cdot psf$	Panel Weight
$M_{tc} := 3527 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1906 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{b_i} := \frac{(8) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$

$$W_{s_i} := \frac{V_{dl_i} + V}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{c_i} := \frac{P_{ae} + C_{dl_i}}{0.5 \cdot (L_i) \cdot (P_w)}$$

$$W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$

L_i	WLL_i
2·ft	$256 \cdot lb \cdot ft^{-2}$
2.5·ft	$164 \cdot lb \cdot ft^{-2}$
3·ft	$115 \cdot lb \cdot ft^{-2}$
3.5·ft	$85 \cdot lb \cdot ft^{-2}$
4·ft	$65 \cdot lb \cdot ft^{-2}$
4.5·ft	$52 \cdot lb \cdot ft^{-2}$
5·ft	$43 \cdot lb \cdot ft^{-2}$
5.5·ft	$36 \cdot lb \cdot ft^{-2}$

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 22 GA., FY = 40 KSI

TWO SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$	Panel Width
$w_{dlp} := 1.571 \cdot psf$	Panel Weight
$M_{tc} := 3527 \cdot in \cdot lb$	Allowable Moment Top Compression
$M_{bc} := 1906 \cdot in \cdot lb$	Allowable Moment Bottom Compression
$V := 1406 \cdot lb$	Allowable Shear
$P_{ae} := 492 \cdot lb$	Allowable Web Crippling Exterior Condition
$P_{ai} := 934 \cdot lb$	Allowable Web Crippling Interior Condition

Calculations:

$i := 1 .. 8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8} \qquad V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2} \qquad C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$$

$$W_{bbs_i} := \frac{(128) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w) \cdot (9)}$$ Bending between supports

$$W_{bs_i} := \frac{(8) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$$ Bending at supports

$$W_{so_i} := \frac{V + V_{dl_i}}{0.625 \cdot (L_i) \cdot (P_w)}$$ Shear only

$$W_{sb_i} := \left[\frac{1}{\left[\frac{.625^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .125^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$$ Bending + Shear

$$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.375 \cdot (L_i) \cdot (P_w)}$$ Web crippling at exterior

$$W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.25 \cdot (L_i) \cdot (P_w)}$$ Web crippling at interior

$$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i}) \qquad W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$$

$$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i}) \qquad W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$$

$$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	341.6·lb·ft^{-2}	313.8·lb·ft^{-2}	224.8·lb·ft^{-2}	676.1·lb·ft^{-2}
2.5·ft	219.7·lb·ft^{-2}	209.6·lb·ft^{-2}	180·lb·ft^{-2}	541.2·lb·ft^{-2}
3·ft	153.4·lb·ft^{-2}	149.4·lb·ft^{-2}	150.1·lb·ft^{-2}	451.2·lb·ft^{-2}
3.5·ft	113.4·lb·ft^{-2}	111.8·lb·ft^{-2}	128.7·lb·ft^{-2}	386.9·lb·ft^{-2}
4·ft	87.5·lb·ft^{-2}	86.8·lb·ft^{-2}	112.7·lb·ft^{-2}	338.7·lb·ft^{-2}
4.5·ft	69.7·lb·ft^{-2}	69.3·lb·ft^{-2}	100.3·lb·ft^{-2}	301.2·lb·ft^{-2}
5·ft	57·lb·ft^{-2}	56.7·lb·ft^{-2}	90.3·lb·ft^{-2}	271.2·lb·ft^{-2}
5.5·ft	47.6·lb·ft^{-2}	47.3·lb·ft^{-2}	82.1·lb·ft^{-2}	246.7·lb·ft^{-2}

L_i	WLL_i
2·ft	299·lb·ft^{-2}
2.5·ft	239·lb·ft^{-2}
3·ft	199·lb·ft^{-2}
3.5·ft	149·lb·ft^{-2}
4·ft	115·lb·ft^{-2}
4.5·ft	92·lb·ft^{-2}
5·ft	75·lb·ft^{-2}
5.5·ft	63·lb·ft^{-2}

ALLOWABLE LOAD TABLE CALCULATIONS FOR:
ZIMMERMAN METAL SL1750, 20" WIDE X 22 GA., FY = 40 KSI

THREE SPAN CONDITION
ALLOWABLE UPLIFT LOAD

units:

$plf := \frac{lb}{ft}$ $psf := \frac{lb}{ft^2}$ $psi := \frac{lb}{in^2}$ $kip := 1000 \cdot lb$ $ksi := \frac{kip}{in^2}$

