Scenario 1

No Reinforcing

Capacity = 540 #/ft

Scenario 2

(2) #4 Bars

Capacity = 1070 #/ft

Scenario 3

(2) #4 Bars

Separated by 1" Min.

Capacity = 2093 #/ft

Scenario 4

(2) #4 Bars

Separated by 1" Min.

Capacity = 2301 #/ft

Scenario 5

(2) #4 Bars

Separated by 1" Min.

Capacity = 3475 #/ft
- Any reinforcing bar above the frame shall extend 24" min. beyond window frame.

- Any reinforcing bar within the frame shall terminate at the vertical frame member intersection.
STRUCTURAL CALCULATIONS

FOR

Boman and Kemp
Window Well
56" x 36" x 6'0"
Soil Pressure
45 psf/ft

Prepared by
ARW Engineers
1594 West Park Circle
Ogden, UT 84404
WINDOW WELL 56" x 36" x 6"-0"

Window Well Section

Partial Section At Straight Elements

Partial Section at Curved Elements

Section Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot; width</td>
<td></td>
</tr>
<tr>
<td>thickness ( t_s )</td>
<td>0.043</td>
</tr>
<tr>
<td>mom of inertia ( I_s )</td>
<td>0.088</td>
</tr>
<tr>
<td>radius of gyr ( r )</td>
<td>0.384</td>
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<tr>
<td>area ( a_s )</td>
<td>0.5965</td>
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<tr>
<td>section mod ( s_s )</td>
<td>0.176</td>
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</table>

Section Properties

<table>
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<tbody>
<tr>
<td>12&quot; width</td>
<td></td>
</tr>
<tr>
<td>thickness ( t_c )</td>
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<td>area ( a_c )</td>
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<td>section mod ( s_c )</td>
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</tbody>
</table>

Material Properties

ASTM A572

\( F_y := 42 \) ksi
Stress Analysis for Soil Load of 45 psf/ft  (Maximum Soil Load 270 psf)

Section forces from finite element analysis

Maximum forces in straight section  \( M_{zz} = 0.141 \text{ k-ft} \)  \( A_2 = 0.60 \text{ k} \)

\[ f_{b2} := \frac{M_{zz} \cdot 12}{s_s} \quad f_{b2} = 9.614 \quad F_b := 0.667 \cdot F_y \quad F_b = 28.014 \]

\[ \text{let} \quad k_l := 1.024 \quad \text{length between inflection points} \]

\[ \frac{k_l}{r} = 62.5 \quad c_c := \sqrt{\frac{2 \cdot \pi \cdot 29000}{42}} \quad c_c = 116.745 \frac{k_l}{c_c} \quad \frac{r}{c_c} = 0.535 \]

\[ F_a := 0.384.42 \quad F_a = 16.128 \quad f_a := \frac{A_2}{a_s} \quad f_a = 1.006 \]

Combined stresses  \( csr := \frac{f_a}{F_a} + \frac{f_{b2}}{F_b} \)  \( csr = 0.406 \)

Maximum soil load capacity

Straight section  \( \text{Maxso2 := } \frac{1.0}{csr} \cdot 270 \quad \text{Maxso2 = 665.778} \)

Check Curved Segment

Section forces from finite element analysis with snow load of 100psf

Maximum forces in segment M23  \( M_{zc2} := 0.077 \)  \( A_{zc2} := 0.69 \)

\[ f_{ac} := \frac{A_{zc2}}{a_c} \quad f_{ac} = 1.104 \]

From AISI Handbook  Allowable axial stress use \( F_y/2 \)  when \( d/r < 294 \)

\[ d := 26 \quad \frac{d}{r_c} = 75.145 \quad \text{Therefore use} \quad F_{ac} := \frac{F_y}{2} \]

\[ f_{bc} := \frac{M_{zc2} \cdot 12}{s_c} \quad f_{bc} = 6.435 \]

Combined stresses  \( csr_c := \frac{f_{ac}}{F_{ac}} + \frac{f_{bc}}{F_b} \)  \( csr_c = 0.282 \)

Maximum soil load capacity

Curved section  \( \text{Maxso1 := } \frac{1.0}{csr_c} \cdot 270 \quad \text{Maxso1 = 956.559} \)