RICE ENGINEERING
105 School Creek Trail | Luxemburg, WI 54217
(P) 920.617.1042

# McDonalds - Puyallup, WA. L2401075

## Canopy Calculations

**Project Location:**
**Puyallup, Washington**
**REI Project # R25-01-042**

**Prepared for:**
**Greenheck - Schofield, WI**
**3/5/2025**

## Design Criteria:

1. ASD Design Loads per Code (2021 IBC, ASCE 7-16).
2. Aluminum extrusions to be **6063-T5 and 6061-T6/6005-T5, 6005A-T5**, brackets shall be alloy **6061-T6** or better conforming to **ASTM B 221**. Formed aluminum shapes and panels shall be alloy **1001-H14** or better conforming to **ASTM B 209**. Members designed per the Aluminum Association, “Aluminum Design Manual”.
3. Deflection to be **L/120 max.** for main span members. Deflection to be **2L/120** for cantilever members.
4. Screws and bolts shall be **stainless steel alloy groups 1,2 or 3 (300series only), condition CW Fy = 65 ksi, Fu = 110 ksi minimum,** with diameters and locations as shown in calculations. Stainless Steel Bolts, Hex Cap Screws greater than ¼” to conform to **ASTM F593 Group 1**.
5. Field and shop welding shall be **E70 or better,** welding shall be done in conformance with **AWS D1.1.** Aluminum filler alloy to be **4043 or 5356,** welding shall be done in conformance with **AWS D1.2.**
6. Design of material separation to prevent reaction between dissimilar materials **not designed by Rice Engineering Inc.**
7. Wood is assumed to be **Spruce-Pine-Fir, SG = 0.42. Designed By Others.**
8. Threaded rods shall be **SAE Grade 5** or better with diameters and locations as shown on calculations.

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

| Building | Planning |
|---|---|
| Engineering | Public Works |
| Fire | Traffic |

City of Puyallup
Building
REVIEWED FOR COMPLIANCE
SKinnear
03/04/2025
9:21:19 AM
CITY OF PUYALLUP STATE OF WASHINGTON

PRCNC20241917

Calculations required to be provided by the Permittee on site for all Inspections

## Disclaimer:

This Certification is limited to the structural design of structural components of this Sunshade system.
It does NOT include responsibility for:

- Structural design of hardware, clevises, and turnbuckles.
- Design of material separation to prevent reaction between dissimilar materials.
- Design of air and water infiltration prevention.
- The manufacture, assembly, or installation of the system.
- Quantities of materials or dimensional accuracy of drawings

Engineers Design Approval Stamp:
Bradley Kueh
2025.03.05 14:28:55-06'00'

BRADLEY JOHN KUEHL
STATE OF WASHINGTON
48092
REGISTERED PROFESSIONAL ENGINEER
03/05/2025

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Engineers Design Approval Stamp:

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PROFESSIONAL ENGINEER
03/05/2025

# ASCE-7/16: Combination of Loads

| Combined Loads (36" Proj.) | Detail Ref. | Sheet No: 1.0 |
|---|---|---|

## Generic Input Variables:

| | | |
|---|---|---|
| *Risk Category* | II | **Table 1.5-1** & **Table 1.5-2** |
| *Importance Factors* | $I_s = 1$  $I_i = 1$  $I_w = 1$  $I_p = 1$ | |
| *Mean Roof Height* | $h \equiv 20 \cdot ft$ | *(Includes Parapet)* |
| *Canopy Height* | $z \equiv 12 \cdot ft$ | |
| *Canopy Projection:* | $L_{uww} \equiv 3 \cdot ft$ | |
| *Building Width* | $L_{width} \equiv 50 \cdot ft$ | |
| *Building Length* | $L_{length} \equiv 100 \cdot ft$ | |
| *Upwind Fetch Distance* | $L_u \equiv 100 \cdot ft$ | |
| *Canopy Slope* | $\theta \equiv 0 \cdot deg$ | |
| *Building Roof Slope* | $\alpha \equiv 0 \cdot deg$ | |

*Exposure Factor* = Partially Exposed — **Table 7-3-1**

*Thermal Factor* = Thermal = "Unheated & Open Air"

*Roof Form* = Monoslope

☐ Sloped Glazing is Applicable — **IBC 2404.2**

## Ice Input Variables:

*Ice Thickness:* $t \equiv 1 \cdot in$ — **Figure 10-2 West** **Figure 10-2 East**

*Concurrent Wind:* $V_i \equiv 30 \cdot mph$

## Snow Input Variables:

☐ Leeward Drift is Not Applicable

| | | |
|---|---|---|
| *Ground Snow Load* | $P_g \equiv 25 \cdot psf$ | **Figure 7.2-1 West** & **Figure 7.2-1 East** |
| *Thermal Factor* | $C_t = 1.2$ | **Table 7-3-2** |
| *Exposure Factor* | $C_e :=$ Table 7-2 $_{i_{terr}, i_{exp}} = 1$ | |

☑ Unobstructed Slippery Surface? — **Sloped Roof Snow Loads** **Figure 7.4-1**

$W := 0.5 \cdot \min(L_{width}, L_{length}) = 25 \cdot ft$ Horizontal Distance From Eave to Ridge

## Wind Input Variables:

**Chapter 30.11**

| | | |
|---|---|---|
| *Exposure Category* | B | **Figure 26.5-1A** **Figure 26.5-1B** |
| *Wind Velocity* | $V \equiv 98 \cdot mph$ | **Figure 26.5-1C** **Figure 26.5-1D** |
| *Structure* = | Buildings: C&C | |
| *Directionality Factor* | $K_d = 0.85$ | **Table 26.6-1** |
| *Topographic Factor* | $K_{zt} \equiv 1.0$ | **Figure 26.8-1** |
| *Effective Wind Area* | $EWA \equiv 1 \cdot sq\ ft$ | |

*Internal Pressure Coefficients:*

Open Buildings

Enclosure = "Open Buildings"

$GCpi1 = 0$ — **Table 26.13-1**

$GCpi2 = 0$ — **Table 26.13-1**

## Dead Load & Ice Input Variables:

| *Qty* | *Member Properties* | *Member Length* | *Circumscribing Diameter* | |
|---|---|---|---|---|
| $n_f \equiv 2$ | $A_1 \equiv 2.4375 \cdot in^2$ | $L_1 \equiv 86.75 \cdot in$ | $D_{c1} \equiv 8.25 \cdot in$ | *Fascia* |
| $n_b \equiv 4$ | $A_2 \equiv 0.4375 \cdot in^2$ | $L_2 \equiv L_{uww}$ | $D_{c2} \equiv 0 \cdot in$ | *Infill Type 1* |
| $n_{b1} \equiv 1$ | $A_3 \equiv 7.15 \cdot in^2$ | $L_3 \equiv 86.75 \cdot in$ | $D_{c3} \equiv 0 \cdot in$ | *Infill Type 2* |
| $n_{b2} \equiv 0$ | $A_4 \equiv 0 \cdot in^2$ | $L_4 \equiv 0 \cdot in$ | $D_{c4} \equiv 0 \cdot in$ | *Hanger Rods* |
| $n_o \equiv 2$ | $t_o \equiv 0.30469$  $d_o \equiv 8 \cdot in$ | $L_5 \equiv L_{uww}$ | | *Outrigger* |

$t_g \equiv 0.0 \cdot in$ *Glass Thickness* — $W_1 \equiv 0 \cdot in$  $L_6 \equiv 0 \cdot in$ *Glass Panel Size*

$t_a \equiv 0.1023 \cdot in$ *Alum Panel Thickness* — $W_2 \equiv L_{uww}$  $L_7 \equiv 86.75 \cdot in$ *Alum Panel Size*

## Live Load Input Variables:

Type = "Custom: LL = 0psf"

$LL := psf \cdot LL' = 0 \cdot psf$

**Table 4.3-1**

## Roof Live Load Input Variables:

$L_r := 20 \cdot psf$ — **4.8 Reduction in Roof Live Loads**

## Seismic Input Variables:

| | | |
|---|---|---|
| *Spectral Response* | $S_S \equiv 1.254$ | *Mapped Spectral Response Acceleration at Short Periods* (**Figure 22-1**) |
| | $S_1 \equiv 0.432$ | *Mapped Spectral Response Acceleration at Long Periods* (**Figure 22-2**) |
| *Component Factors* | $a_p \equiv 2.5$ | *Component Amplification Factor* (Table **13.5-1**) |
| | $R_p \equiv 1.5$ | *Component Response Modification Factor* (Table **13.5-1**) |
| *Site Soil Class* = | D | *(Assume Site Class "D" if Unknown per Section 20.1)* |

| Combined Loads (36" Proj.) | Detail Ref. | Sheet No: 1.0 A |
|---|---|---|

## Wind Load Calculations:

$V = 98 \cdot mph$ $K_{zt} = 1$ $I_w = 1$

$K_d = 0.85$ $r = 0.6$

*External Pressure Coefficients.:* *Internal Pressure:*

**Figure 30.11-1B**

$GCp\_lat = 1$ $GC_{ptop} = -1.1$ $GCpi1 = 0$

$GCpup = -0.9$ $GC_{pbot} = -0.9$ $GCpi2 = 0$

$GC_{ppos} = 0.8$

### Corner Zone Dimension:

$a = \max(\min(5.0 \cdot ft, 10.0 \cdot ft, 8.0 \cdot ft, 10 \cdot ft), \min(2.0 \cdot ft, 4.0 \cdot ft), 3 \cdot ft) = 5 \cdot ft$

### Velocity pressure Coefficients:

$K_{zh} = 0.70 \cdot psf$ At Elevation $h = 20 \cdot ft$

$K_{zz} = 0.70 \cdot psf$ At Elevation $z = 12 \cdot ft$

### Velocity pressures:

$q_h := 0.00256 \cdot K_{zh} \cdot K_{zt} \cdot K_d \cdot (V^2) \cdot I_w = 14.63 \cdot psf$

$q_z := 0.00256 \cdot K_{zz} \cdot K_{zt} \cdot K_d \cdot (V^2) \cdot I_w = 14.63 \cdot psf$

### Calculated Pressures:

$W_{up} := \min[q_h \cdot (GCpup), -16 \cdot psf] = -16 \cdot psf$

$W_{dn} := \max(q_h \cdot GC_{ppos}, 16 \cdot psf) = 16 \cdot psf$

$W_{lat} := \max(q_h \cdot GCp\_lat, 16 \cdot psf) = 16 \cdot psf$

## Dead Load Calculations:

$WT = 159.65\, lbf$

$D := \frac{WT}{L_1 \cdot L_5} = 7.36 \cdot psf$

## Ice Load Calculations:

$f_z = 0.9$ $t_d = 0.9\, in$

$q_{zi} := 0.00256 \cdot K_{zz} \cdot K_{zt} \cdot K_d \cdot (V_i^2) = 1.37 \cdot psf$

$W_i := q_{zi} \cdot (0.85) \cdot 2.0 = 2.33 \cdot psf$

$D_i = 16.02 \cdot psf$

## Seismic Load Calculations:

$F_a = 1$ Short-Period Site Coefficient (**Table 11.4-1**)

$F_v = 1.57$ Long-Period Site Coefficient (**Table 11.4-2**)

$S_{DS} = 0.836$ Design Spec. Resp. Acc. at Short Period (Eqn 11.4-3)

$S_{D1} = 0.45$ Design Spec. Resp. Acc. At Long Period (Eqn 11.4-4)

$f_p := \left(\frac{0.4 \cdot a_p \cdot S_{DS}}{R_p \div I_p}\right) \cdot \left[1 + \left[2 \cdot \left(\frac{z}{h}\right)\right]\right] = 1.23$ (Eqn 13.3-1)

$f_{pmin} := 0.3 \cdot S_{DS} \cdot I_p = 0.25$ (Eqn 13.3-3)

$f_{pmax} := 1.6 \cdot S_{DS} \cdot I_p = 1.34$ (Eqn 13.3-2)

$F_p := \max(f_{pmin}, \min(f_{pmax}, f_p)) = 1.23$

*Vertical Seismic:* $E_v := 0.2 \cdot S_{DS} \cdot D = 1.23 \cdot psf$

*Horizontal Seismic:* $E_h := (F_p) \cdot D = 9.03 \cdot psf$

## Snow Load Calculations:

$P_g = 25 \cdot psf$ Ground Snow Load

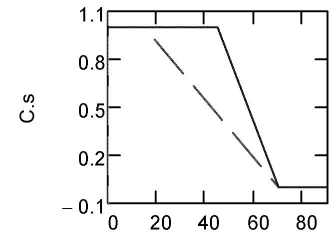
$C_t = 1.2$ Thermal Factor

$C_s = 1$ Roof Slope Factor

$C_e = 1$ Exposure Factor

$I_s = 1$ Importance Factor

FIGURE 7-2




### 7.3 Flat Roof Snow Loads

**7.3-1 Flat Roof Snow Load**

$P_{f\_7.3.1} := \max(0.7 \cdot C_e \cdot C_t \cdot I_s \cdot P_g, 17psf) = 21 \cdot psf$

**7.3.4 Minimum Snow Load for Low-Slope Roofs**

$\theta.min\_7.3.4 = 15\, deg$

$P_m := \left[(P_g \le 20 \cdot psf) \cdot I_s \cdot P_g \ldots + (P_g > 20 \cdot psf) \cdot I_s \cdot 20 \cdot psf\right] \cdot (\theta < \theta_{min\_7.3.4} \cdot deg) = 20 \cdot psf$

$P_f := \max(P_m, P_{f\_7.3.1}) = 21 \cdot psf$

### 7.4 Sloped Roof Snow Loads

**7.4-1 Sloped Roof (Balanced) Snow Load**

$P_{s\_7.4} := C_s \cdot P_f = 21 \cdot psf$

**7.6 Unbalanced Snow Load** **7.7-1 Density of Snow**

$\gamma := \min(0.13 \cdot P_g \div psf + 14, 30) \cdot pcf = 17.25 \cdot pcf$

$h_d(\_l_u, \_p_g, \_I_s) \equiv \left[\left(0.43 \cdot \sqrt[3]{\max\left(\frac{\_l_u}{ft}, 20\right)} \cdot \sqrt[4]{\frac{\_p_g}{psf} + 10} - 1.5\right) \cdot \sqrt{\_I_s}\right] \cdot ft$

**7.9 Sliding Snow**

$USE := \left(chkBox1 \wedge \alpha > \operatorname{atan}\left(\frac{0.25}{12}\right)\right) \vee \left(\neg chkBox1 \wedge \alpha > \operatorname{atan}\left(\frac{2}{12}\right)\right) = 0$

$\omega_{sliding} := USE \cdot [[0.4 \cdot P_f \cdot W \cdot \min[1, L_{uww} \div (15 \cdot ft)]]] = 0$

$len_{sliding} := \min(L_{uww}, 15 \cdot ft) = 3 \cdot ft$

$P_{s\_7.9} := \omega_{sliding} \div len_{sliding} = 0 \cdot psf$

**7.10 Rain-On-Snow**

$W := L_{uww} = 3 \cdot ft$

$P_{s\_7.10} := \left|(P_g \le 20 \cdot psf) \wedge (P_g \ne 0 \cdot psf) \wedge \left[\frac{\theta}{deg} < \left[\frac{W}{ft \cdot (50)}\right]\right]\right| \cdot 5 \cdot psf = 0 \cdot psf$

*Balanced Snow Load:* $P_s := P_{s\_7.4} + \max(P_{s\_7.9}, P_{s\_7.10})$

$S_b := P_s = 21 \cdot psf$

### 7.7 Drifts on Lower Roofs (Aerodynamic Shade)

$h_b := P_{s\_7.4} \div \gamma = 1.22 \cdot ft$

$h_c := (h - z) - h_b = 6.78 \cdot ft$

**Leeward Drift**

**7.7.1 Lower Roof of a Structure**

$L_{ulw} := \max[(L_u), 20 \cdot ft] = 100 \cdot ft$

$h_{dlw} := h_d(L_{ulw}, P_g, I_s) \cdot [[0 \text{ on error}(h_c \div h_b)] \ge 0.2] = 3.35 \cdot ft$

$w_{lw} := \text{if}(h_{dlw} \le h_c, 4 \cdot h_{dlw}, 4 \cdot h_{dlw}^2 \div h_c) = 13.42 \cdot ft$

**Windward Drift**

**7.7.1 Lower Roof of a Structure**

$L_{uww} = 3 \cdot ft$

$h_{dww} := \sqrt{(I_s \cdot P_g \cdot L_{uww}) \div (4 \cdot \gamma)} = 1.04 \cdot ft$

$w_{ww} := \text{if}(h_{dww} \le h_c, 4 \cdot h_{dww}, 4 \cdot h_{dww}^2 \div h_c) = 4.17 \cdot ft$

$h_{d\_max} := (P_g \ne 0) \cdot ft \cdot minPos[[\max(h_{dlw} \cdot \neg chkBox2, h_{dww})\ \ h_c\ \ (0.6 \cdot L_{uww})] \div ft]$

$P_{d1} := h_{d\_max} \cdot \gamma = 31.05 \cdot psf$ Pressure of Drift At Building $h_{d\_max} = 1.8 \cdot ft$

$w := \max(w_{lw} \cdot \neg chkBox2, w_{ww}) = 13.42 \cdot ft$

$P_{d2} := 0 \cdot psf$ Pressure of Drift At Fascia

*Snow Drift (Uniform Pressure):* $S_d := 0.5 \cdot (P_{d1} + P_{d2}) + P_{f\_7.3.1} = 37 \cdot psf$

| Combined Loads (36" Proj.) | Detail Ref. | Sheet No: |
|---|---|---|
| | | 1.0 B |

## Load Combinations:

### Loads (Unfactored):

| | |
|---|---|
| $D = 7.36 \cdot psf$ | *Dead Load* |
| $S_b = 21 \cdot psf$ | *Balanced Snow Load* |
| $S_d = 36.53 \cdot psf$ | *Drift plus Balanced Snow Load* |
| $W_{up} = -16 \cdot psf$ | *Uplift Wind Load (Unfactored)* |
| $W_{dn} = 16 \cdot psf$ | *Downward Wind Load (Unfactored)* |
| $W_{lat} = 16 \cdot psf$ | *Lateral Wind Load (Unfactored)* |
| $D_i = 16.02 \cdot psf$ | *Dead Load Due to Ice (Snow Load Controls)* |
| $W_i = 2.33 \cdot psf$ | *Concurrent Wind Load with Ice Load (Snow Load Controls)* |
| $E_h = 9.03 \cdot psf$ | *Horizontal Seismic Load* |
| $E_v = 1.23 \cdot psf$ | *Vertical Seismic Load* |
| $LL = 0 \cdot psf$ | *Live Load* |
| $L_r = 20 \cdot psf$ | *Reduced Roof Live Load* |

Canopy is a lower roof and per C2.3.4 the effects of freezing rain are included in the snow drift loads

Results ASD

## Load Cases:

| "LC" | "[ASD LC]" |
|---|---|
| "1" | $D$ |
| "2" | $D + 0.7 \cdot D_i + LL$ |
| "3" | $D + \max(0.7 \cdot D_i + 0.7W_i, S_d, L_r)$ |
| "4" | $D + 0.75 \cdot LL + 0.75 \cdot (\max(S_b, L_r))$ |
| "5" | $D + 0.6 \cdot W_{dn}$ |
| "5a" | $D + 0.7 \cdot (E_h + E_v)$ |
| "6" | $D + 0.75 \cdot LL + 0.75 \cdot (0.6 \cdot W_{dn}) + 0.75 \cdot (\max(S_b, L_r))$ |
| "6a" | $D + 0.75 \cdot LL + 0.75 \cdot [0.7 \cdot (E_h + E_v)] + 0.75 \cdot S_b$ |
| "7" | $0.6 \cdot D + 0.6 \cdot W_{up}$ |
| "7a" | $0.6 \cdot D + 0.7 \cdot D_i + 0.7 \cdot W_i$ |
| "IBC 8" | $(0.6W_{dn} - D) \cdot chkBox3$ |
| "IBC 8a" | $(0.6W_{dn} + D + 0.5 \cdot S_d) \cdot chkBox3$ |
| "IBC 8b" | $(0.3 \cdot W_{dn} + D + S_d) \cdot chkBox3$ |

RESULTS = (matrix below) ·psf

| "LC" | "[ASD LC]" |
|---|---|
| "1" | 7.36 |
| "2" | 18.58 |
| "3" | 43.89 |
| "4" | 23.11 |
| "5" | 16.96 |
| "5a" | 14.54 |
| "6" | 30.31 |
| "6a" | 28.5 |
| "7" | −5.18 |
| "7a" | 17.26 |
| "IBC 8" | 0 |
| "IBC 8a" | 0 |
| "IBC 8b" | 0 |

| "LC" | "[LRFD LC]" |
|---|---|
| "1" | $1.4D$ |
| "2" | $1.2D + 1.6LL + 0.5 \cdot \max(S_b, L_r)$ |
| "2a" | $1.2D + 1.6LL + 0.2 \cdot D_i + 0.5 \cdot S_b$ |
| "3" | $1.2D + 1.6 \cdot (\max(L_r, S_d)) + 0.5 \cdot (\max(W_{dn}, LL))$ |
| "4" | $1.2D + 1.0 \cdot W_{dn} + 1.0LL + 0.5 \cdot (\max(L_r, S_b))$ |
| "4a" | $1.2D + 1.0LL + D_i + W_i + 0.5 \cdot S_b$ |
| "5" | $1.2 \cdot D + 1.0 \cdot (E_h + E_v) + 1.0LL + 0.2 \cdot S_b$ |
| "6" | $0.9 \cdot D + 1.0 \cdot W_{up}$ |
| "6a" | $0.9 \cdot D + D_i + W_i$ |
| "7" | $0.9D + 1.0 \cdot (E_h + E_v)$ |
| "IBC 8" | $(1.0W_{dn} - D) \cdot chkBox3$ |
| "IBC 8a" | $(1.0W_{dn} + D + 0.5 \cdot S_d) \cdot chkBox3$ |
| "IBC 8b" | $(0.5W_{dn} + D + S_d) \cdot chkBox3$ |

| |
|---|
| ***Use 44 psf (Downward)*** |
| ***Use 6 psf (Upward)*** |
| ***Use 10 psf (Laterally)*** |

→ "ASD"

# ASCE-7/16: Combination of Loads

| Combined Loads (48" Proj.) | Detail Ref. | Sheet No: 1.1 |
|---|---|---|

## Generic Input Variables:

| | | |
|---|---|---|
| Risk Category | II | Table 1.5-1 & Table 1.5-2 |
| Importance Factors | $I_s = 1$  $I_i = 1$  $I_w = 1$  $I_p = 1$ | |
| Mean Roof Height | $h \equiv 20 \cdot ft$ | (Includes Parapet) |
| Canopy Height | $z \equiv 12 \cdot ft$ | |
| Canopy Projection: | $L_{uww} \equiv 4 \cdot ft$ | |
| Building Width | $L_{width} \equiv 50 \cdot ft$ | |
| Building Length | $L_{length} \equiv 100 \cdot ft$ | |
| Upwind Fetch Distance | $L_u \equiv 100 \cdot ft$ | |
| Canopy Slope | $\theta \equiv 0 \cdot deg$ | |
| Building Roof Slope | $\alpha \equiv 0 \cdot deg$ | |

Exposure Factor = Partially Exposed — Table 7-3-1

Thermal Factor = Thermal = "Unheated & Open Air"

Roof Form = Monoslope

☐ Sloped Glazing is Applicable — IBC 2404.2

## Ice Input Variables:

Ice Thickness: $t \equiv 1 \cdot in$ — Figure 10-2 West, Figure 10-2 East

Concurrent Wind: $V_i \equiv 30 \cdot mph$

## Snow Input Variables:

☐ Leeward Drift is Not Applicable

| | | |
|---|---|---|
| Ground Snow Load | $P_g \equiv 25 \cdot psf$ | Figure 7.2-1 West & Figure 7.2-1 East |
| Thermal Factor | $C_t = 1.2$ | Table 7-3-2 |
| Exposure Factor | $C_e := \text{Table 7-2}_{i_{terr}, i_{exp}} = 1$ | |

☑ Unobstructed Slippery Surface? — Sloped Roof Snow Loads, Figure 7.4-1

$W := 0.5 \cdot \min(L_{width}, L_{length}) = 25 \cdot ft$ Horizontal Distance From Eave to Ridge

## Wind Input Variables:

Chapter 30.11

| | | |
|---|---|---|
| Exposure Category | B | Figure 26.5-1A, Figure 26.5-1B |
| Wind Velocity | $V \equiv 98 \cdot mph$ | Figure 26.5-1C, Figure 26.5-1D |
| Structure = | Buildings: C&C | |
| Directionality Factor | $K_d = 0.85$ | Table 26.6-1 |
| Topographic Factor | $K_{zt} \equiv 1.0$ | Figure 26.8-1 |
| Effective Wind Area | $EWA \equiv 1 \cdot sq\ ft$ | |

Internal Pressure Coefficients:

Open Buildings

Enclosure = "Open Buildings"

$GCpi1 = 0$ — Table 26.13-1

$GCpi2 = 0$ — Table 26.13-1

## Dead Load & Ice Input Variables:

| Qty | Member Properties | Member Length | Circumscribing Diameter | |
|---|---|---|---|---|
| $n_f \equiv 2$ | $A_1 \equiv 2.4375 \cdot in^2$ | $L_1 \equiv 80 \cdot in$ | $D_{c1} \equiv 8.25 \cdot in$ | Fascia |
| $n_b \equiv 4$ | $A_2 \equiv 0.4375 \cdot in^2$ | $L_2 \equiv L_{uww}$ | $D_{c2} \equiv 0 \cdot in$ | Infill Type 1 |
| $n_{b1} \equiv 1$ | $A_3 \equiv 8.14 \cdot in^2$ | $L_3 \equiv 80 \cdot in$ | $D_{c3} \equiv 0 \cdot in$ | Infill Type 2 |
| $n_{b2} \equiv 0$ | $A_4 \equiv 0 \cdot in^2$ | $L_4 \equiv 0 \cdot in$ | $D_{c4} \equiv 0 \cdot in$ | Hanger Rods |
| $n_o \equiv 2$ | $t_o \equiv 0.30469$  $d_o \equiv 8 \cdot in$ | $L_5 \equiv L_{uww}$ | | Outrigger |

$t_g \equiv 0.0 \cdot in$ Glass Thickness — $W_1 \equiv 0 \cdot in$  $L_6 \equiv 0 \cdot in$ Glass Panel Size

$t_a \equiv 0.10172 \cdot in$ Alum Panel Thickness — $W_2 \equiv L_{uww}$  $L_7 \equiv 80 \cdot in$ Alum Panel Size

## Live Load Input Variables:

Type = "Custom: LL = 0psf"

$LL := psf \cdot LL' = 0 \cdot psf$

Table 4.3-1

## Roof Live Load Input Variables:

$L_r := 20 \cdot psf$ — 4.8 Reduction in Roof Live Loads

## Seismic Input Variables:

| | | |
|---|---|---|
| Spectral Response | $S_S \equiv 1.254$ | Mapped Spectral Response Acceleration at Short Periods (Figure 22-1) |
| | $S_1 \equiv 0.432$ | Mapped Spectral Response Acceleration at Long Periods (Figure 22-2) |
| Component Factors | $a_p \equiv 2.5$ | Component Amplification Factor (Table 13.5-1) |
| | $R_p \equiv 1.5$ | Component Response Modification Factor (Table 13.5-1) |
| Site Soil Class = | D | (Assume Site Class "D" if Unknown per Section 20.1) |

| Combined Loads (48" Proj.) | Detail Ref. | Sheet No: 1.1 A |
|---|---|---|

## Wind Load Calculations:

$V = 98 \cdot mph$  $K_{zt} = 1$  $I_w = 1$

$K_d = 0.85$  $r = 0.6$

*External Pressure Coefficients.:*  *Internal Pressure:*

**Figure 30.11-1B**

$GCp\_lat = 1$  $GC_{ptop} = -1.1$  $GCpi1 = 0$

$GCpup = -0.9$  $GC_{pbot} = -0.9$  $GCpi2 = 0$

$GC_{ppos} = 0.8$

### Corner Zone Dimension:

$a = \max(\min(5.0 \cdot ft, 10.0 \cdot ft, 8.0 \cdot ft, 10 \cdot ft), \min(2.0 \cdot ft, 4.0 \cdot ft), 3 \cdot ft) = 5 \cdot ft$

### Velocity pressure Coefficients:

$K_{zh} = 0.70 \cdot psf$  At Elevation $h = 20 \cdot ft$

$K_{zz} = 0.70 \cdot psf$  At Elevation $z = 12 \cdot ft$

### Velocity pressures:

$q_h := 0.00256 \cdot K_{zh} \cdot K_{zt} \cdot K_d \cdot (V\,\hat{}\,2) \cdot I_w = 14.63 \cdot psf$

$q_z := 0.00256 \cdot K_{zz} \cdot K_{zt} \cdot K_d \cdot (V\,\hat{}\,2) \cdot I_w = 14.63 \cdot psf$

### Calculated Pressures:

$W_{up} := \min[q_h \cdot (GCpup), -16 \cdot psf] = -16 \cdot psf$

$W_{dn} := \max(q_h \cdot GC_{ppos}, 16 \cdot psf) = 16 \cdot psf$

$W_{lat} := \max(q_h \cdot GCp\_lat, 16 \cdot psf) = 16 \cdot psf$

### Dead Load Calculations:

$WT = 174.47\,lbf$

$D := \frac{WT}{L_1 \cdot L_5} = 6.54 \cdot psf$

### Ice Load Calculations:

$f_z = 0.9$  $t_d = 0.9\,in$

$q_{zi} := 0.00256 \cdot K_{zz} \cdot K_{zt} \cdot K_d \cdot (V_i\,\hat{}\,2) = 1.37 \cdot psf$

$W_i := q_{zi} \cdot (0.85) \cdot 2.0 = 2.33 \cdot psf$

$D_i = 14.4 \cdot psf$

## Seismic Load Calculations:

$F_a = 1$  Short-Period Site Coefficient (**Table 11.4-1**)

$F_v = 1.57$  Long-Period Site Coefficient (**Table 11.4-2**)

$S_{DS} = 0.836$  Design Spec. Resp.Acc. at Short Period (Eqn 11.4-3)

$S_{D1} = 0.45$  Design Spec.Resp.Acc. At Long Period (Eqn 11.4-4)

$f_p := \left(\frac{0.4 \cdot a_p \cdot S_{DS}}{R_p \div I_p}\right) \cdot \left[1 + \left[2 \cdot \left(\frac{z}{h}\right)\right]\right] = 1.23$  (Eqn 13.3-1)

$f_{pmin} := 0.3 \cdot S_{DS} \cdot I_p = 0.25$  (Eqn 13.3-3)

$f_{pmax} := 1.6 \cdot S_{DS} \cdot I_p = 1.34$  (Eqn 13.3-2)

$F_p := \max(f_{pmin}, \min(f_{pmax}, f_p)) = 1.23$

*Vertical Seismic:* $E_v := 0.2 \cdot S_{DS} \cdot D = 1.09 \cdot psf$

*Horizontal Seismic:* $E_h := (F_p) \cdot D = 8.02 \cdot psf$

## Snow Load Calculations:

$P_g = 25 \cdot psf$  Ground Snow Load

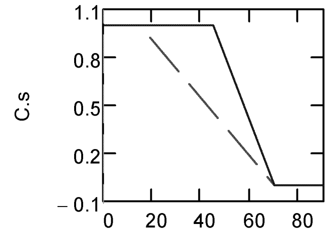
$C_t = 1.2$  Thermal Factor

$C_s = 1$  Roof Slope Factor

$C_e = 1$  Exposure Factor

$I_s = 1$  Importance Factor

FIGURE 7-2




Roof Slope (Degrees)

### 7.3 Flat Roof Snow Loads

**7.3-1 Flat Roof Snow Load**

$P_{f\_7.3.1} := \max(0.7 \cdot C_e \cdot C_t \cdot I_s \cdot P_g, 17psf) = 21 \cdot psf$

**7.3.4 Minimum Snow Load for Low-Slope Roofs**

$\theta.min\_7.3.4 = 15\,deg$

$P_m := \begin{bmatrix} (P_g \le 20 \cdot psf) \cdot I_s \cdot P_g \ldots \\ + (P_g > 20 \cdot psf) \cdot I_s \cdot 20 \cdot psf \end{bmatrix} \cdot (\theta < \theta_{min\_7.3.4} \cdot deg) = 20 \cdot psf$

$P_f := \max(P_m, P_{f\_7.3.1}) = 21 \cdot psf$

### 7.4 Sloped Roof Snow Loads

**7.4-1 Sloped Roof (Balanced) Snow Load**

$P_{s\_7.4} := C_s \cdot P_f = 21 \cdot psf$

**7.6 Unbalanced Snow Load**  **7.7-1 Density of Snow**

$\gamma := \min(0.13 \cdot P_g \div psf + 14, 30) \cdot pcf = 17.25 \cdot pcf$

$h_d(\_l_u, \_p_g, \_I_s) \equiv \left[\left(0.43 \cdot \sqrt[3]{\max\left(\frac{\_l_u}{ft}, 20\right)} \cdot \sqrt[4]{\frac{\_p_g}{psf} + 10} - 1.5\right) \cdot \sqrt{\_I_s}\right] \cdot ft$

**7.9 Sliding Snow**

$USE := \left(chkBox1 \wedge \alpha > atan\left(\frac{0.25}{12}\right)\right) \vee \left(\neg chkBox1 \wedge \alpha > atan\left(\frac{2}{12}\right)\right) = 0$

$\omega_{sliding} := USE \cdot [[0.4 \cdot P_f \cdot W \cdot \min[1, L_{uww} \div (15 \cdot ft)]]] = 0$

$len_{sliding} := \min(L_{uww}, 15 \cdot ft) = 4 \cdot ft$

$P_{s\_7.9} := \omega_{sliding} \div len_{sliding} = 0 \cdot psf$

**7.10 Rain-On-Snow**

$W := L_{uww} = 4 \cdot ft$

$P_{s\_7.10} := \left|(P_g \le 20 \cdot psf) \wedge (P_g \ne 0 \cdot psf) \wedge \left[\frac{\theta}{deg} < \left[\frac{W}{ft \cdot (50)}\right]\right]\right| \cdot 5 \cdot psf = 0 \cdot psf$

*Balanced Snow Load:* $P_s := P_{s\_7.4} + \max(P_{s\_7.9}, P_{s\_7.10})$

$S_b := P_s = 21 \cdot psf$

### 7.7 Drifts on Lower Roofs (Aerodynamic Shade)

$h_b := P_{s\_7.4} \div \gamma = 1.22 \cdot ft$

$h_c := (h - z) - h_b = 6.78 \cdot ft$

**Leeward Drift**

**7.7.1 Lower Roof of a Structure**

$L_{ulw} := \max[(L_u), 20 \cdot ft] = 100 \cdot ft$

$h_{dlw} := h_d(L_{ulw}, P_g, I_s) \cdot [[0 \text{ on error}(h_c \div h_b)] \ge 0.2] = 3.35 \cdot ft$

$w_{lw} := if(h_{dlw} \le h_c, 4 \cdot h_{dlw}, 4 \cdot h_{dlw}\,\hat{}\,2 \div h_c) = 13.42 \cdot ft$

**Windward Drift**

**7.7.1 Lower Roof of a Structure**

$L_{uww} = 4 \cdot ft$

$h_{dww} := \sqrt{(I_s \cdot P_g \cdot L_{uww}) \div (4 \cdot \gamma)} = 1.2 \cdot ft$

$w_{ww} := if(h_{dww} \le h_c, 4 \cdot h_{dww}, 4 \cdot h_{dww}^2 \div h_c) = 4.82 \cdot ft$

$h_{d\_max} := (P_g \ne 0) \cdot ft \cdot minPos[[\max(h_{dlw} \cdot \neg chkBox2, h_{dww}) \;\; h_c \;\; (0.6 \cdot L_{uww})] \div ft]$

$P_{d1} := h_{d\_max} \cdot \gamma = 41.4 \cdot psf$  Pressure of Drift At Building  $h_{d\_max} = 2.4 \cdot ft$

$w := \max(w_{lw} \cdot \neg chkBox2, w_{ww}) = 13.42 \cdot ft$

$P_{d2} := 0 \cdot psf$  Pressure of Drift At Fascia

*Snow Drift (Uniform Pressure):* $S_d := 0.5 \cdot (P_{d1} + P_{d2}) + P_{f\_7.3.1} = 42 \cdot psf$

| | | | | |
|---|---|---|---|---|
| RICE ENGINEERING | 105 School Creek Trail, Luxemburg, WI 54217, Phone: (920) 617-1042, Fax: (920) 617-1100, www.rice-inc.com | Project Description: **McDonalds - Puyallup, WA. L2401075** | Job No: R25-01-042 | |
| | | | Engineer: SWP | Sheet No: 1.1 A |
| | | | Date: 2/26/2025 | Rev: |
| Template: REI-MC-5209 | | | Chk By: | Date: |

| Combined Loads (48" Proj.) | Detail Ref. | Sheet No: 1.1 B |
|---|---|---|

## Load Combinations:

### Loads (Unfactored):

| | |
|---|---|
| $D = 6.54 \cdot psf$ | *Dead Load* |
| $S_b = 21 \cdot psf$ | *Balanced Snow Load* |
| $S_d = 41.7 \cdot psf$ | *Drift plus Balanced Snow Load* |
| $W_{up} = -16 \cdot psf$ | *Uplift Wind Load (Unfactored)* |
| $W_{dn} = 16 \cdot psf$ | *Downward Wind Load (Unfactored)* |
| $W_{lat} = 16 \cdot psf$ | *Lateral Wind Load (Unfactored)* |
| $D_i = 14.4 \cdot psf$ | *Dead Load Due to Ice (Snow Load Controls)* |
| $W_i = 2.33 \cdot psf$ | *Concurrent Wind Load with Ice Load (Snow Load Controls)* |
| $E_h = 8.02 \cdot psf$ | *Horizontal Seismic Load* |
| $E_v = 1.09 \cdot psf$ | *Vertical Seismic Load* |
| $LL = 0 \cdot psf$ | *Live Load* |
| $L_r = 20 \cdot psf$ | *Reduced Roof Live Load* |

Canopy is a lower roof and per C2.3.4 the effects of freezing rain are included in the snow drift loads

Results ASD

## Load Cases:

| "LC" | "[ASD LC]" |
|---|---|
| "1" | $D$ |
| "2" | $D + 0.7 \cdot D_i + LL$ |
| "3" | $D + \max(0.7 \cdot D_i + 0.7W_i, S_d, L_r)$ |
| "4" | $D + 0.75 \cdot LL + 0.75 \cdot (\max(S_b, L_r))$ |
| "5" | $D + 0.6 \cdot W_{dn}$ |
| "5a" | $D + 0.7 \cdot (E_h + E_v)$ |
| "6" | $D + 0.75 \cdot LL + 0.75 \cdot (0.6 \cdot W_{dn}) + 0.75 \cdot (\max(S_b, L_r))$ |
| "6a" | $D + 0.75 \cdot LL + 0.75 \cdot [0.7 \cdot (E_h + E_v)] + 0.75 \cdot S_b$ |
| "7" | $0.6 \cdot D + 0.6 \cdot W_{up}$ |
| "7a" | $0.6 \cdot D + 0.7 \cdot D_i + 0.7 \cdot W_i$ |
| "IBC 8" | $(0.6W_{dn} - D) \cdot chkBox3$ |
| "IBC 8a" | $(0.6W_{dn} + D + 0.5 \cdot S_d) \cdot chkBox3$ |
| "IBC 8b" | $(0.3 \cdot W_{dn} + D + S_d) \cdot chkBox3$ |

RESULTS = (·psf)

| "LC" | "[ASD LC]" |
|---|---|
| "1" | 6.54 |
| "2" | 16.63 |
| "3" | 48.24 |
| "4" | 22.29 |
| "5" | 16.14 |
| "5a" | 12.92 |
| "6" | 29.49 |
| "6a" | 27.08 |
| "7" | −5.67 |
| "7a" | 15.64 |
| "IBC 8" | 0 |
| "IBC 8a" | 0 |
| "IBC 8b" | 0 |

| "LC" | "[LRFD LC]" |
|---|---|
| "1" | $1.4D$ |
| "2" | $1.2D + 1.6LL + 0.5 \cdot \max(S_b, L_r)$ |
| "2a" | $1.2D + 1.6LL + 0.2 \cdot D_i + 0.5 \cdot S_b$ |
| "3" | $1.2D + 1.6 \cdot (\max(L_r, S_d)) + 0.5 \cdot (\max(W_{dn}, LL))$ |
| "4" | $1.2D + 1.0 \cdot W_{dn} + 1.0LL + 0.5 \cdot (\max(L_r, S_b))$ |
| "4a" | $1.2D + 1.0LL + D_i + W_i + 0.5 \cdot S_b$ |
| "5" | $1.2 \cdot D + 1.0 \cdot (E_h + E_v) + 1.0LL + 0.2 \cdot S_b$ |
| "6" | $0.9 \cdot D + 1.0 \cdot W_{up}$ |
| "6a" | $0.9 \cdot D + D_i + W_i$ |
| "7" | $0.9D + 1.0 \cdot (E_h + E_v)$ |
| "IBC 8" | $(1.0W_{dn} - D) \cdot chkBox3$ |
| "IBC 8a" | $(1.0W_{dn} + D + 0.5 \cdot S_d) \cdot chkBox3$ |
| "IBC 8b" | $(0.5W_{dn} + D + S_d) \cdot chkBox3$ |

***Use 49 psf (Downward)***

***Use 6 psf (Upward)***

***Use 10 psf (Laterally)***

→ "ASD"

## Loading Information:

| | |
|---|---|
| $DL_{dn} := 44\ psf$ | *worst case downward load* |
| $LC6 := 30.31\ psf$ | *load case 6 w/o drift* |
| $DL_{up} := 6\ psf$ | *uplift load* |
| $WL_{Lat} := 10\ psf$ | *lateral wind load* |
| $DeadL := 7.36\ psf$ | *dead load* |
| $S_b := 21\ psf$ | *balanced snow load* |
| $P_{d1} := 31.05\ psf$ | *snow drift (at wall)* |
| $P_{d2} := 0\ psf$ | *snow drift (at front fascia)* |

## System Information:

☐ Standalone ☑ Soffit Panel

| | |
|---|---|
| $L_c := 94.67\ in$ | *canopy length* |
| $Proj := 36\ in$ | *canopy projection* |

## Member Section Information:

***Top Panel:***

| | |
|---|---|
| $t_p := 0.1\ in$ | *panel thickness* |

***Panel Stiffener:***

| | |
|---|---|
| $b_s := 1\ in$ | *stiffener width* |
| $d_s := 1\ in$ | *stiffener depth* |
| $t_s := 0.125\ in$ | *stiffener thickness* |

***Front Fascia:***

| | |
|---|---|
| $b_{ff} := 2\ in$ | *front fascia width* |
| $d_{ff} := 8\ in$ | *front fascia depth* |
| $t_{ff} := 0.125\ in$ | *front fascia thickness* |

***Rear Fascia:***

| | |
|---|---|
| $b_{rf} := 2\ in$ | *rear fascia width* |
| $d_{rf} := 8\ in$ | *rear fascia depth* |
| $t_{rf} := 0.125\ in$ | *rear fascia thickness* |

***End Outrigger:***

| | |
|---|---|
| $b_{eo} := 2\ in$ | *end outrigger width* |
| $d_{eo} := 8\ in$ | *end outrigger depth* |
| $t_{eo} := 0.125\ in$ | *end outrigger thickness* |

***Intermediate Outrigger:***

| | |
|---|---|
| $b_{io} := 2\ in$ | *intermediate outrigger width* |
| $d_{io} := 6\ in$ | *intermediate outrigger depth* |
| $t_{io} := 0.125\ in$ | *intermediate outrigger thickness* |

***Anchor Channel Bracket:***

| | |
|---|---|
| $b_{cb} := 1.6913\ in$ | *anchor channel flange length* |
| $d_{cb} := 5.6937\ in$ | *anchor channel depth* |
| $t_{cb} := 0.25\ in$ | *anchor channel thickness* |

$W_{upASD} = 10.42\ psf$

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 2.01
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## *36" Projection System:*

$L_c = 94.67$ in
$Proj = 36$ in
$t_p = 0.1$ in
$L_{eff} := 1$ in

$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$q := \mathrm{Max}(DL_{dn}, DL_{up}) = 44$ psf

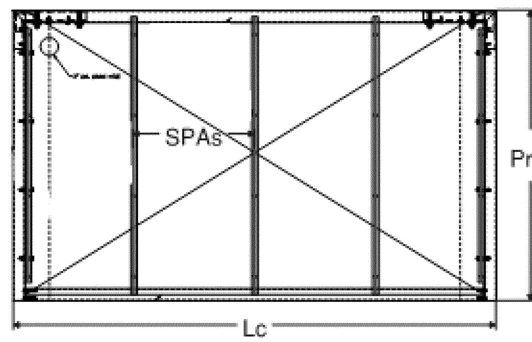
***Number of Intermediate Stiffeners*:**

- ○ 1 Int. Stiffener
- ○ 2 Int. Stiffeners
- ◉ 3 Int. Stiffeners
- ○ 4 Int. Stiffeners
- ○ 5 Int. Stiffeners

[L/60 ▾] Panel Deflection Criteria

$SPA_s := 22.67$ in Panel Stiffener Spacing

***Standalone Reference:***




### *Check Panel:*

$coef_q := [\,0\ \ 12.5\ \ 25\ \ 50\ \ 75\ \ 100\ \ 125\ \ 150\ \ 175\ \ 200\ \ 250\,]^T$

$coef_y := [\,0\ \ 0.62\ \ 0.88\ \ 1.18\ \ 1.37\ \ 1.53\ \ 1.68\ \ 1.77\ \ 1.88\ \ 1.96\ \ 2.12\,]^T$

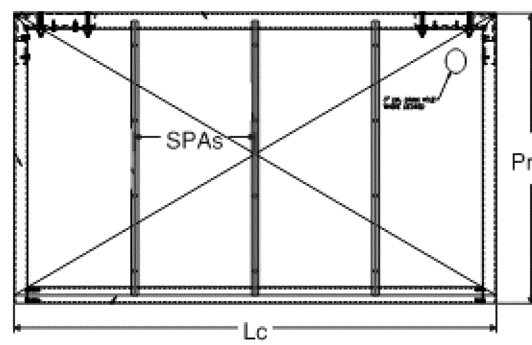
$coef_{\sigma d} := [\,0\ \ 1.06\ \ 2.11\ \ 3.78\ \ 5.18\ \ 6.41\ \ 7.65\ \ 8.6\ \ 9.55\ \ 10.6\ \ 12.3\,]^T$

$coef_{\sigma} := [\,0\ \ 4.48\ \ 6.81\ \ 9.92\ \ 12.25\ \ 14.22\ \ 16\ \ 17.5\ \ 18.9\ \ 20.3\ \ 22.8\,]^T$

$\sigma_{all} := 8205.13$ psi - Allowable Stress, used for Design

$y_{all} := 0.38$ in - Allowable Deflection

***Multi-Span Reference:***




The relations among load, deflection and stress are expressed by numerical values of the dimensionless coefficients shown below (It is assumed that v is equal to or near 0.316):

$$coef_q = \frac{q_{adj} \cdot b^4}{E \cdot t^4} \qquad coef_y = \frac{y}{t}$$

$$coef_{\sigma d} = \frac{\sigma_d \cdot b^2}{E \cdot t^2} \qquad coef_{\sigma} = \frac{\sigma \cdot b^2}{E \cdot t^2}$$

The collected data for these coefficients is listed below. For any given value of qb⁴/Et⁴, values for the other three coefficients may be interpolated.

$$y_{act} = \mathrm{linterp}\left(coef_q, coef_y, \frac{q \cdot b^4}{E \cdot t_{.1}^{\,4}}\right) \cdot t_{.1} \cdot 1.5$$

$y_{act} := 0.21$ in
$y_{all} = 0.38$ in

$$\sigma_d := \mathrm{linterp}\left(coef_q, coef_{\sigma d}, \frac{q \cdot (SPA_s)^4}{E_{alum} \cdot t_p^{\,4}}\right) \cdot \left(\frac{E_{alum} \cdot t_p^{\,2}}{(SPA_s)^2}\right)$$

$\sigma_d = 1065.32$ psi
$\sigma_{all} = 8205$ psi

$$\sigma := \left(\mathrm{linterp}\left(coef_q, coef_{\sigma}, \frac{q \cdot (SPA_s)^4}{E_{alum} \cdot t_p^{\,4}}\right) \cdot \frac{E_{alum} \cdot t_p^{\,2}}{(SPA_s)^2}\right)$$

$\sigma = 2483.4$ psi
$\sigma_{all} = 8205$ psi

***Using L / 60 Deflection Limit:***
***Use 0.100 " Thick***
***Panel Type = 1100−H14 Aluminum***
***Maximum Span = 22.67"***

$PANEL := \mathrm{stack}(I_\Delta, I_{\sigma d}, I_\sigma) =$ ["0.56 ≤ 1.00 ∴ PASS"; "0.13 ≤ 1.00 ∴ PASS"; "0.3 ≤ 1.00 ∴ PASS"]

***Check Panel Fasteners (to Stiffener):***

***Fastener Type:*** #12-14 (Cond. CW)

***Stiffener Material:*** 6061-T6

$D_{ws} := 0.305\ in$ $SP_f := 12\ in$ $d_e := 0.5\ in$ $t_s = 0.125\ in$

***Shear Allowables:***

$V_{bearstiffener} := 684\ lbf$
$V_{bearpanel} := 230.4\ lbf$
$V_{fast} := 373\ lbf$
$V_{fall} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutstiffener} := 378\ lbf$
$T_{povrpanel} := 221.67\ lbf$
$T_{fast} := 645\ lbf$
$T_{fall} := 221.67\ lbf$

