

**EVALUATION REPORT**  
**ON**  
**STEELMASTER ARCH PANELS**  
**FOR FLORIDA PRODUCT APPROVAL**  
**FL15623-R7**

**FLORIDA BUILDING CODE 2023**

Compliance Method: Statewide Product Approval Rule 61G20-3.005(2)(b)

Category: Structural Components

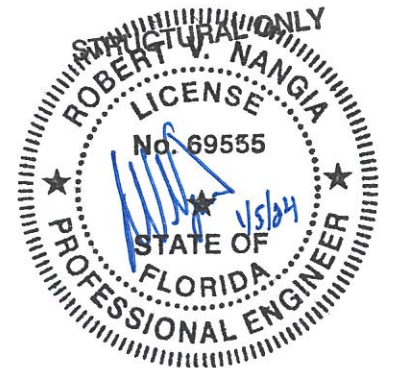
Sub - Category: Structural Wall Components

(20 psf Live Load, 200 mph Wind, HVHZ, 125 mph Tornado)

**Manufacturer**  
**Future Steel Buildings Intl. Corp.**  
**220 Chrysler Drive**  
**Brampton, ON L6S 6B6**

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Report: FL\_Evaluation\_23



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## **1. Statement of Compliance**

Based on evaluation of the technical documentation, it is concluded that the SteelMaster arch panels are in compliance with the requirements of the 2023 Florida Building Code for High-Velocity Hurricane Zones (HVHZ).

## **2. Product Description**

SteelMaster arch panels are made of ASTM A792 Grade 80 AZ60 steel, function as both the structural components and the envelope of the arch-type structures. SteelMaster arch panel cross section is shown in Figure 1.

## **3. Technical Documentation**

### **3.1 Design Criteria and Method**

AISI Specification <sup>1</sup>, ASCE 7 <sup>2</sup>, and Florida Building Code 2023 <sup>3</sup> have been used to design SteelMaster arch panels. As listed in Sections 3.4 and 3.5, a total of 46 basic load cases and 187 load combinations have been taken into account in the design.

### **3.2 Design Data**

- Live Load : roof live load of 20 psf
- Snow Load: Ground snow of 0 psf, partially exposed, cold roof
- Wind Load: Ultimate 3-second gust wind speed of 200 mph, HVHZ, exposure C, partially enclosed
- Tornado Load: Tornado wind speed of 125 mph, partially enclosed

### **3.3 Summary of Key Results**

The key design results are summarized in Figure 2. Since the maximum interaction factor for all of the arch panels and 187 load combinations is less than 1.0, these arch panels can safely resist all the loads and load combinations required by the 2023 Florida Building Code for HVHZ.

### 3.4 Basic Loads

SteelMaster arch panels are designed for the following 46 basic load cases. The two letter basic load ID will be used for load combinations in Section 3.5.

- |            |                                        |            |                                               |
|------------|----------------------------------------|------------|-----------------------------------------------|
| 1. DL      | - dead load                            | 24. SPRNL  | - SPR notional load to left                   |
| 2. DLNL    | - DL notional load to left             | 25. SPRNR  | - SPR notional load to right                  |
| 3. DLNR    | - DL notional load to right            | 26. SPRNLR | - SPR notional load to left & right           |
| 4. DLNLR   | - DL notional load to left & right     | 27. SL     | - unbalanced roof snow load on left side      |
| 5. LU      | - uniform roof live load               | 28. SLNL   | - SL notional load to left                    |
| 6. LUNL    | - LU notional load to left             | 29. SLNR   | - SL notional load to right                   |
| 7. LUNR    | - LU notional load to right            | 30. SR     | - unbalanced roof snow load on right side     |
| 8. LUNLR   | - LU notional load to left & right     | 31. SRNL   | - SR notional load to left                    |
| 9. LL      | - roof Live load on Left side          | 32. SRNR   | - SR notional load to right                   |
| 10. LLNL   | - LL notional load to left             | 33. WL     | - external wind from left side                |
| 11. LLNR   | - LL notional load to right            | 34. WR     | - external wind from right side               |
| 12. LR     | - roof live load on right side         | 35. WA     | - external wind along building length         |
| 13. LRNL   | - LR notional load to left             | 36. WLA    | - 0.75 WL on walls & larger WA on roof        |
| 14. LRNR   | - LR notional load to right            | 37. WRA    | - 0.75 WR on walls & larger WA on roof        |
| 15. SB     | - balanced roof snow load              | 38. WP     | - positive internal wind pressure             |
| 16. SBNL   | - SB notional load to left             | 39. WN     | - negative internal wind pressure             |
| 17. SBNR   | - SB notional load to right            | 40. WLT    | - external tornado wind from left side        |
| 18. SBNLR  | - SB notional load to left & right     | 41. WRT    | - external tornado wind from right side       |
| 19. SPL    | - partial roof snow load on left side  | 42. WAT    | - external tornado wind along building length |
| 20. SPLNL  | - SPL notional load to left            | 43. WLAT   | - 0.75 WLT on walls & larger WAT on roof      |
| 21. SPLNR  | - SPL notional load to right           | 44. WRAT   | - 0.75 WRT on walls & larger WAT on roof      |
| 22. SPLNLR | - SPL Notional load to left & right    | 45. WPT    | - positive internal tornado wind pressure     |
| 23. SPR    | - partial roof snow load on right side | 46. WNT    | - negative internal tornado wind pressure     |

