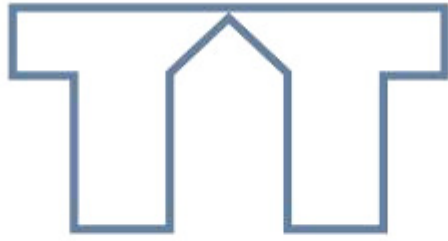


# Sturdi-Wall Calculation Package

(Addendum 1)

*Allowable shear and uplift for drill set models based upon  
strength of steel plate*



timbertech

ENGINEERING

Project Number S021-12

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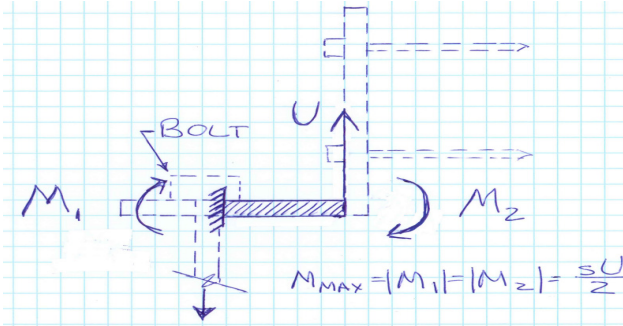
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**DEFINITION SKETCH FOR BENDING MOMENT CALCULATIONS BELOW**



**UPLIFT: BENDING STRENGTH OF SW60 UNIVERSAL BRACKET (PAIR)**

Uplift Load (lbs)	U	7050	
Distance between Moment 1 and Moment 2	s	1.06	
<b>Maximum Bending Moment (lb-in)</b>	$M_{max}$	<b>3737</b>	$M_{max} = M_1 = M_2 = sU/2$ (see definition sketch)
<b>BENDING STRENGTH OF STEEL PLATE</b>			
Design Method, ASD or LRFD:		ASD	AISC Steel Construction Manual, Section F11.1
Specified Minimum Yield Stress (ksi)	$F_y$	40	
Plate Width (in)	t	10.00	(bolt head covers hole, moment at bolt passes thru gross width)
Plate Depth (in)	d	0.25	
Approximate Distance Between Bracing Points (in)	$L_b$	1.00	
$L_b/d^2$		0.00	
$0.08E/F_y$		58.00	$L_b d/t^2 \leq 0.08E/F_y$ [OK, COMPACT]
Plastic Section Modulus (in <sup>3</sup> )	Z	0.16	
Elastic Section Modulus (in <sup>3</sup> )	S	0.10	
Plastic Bending Strength (ft-lb)	$M_p$	520.8	$M_p = ZF_y (1000/12)$
Elastic Bending Strength (ft-lb)	$M_y$	347.2	$M_y = SF_y (1000/12)$
Safety Factor	$\Omega$	1.67	AISC Section F1.1
<b>Allowable Bending Strength (in-lb)</b>	$Mn/\Omega$	<b>3743</b>	$Mn/\Omega = Mp/\Omega \leq 1.6My/\Omega$
<b>Actual/Allowable = 3737 ÷ 3743 = 1.00 &lt; 1.0 PASS</b>			

**UPLIFT: BENDING STRENGTH OF SW80 UNIVERSAL BRACKET (PAIR)**

Uplift Load (lbs)	U	8300	
Distance between Moment 1 and Moment 2	s	1.25	
<b>Maximum Bending Moment (lb-in)</b>	$M_{max}$	<b>5188</b>	$M_{max} = M_1 = M_2 = sU/2$ (see definition sketch)
<b>BENDING STRENGTH OF STEEL PLATE</b>			
Design Method, ASD or LRFD:		ASD	AISC Steel Construction Manual, Section F11.1
Specified Minimum Yield Stress (ksi)	$F_y$	40	
Plate Width (in)	t	14.00	(bolt head covers hole, moment at bolt passes thru gross width)
Plate Depth (in)	d	0.25	
Approximate Distance Between Bracing Points (in)	$L_b$	1.00	
$L_b/d^2$		0.00	
$0.08E/F_y$		58.00	$L_b d/t^2 \leq 0.08E/F_y$ [OK, COMPACT]
Plastic Section Modulus (in <sup>3</sup> )	Z	0.22	
Elastic Section Modulus (in <sup>3</sup> )	S	0.15	
Plastic Bending Strength (ft-lb)	$M_p$	729.2	$M_p = ZF_y (1000/12)$
Elastic Bending Strength (ft-lb)	$M_y$	486.1	$M_y = SF_y (1000/12)$
Safety Factor	$\Omega$	1.67	AISC Section F1.1
<b>Allowable Bending Strength (in-lb)</b>	$Mn/\Omega$	<b>5240</b>	$Mn/\Omega = Mp/\Omega \leq 1.6My/\Omega$
<b>Actual/Allowable = 5188 ÷ 5240 = 0.99 &lt; 1.0 PASS</b>			