$w_{dl} := q \cdot SPA_s = 6.93\ pli$

$T_f := 1.25 \cdot w_{dl} \cdot SP_f = 103.89\ lbf$

$$I_f := \frac{T_f}{T_{fall}} = 0.47$$

***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to stiffener as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into stiffener on load bearing length of fastener per manufacturer specifications.*

***Check Panel Fasteners (to Outriggers):***

***Fastener Type:*** #12-14 (Cond. CW)

***Outrigger Material:*** 6005-T5

$D_{ws1} := 0.305\ in$ $SP_{f1} := 12\ in$ $d_{e1} := 0.5\ in$ $t_{io} = 0.12\ in$

***Shear Allowables:***

$V_{bearoutrigger} := 684\ lbf$
$V_{bearpanel1} := 230.4\ lbf$
$V_{fast1} := 373\ lbf$
$V_{fall1} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutoutrigger} := 378\ lbf$
$T_{povrpanel1} := 221.67\ lbf$
$T_{fast1} := 645\ lbf$
$T_{fall1} := 221.67\ lbf$

$w_{dl1} := q \cdot 0.5 \cdot SPA_s = 3.46\ pli$

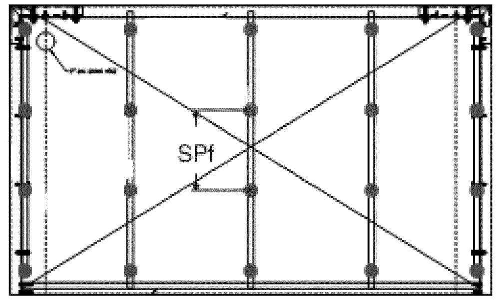
$T_{f1} := 1.25 \cdot w_{dl1} \cdot SP_{f1} = 51.95\ lbf$

$$I_{f1} := \frac{T_{f1}}{T_{fall1}} = 0.23$$

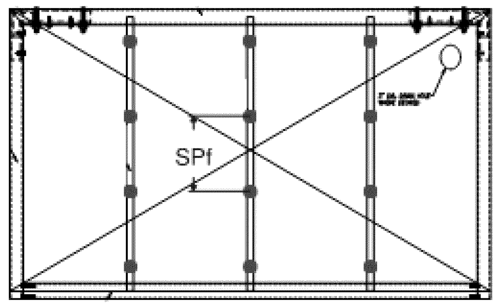
***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to outrigger as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into outrigger on load bearing length of fastener per manufacturer specifications.*

***** Multi-span systems only *****

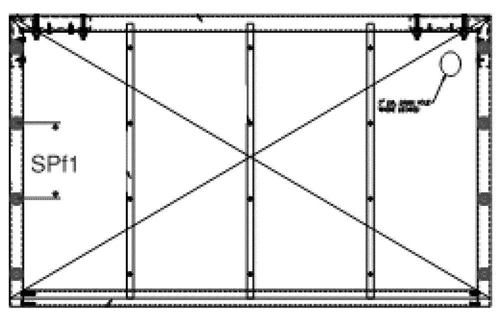
***Standalone Reference:***




***Multi-Span Reference:***




***Multi-Span Reference:***



***Check Panel Fasteners (to Front/Rear Fascia):***

***Fastener Type:*** #12-14 (Cond. CW)

***Fascia Material:*** 6005-T5

$D_{ws2} := 0.305\ in$ $SP_{f2} := 12\ in$ $d_{e2} := 0.5\ in$ $t_f := 0.125\ in$

***Shear Allowables:***

$V_{bearfascia} := 684\ lbf$
$V_{bearpanel2} := 230.4\ lbf$
$V_{fast2} := 373\ lbf$
$V_{fall12} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutfascia} := 378\ lbf$
$T_{povrpanel2} := 221.67\ lbf$
$T_{fast2} := 645\ lbf$
$T_{fall2} := 221.67\ lbf$

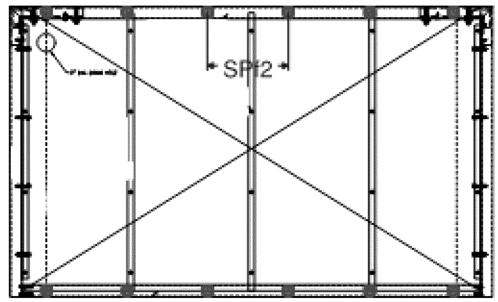
$w_{dl2} := q \cdot 0.5 \cdot SPA_s = 3.46\ pli$

$T_{f2} := 1.25 \cdot w_{dl2} \cdot SP_{f2} = 51.95\ lbf$

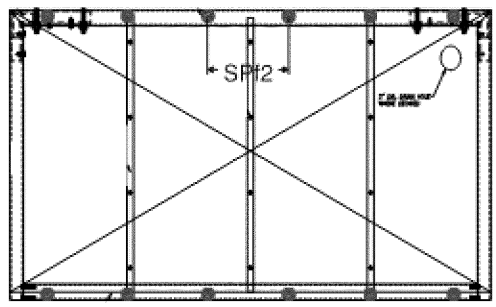
$$I_{f2} := \frac{T_{f2}}{T_{fall2}} = 0.23$$

***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to front/rear fascia as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into outrigger on load bearing length of fastener per manufacturer specifications.*

***Standalone Reference:***




***Multi-Span Reference:***




$PANEL\_FASTENERS := \text{stack}(I_f, I_{f1}, I_{f2}) = \begin{bmatrix} \text{"0.47 ≤ 1.00 ∴ PASS"} \\ \text{"0.23 ≤ 1.00 ∴ PASS"} \\ \text{"0.23 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

## PANEL STIFFENER

### System Data:

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in

### Stiffener Data:

$b := b_s = 1$ in
$d := d_s = 1$ in
$t := t_s = 0.12$ in
$L := Proj - 4\ in = 32$ in
$L_b := L$
$E_{alum} = 10100000$ psi

### Outrigger Material:

6005-T5

$d_e := 0.5$ in $\quad t_o := t_{eo} = 0.12$ in

### Section Properties:

$I_{x1} = 0.06$ in⁴ $\quad A_1 = 0.44$ in²
$I_{y1} = 0.06$ in⁴ $\quad J_1 = 0.08$ in⁴
$S_{x1} = 0.11$ in³ $\quad Z_{x1} = 0.14$ in³
$S_{y1} = 0.11$ in³ $\quad Z_{y1} = 0.14$ in³

### Stiffener Shape:

Rectangular Tube

### Stiffener Material:

6061-T6

### Fascia Material:

6005-T5

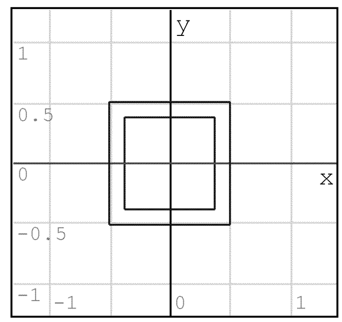
### Fascia Data:

$t_f := \text{Min}(t_{ff}, t_{rf}) = 0.12$ in

## CALCULATIONS

$a = 11.33$ in
$TL := \text{Max}(DL_{dn}, DL_{up}) = 44$ psf
$w_x := TL \cdot SPA_s = 6.93$ pli

$R_{sRLC3} := 78.86$ lbf *LC3 stiffener reaction (rear fascia)*
$R_{sFLC3} := 63.9$ lbf *LC3 stiffener reaction (front fascia)*
$R_{sLC6} := 49.3$ lbf *LC6 stiffener reaction*




### Check Panel Stiffener:

$M_x := 738.27$ lbf·in
$f_{bx} := (M_x) \div (S_{x1}) = 6480$ psi
$F_{bx} := 21212.12$ psi
$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.31$

$\Delta_x := 0.13$ in
$\Delta_{xall} := (L) \div (60) = 0.53$ in
$I_\Delta := (\Delta_x) \div (\Delta_{xall}) = 0.25$

### Check Stiffener Bearing on Fascia:

$R_{bear} := \text{Max}(R_{sRLC3}, R_{sFLC3}, R_{sLC6}) = 78.86$ lbf
$A_{bear} := b_s \cdot \text{Min}(t_{ff}, t_{rf}) = 0.12$ in²
$$R_{ball} := \frac{1.33 \cdot ADM\_F_{tu}(alloy_3, 0) \cdot A_{bear}}{1.95} = 3239.74 \text{ lbf}$$
$I_{bear} := (R_{bear}) \div (R_{ball}) = 0.02$

**Use 1" x 1" x 1/8" thk @ 22.67" o.c.**
*AL. tube as shown (6061-T6)*

### Check Fasteners (to Outrigger):

**Fastener Type:** 1/4-14" (Cond. CW)

$SP_f := 12$ in
$D_{ws} := 0.428$ in

$V_f := 1.25 \cdot 0.5 \cdot w_x \cdot SP_f = 51.95$ lbf
$$T_f := \frac{V_f \cdot 0.5 \cdot b}{0.5 \cdot d} = 51.95 \text{ lbf}$$

**Shear Allowables:**

$V_{bearstiffener} := 791.67$ lbf
$V_{bearoutrigger} := 791.67$ lbf
$V_{fast} := 517$ lbf
$V_{fall} := 517$ lbf

**Tension Allowables:**

$T_{povrstiffener} := 934.06$ lbf
$T_{poutoutrigger} := 437.5$ lbf
$T_{fast} := 896$ lbf
$T_{fall} := 437.5$ lbf

$$I_f := \left(\frac{V_f}{V_{fall}}\right)^2 + \left(\frac{T_f}{T_{fall}}\right)^2 = 0.02$$

### Check Fastener Tilting (to Outrigger):

$$R_{tilt} := \frac{4.2 \cdot \sqrt{(t_{eo}^{\ 3} \cdot Dia_{b1})} \cdot ADM\_F_{tu}(alloy_3, 0)}{3} = 1175.57 \text{ lbf}$$
$I_{tilt} := (V_f) \div (R_{tilt}) = 0.04$

**Use 1/4-14 S.S. Fasteners**
**12" o.c. max.** *to attach stiffener to outrigger as shown*
*300 Series (Fy = 65,000 psi)*

***** Standalone systems only *****

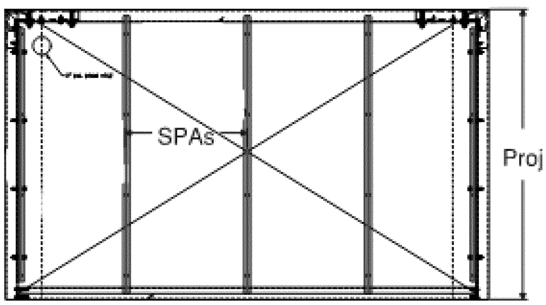
*STIFFENER* = ["0.31 ≤ 1.00 ∴ PASS", "0.25 ≤ 1.00 ∴ PASS"]

*BEARING* = "0.02 ≤ 1.00 ∴ PASS"

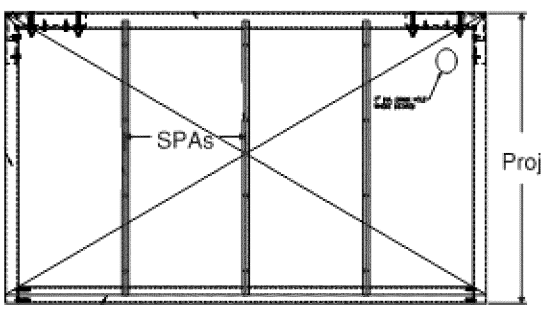
*FASTENERS* = ["0.02 ≤ 1.00 ∴ PASS", "0.04 ≤ 1.00 ∴ PASS"]

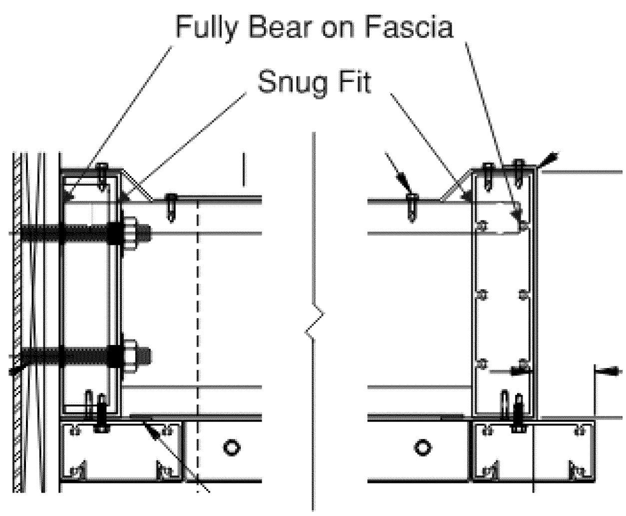
***Use 1" x 1" x 1/8" thk @* 22.67 *" o.c.***
*AL. tube as shown (6061-T6)*

***Standalone Reference:***




***Multi-Span Reference:***

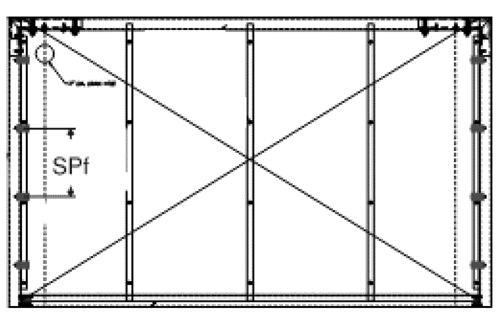



***Use 1/4-14 S.S. Fasteners***
***12" o.c. max.*** *to attach stiffener to outrigger as shown*
*300 Series (Fy = 65,000 psi)*

***** Standalone systems only *****

***Standalone Reference:***



## FRONT FASCIA

### System Data:

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in
$N_{int} := n_{stiffeners} = 3$
$w_y := WL_{Lat} \cdot d = 0.56$ pli

### Front Fascia Data:

$b := b_{ff} = 2$ in   $L := L_c - 4\ in = 90.67$ in
$d := d_{ff} = 8$ in   $L_b := L$   ☐ Welded within 1 inch of Mmax
$t := t_{ff} = 0.12$ in   $E_{alum} = 10100000$ psi

### Outrigger Data:

$d_e := 0.3515$ in   $t_o := Min(t_{io}, t_{eo}) = 0.12$ in
$I_{yio} := 1.432\ in^4$ intermediate outrigger
$I_{yeo} := I_{y1} = 1.87\ in^4$ end outrigger

### Section Properties:

$I_{x1} = 17.45\ in^4$   $A_1 = 2.44\ in^2$
$I_{y1} = 1.87\ in^4$   $J_1 = 5.59\ in^4$
$S_{x1} = 4.36\ in^3$   $Z_{x1} = 5.72\ in^3$
$S_{y1} = 1.87\ in^3$   $Z_{y1} = 2.07\ in^3$

### Front Fascia Shape:
Rectangular Tube

### Front Fascia Material:
6005A-T5

### Outrigger Material:
6005-T5

## CALCULATIONS

$a = 11.33$ in   $R_{sFLC3} = 63.9$ lbf
$TL := Max(DL_{dn}, DL_{up}) = 44$ psf   $R_{sLC6} = 49.3$ lbf
$w_x := TL \cdot SPA_s = 6.93$ pli
$w_y := WL_{Lat} \cdot d = 0.56$ pli

### Check Front Fascia:

$j := 1$
while $j \cdot \frac{L}{N_{int}+1} < \frac{L}{2}$
  $x_j := j$
  $j := j + 1$

**Downward Load:**

$M_{xffLC3} := 4911.29$ lbf·in
$M_{xffLC6} := 3893.44$ lbf·in
$M_x := Max(M_{xffLC3}, M_{xffLC6}) = 4911.29$ lbf·in
$f_{bx} := (M_x) \div (S_{x1}) = 1126$ psi

$F_{bx} := 20450.14$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.06$

$\Delta_x := 0.02$ in
$\Delta_{xall} := (L) \div (120) = 0.76$ in

$I_{\Delta x} := (\Delta_x) \div (\Delta_{xall}) = 0.03$

**Lateral Wind Load:**

$M_{yFL} := 311.64$ lbf·in Wind load applied to fascia

$M_{yOL} := 191.2$ lbf·in Wind load applied to outrigger

$f_{by} := (Max(M_{yFL}, M_{yOL})) \div (S_{y1}) = 166.47$ psi

$F_{by} := 9057.65$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.02$

$\Delta_y := 0.0052$ in
$\Delta_{yall} := (L) \div (120) = 0.76$ in

$I_{\Delta y'} := (\Delta_y) \div (\Delta_{yall}) = 0.01$

**Use 2" x 8" x 1/8" thk Front Fascia**
AL. tube as shown (6005A-T5)

### Check Fasteners (to Outrigger):

**Fastener Type:**
#10-16 (Cond. CW)   $n_f := 4$   $D_{ws} := 0.305$ in

**Shear Allowables:**

$V_{bearfascia} := 556.54$ lbf
$V_{bearoutrigger} := 556.54$ lbf
$V_{fast} := 275$ lbf
$V_{fall} := 275$ lbf

**Tension Allowables:**

$T_{povroutrigger} := 665.63$ lbf
$T_{poutfascia} := 436.21$ lbf
$T_{fast} := 477$ lbf
$T_{fall} := 436.21$ lbf

**Downward Load:**

$R_{ffdlLC3} := 184.72$ lbf
$R_{ffdlLC6} :=$ 147.11 lbf
$R_{ffdl} := Max(R_{ffdlLC3}, R_{ffdlLC6}) = 184.72$ lbf
$V_{fdl} := (R_{ffdl}) \div (n_f) = 46.18$ lbf

$I_{fdl} := (V_{fdl}) \div (V_{fall}) = 0.17$

**Lateral Wind Load (Z):**

$R_{fwlz} := (w_y \cdot L) \div (2) = 25.19$ lbf
$V_{fwlz} := (R_{fwlz}) \div (n_f) = 6.3$ lbf

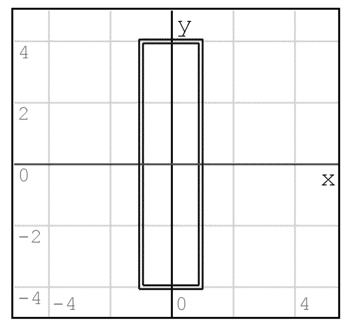
$I_{fwlz} := (V_{fwlz}) \div (V_{fall}) = 0.02$

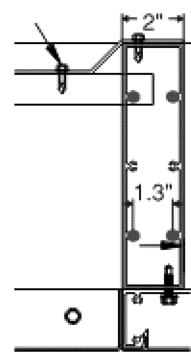
**Lateral Wind Load (X):**

$$T_{fwlx} := \frac{Max(R_{xLAT[1..4]\,1})}{n_f} + \frac{Max(M_{yLAT1[1..4]\,1})}{0.5 \cdot n_f \cdot 1.2969\ in} = 123.82\ lbf$$

$I_{fwlx} := (T_{fwlx}) \div (T_{fall}) = 0.28$

**Use (4) #10-16 S.S. Fasteners**
*to attach front fascia to outrigger as shown*
*5/8" min. thread engagement into fascia screw chase*
*300 Series (Fy = 65,000 psi)*




$$FRONT\_FASCIA = \begin{bmatrix} \text{"0.06 ≤ 1.00 ∴ PASS"} \\ \text{"0.03 ≤ 1.00 ∴ PASS"} \\ \text{"0.02 ≤ 1.00 ∴ PASS"} \\ \text{"0.01 ≤ 1.00 ∴ PASS"} \end{bmatrix}$$

$$FASTENERS = \begin{bmatrix} \text{"0.17 ≤ 1.00 ∴ PASS"} \\ \text{"0.02 ≤ 1.00 ∴ PASS"} \\ \text{"0.28 ≤ 1.00 ∴ PASS"} \end{bmatrix}$$

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 2.07
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## END OUTRIGGER

### System Data:

$L_c = 94.67$ in
$DL_{dn} = 44$ psf
$LC6 = 30.31$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$DeadL = 7.36$ psf
$SPA_s = 22.67$ in

### Outrigger Data:

$b := b_{eo} = 2$ in  $L := Proj = 36$ in
$d := d_{eo} = 8$ in  $L_b := L$
$t := t_{eo} = 0.12$ in  $E_{alum} = 10100000$ psi

☐ Welded within 1 inch of Mmax

### Drift Data:

$S_b = 21$ psf
$P_{d1} = 31.05$ psf
$P_{d2} = 0$ psf

### Section Properties:

$I_{x1} = 12.6$ in⁴  $A_1 = 1.47$ in²
$I_{y1} = 0.46$ in⁴  $J_1 = 0.01$ in⁴
$S_{x1} = 3.15$ in³  $Z_{x1} = 3.85$ in³
$S_{y1} = 0.28$ in³  $Z_{y1} = 0.22$ in³

### Outrigger Shape:

Channel

### Outrigger Material:

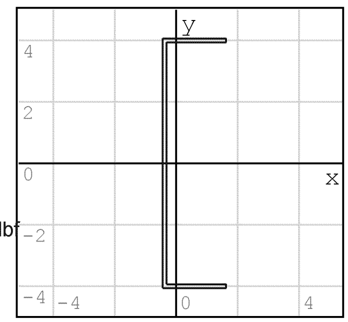
6005-T5

$I_{yio} := I_{y1} = 0.46$ in⁴ end outrigger
$I_{yeo} := 1.8721$ in$^4$ end outrigger
$w_y := WL_{Lat} \cdot d = 0.56$ pli

## CALCULATIONS

$TW := 13.33$ in

### Check End Outrigger:




**LC3 Drift Dist. Loads:**

$w_{owall2wayLC3} := (2 \cdot P_{dO1} + S_b + DeadL) \cdot a = 5.31$ pli
$w_{omiddrift} := P_{dO1} \cdot a = 1.54$ pli
$w_{omiduniLC3} := (P_{dO2} + S_b + DeadL) \cdot a = 3.14$ pli
$w_{oend2wayLC3} := (P_{dO2} + S_b + DeadL) \cdot a = 3.14$ pli
$w_{owallb} := P_{d1} \cdot b = 0.43$ pli
$w_{ounib} := (S_b + DeadL) \cdot b = 0.39$ pli
$w_{owall1wayLC3} := P_{d1} \cdot TW = 2.88$ pli
$w_{ouniLC3} := (S_b + DeadL) \cdot TW = 2.63$ pli

**LC3 Point Loads:**

$F_{wall2wayLC3} := \frac{1}{2} \cdot a \cdot w_{owall2wayLC3} = 30.09$ lbf
$F_{middrift} := \frac{1}{2} \cdot (L - 2 \cdot TW) \cdot w_{omiddrift} = 7.18$ lbf
$F_{miduniLC3} := (L - 2 \cdot TW) \cdot (P_{dO2} + S_b + DeadL) \cdot a = 29.28$ lbf
$F_{end2wayLC3} := \frac{1}{2} \cdot a \cdot w_{oend2wayLC3} = 17.78$ lbf
$F_{wallb} := \frac{1}{2} \cdot L \cdot w_{owallb} = 7.76$ lbf
$F_{unib} := L \cdot w_{ounib} = 14.18$ lbf
$F_{wall1wayLC3} := \frac{1}{2} \cdot L \cdot w_{owall1wayLC3} = 51.75$ lbf
$F_{uniLC3} := L \cdot w_{ouniLC3} = 94.54$ lbf

$R_{ffdlLC3} = 184.72$ lbf

$R_{yOLC3} := 290.98$ lbf ***vertical rxn @ thru-bolts***

**LC3 Strong Axis Moment:**

$M_{xOLC3} := 8392.72$ lbf·in

$f_{bxLC3} := (M_{xOLC3}) \div (S_{x1}) = 2664$ psi

$I_{bxLC3} := (f_{bxLC3}) \div (F_{bx}) = 0.28$

**LC3 Strong Axis Deflection:**

$\Delta_{xLC3} := 0.04$ in

$I_{\Delta xLC3} := (\Delta_{xLC3}) \div (\Delta_{xall}) = 0.06$

**LC6 Uniform Dist. Load:**

$w_{LC6uni} := LC6 \cdot TW = 2.81$ pli

**LC6 Point Load:**

$F_{wall2wayLC6} := \frac{1}{2} \cdot TW \cdot w_{LC6uni} = 18.71$ lbf
$F_{miduniLC6} := (L - 2 \cdot TW) \cdot w_{LC6uni} = 26.19$ lbf
$F_{end2wayLC6} := \frac{1}{2} \cdot TW \cdot w_{LC6uni} = 18.71$ lbf
$R_{ffdlLC6} = 147.11$ lbf

$R_{yOLC6} := 210.73$ lbf ***vertical rxn @ thru-bolts***

**LC6 Strong Axis Moment:**

$M_{xOLC6} := 6441.1$ lbf·in

$f_{bxLC6} := (M_{xOLC6}) \div (S_{x1}) = 2045$ psi

$I_{bxLC6} := (f_{bxLC6}) \div (F_{bx}) = 0.22$

**LC6 Strong Axis Deflection:**

$\Delta_{xLC6} := 0.03$ in

$I_{\Delta xLC6} := (\Delta_{xLC6}) \div (\Delta_{xall}) = 0.05$

### Lateral Wind Load:

$M_{yOL} := 196.88$ lbf·in Wind load applied to outrigger
$M_{yFL} := 64.81$ lbf·in Wind load applied to fascia
$f_{by} := (\mathrm{Max}(M_{yFL}, M_{yOL})) \div (S_{y1}) = 696$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.08$

**Weak Axis Deflection:**

$\Delta_y := 0.0252$ in

$I_{\Delta y} := (\Delta_y) \div (\Delta_{yall}) = 0.04$

### Outrigger Allowables:

$F_{bx} := 9439.68$ psi
$F_{by} := 9057.65$ psi
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.6$ in
$\Delta_{yall} := (2 \cdot L_b) \div (120) = 0.6$ in

***Use 2" x 8" x 1/8" thk End Outrigger***
*AL. tube as shown (6005-T5)*

END_OUTRIGGER =

| |
|---|
| "0.28 ≤ 1.00 ∴ PASS" |
| "0.22 ≤ 1.00 ∴ PASS" |
| "0.08 ≤ 1.00 ∴ PASS" |
| "0.06 ≤ 1.00 ∴ PASS" |
| "0.05 ≤ 1.00 ∴ PASS" |
| "0.04 ≤ 1.00 ∴ PASS" |

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 2.08
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## INTERMEDIATE OUTRIGGER

***System Data:***

$L_c = 94.67\ in$
$DL_{dn} = 44\ psf$
$LC6 = 30.31\ psf$
$DL_{up} = 6\ psf$
$WL_{Lat} = 10\ psf$
$DeadL = 7.36\ psf$
$SPA_s = 22.67\ in$

***Outrigger Data:***

$b := b_{io} = 2\ in$ $\quad L := Proj = 36\ in$
$d := d_{io} = 6\ in$ $\quad L_b := L$
$t := t_{io} = 0.12\ in$ $\quad E_{alum} = 10100000\ psi$

***Drift Data:***

$S_b = 21\ psf$
$P_{d1} = 31.05\ psf$
$P_{d2} = 0\ psf$

☐ Welded within 1 inch of Mmax

***Section Properties:***

$I_{x1} = 6.3\ in^4$ $\quad A_1 = 1.22\ in^2$
$I_{y1} = 0.43\ in^4$ $\quad J_1 = 0.01\ in^4$
$S_{x1} = 2.1\ in^3$ $\quad Z_{x1} = 2.5\ in^3$
$S_{y1} = 0.27\ in^3$ $\quad Z_{y1} = 0.41\ in^3$

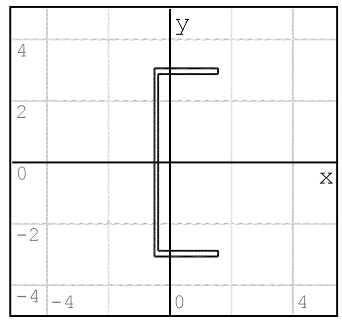
***Outrigger Shape:*** Channel

***Outrigger Material:*** 6061-T6

$I_{yio} := I_{y1} = 0.43\ in^4$ intermediate outrigger
$I_{yeo} := 1.8721\ in^4$ end outrigger
$w_y := WL_{Lat} \cdot d = 0.42\ pli$

## CALCULATIONS

$TW = 13.33\ in$




***Check Intermediate Outrigger:***

***LC3 Drift Dist. Loads:***

$w_{owall2wayLC3} = 5.31\ pli$
$w_{omiddrift} = 1.54\ pli$
$w_{omiduniLC3} = 3.14\ pli$
$w_{oend2wayLC3} = 3.14\ pli$
$w_{owallb} = 0.43\ pli$
$w_{ounib} = 0.39\ pli$
$w_{owall1wayLC3} = 2.88\ pli$
$w_{ouniLC3} = 2.63\ pli$

***LC3 Point Loads:***

$F_{wall2wayLC3} = 30.09\ lbf$
$F_{middrift} = 7.18\ lbf$
$F_{miduniLC3} = 29.28\ lbf$
$F_{end2wayLC3} = 17.78\ lbf$
$F_{wallb} = 7.76\ lbf$
$F_{unib} = 14.18\ lbf$
$F_{wall1wayLC3} = 51.75\ lbf$
$F_{uniLC3} = 94.54\ lbf$
$R_{ffdlLC3} = 184.72\ lbf$

$R_{yOLC3} := 290.98\ lbf$ ***vertical rxn @ thru-bolts***

***LC3 Strong Axis Moment:***

$M_{xOLC3} := 8392.72\ lbf \cdot in$

$f_{bxLC3} := (M_{xOLC3}) \div (S_{x1}) = 3999\ psi$

$I_{bxLC3} := (f_{bxLC3}) \div (F_{bx}) = 0.42$

***LC3 Strong Axis Deflection:***

$\Delta_{xLC3} := 0.08\ in$

$I_{\Delta xLC3} := (\Delta_{xLC3}) \div (\Delta_{xall}) = 0.13$

***LC6 Uniform Dist. Load:***

$w_{LC6uni} = 2.81\ pli$

***LC6 Point Load:***

$F_{wall2wayLC6} = 18.71\ lbf$
$F_{miduniLC6} = 26.19\ lbf$
$F_{end2wayLC6} = 18.71\ lbf$
$R_{ffdlLC6} = 147.11\ lbf$

$R_{yOLC6} := 210.73\ lbf$ ***vertical rxn @ thru-bolts***

***LC6 Strong Axis Moment:***

$M_{xOLC6} := 6441.1\ lbf \cdot in$

$f_{bxLC6} := (M_{xOLC6}) \div (S_{x1}) = 3069\ psi$

$I_{bxLC6} := (f_{bxLC6}) \div (F_{bx}) = 0.33$

***LC6 Strong Axis Deflection:***

$\Delta_{xLC6} := 0.06\ in$

$I_{\Delta xLC6} := (\Delta_{xLC6}) \div (\Delta_{xall}) = 0.1$

***Lateral Wind Load:***

$M_{yOL} := 147.66\ lbf \cdot in$ Wind load applied to outrigger
$M_{yFL} := 48.61\ lbf \cdot in$ Wind load applied to fascia

$f_{by} := (\max(M_{yFL}, M_{yOL})) \div (S_{y1}) = 537.28\ psi$

$I_{by} := (f_{by}) \div (F_{by}) = 0.04$

***Weak Axis Deflection:***

$\Delta_y := 0.0203\ in$

$I_{\Delta y} := (\Delta_y) \div (\Delta_{yall}) = 0.03$

***Outrigger Allowables:***

$F_{bx} := 9439.68\ psi$
$F_{by} := 12076.87\ psi$
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.6\ in$
$\Delta_{yall} := (2 \cdot L_b) \div (120) = 0.6\ in$

***Use 2" x 6" x 1/8" thk Int. Outrigger***
*AL. tube as shown (6061-T6)*

$INT\_OUTRIGGER =$

| |
|---|
| "0.42 ≤ 1.00 ∴ PASS" |
| "0.33 ≤ 1.00 ∴ PASS" |
| "0.04 ≤ 1.00 ∴ PASS" |
| "0.13 ≤ 1.00 ∴ PASS" |
| "0.1 ≤ 1.00 ∴ PASS" |
| "0.03 ≤ 1.00 ∴ PASS" |

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 2.09
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## REAR FASCIA

### System Data:

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in
$N_{int} = 3$

### Rear Fascia Data:

$b := b_{rf} = 2$ in  $L := L_c - 2\text{ in} = 92.67$ in
$d := d_{rf} = 8$ in  $L_b := L$
$t := t_{rf} = 0.12$ in  $E_{alum} = 10100000$ psi

$R_{yOLC3} = 290.98$ lbf  $R_{yOLC6} = 210.73$ lbf
$M_{xOLC3} = 8392.72$ lbf·in  $M_{xOLC6} = 6441.1$ lbf·in

☐ Welded within 1 inch of Mmax

### Section Properties:

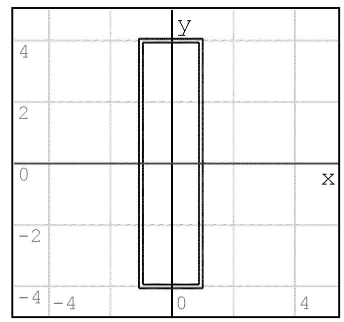
$I_{x1} = 17.45$ in⁴  $A_1 = 2.44$ in²
$I_{y1} = 1.87$ in⁴  $J_1 = 5.59$ in⁴
$S_{x1} = 4.36$ in³  $Z_{x1} = 5.72$ in³
$S_{y1} = 1.87$ in³  $Z_{y1} = 2.07$ in³

**Rear Fascia Shape:** Rectangular Tube

**Rear Fascia Material:** 6005-T5

## CALCULATIONS

$a = 11.33$ in
$TL := \mathrm{Max}\left(DL_{dn}, DL_{up}\right) = 44$ psf
$w_x := TL \cdot SPA_s = 6.93$ pli
$w_y := WL_{Lat} \cdot d = 0.56$ pli




### Check Rear Fascia:

$j := 1$
while $j \cdot \dfrac{L}{N_{int}+1} < \dfrac{L}{2}$
  $x_j := j$
  $j := j + 1$

**Downward Load:**

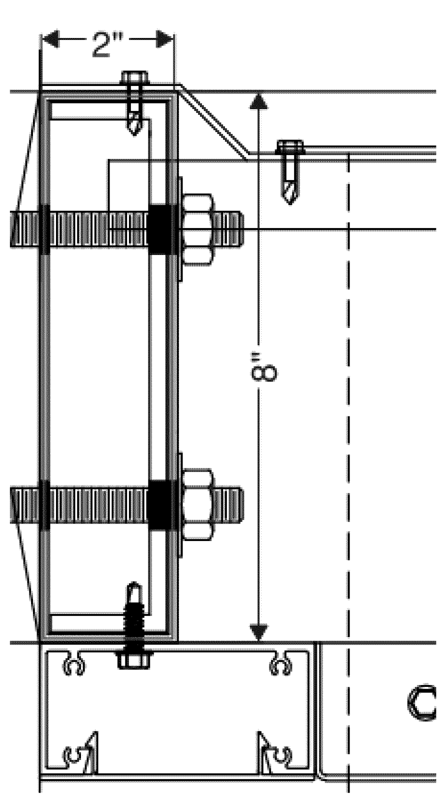
$R_{rfdlLC3} := 241.55$ lbf Rear fascia vertical rxn @ anchors (LC3)
$R_{rfdlLC6} := 147.53$ lbf Rear fascia vertical rxn @ anchors (LC6)
$M_{xrfLC3} := 6634.32$ lbf·in
$M_{xrfLC6} := 4063.45$ lbf·in
$M_x := \mathrm{Max}\left(M_{xrfLC3}, M_{xrfLC6}\right) = 6634.32$ lbf·in
$f_{bx} := \left(M_x\right) \div \left(S_{x1}\right) = 1521$ psi

$F_{bx} := 20450.14$ psi

$I_{bx} := \left(f_{bx}\right) \div \left(F_{bx}\right) = 0.07$

$\Delta_x := 0.03$ in
$\Delta_{xall} := (L) \div (120) = 0.77$ in

$I_{\Delta x} := \left(\Delta_x\right) \div \left(\Delta_{xall}\right) = 0.04$




**Torsion Due to Outrigger:**

$Tor_{rf} := 9629.41$ lbf·in

$$\tau_{rf} := \frac{Tor_{rf}}{2 \cdot t \cdot (b - t) \cdot (d - t)} = 2608.6 \text{ psi}$$

$F_\tau := 7483.08$ psi

$I_\tau := \left(\tau_{rf}\right) \div \left(F_\tau\right) = 0.35$

***Use 2" x 8" x 1/8" thk Rear Fascia***
*AL. tube as shown (6005-T5)*

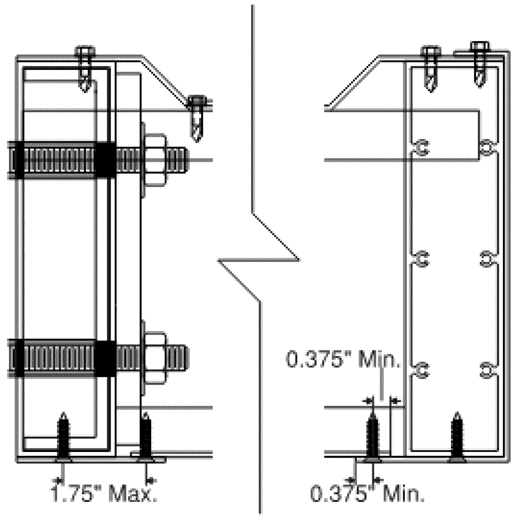
$REAR\_FASCIA =$
"0.07 ≤ 1.00 ∴ PASS"
"0.35 ≤ 1.00 ∴ PASS"
"0.04 ≤ 1.00 ∴ PASS"

## SOFFIT

$t_{sp} := 0.1\ in$ *soffit panel thickness*    $W_{upASD} = 10.42\ psf$

$N_{ss} := 5$ *# of soffit stiffeners*    $L_{stiff} = 32\ in$ *stiffener length*

$Sp_{ss} := (96\ in) \div ((N_{ss} - 1)) = 24\ in$ *soffit stiffener spacing*




### *Check Soffit Panel Bending:*

$L_{bpanel} := Sp_{ss} = 24\ in$

$w_{panel} := W_{upASD} \cdot Proj = 2.6\ pli$

$$M_{ypanel} := \frac{168 \cdot w_{panel} \cdot L_{bpanel}^2}{1568} = 160.7\ lbf \cdot in$$

$$S_{ypanel} := \frac{t_{sp}^2 \cdot (Proj - 4.5\ in)}{6} = 0.05\ in^3$$

$f_{bpanel} := (M_{ypanel}) \div (S_{ypanel}) = 3061.03\ psi$

$F_{bpanel} := 11500\ psi$

$I_{bpanel} := (f_{bpanel}) \div (F_{bpanel}) = 0.27$

### *Check Panel Deflection:*

L/60 *Panel Deflection Criteria*

$$I_{yp} := \frac{t_p^3 \cdot (Proj - 4.5\ in)}{12} = 0.0026\ in^4$$

$$\Delta_{yp} := 0.00541 \cdot \frac{w_{panel} \cdot L_{bpanel}^4}{E_{alum} \cdot I_{yp}} = 0.18\ in$$

$$\Delta_{ypall} := \frac{L_{bpanel}}{Deflection\ Criteria} = 0.4\ in$$

$I_{\Delta yp} := (\Delta_{yp}) \div (\Delta_{ypall}) = 0.44$

***Using L / 60 Deflection Limit:***
***Use 0.100 " Thick***
***Panel Type = 1100−H14 Aluminum***
***Maximum Span = 24.00"***

### *Check Fasteners (to stiffeners):*

***Fastener Size:*** #10-16 (Cond. CW)

$t_{ss} := 0.121\ in$    $t_h := t_{sp}$

$d_{es} := 0.5\ in$    $d_{eh} := 0.875\ in$

$D_h := 0.2525\ in$    $Spf := 12\ in$

***Stiffener:*** 5052-H32    ***Panel:*** 1100-H14

$T_{fs} := 1.25 \cdot 1.25 \cdot W_{upASD} \cdot Sp_{ss} \cdot Spf = 32.55\ lbf$

$T_{falls} := 91.61\ lbf$

$I_{fs} := (T_{fs}) \div (T_{falls}) = 0.36$

***Use #10-16 S.S. Countersunk Fasteners***
***12" o.c. max.*** *to attach panel to stiffeners*
*300 Series Stainless Steel (Fy = 65,000 psi)*

### *Check Soffit Mounting Strip:*

$L_{effms} := 12\ in$    $t_{ms} := t_{sp} = 0.1\ in$

$$R_{ss} := \frac{1.25 \cdot W_{upASD} \cdot Sp_{ss} \cdot L_{stiff}}{2} = 34.72\ lbf$$

$M_{wkms} := R_{ss} \cdot 1.75\ in = 60.76\ lbf \cdot in$

$$L_{reqms} := \frac{M_{wkms} \cdot 6}{t_{ms}^2 \cdot F_{bpanel}} = 3.17\ in$$

$I_{bms} := (L_{reqms}) \div (L_{effms}) = 0.26$

$$I_{yms} := \frac{L_{effms} \cdot t_{ms}^3}{12} = 0\ in^4$$

$$\Delta_{ms} := \frac{R_{ss} \cdot (1.75\ in)^3}{3\ E_{alum} \cdot I_{yms}} = 0.01\ in$$

$$\Delta_{msall} := \frac{1.75\ in}{60} = 0.03\ in$$

$I_{\Delta ms} := (\Delta_{ms}) \div (\Delta_{msall}) = 0.21$

### *Check Soffit Mounting Strip Fasteners:*

$T_{fmsp} := R_{ss} = 34.72\ lbf$

$$T_{fmsrf} := \frac{R_{ss} \cdot 0.6033\ in}{1.056\ in} = 19.84\ lbf$$

$$T_{povrms} := \left(\left(0.27 + 1.45 \cdot \frac{t_{ms}}{0.19\ in}\right) \cdot 0.19\ in \cdot t_{ms} \cdot 14\ ksi\right) \div (3) = 91.61\ lbf$$

$T_{fasms} := 477\ lbf$

$T_{poutp} := (1.2 \cdot 0.19\ in \cdot t_{sp} \cdot 14\ ksi) \div (3) = 106.4\ lbf$

$T_{poutrf} := (1.2 \cdot 0.19\ in \cdot t_{rf} \cdot 35\ ksi) \div (3) = 332.5\ lbf$

$I_{fmsp} := (T_{fmsp}) \div (Min(T_{povrms}, T_{fasms}, T_{poutp})) = 0.38$

***Use #10-16 S.S. Undercut Fasteners***
***12" o.c. max.*** *to attach soffit panel to mounting strip*
*300 Series Stainless Steel (Fy = 65,000 psi)*

$I_{fmsrf} := (T_{fmsrf}) \div (Min(T_{povrms}, T_{fasms}, T_{poutrf})) = 0.22$

***Use #10-16 S.S. Undercut Fasteners***
***12" o.c. max.*** *to attach mounting strip to rear fascia.*
***Fastener must be in-line with each stiffener end.***
*300 Series Stainless Steel (Fy = 65,000 psi)*

*SOFFIT_PANEL* = ["0.27 ≤ 1.00 ∴ PASS", "0.44 ≤ 1.00 ∴ PASS"]

*STIFFENER_FASTENERS* = "0.36 ≤ 1.00 ∴ PASS"

*SOFFIT_MOUNTING_STRIP* = ["0.26 ≤ 1.00 ∴ PASS", "0.21 ≤ 1.00 ∴ PASS"]

*MOUNTING_STRIP_FASTENERS* = ["0.38 ≤ 1.00 ∴ PASS", "0.22 ≤ 1.00 ∴ PASS"]

***Stiffener Angle:*** 5052-H32

$L_{1s} := 1.75\ in$

$L_{2s} := 1.75\ in$

$t_{ss} = 0.121\ in$

$C_{bs} := 1.0$

$Alum_{Den} := 158\ pcf$

$L_{stiff} = 32\ in$ *stiffener length*

$T_{ws} = 24\ in$ *stiffener trib. width*

$W_{upASD} = 10.42\ psf$

$P_{light} := 5\ lbf$

"Stiffener Section Properties"

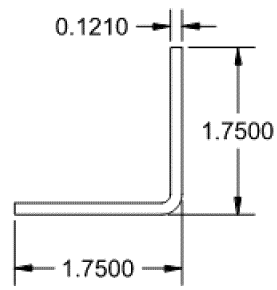
$A_s := 0.401\ in^2$

$I_{ys} := 0.12\ in^4$

$S_{xstop} := 0.096\ in^3$

$S_{xsbot} := 0.245\ in^3$

$J_s := 0.002\ in^4$




***Check Stiffener Bending:***

***Uplift:***

$w_{upstiff} := W_{upASD} \cdot T_{ws} = 1.74\ pli$

$$M_{xsu} := \frac{w_{upstiff} \cdot L_{stiff}^2}{8} = 222.21\ lbf \cdot in$$

$$f_{bxsu} := \frac{M_{xsu}}{S_{xsbot}} = 906.97\ psi$$

$F_{bxsuF.5.a.2} = 9087.68\ psi$ *uniform compression local buckling*

$F_{bxsu} := 9087.68\ psi$

$I_{bsu} := (f_{bxsu}) \div (F_{bxsu}) = 0.1$

***Uplift Deflection:***

$$\Delta_{ysu} := \frac{5 \cdot w_{upstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} = 0.02\ in$$

$\Delta_{ysuall} := Min(1.5\ in, (L_{stiff}) \div (60)) = 0.53\ in$

$I_{\Delta ysu} := (\Delta_{ysu}) \div (\Delta_{ysuall}) = 0.04$

***Dead Load:***

$w_{DLstiff} := Alum_{Den} \cdot (A_s + t_{sp} \cdot T_{ws}) = 0.26\ pli$

$$M_{xsDL} := \frac{w_{DLstiff} \cdot L_{stiff}^2}{8} + \frac{P_{light} \cdot L_{stiff}}{4} = 72.78\ lbf \cdot in$$

$$f_{bxsDL} := \frac{M_{xsDL}}{S_{xstop}} = 758.15\ psi$$

$F_{bxsDLF.5.a.1} = 10685.01\ psi$ *leg tip max. compression local buckling*

$F_{bxsDLLTB} = 26548.53\ psi$ *leg tip max. compression LTB*

$F_{bxsDL} := 10685.01\ psi$

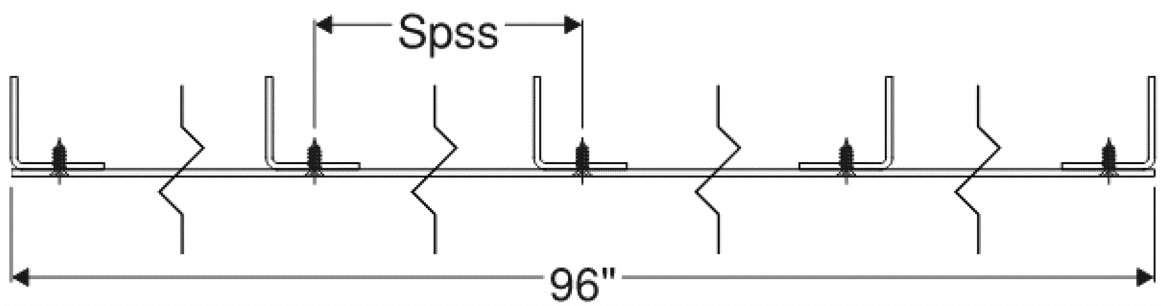
$I_{bsDL} := (f_{bxsDL}) \div (F_{bxsDL}) = 0.07$

***Dead Load Deflection:***

$$\Delta_{ysDL} = \frac{5 \cdot w_{DLstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} + \frac{P_{light} \cdot L_{stiff}^3}{48\ E_{alum} \cdot I_{ys}} = 0.01\ in$$

$\Delta_{ysDLall} := Min(1.5\ in, (L_{stiff}) \div (60)) = 0.53\ in$

$I_{\Delta ysDL} := (\Delta_{ysDL}) \div (\Delta_{ysDLall}) = 0.01$




***Use (5) 1-3/4" x 1-3/4" x 0.121" Formed Alum. Angles***
*(2) @ each panel end and spaced* **24.0** *" max. along 8' panel length as shown (5052-H32)*

STIFFENER =
"0.1 ≤ 1.00 ∴ PASS"
"0.04 ≤ 1.00 ∴ PASS"
"0.07 ≤ 1.00 ∴ PASS"
"0.01 ≤ 1.00 ∴ PASS"

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 2.12
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## ANCHOR BRACKET

**System Data:**

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf

**Channel Anchor Data:**

$b := b_{cb} = 1.69$ in  $L := 4.25$ in
$d := d_{cb} = 5.69$ in  $L_b := L$
$t := t_{cb} = 0.25$ in  $E_{alum} = 10100000$ psi

$R_{rfdlLC3} = 241.55$ lbf  $R_{rfdlLC6} = 147.53$ lbf
$R_{yOLC3} = 290.98$ lbf  $R_{yOLC6} = 210.73$ lbf
$M_{xOLC3} = 8392.72$ lbf·in  $M_{xOLC6} = 6441.1$ lbf·in

☑ Welded within 1 inch of Mmax

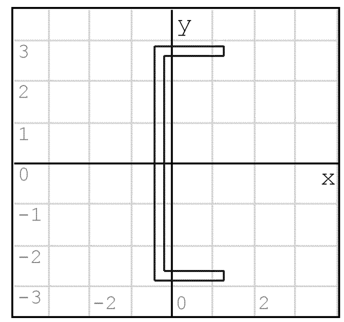
**Section Properties:**

$I_{x1} = 9.19$ in⁴  $A_1 = 2.14$ in²
$I_{y1} = 0.47$ in⁴  $J_1 = 0.05$ in⁴
$S_{x1} = 3.23$ in³  $Z_{x1} = 3.99$ in³
$S_{y1} = 0.37$ in³  $Z_{y1} = 0.45$ in³

**Corner Key Shape:** Channel
**Corner Key Material:** 6061-T6
**Weld Filler:** 4043
**Outrigger Material:** 6005-T5

## CALCULATIONS

$M_x = M_{xO} + (R_{yO} \cdot L)$  $R_{yO} := 290.98$ lbf
$M_x := 9629.41$ lbf·in  $R_{fdl} := 241.55$ lbf