### 3.5 Load Combinations

Every SteelMaster arch panel is designed for the 187 load combinations listed on Page 3 (please see Section 3.4 for basic load ID):

### 3.6 References

1. American Iron and Steel Institute, "AISI Standard: AISI S100-16 (2020) w/S2-20, North American Specification for the Design of Cold-formed Steel Structural Members," AISI, Washington, DC, 4<sup>th</sup> Printing, Dec. 2020, 505 pages.
2. American Society of Civil Engineers, "ASCE Standard ASCE/SEI 7-22: Minimum Design Loads for Buildings and Other Structures," ASCE, Reston, Virginia, 2022, 985 pages.
3. State of Florida, "Florida Building Code, Building, Eighth Edition (2023)," State of Florida, First Printing, July 2023.

1. 1.4 DL + 1.4 DLNL
2. 1.4 DL + 1.4 DLNR
3. 1.4 DL + 1.4 DLNLR
4. 1.2 DL + 1.2 DLNL + 1.6 LU + 1.6 LUNL
5. 1.2 DL + 1.2 DLNL + 1.6 LU + 1.6 LUNR
6. 1.2 DL + 1.2 DLNLR + 1.6 LU + 1.6 LUNLR
7. 1.2 DL + 1.2 DLNL + 1.6 LL + 1.6 LLNL
8. 1.2 DL + 1.2 DLNR + 1.6 LL + 1.6 LLNR
9. 1.2 DL + 1.2 DLNL + 1.6 LR + 1.6 LRNL
10. 1.2 DL + 1.2 DLNR + 1.6 LR + 1.6 LRNR
11. 1.2 DL + 1.2 DLNL + SB + SBNL
12. 1.2 DL + 1.2 DLNR + SB + SBNR
13. 1.2 DL + 1.2 DLNLR + SB + SBNLR
14. 1.2 DL + 1.2 DLNL + SPL + SPLNL
15. 1.2 DL + 1.2 DLNR + SPL + SPLNR
16. 1.2 DL + 1.2 DLNLR + SPL + SPLNLR
17. 1.2 DL + 1.2 DLNL + SPR + SPRNL
18. 1.2 DL + 1.2 DLNR + SPR + SPRNR
19. 1.2 DL + 1.2 DLNLR + SPR + SPRNLR
20. 1.2 DL + 1.2 DLNL + SL + SLNL
21. 1.2 DL + 1.2 DLNR + SL + SLNR
22. 1.2 DL + 1.2 DLNL + SR + SRNL
23. 1.2 DL + 1.2 DLNR + SR + SRNR
24. 0.9 DL + 0.9 DLNR + WL + WP
25. 0.9 DL + 0.9 DLNR + WL + WN
26. 0.9 DL + 0.9 DLNL + WR + WP
27. 0.9 DL + 0.9 DLNL + WR + WN
28. 0.9 DL + 0.9 DLNLR + WA + WP
29. 0.9 DL + 0.9 DLNLR + WA + WN
30. 0.9 DL + 0.9 DLNR + WLA + WP
31. 0.9 DL + 0.9 DLNR + WLA + WN
32. 0.9 DL + 0.9 DLNL + WRA + WP
33. 0.9 DL + 0.9 DLNL + WRA + WN
34. 0.9 DL + 0.9 DLNR + WLT + WPT
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38. 0.9 DL + 0.9 DLNR + WAT + WPT
39. 0.9 DL + 0.9 DLNR + WAT + WNT
40. 0.9 DL + 0.9 DLNR + WLAT + WPT
41. 0.9 DL + 0.9 DLNR + WLAT + WNT
42. 0.9 DL + 0.9 DLNL + WRAT + WPT
43. 0.9 DL + 0.9 DLNL + WRAT + WNT
44. 1.2 DL + 1.2 DLNR + 1.6 LU + 1.6 LUNR + 0.5 WL + 0.5 WP
45. 1.2 DL + 1.2 DLNR + 1.6 LU + 1.6 LUNR + 0.5 WL + 0.5 WN
46. 1.2 DL + 1.2 DLNL + 1.6 LU + 1.6 LUNL + 0.5 WR + 0.5 WP
47. 1.2 DL + 1.2 DLNL + 1.6 LU + 1.6 LUNL + 0.5 WR + 0.5 WN
48. 1.2 DL + 1.2 DLNLR + 1.6 LU + 1.6 LUNLR + 0.5 WA + 0.5 WP
49. 1.2 DL + 1.2 DLNLR + 1.6 LU + 1.6 LUNLR + 0.5 WA + 0.5 WN
50. 1.2 DL + 1.2 DLNR + 1.6 LU + 1.6 LUNR + 0.5 WLA + 0.5 WP
51. 1.2 DL + 1.2 DLNR + 1.6 LU + 1.6 LUNR + 0.5 WLA + 0.5 WN
52. 1.2 DL + 1.2 DLNL + 1.6 LU + 1.6 LUNL + 0.5 WRA + 0.5 WP
53. 1.2 DL + 1.2 DLNL + 1.6 LU + 1.6 LUNL + 0.5 WRA + 0.5 WN
54. 1.2 DL + 1.2 DLNR + 1.6 LL + 1.6 LLNR + 0.5 WL + 0.5 WP
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56. 1.2 DL + 1.2 DLNL + 1.6 LL + 1.6 LLNL + 0.5 WR + 0.5 WP