**UPLIFT: BENDING STRENGTH OF SW46 BRACKET**

Uplift Load (lbs)	U	7050	
Distance between Moment 1 and Moment 2	s	1.06	
<b>Maximum Bending Moment (lb-in)</b>	$M_{max}$	<b>3737</b>	$M_{max} = M_1 = M_2 = sU/2$ (see definition sketch)
<b>BENDING STRENGTH OF STEEL PLATE</b>			
Design Method, ASD or LRFD:		ASD	AISC Steel Construction Manual, Section F11.1
Specified Minimum Yield Stress (ksi)	$F_y$	40	
Plate Width (in)	t	10.00	(bolt head covers hole, moment at bolt passes thru gross width)
Plate Depth (in)	d	0.25	
Approximate Distance Between Bracing Points (in)	$L_b$	1.00	
$L_b/d^2$		0.00	
$0.08E/F_y$		58.00	$L_b d/t^2 \leq 0.08E/F_y$ [OK, COMPACT]
Plastic Section Modulus (in <sup>3</sup> )	Z	0.16	
Elastic Section Modulus (in <sup>3</sup> )	S	0.10	
Plastic Bending Strength (ft-lb)	$M_p$	520.8	$M_p = ZF_y (1000/12)$
Elastic Bending Strength (ft-lb)	$M_y$	347.2	$M_y = SF_y (1000/12)$
Safety Factor	$\Omega$	1.67	AISC Section F1.1
<b>Allowable Bending Strength (in-lb)</b>	$M_n/\Omega$	<b>3743</b>	$M_n/\Omega = M_p/\Omega \leq 1.6M_y/\Omega$
<b>Actual/Allowable = 3737 ÷ 3743 = 1.00 &lt; 1.0 PASS</b>			

**UPLIFT: BENDING STRENGTH OF SW66 SERIES BRACKET**

Uplift Load (lbs)	U	7050	
Distance between Moment 1 and Moment 2	s	1.06	
<b>Maximum Bending Moment (lb-in)</b>	$M_{max}$	<b>3737</b>	$M_{max} = M_1 = M_2 = sU/2$ (see definition sketch)
<b>BENDING STRENGTH OF STEEL PLATE</b>			
Design Method, ASD or LRFD:		ASD	AISC Steel Construction Manual, Section F11.1
Specified Minimum Yield Stress (ksi)	$F_y$	40	
Plate Width (in)	t	10.00	(bolt head covers hole, moment at bolt passes thru gross width)
Plate Depth (in)	d	0.25	
Approximate Distance Between Bracing Points (in)	$L_b$	1.00	
$L_b/d^2$		0.00	
$0.08E/F_y$		58.00	$L_b d/t^2 \leq 0.08E/F_y$ [OK, COMPACT]
Plastic Section Modulus (in <sup>3</sup> )	Z	0.16	
Elastic Section Modulus (in <sup>3</sup> )	S	0.10	
Plastic Bending Strength (ft-lb)	$M_p$	520.8	$M_p = ZF_y (1000/12)$
Elastic Bending Strength (ft-lb)	$M_y$	347.2	$M_y = SF_y (1000/12)$
Safety Factor	$\Omega$	1.67	AISC Section F1.1
<b>Allowable Bending Strength (in-lb)</b>	$M_n/\Omega$	<b>3743</b>	$M_n/\Omega = M_p/\Omega \leq 1.6M_y/\Omega$
<b>Actual/Allowable = 3737 ÷ 3743 = 1.00 &lt; 1.0 PASS</b>			