**Check Thru-Bolts:**

**Fastener Type:** 1/2-13 (Cond. CW)

$t_o := \text{Min}(t_{io}, t_{eo}) = 0.125$ in
$n_{tb} := 6$
$d_e := 1$ in

**Shear Allowables:**

$V_{bearoutrigger} := 2435.9$ lbf
$V_{bearchannel} := 2307.69$ lbf
$V_{Bolt} := 2984$ lbf
$V_{tball} := 2307.69$ lbf

$$V_{tb} := \sqrt{\left(\frac{R_{yO}}{n_{tb}}\right)^2 + \left(\frac{M_x}{0.5 \cdot n_{tb} \cdot 3.625 \text{ in}}\right)^2} = 886.79 \text{ lbf}$$

$F_{syO} := 21000$ psi  $F_{suO} := 22800$ psi  $n_{sp} := 2$
$A_{gv} := 0.45$ in²
$A_{nv} := 0.28$ in²
$R_{nsy} := (F_{syO} \cdot A_{gv} \cdot n_{sp}) \div (1.5) = 12687.5$ lbf
$R_{nsr} := (F_{suO} \cdot A_{nv} \cdot n_{sp}) \div (1.95) = 6485.58$ lbf
$V_{couple} := (M_x) \div (3.625 \text{ in}) = 2656.39$ lbf

$$I_{tb} := \text{Max}\left(\frac{V_{tb}}{V_{tball}}, \frac{V_{couple}}{\text{Min}(R_{nsy}, R_{nsr})}\right) = 0.41$$

***Use (6) 1/2" Dia. S.S. Thru-Bolts***
*3.625" o.c. vertically*
*1.25" o.c. horizontally*
*to attach outrigger to corner key channel as shown*
*300 Series (Fy = 65,000 psi)*

**Check Channel Bracket:**

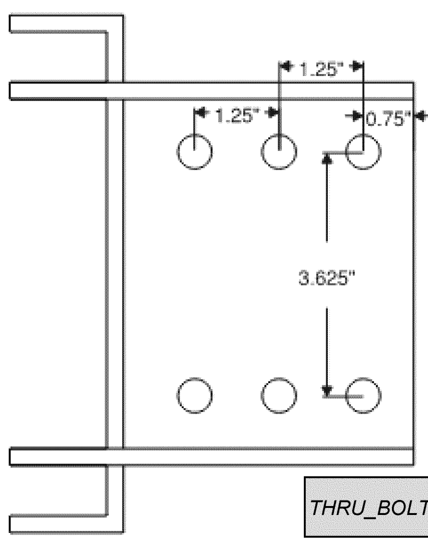
**Outrigger Channel:**

$f_{bxOC} := (M_x) \div (S_{x1}) = 2984$ psi
$F_{bx} := 9090.91$ psi
$I_{bxOC} := (f_{bxOC}) \div (F_{bx}) = 0.33$

**Rear Fascia Channel:**

$M_{xRFC} := R_{yO} \cdot 5.75 \text{ in} = 1673.16$ lbf·in
$S_{xRFC} := 6.4503$ in³
$f_{bxRFC} := (M_{xRFC}) \div (S_{xRFC}) = 259.39$ psi
$I_{bxRFC} := (f_{bxRFC}) \div (F_{bx}) = 0.03$

***Use 1/4" thk Anchor Channels***
*as shown (6061-T6)*
*Snug tight inside outrigger and rear fascia*




$THRU_BOLTS = $ ["0.38 ≤ 1.00 ∴ PASS", "0.41 ≤ 1.00 ∴ PASS"]

$CHANNEL_BRACKET = $ ["0.33 ≤ 1.00 ∴ PASS", "0.03 ≤ 1.00 ∴ PASS"]

***Rear fascia tube torsion due to outrigger moment check on page 2.09***

## *Check Channel Bracket Welds:*

$d_w := d = 5.69\ \text{in}$  $M_x = 9629.41\ \text{lbf·in}$

$b_w := 2.391\ \text{in}$  $R_{yO} = 290.98\ \text{lbf}$

$t_w := 0.25\ \text{in}$

$$A_w := t_w \cdot (2 \cdot b_w + d_w) = 2.62\ \text{in}^2$$

$$S_{w1} := t_w \cdot \left(b_w \cdot d_w + \frac{d_w^{\ 2}}{6}\right) = 4.75\ \text{in}^3$$

$$S_{w2} := \frac{t_w \cdot (2 \cdot b_w + d_w)^2}{6} = 4.57\ \text{in}^3$$

$$f_w := \sqrt{\left(\frac{0.7071 \cdot M_x}{S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{S_{w2}} + \frac{R_{yO}}{A_w}\right)^2} = 2147.53\ \text{psi}$$

$F_{tub} := 24000\ \text{psi}$  $F_{tuw} = 24000\ \text{psi}$

$$F_{sbT} := \frac{F_{tub}}{1.95} = 12307.69\ \text{psi} \qquad F_{swT} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

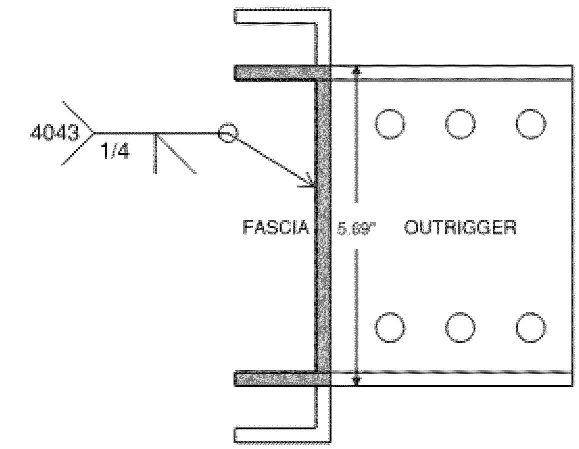
$$F_{sbV} := \frac{0.6 \cdot F_{tub}}{1.95} = 7384.62\ \text{psi} \qquad F_{swV} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

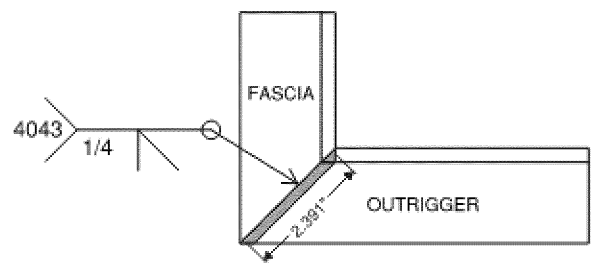
$$I_{wbm} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{sbT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{sbV} \cdot S_{w2}} + \frac{R_{yO}}{F_{sbV} \cdot A_w}\right)^2} = 0.25$$

$$I_{wf} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{swT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{swV} \cdot S_{w2}} + \frac{R_{yO}}{F_{swV} \cdot A_w}\right)^2} = 0.29$$

$I_w := \text{Max}(I_{wbm}, I_{wf}) = 0.29$

***Use 1/4" Bevel Groove Welds***
*Full perimeter of outrigger channel to attach outrigger channel to anchor channel.*
*(4043 Filler)*




## *Check Front Reinforcing Plate:*

$t_{Rp} := 0.5\ \text{in}$

$$P_w := \frac{M_x}{5.1937\ \text{in}} = 1854.06\ \text{lbf}$$

$M_{wkRp} := P_w \cdot 2.1746\ \text{in} = 4031.83\ \text{lbf·in}$

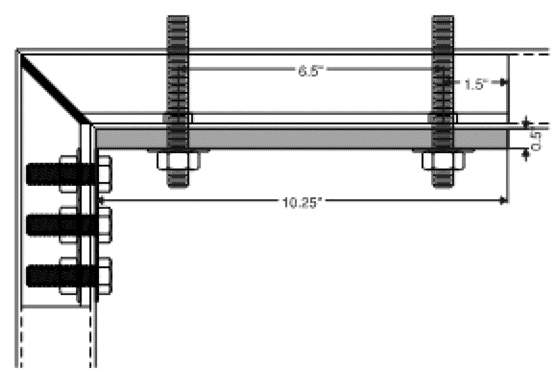
$S_{yRp} := \left((t_{Rp})^2 \cdot 0.85 \cdot 7.5\ \text{in}\right) \div (6) = 0.27\ \text{in}^3$

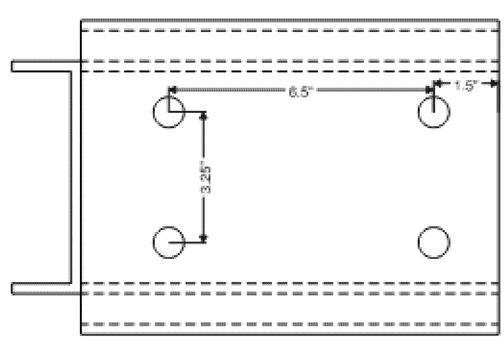
$f_{wkRp} := (M_{wkRp}) \div (S_{yRp}) = 15178.65\ \text{psi}$

$F_{bwkRp} := 31800\ \text{psi}$

$I_{Rp} := (f_{wkRp}) \div (F_{bwkRp}) = 0.48$

***Use 7-1/2" x 10-1/4" 1/2" thk Rein. Plate***
*(6061-T6)*




$ANCHOR\_BRACKET\_WELDS = \begin{bmatrix} \text{"0.25 ≤ 1.00 ∴ PASS"} \\ \text{"0.29 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

$REINFORCING\_PLATE = [\text{"0.48 ≤ 1.00 ∴ PASS"}]$

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 2.14
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

***Check Thru-Bolt Anchors (Wood Blocking):***

☐ Brick Fascia Present

$n_a := 4$

$V_a := \frac{R_{yO} \cdot 9.6\ in}{0.5 \cdot n_a \cdot 6.5\ in} + \frac{R_{fdl}}{n_a} = 275.27\ lbf$

$T_a := 2123.06\ lbf$

***Pipe Sleeve Data:***

$OD := 1.05\ in$

$t_{sleeve} := 0.154\ in$

***Washer Data:***

$b_{wp} := 2.5\ in$ $t_{wp} := 0.25\ in$

$d_{wp} := 2.5\ in$ $F_{ywp} := 36\ ksi$

***Substrate Data:***

$t_p := t_{Rp}$

$e_s := 4.5\ in$

$l_m := 4.5\ in$

$G := 0.42$

$F_c := 425\ psi$

Anchor Diameter: 5/8"

Anchor Type: Thru-Bolt

$F_u := 120\ ksi$

$F_{es} := 43000\ psi$

$\Omega_{tb} := 2.5$

$C_M := 1.0$
$C_t := 1.0$
$C_g := 1.0$
$C_\Delta := 1.0$
$C_{eg} := 1.0$
$C_{di} := 1.0$
$C_D := 1.15$

***Wood Allowables:***

***Shear:***

$Z_{Im} = 1013.68\ lbf$ $Z_{IIIm} = 669.4\ lbf$

$Z_{Is} = 2208.13\ lbf$ $Z_{IIIs} = 623.63\ lbf$

$Z_{II} = 517.19\ lbf$ $Z_{IV} = 745.84\ lbf$

$Z_1 := \text{Min}\left(Z_{Im}, Z_{Is}, Z_{II}, Z_{IIIm}, Z_{IIIs}, Z_{IV}\right) = 517.19\ lbf$

$V_{wood} := Z_1 \cdot C_D \cdot C_M \cdot C_t \cdot C_g \cdot C_\Delta \cdot C_{eg} \cdot C_{di} = 594.77\ lbf$

$R_\alpha := \sqrt{T_a^2 + V_a^2} = 2140.83\ lbf$

$\alpha := \text{atan}\left(\frac{T_a}{V_a}\right) = 82.61\ deg$

$Z_\alpha := \frac{W' \cdot V_{wood}}{W' \cdot (\cos(\alpha))^2 + V_{wood} \cdot (\sin(\alpha))^2} = 1356.35\ lbf$

***Tension:***

$W' = 1386.19\ lbf$

$T_{wood} = \text{"N/A"}$

***Bolt Allowables:***

$V_{bolt} := \frac{F_u}{\Omega_{tb} \cdot \sqrt{3}} \cdot A_r = 5739.61\ lbf$

$T_{bolt} := \frac{F_u}{\Omega_{tb}} \cdot A_S = 10848.08\ lbf$

***Required Washer Minimums:***

$F_{bwp} := 0.75 \cdot F_{ywp} = 27000\ psi$

$A_{wreq} := \frac{T_a}{C_D \cdot F_c} = 4.34\ in^2$

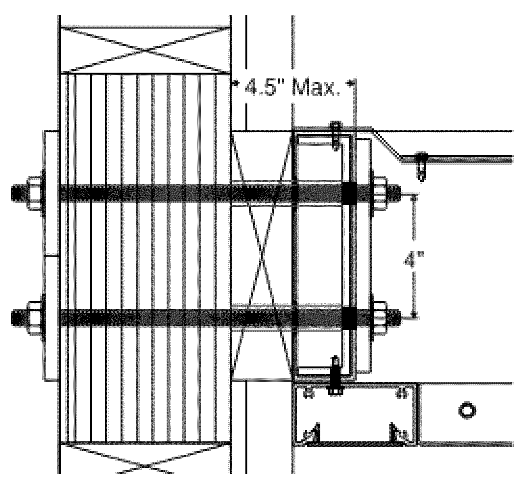
$b_{wpmin} := \sqrt{A_{wreq}} = 2.08\ in$

$d_{wpmin} := b_{wpmin} = 2.08\ in$

$t_{wpmin} := \sqrt{\frac{T_a \cdot b_{wpmin} \cdot 6}{F_{bwp} \cdot 8 \cdot d_{wpmin}}} = 0.24\ in$

***Check Bolt Bending:***

| "Thru-Bolt" | | "Pipe Sleeve" | |
|---|---|---|---|
| 401.85 lbf in | "Mb" | 836.86 lbf in | "Mbs" |
| 16765.99 $\frac{lbf}{in^2}$ | "fb" | 9809.84 $\frac{lbf}{in^2}$ | "fbs" |
| 69000 $\frac{lbf}{in^2}$ | "Fb" | 22500 $\frac{lbf}{in^2}$ | "Fbs" |
| 0.06 in | "Space" | 0.44 | "Int." |
| 0.24 | "Bend Int." | | |
| 0.94 | "Space Int." | | |




***Use 1.05" O.D. x 0.154" Thick SCH. 80 Pipe Sleeves***
*(300 Series SS, Fy = 30 ksi Min.)*

***Use (4) 0.625"-11 HD Galvanized Steel Thru-Bolts***
***(Grade 5, Fy = 92,000 psi, Fu = 120,000 psi)***
***w/ 2.5" x 2.5" x 0.250" A36 Steel Backer Plates***
*2.5" min. edge dist. 2.5" min. end distance.*
*(3) layers of Spruce Pine-Fir (S.G. = 0.42 MIN.) wood blocking or stronger.*
*Wood blocking by others not by Rice Engineering, Inc.*

THRU_BOLT_ANCHORS = "PASS"

## Loading Information:

| | |
|---|---|
| $DL_{dn} := 49\ psf$ | *worst case downward load* |
| $LC6 := 29.49\ psf$ | *load case 6 w/o drift* |
| $DL_{up} := 6\ psf$ | *uplift load* |
| $WL_{Lat} := 10\ psf$ | *lateral wind load* |
| $DeadL := 6.54\ psf$ | *dead load* |
| $S_b := 21\ psf$ | *balanced snow load* |
| $P_{d1} := 41.4\ psf$ | *snow drift (at wall)* |
| $P_{d2} := 0\ psf$ | *snow drift (at front fascia)* |

## System Information:

☑ Standalone ☐ Soffit Panel

| | |
|---|---|
| $L_c := 80\ in$ | *canopy length* |
| $Proj := 48\ in$ | *canopy projection* |

## Member Section Information:

**Top Panel:**

| | |
|---|---|
| $t_p := 0.1\ in$ | *panel thickness* |

**Panel Stiffener:**

| | |
|---|---|
| $b_s := 1\ in$ | *stiffener width* |
| $d_s := 1\ in$ | *stiffener depth* |
| $t_s := 0.125\ in$ | *stiffener thickness* |

**Front Fascia:**

| | |
|---|---|
| $b_{ff} := 2\ in$ | *front fascia width* |
| $d_{ff} := 8\ in$ | *front fascia depth* |
| $t_{ff} := 0.125\ in$ | *front fascia thickness* |

**Rear Fascia:**

| | |
|---|---|
| $b_{rf} := 2\ in$ | *rear fascia width* |
| $d_{rf} := 8\ in$ | *rear fascia depth* |
| $t_{rf} := 0.125\ in$ | *rear fascia thickness* |

**End Outrigger:**

| | |
|---|---|
| $b_{eo} := 2\ in$ | *end outrigger width* |
| $d_{eo} := 8\ in$ | *end outrigger depth* |
| $t_{eo} := 0.125\ in$ | *end outrigger thickness* |

**Intermediate Outrigger:**

| | |
|---|---|
| $b_{io} := 2\ in$ | *intermediate outrigger width* |
| $d_{io} := 6\ in$ | *intermediate outrigger depth* |
| $t_{io} := 0.125\ in$ | *intermediate outrigger thickness* |

**Anchor Channel Bracket:**

| | |
|---|---|
| $b_{cb} := 1.6913\ in$ | *anchor channel flange length* |
| $d_{cb} := 5.6937\ in$ | *anchor channel depth* |
| $t_{cb} := 0.25\ in$ | *anchor channel thickness* |

$W_{upASD} = 9.92\ psf$

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**REI Project #** R25-01-042

**Description:** 48" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.01
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

### *36" Projection System:*

$L_c = 80$ in  $DL_{dn} = 49$ psf
$Proj = 48$ in  $DL_{up} = 6$ psf
$t_p = 0.1$ in  $q := \text{Max}\left(DL_{dn}, DL_{up}\right) = 49$ psf
$L_{eff} := 1$ in

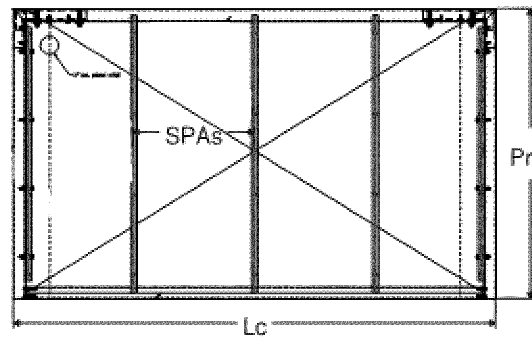
L/60 Panel Deflection Criteria

$SPA_s := 25$ in Panel Stiffener Spacing

**Number of Intermediate Stiffeners**:

○ 1 Int. Stiffener
◉ 2 Int. Stiffeners
○ 3 Int. Stiffeners
○ 4 Int. Stiffeners
○ 5 Int. Stiffeners

***Standalone Reference:***




### *Check Panel:*

$coef_q := [\ 0\ 12.5\ 25\ 50\ 75\ 100\ 125\ 150\ 175\ 200\ 250\ ]$

$coef_y := [\ 0\ 0.7\ 0.95\ 1.24\ 1.44\ 1.6\ 1.72\ 1.84\ 1.94\ 2.03\ 2.2\ ]$

$coef_{\sigma d} := [\ 0\ 1.29\ 2.4\ 4.15\ 5.61\ 6.91\ 8.1\ 9.21\ 10.1\ 10.9\ 12.2\ ]$

$coef_{\sigma} := [\ 0\ 4.87\ 7.16\ 10.3\ 12.6\ 14.6\ 16.4\ 18\ 19.4\ 20.9\ 23.6\ ]$

$\sigma_{all} := 8205.13$ psi - Allowable Stress, used for Design

$y_{all} := 0.42$ in - Allowable Deflection

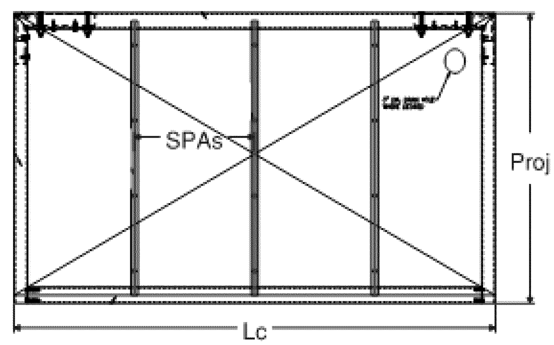
The relations among load, deflection and stress are expressed by numerical values of the dimensionless coefficients shown below (It is assumed that v is equal to or near 0.316):

$$coef_q = \frac{q_{adj} \cdot b^4}{E \cdot t^4} \qquad coef_y = \frac{y}{t}$$

$$coef_{\sigma d} = \frac{\sigma_d \cdot b^2}{E \cdot t^2} \qquad coef_{\sigma} = \frac{\sigma \cdot b^2}{E \cdot t^2}$$

The collected data for these coefficients is listed below. For any given value of qb⁴/Et⁴, values for the other three coefficients may be interpolated.

***Multi-Span Reference:***




$$y_{act} = \text{linterp}\left(coef_q, coef_y, \frac{q \cdot b^4}{E \cdot t_{.1}^4}\right) \cdot t_{.1} \cdot 1.5$$

$y_{act} := 0.26$ in
$y_{all} = 0.42$ in

$$\sigma_d := \text{linterp}\left(coef_q, coef_{\sigma d}, \frac{q \cdot \left(SPA_s\right)^4}{E_{alum} \cdot t_p^4}\right) \cdot \left(\frac{E_{alum} \cdot t_p^2}{\left(SPA_s\right)^2}\right)$$

$\sigma_d = 1356.35$ psi
$\sigma_{all} = 8205$ psi

$$\sigma := \left(\text{linterp}\left(coef_q, coef_{\sigma}, \frac{q \cdot \left(SPA_s\right)^4}{E_{alum} \cdot t_p^4}\right) \cdot \frac{E_{alum} \cdot t_p^2}{\left(SPA_s\right)^2}\right)$$

$\sigma = 2718.55$ psi
$\sigma_{all} = 8205$ psi

***Using L / 60 Deflection Limit:***
***Use 0.100 " Thick***
***Panel Type = 1100−H14 Aluminum***
***Maximum Span = 25.00"***

$PANEL := \text{stack}\left(I_{\Delta}, I_{\sigma d}, I_{\sigma}\right) =$

| |
|---|
| "0.63 ≤ 1.00 ∴ PASS" |
| "0.17 ≤ 1.00 ∴ PASS" |
| "0.33 ≤ 1.00 ∴ PASS" |

RICE ENGINEERING
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

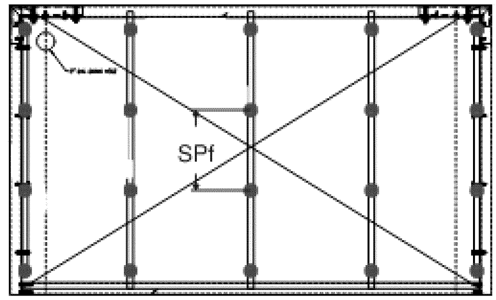

**REI Project #** R25-01-042

**Description:** 48" Typical System

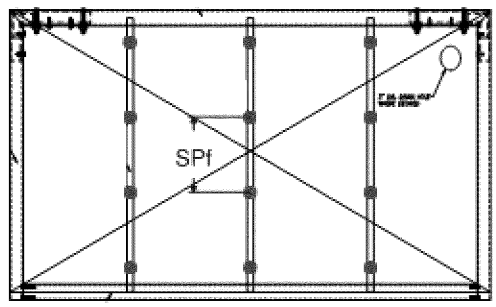
**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.02
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

***Standalone Reference:***




***Multi-Span Reference:***




***Check Panel Fasteners (to Stiffener):***

***Fastener Type:*** #12-14 (Cond. CW)

***Stiffener Material:*** 6061-T6

$D_{ws} := 0.305\ in$ $SP_f := 12\ in$ $d_e := 0.5\ in$ $t_s = 0.125\ in$

***Shear Allowables:***

$V_{bearstiffener} := 684\ lbf$
$V_{bearpanel} := 230.4\ lbf$
$V_{fast} := 373\ lbf$
$V_{fall} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutstiffener} := 378\ lbf$
$T_{povrpanel} := 221.67\ lbf$
$T_{fast} := 645\ lbf$
$T_{fall} := 221.67\ lbf$

$w_{dl} := q \cdot SPA_s = 8.51\ pli$

$T_f := 1.25 \cdot w_{dl} \cdot SP_f = 127.6\ lbf$

$$I_f := \frac{T_f}{T_{fall}} = 0.58$$

***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to stiffener as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into stiffener on load bearing length of fastener per manufacturer specifications.*

***Check Panel Fasteners (to Outriggers):***

***Fastener Type:*** #12-14 (Cond. CW)

***Outrigger Material:*** 6005-T5

$D_{ws1} := 0.305\ in$ $SP_{f1} := 12\ in$ $d_{e1} := 0.5\ in$ $t_{io} = 0.12\ in$

***Shear Allowables:***

$V_{bearoutrigger} := 684\ lbf$
$V_{bearpanel1} := 230.4\ lbf$
$V_{fast1} := 373\ lbf$
$V_{fall1} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutoutrigger} := 378\ lbf$
$T_{povrpanel1} := 221.67\ lbf$
$T_{fast1} := 645\ lbf$
$T_{fall1} := 221.67\ lbf$

$w_{dl1} := q \cdot 0.5 \cdot SPA_s = 4.25\ pli$

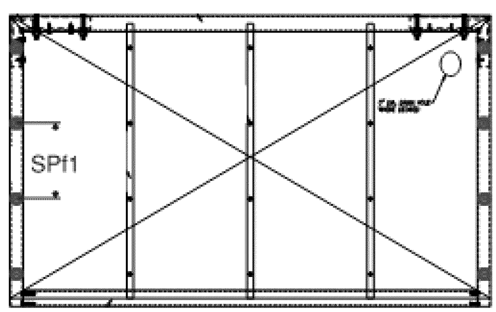
$T_{f1} := 1.25 \cdot w_{dl1} \cdot SP_{f1} = 63.8\ lbf$

$$I_{f1} := \frac{T_{f1}}{T_{fall1}} = 0.29$$

***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to outrigger as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into outrigger on load bearing length of fastener per manufacturer specifications.*

***** Multi-span systems only *****

***Multi-Span Reference:***



### *Check Panel Fasteners (to Front/Rear Fascia):*

***Fastener Type:*** #12-14 (Cond. CW)

***Fascia Material:*** 6005-T5

$D_{ws2} := 0.305\ in$ $SP_{f2} := 12\ in$ $d_{e2} := 0.5\ in$ $t_f := 0.125\ in$

***Shear Allowables:***

$V_{bearfascia} := 684\ lbf$
$V_{bearpanel2} := 230.4\ lbf$
$V_{fast2} := 373\ lbf$
$V_{fall12} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutfascia} := 378\ lbf$
$T_{povrpanel2} := 241.5\ lbf$
$T_{fast2} := 645\ lbf$
$T_{fall2} := 241.5\ lbf$

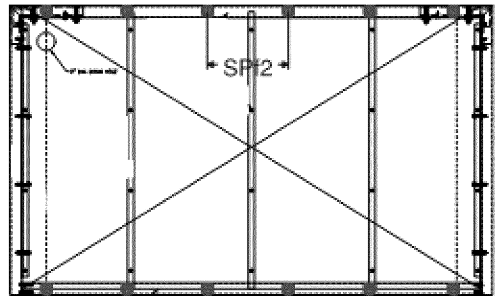
$w_{dl2} := q \cdot 0.5 \cdot SPA_s = 4.25\ pli$

$T_{f2} := 1.25 \cdot w_{dl2} \cdot SP_{f2} = 63.8\ lbf$

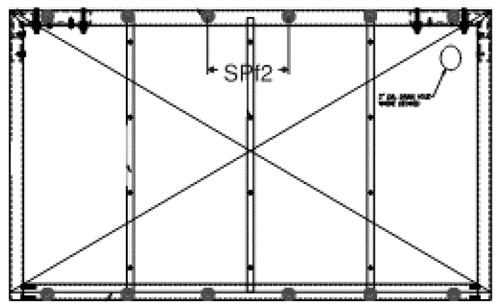
$$I_{f2} := \frac{T_{f2}}{T_{fall2}} = 0.26$$

***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to front/rear fascia as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into outrigger on load bearing length of fastener per manufacturer specifications.*

***Standalone Reference:***




***Multi-Span Reference:***




$$PANEL\_FASTENERS := stack(I_f, I_{f1}, I_{f2}) = \begin{bmatrix} \text{"0.58 ≤ 1.00 ∴ PASS"} \\ \text{"0.29 ≤ 1.00 ∴ PASS"} \\ \text{"0.26 ≤ 1.00 ∴ PASS"} \end{bmatrix}$$

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## PANEL STIFFENER

### System Data:

$Proj = 48$ in
$DL_{dn} = 49$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 25$ in

### Fascia Data:

$t_f := Min(t_{ff}, t_{rf}) = 0.12$ in

### Stiffener Data:

$b := b_s = 1$ in
$d := d_s = 1$ in
$t := t_s = 0.12$ in
$L := Proj - 4\ in = 44$ in
$L_b := L$
$E_{alum} = 10100000$ psi

### Outrigger Material:

6005-T5

$d_e := 0.5$ in  $t_o := t_{eo} = 0.12$ in

### Section Properties:

$I_{x1} = 0.06\ in^4$  $A_1 = 0.44\ in^2$
$I_{y1} = 0.06\ in^4$  $J_1 = 0.08\ in^4$
$S_{x1} = 0.11\ in^3$  $Z_{x1} = 0.14\ in^3$
$S_{y1} = 0.11\ in^3$  $Z_{y1} = 0.14\ in^3$

### Stiffener Shape:

Rectangular Tube

### Stiffener Material:

6061-T6

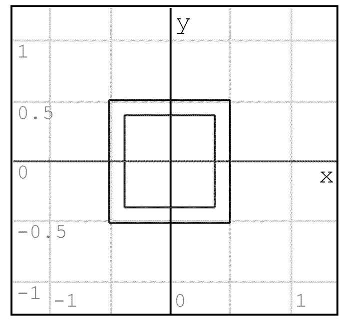
### Fascia Material:

6005-T5

## CALCULATIONS

$a = 12.5$ in
$TL := Max(DL_{dn}, DL_{up}) = 49$ psf
$w_x := TL \cdot SPA_s = 8.51$ pli

$R_{sRLC3} := 149.2$ lbf  *LC3 stiffener reaction (rear fascia)*
$R_{sFLC3} := 114.61$ lbf  *LC3 stiffener reaction (front fascia)*
$R_{sLC6} := 80.64$ lbf  *LC6 stiffener reaction*




### Check Panel Stiffener:

$M_x := 1837.15$ lbf·in
$f_{bx} := (M_x) \div (S_{x1}) = 16125$ psi
$F_{bx} := 21212.12$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.76$

$\Delta_x := 0.63$ in
$\Delta_{xall} := (L) \div (60) = 0.73$ in

$I_\Delta := (\Delta_x) \div (\Delta_{xall}) = 0.86$

### Check Stiffener Bearing on Fascia:

$R_{bear} := Max(R_{sRLC3}, R_{sFLC3}, R_{sLC6}) = 149.2$ lbf

$A_{bear} := b_s \cdot Min(t_{ff}, t_{rf}) = 0.12\ in^2$

$$R_{ball} := \frac{1.33 \cdot ADM\_F_{tu}(alloy_3, 0) \cdot A_{bear}}{1.95} = 3239.74\ lbf$$

$I_{bear} := (R_{bear}) \div (R_{ball}) = 0.05$

**Use 1" x 1" x 1/8" thk @ 25.00" o.c.**
*AL. tube as shown (6061-T6)*

### Check Fasteners (to Outrigger):

**Fastener Type:** 1/4-14" (Cond. CW)

$SP_f := 12$ in
$D_{ws} := 0.428$ in

$V_f := 1.25 \cdot 0.5 \cdot w_x \cdot SP_f = 63.8$ lbf

$$T_f := \frac{V_f \cdot 0.5 \cdot b}{0.5 \cdot d} = 63.8\ lbf$$

**Shear Allowables:**

$V_{bearstiffener} := 791.67$ lbf
$V_{bearoutrigger} := 791.67$ lbf
$V_{fast} := 517$ lbf
$V_{fall} := 517$ lbf

**Tension Allowables:**

$T_{povrstiffener} := 934.06$ lbf
$T_{poutoutrigger} := 437.5$ lbf
$T_{fast} := 896$ lbf
$T_{fall} := 437.5$ lbf

$$I_f := \left(\frac{V_f}{V_{fall}}\right)^2 + \left(\frac{T_f}{T_{fall}}\right)^2 = 0.04$$

### Check Fastener Tilting (to Outrigger):

$$R_{tilt} := \frac{4.2 \cdot \sqrt{\left(t_{eo}^{\ 3} \cdot Dia_{b1}\right)} \cdot ADM\_F_{tu}(alloy_3, 0)}{3} = 1175.57\ lbf$$

$I_{tilt} := (V_f) \div (R_{tilt}) = 0.05$

**Use 1/4-14 S.S. Fasteners**
**12" o.c. max.** *to attach stiffener to outrigger as shown*
*300 Series (Fy = 65,000 psi)*

***** Standalone systems only *****

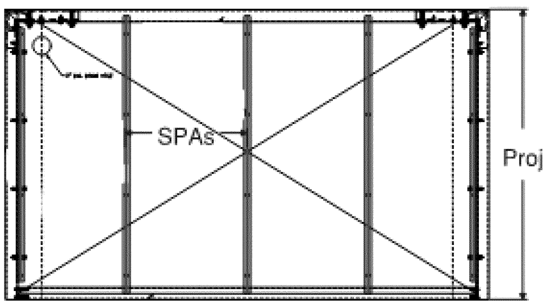
$STIFFENER = \begin{bmatrix} "0.76 \le 1.00\ \therefore\ PASS" \\ "0.86 \le 1.00\ \therefore\ PASS" \end{bmatrix}$

$BEARING = "0.05 \le 1.00\ \therefore\ PASS"$

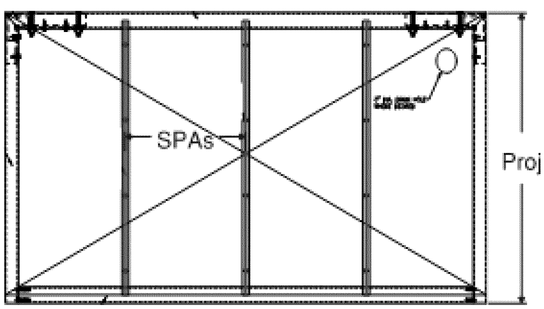
$FASTENERS = \begin{bmatrix} "0.04 \le 1.00\ \therefore\ PASS" \\ "0.05 \le 1.00\ \therefore\ PASS" \end{bmatrix}$

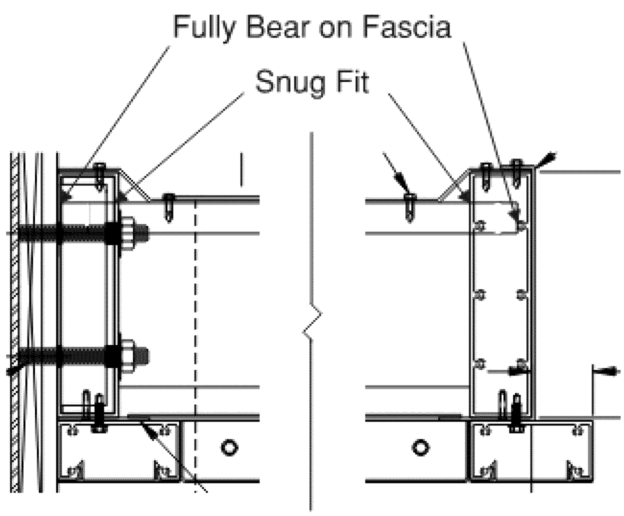
***Use 1" x 1" x 1/8" thk @* 25.00*" o.c.***
*AL. tube as shown (6061-T6)*

***Standalone Reference:***




***Multi-Span Reference:***

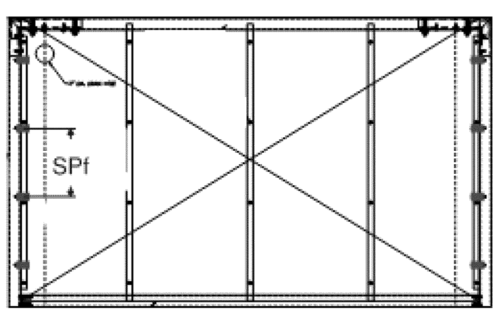



***Use 1/4-14 S.S. Fasteners***
***12" o.c. max.** to attach stiffener to outrigger as shown*
*300 Series (Fy = 65,000 psi)*

***** Standalone systems only *****

***Standalone Reference:***



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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 48" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.06
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## FRONT FASCIA

**System Data:**

$Proj = 48$ in
$DL_{dn} = 49$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 25$ in
$N_{int} := n_{stiffeners} = 2$
$w_y := WL_{Lat} \cdot d = 0.56$ pli

**Front Fascia Data:**

$b := b_{ff} = 2$ in    $L := L_c - 4\text{ in} = 76$ in
$d := d_{ff} = 8$ in    $L_b := L$
$t := t_{ff} = 0.12$ in    $E_{alum} = 10100000$ psi

☑ Welded within 1 inch of Mmax

**Outrigger Data:**

$d_e := 0.3515$ in    $t_o := \text{Min}(t_{io}, t_{eo}) = 0.12$ in
$I_{yio} := 1.432\text{ in}^4$ intermediate outrigger
$I_{yeo} := I_{y1} = 1.87\text{ in}^4$ end outrigger

**Section Properties:**

$I_{x1} = 17.45\text{ in}^4$    $A_1 = 2.44\text{ in}^2$
$I_{y1} = 1.87\text{ in}^4$    $J_1 = 5.59\text{ in}^4$
$S_{x1} = 4.36\text{ in}^3$    $Z_{x1} = 5.72\text{ in}^3$
$S_{y1} = 1.87\text{ in}^3$    $Z_{y1} = 2.07\text{ in}^3$

**Front Fascia Shape:** Rectangular Tube
**Front Fascia Material:** 6005A-T5
**Outrigger Material:** 6005-T5

## CALCULATIONS

$a = 12.5$ in
$TL := \text{Max}(DL_{dn}, DL_{up}) = 49$ psf
$w_x := TL \cdot SPA_s = 8.51$ pli
$w_y := WL_{Lat} \cdot d = 0.56$ pli

$R_{sFLC3} = 114.61$ lbf
$R_{sLC6} = 80.64$ lbf

**Check Front Fascia:**

$j := 1$
while $j \cdot \frac{L}{N_{int}+1} < \frac{L}{2}$
  $x_j := j$
  $j := j + 1$

**Downward Load:**

$M_{xffLC3} := 4524.08\text{ lbf·in}$
$M_{xffLC6} := 3293.28\text{ lbf·in}$
$M_x := \text{Max}(M_{xffLC3}, M_{xffLC6}) = 4524.08\text{ lbf·in}$
$f_{bx} := (M_x) \div (S_{x1}) = 1037$ psi

$F_{bx} := 7878.79$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.13$

$\Delta_x := 0.02$ in
$\Delta_{xall} := (L) \div (120) = 0.63$ in

$I_{\Delta x} := (\Delta_x) \div (\Delta_{xall}) = 0.02$

**Lateral Wind Load:**

$M_{yFL} := 232.8\text{ lbf·in}$ Wind load applied to fascia

$M_{yOL} := 342.86\text{ lbf·in}$ Wind load applied to outrigger

$f_{by} := (\text{Max}(M_{yFL}, M_{yOL})) \div (S_{y1}) = 183.14$ psi

$F_{by} := 5005.79$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.04$

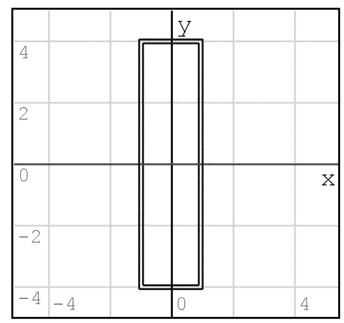
$\Delta_y := 0.0026$ in
$\Delta_{yall} := (L) \div (120) = 0.63$ in

$I_{\Delta y'} := (\Delta_y) \div (\Delta_{yall}) = 0$

**Use 2" x 8" x 1/8" thk Front Fascia**
AL. tube as shown (6005A-T5)

**Check Fasteners (to Outrigger):**

**Fastener Type:** #10-16 (Cond. CW)    $n_f := 4$    $D_{ws} := 0.305$ in




**Shear Allowables:**

$V_{bearfascia} := 351.5$ lbf
$V_{bearoutrigger} := 556.54$ lbf
$V_{fast} := 275$ lbf
$V_{fall} := 275$ lbf

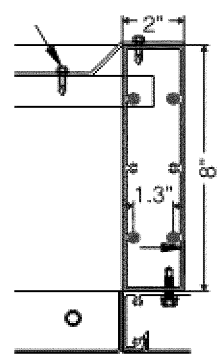
**Tension Allowables:**

$T_{povroutrigger} := 665.63$ lbf
$T_{poutfascia} := 436.21$ lbf
$T_{fast} := 477$ lbf
$T_{fall} := 436.21$ lbf

**Downward Load:**

$R_{ffdlLC3} := 199.91$ lbf
$R_{ffdlLC6} := 146.45$ lbf
$R_{ffdl} := \text{Max}(R_{ffdlLC3}, R_{ffdlLC6}) = 199.91$ lbf
$V_{fdl} := (R_{ffdl}) \div (n_f) = 49.98$ lbf

$I_{fdl} := (V_{fdl}) \div (V_{fall}) = 0.18$




**Lateral Wind Load (Z):**

$R_{fwlz} := (w_y \cdot L) \div (2) = 21.11$ lbf
$V_{fwlz} := (R_{fwlz}) \div (n_f) = 5.28$ lbf

$I_{fwlz} := (V_{fwlz}) \div (V_{fall}) = 0.02$

**Lateral Wind Load (X):**

$$T_{fwlx} := \frac{\text{Max}(R_{xLAT}[3..4]\,1)}{n_f} + \frac{\text{Max}(M_{yLAT1}[3..4]\,1)}{0.5 \cdot n_f \cdot 1.2969\text{ in}} = 137.06\text{ lbf}$$

$I_{fwlx} := (T_{fwlx}) \div (T_{fall}) = 0.31$

**Use (4) #10 S.S. Fasteners**
*to attach front fascia to outrigger as shown*
*5/8" min. thread engagement into fascia screw chase*
*300 Series (Fy = 65,000 psi)*

$FRONT\_FASCIA = \begin{bmatrix} \text{"0.13 ≤ 1.00 ∴ PASS"} \\ \text{"0.02 ≤ 1.00 ∴ PASS"} \\ \text{"0.04 ≤ 1.00 ∴ PASS"} \\ \text{"0 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

$FASTENERS = \begin{bmatrix} \text{"0.18 ≤ 1.00 ∴ PASS"} \\ \text{"0.02 ≤ 1.00 ∴ PASS"} \\ \text{"0.31 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 48" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.07
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## END OUTRIGGER

**System Data:**

$L_c = 80$ in
$DL_{dn} = 49$ psf
$LC6 = 29.49$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$DeadL = 6.54$ psf
$SPA_s = 25$ in

**Outrigger Data:**

$b := b_{eo} = 2$ in  $L := Proj = 48$ in
$d := d_{eo} = 8$ in  $L_b := L$
$t := t_{eo} = 0.12$ in  $E_{alum} = 10100000$ psi

**Drift Data:**

$S_b = 21$ psf
$P_{d1} = 41.4$ psf
$P_{d2} = 0$ psf

☐ Welded within 1 inch of Mmax

**Section Properties:**

$I_{x1} = 12.6$ in⁴  $A_1 = 1.47$ in²
$I_{y1} = 0.46$ in⁴  $J_1 = 0.01$ in⁴
$S_{x1} = 3.15$ in³  $Z_{x1} = 3.85$ in³
$S_{y1} = 0.28$ in³  $Z_{y1} = 0.22$ in³

**Outrigger Shape:** Channel

**Outrigger Material:** 6005-T5

$I_{yio} := I_{y1} = 0.46$ in⁴ end outrigger
$I_{yeo} := 1.8721$ in$^4$ end outrigger
$w_y := WL_{Lat} \cdot d = 0.56$ pli

## CALCULATIONS

$TW := 15$ in

**Check End Outrigger:**

**LC3 Drift Dist. Loads:**

$w_{owall2wayLC3} := (2 \cdot P_{dO1} + S_b + DeadL) \cdot a = 7.33$ pli
$w_{omiddrift} := P_{dO1} \cdot a = 2.47$ pli
$w_{omiduniLC3} := (P_{dO2} + S_b + DeadL) \cdot a = 3.51$ pli
$w_{oend2wayLC3} := (P_{dO2} + S_b + DeadL) \cdot a = 3.51$ pli
$w_{owallb} := P_{d1} \cdot b = 0.57$ pli
$w_{ounib} := (S_b + DeadL) \cdot b = 0.38$ pli
$w_{owall1wayLC3} := P_{d1} \cdot TW = 4.31$ pli
$w_{ouniLC3} := (S_b + DeadL) \cdot TW = 2.87$ pli

**LC3 Point Loads:**

$F_{wall2wayLC3} := \frac{1}{2} \cdot a \cdot w_{owall2wayLC3} = 45.83$ lbf
$F_{middrift} := \frac{1}{2} \cdot (L - 2 \cdot TW) \cdot w_{omiddrift} = 22.24$ lbf
$F_{miduniLC3} := (L - 2 \cdot TW) \cdot (P_{dO2} + S_b + DeadL) \cdot a = 63.25$ lbf
$F_{end2wayLC3} := \frac{1}{2} \cdot a \cdot w_{oend2wayLC3} = 21.96$ lbf
$F_{wallb} := \frac{1}{2} \cdot L \cdot w_{owallb} = 13.8$ lbf
$F_{unib} := L \cdot w_{ounib} = 18.36$ lbf
$F_{wall1wayLC3} := \frac{1}{2} \cdot L \cdot w_{owall1wayLC3} = 103.5$ lbf
$F_{uniLC3} := L \cdot w_{ouniLC3} = 137.7$ lbf

$R_{ffdlLC3} = 199.91$ lbf

$R_{yOLC3} := 385.33$ lbf ***vertical rxn @ thru-bolts***

**LC3 Strong Axis Moment:**

$M_{xOLC3} := 13534.54$ lbf·in

$f_{bxLC3} := (M_{xOLC3}) \div (S_{x1}) = 4296$ psi

$I_{bxLC3} := (f_{bxLC3}) \div (F_{bx}) = 0.53$

**LC3 Strong Axis Deflection:**

$\Delta_{xLC3} := 0.1$ in

$I_{\Delta xLC3} := (\Delta_{xLC3}) \div (\Delta_{xall}) = 0.13$

**LC6 Uniform Dist. Load:**

$w_{LC6uni} := LC6 \cdot TW = 3.07$ pli

**LC6 Point Load:**

$F_{wall2wayLC6} := \frac{1}{2} \cdot TW \cdot w_{LC6uni} = 23.04$ lbf
$F_{miduniLC6} := (L - 2 \cdot TW) \cdot w_{LC6uni} = 55.29$ lbf
$F_{end2wayLC6} := \frac{1}{2} \cdot TW \cdot w_{LC6uni} = 23.04$ lbf
$R_{ffdlLC6} = 146.45$ lbf

$R_{yOLC6} := 247.82$ lbf ***vertical rxn @ thru-bolts***

**LC6 Strong Axis Moment:**

$M_{xOLC6} := 9462.6$ lbf·in

$f_{bxLC6} := (M_{xOLC6}) \div (S_{x1}) = 3004$ psi

$I_{bxLC6} := (f_{bxLC6}) \div (F_{bx}) = 0.37$

**LC6 Strong Axis Deflection:**

$\Delta_{xLC6} := 0.07$ in

$I_{\Delta xLC6} := (\Delta_{xLC6}) \div (\Delta_{xall}) = 0.09$

**Lateral Wind Load:**

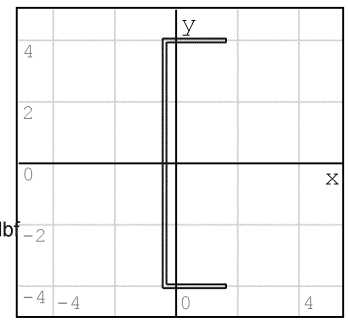
$M_{yOL} := 330.46$ lbf·in Wind load applied to outrigger
$M_{yFL} := 108.81$ lbf·in Wind load applied to fascia
$f_{by} := (\text{Max}(M_{yFL}, M_{yOL})) \div (S_{y1}) = 1168.26$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.13$

**Weak Axis Deflection:**

$\Delta_y := 0.0797$ in

$I_{\Delta y} := (\Delta_y) \div (\Delta_{yall}) = 0.1$




**Outrigger Allowables:**

$F_{bx} := 8093$ psi
$F_{by} := 9057.65$ psi
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.8$ in
$\Delta_{yall} := (2 \cdot L_b) \div (120) = 0.8$ in

**Use 2" x 8" x 1/8" thk End Outrigger**
*AL. tube as shown (6005-T5)*

END_OUTRIGGER =
"0.53 ≤ 1.00 ∴ PASS"
"0.37 ≤ 1.00 ∴ PASS"
"0.13 ≤ 1.00 ∴ PASS"
"0.13 ≤ 1.00 ∴ PASS"
"0.09 ≤ 1.00 ∴ PASS"
"0.1 ≤ 1.00 ∴ PASS"

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 48" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.08
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## INTERMEDIATE OUTRIGGER

**System Data:**

$L_c = 80$ in
$DL_{dn} = 49$ psf
$LC6 = 29.49$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$DeadL = 6.54$ psf
$SPA_s = 25$ in

**Outrigger Data:**

$b := b_{io} = 2$ in  $L := Proj = 48$ in
$d := d_{io} = 6$ in  $L_b := L$
$t := t_{io} = 0.12$ in  $E_{alum} = 10100000$ psi