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60. 1.2 DL + 1.2 DLNL + 1.6 LL + 1.6 LLNL + 0.5 WRA + 0.5 WP
61. 1.2 DL + 1.2 DLNL + 1.6 LL + 1.6 LLNL + 0.5 WRA + 0.5 WN
62. 1.2 DL + 1.2 DLNR + 1.6 LR + 1.6 LRNR + 0.5 WL + 0.5 WP
63. 1.2 DL + 1.2 DLNR + 1.6 LR + 1.6 LRNR + 0.5 WL + 0.5 WN
64. 1.2 DL + 1.2 DLNL + 1.6 LR + 1.6 LRNL + 0.5 WR + 0.5 WP
65. 1.2 DL + 1.2 DLNL + 1.6 LR + 1.6 LRNL + 0.5 WR + 0.5 WN
66. 1.2 DL + 1.2 DLNR + 1.6 LR + 1.6 LRNR + 0.5 WLA + 0.5 WP
67. 1.2 DL + 1.2 DLNR + 1.6 LR + 1.6 LRNR + 0.5 WLA + 0.5 WN
68. 1.2 DL + 1.2 DLNL + 1.6 LR + 1.6 LRNL + 0.5 WRA + 0.5 WP
69. 1.2 DL + 1.2 DLNL + 1.6 LR + 1.6 LRNL + 0.5 WRA + 0.5 WN
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71. 1.2 DL + 1.2 DLNR + SB + SBNR + 0.5 WL + 0.5 WN
72. 1.2 DL + 1.2 DLNL + SB + SBNL + 0.5 WR + 0.5 WP
73. 1.2 DL + 1.2 DLNL + SB + SBNL + 0.5 WR + 0.5 WN
74. 1.2 DL + 1.2 DLNLR + SB + SBNLR + 0.5 WA + 0.5 WP
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99. 1.2 DL + 1.2 DLNL + SPR + SPRNL + 0.5 WRA + 0.5 WN
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114. 1.2 DL + 1.2 DLNL + SR + SRNL + 0.5 WRA + 0.5 WP
115. 1.2 DL + 1.2 DLNL + SR + SRNL + 0.5 WRA + 0.5 WN
116. 1.2 DL + 1.2 DLNR + 0.5 LU + 0.5 LUNR + WL + WP
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145. 1.2 DL + 1.2 DLNL + 0.3 SB + 0.3 SBNL + WR + WN
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148. 1.2 DL + 1.2 DLNR + 0.3 SB + 0.3 SBNR + WLA + WP
149. 1.2 DL + 1.2 DLNR + 0.3 SB + 0.3 SBNR + WLA + WN
150. 1.2 DL + 1.2 DLNL + 0.3 SB + 0.3 SBNL + WRA + WP
151. 1.2 DL + 1.2 DLNL + 0.3 SB + 0.3 SBNL + WRA + WN
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153. 1.2 DL + 1.2 DLNR + 0.3 SPL + 0.3 SPLNR + WL + WN
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157. 1.2 DL + 1.2 DLNLR + 0.3 SPL + 0.3 SPLNLR + WA + WN
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165. 1.2 DL + 1.2 DLNL + 0.3 SPR + 0.3 SPRNL + WR + WN
166. 1.2 DL + 1.2 DLNLR + 0.3 SPR + 0.3 SPRNLR + WA + WP
167. 1.2 DL + 1.2 DLNLR + 0.3 SPR + 0.3 SPRNLR + WA + WN
168. 1.2 DL + 1.2 DLNR + 0.3 SPR + 0.3 SPRNR + WLA + WP
169. 1.2 DL + 1.2 DLNR + 0.3 SPR + 0.3 SPRNR + WLA + WN
170. 1.2 DL + 1.2 DLNL + 0.3 SPR + 0.3 SPRNL + WRA + WP
171. 1.2 DL + 1.2 DLNL + 0.3 SPR + 0.3 SPRNL + WRA + WN
172. 1.2 DL + 1.2 DLNR + 0.3 SL + 0.3 SLNR + WL + WP
173. 1.2 DL + 1.2 DLNR + 0.3 SL + 0.3 SLNR + WL + WN
174. 1.2 DL + 1.2 DLNL + 0.3 SL + 0.3 SLNL + WR + WP
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178. 1.2 DL + 1.2 DLNL + 0.3 SL + 0.3 SLNL + WRA + WP
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182. 1.2 DL + 1.2 DLNL + 0.3 SR + 0.3 SRNL + WR + WP
183. 1.2 DL + 1.2 DLNL + 0.3 SR + 0.3 SRNL + WR + WN
184. 1.2 DL + 1.2 DLNR + 0.3 SR + 0.3 SRNR + WLA + WP
185. 1.2 DL + 1.2 DLNR + 0.3 SR + 0.3 SRNR + WLA + WN
186. 1.2 DL + 1.2 DLNL + 0.3 SR + 0.3 SRNL + WRA + WP
187. 1.2 DL + 1.2 DLNL + 0.3 SR + 0.3 SRNL + WRA + WN