**UPLIFT: BENDING STRENGTH OF SW63 AND SW64 BRACKETS**

Uplift Load (lbs)	U	7050	
Distance between Moment 1 and Moment 2	s	1.06	
<b>Maximum Bending Moment (lb-in)</b>	$M_{max}$	<b>3737</b>	$M_{max} = M_1 = M_2 = sU/2$ (see definition sketch)
<b>BENDING STRENGTH OF STEEL PLATE</b>			
Design Method, ASD or LRFD:		ASD	AISC Steel Construction Manual, Section F11.1
Specified Minimum Yield Stress (ksi)	$F_y$	40	
Plate Width (in)	t	10.00	(bolt head covers hole, moment at bolt passes thru gross width)
Plate Depth (in)	d	0.25	
Approximate Distance Between Bracing Points (in)	$L_b$	1.00	
$L_b d/t^2$		0.00	
$0.08E/F_y$		58.00	$L_b d/t^2 \leq 0.08E/F_y$ [OK, COMPACT]
Plastic Section Modulus (in <sup>3</sup> )	Z	0.16	
Elastic Section Modulus (in <sup>3</sup> )	S	0.10	
Plastic Bending Strength (ft-lb)	$M_p$	520.8	$M_p = ZF_y (1000/12)$
Elastic Bending Strength (ft-lb)	$M_y$	347.2	$M_y = SF_y (1000/12)$
Safety Factor	$\Omega$	1.67	AISC Section F1.1
<b>Allowable Bending Strength (in-lb)</b>	$M_n/\Omega$	<b>3743</b>	$M_n/\Omega = M_p/\Omega \leq 1.6M_y/\Omega$
<b>Actual/Allowable = 3737 ÷ 3743 = 1.00 &lt; 1.0 PASS</b>			

**UPLIFT: BENDING STRENGTH OF SW83, SW84 AND SW85 BRACKETS**

Uplift Load (lbs)	U	8300	
Distance between Moment 1 and Moment 2	s	1.25	
<b>Maximum Bending Moment (lb-in)</b>	$M_{max}$	<b>5188</b>	$M_{max} = M_1 = M_2 = sU/2$ (see definition sketch)
<b>BENDING STRENGTH OF STEEL PLATE</b>			
Design Method, ASD or LRFD:		ASD	AISC Steel Construction Manual, Section F11.1
Specified Minimum Yield Stress (ksi)	$F_y$	40	
Plate Width (in)	t	14.00	(bolt head covers hole, moment at bolt passes thru gross width)
Plate Depth (in)	d	0.25	
Approximate Distance Between Bracing Points (in)	$L_b$	1.00	
$L_b d/t^2$		0.00	
$0.08E/F_y$		58.00	$L_b d/t^2 \leq 0.08E/F_y$ [OK, COMPACT]
Plastic Section Modulus (in <sup>3</sup> )	Z	0.22	
Elastic Section Modulus (in <sup>3</sup> )	S	0.15	
Plastic Bending Strength (ft-lb)	$M_p$	729.2	$M_p = ZF_y (1000/12)$
Elastic Bending Strength (ft-lb)	$M_y$	486.1	$M_y = SF_y (1000/12)$
Safety Factor	$\Omega$	1.67	AISC Section F1.1
<b>Allowable Bending Strength (in-lb)</b>	$M_n/\Omega$	<b>5240</b>	$M_n/\Omega = M_p/\Omega \leq 1.6M_y/\Omega$
<b>Actual/Allowable = 5188 ÷ 5240 = 0.99 &lt; 1.0 PASS</b>			