**Drift Data:**

$S_b = 21$ psf
$P_{d1} = 41.4$ psf
$P_{d2} = 0$ psf

☐ Welded within 1 inch of Mmax

**Section Properties:**

$I_{x1} = 6.3$ in⁴  $A_1 = 1.22$ in²
$I_{y1} = 0.43$ in⁴  $J_1 = 0.01$ in⁴
$S_{x1} = 2.1$ in³  $Z_{x1} = 2.5$ in³
$S_{y1} = 0.27$ in³  $Z_{y1} = 0.41$ in³

**Outrigger Shape:** Channel

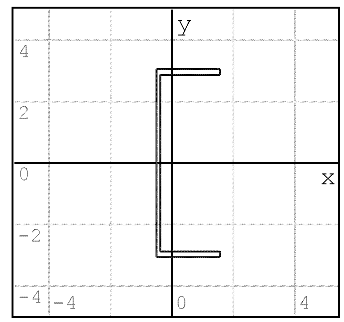
**Outrigger Material:** 6061-T6

$I_{yio} := I_{y1} = 0.43$ in⁴ intermediate outrigger
$I_{yeo} := 1.8721$ in$^4$ end outrigger
$w_y := WL_{Lat} \cdot d = 0.42$ pli

## CALCULATIONS

$TW = 15$ in

**Check Intermediate Outrigger:**




**LC3 Drift Dist. Loads:**

$w_{owall2wayLC3} = 7.33$ pli
$w_{omiddrift} = 2.47$ pli
$w_{omiduniLC3} = 3.51$ pli
$w_{oend2wayLC3} = 3.51$ pli
$w_{owallb} = 0.57$ pli
$w_{ounib} = 0.38$ pli
$w_{owall1wayLC3} = 4.31$ pli
$w_{ouniLC3} = 2.87$ pli

**LC3 Point Loads:**

$F_{wall2wayLC3} = 45.83$ lbf
$F_{middrift} = 22.24$ lbf
$F_{miduniLC3} = 63.25$ lbf
$F_{end2wayLC3} = 21.96$ lbf
$F_{wallb} = 13.8$ lbf
$F_{unib} = 18.36$ lbf
$F_{wall1wayLC3} = 103.5$ lbf
$F_{uniLC3} = 137.7$ lbf
$R_{ffdlLC3} = 199.91$ lbf

$R_{yOLC3} := 385.33$ lbf **vertical rxn @ thru-bolts**

**LC3 Strong Axis Moment:**

$M_{xOLC3} := 13534.54$ lbf·in

$f_{bxLC3} := (M_{xOLC3}) \div (S_{x1}) = 6450$ psi

$I_{bxLC3} := (f_{bxLC3}) \div (F_{bx}) = 0.74$

**LC3 Strong Axis Deflection:**

$\Delta_{xLC3} := 0.21$ in

$I_{\Delta xLC3} := (\Delta_{xLC3}) \div (\Delta_{xall}) = 0.26$

**LC6 Uniform Dist. Load:**

$w_{LC6uni} = 3.07$ pli

**LC6 Point Load:**

$F_{wall2wayLC6} = 23.04$ lbf
$F_{miduniLC6} = 55.29$ lbf
$F_{end2wayLC6} = 23.04$ lbf
$R_{ffdlLC6} = 146.45$ lbf

$R_{yOLC6} := 247.82$ lbf **vertical rxn @ thru-bolts**

**LC6 Strong Axis Moment:**

$M_{xOLC6} := 9462.6$ lbf·in

$f_{bxLC6} := (M_{xOLC6}) \div (S_{x1}) = 4509$ psi

$I_{bxLC6} := (f_{bxLC6}) \div (F_{bx}) = 0.52$

**LC6 Strong Axis Deflection:**

$\Delta_{xLC6} := 0.15$ in

$I_{\Delta xLC6} := (\Delta_{xLC6}) \div (\Delta_{xall}) = 0.19$

**Lateral Wind Load:**

$M_{yOL} := 247.38$ lbf·in Wind load applied to outrigger
$M_{yFL} := 82.34$ lbf·in Wind load applied to fascia

$f_{by} := (\text{Max}(M_{yFL}, M_{yOL})) \div (S_{y1}) = 900.15$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.07$

**Weak Axis Deflection:**

$\Delta_y := 0.0641$ in

$I_{\Delta y} := (\Delta_y) \div (\Delta_{yall}) = 0.08$

**Outrigger Allowables:**

$F_{bx} := 8748.53$ psi
$F_{by} := 12076.87$ psi
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.8$ in
$\Delta_{yall} := (2 \cdot L_b) \div (120) = 0.8$ in

**Use 2" x 6" x 1/8" thk Int. Outrigger**
*AL. tube as shown (6061-T6)*

INT_OUTRIGGER =

| |
|---|
| "0.74 ≤ 1.00 ∴ PASS" |
| "0.52 ≤ 1.00 ∴ PASS" |
| "0.07 ≤ 1.00 ∴ PASS" |
| "0.26 ≤ 1.00 ∴ PASS" |
| "0.19 ≤ 1.00 ∴ PASS" |
| "0.08 ≤ 1.00 ∴ PASS" |

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 48" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.09
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## REAR FASCIA

***System Data:***

$Proj = 48\ in$
$DL_{dn} = 49\ psf$
$DL_{up} = 6\ psf$
$WL_{Lat} = 10\ psf$
$SPA_s = 25\ in$
$N_{int} = 2$

***Rear Fascia Data:***

$b := b_{rf} = 2\ in$ $\quad L := L_c - 2\ in = 78\ in$
$d := d_{rf} = 8\ in$ $\quad L_b := L$
$t := t_{rf} = 0.12\ in$ $\quad E_{alum} = 10100000\ psi$

$R_{yOLC3} = 385.33\ lbf$ $\quad R_{yOLC6} = 247.82\ lbf$
$M_{xOLC3} = 13534.54\ lbf \cdot in$ $\quad M_{xOLC6} = 9462.6\ lbf \cdot in$

☑ Welded within 1 inch of Mmax

***Section Properties:***

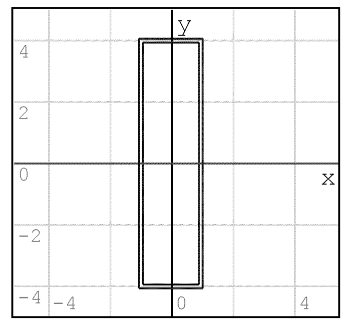
$I_{x1} = 17.45\ in^4$ $\quad A_1 = 2.44\ in^2$
$I_{y1} = 1.87\ in^4$ $\quad J_1 = 5.59\ in^4$
$S_{x1} = 4.36\ in^3$ $\quad Z_{x1} = 5.72\ in^3$
$S_{y1} = 1.87\ in^3$ $\quad Z_{y1} = 2.07\ in^3$

***Rear Fascia Shape:*** Rectangular Tube

***Rear Fascia Material:*** 6005-T5

## CALCULATIONS

$a = 12.5\ in$
$TL := \text{Max}(DL_{dn}, DL_{up}) = 49\ psf$
$w_x := TL \cdot SPA_s = 8.51\ pli$
$w_y := WL_{Lat} \cdot d = 0.56\ pli$




***Check Rear Fascia:***

$j := 1$
while $j \cdot \frac{L}{N_{int} + 1} < \frac{L}{2}$
$\quad x_j := j$
$\quad j := j + 1$

***Downward Load:***

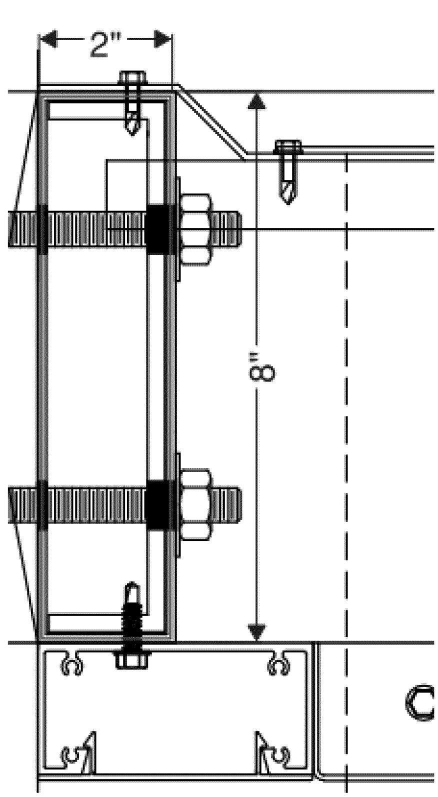
$R_{rfdlLC3} := 274.26\ lbf$ Rear fascia vertical rxn @ anchors (LC3)
$R_{rfdlLC6} := 144.61\ lbf$ Rear fascia vertical rxn @ anchors (LC6)
$M_{xrfLC3} := 6444.45\ lbf \cdot in$
$M_{xrfLC6} := 3408.8\ lbf \cdot in$
$M_x := \text{Max}(M_{xrfLC3}, M_{xrfLC6}) = 6444.45\ lbf \cdot in$
$f_{bx} := (M_x) \div (S_{x1}) = 1477\ psi$

$F_{bx} := 7878.79\ psi$

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.19$

$\Delta_x := 0.02\ in$
$\Delta_{xall} := (L) \div (120) = 0.65\ in$

$I_{\Delta x} := (\Delta_x) \div (\Delta_{xall}) = 0.04$




***Torsion Due to Outrigger:***

$Tor_{rf} := 15172.21\ lbf \cdot in$

$$\tau_{rf} := \frac{Tor_{rf}}{2 \cdot t \cdot (b - t) \cdot (d - t)} = 4110.14\ psi$$

$F_\tau := 7483.08\ psi$

$I_\tau := (\tau_{rf}) \div (F_\tau) = 0.55$

***Use 2" x 8" x 1/8" thk Rear Fascia***
*AL. tube as shown (6005-T5)*

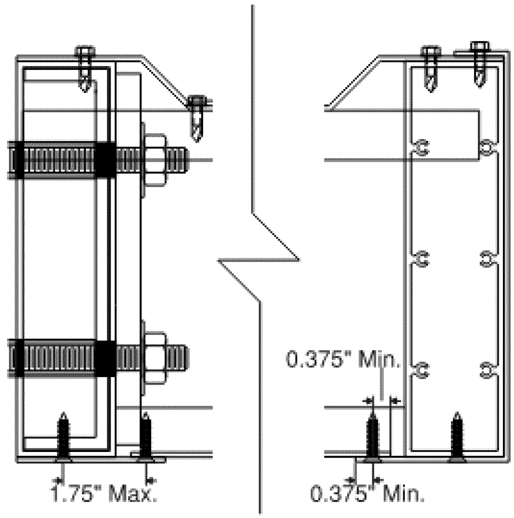
$REAR\_FASCIA =$ ["0.19 ≤ 1.00 ∴ PASS"; "0.55 ≤ 1.00 ∴ PASS"; "0.04 ≤ 1.00 ∴ PASS"]

## SOFFIT

$t_{sp} := 0.1$ in *soffit panel thickness* $W_{upASD} = 9.92$ psf

$N_{ss} := 5$ *# of soffit stiffeners* $L_{stiff} = 44$ in *stiffener length*

$Sp_{ss} := (96\ in) \div ((N_{ss} - 1)) = 24$ in *soffit stiffener spacing*




***Check Soffit Panel Bending:***

$L_{bpanel} := Sp_{ss} = 24$ in

$w_{panel} := W_{upASD} \cdot Proj = 3.31$ pli

$$M_{ypanel} := \frac{168 \cdot w_{panel} \cdot L_{bpanel}^{2}}{1568} = 204.15\ lbf \cdot in$$

$$S_{ypanel} := \frac{t_{sp}^{2} \cdot (Proj - 4.5\ in)}{6} = 0.07\ in^3$$

$f_{bpanel} := (M_{ypanel}) \div (S_{ypanel}) = 2815.87$ psi

$F_{bpanel} := 11500$ psi

$I_{bpanel} := (f_{bpanel}) \div (F_{bpanel}) = 0.24$

***Check Panel Deflection:***

L/60 *Panel Deflection Criteria*

$$I_{yp} := \frac{t_p^{3} \cdot (Proj - 4.5\ in)}{12} = 0.0036\ in^4$$

$$\Delta_{yp} := 0.00541 \cdot \frac{w_{panel} \cdot L_{bpanel}^{4}}{E_{alum} \cdot I_{yp}} = 0.16\ in$$

$$\Delta_{ypall} := \frac{L_{bpanel}}{Deflection\ Criteria} = 0.4\ in$$

$I_{\Delta yp} := (\Delta_{yp}) \div (\Delta_{ypall}) = 0.41$

***Using L /60 Deflection Limit:***
***Use 0.100 " Thick***
***Panel Type =* 1100−H14 Aluminum**
***Maximum Span =* 24.00"**

***Check Fasteners (to stiffeners):***

***Fastener Size:*** #10-16 (Cond. CW)

$t_{ss} := 0.121$ in $t_h := t_{sp}$

$d_{es} := 0.5$ in $d_{eh} := 0.875$ in

$D_h := 0.2525$ in $Spf := 12$ in

***Stiffener:*** 5052-H32 ***Panel:*** 1100-H14

$T_{fs} := 1.25 \cdot 1.25 \cdot W_{upASD} \cdot Sp_{ss} \cdot Spf = 31.01$ lbf

$T_{falls} := 91.61$ lbf

$I_{fs} := (T_{fs}) \div (T_{falls}) = 0.34$

***Use #10-16 S.S. Countersunk Fasteners***
***12" o.c. max.*** *to attach panel to stiffeners*
*300 Series Stainless Steel (Fy = 65,000 psi)*

*SOFFIT_PANEL* = "N/A"

*SOFFIT_MOUNTING_STRIP* = "N/A"

***Check Soffit Mounting Strip:***

$L_{effms} := 12$ in $t_{ms} := t_{sp} = 0.1$ in

$$R_{ss} := \frac{1.25 \cdot W_{upASD} \cdot Sp_{ss} \cdot L_{stiff}}{2} = 45.48\ lbf$$

$M_{wkms} := R_{ss} \cdot 1.75\ in = 79.6\ lbf \cdot in$

$$L_{reqms} := \frac{M_{wkms} \cdot 6}{t_{ms}^{2} \cdot F_{bpanel}} = 4.15\ in$$

$I_{bms} := (L_{reqms}) \div (L_{effms}) = 0.35$

$$I_{yms} := \frac{L_{effms} \cdot t_{ms}^{3}}{12} = 0\ in^4$$

$$\Delta_{ms} := \frac{R_{ss} \cdot (1.75\ in)^{3}}{3\ E_{alum} \cdot I_{yms}} = 0.01\ in$$

$$\Delta_{msall} := \frac{1.75\ in}{60} = 0.03\ in$$

$I_{\Delta ms} := (\Delta_{ms}) \div (\Delta_{msall}) = 0.28$

***Check Soffit Mounting Strip Fasteners:***

$T_{fmsp} := R_{ss} = 45.48$ lbf

$$T_{fmsrf} := \frac{R_{ss} \cdot 0.6033\ in}{1.056\ in} = 25.99\ lbf$$

$$T_{povrms} := \left(\left(0.27 + 1.45 \cdot \frac{t_{ms}}{0.19\ in}\right) \cdot 0.19\ in \cdot t_{ms} \cdot 14\ ksi\right) \div (3) = 91.61\ lbf$$

$T_{fasms} := 477$ lbf

$T_{poutp} := (1.2 \cdot 0.19\ in \cdot t_{sp} \cdot 14\ ksi) \div (3) = 106.4$ lbf

$T_{poutrf} := (1.2 \cdot 0.19\ in \cdot t_{rf} \cdot 35\ ksi) \div (3) = 332.5$ lbf

$I_{fmsp} := (T_{fmsp}) \div (Min(T_{povrms}, T_{fasms}, T_{poutp})) = 0.5$

***Use #10-16 S.S. Undercut Fasteners***
***12" o.c. max.*** *to attach soffit panel to mounting strip*
*300 Series Stainless Steel (Fy = 65,000 psi)*

$I_{fmsrf} := (T_{fmsrf}) \div (Min(T_{povrms}, T_{fasms}, T_{poutrf})) = 0.28$

***Use #10-16 S.S. Undercut Fasteners***
***12" o.c. max.*** *to attach mounting strip to rear fascia.*
***Fastener must be in-line with each stiffener end.***
*300 Series Stainless Steel (Fy = 65,000 psi)*

*STIFFENER_FASTENERS* = "N/A"

*MOUNTING_STRIP_FASTENERS* = "N/A"

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100
**REI Project #** R25-01-042

**Description:** 48" Typical System
**Project Name:** McDonalds - Puyallup, WA. L2401075

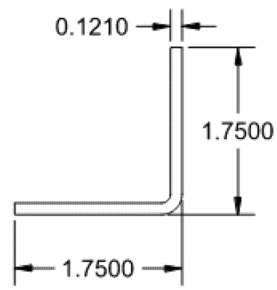
**Sheet No:** 3.11
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

***Stiffener Angle:*** 5052-H32

$L_{1s} := 1.75\ in$
$L_{2s} := 1.75\ in$
$t_{ss} = 0.121\ in$
$C_{bs} := 1.0$
$Alum_{Den} := 158\ pcf$

$L_{stiff} = 44\ in$ *stiffener length*
$T_{ws} = 24\ in$ *stiffener trib. width*
$W_{upASD} = 9.92\ psf$
$P_{light} := 5\ lbf$

"Stiffener Section Properties"
$A_s := 0.401\ in^2$
$I_{ys} := 0.12\ in^4$
$S_{xstop} := 0.096\ in^3$
$S_{xsbot} := 0.245\ in^3$
$J_s := 0.002\ in^4$




***Check Stiffener Bending:***

***Uplift:***

$w_{upstiff} := W_{upASD} \cdot T_{ws} = 1.65\ pli$

$M_{xsu} := \frac{w_{upstiff} \cdot L_{stiff}^2}{8} = 400.27\ lbf \cdot in$

$f_{bxsu} := \frac{M_{xsu}}{S_{xsbot}} = 1633.75\ psi$

$F_{bxsuF.5.a.2} = 9087.68\ psi$ *uniform compression local buckling*

$F_{bxsu} := 9087.68\ psi$

$I_{bsu} := (f_{bxsu}) \div (F_{bxsu}) = 0.18$

***Uplift Deflection:***

$\Delta_{ysu} := \frac{5 \cdot w_{upstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} = 0.07\ in$

$\Delta_{ysuall} := \mathrm{Min}\left(1.5\ in, (L_{stiff}) \div (60)\right) = 0.73\ in$

$I_{\Delta ysu} := (\Delta_{ysu}) \div (\Delta_{ysuall}) = 0.09$

***Dead Load:***

$w_{DLstiff} := Alum_{Den} \cdot (A_s + t_{sp} \cdot T_{ws}) = 0.26\ pli$

$M_{xsDL} := \frac{w_{DLstiff} \cdot L_{stiff}^2}{8} + \frac{P_{light} \cdot L_{stiff}}{4} = 116.98\ lbf \cdot in$

$f_{bxsDL} := \frac{M_{xsDL}}{S_{xstop}} = 1218.53\ psi$

$F_{bxsDLF.5.a.1} = 10685.01\ psi$ *leg tip max. compression local buckling*

$F_{bxsDLLTB} = 25099.64\ psi$ *leg tip max. compression LTB*

$F_{bxsDL} := 10685.01\ psi$

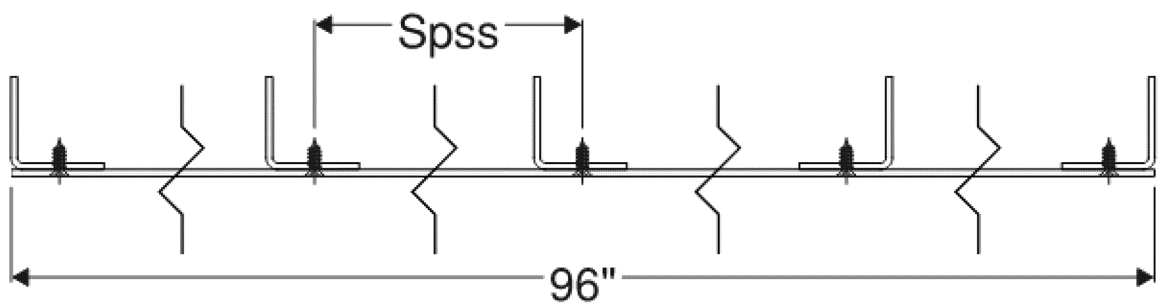
$I_{bsDL} := (f_{bxsDL}) \div (F_{bxsDL}) = 0.11$

***Dead Load Deflection:***

$\Delta_{ysDL} = \frac{5 \cdot w_{DLstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} + \frac{P_{light} \cdot L_{stiff}^3}{48\ E_{alum} \cdot I_{ys}} = 0.02\ in$

$\Delta_{ysDLall} := \mathrm{Min}\left(1.5\ in, (L_{stiff}) \div (60)\right) = 0.73\ in$

$I_{\Delta ysDL} := (\Delta_{ysDL}) \div (\Delta_{ysDLall}) = 0.02$




***Use (5) 1-3/4" x 1-3/4" x 0.121" Formed Alum. Angles***
*(2) @ each panel end and spaced* **24.0** *" max. along 8' panel length as shown (5052-H32)*

$STIFFENER$ = "N/A"

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 48" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.12
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## ANCHOR BRACKET

### System Data:

$Proj = 48$ in
$DL_{dn} = 49$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf

### Channel Anchor Data:

$b := b_{cb} = 1.69$ in $\quad L := 4.25$ in
$d := d_{cb} = 5.69$ in $\quad L_b := L$
$t := t_{cb} = 0.25$ in $\quad E_{alum} = 10100000$ psi

$R_{rfdlLC3} = 274.26$ lbf $\quad R_{rfdlLC6} = 144.61$ lbf
$R_{yOLC3} = 385.33$ lbf $\quad R_{yOLC6} = 247.82$ lbf
$M_{xOLC3} = 13534.54$ lbf·in $\quad M_{xOLC6} = 9462.6$ lbf·in

☑ Welded within 1 inch of Mmax

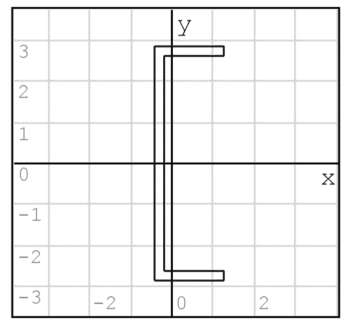
### Section Properties:

$I_{x1} = 9.19$ in⁴ $\quad A_1 = 2.14$ in²
$I_{y1} = 0.47$ in⁴ $\quad J_1 = 0.05$ in⁴
$S_{x1} = 3.23$ in³ $\quad Z_{x1} = 3.99$ in³
$S_{y1} = 0.37$ in³ $\quad Z_{y1} = 0.45$ in³

**Corner Key Shape:** Channel
**Corner Key Material:** 6061-T6
**Weld Filler:** 4043
**Outrigger Material:** 6061-T6

## CALCULATIONS

$M_x = M_{xO} + (R_{yO} \cdot L)$ $\quad R_{yO} := 385.33$ lbf
$M_x := 15172.21$ lbf·in $\quad R_{fdl} := 274.26$ lbf




### Check Thru-Bolts:

**Fastener Type:** 1/2-13 (Cond. CW)

$t_o := \mathrm{Min}(t_{io}, t_{eo}) = 0.125$ in
$n_{tb} := 6$
$d_e := 1$ in

**Shear Allowables:**

$V_{bearoutrigger} := 2435.9$ lbf
$V_{bearchannel} := 2307.69$ lbf
$V_{Bolt} := 2984$ lbf
$V_{tball} := 2307.69$ lbf

$$V_{tb} := \sqrt{\left(\frac{R_{yO}}{n_{tb}}\right)^2 + \left(\frac{M_x}{0.5 \cdot n_{tb} \cdot 3.625\ \text{in}}\right)^2} = 1396.62\ \text{lbf}$$

$F_{syO} := 21000$ psi $\quad F_{suO} := 22800$ psi $\quad n_{sp} := 2$
$A_{gv} := 0.45$ in²
$A_{nv} := 0.28$ in²
$R_{nsy} := (F_{syO} \cdot A_{gv} \cdot n_{sp}) \div (1.5) = 12687.5$ lbf
$R_{nsr} := (F_{suO} \cdot A_{nv} \cdot n_{sp}) \div (1.95) = 6485.58$ lbf
$V_{couple} := (M_x) \div (3.625\ \text{in}) = 4185.44$ lbf

$$I_{tb} := \mathrm{Max}\left(\frac{V_{tb}}{V_{tball}}, \frac{V_{couple}}{\mathrm{Min}(R_{nsy}, R_{nsr})}\right) = 0.65$$

***Use (6) 1/2" Dia. S.S. Thru-Bolts***
*3.625" o.c. vertically*
*1.25" o.c. horizontally*
*to attach outrigger to corner key channel as shown*
*300 Series (Fy = 65,000 psi)*

### Check Channel Bracket:

**Outrigger Channel:**

$f_{bxOC} := (M_x) \div (S_{x1}) = 4701$ psi
$F_{bx} := 9090.91$ psi

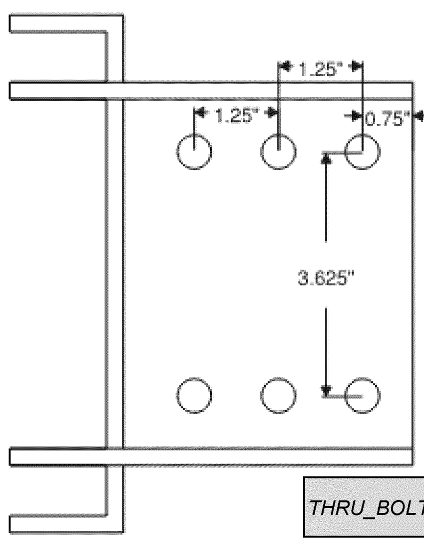
$I_{bxOC} := (f_{bxOC}) \div (F_{bx}) = 0.52$

**Rear Fascia Channel:**

$M_{xRFC} := R_{yO} \cdot 5.75\ \text{in} = 2215.67$ lbf·in
$S_{xRFC} := 6.4503$ in³
$f_{bxRFC} := (M_{xRFC}) \div (S_{xRFC}) = 343.5$ psi

$I_{bxRFC} := (f_{bxRFC}) \div (F_{bx}) = 0.04$

***Use 1/4" thk Anchor Channels***
*as shown (6061-T6)*
*Snug tight inside outrigger and rear fascia*




$THRU\_BOLTS = \begin{bmatrix} \text{"0.61 ≤ 1.00 ∴ PASS"} \\ \text{"0.65 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

$CHANNEL\_BRACKET = \begin{bmatrix} \text{"0.52 ≤ 1.00 ∴ PASS"} \\ \text{"0.04 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

***Rear fascia tube torsion due to outrigger moment check on page 3.09***

### *Check Channel Bracket Welds:*

$d_w := d = 5.69\ \text{in}$  $M_x = 15172.21\ \text{lbf}\cdot\text{in}$

$b_w := 2.391\ \text{in}$  $R_{yO} = 385.33\ \text{lbf}$

$t_w := 0.25\ \text{in}$

$$A_w := t_w \cdot \left(2 \cdot b_w + d_w\right) = 2.62\ \text{in}^2$$

$$S_{w1} := t_w \cdot \left(b_w \cdot d_w + \frac{d_w^{\ 2}}{6}\right) = 4.75\ \text{in}^3$$

$$S_{w2} := \frac{t_w \cdot \left(2 \cdot b_w + d_w\right)^2}{6} = 4.57\ \text{in}^3$$

$$f_w := \sqrt{\left(\frac{0.7071 \cdot M_x}{S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{S_{w2}} + \frac{R_{yO}}{A_w}\right)^2} = 3362.92\ \text{psi}$$

$F_{tub} := 24000\ \text{psi}$  $F_{tuw} = 24000\ \text{psi}$

$$F_{sbT} := \frac{F_{tub}}{1.95} = 12307.69\ \text{psi} \qquad F_{swT} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

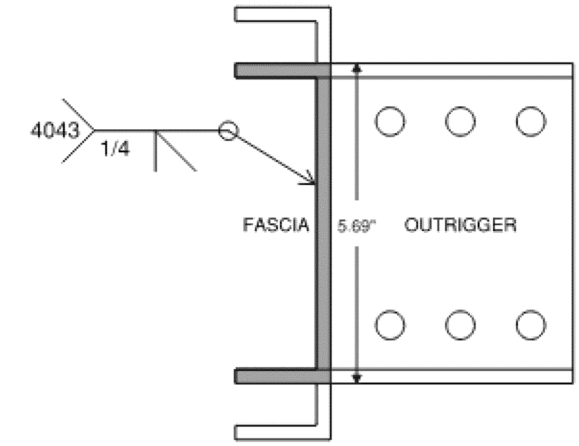
$$F_{sbV} := \frac{0.6 \cdot F_{tub}}{1.95} = 7384.62\ \text{psi} \qquad F_{swV} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

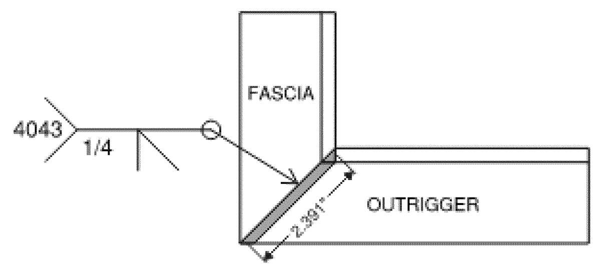
$$I_{wbm} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{sbT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{sbV} \cdot S_{w2}} + \frac{R_{yO}}{F_{sbV} \cdot A_w}\right)^2} = 0.38$$

$$I_{wf} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{swT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{swV} \cdot S_{w2}} + \frac{R_{yO}}{F_{swV} \cdot A_w}\right)^2} = 0.46$$

$I_w := \text{Max}\left(I_{wbm}, I_{wf}\right) = 0.46$

***Use 1/4" Bevel Groove Welds***
*Full perimeter of outrigger channel to attach outrigger channel to anchor channel.*
*(4043 Filler)*




### *Check Front Reinforcing Plate:*

$t_{Rp} := 0.5\ \text{in}$

$$P_w := \frac{M_x}{5.1937\ \text{in}} = 2921.27\ \text{lbf}$$

$M_{wkRp} := P_w \cdot 2.1746\ \text{in} = 6352.6\ \text{lbf}\cdot\text{in}$

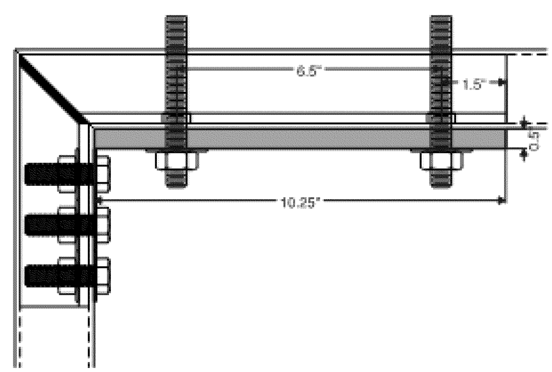
$S_{yRp} := \left(\left(t_{Rp}\right)^2 \cdot 0.85 \cdot 7.5\ \text{in}\right) \div (6) = 0.27\ \text{in}^3$

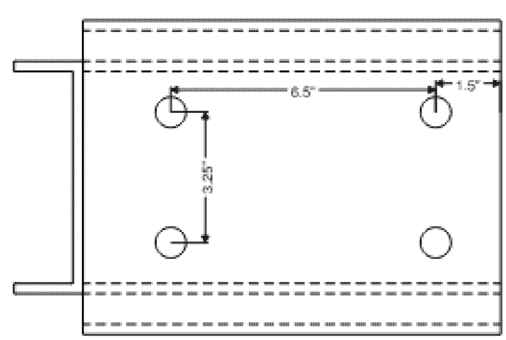
$f_{wkRp} := \left(M_{wkRp}\right) \div \left(S_{yRp}\right) = 23915.66\ \text{psi}$

$F_{bwkRp} := 31800\ \text{psi}$

$I_{Rp} := \left(f_{wkRp}\right) \div \left(F_{bwkRp}\right) = 0.75$

***Use 7-1/2" x 10-1/4" 1/2" thk Rein. Plate***
*(6061-T6)*




$ANCHOR\_BRACKET\_WELDS = \begin{bmatrix} \text{"0.38 ≤ 1.00 ∴ PASS"} \\ \text{"0.46 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

$REINFORCING\_PLATE = \left[\ \text{"0.75 ≤ 1.00 ∴ PASS"}\ \right]$

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 48" Typical System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 3.14
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## *Check Thru-Bolt Anchors (Wood Blocking):*

☐ Brick Fascia Present

$n_a := 4$

$$V_a := \frac{R_{yO} \cdot 9.6\text{ in}}{0.5 \cdot n_a \cdot 6.5\text{ in}} + \frac{R_{fdl}}{n_a} = 353.12\text{ lbf}$$

$T_a := 3265.94\text{ lbf}$

***Pipe Sleeve Data:***

$OD := 1.05\text{ in}$

$t_{sleeve} := 0.154\text{ in}$

***Washer Data:***

$b_{wp} := 3\text{ in}$ $t_{wp} := 0.375\text{ in}$

$d_{wp} := 3\text{ in}$ $F_{ywp} := 36\text{ ksi}$

***Substrate Data:***

$t_p := t_{Rp}$

$e_s := 4.5\text{ in}$

$l_m := 4.5\text{ in}$

$G := 0.42$

$F_c := 425\text{ psi}$

---

Anchor Diameter: 5/8"

Anchor Type: Thru-Bolt

$F_u := 120\text{ ksi}$

$F_{es} := 43000\text{ psi}$

$\Omega_{tb} := 2.5$

$C_M := 1.0$

$C_t := 1.0$

$C_g := 1.0$

$C_\Delta := 1.0$

$C_{eg} := 1.0$

$C_{di} := 1.0$

$C_D := 1.15$

---

### *Wood Allowables:*

***Shear:***

$Z_{Im} = 1013.68\text{ lbf}$ $Z_{IIIm} = 669.4\text{ lbf}$

$Z_{Is} = 2208.13\text{ lbf}$ $Z_{IIIs} = 623.63\text{ lbf}$

$Z_{II} = 517.19\text{ lbf}$ $Z_{IV} = 745.84\text{ lbf}$

$$Z_1 := \text{Min}\left(Z_{Im}, Z_{Is}, Z_{II}, Z_{IIIm}, Z_{IIIs}, Z_{IV}\right) = 517.19\text{ lbf}$$

$$V_{wood} := Z_1 \cdot C_D \cdot C_M \cdot C_t \cdot C_g \cdot C_\Delta \cdot C_{eg} \cdot C_{di} = 594.77\text{ lbf}$$

$$R_\alpha := \sqrt{T_a^{\,2} + V_a^{\,2}} = 3284.97\text{ lbf}$$

$$\alpha := \text{atan}\left(\frac{T_a}{V_a}\right) = 83.83\text{ deg}$$

$$Z_\alpha := \frac{W' \cdot V_{wood}}{W' \cdot (\cos(\alpha))^2 + V_{wood} \cdot (\sin(\alpha))^2} = 1365.2\text{ lbf}$$

***Tension:***

$W' = 1386.19\text{ lbf}$

$T_{wood} = \text{"N/A"}$

***Bolt Allowables:***

$$V_{bolt} := \frac{F_u}{\Omega_{tb} \cdot \sqrt{3}} \cdot A_r = 5739.61\text{ lbf}$$

$$T_{bolt} := \frac{F_u}{\Omega_{tb}} \cdot A_S = 10848.08\text{ lbf}$$

***Required Washer Minimums:***

$$F_{bwp} := 0.75 \cdot F_{ywp} = 27000\text{ psi}$$

$$A_{wreq} := \frac{T_a}{C_D \cdot F_c} = 6.68\text{ in}^2$$

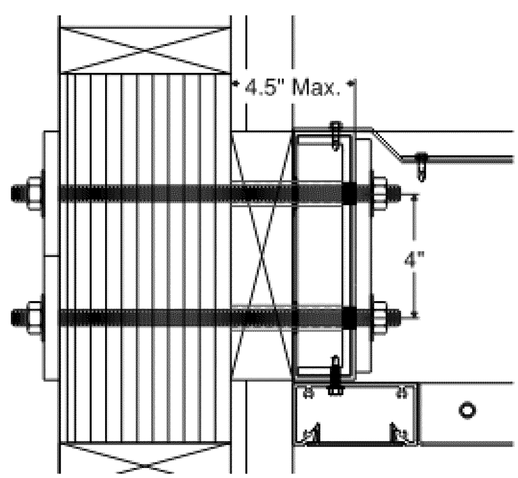
$$b_{wpmin} := \sqrt{A_{wreq}} = 2.59\text{ in}$$

$$d_{wpmin} := b_{wpmin} = 2.59\text{ in}$$

$$t_{wpmin} := \sqrt{\frac{T_a \cdot b_{wpmin} \cdot 6}{F_{bwp} \cdot 8 \cdot d_{wpmin}}} = 0.3\text{ in}$$

***Check Bolt Bending:***

| "Thru-Bolt" | | "Pipe Sleeve" | |
|---|---|---|---|
| 515.5 lbf in | "Mb" | 1073.53 lbf in | "Mbs" |
| 21507.59 lbf/in² | "fb" | 12584.17 lbf/in² | "fbs" |
| 69000 lbf/in² | "Fb" | 22500 lbf/in² | "Fbs" |
| 0.06 in | "Space" | 0.56 | "Int." |
| 0.31 | "Bend Int." | | |
| 0.94 | "Space Int." | | |




*Use 1.05" O.D. x 0.154" Thick SCH. 80 Pipe Sleeves*
*(300 Series SS, Fy = 30 ksi Min.)*

*Use (4) 0.625"-11 HD Galvanized Steel Thru-Bolts*
*(Grade 5, Fy = 92,000 psi, Fu = 120,000 psi)*
*w/ 3" x 3" x 0.375" A36 Steel Backer Plates*
*2.5" min. edge dist. 2.5" min. end distance.*
*(3) layers of Spruce Pine-Fir (S.G. = 0.42 MIN.) wood blocking or stronger.*
*Wood blocking by others not by Rice Engineering, Inc.*

THRU_BOLT_ANCHORS = "PASS"

## Loading Information:

$W_{up} := 16\ psf$ *unfactored uplift*

$P_{light} := 5\ lbf$ *weight of light*

## System Information:

$L_{us} := 108\ in$ *underscore length*

$Light\_Spacing := 60\ in$

$Proj\_UF := 38\ in$ *underscore projection*

$Light\_Gap := 12.8\ in$

$W_{panel} = 30\ in$

(2) Infill Panel Stiffeners

**Underscore Panel:**

$t_p := 0.077\ in$ *panel thickness*

**Underscore Panel Stiffener:**

$L_{1s} := 1.75\ in$ *stiffener leg length*

$L_{2s} := 1.75\ in$ *stiffener leg length*

$t_s := 0.121\ in$ *stiffener thickness*

**Outrigger:**

$b_o := 1.9185\ in$ *outrigger width*

$d_o := 4\ in$ *outrigger depth*

$t_{of} := 0.1\ in$ *outrigger flange thickness*

$t_{ow} := 0.125\ in$ *outrigger web thickness*

**Rear Fascia:**

$b_{rf} := 1.9185\ in$ *rear fascia width*

$d_{rf} := 4\ in$ *rear fascia depth*

$t_{rff} := 0.1\ in$ *rear fascia flange thickness*

$t_{rfw} := 0.125\ in$ *rear fascia web thickness*

**Front Fascia:**

$b_{ff} := 1.9185\ in$ *front fascia width*

$d_{ff} := 4\ in$ *front fascia depth*

$t_{fff} := 0.1\ in$ *front fascia flange thickness*

$t_{ffw} := 0.125\ in$ *front fascia web thickness*

$W_{upASD} := 0.6 \cdot W_{up} = 9.6\ psf$

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(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Underscore

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 4.01
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## Underscore Panel:

$t_p = 0.08$ in — *panel thickness*
$N_s = 2$ — *# of underfill stiffeners*
$Sp_{stiff} = 8.6$ in — *stiffener spacing*

### Check Panel Bending:

$L_{effp} := 1$ in

$w_{panel} := W_{upASD} \cdot L_{effp} = 0.07$ pli

$L_{bpanel} = 12.8$ in

$$M_{ypanel} := \frac{w_{panel} \cdot L_{bpanel}^{2}}{8} = 1.37 \text{ lbf·in}$$

$F_{bpanel} := 11500$ psi

$$L_{reqp} := \frac{M_{ypanel} \cdot 6}{t_p^{2} \cdot F_{bpanel}} = 0.12 \text{ in}$$

$I_{bpanel} := (L_{reqp}) \div (L_{effp}) = 0.12$

### Check Panel Deflection:

L/60 — *Panel Deflection Criteria*

$$I_{yp} := \frac{t_p^{3} \cdot L_{effp}}{12} = 0 \text{ in}^4$$

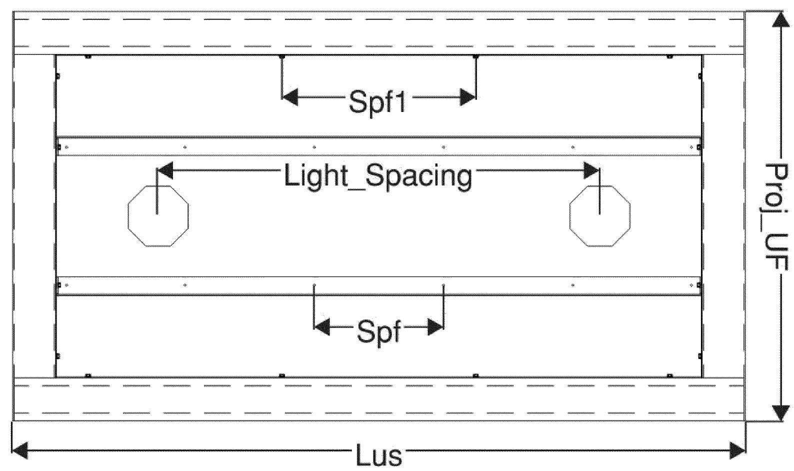
$$\Delta_{yp} := \frac{5 \cdot w_{panel} \cdot L_{bpanel}^{4}}{384\ E_{alum} \cdot I_{yp}} = 0.06 \text{ in}$$

$$\Delta_{ypall} := \frac{L_{bpanel}}{\text{Deflection Criteria}} = 0.21 \text{ in}$$

$I_{\Delta yp} := (\Delta_{yp}) \div (\Delta_{ypall}) = 0.28$

***Using L / 60 Deflection Limit:***
***Use 0.077 " Thick***
***Panel Type = 1100−H14 Aluminum***
***Maximum Span = 12.80"***

### Plan View:




### Check Fasteners (to stiffeners):

**Fastener Size:** #10-16 (Cond. CW)

$t_s = 0.12$ in  $t_h := t_p$
$d_{es} := 0.5$ in  $d_{eh} := 0.875$ in
$D_h := 0.2525$ in  $Spf := 18$ in

**Stiffener:** 5052-H32  **Panel:** 1100-H14

$T_f := 1.25 \cdot 1.25 \cdot W_{upASD} \cdot T_{ws} \cdot Spf = 20.06$ lbf

$T_{fall} := 58.55$ lbf

$I_f := (T_f) \div (T_{fall}) = 0.34$

***Use #10-16 S.S. Countersunk Fasteners***
***18" o.c. max.** to attach panel to stiffeners*
*300 Series Stainless Steel (Fy = 65,000 psi)*

### Check Fasteners (to front/rear fascia):

$D_{f1} := 0.25$ in  $Spf_1 := 18$ in

$V_{f1} := 1.25 \cdot W_{upASD} \cdot 0.5 \cdot T_{ws} \cdot Spf_1 = 8.02$ lbf

$R_{bearp} := 205.33$ lbf
$R_{bearf} := 266.67$ lbf
$V_{fall1} := 205.33$ lbf

$I_{f1} := (V_{f1}) \div (V_{fall1}) = 0.04$

***Use 1/4-20 S.S. Fasteners***
***18" o.c. max.** to attach panel to frame*
*300 Series Stainless Steel (Fy = 65,000 psi)*

*UNDERSCORE_PANEL* = [ "0.12 ≤ 1.00 ∴ PASS" ; "0.28 ≤ 1.00 ∴ PASS" ]

*PAN_TO_STIFF_FASTENERS* = [ "0.34 ≤ 1.00 ∴ PASS" ]

*PAN_TO_FRAME_FASTENERS* = [ "0.04 ≤ 1.00 ∴ PASS" ]

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Underscore

**Project Name:** McDonalds - Puyallup, WA. L2401075

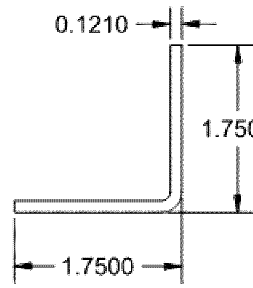
**Sheet No:** 4.02
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

***Stiffener Angle:*** 5052-H32

$L_{1s} = 1.75$ in
$L_{2s} = 1.75$ in
$t_s = 0.121$ in
$C_{bs} := 1.0$
$Alum_{Den} := 158$ pcf

$L_{stiff} = 100$ in *stiffener length*
$T_{ws} = 10.7$ in *stiffener trib. width*
$W_{upASD} = 9.6$ psf
$P_{light} = 5$ lbf

"Stiffener Section Properties"
$A_s := 0.401\ in^2$
$I_{ys} := 0.12\ in^4$
$S_{xstop} := 0.096\ in^3$
$S_{xsbot} := 0.245\ in^3$
$J_s := 0.002\ in^4$




***Check Stiffener Bending:***

***Uplift:***

$w_{upstiff} := W_{upASD} \cdot T_{ws} = 0.71$ pli

$$M_{xsu} := \frac{w_{upstiff} \cdot L_{stiff}^2}{8} = 891.67\ lbf \cdot in$$

$$f_{bxsu} := \frac{M_{xsu}}{S_{xsbot}} = 3639.46\ psi$$

$F_{bxsuF.5.a.2} = 9087.68$ psi *uniform compression local buckling*

$F_{bxsu} := 9087.68$ psi

$I_{bsu} := (f_{bxsu}) \div (F_{bxsu}) = 0.4$

***Uplift Deflection:***

$$\Delta_{ysu} := \frac{5 \cdot w_{upstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} = 0.77\ in$$

$\Delta_{ysuall} := \mathrm{Min}\left(1.5\ in, (L_{stiff}) \div (60)\right) = 1.5$ in

$I_{\Delta ysu} := (\Delta_{ysu}) \div (\Delta_{ysuall}) = 0.51$

***Dead Load:***

$w_{DLstiff} := Alum_{Den} \cdot (A_s + t_p \cdot T_{ws}) = 0.11$ pli

$$M_{xsDL} := \frac{w_{DLstiff} \cdot L_{stiff}^2}{8} + P_{light} \cdot \left(\frac{L_{stiff} - Light\_Spacing}{2}\right) = 240\ lbf \cdot in$$

$$f_{bxsDL} := \frac{M_{xsDL}}{S_{xstop}} = 2499.99\ psi$$

$F_{bxsDLF.5.a.1} = 10685.01$ psi *leg tip max. compression local buckling*

$F_{bxsDLLTB} = 18574.04$ psi *leg tip max. compression LTB*

$F_{bxsDL} := 10685.01$ psi

$I_{bsDL} := (f_{bxsDL}) \div (F_{bxsDL}) = 0.23$

***Dead Load Deflection:***

$$\Delta_{ysDL} = \frac{5 \cdot w_{DLstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} + \frac{P_{light} \cdot a}{24\ E_{alum} \cdot I_{ys}} \cdot \left(3 \cdot L_{stiff}^2 - 4 \cdot a^2\right) = 0.22\ in$$

$\Delta_{ysDLall} := \mathrm{Min}\left(1.5\ in, (L_{stiff}) \div (60)\right) = 1.5$ in

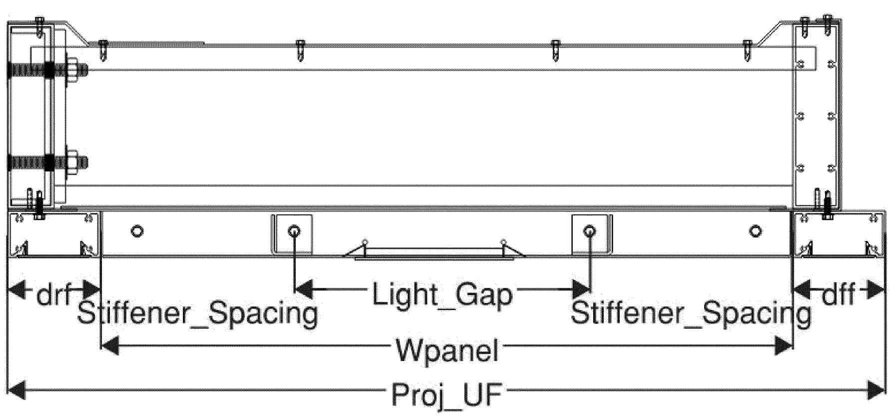
$I_{\Delta ysDL} := (\Delta_{ysDL}) \div (\Delta_{ysDLall}) = 0.15$

***Check Stiffener Fasteners:***

$R_s := \mathrm{Max}\left(0.5 \cdot w_{upstiff} \cdot L_{stiff}, 0.5 \cdot w_{DLstiff} \cdot L_{stiff} + 2 \cdot P_{light}\right) = 35.67$ lbf

$V_{falls} := 443.67$ lbf

$I_{fs} := (R_s) \div (V_{falls}) = 0.08$




***Use (2) 1-3/4" x 1-3/4" x 0.121" Formed Alum. Angles***
*Spaced* **8.6** *" max. from front/rear frame & (***2***) each side of light hole,* **12.8** *" max. (centered by light) as shown (5052-H32)*