## 3.7 Input File

STEEL ARCH MODEL: A20-12 (FBC-2023, 20 PSF LIVE, 200 MPH WIND, HVHZ, 125 MPH TORNADO)  
SYSTEM

DOF=UX,UZ,RY LENGTH=M FORCE=KN UP=+Z

JOINT

1	X=	0.000	Z=	0.000
2	X=	0.000	Z=	0.202
3	X=	0.000	Z=	0.379
4	X=	0.000	Z=	0.555
5	X=	0.000	Z=	0.731
6	X=	0.000	Z=	0.907
7	X=	0.000	Z=	1.083
8	X=	0.000	Z=	1.260
9	X=	0.000	Z=	1.436
10	X=	0.000	Z=	1.612
11	X=	0.007	Z=	1.788
12	X=	0.034	Z=	1.962
13	X=	0.081	Z=	2.132
14	X=	0.146	Z=	2.296
15	X=	0.229	Z=	2.451
16	X=	0.330	Z=	2.595
17	X=	0.446	Z=	2.728
18	X=	0.577	Z=	2.846
19	X=	0.720	Z=	2.949
20	X=	0.873	Z=	3.035
21	X=	1.036	Z=	3.103
22	X=	1.201	Z=	3.164
23	X=	1.366	Z=	3.226
24	X=	1.531	Z=	3.287
25	X=	1.696	Z=	3.349
26	X=	1.861	Z=	3.410
27	X=	2.026	Z=	3.472
28	X=	2.192	Z=	3.533
29	X=	2.357	Z=	3.595
30	X=	2.524	Z=	3.651
31	X=	2.695	Z=	3.691
32	X=	2.870	Z=	3.716
33	X=	3.046	Z=	3.724
34	X=	3.222	Z=	3.716
35	X=	3.396	Z=	3.691
36	X=	3.567	Z=	3.651
37	X=	3.735	Z=	3.595
38	X=	3.900	Z=	3.533
39	X=	4.065	Z=	3.472
40	X=	4.230	Z=	3.410
41	X=	4.395	Z=	3.349
42	X=	4.560	Z=	3.287
43	X=	4.725	Z=	3.226
44	X=	4.890	Z=	3.164
45	X=	5.056	Z=	3.103
46	X=	5.218	Z=	3.035
47	X=	5.372	Z=	2.949
48	X=	5.515	Z=	2.846
49	X=	5.645	Z=	2.728
50	X=	5.761	Z=	2.595
51	X=	5.862	Z=	2.451
52	X=	5.945	Z=	2.296
53	X=	6.011	Z=	2.132
54	X=	6.057	Z=	1.962
55	X=	6.084	Z=	1.788
56	X=	6.091	Z=	1.612
57	X=	6.091	Z=	1.436
58	X=	6.091	Z=	1.260
59	X=	6.091	Z=	1.083
60	X=	6.091	Z=	0.907
61	X=	6.091	Z=	0.731
62	X=	6.091	Z=	0.555
63	X=	6.091	Z=	0.379