INPUTS:

$P_w := 20 \cdot in$ Panel Width

$w_{dlp} := 1.571 \cdot psf$ Panel Weight

$M_{tc} := 3527 \cdot in \cdot lb$ Allowable Moment Top Compression

$M_{bc} := 1906 \cdot in \cdot lb$ Allowable Moment Bottom Compression

$V := 1406 \cdot lb$ Allowable Shear

$P_{ae} := 492 \cdot lb$ Allowable Web Crippling Exterior Condition

$P_{ai} := 934 \cdot lb$ Allowable Web Crippling Interior Condition

Calculations:

$i := 1..8$

$L_i :=$

2.0·ft
2.5·ft
3.0·ft
3.5·ft
4.0·ft
4.5·ft
5.0·ft
5.5·ft

$M_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)^2}{8}$ $V_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$ $C_{dl_i} := \frac{(w_{dlp}) \cdot (P_w) \cdot (L_i)}{2}$

$W_{bbs_i} := \frac{(13) \cdot (M_{bc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending between supports $W_{bs_i} := \frac{(9.34) \cdot (M_{tc} + M_{dl_i})}{(L_i)^2 \cdot (P_w)}$ Bending at supports

$W_{so_i} := \frac{V + V_{dl_i}}{0.607 \cdot (L_i) \cdot (P_w)}$ Shear only $W_{sb_i} := \left[\frac{1}{\left[\frac{.607^2 \cdot (L_i)^2}{(V + V_{dl_i})^2} + .1071^2 \cdot \frac{(L_i)^4}{(M_{tc} + M_{dl_i})^2} \right]} \right]^{.5} \cdot \frac{1}{P_w}$ Bending + Shear

$W_{ce_i} := \frac{P_{ae} + C_{dl_i}}{0.393 \cdot (L_i) \cdot (P_w)}$ Web crippling at exterior $W_{ci_i} := \frac{P_{ai} + C_{dl_i}}{1.143 \cdot (L_i) \cdot (P_w)}$ Web crippling at interior

$W_{b_i} := if(W_{bbs_i} < W_{bs_i}, W_{bbs_i}, W_{bs_i})$ $W_{c_i} := if(W_{ce_i} < W_{ci_i}, W_{ce_i}, W_{ci_i})$

$W_{s_i} := if(W_{so_i} < W_{sb_i}, W_{so_i}, W_{sb_i})$ $W_{comp_i} := if(W_{s_i} < W_{b_i}, W_{s_i}, W_{b_i})$

$WLL_i := if(W_{comp_i} < W_{c_i}, W_{comp_i}, W_{c_i}) \cdot 1.33$ ALLOWABLE LOAD

L_i	W_{b_i}	W_{sb_i}	W_{c_i}	W_{so_i}
2·ft	312.3·lb·ft^{-2}	355.5·lb·ft^{-2}	245.8·lb·ft^{-2}	696.2·lb·ft^{-2}
2.5·ft	200.8·lb·ft^{-2}	239.5·lb·ft^{-2}	196.8·lb·ft^{-2}	557.2·lb·ft^{-2}
3·ft	140.2·lb·ft^{-2}	171.7·lb·ft^{-2}	164.1·lb·ft^{-2}	464.6·lb·ft^{-2}
3.5·ft	103.7·lb·ft^{-2}	128.9·lb·ft^{-2}	140.8·lb·ft^{-2}	398.4·lb·ft^{-2}
4·ft	80·lb·ft^{-2}	100.3·lb·ft^{-2}	123.3·lb·ft^{-2}	348.7·lb·ft^{-2}
4.5·ft	63.7·lb·ft^{-2}	80.3·lb·ft^{-2}	109.6·lb·ft^{-2}	310.1·lb·ft^{-2}
5·ft	52.1·lb·ft^{-2}	65.8·lb·ft^{-2}	98.7·lb·ft^{-2}	279.3·lb·ft^{-2}
5.5·ft	43.5·lb·ft^{-2}	54.9·lb·ft^{-2}	89.8·lb·ft^{-2}	254·lb·ft^{-2}

L_i	WLL_i
2·ft	327·lb·ft^{-2}
2.5·ft	262·lb·ft^{-2}
3·ft	186·lb·ft^{-2}
3.5·ft	138·lb·ft^{-2}
4·ft	106·lb·ft^{-2}
4.5·ft	85·lb·ft^{-2}
5·ft	69·lb·ft^{-2}
5.5·ft	58·lb·ft^{-2}