***Use 1/4-20 S.S. Fasteners @ Stiffener Ends***
*300 Series Stainless Steel (Fy = 65,000 psi)*

STIFFENER = [ "0.4 ≤ 1.00 ∴ PASS" ; "0.51 ≤ 1.00 ∴ PASS" ; "0.23 ≤ 1.00 ∴ PASS" ; "0.15 ≤ 1.00 ∴ PASS" ]

STIFF_TO_FRAME_FASTENERS = [ "0.08 ≤ 1.00 ∴ PASS" ]

## OUTRIGGER

### System Data:

$Proj\_UF = 38$ in

$W_{upASD} = 9.6$ psf

☐ Welded within 1 inch of Mmax

**Outrigger Shape:** Channel

**Outrigger Material:** 6063-T5

**Frame Fascia Material:** 6063-T5

### Outrigger Data:

$b := b_o = 1.92$ in  $L := W_{panel} = 30$ in

$d := d_o = 4$ in  $L_b := L$

$tw := t_{ow} = 0.12$ in  $E_{alum} = 10100000$ psi

$tf := t_{of} = 0.1$ in

### Section Properties:

$I_{x1} = 2.82$ in⁴  $A_1 = 1.2$ in²

$I_{y1} = 0.63$ in⁴  $J_1 = 0.01$ in⁴

$S_{x1} = 1.41$ in³  $Z_{x1} = 1.71$ in³

$S_{y1} = 0.52$ in³  $Z_{y1} = 0.74$ in³

## CALCULATIONS

### Check Outrigger:

$w_{ou} := d_o \cdot W_{upASD} = 0.27$ pli

$R_s = 35.67$ lbf

$j := 1$

while $j \cdot \frac{W_{panel}}{N_s + 1} < \frac{W_{panel}}{2}$

  $x_j := j$

  $j := j + 1$

**Uplift:**

$M_{you} := 336.73$ lbf·in

$f_{byou} := (M_{you}) \div (S_{y1}) = 644$ psi

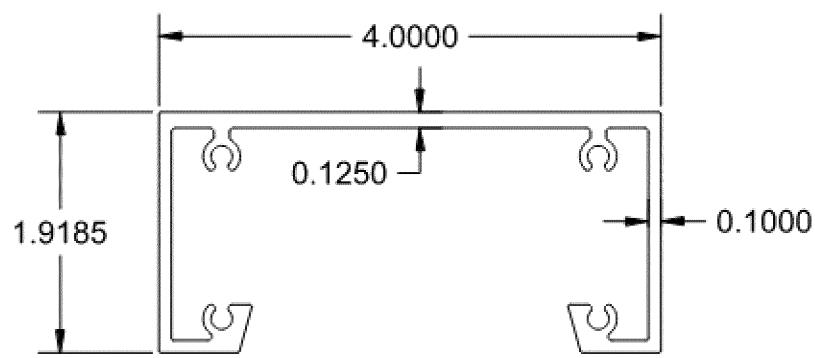
$F_{by} := 9168.29$ psi

$I_{byou} := (f_{byou}) \div (F_{by}) = 0.07$

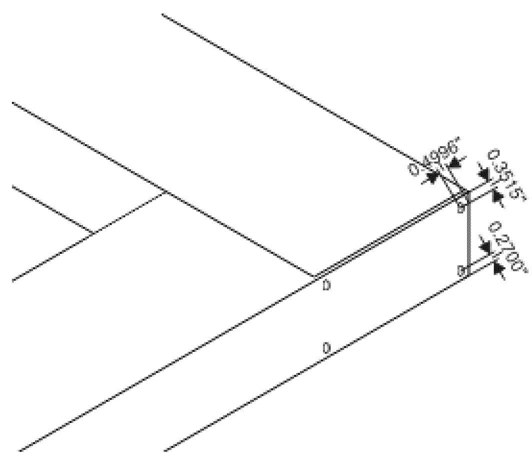
$\Delta_{you} := 0.01$ in

$\Delta_{youall} := (L) \div (120) = 0.25$ in

$I_{\Delta you} := (\Delta_{you}) \div (\Delta_{youall}) = 0.02$




**Use 1.9185" x 4" x 1/8" thk Outrigger**
*AL. channel as shown (6063-T5)*




### Check Fasteners (to Fascia Frame):

**Fastener Type:** #10-16 (Cond. CW)

$n_f := 4$

$d_e := 0.27$ in

**Shear Allowables:**

$V_{bearoutrigger} := 198$ lbf

$V_{bearfascia} := 198$ lbf

$V_{fast} := 275$ lbf

$V_{fall} := 198$ lbf

$R_{ou} := \frac{N_s \cdot R_s + w_{ou} \cdot L}{2} = 39.67$ lbf

$V_{fou} := (R_{ou}) \div (0.5 \cdot n_f) = 19.83$ lbf

$I_{fou} := (V_{fou}) \div (V_{fall}) = 0.1$

**Use (4) #10 S.S. Fasteners**
*to attach outrigger to fascia frame as shown*
*5/8" min. thread engagement into fascia screw chase*
*300 Series (Fy = 65,000 psi)*

$OUTRIGGER = \begin{bmatrix} \text{"0.07 ≤ 1.00 ∴ PASS"} \\ \text{"0.02 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

$OUTRIGGER\_TO\_FRAME\_FASTENERS = [\text{"0.1 ≤ 1.00 ∴ PASS"}]$

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(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Underscore

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 4.04
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## REAR FASCIA

### System Data:

$Proj\_UF = 38$ in
$W_{upASD} = 9.6$ psf

$e1 := 1.3703$ in
$e2 := 0.6297$ in
$e3 := 0.8707$ in

☐ Welded within 1 inch of Mmax

**Rear Fascia Shape:** Channel
**Rear Fascia Material:** 6063-T5
**Canopy Material:** 6005-T5

### Rear Fascia Data:

$b := b_{rf} = 1.92$ in  $L := L_{us} = 108$ in
$d := d_{rf} = 4$ in  $L_b := 15$ in
$tw := t_{rfw} = 0.12$ in  $E_{alum} = 10100000$ psi
$tf := t_{rff} = 0.1$ in

### Section Properties:

$I_{x1} = 2.82$ in⁴  $A_1 = 1.2$ in²
$I_{y1} = 0.63$ in⁴  $J_1 = 0.01$ in⁴
$S_{x1} = 1.41$ in³  $Z_{x1} = 1.71$ in³
$S_{y1} = 0.52$ in³  $Z_{y1} = 0.74$ in³

## CALCULATIONS

### Check Rear Fascia:

$T_{wRF} = 8.3$ in  *rear fascia trib. width*
$w_{rfu} := T_{wRF} \cdot W_{upASD} = 0.55$ pli
$R_{ou} = 39.67$ lbf

**Uplift:**

$M_{yrfu} := 251.34$ lbf·in
$f_{byrfu} := (M_{yrfu}) \div (S_{y1}) = 481$ psi
$F_{by} := 9168.29$ psi

$I_{byrfu} := (f_{byrfu}) \div (F_{by}) = 0.05$

$$\Delta_{yrfu} := \frac{5 \cdot w_{rfu} \cdot L_b^{\,4}}{384\ E_{alum} \cdot I_{y1}} + \text{Max}\left(\frac{R_{ou} \cdot (6\text{ in})^2}{3\ E_{alum} \cdot I_{y1}} \cdot \left(6\text{ in} + \frac{3}{2} \cdot L_b\right), \frac{R_{ou} \cdot L_b^{\,2} \cdot 6\text{ in}}{8\ E_{alum} \cdot I_{y1}}\right) = 0\text{ in}$$

$\Delta_{yrfuall} := (L_b) \div (120) = 0.12$ in

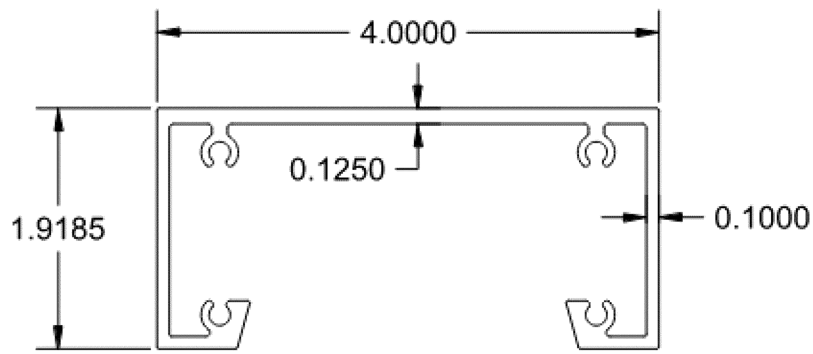
$I_{\Delta yrfu} := (\Delta_{yrfu}) \div (\Delta_{yrfuall}) = 0.02$

**Local Bending:**

$L_{effrf} := 0.5 \cdot L_b = 7.5$ in
$M_{wkrf} := 24.95$ lbf·in

$$L_{reqrf} := \frac{M_{wkrf} \cdot 6}{14500\text{ psi} \cdot tw^2} = 0.66\text{ in}$$

$I_{wkrfu} := (L_{reqrf}) \div (L_{effrf}) = 0.09$




**Use 1.9185" x 4" x 1/8" thk Rear Fascia**
*AL. channel as shown (6063-T5)*

### Check Fasteners (to Canopy):

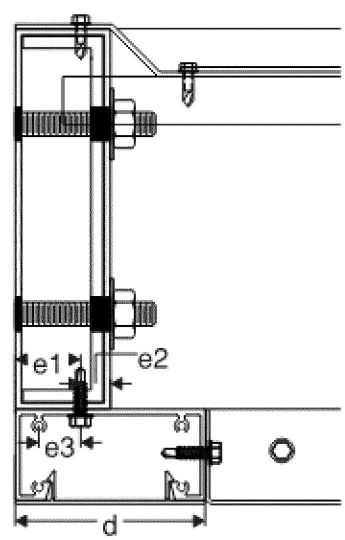
**Fastener Type:** 1/4-20 (Cond. CW)

$n_f := 4$
$D_{ws} := 0.428$ in

**Tension Allowables:**

$T_{povrrf} := 427$ lbf
$T_{poutcanopy} := 437.5$ lbf
$T_{fast} := 1061$ lbf
$T_{fall} := 427$ lbf
$T_{a1} := 122.21$ lbf

$I_{a1} := (T_{a1}) \div (T_{fall}) = 0.29$




**Use (2) 1/4"-20 S.S. Fasteners**
*to attach rear fascia to canopy @ each end,*
*then* **(1) @ 15** *" O.C. max.*
*300 Series (Fy = 65,000 psi)*

*REAR_FASCIA* = [ "0.05 ≤ 1.00 ∴ PASS" ; "0.02 ≤ 1.00 ∴ PASS" ; "0.09 ≤ 1.00 ∴ PASS" ]

*REAR_FASCIA_TO_CANOPY_FASTENERS* = [ "0.29 ≤ 1.00 ∴ PASS" ]

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Underscore

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 4.05
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## FRONT FASCIA

### System Data:

$Proj\_UF = 38$ in
$W_{upASD} = 9.6$ psf

$e1 := 0.4831$ in
$e2 := 1.5169$ in
$e3 := 1.0170$ in

☐ Welded within 1 inch of Mmax

**Rear Fascia Shape:** Channel

**Rear Fascia Material:** 6063-T5

**Canopy Material:** 6005-T5

### Front Fascia Data:

$b := b_{ff} = 1.92$ in  $L := L_{us} = 108$ in
$d := d_{ff} = 4$ in  $L_b := 15$ in
$tw := t_{ffw} = 0.12$ in  $E_{alum} = 10100000$ psi
$tf := t_{fff} = 0.1$ in

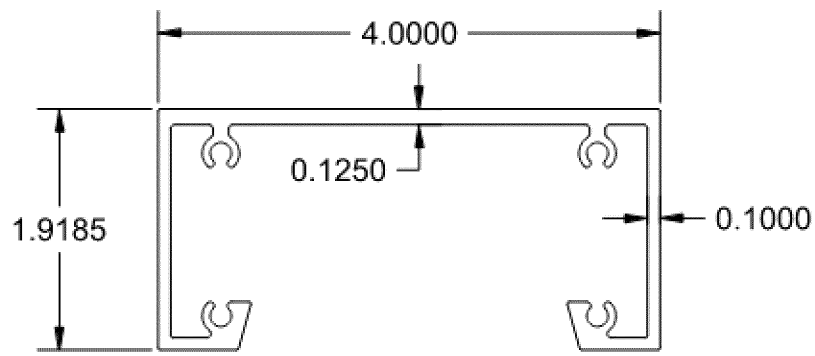
### Section Properties:

$I_{x1} = 2.82$ in⁴  $A_1 = 1.2$ in²
$I_{y1} = 0.63$ in⁴  $J_1 = 0.01$ in⁴
$S_{x1} = 1.41$ in³  $Z_{x1} = 1.71$ in³
$S_{y1} = 0.52$ in³  $Z_{y1} = 0.74$ in³

## CALCULATIONS

### Check Front Fascia:

$T_{wFF} = 8.3$ in ⌝ *rear fascia trib. width*
$w_{ffu} := T_{wFF} \cdot W_{upASD} = 0.55$ pli
$R_{ou} = 39.67$ lbf




**Uplift:**

$M_{yffu} := 251.34$ lbf·in ⌝
$f_{byffu} := (M_{yffu}) \div (S_{y1}) = 481$ psi
$F_{by} := 9168.29$ psi ⌝

$I_{byffu} := (f_{byffu}) \div (F_{by}) = 0.05$

$$\Delta_{yffu} := \frac{5 \cdot w_{ffu} \cdot L_b^{\,4}}{384\ E_{alum} \cdot I_{y1}} + \text{Max}\left(\frac{R_{ou} \cdot (6\text{ in})^2}{3\ E_{alum} \cdot I_{y1}} \cdot \left(6\text{ in} + \frac{3}{2} \cdot L_b\right), \frac{R_{ou} \cdot L_b^{\,2} \cdot 6\text{ in}}{8\ E_{alum} \cdot I_{y1}}\right) = 0\text{ in}$$

**Use 1.9185" x 4" x 1/8" thk Front Fascia**
*AL. channel as shown (6063-T5)*

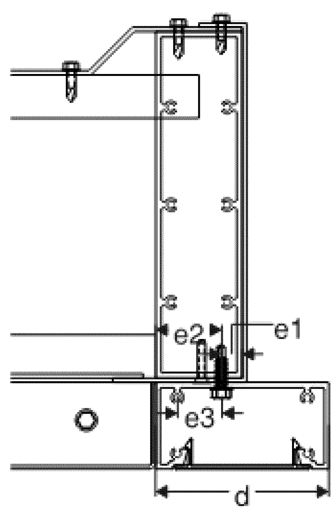
$\Delta_{yffuall} := (L_b) \div (120) = 0.12$ in

$I_{\Delta yffu} := (\Delta_{yffu}) \div (\Delta_{yffuall}) = 0.02$

**Local Bending:**

$L_{effff} := 0.5 \cdot L_b = 7.5$ in
$M_{wkff} := 23.56$ lbf·in ⌝
$$L_{reqff} := \frac{M_{wkff} \cdot 6}{14500\text{ psi} \cdot tw^2} = 0.62\text{ in}$$

$I_{wkffu} := (L_{reqff}) \div (L_{effff}) = 0.08$




### Check Fasteners (to Canopy):

**Fastener Type:** 1/4-20 (Cond. CW)

$n_f := 4$
$D_{ws} := 0.428$ in

**Tension Allowables:**

$T_{povrff} := 427$ lbf ⌝
$T_{poutcanopy} := 437.5$ lbf ⌝
$T_{fast} := 1061$ lbf ⌝
$T_{fall} := 427$ lbf ⌝
$T_{a2} := 100.86$ lbf ⌝

$I_{a2} := (T_{a2}) \div (T_{fall}) = 0.24$

**Use (2) 1/4"-20 S.S. Fasteners**
*to attach front fascia to canopy @ each end, then* ***(1) @*** **15** *" O.C. max.*
*300 Series (Fy = 65,000 psi)*

FRONT_FASCIA = [ "0.05 ≤ 1.00 ∴ PASS" ; "0.02 ≤ 1.00 ∴ PASS" ; "0.08 ≤ 1.00 ∴ PASS" ]

FRONT_FASCIA_TO_CANOPY_FASTENERS = [ "0.24 ≤ 1.00 ∴ PASS" ]

## *Loading Information:*

$W_{up} := 16\ psf$ *unfactored uplift*
$P_{light} := 5\ lbf$ *weight of light*

## *System Information:*

$L_{us} := 68\ in$ *underscore length*
$Light\_Spacing := 41\ in$
$Proj\_UF := 52\ in$ *underscore projection*
$Light\_Gap := 12.8\ in$
$W_{panel} = 42\ in$

(2) Infill Panel Stiffeners

***Underscore Panel:***

$t_p := 0.077\ in$ *panel thickness*

***Underscore Panel Stiffener:***

$L_{1s} := 1.75\ in$ *stiffener leg length*
$L_{2s} := 1.75\ in$ *stiffener leg length*
$t_s := 0.121\ in$ *stiffener thickness*

***Outrigger:***

$b_o := 1.9185\ in$ *outrigger width*
$d_o := 4\ in$ *outrigger depth*
$t_{of} := 0.1\ in$ *outrigger flange thickness*
$t_{ow} := 0.125\ in$ *outrigger web thickness*

***Rear Fascia:***

$b_{rf} := 1.9185\ in$ *rear fascia width*
$d_{rf} := 4\ in$ *rear fascia depth*
$t_{rff} := 0.1\ in$ *rear fascia flange thickness*
$t_{rfw} := 0.125\ in$ *rear fascia web thickness*

***Front Fascia:***

$b_{ff} := 1.9185\ in$ *front fascia width*
$d_{ff} := 6\ in$ *front fascia depth*
$t_{fff} := 0.1\ in$ *front fascia flange thickness*
$t_{ffw} := 0.125\ in$ *front fascia web thickness*

$W_{upASD} := 0.6 \cdot W_{up} = 9.6\ psf$

## Underscore Panel:

$t_p = 0.08$ in *panel thickness*
$N_s = 2$ *# of underfill stiffeners*
$Sp_{stiff} = 14.6$ in *stiffener spacing*

### Check Panel Bending:

$L_{effp} := 1$ in
$w_{panel} := W_{upASD} \cdot L_{effp} = 0.07$ pli

$L_{bpanel} = 14.6$ in
$$M_{ypanel} := \frac{w_{panel} \cdot L_{bpanel}^2}{8} = 1.78 \text{ lbf·in}$$
$F_{bpanel} := 11500$ psi
$$L_{reqp} := \frac{M_{ypanel} \cdot 6}{t_p^2 \cdot F_{bpanel}} = 0.16 \text{ in}$$

$I_{bpanel} := (L_{reqp}) \div (L_{effp}) = 0.16$

### Check Panel Deflection:

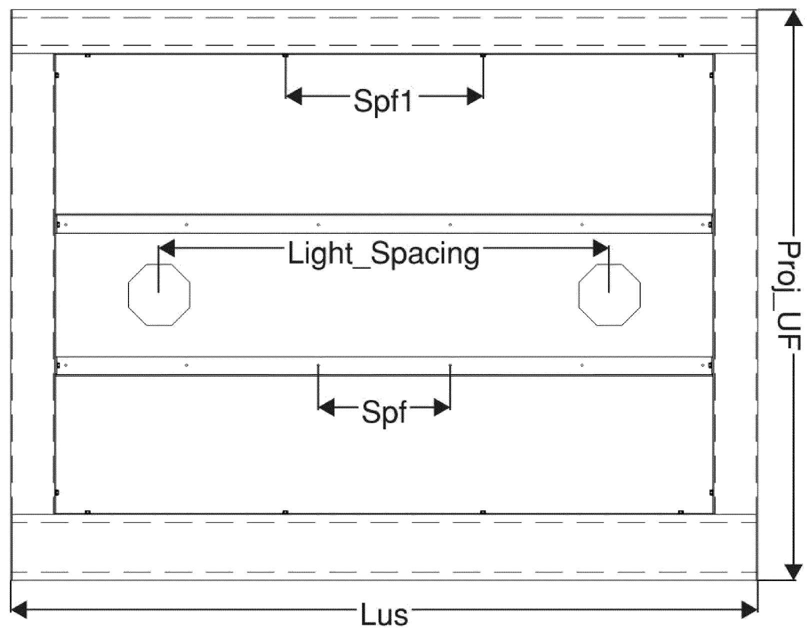
L/60 *Panel Deflection Criteria*

$$I_{yp} := \frac{t_p^3 \cdot L_{effp}}{12} = 0 \text{ in}^4$$
$$\Delta_{yp} := \frac{5 \cdot w_{panel} \cdot L_{bpanel}^4}{384\, E_{alum} \cdot I_{yp}} = 0.1 \text{ in}$$
$$\Delta_{ypall} := \frac{L_{bpanel}}{\text{Deflection Criteria}} = 0.24 \text{ in}$$

$I_{\Delta yp} := (\Delta_{yp}) \div (\Delta_{ypall}) = 0.42$

**Using L / 60 Deflection Limit:**
**Use 0.077 " Thick**
**Panel Type = 1100−H14 Aluminum**
**Maximum Span = 14.60"**

**Plan View:**




### Check Fasteners (to stiffeners):

**Fastener Size:** #10-16 (Cond. CW)

$t_s = 0.12$ in  $t_h := t_p$
$d_{es} := 0.5$ in  $d_{eh} := 0.875$ in
$D_h := 0.2525$ in  $Spf := 18$ in

**Stiffener:** 5052-H32  **Panel:** 1100-H14

$T_f := 1.25 \cdot 1.25 \cdot W_{upASD} \cdot T_{ws} \cdot Spf = 25.69$ lbf

$T_{fall} := 58.55$ lbf

$I_f := (T_f) \div (T_{fall}) = 0.44$

**Use #10-16 S.S. Countersunk Fasteners**
**18" o.c. max.** *to attach panel to stiffeners*
*300 Series Stainless Steel (Fy = 65,000 psi)*

### Check Fasteners (to front/rear fascia):

$D_{f1} := 0.25$ in  $Spf_1 := 18$ in
$V_{f1} := 1.25 \cdot W_{upASD} \cdot 0.5 \cdot T_{ws} \cdot Spf_1 = 10.28$ lbf
$R_{bearp} := 205.33$ lbf
$R_{bearf} := 266.67$ lbf
$V_{fall1} := 205.33$ lbf

$I_{f1} := (V_{f1}) \div (V_{fall1}) = 0.05$

**Use 1/4-20 S.S. Fasteners**
**18" o.c. max.** *to attach panel to frame*
*300 Series Stainless Steel (Fy = 65,000 psi)*

UNDERSCORE_PANEL = [ "0.16 ≤ 1.00 ∴ PASS" ; "0.42 ≤ 1.00 ∴ PASS" ]

PAN_TO_STIFF_FASTENERS = [ "0.44 ≤ 1.00 ∴ PASS" ]

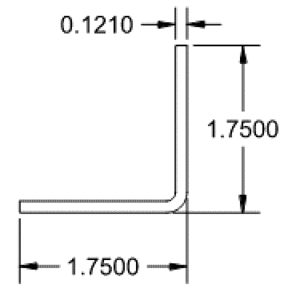
PAN_TO_FRAME_FASTENERS = [ "0.05 ≤ 1.00 ∴ PASS" ]

***Stiffener Angle:*** 5052-H32

$L_{1s} = 1.75\ in$
$L_{2s} = 1.75\ in$
$t_s = 0.121\ in$
$C_{bs} := 1.0$
$Alum_{Den} := 158\ pcf$

$L_{stiff} = 60\ in$ *stiffener length*
$T_{ws} = 13.7\ in$ *stiffener trib. width*
$W_{upASD} = 9.6\ psf$
$P_{light} = 5\ lbf$

"Stiffener Section Properties"
$A_s := 0.401\ in^2$
$I_{ys} := 0.12\ in^4$
$S_{xstop} := 0.096\ in^3$
$S_{xsbot} := 0.245\ in^3$
$J_s := 0.002\ in^4$




***Check Stiffener Bending:***

***Uplift:***

$w_{upstiff} := W_{upASD} \cdot T_{ws} = 0.91\ pli$

$$M_{xsu} := \frac{w_{upstiff} \cdot L_{stiff}^2}{8} = 411\ lbf \cdot in$$

$$f_{bxsu} := \frac{M_{xsu}}{S_{xsbot}} = 1677.55\ psi$$

$F_{bxsuF.5.a.2} = 9087.68\ psi$ *uniform compression local buckling*

$F_{bxsu} := 9087.68\ psi$

$I_{bsu} := (f_{bxsu}) \div (F_{bxsu}) = 0.18$

***Uplift Deflection:***

$$\Delta_{ysu} := \frac{5 \cdot w_{upstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} = 0.13\ in$$

$\Delta_{ysuall} := Min(1.5\ in, (L_{stiff}) \div (60)) = 1\ in$

$I_{\Delta ysu} := (\Delta_{ysu}) \div (\Delta_{ysuall}) = 0.13$

***Dead Load:***

$w_{DLstiff} := Alum_{Den} \cdot (A_s + t_p \cdot T_{ws}) = 0.13\ pli$

$$M_{xsDL} := \frac{w_{DLstiff} \cdot L_{stiff}^2}{8} + P_{light} \cdot \left(\frac{L_{stiff} - Light\_Spacing}{2}\right) = 107.4\ lbf \cdot in$$

$$f_{bxsDL} := \frac{M_{xsDL}}{S_{xstop}} = 1118.79\ psi$$

$F_{bxsDLF.5.a.1} = 10685.01\ psi$ *leg tip max. compression local buckling*

$F_{bxsDLLTB} = 23146.8\ psi$ *leg tip max. compression LTB*

$F_{bxsDL} := 10685.01\ psi$

$I_{bsDL} := (f_{bxsDL}) \div (F_{bxsDL}) = 0.1$

***Dead Load Deflection:***

$$\Delta_{ysDL} = \frac{5 \cdot w_{DLstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} + \frac{P_{light} \cdot a}{24\ E_{alum} \cdot I_{ys}} \cdot (3 \cdot L_{stiff}^2 - 4 \cdot a^2) = 0.04\ in$$

$\Delta_{ysDLall} := Min(1.5\ in, (L_{stiff}) \div (60)) = 1\ in$

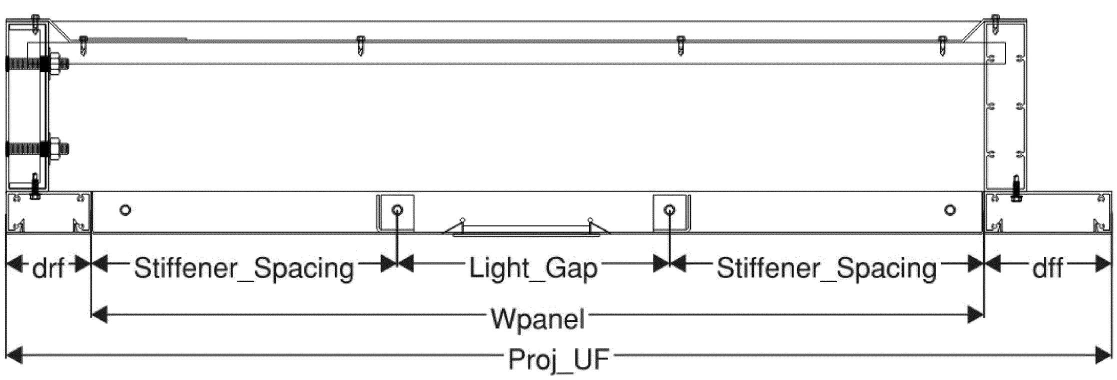
$I_{\Delta ysDL} := (\Delta_{ysDL}) \div (\Delta_{ysDLall}) = 0.04$

***Check Stiffener Fasteners:***

$R_s := Max(0.5 \cdot w_{upstiff} \cdot L_{stiff}, 0.5 \cdot w_{DLstiff} \cdot L_{stiff} + 2 \cdot P_{light}) = 27.4\ lbf$

$V_{falls} := 443.67\ lbf$

$I_{fs} := (R_s) \div (V_{falls}) = 0.06$




***Use (2) 1-3/4" x 1-3/4" x 0.121" Formed Alum. Angles***
*Spaced* **14.6** *" max. from front/rear frame & (***2***) each side of light hole,* **12.8** *" max. (centered by light) as shown (5052-H32)*

***Use 1/4-20 S.S. Fasteners @ Stiffener Ends***
*300 Series Stainless Steel (Fy = 65,000 psi)*

STIFFENER = [ "0.18 ≤ 1.00 ∴ PASS" ; "0.13 ≤ 1.00 ∴ PASS" ; "0.1 ≤ 1.00 ∴ PASS" ; "0.04 ≤ 1.00 ∴ PASS" ]

STIFF_TO_FRAME_FASTENERS = [ "0.06 ≤ 1.00 ∴ PASS" ]

## OUTRIGGER

### System Data:

$Proj\_UF = 52$ in
$W_{upASD} = 9.6$ psf

☐ Welded within 1 inch of Mmax

**Outrigger Shape:** Channel
**Outrigger Material:** 6063-T5
**Frame Fascia Material:** 6063-T5

### Outrigger Data:

$b := b_o = 1.92$ in  $L := W_{panel} = 42$ in
$d := d_o = 4$ in  $L_b := L$
$tw := t_{ow} = 0.12$ in  $E_{alum} = 10100000$ psi
$tf := t_{of} = 0.1$ in

### Section Properties:

$I_{x1} = 2.82$ in⁴  $A_1 = 1.2$ in²
$I_{y1} = 0.63$ in⁴  $J_1 = 0.01$ in⁴
$S_{x1} = 1.41$ in³  $Z_{x1} = 1.71$ in³
$S_{y1} = 0.52$ in³  $Z_{y1} = 0.74$ in³

## CALCULATIONS

### Check Outrigger:

$w_{ou} := d_o \cdot W_{upASD} = 0.27$ pli

$R_s = 27.4$ lbf
$j := 1$
while $j \cdot \frac{W_{panel}}{N_s + 1} < \frac{W_{panel}}{2}$
  $x_j := j$
  $j := j + 1$

**Uplift:**

$M_{you} := 458.84$ lbf·in

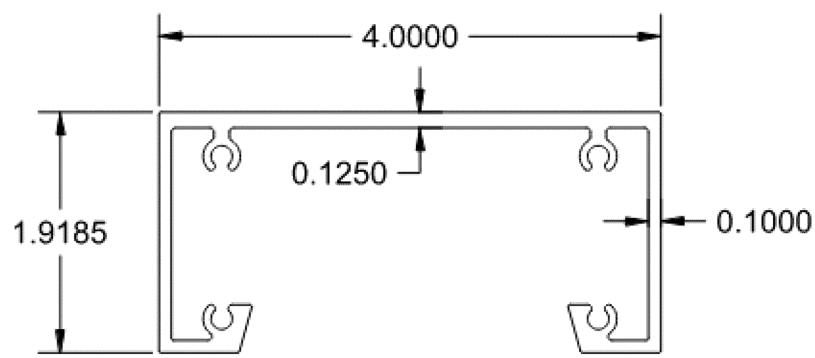
$f_{byou} := (M_{you}) \div (S_{y1}) = 877$ psi

$F_{by} := 9168.29$ psi

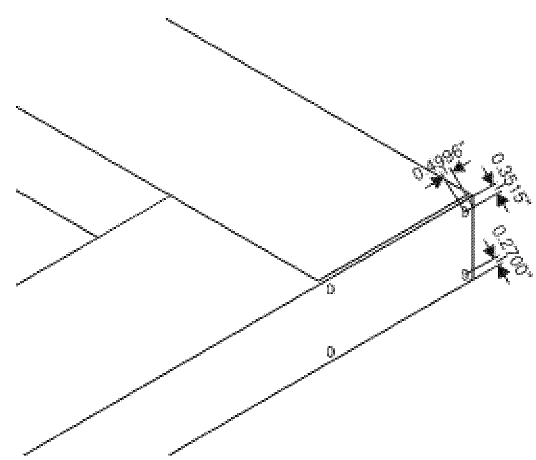
$I_{byou} := (f_{byou}) \div (F_{by}) = 0.1$

$\Delta_{you} := 0.01$ in
$\Delta_{youall} := (L) \div (120) = 0.35$ in

$I_{\Delta you} := (\Delta_{you}) \div (\Delta_{youall}) = 0.04$




**Use 1.9185" x 4" x 1/8" thk Outrigger**
*AL. channel as shown (6063-T5)*




### Check Fasteners (to Fascia Frame):

**Fastener Type:** #10-16 (Cond. CW)

$n_f := 4$
$d_e := 0.27$ in

**Shear Allowables:**

$V_{bearoutrigger} := 198$ lbf
$V_{bearfascia} := 198$ lbf
$V_{fast} := 275$ lbf
$V_{fall} := 198$ lbf

$R_{ou} := \frac{N_s \cdot R_s + w_{ou} \cdot L}{2} = 33$ lbf

$V_{fou} := (R_{ou}) \div (0.5 \cdot n_f) = 16.5$ lbf

$I_{fou} := (V_{fou}) \div (V_{fall}) = 0.08$

**Use (4) #10 S.S. Fasteners**
*to attach outrigger to fascia frame as shown*
*5/8" min. thread engagement into fascia screw chase*
*300 Series (Fy = 65,000 psi)*

$OUTRIGGER = \begin{bmatrix} \text{"0.1 ≤ 1.00 ∴ PASS"} \\ \text{"0.04 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

$OUTRIGGER\_TO\_FRAME\_FASTENERS = [\text{"0.08 ≤ 1.00 ∴ PASS"}]$

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 48" Underscore

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 5.04
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## REAR FASCIA

### System Data:

$Proj\_UF = 52$ in

$W_{upASD} = 9.6$ psf

$e1 := 1.3703$ in

$e2 := 0.6297$ in

$e3 := 0.8707$ in

☐ Welded within 1 inch of Mmax

**Rear Fascia Shape:** Channel

**Rear Fascia Material:** 6063-T5

**Canopy Material:** 6005-T5

### Rear Fascia Data:

$b := b_{rf} = 1.92$ in    $L := L_{us} = 68$ in

$d := d_{rf} = 4$ in    $L_b := 15$ in

$tw := t_{rfw} = 0.12$ in    $E_{alum} = 10100000$ psi

$tf := t_{rff} = 0.1$ in

### Section Properties:

$I_{x1} = 2.82\ in^4$    $A_1 = 1.2\ in^2$

$I_{y1} = 0.63\ in^4$    $J_1 = 0.01\ in^4$

$S_{x1} = 1.41\ in^3$    $Z_{x1} = 1.71\ in^3$

$S_{y1} = 0.52\ in^3$    $Z_{y1} = 0.74\ in^3$

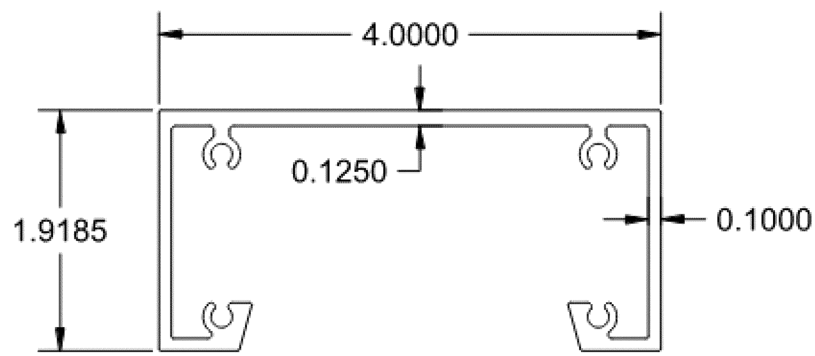
## CALCULATIONS

### Check Rear Fascia:

$T_{wRF} = 11.3$ in  *rear fascia trib. width*

$w_{rfu} := T_{wRF} \cdot W_{upASD} = 0.75$ pli

$R_{ou} = 33$ lbf




**Uplift:**

$M_{yrfu} := 216.16$ lbf·in

$f_{byrfu} := (M_{yrfu}) \div (S_{y1}) = 413$ psi

$F_{by} := 9168.29$ psi

$I_{byrfu} := (f_{byrfu}) \div (F_{by}) = 0.05$

$$\Delta_{yrfu} := \frac{5 \cdot w_{rfu} \cdot L_b^{\,4}}{384\ E_{alum} \cdot I_{y1}} + \mathrm{Max}\left(\frac{R_{ou} \cdot (6\ in)^2}{3\ E_{alum} \cdot I_{y1}} \cdot \left(6\ in + \frac{3}{2} \cdot L_b\right), \frac{R_{ou} \cdot L_b^{\,2} \cdot 6\ in}{8\ E_{alum} \cdot I_{y1}}\right) = 0\ in$$

**Use 1.9185" x 4" x 1/8" thk Rear Fascia**
*AL. channel as shown (6063-T5)*

$\Delta_{yrfuall} := (L_b) \div (120) = 0.12$ in

$I_{\Delta yrfu} := (\Delta_{yrfu}) \div (\Delta_{yrfuall}) = 0.01$

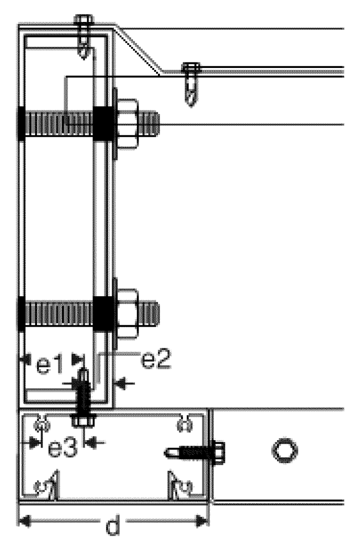
**Local Bending:**

$L_{effrf} := 0.5 \cdot L_b = 7.5$ in

$M_{wkrf} := 33.96$ lbf·in

$$L_{reqrf} := \frac{M_{wkrf} \cdot 6}{14500\ psi \cdot tw^2} = 0.9\ in$$

$I_{wkrfu} := (L_{reqrf}) \div (L_{effrf}) = 0.12$




### Check Fasteners (to Canopy):

**Fastener Type:** 1/4-20 (Cond. CW)

$n_f := 4$

$D_{ws} := 0.428$ in

**Tension Allowables:**

$T_{povrrf} := 427$ lbf

$T_{poutcanopy} := 437.5$ lbf

$T_{fast} := 1061$ lbf

$T_{fall} := 427$ lbf

$T_{a1} := 116.33$ lbf

$I_{a1} := (T_{a1}) \div (T_{fall}) = 0.27$

**Use (2) 1/4"-20 S.S. Fasteners**
*to attach rear fascia to canopy @ each end, then* **(1) @ 15** *" O.C. max.*
*300 Series (Fy = 65,000 psi)*

REAR_FASCIA = [ "0.05 ≤ 1.00 ∴ PASS" ; "0.01 ≤ 1.00 ∴ PASS" ; "0.12 ≤ 1.00 ∴ PASS" ]

REAR_FASCIA_TO_CANOPY_FASTENERS = [ "0.27 ≤ 1.00 ∴ PASS" ]

## FRONT FASCIA

**System Data:**

$Proj\_UF = 52$ in
$W_{upASD} = 9.6$ psf

$e1 := 0.4831$ in
$e2 := 1.5169$ in
$e3 := 1.0170$ in

☐ Welded within 1 inch of Mmax

**Rear Fascia Shape:** Channel
**Rear Fascia Material:** 6063-T5
**Canopy Material:** 6005-T5

**Front Fascia Data:**

$b := b_{ff} = 1.92$ in  $L := L_{us} = 68$ in
$d := d_{ff} = 6$ in  $L_b := 15$ in
$tw := t_{ffw} = 0.12$ in  $E_{alum} = 10100000$ psi
$tf := t_{fff} = 0.1$ in

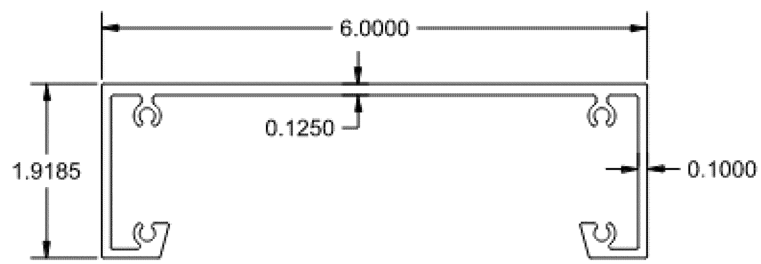
**Section Properties:**

$I_{x1} = 7.52$ in⁴  $A_1 = 1.45$ in²
$I_{y1} = 0.72$ in⁴  $J_1 = 0.01$ in⁴
$S_{x1} = 2.51$ in³  $Z_{x1} = 3.03$ in³
$S_{y1} = 0.55$ in³  $Z_{y1} = 0.78$ in³

## CALCULATIONS

**Check Front Fascia:**

$T_{wFF} = 11.3$ in rear fascia trib. width
$w_{ffu} := T_{wFF} \cdot W_{upASD} = 0.89$ pli
$R_{ou} = 33$ lbf




**Uplift:**

$M_{yffu} := 219.38$ lbf·in
$f_{byffu} := (M_{yffu}) \div (S_{y1}) = 403$ psi
$F_{by} := 7836.66$ psi

$I_{byffu} := (f_{byffu}) \div (F_{by}) = 0.05$

$$\Delta_{yffu} := \frac{5 \cdot w_{ffu} \cdot L_b^{\,4}}{384\, E_{alum} \cdot I_{y1}} + \text{Max}\left(\frac{R_{ou} \cdot (6\text{ in})^2}{3\, E_{alum} \cdot I_{y1}} \cdot \left(6\text{ in} + \frac{3}{2} \cdot L_b\right), \frac{R_{ou} \cdot L_b^{\,2} \cdot 6\text{ in}}{8\, E_{alum} \cdot I_{y1}}\right) = 0\text{ in}$$

**Use 1.9185" x 6" x 1/8" thk Front Fascia**
*AL. channel as shown (6063-T5)*

$\Delta_{yffuall} := (L_b) \div (120) = 0.12$ in

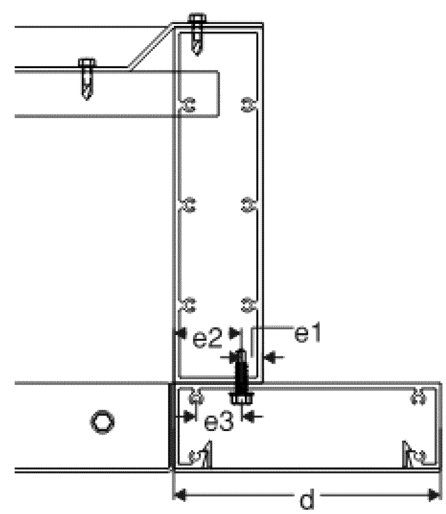
$I_{\Delta yffu} := (\Delta_{yffu}) \div (\Delta_{yffuall}) = 0.01$

**Local Bending:**

$L_{effff} := 0.5 \cdot L_b = 7.5$ in
$M_{wkff} := 68.15$ lbf·in

$$L_{reqff} := \frac{M_{wkff} \cdot 6}{14500\text{ psi} \cdot tw^2} = 1.8\text{ in}$$

$I_{wkffu} := (L_{reqff}) \div (L_{effff}) = 0.24$




**Check Fasteners (to Canopy):**

**Fastener Type:** 1/4-20 (Cond. CW)

$n_f := 4$
$D_{ws} := 0.428$ in

**Tension Allowables:**

$T_{povrff} := 427$ lbf
$T_{poutcanopy} := 437.5$ lbf
$T_{fast} := 1061$ lbf
$T_{fall} := 427$ lbf
$T_{a2} := 145.64$ lbf

$I_{a2} := (T_{a2}) \div (T_{fall}) = 0.34$

**Use (2) 1/4"-20 S.S. Fasteners**
*to attach front fascia to canopy @ each end, then* **(1) @ 15** *" O.C. max.*
*300 Series (Fy = 65,000 psi)*

FRONT_FASCIA = [ "0.05 ≤ 1.00 ∴ PASS" ; "0.01 ≤ 1.00 ∴ PASS" ; "0.24 ≤ 1.00 ∴ PASS" ]

FRONT_FASCIA_TO_CANOPY_FASTENERS = [ "0.34 ≤ 1.00 ∴ PASS" ]

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.00
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## Loading Information:

| | |
|---|---|
| $DL_{dn} := 44\ psf$ | *worst case downward load* |
| $LC6 := 30.31\ psf$ | *load case 6 w/o drift (from design load template)* |
| $DL_{up} := 6\ psf$ | *uplift load* |
| $WL_{Lat} := 10\ psf$ | *lateral wind load* |
| $DeadL := 7.36\ psf$ | *dead load* |
| $S_b := 21\ psf$ | *balanced snow load* |
| $P_{d1} := 31.05\ psf$ | *snow drift (at wall)* |
| $P_{d2} := 0\ psf$ | *snow drift (at front fascia)* |

**RISA Load Combinations:**

***LC1*** *- Dead Load* ***(DL)***
***LC2*** *- Lateral Wind Load* ***(WLx)***
***LC3*** *- Lateral Wind Load* ***(WLz)***
***LC4*** *- Snow Drift Load* ***(DL + Sb + Sd)***
***LC5*** *- Balanced Snow Load* ***(DL + 0.75(0.6WLdn) + 0.75Sb)***
***LC6*** *- Snow Drift Load (One Side)* ***[DL + Sb + Sd(One Side)]***

## RISA Corner Member Labels:

$Outrigger := \begin{bmatrix} M1 \\ M2 \end{bmatrix}$  $Corner\_Outrigger := [M3]$  $Rear\_Fascia := \begin{bmatrix} M4 \\ M5 \end{bmatrix}$  $Front\_Fascia := \begin{bmatrix} M6 \\ M7 \end{bmatrix}$

$Outrigger_\Delta := \begin{bmatrix} M1_{Def} \\ M2_{Def} \end{bmatrix}$  $Corner\_Outrigger_\Delta := [M3_{Def}]$  $Rear\_Fascia_\Delta := \begin{bmatrix} M4_{Def} \\ M5_{Def} \end{bmatrix}$  $Front\_Fascia_\Delta := \begin{bmatrix} M6_{Def} \\ M7_{Def} \end{bmatrix}$

## System Information:

☐ Standalone   ☑ Soffit Panel

| | |
|---|---|
| $L_t := 138.67\ in$ | *Total canopy length* |
| $L_{cant} := 44\ in$ | *Cantilevered canopy length* |
| $L_c := L_t - L_{cant} = 94.67\ in$ | *Intermediate canopy length* |
| $Proj := 36\ in$ | *canopy projection* |
| $L_{rf} := 8\ in$ | *rear fascia length* |
| $L_{co} := 50.9125\ in$ | *corner outrigger length* |

## Member Section Information:

**Top Panel:**

| | |
|---|---|
| $t_p := 0.1\ in$ | *panel thickness* |

**Panel Stiffener:**

| | |
|---|---|
| $b_s := 1\ in$ | *stiffener width* |
| $d_s := 1\ in$ | *stiffener depth* |
| $t_s := 0.125\ in$ | *stiffener thickness* |

**Front Fascia:**

| | |
|---|---|
| $b_{ff} := 2\ in$ | *front fascia width* |
| $d_{ff} := 8\ in$ | *front fascia depth* |
| $t_{ff} := 0.125\ in$ | *front fascia thickness* |

**Rear Fascia:**

| | |
|---|---|
| $b_{rf} := 2\ in$ | *rear fascia width* |
| $d_{rf} := 8\ in$ | *rear fascia depth* |
| $t_{rf} := 0.125\ in$ | *rear fascia thickness* |

**End Outrigger:**

| | |
|---|---|
| $b_{eo} := 2\ in$ | *end outrigger width* |
| $d_{eo} := 8\ in$ | *end outrigger depth* |
| $t_{eo} := 0.125\ in$ | *end outrigger thickness* |

**Intermediate Outrigger:**

| | |
|---|---|
| $b_{io} := 2\ in$ | *intermediate outrigger width* |
| $d_{io} := 6\ in$ | *intermediate outrigger depth* |
| $t_{io} := 0.125\ in$ | *intermediate outrigger thickness* |

**Anchor Channel Bracket:**

| | |
|---|---|
| $b_{cb} := 1.6913\ in$ | *anchor channel flange length* |
| $d_{cb} := 5.6937\ in$ | *anchor channel depth* |
| $t_{cb} := 0.25\ in$ | *anchor channel thickness* |

## RISA Corner Member Data:

**Corner Front Fascia:**

$Axial_{cff} := 13.82\ lbf$  $\Delta_{xcff} := 0.102\ in$
$V_{ycff} := 139.4\ lbf$  $\Delta_{ycff} := 0.001\ in$
$V_{zcff} := 17.17\ lbf$
$Tor_{cff} := 785.18\ lbf \cdot in$  $b_{cff} := b_{ff}$
$M_{ycff} := 97.4\ lbf \cdot in$  $d_{cff} := d_{ff}$
$M_{zcff} := 4802.22\ lbf \cdot in$  $t_{cff} := t_{ff}$

**Corner Rear Fascia:**

$Axial_{crf} := 2.78\ lbf$  $\Delta_{xcrf} := 0.007\ in$
$V_{ycrf} := 48.37\ lbf$  $\Delta_{ycrf} := 0$
$V_{zcrf} := 1.9\ lbf$
$Tor_{crf} := 2237.92\ lbf \cdot in$  $b_{crf} := b_{rf}$
$M_{ycrf} := 25.26\ lbf \cdot in$  $d_{crf} := d_{rf}$
$M_{zcrf} := 349.76\ lbf \cdot in$  $t_{crf} := t_{rf}$

**Adjacent Corner Outriggers:**

$Axial_{ao} := 16.45\ lbf$  $\Delta_{xao} := 0.001\ in$
$V_{yao} := 183.64\ lbf$  $\Delta_{yao} := 0$
$V_{zao} := 13.82\ lbf$
$Tor_{ao} := 0$  $b_{ao} := b_{eo}$
$M_{yao} := 82.64\ lbf \cdot in$  $d_{ao} := d_{eo}$
$M_{zao} := 2237.92\ lbf \cdot in$  $t_{ao} := t_{eo}$