64 X= 6.091 Z= 0.202  
65 X= 6.091 Z= 0.000

RESTRAINT

ADD= 1 DOF=UX,UZ  
ADD= 65 DOF=UX,UZ

SPRING

ADD= 1 RY= 183.3531  
ADD= 65 RY= 183.3531

MATERIAL

NAME=CS TYPE=ISO M=7.85 W=77  
T=0 E=1827E5 U=0.3 A=1.17E-5

FRAME SECTION

NAME=PANEL1 TYPE=PRISM MAT=CS A= 6460.E-07 I= 3268.E-09 SH=G  
NAME=PANEL2 TYPE=PRISM MAT=CS A= 1865.E-07 I= 1166.E-09 SH=G  
NAME=PANEL3 TYPE=PRISM MAT=CS A= 6460.E-07 I= 3268.E-09 SH=G  
NAME=PANEL4 TYPE=PRISM MAT=CS A= 1865.E-07 I= 1166.E-09 SH=G  
NAME=PANEL5 TYPE=PRISM MAT=CS A= 6460.E-07 I= 3268.E-09 SH=G  
NAME=PANEL6 TYPE=PRISM MAT=CS A= 1865.E-07 I= 1166.E-09 SH=G  
NAME=PANEL7 TYPE=PRISM MAT=CS A= 6460.E-07 I= 3268.E-09 SH=G

FRAME

CSYS=0 PLDIR=+Z,-X LOCAL=12

1 J= 1 2 SEC=PANEL1 NSEG=2  
2 J= 2 3 SEC=PANEL1 NSEG=2  
3 J= 3 4 SEC=PANEL1 NSEG=2  
4 J= 4 5 SEC=PANEL1 NSEG=2  
5 J= 5 6 SEC=PANEL1 NSEG=2  
6 J= 6 7 SEC=PANEL1 NSEG=2  
7 J= 7 8 SEC=PANEL1 NSEG=2  
8 J= 8 9 SEC=PANEL1 NSEG=2  
9 J= 9 10 SEC=PANEL1 NSEG=2  
10 J= 9 10 SEC=PANEL2 NSEG=2

CSYS=0 PLDIR=+Z,+X LOCAL=12

11 J= 10 11 SEC=PANEL2 NSEG=2  
12 J= 11 12 SEC=PANEL2 NSEG=2  
13 J= 12 13 SEC=PANEL2 NSEG=2  
14 J= 13 14 SEC=PANEL2 NSEG=2  
15 J= 14 15 SEC=PANEL2 NSEG=2  
16 J= 15 16 SEC=PANEL2 NSEG=2  
17 J= 16 17 SEC=PANEL2 NSEG=2  
18 J= 17 18 SEC=PANEL2 NSEG=2  
19 J= 18 19 SEC=PANEL2 NSEG=2  
20 J= 19 20 SEC=PANEL2 NSEG=2  
21 J= 20 21 SEC=PANEL2 NSEG=2  
22 J= 21 22 SEC=PANEL2 NSEG=2  
23 J= 21 22 SEC=PANEL3 NSEG=2  
24 J= 22 23 SEC=PANEL3 NSEG=2  
25 J= 23 24 SEC=PANEL3 NSEG=2  
26 J= 24 25 SEC=PANEL3 NSEG=2  
27 J= 25 26 SEC=PANEL3 NSEG=2  
28 J= 26 27 SEC=PANEL3 NSEG=2  
29 J= 27 28 SEC=PANEL3 NSEG=2  
30 J= 28 29 SEC=PANEL3 NSEG=2  
31 J= 28 29 SEC=PANEL4 NSEG=2  
32 J= 29 30 SEC=PANEL4 NSEG=2  
33 J= 30 31 SEC=PANEL4 NSEG=2  
34 J= 31 32 SEC=PANEL4 NSEG=2  
35 J= 32 33 SEC=PANEL4 NSEG=2  
36 J= 33 34 SEC=PANEL4 NSEG=2  
37 J= 34 35 SEC=PANEL4 NSEG=2  
38 J= 35 36 SEC=PANEL4 NSEG=2  
39 J= 36 37 SEC=PANEL4 NSEG=2  
40 J= 37 38 SEC=PANEL4 NSEG=2  
41 J= 37 38 SEC=PANEL5 NSEG=2  
42 J= 38 39 SEC=PANEL5 NSEG=2  
43 J= 39 40 SEC=PANEL5 NSEG=2  
44 J= 40 41 SEC=PANEL5 NSEG=2

```

45 J= 41 42 SEC=PANEL5 NSEG=2
46 J= 42 43 SEC=PANEL5 NSEG=2
47 J= 43 44 SEC=PANEL5 NSEG=2
48 J= 44 45 SEC=PANEL5 NSEG=2
49 J= 44 45 SEC=PANEL6 NSEG=2
50 J= 45 46 SEC=PANEL6 NSEG=2
51 J= 46 47 SEC=PANEL6 NSEG=2
52 J= 47 48 SEC=PANEL6 NSEG=2
53 J= 48 49 SEC=PANEL6 NSEG=2
54 J= 49 50 SEC=PANEL6 NSEG=2
55 J= 50 51 SEC=PANEL6 NSEG=2
56 J= 51 52 SEC=PANEL6 NSEG=2
57 J= 52 53 SEC=PANEL6 NSEG=2
58 J= 53 54 SEC=PANEL6 NSEG=2
59 J= 54 55 SEC=PANEL6 NSEG=2
60 J= 55 56 SEC=PANEL6 NSEG=2
61 J= 56 57 SEC=PANEL6 NSEG=2
62 J= 56 57 SEC=PANEL7 NSEG=2
63 J= 57 58 SEC=PANEL7 NSEG=2
64 J= 58 59 SEC=PANEL7 NSEG=2
65 J= 59 60 SEC=PANEL7 NSEG=2
66 J= 60 61 SEC=PANEL7 NSEG=2
67 J= 61 62 SEC=PANEL7 NSEG=2
68 J= 62 63 SEC=PANEL7 NSEG=2
69 J= 63 64 SEC=PANEL7 NSEG=2
70 J= 64 65 SEC=PANEL7 NSEG=2