**SW6C UPLIFT: BENDING STRENGTH OF STEEL ANGLES (PAIR)**

Uplift Load (lbs)	U	7050	
Distance between Moment 1 and Moment 2	s	0.8125	
<b>Maximum Bending Moment (lb-in)</b>	$M_{max}$	<b>2864</b>	$M_{max} = M_1 = M_2 = sU/2$ (see definition sketch)
<b>BENDING STRENGTH OF STEEL PLATE</b>			
Design Method, ASD or LRFD:		ASD	AISC Steel Construction Manual, Section F11.1
Specified Minimum Yield Stress (ksi)	$F_y$	40	
Plate Width (in)	t	8.00	(bolt head covers hole, moment at bolt passes thru gross width)
Plate Depth (in)	d	0.25	
Approximate Distance Between Bracing Points (in)	$L_b$	1.00	
$L_b/d^2$		0.00	
$0.08E/F_y$		58.00	$L_b d/t^2 \leq 0.08E/F_y$ [OK, COMPACT]
Plastic Section Modulus (in <sup>3</sup> )	Z	0.13	
Elastic Section Modulus (in <sup>3</sup> )	S	0.08	
Plastic Bending Strength (ft-lb)	$M_p$	416.7	$M_p = ZF_y (1000/12)$
Elastic Bending Strength (ft-lb)	$M_y$	277.8	$M_y = SF_y (1000/12)$
Safety Factor	$\Omega$	1.67	AISC Section F1.1
<b>Allowable Bending Strength (in-lb)</b>	$M_n/\Omega$	<b>2994</b>	$M_n/\Omega = M_p/\Omega \leq 1.6M_y/\Omega$
<b>Actual/Allowable = 2864 ÷ 2994 = 0.96 &lt; 1.0 PASS</b>			

**STEEL SHEAR CALCUALTIONS FOR SW46, SW60 (PAIR), SW63, SW64 AND SW66 BRACKETS**

<b>Load on Connection (lbs)</b>		<b>31430</b>	
<b>SHEAR STRENGTH - AISC STEEL MANUAL, SECTION J4.3</b>			
Design Method, ASD or LRFD:		<b>ASD</b>	
Specified Minimum Yield Stress (ksi)	$F_y$	<b>40</b>	
Net Area Subject to Shear (in <sup>2</sup> )	$A_{nv}$	<b>2.19</b>	
Safety Factor	$\Omega$	<b>1.67</b>	
<b>Allowable Strength (lbs)</b>	<b>Rn/Ω</b>	<b>31437</b>	$Rn/\Omega = 0.6F_yA_{nv}/\Omega$
<b>Actual/Allowable = 31430 ÷ 31437 = 1.00 &lt; 1.0 PASS</b>			

**STEEL SHEAR CALCUALTIONS FOR SW80 (PAIR), SW83, SW84 AND SW85 BRACKETS**

<b>Load on Connection (lbs)</b>		<b>45800</b>	
<b>SHEAR STRENGTH - AISC STEEL MANUAL, SECTION J4.3</b>			
Design Method, ASD or LRFD:		<b>ASD</b>	
Specified Minimum Yield Stress (ksi)	$F_y$	<b>40</b>	
Net Area Subject to Shear (in <sup>2</sup> )	$A_{nv}$	<b>3.19</b>	
Safety Factor	$\Omega$	<b>1.67</b>	
<b>Allowable Strength (lbs)</b>	<b>Rn/Ω</b>	<b>45808</b>	$Rn/\Omega = 0.6F_yA_{nv}/\Omega$
<b>Actual/Allowable = 45800 ÷ 45808 = 1.00 &lt; 1.0 PASS</b>			

**STEEL SHEAR CALCUALTIONS FOR SW6C BRACKET (SINGLE)**

<b>Load on Connection (lbs)</b>		<b>13470</b>	
<b>SHEAR STRENGTH - AISC STEEL MANUAL, SECTION J4.3</b>			
Design Method, ASD or LRFD:		<b>ASD</b>	
Specified Minimum Yield Stress (ksi)	$F_y$	<b>40</b>	
Net Area Subject to Shear (in <sup>2</sup> )	$A_{nv}$	<b>0.94</b>	
Safety Factor	$\Omega$	<b>1.67</b>	
<b>Allowable Strength (lbs)</b>	<b>Rn/Ω</b>	<b>13473</b>	$Rn/\Omega = 0.6F_yA_{nv}/\Omega$
<b>Actual/Allowable = 13470 ÷ 13473 = 1.00 &lt; 1.0 PASS</b>			