**Corner Outriggers:**

$Axial_{co} := 3.06\ lbf$  $\Delta_{xco} := 0.102\ in$
$V_{yco} := 177.94\ lbf$  $\Delta_{yco} := 0.001\ in$
$V_{zco} := 1.68\ lbf$
$Tor_{co} := 4802.22\ lbf \cdot in$  $b_{co} := b_{eo}$
$M_{yco} := 56.26\ lbf \cdot in$  $d_{co} := d_{eo}$
$M_{zco} := 5680.95\ lbf \cdot in$  $t_{co} := t_{eo}$

## RISA Corner Thru-Bolt Reactions:

**Snow Drift Load (RISA LC4):**

$R_{yN7Drift} := -101.82\ lbf$
$R_{yN8Drift} := 38.51\ lbf$
$R_{yN9Drift} := 325.28\ lbf$
$R_{yN10Drift} := -101.82\ lbf$
$R_{yN11Drift} := 38.51\ lbf$
$R_{yN12Drift} := 325.28\ lbf$

**Balanced Snow Load (RISA LC5):**

$R_{yN7Bal} := -103.26\ lbf$
$R_{yN8Bal} := 30.47\ lbf$
$R_{yN9Bal} := 269.81\ lbf$
$R_{yN10Bal} := -103.26\ lbf$
$R_{yN11Bal} := 30.47\ lbf$
$R_{yN12Bal} := 269.81\ lbf$

**Snow Drift Load ( One Side RISA LC6):**

$R_{yN7DriftOS} := -92.4\ lbf$
$R_{yN8DriftOS} := 36.47\ lbf$
$R_{yN9DriftOS} := 295.14\ lbf$
$R_{yN10DriftOS} := -106.04\ lbf$
$R_{yN11DriftOS} := 30.54\ lbf$
$R_{yN12DriftOS} := 282.59\ lbf$

$W_{upASD} = 10.42\ psf$

## *36" Projection System:*

$L_c = 94.67$ in
$Proj = 36$ in
$t_p = 0.1$ in
$L_{eff} := 1$ in

$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$q := \text{Max}\left(DL_{dn}, DL_{up}\right) = 44$ psf

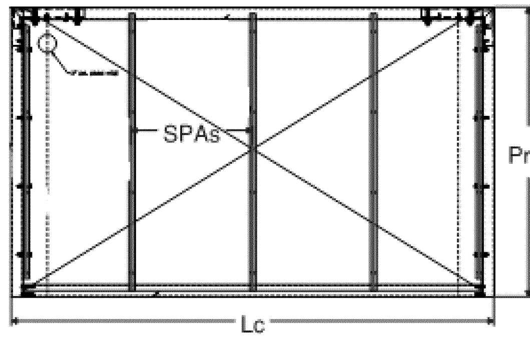
***Number of Intermediate Stiffeners***:

- ○ 1 Int. Stiffener
- ○ 2 Int. Stiffeners
- ◉ 3 Int. Stiffeners
- ○ 4 Int. Stiffeners
- ○ 5 Int. Stiffeners

[L/60 ▾] Panel Deflection Criteria

$SPA_s := 22.67$ in Panel Stiffener Spacing

***Standalone Reference:***




### *Check Panel:*

$coef_q := [\ 0\ 12.5\ 25\ 50\ 75\ 100\ 125\ 150\ 175\ 200\ 250\ ]^T$

$coef_y := [\ 0\ 0.62\ 0.88\ 1.18\ 1.37\ 1.53\ 1.68\ 1.77\ 1.88\ 1.96\ 2.12\ ]^T$

$coef_{\sigma d} := [\ 0\ 1.06\ 2.11\ 3.78\ 5.18\ 6.41\ 7.65\ 8.6\ 9.55\ 10.6\ 12.3\ ]^T$

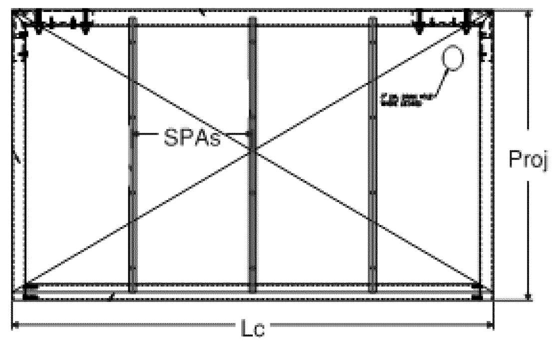
$coef_{\sigma} := [\ 0\ 4.48\ 6.81\ 9.92\ 12.25\ 14.22\ 16\ 17.5\ 18.9\ 20.3\ 22.8\ ]^T$

$\sigma_{all} := 8205.13$ psi - Allowable Stress, used for Design

$y_{all} := 0.38$ in - Allowable Deflection

The relations among load, deflection and stress are expressed by numerical values of the dimensionless coefficients shown below (It is assumed that v is equal to or near 0.316):

***Multi-Span Reference:***




$$coef_q = \frac{q_{adj} \cdot b^4}{E \cdot t^4} \qquad coef_y = \frac{y}{t}$$

$$coef_{\sigma d} = \frac{\sigma_d \cdot b^2}{E \cdot t^2} \qquad coef_{\sigma} = \frac{\sigma \cdot b^2}{E \cdot t^2}$$

The collected data for these coefficients is listed below. For any given value of qb⁴/Et⁴, values for the other three coefficients may be interpolated.

$$y_{act} = \text{linterp}\left(coef_q, coef_y, \frac{q \cdot b^4}{E \cdot t_{.1}^4}\right) \cdot t_{.1} \cdot 1.5$$

$y_{act} := 0.21$ in
$y_{all} = 0.38$ in

$$\sigma_d := \text{linterp}\left(coef_q, coef_{\sigma d}, \frac{q \cdot \left(SPA_s\right)^4}{E_{alum} \cdot t_p^4}\right) \cdot \left(\frac{E_{alum} \cdot t_p^2}{\left(SPA_s\right)^2}\right)$$

$\sigma_d = 1065.32$ psi
$\sigma_{all} = 8205$ psi

$$\sigma := \left(\text{linterp}\left(coef_q, coef_{\sigma}, \frac{q \cdot \left(SPA_s\right)^4}{E_{alum} \cdot t_p^4}\right) \cdot \frac{E_{alum} \cdot t_p^2}{\left(SPA_s\right)^2}\right)$$

$\sigma = 2483.4$ psi
$\sigma_{all} = 8205$ psi

***Using L / 60 Deflection Limit:***
***Use* 0.100 " *Thick***
***Panel Type =* 1100−H14 Aluminum**
***Maximum Span =* 22.67"**

$$PANEL := \text{stack}\left(I_{\Delta}, I_{\sigma d}, I_{\sigma}\right) = \begin{bmatrix} \text{"0.56} \le \text{1.00 ∴ PASS"} \\ \text{"0.13} \le \text{1.00 ∴ PASS"} \\ \text{"0.3} \le \text{1.00 ∴ PASS"} \end{bmatrix}$$

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.02
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

***Check Panel Fasteners (to Stiffener):***

***Fastener Type:*** #12-14 (Cond. CW)

***Stiffener Material:*** 6061-T6

$D_{ws} := 0.305\ in$ $SP_f := 12\ in$ $d_e := 0.5\ in$ $t_s = 0.125\ in$

***Shear Allowables:***

$V_{bearstiffener} := 684\ lbf$
$V_{bearpanel} := 230.4\ lbf$
$V_{fast} := 373\ lbf$
$V_{fall} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutstiffener} := 378\ lbf$
$T_{povrpanel} := 221.67\ lbf$
$T_{fast} := 645\ lbf$
$T_{fall} := 221.67\ lbf$

$w_{dl} := q \cdot SPA_s = 6.93\ pli$

$T_f := 1.25 \cdot w_{dl} \cdot SP_f = 103.89\ lbf$

$$I_f := \frac{T_f}{T_{fall}} = 0.47$$

***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to stiffener as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into stiffener on load bearing length of fastener per manufacturer specifications.*

***Check Panel Fasteners (to Outriggers):***

***Fastener Type:*** #12-14 (Cond. CW)

***Outrigger Material:*** 6005-T5

$D_{ws1} := 0.305\ in$ $SP_{f1} := 12\ in$ $d_{e1} := 0.5\ in$ $t_{io} = 0.12\ in$

***Shear Allowables:***

$V_{bearoutrigger} := 684\ lbf$
$V_{bearpanel1} := 230.4\ lbf$
$V_{fast1} := 373\ lbf$
$V_{fall1} := 230.4\ lbf$

***Tension Allowables:***

$T_{poutoutrigger} := 378\ lbf$
$T_{povrpanel1} := 221.67\ lbf$
$T_{fast1} := 645\ lbf$
$T_{fall1} := 221.67\ lbf$

$w_{dl1} := q \cdot 0.5 \cdot SPA_s = 3.46\ pli$

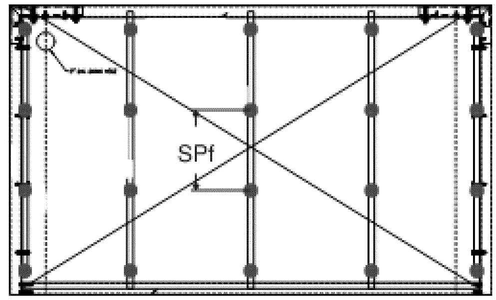
$T_{f1} := 1.25 \cdot w_{dl1} \cdot SP_{f1} = 51.95\ lbf$

$$I_{f1} := \frac{T_{f1}}{T_{fall1}} = 0.23$$

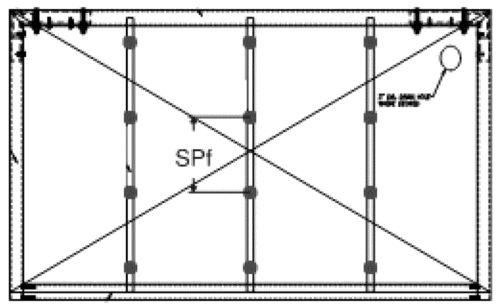
***Use #12-14 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to outrigger as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into outrigger on load bearing length of fastener per manufacturer specifications.*

***** Multi-span systems only *****

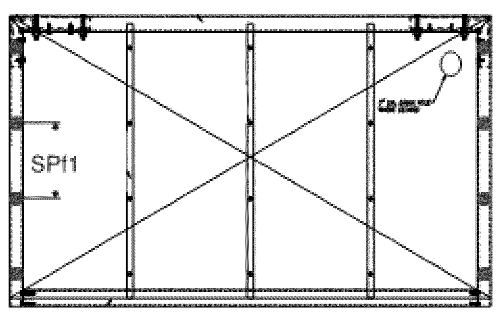
***Standalone Reference:***




***Multi-Span Reference:***




***Multi-Span Reference:***



***Check Panel Fasteners (to Front/Rear Fascia):***

***Fastener Type:*** #12-24 (Cond. CW)

***Fascia Material:*** 6005-T5

$D_{ws2} := 0.305$ in $SP_{f2} := 12$ in $d_{e2} := 0.5$ in $t_f := 0.125$ in

***Shear Allowables:***

$V_{bearfascia} := 684$ lbf

$V_{bearpanel2} := 230.4$ lbf

$V_{fast2} := 411$ lbf

$V_{fall12} := 230.4$ lbf

***Tension Allowables:***

$T_{poutfascia} := 378$ lbf

$T_{povrpanel2} := 241.5$ lbf

$T_{fast2} := 805$ lbf

$T_{fall2} := 241.5$ lbf

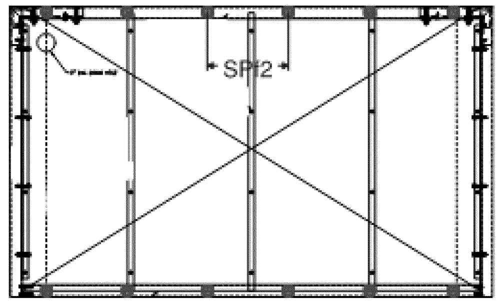
$w_{dl2} := q \cdot 0.5 \cdot SPA_s = 3.46$ pli

$T_{f2} := 1.25 \cdot w_{dl2} \cdot SP_{f2} = 51.95$ lbf

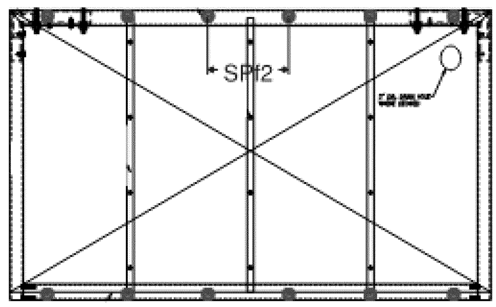
$$I_{f2} := \frac{T_{f2}}{T_{fall2}} = 0.22$$

***Use #12-24 S.S. Fasteners***
***12" o.c. max.*** *to attach panel to front/rear fascia as shown*
*300 Series (Fy = 65,000 psi)*
*Min. 1/2" edge/end distance w/ full engagement into outrigger on load bearing length of fastener per manufacturer specifications.*

***Standalone Reference:***




***Multi-Span Reference:***




$$PANEL\_FASTENERS := stack(I_f, I_{f1}, I_{f2}) = \begin{bmatrix} \text{"0.47 ≤ 1.00 ∴ PASS"} \\ \text{"0.23 ≤ 1.00 ∴ PASS"} \\ \text{"0.22 ≤ 1.00 ∴ PASS"} \end{bmatrix}$$

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.04
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## PANEL STIFFENER

### System Data:

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in

### Fascia Data:

$t_f := \text{Min}(t_{ff}, t_{rf}) = 0.12$ in

### Stiffener Data:

$b := b_s = 1$ in
$d := d_s = 1$ in
$t := t_s = 0.12$ in
$L := Proj - 4\text{ in} = 32$ in
$L_b := L$
$E_{alum} = 10100000$ psi

### Outrigger Material:

6005-T5

$d_e := 0.5$ in  $t_o := t_{eo} = 0.12$ in

### Section Properties:

$I_{x1} = 0.06$ in⁴  $A_1 = 0.44$ in²
$I_{y1} = 0.06$ in⁴  $J_1 = 0.08$ in⁴
$S_{x1} = 0.11$ in³  $Z_{x1} = 0.14$ in³
$S_{y1} = 0.11$ in³  $Z_{y1} = 0.14$ in³

### Stiffener Shape:

Rectangular Tube

### Stiffener Material:

6061-T6

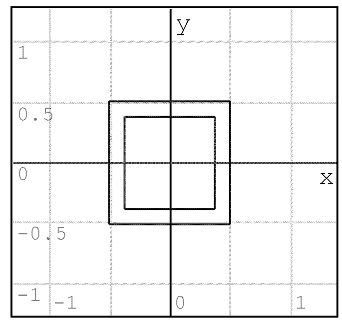
### Fascia Material:

6005-T5

## CALCULATIONS

$a = 11.33$ in
$TL := \text{Max}(DL_{dn}, DL_{up}) = 44$ psf
$w_x := TL \cdot SPA_s = 6.93$ pli

$R_{sRLC3} := 78.86$ lbf *LC3 stiffener reaction (rear fascia)*
$R_{sFLC3} := 63.9$ lbf *LC3 stiffener reaction (front fascia)*
$R_{sLC6} := 49.3$ lbf *LC6 stiffener reaction*




### Check Panel Stiffener:

$M_x := 738.27$ lbf·in
$f_{bx} := (M_x) \div (S_{x1}) = 6480$ psi
$F_{bx} := 21212.12$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.31$

$\Delta_x := 0.13$ in
$\Delta_{xall} := (L) \div (60) = 0.53$ in

$I_\Delta := (\Delta_x) \div (\Delta_{xall}) = 0.25$

### Check Stiffener Bearing on Fascia:

$R_{bear} := \text{Max}(R_{sRLC3}, R_{sFLC3}, R_{sLC6}) = 78.86$ lbf

$A_{bear} := b_s \cdot \text{Min}(t_{ff}, t_{rf}) = 0.12$ in²

$$R_{ball} := \frac{1.33 \cdot ADM\_F_{tu}(alloy_3, 0) \cdot A_{bear}}{1.95} = 3239.74 \text{ lbf}$$

$I_{bear} := (R_{bear}) \div (R_{ball}) = 0.02$

**Use 1" x 1" x 1/8" thk @ 22.67" o.c.**
*AL. tube as shown (6061-T6)*

### Check Fasteners (to Outrigger):

**Fastener Type:** 1/4-14" (Cond. CW)

$SP_f := 12$ in
$D_{ws} := 0.428$ in

$V_f := 1.25 \cdot 0.5 \cdot w_x \cdot SP_f = 51.95$ lbf

$$T_f := \frac{V_f \cdot 0.5 \cdot b}{0.5 \cdot d} = 51.95 \text{ lbf}$$

**Shear Allowables:**

$V_{bearstiffener} := 791.67$ lbf
$V_{bearoutrigger} := 791.67$ lbf
$V_{fast} := 517$ lbf
$V_{fall} := 517$ lbf

**Tension Allowables:**

$T_{povrstiffener} := 934.06$ lbf
$T_{poutoutrigger} := 437.5$ lbf
$T_{fast} := 896$ lbf
$T_{fall} := 437.5$ lbf

$$I_f := \left(\frac{V_f}{V_{fall}}\right)^2 + \left(\frac{T_f}{T_{fall}}\right)^2 = 0.02$$

### Check Fastener Tilting (to Outrigger):

$$R_{tilt} := \frac{4.2 \cdot \sqrt{(t_{eo}{}^3 \cdot Dia_{b1})} \cdot ADM\_F_{tu}(alloy_3, 0)}{3} = 1175.57 \text{ lbf}$$

$I_{tilt} := (V_f) \div (R_{tilt}) = 0.04$

**Use 1/4-14 S.S. Fasteners**
**12" o.c. max.** *to attach stiffener to outrigger as shown*
*300 Series (Fy = 65,000 psi)*

*** Standalone systems only ***

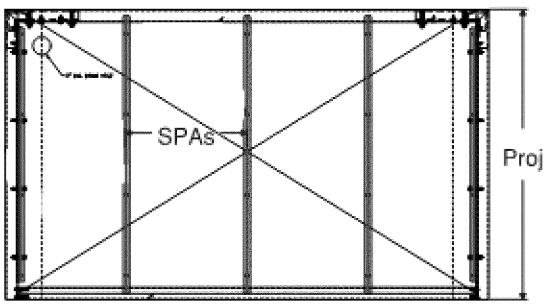
STIFFENER = ["0.31 ≤ 1.00 ∴ PASS", "0.25 ≤ 1.00 ∴ PASS"]

BEARING = "0.02 ≤ 1.00 ∴ PASS"

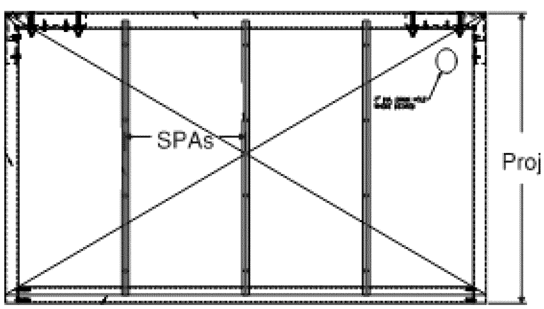
FASTENERS = ["0.02 ≤ 1.00 ∴ PASS", "0.04 ≤ 1.00 ∴ PASS"]

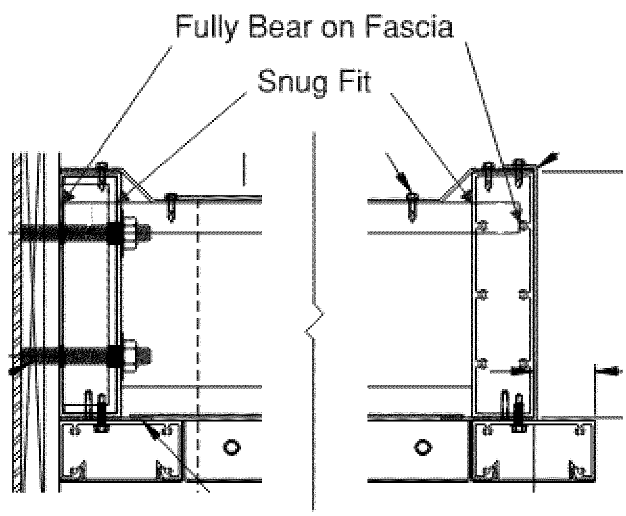
***Use 1" x 1" x 1/8" thk @ 22.67" o.c.***
*AL. tube as shown (6061-T6)*

***Standalone Reference:***




***Multi-Span Reference:***

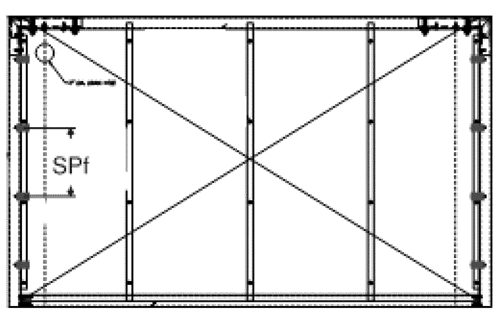



***Use 1/4-14 S.S. Fasteners***
***12" o.c. max.*** *to attach stiffener to outrigger as shown*
*300 Series (Fy = 65,000 psi)*

***** Standalone systems only *****

***Standalone Reference:***



## FRONT FASCIA

### System Data:

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in
$N_{int} := n_{stiffeners} = 3$

$w_y := WL_{Lat} \cdot d = 0.56$ pli

### Front Fascia Data:

$b := b_{ff} = 2$ in  $L := L_c - 4\ in = 90.67$ in
$d := d_{ff} = 8$ in  $L_b := L$
$t := t_{ff} = 0.12$ in  $E_{alum} = 10100000$ psi

☑ Welded within 1 inch of Mmax

### Outrigger Data:

$d_e := 0.3515$ in  $t_o := Min(t_{io}, t_{eo}) = 0.12$ in
$I_{yio} := 1.432\ in^4$ intermediate outrigger
$I_{yeo} := I_{y1} = 1.87\ in^4$ end outrigger

### Section Properties:

$I_{x1} = 17.45\ in^4$  $A_1 = 2.44\ in^2$
$I_{y1} = 1.87\ in^4$  $J_1 = 5.59\ in^4$
$S_{x1} = 4.36\ in^3$  $Z_{x1} = 5.72\ in^3$
$S_{y1} = 1.87\ in^3$  $Z_{y1} = 2.07\ in^3$

### Front Fascia Shape:
Rectangular Tube

### Front Fascia Material:
6005A-T5

### Outrigger Material:
6005-T5

## CALCULATIONS

$a = 11.33$ in
$TL := Max(DL_{dn}, DL_{up}) = 44$ psf
$w_x := TL \cdot SPA_s = 6.93$ pli
$w_y := WL_{Lat} \cdot d = 0.56$ pli

$R_{sFLC3} = 63.9$ lbf
$R_{sLC6} = 49.3$ lbf

### Check Front Fascia:

$j := 1$
while $j \cdot \frac{L}{N_{int}+1} < \frac{L}{2}$
  $x_j := j$
  $j := j + 1$

**Downward Load:**

$M_{xffLC3} := 4911.29$ lbf·in
$M_{xffLC6} := 3893.44$ lbf·in
$M_x := Max(M_{xffLC3}, M_{xffLC6}) = 4911.29$ lbf·in
$f_{bx} := (M_x) \div (S_{x1}) = 1126$ psi

$F_{bx} := 7878.79$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.14$

$\Delta_x := 0.02$ in
$\Delta_{xall} := (L) \div (120) = 0.76$ in

$I_{\Delta x} := (\Delta_x) \div (\Delta_{xall}) = 0.03$

**Lateral Wind Load:**

$M_{yFL} := 311.64$ lbf·in Wind load applied to fascia

$M_{yOL} := 191.2$ lbf·in Wind load applied to outrigger

$f_{by} := (Max(M_{yFL}, M_{yOL})) \div (S_{y1}) = 166.47$ psi

$F_{by} := 5005.79$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.03$

$\Delta_y := 0.0052$ in
$\Delta_{yall} := (L) \div (120) = 0.76$ in

$I_{\Delta y'} := (\Delta_y) \div (\Delta_{yall}) = 0.01$

***Use 2" x 8" x 1/8" thk Front Fascia***
*AL. tube as shown (6005A-T5)*

### Check Fasteners (to Outrigger):

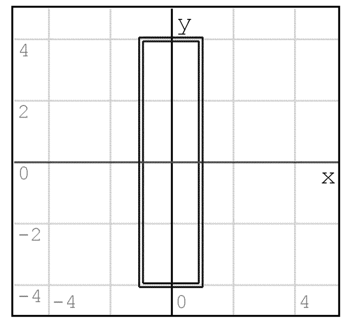
**Fastener Type:**
#10-16 (Cond. CW)  $n_f := 4$  $D_{ws} := 0.305$ in

**Shear Allowables:**

$V_{bearfascia} := 351.5$ lbf
$V_{bearoutrigger} := 556.54$ lbf
$V_{fast} := 275$ lbf
$V_{fall} := 275$ lbf

**Tension Allowables:**

$T_{povroutrigger} := 665.63$ lbf
$T_{poutfascia} := 436.21$ lbf
$T_{fast} := 477$ lbf
$T_{fall} := 436.21$ lbf




**Downward Load:**

$R_{ffdlLC3} := 184.72$ lbf
$R_{ffdlLC6} := 147.11$ lbf
$R_{ffdl} := Max(R_{ffdlLC3}, R_{ffdlLC6}) = 184.72$ lbf
$V_{fdl} := (R_{ffdl}) \div (n_f) = 46.18$ lbf

$I_{fdl} := (V_{fdl}) \div (V_{fall}) = 0.17$

**Lateral Wind Load (Z):**

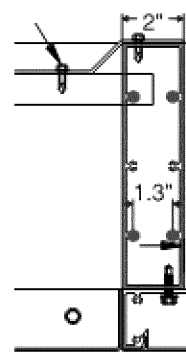
$R_{fwlz} := (w_y \cdot L) \div (2) = 25.19$ lbf
$V_{fwlz} := (R_{fwlz}) \div (n_f) = 6.3$ lbf

$I_{fwlz} := (V_{fwlz}) \div (V_{fall}) = 0.02$

**Lateral Wind Load (X):**

$$T_{fwlx} := \frac{Max(R_{xLAT}[3..4]1)}{n_f} + \frac{Max(M_{yLAT1}[3..4]1)}{0.5 \cdot n_f \cdot 1.2969\ in} = 77.39\ lbf$$

$I_{fwlx} := (T_{fwlx}) \div (T_{fall}) = 0.18$




***Use (4) #10 S.S. Fasteners***
*to attach front fascia to outrigger as shown*
*5/8" min. thread engagement into fascia screw chase*
*300 Series (Fy = 65,000 psi)*

$FRONT_FASCIA = $ ["0.14 ≤ 1.00 ∴ PASS"; "0.03 ≤ 1.00 ∴ PASS"; "0.03 ≤ 1.00 ∴ PASS"; "0.01 ≤ 1.00 ∴ PASS"]

$FASTENERS = $ ["0.17 ≤ 1.00 ∴ PASS"; "0.02 ≤ 1.00 ∴ PASS"; "0.18 ≤ 1.00 ∴ PASS"]

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.07
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## FRONT FASCIA (CORNER)

**System Data:**

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in
$N_{int} := n_{stiffeners} = 3$

**Corner Front Fascia Data:**

$b := b_{cff} = 2$ in
$d := d_{cff} = 8$ in
$t := t_{cff} = 0.12$ in
$L := L_{cant} = 44$ in
$L_b := L$
$E_{alum} = 10100000$ psi

**Max Member Forces:**

$Axial_{cff} = 13.82$ lbf
$V_{ycff} = 139.4$ lbf
$V_{zcff} = 17.17$ lbf
$Tor_{cff} = 785.18$ lbf·in
$M_{ycff} = 97.4$ lbf·in
$M_{zcff} = 4802.22$ lbf·in

☑ Welded within 1 inch of Mmax

**Front Fascia Shape:** Rectangular Tube

**Front Fascia Material:** 6005-T5

**Section Properties:**

$I_{x1} = 17.45$ in⁴ $A_1 = 2.44$ in²
$I_{y1} = 1.87$ in⁴ $J_1 = 5.59$ in⁴
$S_{x1} = 4.36$ in³ $Z_{x1} = 5.72$ in³
$S_{y1} = 1.87$ in³ $Z_{y1} = 2.07$ in³

## CALCULATIONS

**Check Corner Front Fascia:**

**Axial:**

$f_c := (Axial_{cff}) \div (A_1) = 5.67$ psi

$F_c := 5857.26$ psi

$I_{axial} := (f_c) \div (F_c) = 0$

**Shear:**

$f_{vy} := (V_{ycff}) \div (2 \cdot (d - 2 \cdot t) \cdot t) = 71.95$ psi

$f_{vz} := (V_{zcff}) \div (2 \cdot (b - 2 \cdot t) \cdot t) = 39.25$ psi

$F_v := 4285.74$ psi

$$I_v := \sqrt{\left(\frac{f_{vy}}{F_v}\right)^2 + \left(\frac{f_{vz}}{F_v}\right)^2} = 0.02$$

**Torsion:**

$f_T := (Tor_{cff}) \div (2 \cdot b \cdot d \cdot t) = 196.29$ psi

$F_T := 4285.74$ psi

$I_T := (f_T) \div (F_T) = 0.05$

**Bending:**

$f_{bx} := (M_{zcff}) \div (S_{x1}) = 1101$ psi

$F_{bx} := 7878.79$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.14$

$f_{by} := (M_{ycff}) \div (S_{y1}) = 52.03$ psi

$F_{by} := 5005.79$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.01$

**Deflection:**

$\Delta_{xcff} = 0.1$ in

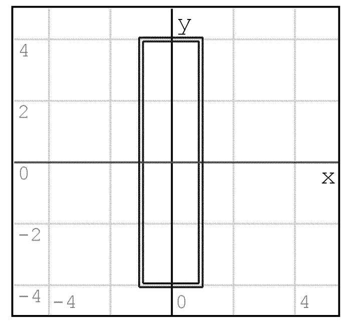
$\Delta_{xall} := (2 \cdot L_{cant}) \div (120) = 0.73$ in

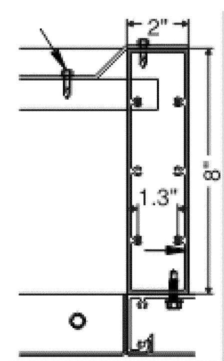
$I_{\Delta x} := (\Delta_{xcff}) \div (\Delta_{xall}) = 0.14$

$\Delta_{ycff} = 0$ in

$\Delta_{yall} := (2 \cdot L_{cant}) \div (120) = 0.73$ in

$I_{\Delta y} := (\Delta_{ycff}) \div (\Delta_{yall}) = 0$




$$I_{FFCorner} := \mathrm{Max}\left(I_{axial} + (I_{bx} + I_{by})^n + (I_v + I_T)^2,\ I_{axial} + (I_{bx} + I_{by})\right) = 0.15$$

**Use 2" x 8" x 1/8" thk Front Fascia**
*AL. tube as shown (6005-T5)*

CORNER_FRONT_FASCIA =

| |
|---|
| "0 ≤ 1.00 ∴ PASS" |
| "0.02 ≤ 1.00 ∴ PASS" |
| "0.05 ≤ 1.00 ∴ PASS" |
| "0.14 ≤ 1.00 ∴ PASS" |
| "0.01 ≤ 1.00 ∴ PASS" |
| "0.15 ≤ 1.00 ∴ PASS" |
| "0.14 ≤ 1.00 ∴ PASS" |
| "0 ≤ 1.00 ∴ PASS" |

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.08
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## END OUTRIGGER

### System Data:

$L_c = 94.67$ in
$DL_{dn} = 44$ psf
$LC6 = 30.31$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$DeadL = 7.36$ psf
$SPA_s = 22.67$ in

### Outrigger Data:

$b := b_{eo} = 2$ in    $L := Proj = 36$ in
$d := d_{eo} = 8$ in    $L_b := L$
$t := t_{eo} = 0.12$ in    $E_{alum} = 10100000$ psi

☐ Welded within 1 inch of Mmax

### Drift Data:

$S_b = 21$ psf
$P_{d1} = 31.05$ psf
$P_{d2} = 0$ psf

### Section Properties:

$I_{x1} = 12.6$ in⁴    $A_1 = 1.47$ in²
$I_{y1} = 0.46$ in⁴    $J_1 = 0.01$ in⁴
$S_{x1} = 3.15$ in³    $Z_{x1} = 3.85$ in³
$S_{y1} = 0.28$ in³    $Z_{y1} = 0.22$ in³

### Outrigger Shape:

Channel

### Outrigger Material:

6005-T5

$I_{yio} := I_{y1} = 0.46\ in^4$ end outrigger
$I_{yeo} := 1.8721\ in^4$ end outrigger
$w_y := WL_{Lat} \cdot d = 0.56$ pli

## CALCULATIONS

### Check End Outrigger:

$TW := 13.33$ in

**LC3 Drift Dist. Loads:**

$w_{owall2wayLC3} := (2 \cdot P_{dO1} + S_b + DeadL) \cdot a = 5.31$ pli
$w_{omiddrift} := P_{dO1} \cdot a = 1.54$ pli
$w_{omiduniLC3} := (P_{dO2} + S_b + DeadL) \cdot a = 3.14$ pli
$w_{oend2wayLC3} := (P_{dO2} + S_b + DeadL) \cdot a = 3.14$ pli
$w_{owallb} := P_{d1} \cdot b = 0.43$ pli
$w_{ounib} := (S_b + DeadL) \cdot b = 0.39$ pli
$w_{owall1wayLC3} := P_{d1} \cdot TW = 2.88$ pli
$w_{ouniLC3} := (S_b + DeadL) \cdot TW = 2.63$ pli

**LC3 Point Loads:**

$F_{wall2wayLC3} := 0.5 \cdot a \cdot w_{owall2wayLC3} = 30.09$ lbf
$F_{middrift} := 0.5 \cdot (L - 2 \cdot TW) \cdot w_{omiddrift} = 7.18$ lbf
$F_{miduniLC3} := (L - 2 \cdot TW) \cdot (P_{dO2} + S_b + DeadL) \cdot a = 29.28$ lbf
$F_{end2wayLC3} := 0.5 \cdot a \cdot w_{oend2wayLC3} = 17.78$ lbf
$F_{wallb} := 0.5 \cdot L \cdot w_{owallb} = 7.76$ lbf
$F_{unib} := L \cdot w_{ounib} = 14.18$ lbf
$F_{wall1wayLC3} := 0.5 \cdot L \cdot w_{owall1wayLC3} = 51.75$ lbf
$F_{uniLC3} := L \cdot w_{ouniLC3} = 94.54$ lbf
$R_{ffdlLC3} = 184.72$ lbf

$R_{yN7Drift} = -101.82$ lbf    $R_{yN7DriftOS} = -92.4$ lbf
$R_{yN8Drift} = 38.51$ lbf    $R_{yN8DriftOS} = 36.47$ lbf
$R_{yN9Drift} = 325.28$ lbf    $R_{yN9DriftOS} = 295.14$ lbf
$R_{yN10Drift} = -101.82$ lbf    $R_{yN10DriftOS} = -106.04$ lbf
$R_{yN11Drift} = 38.51$ lbf    $R_{yN11DriftOS} = 30.54$ lbf
$R_{yN12Drift} = 325.28$ lbf    $R_{yN12DriftOS} = 282.59$ lbf

$R_{yOLC3C} := 552.95$ lbf ***vertical rxn @ thru-bolts***

**LC3 Strong Axis Moment:**

$M_{xOLC3C} := 17806.26$ lbf·in
$f_{bxLC3} := (M_{xOLC3C}) \div (S_{x1}) = 5652$ psi

$I_{bxLC3} := (f_{bxLC3}) \div (F_{bx}) = 0.6$

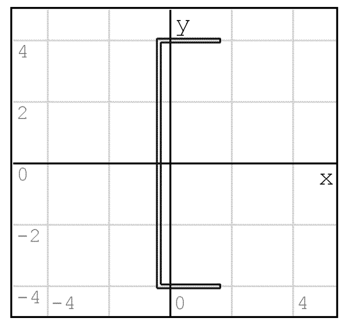
**LC3 Strong Axis Deflection:**

$\Delta_{xLC3} := 0.07$ in

$I_{\Delta xLC3} := (\Delta_{xLC3}) \div (\Delta_{xall}) = 0.12$

### Outrigger Allowables:

$F_{bx} := 9439.68$ psi
$F_{by} := 9057.65$ psi
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.6$ in
$\Delta_{yall} := (2 \cdot L_b) \div (120) = 0.6$ in




**LC6 Uniform Dist. Load:**

$w_{LC6uni} := LC6 \cdot TW = 2.81$ pli

**LC6 Point Load:**

$F_{wall2wayLC6} := \frac{1}{2} \cdot TW \cdot w_{LC6uni} = 18.71$ lbf
$F_{miduniLC6} := (L - 2 \cdot TW) \cdot w_{LC6uni} = 26.19$ lbf
$F_{end2wayLC6} := \frac{1}{2} \cdot TW \cdot w_{LC6uni} = 18.71$ lbf
$R_{ffdlLC6} = 147.11$ lbf

$R_{yN7Bal} = -103.26$ lbf    $R_{yN10Bal} = -103.26$ lbf
$R_{yN8Bal} = 30.47$ lbf    $R_{yN11Bal} = 30.47$ lbf
$R_{yN9Bal} = 269.81$ lbf    $R_{yN12Bal} = 269.81$ lbf

$R_{yOLC6C} := 407.74$ lbf ***vertical rxn @ thru-bolts***

**LC6 Strong Axis Moment:**

$M_{xOLC6C} := 14091.18$ lbf·in
$f_{bxLC6} := (M_{xOLC6C}) \div (S_{x1}) = 4473$ psi

$I_{bxLC6} := (f_{bxLC6}) \div (F_{bx}) = 0.47$

**LC6 Strong Axis Deflection:**

$\Delta_{xLC6} := 0.07$ in

$I_{\Delta xLC6} := (\Delta_{xLC6}) \div (\Delta_{xall}) = 0.11$

### Lateral Wind Load:

$M_{yOL} := 196.88$ lbf·in Wind load applied to outrigger
$M_{yFL} := 64.81$ lbf·in Wind load applied to fascia
$f_{by} := (\mathrm{Max}(M_{yFL}, M_{yOL})) \div (S_{y1}) = 696$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.08$

**Weak Axis Deflection:**

$\Delta_y := 0.0252$ in

$I_{\Delta y} := (\Delta_y) \div (\Delta_{yall}) = 0.04$

$$END\_OUTRIGGER = \begin{bmatrix} \text{"0.6 ≤ 1.00 ∴ PASS"} \\ \text{"0.47 ≤ 1.00 ∴ PASS"} \\ \text{"0.08 ≤ 1.00 ∴ PASS"} \\ \text{"0.12 ≤ 1.00 ∴ PASS"} \\ \text{"0.11 ≤ 1.00 ∴ PASS"} \\ \text{"0.04 ≤ 1.00 ∴ PASS"} \end{bmatrix}$$

***Use 2" x 8" x 1/8" thk End Outrigger***
*AL. tube as shown (6005-T5)*

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.09
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## INTERMEDIATE OUTRIGGER

**System Data:**

$L_c = 94.67$ in
$DL_{dn} = 44$ psf
$LC6 = 30.31$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$DeadL = 7.36$ psf
$SPA_s = 22.67$ in

**Outrigger Data:**

$b := b_{io} = 2$ in $\quad L := Proj = 36$ in
$d := d_{io} = 6$ in $\quad L_b := L$
$t := t_{io} = 0.12$ in $\quad E_{alum} = 10100000$ psi

**Drift Data:**

$S_b = 21$ psf
$P_{d1} = 31.05$ psf
$P_{d2} = 0$ psf

☐ Welded within 1 inch of Mmax

**Section Properties:**

$I_{x1} = 6.3\ in^4$ $\quad A_1 = 1.22\ in^2$
$I_{y1} = 0.43\ in^4$ $\quad J_1 = 0.01\ in^4$
$S_{x1} = 2.1\ in^3$ $\quad Z_{x1} = 2.5\ in^3$
$S_{y1} = 0.27\ in^3$ $\quad Z_{y1} = 0.41\ in^3$

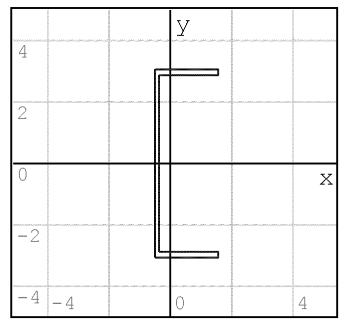
**Outrigger Shape:** Channel

**Outrigger Material:** 6061-T6

$I_{yio} := I_{y1} = 0.43\ in^4$ intermediate outrigger
$I_{yeo} := 1.8721\ in^4$ end outrigger
$w_y := WL_{Lat} \cdot d = 0.42$ pli

## CALCULATIONS

$TW = 13.33$ in




**Check Intermediate Outrigger:**

**LC3 Drift Dist. Loads:**

$w_{owall2wayLC3} = 5.31$ pli
$w_{omiddrift} = 1.54$ pli
$w_{omiduniLC3} = 3.14$ pli
$w_{oend2wayLC3} = 3.14$ pli
$w_{owallb} = 0.43$ pli
$w_{ounib} = 0.39$ pli
$w_{owall1wayLC3} = 2.88$ pli
$w_{ouniLC3} = 2.63$ pli

**LC3 Point Loads:**

$F_{wall2wayLC3} = 30.09$ lbf
$F_{middrift} = 7.18$ lbf
$F_{miduniLC3} = 29.28$ lbf
$F_{end2wayLC3} = 17.78$ lbf
$F_{wallb} = 7.76$ lbf
$F_{unib} = 14.18$ lbf
$F_{wall1wayLC3} = 51.75$ lbf
$F_{uniLC3} = 94.54$ lbf
$R_{ffdlLC3} = 184.72$ lbf

$R_{yOLC3} := 290.98$ lbf **vertical rxn @ thru-bolts**

**LC3 Strong Axis Moment:**

$M_{xOLC3} := 8392.72\ lbf \cdot in$

$f_{bxLC3} := (M_{xOLC3}) \div (S_{x1}) = 3999$ psi

$I_{bxLC3} := (f_{bxLC3}) \div (F_{bx}) = 0.42$

**LC3 Strong Axis Deflection:**

$\Delta_{xLC3} := 0.08$ in

$I_{\Delta xLC3} := (\Delta_{xLC3}) \div (\Delta_{xall}) = 0.13$

**LC6 Uniform Dist. Load:**

$w_{LC6uni} = 2.81$ pli

**LC6 Point Load:**

$F_{wall2wayLC6} = 18.71$ lbf
$F_{miduniLC6} = 26.19$ lbf
$F_{end2wayLC6} = 18.71$ lbf
$R_{ffdlLC6} = 147.11$ lbf

$R_{yOLC6} := 210.73$ lbf **vertical rxn @ thru-bolts**

**LC6 Strong Axis Moment:**

$M_{xOLC6} := 6441.1\ lbf \cdot in$

$f_{bxLC6} := (M_{xOLC6}) \div (S_{x1}) = 3069$ psi

$I_{bxLC6} := (f_{bxLC6}) \div (F_{bx}) = 0.33$

**LC6 Strong Axis Deflection:**

$\Delta_{xLC6} := 0.06$ in

$I_{\Delta xLC6} := (\Delta_{xLC6}) \div (\Delta_{xall}) = 0.1$

**Lateral Wind Load:**

$M_{yOL} := 147.66\ lbf \cdot in$ Wind load applied to outrigger
$M_{yFL} := 48.61\ lbf \cdot in$ Wind load applied to fascia

$f_{by} := (\mathrm{Max}(M_{yFL}, M_{yOL})) \div (S_{y1}) = 537.28$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.04$

**Weak Axis Deflection:**

$\Delta_y := 0.0203$ in

$I_{\Delta y} := (\Delta_y) \div (\Delta_{yall}) = 0.03$

**Outrigger Allowables:**

$F_{bx} := 9439.68$ psi
$F_{by} := 12076.87$ psi
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.6$ in
$\Delta_{yall} := (2 \cdot L_b) \div (120) = 0.6$ in

**Use 2" x 6" x 1/8" thk Int. Outrigger**
*AL. tube as shown (6061-T6)*

$$INT\_OUTRIGGER = \begin{bmatrix} \text{"0.42} \le \text{1.00} \therefore \text{PASS"} \\ \text{"0.33} \le \text{1.00} \therefore \text{PASS"} \\ \text{"0.04} \le \text{1.00} \therefore \text{PASS"} \\ \text{"0.13} \le \text{1.00} \therefore \text{PASS"} \\ \text{"0.1} \le \text{1.00} \therefore \text{PASS"} \\ \text{"0.03} \le \text{1.00} \therefore \text{PASS"} \end{bmatrix}$$

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100
**REI Project #** R25-01-042

**Description:**
36" Cantilevered Corner System

**Project Name:**
McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.10
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## ADJACENT CORNER OUTRIGGER

**System Data:**

$DL_{dn} = 44$ psf
$LC6 = 30.31$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$DeadL = 7.36$ psf
$S_b = 21$ psf
$P_{d1} = 31.05$ psf
$P_{d2} = 0$ psf

**Adjacent Outrigger Data:**

$b := b_{ao} = 2$ in
$d := d_{ao} = 8$ in
$t := t_{ao} = 0.12$ in
$L := Proj = 36$ in
$L_b := L$
$E_{alum} = 10100000$ psi

**Max Member Forces:**

$Axial_{ao} = 16.45$ lbf
$V_{yao} = 183.64$ lbf
$V_{zao} = 13.82$ lbf
$Tor_{ao} = 0$
$M_{yao} = 82.64$ lbf·in
$M_{zao} = 2237.92$ lbf·in

☑ Welded within 1 inch of Mmax

**Outrigger Shape:** Rectangular Tube

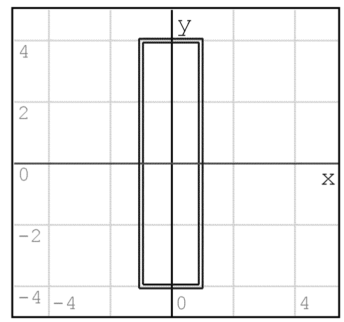
**Outrigger Material:** 6005-T5

**Section Properties:**

$I_{x1} = 17.45$ in⁴ $A_1 = 2.44$ in²
$I_{y1} = 1.87$ in⁴ $J_1 = 5.59$ in⁴
$S_{x1} = 4.36$ in³ $Z_{x1} = 5.72$ in³
$S_{y1} = 1.87$ in³ $Z_{y1} = 2.07$ in³

## CALCULATIONS

### Check Adjacent Corner Outriggers:




**Axial:**

$f_c := (Axial_{ao}) \div (A_1) = 6.75$ psi

$F_c := 5857.26$ psi

$I_{axial} := (f_c) \div (F_c) = 0$

**Shear:**

$f_{vy} := (V_{yao}) \div (2 \cdot (d - 2 \cdot t) \cdot t) = 94.78$ psi

$f_{vz} := (V_{zao}) \div (2 \cdot (b - 2 \cdot t) \cdot t) = 31.59$ psi

$F_v := 4285.74$ psi

$$I_v := \sqrt{\left(\frac{f_{vy}}{F_v}\right)^2 + \left(\frac{f_{vz}}{F_v}\right)^2} = 0.02$$

**Torsion:**

$f_T := (Tor_{ao}) \div (2 \cdot b \cdot d \cdot t) = 0$

$F_T := 4285.74$ psi

$I_T := (f_T) \div (F_T) = 0$

**Bending:**

$f_{bx} := (M_{zao}) \div (S_{x1}) = 513$ psi

$F_{bx} := 7878.79$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.07$

$f_{by} := (M_{yao}) \div (S_{y1}) = 44.14$ psi

$F_{by} := 5005.79$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.01$

**Deflection:**

$\Delta_{xao} = 0$ in

$\Delta_{xall} := (2 \cdot L) \div (120) = 0.6$ in

$I_{\Delta x} := (\Delta_{xao}) \div (\Delta_{xall}) = 0$

$\Delta_{yao} = 0$

$\Delta_{yall} := (2 \cdot L) \div (120) = 0.6$ in

$I_{\Delta y} := (\Delta_{yao}) \div (\Delta_{yall}) = 0$

$$I_{AOCorner} := \text{Max}\left(I_{axial} + (I_{bx} + I_{by})^n + (I_v + I_T)^2, I_{axial} + (I_{bx} + I_{by})\right) = 0.08$$

**Use 2" x 8" x 1/8" thk Outriggers**
*AL. tube as shown (6005-T5)*

ADJ_OUTRIGGER =

| |
|---|
| "0 ≤ 1.00 ∴ PASS" |
| "0.02 ≤ 1.00 ∴ PASS" |
| "0 ≤ 1.00 ∴ PASS" |
| "0.07 ≤ 1.00 ∴ PASS" |
| "0.01 ≤ 1.00 ∴ PASS" |
| "0.08 ≤ 1.00 ∴ PASS" |
| "0 ≤ 1.00 ∴ PASS" |
| "0 ≤ 1.00 ∴ PASS" |

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:**
36" Cantilevered Corner System

**Project Name:**
McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.11
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## CORNER OUTRIGGER

### System Data:

$DL_{dn} = 44$ psf
$LC6 = 30.31$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$DeadL = 7.36$ psf
$S_b = 21$ psf
$P_{d1} = 31.05$ psf
$P_{d2} = 0$ psf

### Corner Outrigger Data:

$b := b_{co} = 2$ in
$d := d_{co} = 8$ in
$t := t_{co} = 0.12$ in
$L := L_{co} = 50.91$ in
$L_b := L$
$E_{alum} = 10100000$ psi