```

LOAD

```

NAME=DL SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 UZ= -0.07910
ADD= 10 22 1 UZ= -0.07910
ADD= 23 30 1 UZ= -0.07910
ADD= 31 40 1 UZ= -0.07910
ADD= 41 48 1 UZ= -0.07910
ADD= 49 61 1 UZ= -0.07910
ADD= 62 70 1 UZ= -0.07910
NAME=DLNL SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 UX= -0.00033
ADD= 10 22 1 UX= -0.00033
ADD= 23 30 1 UX= -0.00033
ADD= 31 40 1 UX= -0.00033
ADD= 41 48 1 UX= -0.00033
ADD= 49 61 1 UX= -0.00033
ADD= 62 70 1 UX= -0.00033
NAME=DLNR SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 UX= 0.00033
ADD= 10 22 1 UX= 0.00033
ADD= 23 30 1 UX= 0.00033
ADD= 31 40 1 UX= 0.00033
ADD= 41 48 1 UX= 0.00033
ADD= 49 61 1 UX= 0.00033
ADD= 62 70 1 UX= 0.00033
NAME=DLNLR SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 UX= -0.00033
ADD= 10 22 1 UX= -0.00033
ADD= 23 30 1 UX= -0.00033
ADD= 31 35 1 UX= -0.00033
ADD= 36 40 1 UX= 0.00033
ADD= 41 48 1 UX= 0.00033
ADD= 49 61 1 UX= 0.00033
ADD= 62 70 1 UX= 0.00033
NAME=LU SW=0
TYPE=DISTRIBUTED SPAN
ADD= 10 21 1 UZP= -0.57006
ADD= 23 29 1 UZP= -0.57006
ADD= 31 40 1 UZP= -0.57006
ADD= 42 48 1 UZP= -0.57006