### Max Member Forces:

$Axial_{co} = 3.06$ lbf
$V_{yco} = 177.94$ lbf
$V_{zco} = 1.68$ lbf
$Tor_{co} = 4802.22$ lbf·in
$M_{yco} = 56.26$ lbf·in
$M_{zco} = 5680.95$ lbf·in

☑ Welded within 1 inch of Mmax

### Outrigger Shape:

Rectangular Tube

### Outrigger Material:

6005-T5

### Section Properties:

$I_{x1} = 17.45$ in⁴ $A_1 = 2.44$ in²
$I_{y1} = 1.87$ in⁴ $J_1 = 5.59$ in⁴
$S_{x1} = 4.36$ in³ $Z_{x1} = 5.72$ in³
$S_{y1} = 1.87$ in³ $Z_{y1} = 2.07$ in³

## CALCULATIONS

### Check Corner Outriggers:

**Axial:**

$f_c := (Axial_{co}) \div (A_1) = 1.25$ psi

$F_c := 5857.26$ psi

$I_{axial} := (f_c) \div (F_c) = 0$

**Shear:**

$f_{vy} := (V_{yco}) \div (2 \cdot (d - 2 \cdot t) \cdot t) = 91.84$ psi

$f_{vz} := (V_{zco}) \div (2 \cdot (b - 2 \cdot t) \cdot t) = 3.84$ psi

$F_v := 4285.74$ psi

$$I_v := \sqrt{\left(\frac{f_{vy}}{F_v}\right)^2 + \left(\frac{f_{vz}}{F_v}\right)^2} = 0.02$$

**Torsion:**

$f_T := (Tor_{co}) \div (2 \cdot b \cdot d \cdot t) = 1200.55$ psi

$F_T := 4285.74$ psi

$I_T := (f_T) \div (F_T) = 0.28$

**Bending:**

$f_{bx} := (M_{zco}) \div (S_{x1}) = 1302$ psi

$F_{bx} := 7878.79$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.17$

$f_{by} := (M_{yco}) \div (S_{y1}) = 30.05$ psi

$F_{by} := 5005.79$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0.01$

**Deflection:**

$\Delta_{xco} = 0.1$ in

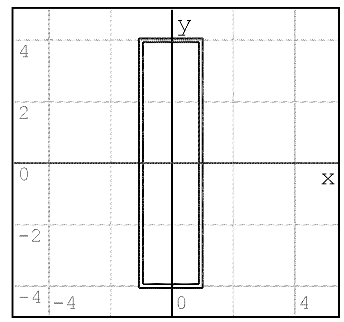
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.85$ in

$I_{\Delta x} := (\Delta_{xco}) \div (\Delta_{xall}) = 0.12$

$\Delta_{yco} = 0$ in

$\Delta_{yall} := (2 \cdot L) \div (120) = 0.85$ in

$I_{\Delta y} := (\Delta_{yco}) \div (\Delta_{yall}) = 0$




$$I_{OCorner} := \text{Max}\left(I_{axial} + (I_{bx} + I_{by})^n + (I_v + I_T)^2, I_{axial} + (I_{bx} + I_{by})\right) = 0.17$$

**Use 2" x 8" x 1/8" thk Outriggers**
*AL. tube as shown (6005-T5)*

$COR\_OUTRIGGER =$

| |
|---|
| "0 ≤ 1.00 ∴ PASS" |
| "0.02 ≤ 1.00 ∴ PASS" |
| "0.28 ≤ 1.00 ∴ PASS" |
| "0.17 ≤ 1.00 ∴ PASS" |
| "0.01 ≤ 1.00 ∴ PASS" |
| "0.17 ≤ 1.00 ∴ PASS" |
| "0.12 ≤ 1.00 ∴ PASS" |
| "0 ≤ 1.00 ∴ PASS" |

## REAR FASCIA

### System Data:

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in
$N_{int} = 3$

### Rear Fascia Data:

$b := b_{rf} = 2$ in  $L := L_c - 2\ \text{in} = 92.67$ in
$d := d_{rf} = 8$ in  $L_b := L$
$t := t_{rf} = 0.12$ in  $E_{alum} = 10100000$ psi

☑ Welded within 1 inch of Mmax

### Outrigger Reactions:

$R_{yOLC3} = 290.98$ lbf  $R_{yOLC3C} = 552.95$ lbf
$M_{xOLC3} = 8392.72$ lbf·in  $M_{xOLC3C} = 17806.26$ lbf·in
$R_{yOLC6} = 210.73$ lbf  $R_{yOLC6C} = 407.74$ lbf
$M_{xOLC6} = 6441.1$ lbf·in  $M_{xOLC6C} = 14091.18$ lbf·in

### Rear Fascia Shape:

Rectangular Tube

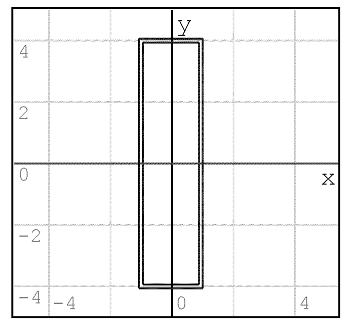
### Rear Fascia Material:

6005-T5

### Section Properties:

$I_{x1} = 17.45\ \text{in}^4$  $A_1 = 2.44\ \text{in}^2$
$I_{y1} = 1.87\ \text{in}^4$  $J_1 = 5.59\ \text{in}^4$
$S_{x1} = 4.36\ \text{in}^3$  $Z_{x1} = 5.72\ \text{in}^3$
$S_{y1} = 1.87\ \text{in}^3$  $Z_{y1} = 2.07\ \text{in}^3$

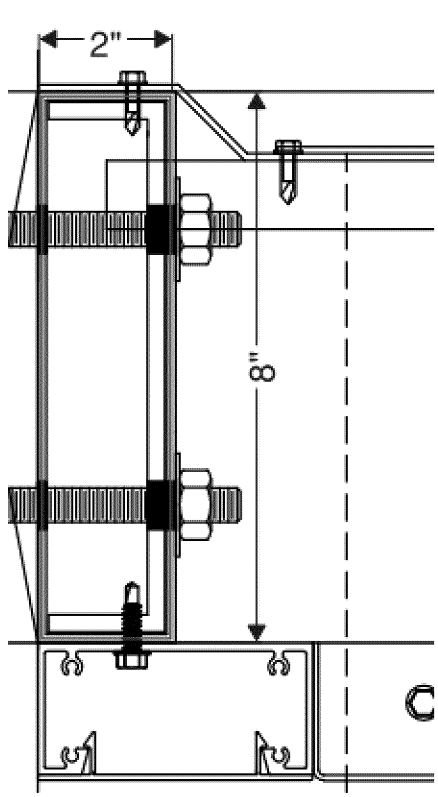
## CALCULATIONS




$a = 11.33$ in
$TL := \text{Max}\left(DL_{dn}, DL_{up}\right) = 44$ psf
$w_x := TL \cdot SPA_s = 6.93$ pli
$w_y := WL_{Lat} \cdot d = 0.56$ pli

### Check Rear Fascia:

$j := 1$
while $j \cdot \dfrac{L}{N_{int}+1} < \dfrac{L}{2}$
  $x_j := j$
  $j := j + 1$




**Downward Load:**

$R_{rfdlLC3} := 241.55$ lbf Rear fascia vertical rxn @ anchors (LC3)
$R_{rfdlLC6} := 147.53$ lbf Rear fascia vertical rxn @ anchors (LC6)
$M_{xrfLC3} := 6634.32$ lbf·in
$M_{xrfLC6} := 4063.45$ lbf·in
$M_x := \text{Max}\left(M_{xrfLC3}, M_{xrfLC6}\right) = 6634.32$ lbf·in
$f_{bx} := \left(M_x\right) \div \left(S_{x1}\right) = 1521$ psi

$F_{bx} := 7878.79$ psi

$I_{bx} := \left(f_{bx}\right) \div \left(F_{bx}\right) = 0.19$

$\Delta_x := 0.03$ in
$\Delta_{xall} := (L) \div (120) = 0.77$ in

$I_{\Delta x} := \left(\Delta_x\right) \div \left(\Delta_{xall}\right) = 0.04$

**Torsion Due to Outrigger:**

$Tor_{rf} := 20156.3$ lbf·in

$$\tau_{rf} := \frac{Tor_{rf}}{2 \cdot t \cdot (b - t) \cdot (d - t)} = 5460.33\ \text{psi}$$

$F_\tau := 7483.08$ psi

$I_\tau := \left(\tau_{rf}\right) \div \left(F_\tau\right) = 0.73$

***Use 2" x 8" x 1/8" thk Rear Fascia***
*AL. tube as shown (6005-T5)*

REAR_FASCIA = [ "0.19 ≤ 1.00 ∴ PASS" ; "0.73 ≤ 1.00 ∴ PASS" ; "0.04 ≤ 1.00 ∴ PASS" ]

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105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.13
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## REAR FASCIA (CORNER)

### System Data:

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf
$SPA_s = 22.67$ in
$N_{int} := n_{stiffeners} = 3$

### Corner Rear Fascia Data:

$b := b_{crf} = 2$ in
$d := d_{crf} = 8$ in
$t := t_{crf} = 0.12$ in
$L := L_{rf} = 8$ in
$L_b := L$
$E_{alum} = 10100000$ psi

### Max Member Forces:

$Axial_{crf} = 2.78$ lbf
$V_{ycrf} = 48.37$ lbf
$V_{zcrf} = 1.9$ lbf
$Tor_{crf} = 2237.92$ lbf·in
$M_{ycrf} = 25.26$ lbf·in
$M_{zcrf} = 349.76$ lbf·in

☑ Welded within 1 inch of Mmax

### Corner Rear Fascia Shape:

Rectangular Tube

### Corner Rear Fascia Material:

6005-T5

### Section Properties:

$I_{x1} = 17.45$ in⁴  $A_1 = 2.44$ in²
$I_{y1} = 1.87$ in⁴  $J_1 = 5.59$ in⁴
$S_{x1} = 4.36$ in³  $Z_{x1} = 5.72$ in³
$S_{y1} = 1.87$ in³  $Z_{y1} = 2.07$ in³

## CALCULATIONS

### Check Corner Rear Fascia:

**Axial:**

$f_c := (Axial_{crf}) \div (A_1) = 1.14$ psi

$F_c := 5857.26$ psi

$I_{axial} := (f_c) \div (F_c) = 0$

**Shear:**

$f_{vy} := (V_{ycrf}) \div (2 \cdot (d - 2 \cdot t) \cdot t) = 24.96$ psi

$f_{vz} := (V_{zcrf}) \div (2 \cdot (b - 2 \cdot t) \cdot t) = 4.34$ psi

$F_v := 4285.74$ psi

$$I_v := \sqrt{\left(\frac{f_{vy}}{F_v}\right)^2 + \left(\frac{f_{vz}}{F_v}\right)^2} = 0.01$$

**Torsion:**

$f_T := (Tor_{crf}) \div (2 \cdot b \cdot d \cdot t) = 559.48$ psi

$F_T := 4285.74$ psi

$I_T := (f_T) \div (F_T) = 0.13$

**Bending:**

$f_{bx} := (M_{zcrf}) \div (S_{x1}) = 80$ psi

$F_{bx} := 7878.79$ psi

$I_{bx} := (f_{bx}) \div (F_{bx}) = 0.01$

$f_{by} := (M_{ycrf}) \div (S_{y1}) = 13.49$ psi

$F_{by} := 5005.79$ psi

$I_{by} := (f_{by}) \div (F_{by}) = 0$

**Deflection:**

$\Delta_{xcrf} = 0.01$ in

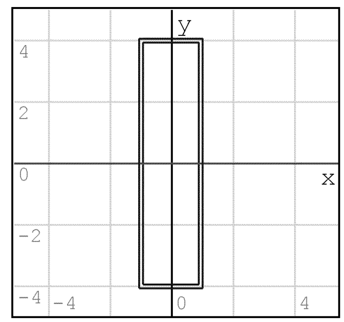
$\Delta_{xall} := (2 \cdot L) \div (120) = 0.13$ in

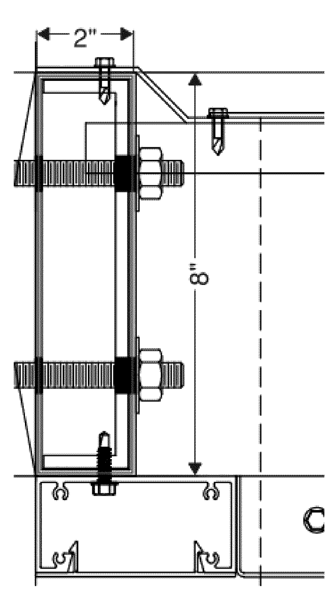
$I_{\Delta x} := (\Delta_{xcrf}) \div (\Delta_{xall}) = 0.05$

$\Delta_{ycrf} = 0$

$\Delta_{yall} := (2 \cdot L) \div (120) = 0.13$ in

$I_{\Delta y} := (\Delta_{ycrf}) \div (\Delta_{yall}) = 0$




$$I_{RFCorner} := \mathrm{Max}\left(I_{axial} + (I_{bx} + I_{by})^n + (I_v + I_T)^2, I_{axial} + (I_{bx} + I_{by})\right) = 0.02$$

**Use 2" x 8" x 1/8" thk Front Fascia**
*AL. tube as shown (6005-T5)*

CORNER_REAR_FASCIA =

| |
|---|
| "0 ≤ 1.00 ∴ PASS" |
| "0.01 ≤ 1.00 ∴ PASS" |
| "0.13 ≤ 1.00 ∴ PASS" |
| "0.01 ≤ 1.00 ∴ PASS" |
| "0 ≤ 1.00 ∴ PASS" |
| "0.02 ≤ 1.00 ∴ PASS" |
| "0.05 ≤ 1.00 ∴ PASS" |
| "0 ≤ 1.00 ∴ PASS" |

## *Corner System Welds*

### *Corner Weld Geometry:*

***Front Fascia - Corner Outrigger Location:***

$L_{cffo} := L_{cant} - L_{rf} = 36 \text{ in}$

$\theta_{co} := \operatorname{atan}\left(\frac{Proj}{L_{cffo}}\right) = 45 \text{ deg}$

$b_{coj} := \frac{b_{co}}{\cos\left(\theta_{co}\right)} = 2.83 \text{ in}$

$L_{cffi} := L_{cffo} - b_{coj} - \frac{b_{cff}}{\sin\left(\theta_{co}\right)} = 30.34 \text{ in}$

$\theta_{cffj} := \frac{180 \text{ deg} - \left(90 \text{ deg} + \left(90 \text{ deg} - \theta_{co}\right)\right)}{2} = 22.5 \text{ deg}$ *weld angle at miter*

$b_{cffwj} := \sqrt{b_{cff}^{\ 2} + \left(L_{cffo} - L_{cffi}\right)^2} = 6 \text{ in}$ *weld width*

$d_{cffwj} := d_{cff} = 8 \text{ in}$ *weld depth*

$t_{cffwj} := t_{cff} = 0.12 \text{ in}$ *weld thickness*

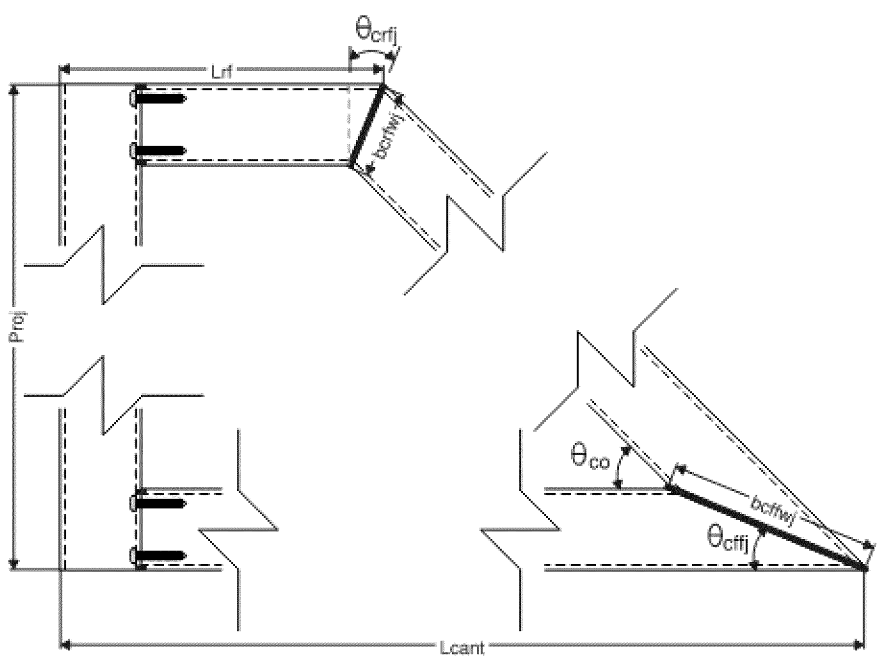
***Rear Fascia - Corner Outrigger Location:***

$\theta_{crfj} := \theta_{cffj} = 22.5 \text{ deg}$ *weld angle at miter*

$b_{crfwj} := \frac{b_{crf}}{\cos\left(\theta_{crfj}\right)} = 2.16 \text{ in}$ *weld width*

$d_{crfwj} := d_{crf} = 8 \text{ in}$ *weld depth*

$t_{crfwj} := t_{crf} = 0.12 \text{ in}$ *weld thickness*



## Weld Section Properties:

**Front Fascia - J End:**

$A_{wffj} := 3.44\ in^2$ $S_{wxffj} := 8.24\ in^3$
$A_{wyffj} := 1.94\ in^2$ $S_{wyffj} := 7.07\ in^3$
$A_{wzffj} := 1.44\ in^2$ $J_{wffj} := 19.46\ in^4$

**Rear Fascia - J End:**

$A_{wrfj} := 2.48\ in^2$ $S_{wxrfj} := 4.52\ in^3$
$A_{wyrfj} := 1.94\ in^2$ $S_{wyrfj} := 2.06\ in^3$
$A_{wzrfj} := 0.48\ in^2$ $J_{wrfj} := 3.25\ in^4$

**Frame Material:** 6005-T5

**Weld Filler:** 4043

$$F_{sw} := \frac{0.6 \cdot 0.85 \cdot F_{tuw}}{1.95} = 6276.92\ psi$$

$F_{tub} := 24000\ psi$

$$F_{sb} := \frac{0.6 \cdot F_{tub}}{1.95} = 7384.62\ psi$$

## Check Corner Welds:

**Front Fascia - Corner Outrigger Location:**

$Axial_{cff} = 13.82\ lbf$
$V_{ycff} = 139.4\ lbf$
$V_{zcff} = 17.17\ lbf$
$Tor_{cff} = 785.18\ lbf \cdot in$
$M_{ycff} = 97.4\ lbf \cdot in$
$M_{zcff} = 4802.22\ lbf \cdot in$

$Axial_{cffjW} := Axial_{cff} \cdot \sin(\theta_{cffj}) + V_{zcff} \cdot \cos(\theta_{cffj}) = 21.15\ lbf$
$V_{ycffjW} := V_{ycff} = 139.4\ lbf$
$V_{zcffjW} := Axial_{cff} \cdot \cos(\theta_{cffj}) + V_{zcff} \cdot \sin(\theta_{cffj}) = 19.34\ lbf$
$Tor_{cffjW} := Tor_{cff} \cdot \sin(\theta_{cffj}) + M_{zcff} \cdot \cos(\theta_{cffj}) = 4737.15\ lbf \cdot in$
$M_{ycffjW} := M_{ycff} = 97.4\ lbf \cdot in$
$M_{zcffjW} := Tor_{cff} \cdot \cos(\theta_{cffj}) + M_{zcff} \cdot \sin(\theta_{cffj}) = 2563.14\ lbf \cdot in$

$f_{affj} := (Axial_{cffjW}) \div (A_{wffj}) = 6.15\ psi$ $f_{torffj} := (Tor_{cffjW}) \div (2 \cdot b_{cffwj} \cdot d_{cffwj} \cdot t_{cffwj}) = 394.76\ psi$

$f_{vyffj} := (V_{ycffjW}) \div (A_{wyffj}) = 71.95\ psi$ $f_{byffj} := (M_{ycffjW}) \div (S_{wyffj}) = 13.77\ psi$

$f_{vzffj} := (V_{zcffjW}) \div (A_{wzffj}) = 13.45\ psi$ $f_{bzffj} := (M_{zcffjW}) \div (S_{wxffj}) = 311.1\ psi$

$$f_{wffj} := \sqrt{f_{bzffj}^2 + f_{byffj}^2 + f_{vyffj}^2 + f_{vzffj}^2} + f_{torffj} + f_{affj} = 720.81\ psi$$

$I_{wffj} := (f_{wffj}) \div (\mathrm{Min}(F_{sw}, F_{sb})) = 0.11$

***Use Full Penetration Welds***
*Around entire perimeter of front fascia corner outrigger mitered connection.*
*(4043 Filler)*

**Front Fascia - Adjacent Corner Outrigger Location:**

$Axial_{cff} = 13.82\ lbf$ $Tor_{cff} = 785.18\ lbf \cdot in$
$V_{ycff} = 139.4\ lbf$ $M_{ycff} = 97.4\ lbf \cdot in$
$V_{zcff} = 17.17\ lbf$ $M_{zcff} = 4802.22\ lbf \cdot in$

$L_{wcff} := 6\ in$ $t_{wcff} := 0.125\ in$ $n_{wcff} := 2$

$A_{wcff} := L_{wcff} \cdot t_{wcff} = 0.75\ in^2$

$$V_{wcff} := \sqrt{\left(\frac{V_{ycff}}{n_{wcff}} + \frac{Tor_{cff}}{b_{cff}}\right)^2 + \left(\frac{V_{zcff}}{n_{wcff}}\right)^2} = 462.37\ lbf$$

$$T_{wcff} := Axial_{cff} + \frac{M_{ycff}}{b_{cff}} = 62.52\ lbf$$

$$f_{wfcff} := \sqrt{\left(\frac{V_{wcff}}{A_{wcff}}\right)^2 + \left(\frac{T_{wcff}}{A_{wcff}}\right)^2} = 622.1\ psi$$

$I_{wfcff} := (f_{wfcff}) \div (\mathrm{Min}(F_{sw}, F_{sb})) = 0.1$

***Use (2) 6" Vertical Full Penetration Line Welds***
*To attach corner front fascia to adjacent tube outrigger.*
*(4043 Filler)*

**Fastener Size:** #10-16 (Cond. CW)

$D_h := 0.201\ in$

$t_s := t_{cff}$ $t_h := t_{ao}$
$d_{es} := 0.352\ in$ $d_{eh} := 0.352\ in$
$t_{sb} := 0.625\ in$ $D_{ws} := 0.363\ in$

**Substrate:** 6005-T5

**Material Under Head:** 6061-T6

$n_{fcff} := 4$

$$V_{fcff} := \sqrt{\left(\frac{V_{ycff}}{n_{fcff}}\right)^2 + \left(\frac{V_{zcff}}{n_{fcff}} + \frac{Tor_{cff}}{0.5 \cdot n_{fcff} \cdot 4.5\ in}\right)^2} = 97.94\ lbf$$

$$T_{fcff} := \frac{Axial_{cff}}{n_{fcff}} + \frac{M_{ycff}}{0.5 \cdot n_{fcff} \cdot 1.2969\ in} = 41.01\ lbf$$

$V_{fall} := 232.15\ lbf$ $T_{fall} := 359.69\ lbf$

$$I_{fcff} := \left(\frac{V_{fcff}}{V_{fall}}\right)^2 + \left(\frac{T_{fcff}}{T_{fall}}\right)^2 = 0.19$$

***Use (4) #10 S.S. Fasteners***
*to attach front fascia to corner outrigger.*
*5/8" min. thread engagement into fascia screw chase*
*300 Series (Fy = 65,000 psi)*

## *Check Corner Welds (Continued):*

### *Rear Fascia - Corner Outrigger Location:*

$Axial_{crf} = 2.78\ lbf$ $\quad Axial_{crfjW} := Axial_{crf} \cdot \cos(\theta_{crfj}) + V_{zcrf} \cdot \sin(\theta_{crfj}) = 3.29\ lbf$

$V_{ycrf} = 48.37\ lbf$ $\quad V_{ycrfjW} := V_{ycrf} = 48.37\ lbf$

$V_{zcrf} = 1.9\ lbf$ $\quad V_{zcrfjW} := Axial_{crf} \cdot \sin(\theta_{crfj}) + V_{zcrf} \cdot \cos(\theta_{crfj}) = 2.82\ lbf$

$Tor_{crf} = 2237.92\ lbf \cdot in$ $\quad Tor_{crfjW} := Tor_{crf} \cdot \cos(\theta_{crfj}) + M_{zcrf} \cdot \sin(\theta_{crfj}) = 2201.42\ lbf \cdot in$

$M_{ycrf} = 25.26\ lbf \cdot in$ $\quad M_{ycrfjW} := M_{ycrf} = 25.26\ lbf \cdot in$

$M_{zcrf} = 349.76\ lbf \cdot in$ $\quad M_{zcrfjW} := Tor_{crf} \cdot \sin(\theta_{crfj}) + M_{zcrf} \cdot \cos(\theta_{crfj}) = 1179.55\ lbf \cdot in$

$f_{arfj} := (Axial_{crfjW}) \div (A_{wrfj}) = 1.33\ psi$ $\quad f_{torrfj} := (Tor_{crfjW}) \div (2 \cdot b_{crfwj} \cdot d_{crfwj} \cdot t_{crfwj}) = 508.46\ psi$

$f_{vyrfj} := (V_{ycrfjW}) \div (A_{wyrfj}) = 24.96\ psi$ $\quad f_{byrfj} := (M_{ycrfjW}) \div (S_{wyrfj}) = 12.27\ psi$

$f_{vzrfj} := (V_{zcrfjW}) \div (A_{wzrfj}) = 5.88\ psi$ $\quad f_{bzrfj} := (M_{zcrfjW}) \div (S_{wxrfj}) = 260.83\ psi$

$$f_{wrfj} := \sqrt{f_{bzrfj}^2 + f_{byrfj}^2 + f_{vyrfj}^2 + f_{vzrfj}^2} + f_{torrfj} + f_{arfj} = 772.17\ psi$$

$I_{wrfj} := (f_{wrfj}) \div (\text{Min}(F_{sw}, F_{sb})) = 0.12$

***Use Full Penetration Welds***
*Around entire perimeter of rear fascia corner outrigger mitered connection.*
*(4043 Filler)*

### *Rear Fascia - Adjacent Corner Outrigger Location:*

$Axial_{crf} = 2.78\ lbf$ $\quad Tor_{crf} = 2237.92\ lbf \cdot in$

$V_{ycrf} = 48.37\ lbf$ $\quad M_{ycrf} = 25.26\ lbf \cdot in$

$V_{zcrf} = 1.9\ lbf$ $\quad M_{zcrf} = 349.76\ lbf \cdot in$

$L_{wcrf} := 6\ in$ $\quad t_{wcrf} := 0.125\ in$ $\quad n_{wcrf} := 2$

$A_{wcrf} := L_{wcrf} \cdot t_{wcrf} = 0.75\ in^2$

$$V_{wcrf} := \sqrt{\left(\frac{V_{ycrf}}{n_{wcrf}} + \frac{Tor_{crf}}{b_{crf}}\right)^2 + \left(\frac{V_{zcrf}}{n_{wcrf}}\right)^2} = 1143.15\ lbf$$

$$T_{wcrf} := Axial_{crf} + \frac{M_{ycrf}}{b_{crf}} = 15.41\ lbf$$

$$f_{wfcrf} := \sqrt{\left(\frac{V_{wcrf}}{A_{wcrf}}\right)^2 + \left(\frac{T_{wcrf}}{A_{wcrf}}\right)^2} = 1524.33\ psi$$

$I_{wfcrf} := (f_{wfcrf}) \div (\text{Min}(F_{sw}, F_{sb})) = 0.24$

***Use (2) 6" Vertical Full Penetration Line Welds***
*To attach corner rear fascia to adjacent tube outrigger.*
*(4043 Filler)*

***Fastener Size:*** #10-16 (Cond. CW)

$t_s := t_{cff}$ $\quad t_h := t_{ao}$

$d_{es} := 0.352\ in$ $\quad d_{eh} := 0.352\ in$

$t_{sb} := 0.625\ in$ $\quad D_{ws} := 0.363\ in$

$D_h := 0.201\ in$

***Substrate:*** 6005-T5

***Material Under Head:*** 6061-T6

$n_{fcrf} := 4$

$$V_{fcrf} := \sqrt{\left(\frac{V_{ycrf}}{n_{fcrf}}\right)^2 + \left(\frac{V_{zcrf}}{n_{fcrf}} + \frac{Tor_{crf}}{0.5 \cdot n_{fcrf} \cdot 4.5\ in}\right)^2} = 249.43\ lbf$$

$$T_{fcrf} := \frac{Axial_{crf}}{n_{fcrf}} + \frac{M_{ycrf}}{0.5 \cdot n_{fcrf} \cdot 1.2969\ in} = 10.43\ lbf$$

$V_{fall} := 232.15\ lbf$ $\quad T_{fall} := 359.69\ lbf$

$$I_{fcrf} := \left(\frac{V_{fcrf}}{V_{fall}}\right)^2 + \left(\frac{T_{fcrf}}{T_{fall}}\right)^2 = 1.16$$ <--- Okay w/ welds

***Use (4) #10 S.S. Fasteners***
*to attach corner rear fascia to adjacent tube outrigger.*
*5/8" min. thread engagement into fascia screw chase*
*300 Series (Fy = 65,000 psi)*

CORNER_CONNECTIONS =
"0.11 ≤ 1.00 ∴ PASS"
"0.1 ≤ 1.00 ∴ PASS"
"0.12 ≤ 1.00 ∴ PASS"
"0.24 ≤ 1.00 ∴ PASS"

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.17
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## *Corner System Thru-Bolts*

### *Check Thru-Bolts to Adjacent Outriggers:*

***Thru-Bolt Size:*** 3/8-16 (Cond.CW)

$t_s := t_{ao}$ $\quad t_h := t_{eo}$

$d_{es} := 0.75\ in$ $\quad d_{eh} := 0.75\ in$

$N_{tb} := 2$ $\quad D_{ws} := 0.75\ in$

$D_h := 0.4375\ in$

***Substrate:*** 6005-T5 $\quad$ ***Material Under Head:*** 6005-T5

$V_{tb} = (R_y) \div (N_{tb}) := 162.64\ lbf$

$V_{tball} := 621.15\ lbf$

$I_{tba} := (V_{tb}) \div (V_{tball}) = 0.26$

**Use (6) Total 3/8" Thru-Bolts per Adjacent Outrigger as shown.**
*to attach adjacent corner outrigger to typical system end outrigger as shown.*
*5" Vertical Spacing.*
*Horizontal Spacing As Shown.*
*300 Series (Fy = 65,000 psi)*

***Vertical Node Reactions:***

| "LC" | "Node" | "Ry" |
|---|---|---|
| 4 | "N7" | −101.82 lbf |
| 4 | "N9" | 325.28 lbf |
| 4 | "N10" | −101.82 lbf |
| 4 | "N12" | 325.28 lbf |
| 4 | "N11" | 38.51 lbf |
| 4 | "N8" | 38.51 lbf |
| "LC" | "Node" | "Ry" |
| 5 | "N7" | −103.26 lbf |
| 5 | "N9" | 269.81 lbf |
| 5 | "N10" | −103.26 lbf |
| 5 | "N12" | 269.81 lbf |
| 5 | "N11" | 30.47 lbf |
| 5 | "N8" | 30.47 lbf |
| "LC" | "Node" | "Ry" |
| 6 | "N7" | −92.4 lbf |
| 6 | "N9" | 295.14 lbf |
| 6 | "N10" | −106.04 lbf |
| 6 | "N12" | 282.59 lbf |
| 6 | "N11" | 30.54 lbf |
| 6 | "N8" | 36.47 lbf |

### *Corner Outrigger Connection:*

***Check Thru-Bolts:***

$Tor_{co} = 4802.22\ lbf \cdot in$

$P_{tb} := (Tor_{co}) \div (6\ in) = 800.37\ lbf$

$T_{tb} := 2 \cdot P_{tb} = 1600.74\ lbf$

$T_{fas} = 3100\ lbf$

$I_{tbc} := (T_{tb}) \div (T_{fas}) = 0.52$

***Washer Plate Requirements:***

$$D_{wsreq} := \frac{P_{tb} \cdot 3}{t_h \cdot ADM\_F_{tu}(alloy\_h, 0)} + D_h = 0.943\ in$$

$b_p := D_{wsreq}$ $\quad d_p := D_{wsreq}$

$$t_{pmin} := \sqrt{\frac{P_{tb} \cdot b_p \cdot 6}{F_{byco} \cdot 8 \cdot d_p}} = 0.14\ in$$

***Check Tube Surface Bearing:***

$P_{bear} := 2 \cdot P_{tb} = 1600.74\ lbf$

$$R_{nbear} := \frac{1.33 \cdot ADM\_F_{tu}(alloy\_s, 0) \cdot t_{co} \cdot 2\ in}{3} = 4211.67\ lbf$$

$I_{sb} := (P_{bear}) \div (R_{nbear}) = 0.38$

***Check Local Tube Wall Bending:***

$a_{27} := 6\ in$ $\quad b_{27} := 2\ in$ $\quad L_{27} := d_{co} = 8\ in$ $\quad L_{eff27} := 18\ in$

$M_{yloc} := 900.42\ lbf \cdot in$

$F_{byco} = 31818.18\ psi$

$$L_{req27} := \frac{M_{yloc} \cdot 6}{F_{byco} \cdot t_{co}^{2}} = 10.87\ in$$

$I_{ltwb} := (L_{req27}) \div (L_{eff27}) = 0.6$

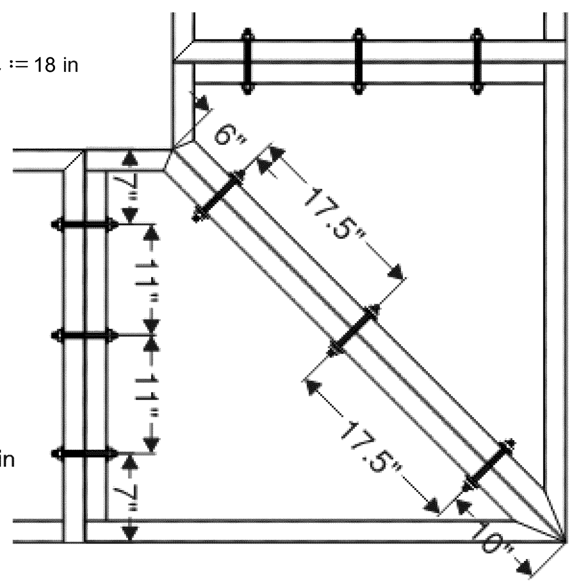
***Check Local Tube Wall Deflection:***

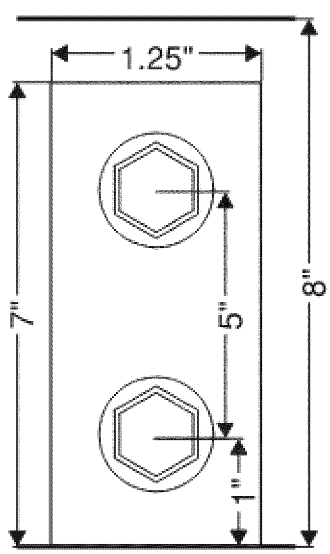
$$I_{y27} := \frac{L_{eff27} \cdot t_{co}^{3}}{12} = 0\ in^4$$

$$\Delta_{27} := \frac{2 \cdot P_{tb} \cdot a_{27}^{3} \cdot b_{27}^{2}}{3\ E_{alum} \cdot I_{y27} \cdot (3 \cdot a_{27} + b_{27})^{2}} = 0.039\ in$$

$\Delta_{27all} := (d_{co}) \div (120) = 0.07\ in$

$I_{ltwd} := (\Delta_{27}) \div (\Delta_{27all}) = 0.58$




**Use (6) Total 3/8" Thru-Bolts per Corner Outrigger as shown.**
*to attach corner outriggers together as shown.*
*5" Vertical Spacing.*
*Horizontal Spacing As Shown.*
*300 Series (Fy = 65,000 psi)*
***Use 1-1/4" x 7" x 3/16" Washer Plates per Thru-Bolt Group.***
*(6061-T6 Min.)*

ADJ_CORNER_THRU_BOLTS = [ "0.26 ≤ 1.00 ∴ PASS" ]

CORNER_THRU_BOLTS = [ "0.52 ≤ 1.00 ∴ PASS"; "0.38 ≤ 1.00 ∴ PASS"; "0.6 ≤ 1.00 ∴ PASS"; "0.58 ≤ 1.00 ∴ PASS" ]

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**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

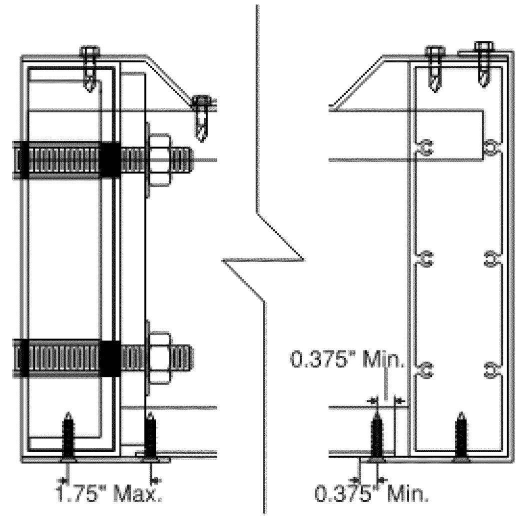


## SOFFIT

$t_{sp} := 0.1$ in *soffit panel thickness* $W_{upASD} = 10.42$ psf

$N_{ss} := 5$ *# of soffit stiffeners* $L_{stiff} = 32$ in *stiffener length*

$Sp_{ss} := (96\ in) \div ((N_{ss} - 1)) = 24$ in *soffit stiffener spacing*




### Check Soffit Panel Bending:

$L_{bpanel} := Sp_{ss} = 24$ in

$w_{panel} := W_{upASD} \cdot Proj = 2.6$ pli

$$M_{ypanel} := \frac{168 \cdot w_{panel} \cdot L_{bpanel}^{2}}{1568} = 160.7\ lbf \cdot in$$

$$S_{ypanel} := \frac{t_{sp}^{2} \cdot (Proj - 4.5\ in)}{6} = 0.05\ in^3$$

$f_{bpanel} := (M_{ypanel}) \div (S_{ypanel}) = 3061.03$ psi

$F_{bpanel} := 11500$ psi

$I_{bpanel} := (f_{bpanel}) \div (F_{bpanel}) = 0.27$

### Check Panel Deflection:

L/60 *Panel Deflection Criteria*

$$I_{yp} := \frac{t_p^{3} \cdot (Proj - 4.5\ in)}{12} = 0.0026\ in^4$$

$$\Delta_{yp} := 0.00541 \cdot \frac{w_{panel} \cdot L_{bpanel}^{4}}{E_{alum} \cdot I_{yp}} = 0.18\ in$$

$$\Delta_{ypall} := \frac{L_{bpanel}}{Deflection\ Criteria} = 0.4\ in$$

$I_{\Delta yp} := (\Delta_{yp}) \div (\Delta_{ypall}) = 0.44$

**Using L /60 Deflection Limit:**
**Use 0.100 " Thick**
**Panel Type = 1100−H14 Aluminum**
**Maximum Span = 24.00"**

### Check Fasteners (to stiffeners):

**Fastener Size:** #10-16 (Cond. CW)

$t_{ss} := 0.121$ in $t_h := t_{sp}$

$d_{es} := 0.5$ in $d_{eh} := 0.875$ in

$D_h := 0.2525$ in $Spf := 12$ in

**Stiffener:** 5052-H32 **Panel:** 1100-H14

$T_{fs} := 1.25 \cdot 1.25 \cdot W_{upASD} \cdot Sp_{ss} \cdot Spf = 32.55$ lbf

$T_{falls} := 91.61$ lbf

$I_{fs} := (T_{fs}) \div (T_{falls}) = 0.36$

***Use #10-16 S.S. Countersunk Fasteners***
***12" o.c. max.*** *to attach panel to stiffeners*
*300 Series Stainless Steel (Fy = 65,000 psi)*

### Check Soffit Mounting Strip:

$L_{effms} := 12$ in $t_{ms} := t_{sp} = 0.1$ in

$$R_{ss} := \frac{1.25 \cdot W_{upASD} \cdot Sp_{ss} \cdot L_{stiff}}{2} = 34.72\ lbf$$

$M_{wkms} := R_{ss} \cdot 1.75\ in = 60.76\ lbf \cdot in$

$$L_{reqms} := \frac{M_{wkms} \cdot 6}{t_{ms}^{2} \cdot F_{bpanel}} = 3.17\ in$$

$I_{bms} := (L_{reqms}) \div (L_{effms}) = 0.26$

$$I_{yms} := \frac{L_{effms} \cdot t_{ms}^{3}}{12} = 0\ in^4$$

$$\Delta_{ms} := \frac{R_{ss} \cdot (1.75\ in)^{3}}{3\ E_{alum} \cdot I_{yms}} = 0.01\ in$$

$$\Delta_{msall} := \frac{1.75\ in}{60} = 0.03\ in$$

$I_{\Delta ms} := (\Delta_{ms}) \div (\Delta_{msall}) = 0.21$

### Check Soffit Mounting Strip Fasteners:

$T_{fmsp} := R_{ss} = 34.72$ lbf

$$T_{fmsrf} := \frac{R_{ss} \cdot 0.6033\ in}{1.056\ in} = 19.84\ lbf$$

$$T_{povrms} := \left(\left(0.27 + 1.45 \cdot \frac{t_{ms}}{0.19\ in}\right) \cdot 0.19\ in \cdot t_{ms} \cdot 14\ ksi\right) \div (3) = 91.61\ lbf$$

$T_{fasms} := 477$ lbf

$T_{poutp} := (1.2 \cdot 0.19\ in \cdot t_{sp} \cdot 14\ ksi) \div (3) = 106.4$ lbf

$T_{poutrf} := (1.2 \cdot 0.19\ in \cdot t_{rf} \cdot 35\ ksi) \div (3) = 332.5$ lbf

$I_{fmsp} := (T_{fmsp}) \div (Min(T_{povrms}, T_{fasms}, T_{poutp})) = 0.38$

***Use #10-16 S.S. Undercut Fasteners***
***12" o.c. max.*** *to attach soffit panel to mounting strip*
*300 Series Stainless Steel (Fy = 65,000 psi)*

$I_{fmsrf} := (T_{fmsrf}) \div (Min(T_{povrms}, T_{fasms}, T_{poutrf})) = 0.22$

***Use #10-16 S.S. Undercut Fasteners***
***12" o.c. max.*** *to attach mounting strip to rear fascia.*
***Fastener must be in-line with each stiffener end.***
*300 Series Stainless Steel (Fy = 65,000 psi)*

SOFFIT_PANEL = ["0.27 ≤ 1.00 ∴ PASS" ; "0.44 ≤ 1.00 ∴ PASS"]

STIFFENER_FASTENERS = "0.36 ≤ 1.00 ∴ PASS"

SOFFIT_MOUNTING_STRIP = ["0.26 ≤ 1.00 ∴ PASS" ; "0.21 ≤ 1.00 ∴ PASS"]

MOUNTING_STRIP_FASTENERS = ["0.38 ≤ 1.00 ∴ PASS" ; "0.22 ≤ 1.00 ∴ PASS"]

***Stiffener Angle:*** 5052-H32

$L_{1s} := 1.75\ in$

$L_{2s} := 1.75\ in$

$t_{ss} = 0.121\ in$

$C_{bs} := 1.0$

$Alum_{Den} := 158\ pcf$

$L_{stiff} = 32\ in$ *stiffener length*

$T_{ws} = 24\ in$ *stiffener trib. width*

$W_{upASD} = 10.42\ psf$

$P_{light} := 5\ lbf$

"Stiffener Section Properties"

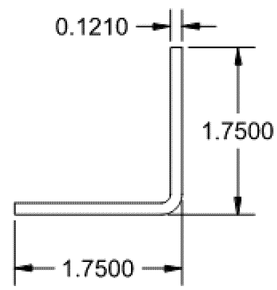
$A_s := 0.401\ in^2$

$I_{ys} := 0.12\ in^4$

$S_{xstop} := 0.096\ in^3$

$S_{xsbot} := 0.245\ in^3$

$J_s := 0.002\ in^4$




***Check Stiffener Bending:***

***Uplift:***

$w_{upstiff} := W_{upASD} \cdot T_{ws} = 1.74\ pli$

$$M_{xsu} := \frac{w_{upstiff} \cdot L_{stiff}^2}{8} = 222.21\ lbf \cdot in$$

$$f_{bxsu} := \frac{M_{xsu}}{S_{xsbot}} = 906.97\ psi$$

$F_{bxsuF.5.a.2} = 9087.68\ psi$ *uniform compression local buckling*

$F_{bxsu} := 9087.68\ psi$

$I_{bsu} := (f_{bxsu}) \div (F_{bxsu}) = 0.1$

***Uplift Deflection:***

$$\Delta_{ysu} := \frac{5 \cdot w_{upstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} = 0.02\ in$$

$\Delta_{ysuall} := Min\left(1.5\ in, \left(L_{stiff}\right) \div (60)\right) = 0.53\ in$

$I_{\Delta ysu} := (\Delta_{ysu}) \div (\Delta_{ysuall}) = 0.04$

***Dead Load:***

$w_{DLstiff} := Alum_{Den} \cdot \left(A_s + t_{sp} \cdot T_{ws}\right) = 0.26\ pli$

$$M_{xsDL} := \frac{w_{DLstiff} \cdot L_{stiff}^2}{8} + \frac{P_{light} \cdot L_{stiff}}{4} = 72.78\ lbf \cdot in$$

$$f_{bxsDL} := \frac{M_{xsDL}}{S_{xstop}} = 758.15\ psi$$

$F_{bxsDLF.5.a.1} = 10685.01\ psi$ *leg tip max. compression local buckling*

$F_{bxsDLLTB} = 26548.53\ psi$ *leg tip max. compression LTB*

$F_{bxsDL} := 10685.01\ psi$

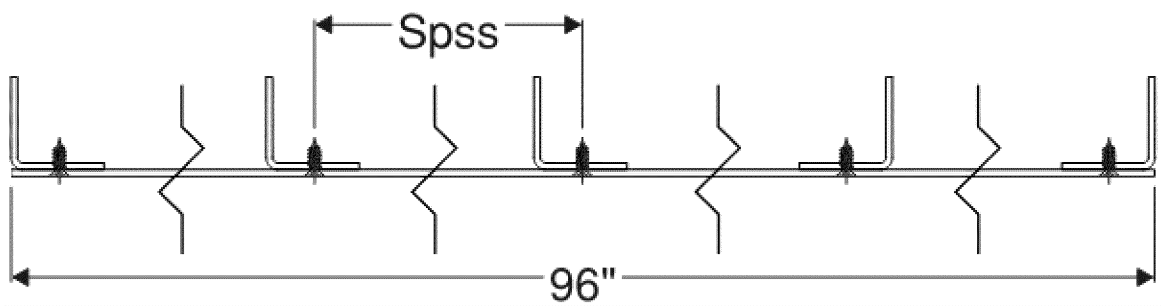
$I_{bsDL} := (f_{bxsDL}) \div (F_{bxsDL}) = 0.07$

***Dead Load Deflection:***

$$\Delta_{ysDL} = \frac{5 \cdot w_{DLstiff} \cdot L_{stiff}^4}{384\ E_{alum} \cdot I_{ys}} + \frac{P_{light} \cdot L_{stiff}^3}{48\ E_{alum} \cdot I_{ys}} = 0.01\ in$$

$\Delta_{ysDLall} := Min\left(1.5\ in, \left(L_{stiff}\right) \div (60)\right) = 0.53\ in$

$I_{\Delta ysDL} := (\Delta_{ysDL}) \div (\Delta_{ysDLall}) = 0.01$




***Use (5) 1-3/4" x 1-3/4" x 0.121" Formed Alum. Angles***
*(2) @ each panel end and spaced* **24.0** *" max. along 8' panel length as shown (5052-H32)*

STIFFENER =

| |
|---|
| "0.1 ≤ 1.00 ∴ PASS" |
| "0.04 ≤ 1.00 ∴ PASS" |
| "0.07 ≤ 1.00 ∴ PASS" |
| "0.01 ≤ 1.00 ∴ PASS" |

## ANCHOR BRACKET (TYPICAL)

**System Data:**

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf

**Channel Anchor Data:**

$b := b_{cb} = 1.69$ in  $L := 4.25$ in
$d := d_{cb} = 5.69$ in  $L_b := L$
$t := t_{cb} = 0.25$ in  $E_{alum} = 10100000$ psi

**Outrigger Reactions:**

$R_{rfdlLC3} = 241.55$ lbf  $R_{rfdlLC6} = 147.53$ lbf
$R_{yOLC3} = 290.98$ lbf  $R_{yOLC6} = 210.73$ lbf
$M_{xOLC3} = 8392.72$ lbf·in  $M_{xOLC6} = 6441.1$ lbf·in

☑ Welded within 1 inch of Mmax

**Section Properties:**

$I_{x1} = 9.19$ in⁴  $A_1 = 2.14$ in²
$I_{y1} = 0.47$ in⁴  $J_1 = 0.05$ in⁴
$S_{x1} = 3.23$ in³  $Z_{x1} = 3.99$ in³
$S_{y1} = 0.37$ in³  $Z_{y1} = 0.45$ in³

**Corner Key Shape:** Channel

**Corner Key Material:** 6061-T6

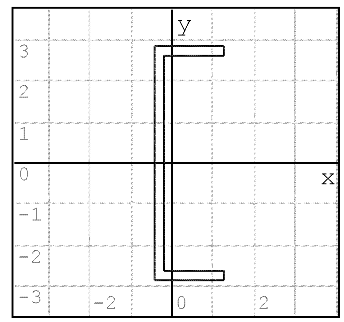
**Weld Filler:** 4043

**Outrigger Material:** 6061-T6

## CALCULATIONS

$M_x = M_{xO} + (R_{yO} \cdot L)$  $R_{yO} := 290.98$ lbf

$M_x := 9629.41$ lbf·in  $R_{fdl} := 241.55$ lbf




**Check Thru-Bolts:**

**Fastener Type:** 1/2-13 (Cond. CW)

$t_o := \mathrm{Min}(t_{io}, t_{eo}) = 0.125$ in
$n_{tb} := 6$
$d_e := 1$ in

**Shear Allowables:**

$V_{bearoutrigger} := 2435.9$ lbf
$V_{bearchannel} := 2307.69$ lbf
$V_{Bolt} := 2984$ lbf
$V_{tball} := 2307.69$ lbf

$$V_{tb} := \sqrt{\left(\frac{R_{yO}}{n_{tb}}\right)^2 + \left(\frac{M_x}{0.5 \cdot n_{tb} \cdot 3.625\ \text{in}}\right)^2} = 886.79\ \text{lbf}$$

$F_{syO} := 21000$ psi  $F_{suO} := 22800$ psi  $n_{sp} := 2$
$A_{gv} := 0.45$ in²
$A_{nv} := 0.28$ in²
$R_{nsy} := (F_{syO} \cdot A_{gv} \cdot n_{sp}) \div (1.5) = 12687.5$ lbf
$R_{nsr} := (F_{suO} \cdot A_{nv} \cdot n_{sp}) \div (1.95) = 6485.58$ lbf
$V_{couple} := (M_x) \div (3.625\ \text{in}) = 2656.39$ lbf

$$I_{tb} := \mathrm{Max}\left(\frac{V_{tb}}{V_{tball}}, \frac{V_{couple}}{\mathrm{Min}(R_{nsy}, R_{nsr})}\right) = 0.41$$

***Use (6) 1/2" Dia. S.S. Thru-Bolts***
*3.625" o.c. vertically*
*1.25" o.c. horizontally*
*to attach outrigger to corner key channel as shown*
*300 Series (Fy = 65,000 psi)*

**Check Channel Bracket:**

**Outrigger Channel:**

$f_{bxOC} := (M_x) \div (S_{x1}) = 2984$ psi

$F_{bx} := 9090.91$ psi

$I_{bxOC} := (f_{bxOC}) \div (F_{bx}) = 0.33$

**Rear Fascia Channel:**

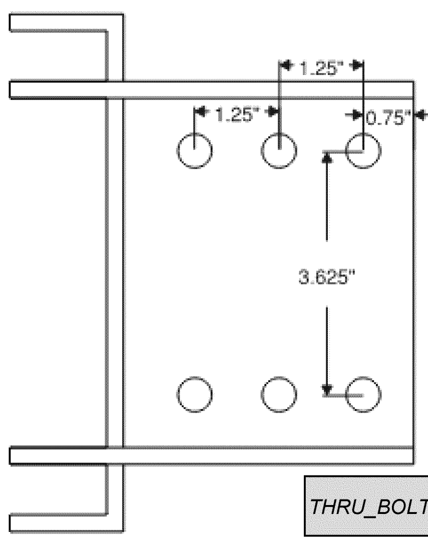
$M_{xRFC} := R_{yO} \cdot 5.75\ \text{in} = 1673.16$ lbf·in

$S_{xRFC} := 6.4503$ in³

$f_{bxRFC} := (M_{xRFC}) \div (S_{xRFC}) = 259.39$ psi

$I_{bxRFC} := (f_{bxRFC}) \div (F_{bx}) = 0.03$

***Use 1/4" thk Anchor Channels***
*as shown (6061-T6)*
*Snug tight inside outrigger and rear fascia*




THRU_BOLTS = ["0.38 ≤ 1.00 ∴ PASS"; "0.41 ≤ 1.00 ∴ PASS"]

CHANNEL_BRACKET = ["0.33 ≤ 1.00 ∴ PASS"; "0.03 ≤ 1.00 ∴ PASS"]

***Rear fascia tube torsion due to outrigger moment check on page 6.12***

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.21
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## *Check Channel Bracket Welds:*

$d_w := d = 5.69\ \text{in}$ $\quad M_x = 9629.41\ \text{lbf·in}$

$b_w := 2.391\ \text{in}$ $\quad R_{yO} = 290.98\ \text{lbf}$

$t_w := 0.25\ \text{in}$

$$A_w := t_w \cdot (2 \cdot b_w + d_w) = 2.62\ \text{in}^2$$

$$S_{w1} := t_w \cdot \left(b_w \cdot d_w + \frac{d_w^{\ 2}}{6}\right) = 4.75\ \text{in}^3$$

$$S_{w2} := \frac{t_w \cdot (2 \cdot b_w + d_w)^2}{6} = 4.57\ \text{in}^3$$

$$f_w := \sqrt{\left(\frac{0.7071 \cdot M_x}{S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{S_{w2}} + \frac{R_{yO}}{A_w}\right)^2} = 2147.53\ \text{psi}$$

$F_{tub} := 24000\ \text{psi}$ $\quad F_{tuw} = 24000\ \text{psi}$

$$F_{sbT} := \frac{F_{tub}}{1.95} = 12307.69\ \text{psi} \qquad F_{swT} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

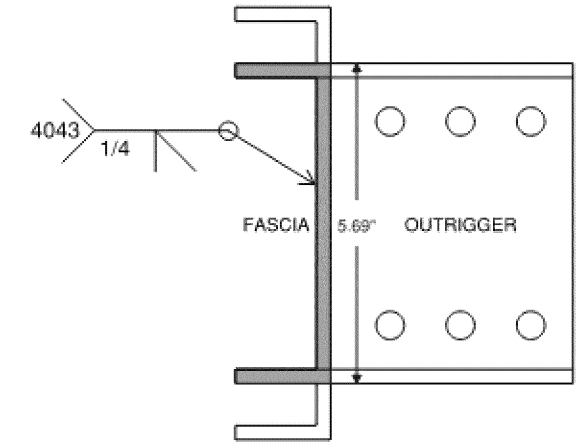
$$F_{sbV} := \frac{0.6 \cdot F_{tub}}{1.95} = 7384.62\ \text{psi} \qquad F_{swV} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

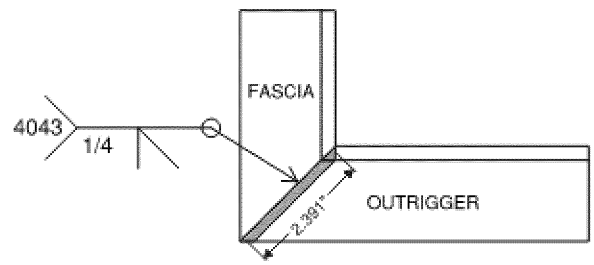
$$I_{wbm} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{sbT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{sbV} \cdot S_{w2}} + \frac{R_{yO}}{F_{sbV} \cdot A_w}\right)^2} = 0.25$$

$$I_{wf} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{swT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{swV} \cdot S_{w2}} + \frac{R_{yO}}{F_{swV} \cdot A_w}\right)^2} = 0.29$$

$$I_w := \text{Max}(I_{wbm}, I_{wf}) = 0.29$$

***Use 1/4" Bevel Groove Welds***
*Full perimeter of outrigger channel to attach outrigger channel to anchor channel.*
*(4043 Filler)*




## *Check Front Reinforcing Plate:*

$t_{Rp} := 0.5\ \text{in}$

$$P_w := \frac{M_x}{5.1937\ \text{in}} = 1854.06\ \text{lbf}$$

$$M_{wkRp} := P_w \cdot 2.1746\ \text{in} = 4031.83\ \text{lbf·in}$$

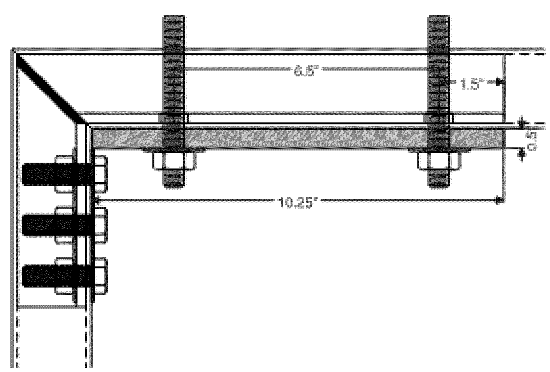
$$S_{yRp} := \left((t_{Rp})^2 \cdot 0.85 \cdot 7.5\ \text{in}\right) \div (6) = 0.27\ \text{in}^3$$

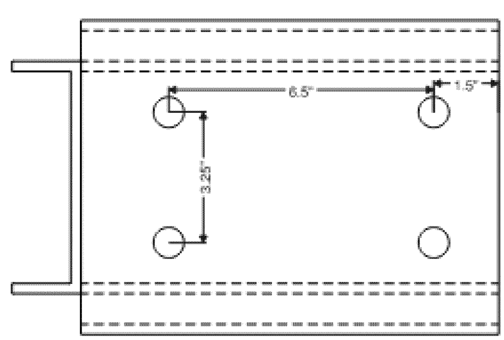
$$f_{wkRp} := (M_{wkRp}) \div (S_{yRp}) = 15178.65\ \text{psi}$$

$F_{bwkRp} := 31800\ \text{psi}$

$$I_{Rp} := (f_{wkRp}) \div (F_{bwkRp}) = 0.48$$

***Use 7-1/2" x 10-1/4" 1/2" thk Rein. Plate***
*(6061-T6)*




*ANCHOR_BRACKET_WELDS* = [ "0.25 ≤ 1.00 ∴ PASS" ; "0.29 ≤ 1.00 ∴ PASS" ]

*REINFORCING_PLATE* = [ "0.48 ≤ 1.00 ∴ PASS" ]

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.22
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

### *Check Thru-Bolt Anchors (Wood Blocking):*

☐ Brick Fascia Present

$n_a := 4 \quad R_{fdl} = 241.55\ lbf$

$$V_a := \frac{R_{yO} \cdot 9.6\ in}{0.5 \cdot n_a \cdot 6.5\ in} + \frac{R_{fdl}}{n_a} = 275.27\ lbf$$

$T_a := 2909.97\ lbf$

***Pipe Sleeve Data:***

$OD := 1.05\ in$
$t_{sleeve} := 0.154\ in$

***Washer Data:***

$b_{wp} := 4\ in \quad t_{wp} := 0.375\ in$
$d_{wp} := 4\ in \quad F_{ywp} := 36\ ksi$

***Substrate Data:***

$t_p := t_{Rp}$
$e_s := 4.5\ in$
$l_m := 4.5\ in$
$G := 0.42$
$F_c := 425\ psi$

Anchor Diameter: 5/8"

Anchor Type: Thru-Bolt

$F_u := 120\ ksi$
$F_{es} := 43000\ psi$

$\Omega_{tb} := 2.5$

$C_M := 1.0$
$C_t := 1.0$
$C_g := 1.0$
$C_\Delta := 1.0$
$C_{eg} := 1.0$
$C_{di} := 1.0$
$C_D := 1.15$

### *Wood Allowables:*

***Shear:***

$Z_{lm} = 1013.68\ lbf \quad Z_{IIIm} = 669.4\ lbf$
$Z_{ls} = 2208.13\ lbf \quad Z_{IIIs} = 623.63\ lbf$
$Z_{II} = 517.19\ lbf \quad Z_{IV} = 745.84\ lbf$

$Z_1 := \mathrm{Min}\left(Z_{lm}, Z_{ls}, Z_{II}, Z_{IIIm}, Z_{IIIs}, Z_{IV}\right) = 517.19\ lbf$

$V_{wood} := Z_1 \cdot C_D \cdot C_M \cdot C_t \cdot C_g \cdot C_\Delta \cdot C_{eg} \cdot C_{di} = 594.77\ lbf$

$R_\alpha := \sqrt{{T_a}^2 + {V_a}^2} = 2922.96\ lbf$

$\alpha := \mathrm{atan}\left(\frac{T_a}{V_a}\right) = 84.6\ deg$

$$Z_\alpha := \frac{W' \cdot V_{wood}}{W' \cdot (\cos(\alpha))^2 + V_{wood} \cdot (\sin(\alpha))^2} = 1370.02\ lbf$$

***Tension:***

$W' = 1386.19\ lbf$
$T_{wood} =$ "N/A"

***Bolt Allowables:***

$$V_{bolt} := \frac{F_u}{\Omega_{tb} \cdot \sqrt{3}} \cdot A_r = 5739.61\ lbf$$

$$T_{bolt} := \frac{F_u}{\Omega_{tb}} \cdot A_S = 10848.08\ lbf$$

***Required Washer Minimums:***

$F_{bwp} := 0.75 \cdot F_{ywp} = 27000\ psi$

$$A_{wreq} := \frac{T_a}{C_D \cdot F_c} = 5.95\ in^2$$

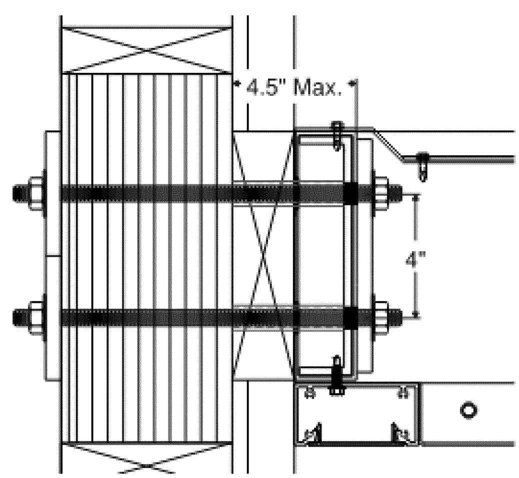
$b_{wpmin} := \sqrt{A_{wreq}} = 2.44\ in$

$d_{wpmin} := b_{wpmin} = 2.44\ in$

$$t_{wpmin} := \sqrt{\frac{T_a \cdot b_{wpmin} \cdot 6}{F_{bwp} \cdot 8 \cdot d_{wpmin}}} = 0.28\ in$$

***Check Bolt Bending:***

| "Thru-Bolt" | | "Pipe Sleeve" | |
|---|---|---|---|
| 401.85 lbf in | "Mb" | 836.86 lbf in | "Mbs" |
| 16765.99 lbf/in² | "fb" | 9809.84 lbf/in² | "fbs" |
| 69000 lbf/in² | "Fb" | 22500 lbf/in² | "Fbs" |
| 0.06 in | "Space" | 0.44 | "Int." |
| 0.24 | "Bend Int." | | |
| 0.94 | "Space Int." | | |




*Use 1.05" O.D. x 0.154" Thick SCH. 80 Pipe Sleeves*
*(300 Series SS, Fy = 30 ksi Min.)*

*Use (4) 0.625"-11 HD Galvanized Steel Thru-Bolts*
*(Grade 5, Fy = 92,000 psi, Fu = 120,000 psi)*
*w/ 4" x 4" x 0.375" A36 Steel Backer Plates*
*2.5" min. edge dist. 2.5" min. end distance.*
*(3) layers of Spruce Pine-Fir (S.G. = 0.42 MIN.) wood blocking or stronger.*
*Wood blocking by others not by Rice Engineering, Inc.*

THRU_BOLT_ANCHORS = "PASS"

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.24
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## ANCHOR BRACKET (CORNER)

***System Data:***

$Proj = 36$ in
$DL_{dn} = 44$ psf
$DL_{up} = 6$ psf
$WL_{Lat} = 10$ psf

$R_{rfdlLC3} = 241.55$ lbf
$R_{rfdlLC6} = 147.53$ lbf

***Channel Anchor Data:***

$b := b_{cb} = 1.69$ in  $L := 4.25$ in
$d := d_{cb} = 5.69$ in  $L_b := L$
$t := t_{cb} = 0.25$ in  $E_{alum} = 10100000$ psi

☑ Welded within 1 inch of Mmax

***Outrigger Reactions:***

$R_{yOLC3} = 290.98$ lbf  $R_{yOLC3C} = 552.95$ lbf
$M_{xOLC3} = 8392.72$ lbf·in  $M_{xOLC3C} = 17806.26$ lbf·in
$R_{yOLC6} = 210.73$ lbf  $R_{yOLC6C} = 407.74$ lbf
$M_{xOLC6} = 6441.1$ lbf·in  $M_{xOLC6C} = 14091.18$ lbf·in

***Section Properties:***

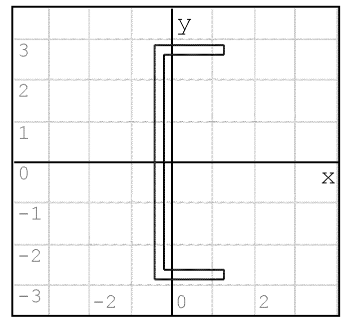
$I_{x1} = 9.19$ in⁴  $A_1 = 2.14$ in²
$I_{y1} = 0.47$ in⁴  $J_1 = 0.05$ in⁴
$S_{x1} = 3.23$ in³  $Z_{x1} = 3.99$ in³
$S_{y1} = 0.37$ in³  $Z_{y1} = 0.45$ in³

***Corner Key Shape:*** Channel
***Corner Key Material:*** 6061-T6
***Weld Filler:*** 4043
***Outrigger Material:*** 6005-T5

## CALCULATIONS

$M_x = M_{xO} + (R_{yO} \cdot L)$  $R_{yO} := 552.95$ lbf

$M_x := 20156.3$ lbf·in  $R_{fdl} := 241.55$ lbf



***Check Thru-Bolts:***

***Fastener Type:*** 1/2-13 (Cond. CW)

$t_o := \mathrm{Min}(t_{io}, t_{eo}) = 0.125$ in
$n_{tb} := 6$
$d_e := 1$ in

***Shear Allowables:***

$V_{bearoutrigger} := 2435.9$ lbf
$V_{bearchannel} := 2307.69$ lbf
$V_{Bolt} := 2984$ lbf
$V_{tball} := 2307.69$ lbf

$$V_{tb} := \sqrt{\left(\frac{R_{yO}}{n_{tb}}\right)^2 + \left(\frac{M_x}{0.5 \cdot n_{tb} \cdot 3.625\ \text{in}}\right)^2} = 1855.74\ \text{lbf}$$

$F_{syO} := 21000$ psi  $F_{suO} := 22800$ psi  $n_{sp} := 2$
$A_{gv} := 0.45$ in²
$A_{nv} := 0.28$ in²
$R_{nsy} := (F_{syO} \cdot A_{gv} \cdot n_{sp}) \div (1.5) = 12687.5$ lbf
$R_{nsr} := (F_{suO} \cdot A_{nv} \cdot n_{sp}) \div (1.95) = 6485.58$ lbf
$V_{couple} := (M_x) \div (3.625\ \text{in}) = 5560.36$ lbf

$$I_{tb} := \mathrm{Max}\left(\frac{V_{tb}}{V_{tball}}, \frac{V_{couple}}{\mathrm{Min}(R_{nsy}, R_{nsr})}\right) = 0.86$$

***Use (6) 1/2" Dia. S.S. Thru-Bolts***
*3.625" o.c. vertically*
*1.25" o.c. horizontally*
*to attach outrigger to corner key channel as shown*
*300 Series (Fy = 65,000 psi)*

***Check Channel Bracket:***

***Outrigger Channel:***

$f_{bxOC} := (M_x) \div (S_{x1}) = 6245$ psi

$F_{bx} := 9090.91$ psi

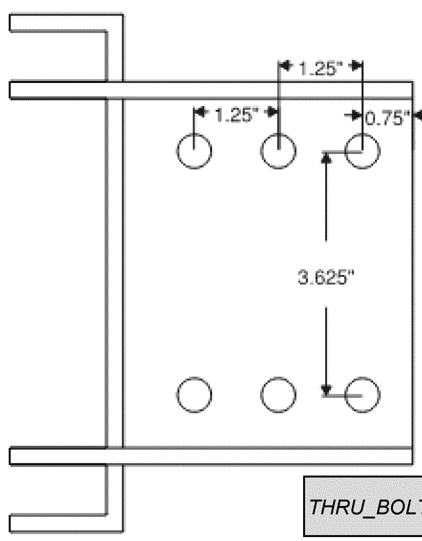
$I_{bxOC} := (f_{bxOC}) \div (F_{bx}) = 0.69$

***Rear Fascia Channel:***

$M_{xRFC} := R_{yO} \cdot 5.75\ \text{in} = 3179.46$ lbf·in
$S_{xRFC} := 6.4503\ \text{in}^3$
$f_{bxRFC} := (M_{xRFC}) \div (S_{xRFC}) = 492.92$ psi

$I_{bxRFC} := (f_{bxRFC}) \div (F_{bx}) = 0.05$

***Use 1/4" thk Anchor Channels***
*as shown (6061-T6)*
*Snug tight inside outrigger and rear fascia*




$THRU\_BOLTS = \begin{bmatrix} \text{"0.8 ≤ 1.00 ∴ PASS"} \\ \text{"0.86 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

$CHANNEL\_BRACKET = \begin{bmatrix} \text{"0.69 ≤ 1.00 ∴ PASS"} \\ \text{"0.05 ≤ 1.00 ∴ PASS"} \end{bmatrix}$

*****Rear fascia tube torsion due to outrigger moment check on page 6.12*****

## *Check Channel Bracket Welds:*

$d_w := d = 5.69\ \text{in}$  $M_x = 20156.3\ \text{lbf}\cdot\text{in}$

$b_w := 2.391\ \text{in}$  $R_{yO} = 552.95\ \text{lbf}$

$t_w := 0.25\ \text{in}$

$$A_w := t_w \cdot (2 \cdot b_w + d_w) = 2.62\ \text{in}^2$$

$$S_{w1} := t_w \cdot \left(b_w \cdot d_w + \frac{d_w^{\ 2}}{6}\right) = 4.75\ \text{in}^3$$

$$S_{w2} := \frac{t_w \cdot (2 \cdot b_w + d_w)^2}{6} = 4.57\ \text{in}^3$$

$$f_w := \sqrt{\left(\frac{0.7071 \cdot M_x}{S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{S_{w2}} + \frac{R_{yO}}{A_w}\right)^2} = 4479.27\ \text{psi}$$

$F_{tub} := 24000\ \text{psi}$  $F_{tuw} = 24000\ \text{psi}$

$$F_{sbT} := \frac{F_{tub}}{1.95} = 12307.69\ \text{psi} \qquad F_{swT} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

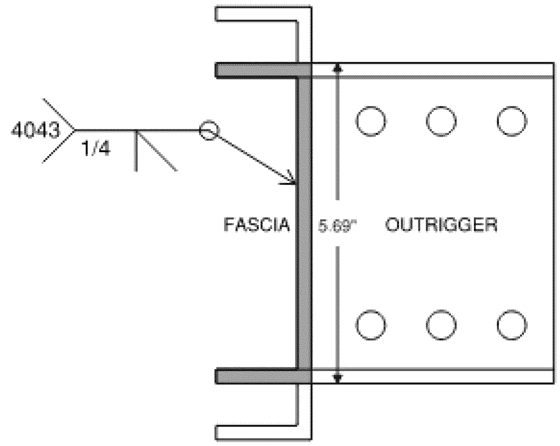
$$F_{sbV} := \frac{0.6 \cdot F_{tub}}{1.95} = 7384.62\ \text{psi} \qquad F_{swV} := \frac{0.6 \cdot F_{tuw}}{1.95} = 7384.62\ \text{psi}$$

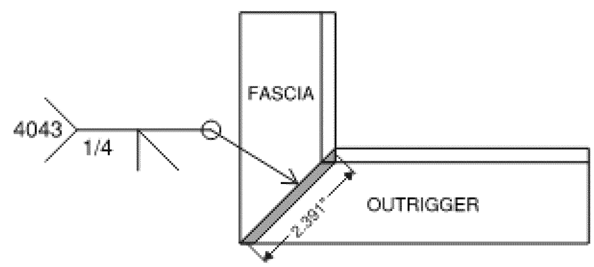
$$I_{wbm} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{sbT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{sbV} \cdot S_{w2}} + \frac{R_{yO}}{F_{sbV} \cdot A_w}\right)^2} = 0.51$$

$$I_{wf} := \sqrt{\left(\frac{0.7071 \cdot M_x}{F_{swT} \cdot S_{w1}}\right)^2 + \left(\frac{0.7071 \cdot M_x}{F_{swV} \cdot S_{w2}} + \frac{R_{yO}}{F_{swV} \cdot A_w}\right)^2} = 0.61$$

$I_w := \text{Max}(I_{wbm}, I_{wf}) = 0.61$

***Use 1/4" Bevel Groove Welds***
*Full perimeter of outrigger channel to attach outrigger channel to anchor channel.*
*(4043 Filler)*




## *Check Front Reinforcing Plate:*

$t_{Rp} := 0.5\ \text{in}$

$$P_w := \frac{M_x}{5.1937\ \text{in}} = 3880.91\ \text{lbf}$$

$M_{wkRp} := P_w \cdot 2.1746\ \text{in} = 8439.43\ \text{lbf}\cdot\text{in}$

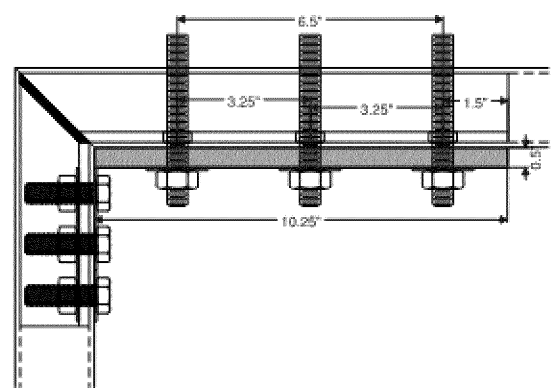
$S_{yRp} := \left((t_{Rp})^2 \cdot 0.85 \cdot 7.5\ \text{in}\right) \div (6) = 0.27\ \text{in}^3$

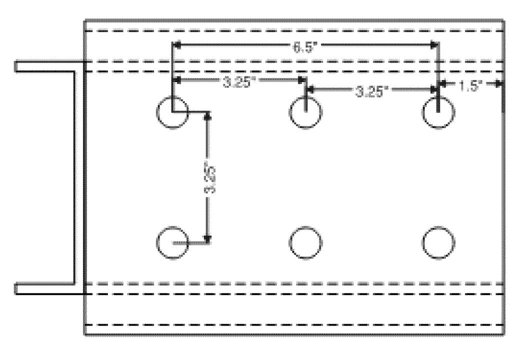
$f_{wkRp} := (M_{wkRp}) \div (S_{yRp}) = 31771.98\ \text{psi}$

$F_{bwkRp} := 31800\ \text{psi}$

$I_{Rp} := (f_{wkRp}) \div (F_{bwkRp}) = 1$

***Use 7-1/2" x 10-1/4" 1/2" thk Rein. Plate***
*(6061-T6)*




*ANCHOR_BRACKET_WELDS* = [ "0.51 ≤ 1.00 ∴ PASS" ; "0.61 ≤ 1.00 ∴ PASS" ]

*REINFORCING_PLATE* = [ "1 ≤ 1.00 ∴ PASS" ]

**RICE ENGINEERING**
105 School Creek Trail | Luxemburg, WI 54217
(Phone) 920.617.1042 | (Fax) 920.617.1100

**REI Project #** R25-01-042

**Description:** 36" Cantilevered Corner System

**Project Name:** McDonalds - Puyallup, WA. L2401075

**Sheet No:** 6.26
**Initials:** SWP
**Date:** 2/26/2025
**Revision:** --/--/----

## Check Thru-Bolt Anchors (Wood Blocking):

☐ Brick Fascia Present

$e_{x'} := 0$ in — Eccentricity of Load

$e_{y'} := 3$ in — Eccentricity of Load

$V_a = V_{elastic} + \frac{R_{fdl}}{n_a} := 321.98$ lbf

$T_a := 6376.78$ lbf

BOLT :=

| "BOLT #" | "X" | "Y" | "Dia" |
|---|---|---|---|
| "#1" | 3 in | 1 in | D1 in |
| "#2" | 3 in | 5 in | D1 in |
| "#3" | 6.25 in | 1 in | D1 in |
| "#4" | 6.25 in | 5 in | D1 in |
| "#5" | 9.5 in | 1 in | D1 in |
| "#6" | 9.5 in | 5 in | D1 in |

**Washer Data:**

$b_{wp} := 4$ in  $t_{wp} := 0.5$ in
$d_{wp} := 4$ in  $F_{ywp} := 36$ ksi

**Pipe Sleeve Data:**

$OD = 1.05$ in
$t_{sleeve} = 0.15$ in

**Substrate Data:**

$t_p := t_{Rp}$
$e_s := 4.5$ in
$l_m := 4.5$ in
$G := 0.42$
$F_c := 425$ psi

Anchor Diameter: 5/8"

Anchor Type: Thru-Bolt

$F_u := 120$ ksi
$F_{es} := 43000$ psi

$\Omega_{tb} := 2.5$

$C_M := 1.0$
$C_t := 1.0$
$C_g := 1.0$
$C_\Delta := 1.0$
$C_{eg} := 1.0$
$C_{di} := 1.0$
$C_D := 1.15$

### Wood Allowables:

**Shear:**

$Z_{Im} = 1013.68$ lbf  $Z_{IIIm} = 669.4$ lbf
$Z_{Is} = 2208.13$ lbf  $Z_{IIIs} = 623.63$ lbf
$Z_{II} = 517.19$ lbf  $Z_{IV} = 745.84$ lbf

$Z_1 := \text{Min}(Z_{Im}, Z_{Is}, Z_{II}, Z_{IIIm}, Z_{IIIs}, Z_{IV}) = 517.19$ lbf

$V_{wood} := Z_1 \cdot C_D \cdot C_M \cdot C_t \cdot C_g \cdot C_\Delta \cdot C_{eg} \cdot C_{di} = 594.77$ lbf

$R_\alpha := \sqrt{T_a^2 + V_a^2} = 6384.91$ lbf

$\alpha := \text{atan}\left(\frac{T_a}{V_a}\right) = 87.11$ deg

$$Z_\alpha := \frac{W' \cdot V_{wood}}{W' \cdot (\cos(\alpha))^2 + V_{wood} \cdot (\sin(\alpha))^2} = 1381.51 \text{ lbf}$$

**Tension:**

$W' = 1386.19$ lbf
$T_{wood} =$ "N/A"

**Bolt Allowables:**

$V_{bolt} := \frac{F_u}{\Omega_{tb} \cdot \sqrt{3}} \cdot A_r = 5739.61$ lbf

$T_{bolt} := \frac{F_u}{\Omega_{tb}} \cdot A_S = 10848.08$ lbf

**Required Washer Minimums:**

$F_{bwp} := 0.75 \cdot F_{ywp} = 27000$ psi

$A_{wreq} := \frac{T_a}{C_D \cdot F_c} = 13.05$ in²

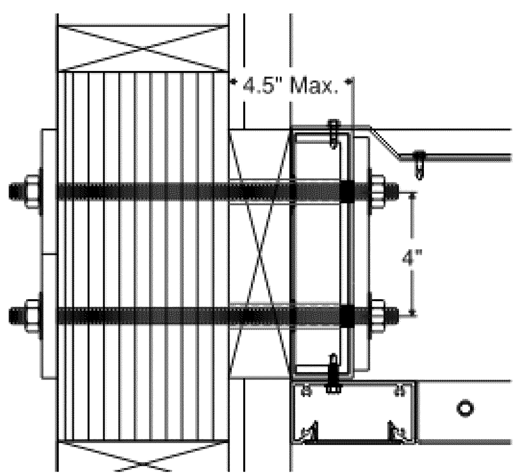
$b_{wpmin} := \sqrt{A_{wreq}} = 3.61$ in

$d_{wpmin} := b_{wpmin} = 3.61$ in

$t_{wpmin} := \sqrt{\frac{T_a \cdot b_{wpmin} \cdot 6}{F_{bwp} \cdot 8 \cdot d_{wpmin}}} = 0.42$ in

**Check Bolt Bending:**

| "Thru-Bolt" | | "Pipe Sleeve" | |
|---|---|---|---|
| 470.05 lbf in | "Mb" | 978.87 lbf in | "Mbs" |
| 19611.26 lbf/in² | "fb" | 11474.62 lbf/in² | "fbs" |
| 69000 lbf/in² | "Fb" | 22500 lbf/in² | "Fbs" |
| 0.06 in | "Space" | 0.51 | "Int." |
| 0.28 | "Bend Int." | | |
| 0.94 | "Space Int." | | |




**Use 1.05" O.D. x 0.154" Thick SCH. 80 Pipe Sleeves**
(300 Series SS, Fy = 30 ksi Min.)

**Use (6) 0.625"-11 HD Galvanized Steel Thru-Bolts**
**(Grade 5, Fy = 92,000 psi, Fu = 120,000 psi)**
**w/ 4.00" x 4.00" x 0.500" A36 Steel Backer Plates**
2.5" min. edge dist. 2.5" min. end distance.
(3) layers of Spruce Pine-Fir (S.G. = 0.42 MIN.) wood blocking or stronger.
Wood blocking by others not by Rice Engineering, Inc.

THRU_BOLT_ANCHORS = "PASS"

***Load Data***

DESIGN AND LOADING

1. THE STRUCTURAL DESIGN OF THIS BUILDING WAS BASED ON THE DESIGN CRITERIA:
   A. BUILDING CODE: 2021 INTERNATIONAL BUILDING CODE
   D. SNOW:
      GROUND SNOW LOAD: 25 PSF
   E. WIND:
      BASIC WIND SPEED: 98 MPH (3-SECOND GUST ULTIMATE)
      IMPORTANCE FACTOR: 1.00
      BUILDING OCCUPANCY CATEGORY: II
      WIND EXPOSURE: B
      PRESSURES PER ASCE7-16
   F. SEISMIC:
      OCCUPANCY CATEGORY: II
      IMPORTANCE FACTOR: 1.00
      SITE CLASS: D (DEFAULT)
      SS = 1.254
      S1= 0.432

## *Fastener Data*

**STAINLESS STEEL - Alloy Groups 1, 2 and 3, Condition CW (UNC Treads)**

| Nominal Fastener Diameter & Threads per Inch | D Nominal Thread Diameter (in) | A(S) Tensile Stress Area (in2) | A(R) Thread Root Area (in2) | Allow able Tension (lbs) | Allow able Shear Single (lbs) | Allow able Shear Double (lbs) | Allow able Bearing (lbs) 1/8" Steel A36 | Allow able Bearing (lbs) 1/8" Aluminum 6063-T5 | Allow able Bearing (lbs) 1/8" Aluminum 6063-T6 | Minimum Material Thickness (lbs) to Equal Tensile Capacity of Fastener (in) A36 | Minimum Material Thickness 6063-T5 | Minimum Material Thickness 6063-T6 | Maximum Tensile Load (lbs) for Available 3/8" Plate Thickness 3/8" Steel A36 | Maximum Tensile Load 3/8" Aluminum 6063-T5 | Maximum Tensile Load 3/8" Aluminum 6063-T6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #6-32 | 0.1380 | 0.0091 | 0.0078 | 303 | 150 | 300 | 900 | 253 | 345 | 0.1335 | 0.2538 | 0.1943 | 303 | 303 | 303 |
| #8-32 | 0.1640 | 0.0140 | 0.0124 | 467 | 239 | 477 | 1,070 | 301 | 410 | 0.1733 | 0.3356 | 0.2466 | 467 | 467 | 467 |
| #10-24 | 0.1900 | 0.0175 | 0.0151 | 584 | 292 | 583 | 1,240 | 348 | 475 | 0.1872 | 0.3410 | 0.2501 | 584 | 584 | 584 |
| #12-24 | 0.2160 | 0.0242 | 0.0214 | 805 | 411 | 822 | 1,409 | 396 | 540 | 0.2269 | > 3/8" | 0.3016 | 805 | 734 | 805 |
| 1/4-20 | 0.2500 | 0.0318 | 0.0280 | 1,061 | 538 | 1,076 | 1,631 | 458 | 625 | 0.2534 | > 3/8" | 0.3373 | 1,061 | 865 | 1,061 |
| 5/16-18 | 0.3125 | 0.0524 | 0.0469 | 2,097 | 1,083 | 2,166 | 2,039 | 573 | 781 | 0.2867 | > 3/8" | > 3/8" | 2,097 | 1,303 | 1,776 |
| 3/8-16 | 0.3750 | 0.0775 | 0.0699 | 3,100 | 1,614 | 3,228 | 2,447 | 688 | 938 | 0.3181 | > 3/8" | > 3/8" | 3,100 | 1,572 | 2,144 |
| 7/16-14 | 0.4375 | 0.1063 | 0.0961 | 4,252 | 2,220 | 4,440 | 2,855 | 802 | 1,094 | 0.3442 | > 3/8" | > 3/8" | 4,252 | 1,873 | 2,554 |
| 1/2-13 | 0.5000 | 0.1419 | 0.1292 | 5,676 | 2,984 | 5,968 | 3,263 | 917 | 1,250 | > 3/8" | > 3/8" | > 3/8" | 5,642 | 2,140 | 2,918 |
| 9/16-12 | 0.5625 | 0.1819 | 0.1664 | 7,278 | 3,842 | 7,685 | 3,670 | 1,031 | 1,406 | > 3/8" | > 3/8" | > 3/8" | 6,444 | 2,444 | 3,333 |
| 5/8-11 | 0.6250 | 0.2260 | 0.2071 | 9,040 | 4,782 | 9,564 | 4,078 | 1,146 | 1,563 | > 3/8" | > 3/8" | > 3/8" | 7,148 | 2,711 | 3,697 |
| 3/4-10 | 0.7500 | 0.3345 | 0.3091 | 11,372 | 6,022 | 12,045 | 4,894 | 1,375 | 1,875 | > 3/8" | > 3/8" | > 3/8" | 8,612 | 3,266 | 4,454 |
| 7/8-9 | 0.8750 | 0.4617 | 0.4285 | 15,583 | 8,351 | 16,701 | 5,709 | 1,604 | 2,188 | > 3/8" | > 3/8" | > 3/8" | 10,158 | 3,853 | 5,254 |
| 1-8 | 1.0000 | 0.6057 | 0.5630 | 20,444 | 10,970 | 21,940 | 6,525 | 1,833 | 2,500 | > 3/8" | > 3/8" | > 3/8" | 11,696 | 4,437 | 6,050 |

**STAINLESS STEEL - Alloy Groups 1, 2 and 3, Condition CW (Spaced Threads)**

| Nominal Fastener Diameter & Threads per Inch | D Nominal Thread Diameter (in) | K Basic Minor Diameter (in) | A(R) Thread Root Area (in2) | Allow able Tension (lbs) | Allow able Shear Single (lbs) | Allow able Shear Double (lbs) | Allow able Bearing (lbs) 1/8" Steel A36 | Allow able Bearing (lbs) 1/8" Aluminum 6063-T5 | Allow able Bearing (lbs) 1/8" Aluminum 6063-T6 | Minimum Material Thickness (lbs) to Equal Tensile Capacity of Fastener (in) A36 | Minimum Material Thickness 6063-T5 | Minimum Material Thickness 6063-T6 | Maximum Tensile Load (lbs) for Available 3/8" Plate Thickness 3/8" Steel A36 | Maximum Tensile Load 3/8" Aluminum 6063-T5 | Maximum Tensile Load 3/8" Aluminum 6063-T6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #6-20 | 0.1380 | 0.0990 | 0.0077 | 257 | 148 | 296 | 900 | 253 | 345 | 0.1191 | 0.1695 | 0.1378 | 257 | 257 | 257 |
| #8-18 | 0.1640 | 0.1160 | 0.0106 | 352 | 203 | 407 | 1,070 | 301 | 410 | 0.1437 | 0.1930 | 0.1567 | 352 | 352 | 352 |
| #10-16 | 0.1900 | 0.1350 | 0.0143 | 477 | 275 | 551 | 1,240 | 348 | 475 | 0.1528 | 0.2225 | 0.1805 | 477 | 477 | 477 |
| #12-14 | 0.2160 | 0.1570 | 0.0194 | 645 | 373 | 745 | 1,409 | 396 | 540 | 0.1820 | 0.2610 | 0.2115 | 645 | 645 | 645 |
| 1/4-14 | 0.2500 | 0.1850 | 0.0269 | 896 | 517 | 1,035 | 1,631 | 458 | 625 | 0.2181 | 0.2994 | 0.2379 | 896 | 896 | 896 |
| 5/16-12 | 0.3125 | 0.2360 | 0.0437 | 1,750 | 1,010 | 2,020 | 2,039 | 573 | 781 | 0.2839 | > 3/8" | 0.2990 | 1,750 | 1,681 | 1,750 |
| 3/8-12 | 0.3750 | 0.2990 | 0.0702 | 2,809 | 1,622 | 3,243 | 2,447 | 688 | 938 | > 3/8" | > 3/8" | > 3/8" | 2,773 | 2,017 | 2,751 |

| Group 1,2,3-Cond. CW | ≤ 5/8" Dia. | ≥ 3/4" Dia. | For Diameters < 3/4" | Effective Area (UNC Threads) | Effective Area (Spaced Threads) |
|---|---|---|---|---|---|
| $F_U$ (Min. Ultimate Tensile Strength) | 100,000 psi | 85,000 psi | $F_T = F_U/SF$ | $A(R) = \pi\ (D-1.2269/N)^2 / 4$ | $A(R) = \pi K^2/4$ |
| $F_T$ (Allow. Tensile Stress, D≤1/4") | 33,333 psi | N/A psi | Allow able Tension = $F_T$[A(S)] | $A(S) = \pi\ (D-0.9743/N)^2 / 4$ | $A(S) = \pi K^2/4$ |
| $F_T$ (Allow. Tensile Stress, D> 1/4") | 40,000 psi | 33,750 psi | $F_V$ = Fu / ( SF x sq rt (3)) | | |
| $F_V$ (Allowable Shear Strass; D≤1/4") | 19,245 psi | N/A psi | Allowable Single Shear = $F_V$[A(R)] | | |
| $F_V$ (Allowable Shear Strass; D>1/4") | 23,094 psi | 19,486 psi | | | |

## ***Fastener Data***

SAE Grade 5 Steel for Diameters up thru 9/16" (UNC Threads)
ASTM A 449 Steel for Diameters 5/8" and Over (UNC Threads)

| Nominal Fastener Diameter & Threads per Inch | D Nominal Thread Diameter (in) | A(S) Tensile Stress Area (in2) | A(R) Thread Root Area (in2) | Allow able Tension (lbs) | Allow able Shear: Single (lbs) | Allow able Shear: Double (lbs) | Allow able Bearing (lbs): 1/8" Steel A36 | Allow able Bearing (lbs): 1/8" Aluminum 6063-T5 | Allow able Bearing (lbs): 1/8" Aluminum 6063-T6 | Minimum Material Thickness (lbs) to Equal Tensile Capacity of Fastener (in): A36 | Minimum Material Thickness: 6063-T5 | Minimum Material Thickness: 6063-T6 | Maximum Tensile Load (lbs) for Available 3/8" Plate Thickness: 3/8" Steel A36 | 3/8" Aluminum 6063-T5 | 3/8" Aluminum 6063-T6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #6-32 | 0.1380 | 0.0091 | 0.0078 | 363 | 180 | 360 | 900 | 253 | 345 | 0.1602 | 0.3046 | 0.2268 | 363 | 363 | 363 |
| #8-32 | 0.1640 | 0.0140 | 0.0124 | 560 | 286 | 573 | 1,070 | 301 | 410 | 0.2079 | > 3/8" | 0.2953 | 560 | 522 | 560 |
| #10-24 | 0.1900 | 0.0175 | 0.0151 | 701 | 350 | 700 | 1,240 | 348 | 475 | 0.2246 | > 3/8" | 0.3001 | 701 | 643 | 701 |
| #12-24 | 0.2160 | 0.0242 | 0.0214 | 967 | 493 | 986 | 1,409 | 396 | 540 | 0.2594 | > 3/8" | 0.3619 | 967 | 734 | 967 |
| 1/4-20 | 0.2500 | 0.0318 | 0.0280 | 1,273 | 646 | 1,291 | 1,631 | 458 | 625 | 0.2745 | > 3/8" | > 3/8" | 1,273 | 865 | 1,179 |
| 5/16-18 | 0.3125 | 0.0524 | 0.0469 | 2,517 | 1,299 | 2,599 | 2,039 | 573 | 781 | 0.3144 | > 3/8" | > 3/8" | 2,517 | 1,303 | 1,776 |
| 3/8-16 | 0.3750 | 0.0775 | 0.0699 | 3,719 | 1,937 | 3,874 | 2,447 | 688 | 938 | 0.3518 | > 3/8" | > 3/8" | 3,719 | 1,572 | 2,144 |
| 7/16-14 | 0.4375 | 0.1063 | 0.0961 | 5,103 | 2,664 | 5,328 | 2,855 | 802 | 1,094 | > 3/8" | > 3/8" | > 3/8" | 4,937 | 1,873 | 2,554 |
| 1/2-13 | 0.5000 | 0.1419 | 0.1292 | 6,811 | 3,581 | 7,162 | 3,263 | 917 | 1,250 | > 3/8" | > 3/8" | > 3/8" | 5,642 | 2,140 | 2,918 |
| 9/16-12 | 0.5625 | 0.1819 | 0.1664 | 8,733 | 4,611 | 9,222 | 3,670 | 1,031 | 1,406 | > 3/8" | > 3/8" | > 3/8" | 6,444 | 2,444 | 3,333 |
| 5/8-11 | 0.6250 | 0.2260 | 0.2071 | 10,848 | 5,738 | 11,477 | 4,078 | 1,146 | 1,563 | > 3/8" | > 3/8" | > 3/8" | 7,148 | 2,711 | 3,697 |
| 3/4-10 | 0.7500 | 0.3345 | 0.3091 | 16,054 | 8,565 | 17,130 | 4,894 | 1,375 | 1,875 | > 3/8" | > 3/8" | > 3/8" | 8,612 | 3,266 | 4,454 |
| 7/8-9 | 0.8750 | 0.4617 | 0.4285 | 22,163 | 11,876 | 23,753 | 5,709 | 1,604 | 2,188 | > 3/8" | > 3/8" | > 3/8" | 10,158 | 3,853 | 5,254 |
| 1-8 | 1.0000 | 0.6057 | 0.5630 | 29,076 | 15,601 | 31,203 | 6,525 | 1,833 | 2,500 | > 3/8" | > 3/8" | > 3/8" | 11,696 | 4,437 | 6,050 |

SAE Grade 5 Steel (Spaced Threads)

| Nominal Fastener Diameter & Threads per Inch | D Nominal Thread Diameter (in) | K Basic Minor Diameter (in) | A(R) Thread Root Area (in2) | Allow able Tension (lbs) | Allow able Shear: Single (lbs) | Allow able Shear: Double (lbs) | Allow able Bearing (lbs): 1/8" Steel A36 | Allow able Bearing (lbs): 1/8" Aluminum 6063-T5 | Allow able Bearing (lbs): 1/8" Aluminum 6063-T6 | Minimum Material Thickness (lbs) to Equal Tensile Capacity of Fastener (in): A36 | Minimum Material Thickness: 6063-T5 | Minimum Material Thickness: 6063-T6 | Maximum Tensile Load (lbs) for Available 3/8" Plate Thickness: 3/8" Steel A36 | 3/8" Aluminum 6063-T5 | 3/8" Aluminum 6063-T6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| #6-20 | 0.1380 | 0.0990 | 0.0077 | 308 | 178 | 356 | 900 | 253 | 345 | 0.1358 | 0.1907 | 0.1543 | 308 | 308 | 308 |
| #8-18 | 0.1640 | 0.1160 | 0.0106 | 423 | 244 | 488 | 1,070 | 301 | 410 | 0.1569 | 0.2175 | 0.1758 | 423 | 423 | 423 |
| #10-16 | 0.1900 | 0.1350 | 0.0143 | 573 | 331 | 661 | 1,240 | 348 | 475 | 0.1834 | 0.2517 | 0.2028 | 573 | 573 | 573 |
| #12-14 | 0.2160 | 0.1570 | 0.0194 | 774 | 447 | 894 | 1,409 | 396 | 540 | 0.2182 | 0.2995 | 0.2380 | 774 | 774 | 774 |
| 1/4-14 | 0.2500 | 0.1850 | 0.0269 | 1,075 | 621 | 1,242 | 1,631 | 458 | 625 | 0.2617 | 0.3593 | 0.2696 | 1,075 | 1,075 | 1,075 |
| 5/16-12 | 0.3125 | 0.2360 | 0.0437 | 2,100 | 1,212 | 2,425 | 2,039 | 573 | 781 | 0.3407 | > 3/8" | 0.3430 | 2,100 | 1,681 | 2,100 |
| 3/8-12 | 0.3750 | 0.2990 | 0.0702 | 3,370 | 1,946 | 3,892 | 2,447 | 688 | 938 | > 3/8" | > 3/8" | > 3/8" | 2,773 | 2,017 | 2,751 |

| | SAE Grade 5 (≤ 9/16") | ASTM A449 (≥ 5/8") | For All Diameters | Effective Area (UNC Threads) | Effective Area (Spaced Threads) |
|---|---|---|---|---|---|
| $F_U$ (Min. Ultimate Tensile Strength) | 120,000 psi | 120,000 psi | $F_T = F_U/SF$ | $A(R) = \pi\ (D-1.2269/N)^2 / 4$ | $A(R) = \pi K^2/4$ |
| $F_T$ (Allow. Tensile Stress, D≤1/4") | 40,000 psi | N/A | Allow able Tension = $F_T$[A(S)] | $A(S) = \pi\ (D-0.9743/N)^2 / 4$ | $A(S) = \pi K^2/4$ |
| $F_T$ (Allow. Tensile Stress, D> 1/4") | 48,000 psi | 48,000 psi | $F_V$ = Fu / ( SF x sq rt (3)) | | |
| $F_V$ (Allowable Shear Strass; D≤1/4") | 23,094 psi | N/A | Allowable Single Shear =$F_V$[A(R)] | | |
| $F_V$ (Allowable Shear Strass; D>1/4") | 27,713 psi | 27,713 psi | | | |