```

```

      ADD= 50 61 1 UZP= -0.57006
NAME=LUNL SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 10 21 1 UX= -0.00238
    ADD= 23 29 1 UX= -0.00238
    ADD= 31 40 1 UX= -0.00238
    ADD= 42 48 1 UX= -0.00238
    ADD= 50 61 1 UX= -0.00238
NAME=LUNR SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 10 21 1 UX= 0.00238
    ADD= 23 29 1 UX= 0.00238
    ADD= 31 40 1 UX= 0.00238
    ADD= 42 48 1 UX= 0.00238
    ADD= 50 61 1 UX= 0.00238
NAME=LUNLR SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 10 21 1 UX= -0.00238
    ADD= 23 29 1 UX= -0.00238
    ADD= 31 35 1 UX= -0.00238
    ADD= 36 40 1 UX= 0.00238
    ADD= 42 48 1 UX= 0.00238
    ADD= 50 61 1 UX= 0.00238
NAME=LL SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 10 21 1 UZP= -0.57006
    ADD= 23 29 1 UZP= -0.57006
    ADD= 31 35 1 UZP= -0.57006
NAME=LLNL SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 10 21 1 UX= -0.00238
    ADD= 23 29 1 UX= -0.00238
    ADD= 31 35 1 UX= -0.00238
NAME=LLNR SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 10 21 1 UX= 0.00238
    ADD= 23 29 1 UX= 0.00238
    ADD= 31 35 1 UX= 0.00238
NAME=LR SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 36 40 1 UZP= -0.57006
    ADD= 42 48 1 UZP= -0.57006
    ADD= 50 61 1 UZP= -0.57006
NAME=LRNL SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 36 40 1 UX= -0.00238
    ADD= 42 48 1 UX= -0.00238
    ADD= 50 61 1 UX= -0.00238
NAME=LRNR SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 36 40 1 UX= 0.00238
    ADD= 42 48 1 UX= 0.00238
    ADD= 50 61 1 UX= 0.00238
NAME=SB SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 1 UZP= 0.00000
NAME=SBNL SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 1 UX= 0.00000
NAME=SBNR SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 1 UX= 0.00000
NAME=SBNLR SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 1 UX= 0.00000
NAME=SPL SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 1 UZP= 0.00000
NAME=SPLNL SW=0
  TYPE=DISTRIBUTED SPAN
    ADD= 1 UX= 0.00000

```

```

NAME=SPLNR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SPLNLR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SPR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UZP= 0.00000
NAME=SPRNL SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SPRNR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SPRNLR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SL SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UZP= 0.00000
NAME=SLNL SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SLNR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UZP= 0.00000
NAME=SRNL SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=SRNR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 UX= 0.00000
NAME=WL SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 8 1 U2= -1.14882
  ADD= 10 15 1 U2= -0.57441
  ADD= 16 21 1 U2= 0.70451
  ADD= 23 29 1 U2= 1.40902
  ADD= 31 35 1 U2= 1.40902
  ADD= 36 40 1 U2= 1.03332
  ADD= 42 48 1 U2= 1.03332
  ADD= 50 55 1 U2= 0.97880
  ADD= 56 61 1 U2= 0.92428
  ADD= 63 70 1 U2= 0.92428
NAME=WR SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 8 1 U2= 0.92428
  ADD= 10 15 1 U2= 0.92428
  ADD= 16 21 1 U2= 0.97880
  ADD= 23 29 1 U2= 1.03332
  ADD= 31 35 1 U2= 1.03332
  ADD= 36 40 1 U2= 1.40902
  ADD= 42 48 1 U2= 1.40902
  ADD= 50 55 1 U2= 0.70451
  ADD= 56 61 1 U2= -0.57441
  ADD= 63 70 1 U2= -1.14882
NAME=WA SW=0
  TYPE=DISTRIBUTED SPAN
  ADD= 1 8 1 U2= 0.97306
  ADD= 10 15 1 U2= 0.97306
  ADD= 16 21 1 U2= 1.49203
  ADD= 23 29 1 U2= 1.49203
  ADD= 31 35 1 U2= 1.49203
  ADD= 36 40 1 U2= 1.49203
  ADD= 42 48 1 U2= 1.49203
  ADD= 50 55 1 U2= 1.49203
  ADD= 56 61 1 U2= 0.97306

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```

ADD= 63 70 1 U2= 0.97306
NAME=WLA SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 8 1 U2= -0.86161
ADD= 10 15 1 U2= -0.43081
ADD= 16 21 1 U2= 0.74602
ADD= 23 29 1 U2= 1.49203
ADD= 31 35 1 U2= 1.49203
ADD= 36 40 1 U2= 1.49203
ADD= 42 48 1 U2= 1.49203
ADD= 50 55 1 U2= 1.09262
ADD= 56 61 1 U2= 0.69321
ADD= 63 70 1 U2= 0.69321
NAME=WRA SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 8 1 U2= 0.69321
ADD= 10 15 1 U2= 0.69321
ADD= 16 21 1 U2= 1.09262
ADD= 23 29 1 U2= 1.49203
ADD= 31 35 1 U2= 1.49203
ADD= 36 40 1 U2= 1.49203
ADD= 42 48 1 U2= 1.49203
ADD= 50 55 1 U2= 0.74602
ADD= 56 61 1 U2= -0.43081
ADD= 63 70 1 U2= -0.86161
NAME=WP SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 U2= 1.18930
ADD= 11 22 1 U2= 1.18930
ADD= 24 30 1 U2= 1.18930
ADD= 32 39 1 U2= 1.18930
ADD= 41 47 1 U2= 1.18930
ADD= 49 60 1 U2= 1.18930
ADD= 62 70 1 U2= 1.18930
NAME=WN SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 U2= -1.18930
ADD= 11 22 1 U2= -1.18930
ADD= 24 30 1 U2= -1.18930
ADD= 32 39 1 U2= -1.18930
ADD= 41 47 1 U2= -1.18930
ADD= 49 60 1 U2= -1.18930
ADD= 62 70 1 U2= -1.18930
NAME=WLT SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 8 1 U2= -0.74230
ADD= 10 15 1 U2= -0.37115
ADD= 16 21 1 U2= 0.19774
ADD= 23 29 1 U2= 0.39548
ADD= 31 35 1 U2= 0.39548
ADD= 36 40 1 U2= 0.55673
ADD= 42 48 1 U2= 0.55673
ADD= 50 55 1 U2= 0.51033
ADD= 56 61 1 U2= 0.46394
ADD= 63 70 1 U2= 0.46394
NAME=WRT SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 8 1 U2= 0.46394
ADD= 10 15 1 U2= 0.46394
ADD= 16 21 1 U2= 0.51033
ADD= 23 29 1 U2= 0.55673
ADD= 31 35 1 U2= 0.55673
ADD= 36 40 1 U2= 0.39548
ADD= 42 48 1 U2= 0.39548
ADD= 50 55 1 U2= 0.19774
ADD= 56 61 1 U2= -0.37115
ADD= 63 70 1 U2= -0.74230
NAME=WAT SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 8 1 U2= 0.64952
ADD= 10 15 1 U2= 0.64952

```

```

ADD= 16 21 1 U2= 0.83509
ADD= 23 29 1 U2= 0.83509
ADD= 31 40 1 U2= 0.83509
ADD= 42 48 1 U2= 0.83509
ADD= 50 55 1 U2= 0.83509
ADD= 56 61 1 U2= 0.64952
ADD= 63 70 1 U2= 0.64952
NAME=WLAT SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 8 1 U2= -0.55673
ADD= 10 15 1 U2= -0.27836
ADD= 16 21 1 U2= 0.41755
ADD= 23 29 1 U2= 0.83509
ADD= 31 35 1 U2= 0.83509
ADD= 36 40 1 U2= 0.83509
ADD= 42 48 1 U2= 0.83509
ADD= 50 55 1 U2= 0.59152
ADD= 56 61 1 U2= 0.34796
ADD= 63 70 1 U2= 0.34796
NAME=WRAT SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 8 1 U2= 0.34796
ADD= 10 15 1 U2= 0.34796
ADD= 16 21 1 U2= 0.59152
ADD= 23 29 1 U2= 0.83509
ADD= 31 35 1 U2= 0.83509
ADD= 36 40 1 U2= 0.83509
ADD= 42 48 1 U2= 0.83509
ADD= 50 55 1 U2= 0.41755
ADD= 56 61 1 U2= -0.27836
ADD= 63 70 1 U2= -0.55673
NAME=WPT SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 U2= 0.54581
ADD= 11 22 1 U2= 0.54581
ADD= 24 30 1 U2= 0.54581
ADD= 32 39 1 U2= 0.54581
ADD= 41 47 1 U2= 0.54581
ADD= 49 60 1 U2= 0.54581
ADD= 62 70 1 U2= 0.54581
NAME=WNT SW=0
TYPE=DISTRIBUTED SPAN
ADD= 1 9 1 U2= -0.54581
ADD= 11 22 1 U2= -0.54581
ADD= 24 30 1 U2= -0.54581
ADD= 32 39 1 U2= -0.54581
ADD= 41 47 1 U2= -0.54581
ADD= 49 60 1 U2= -0.54581
ADD= 62 70 1 U2= -0.54581
END

```

### 3.8 Design Summary

```

FUTURE STEEL ARCH BUILDING DESIGN PROGRAM (v. 11.0)
Future Steel Buildings Intl. Corp. Copyright 1998-2024
PROJECT NAME: FL PRODUCT APPROVAL PROJECT # FBC2023
File Name: C:\WORK\A2012FL.DSN JAN-01-2024, 21:54:26
=====

```

SPECIFIED ARCH DESIGN PARAMETERS  
\*\*\*\*\*

BUILDING LOCATION	= UNITED STATES	BASE TYPE	= BRACKET
ARCH TYPE	= A	ARCH HEIGHT	= 12.22 ft
ARCH SPAN	= 19.98 ft	GROUND SNOW	= 0.00 psf
FLAT ROOF LIVE LOAD	= 20.00 psf	R-VALUE	= 0
THERMAL COEFFICIENT	= 1.2	EXPOSURE DEGREE	= PARTIAL
EXPOSURE CATEGORY	= C	COLLATERAL DEAD LOAD	= 1.00 psf
RISK CATEGORY	= IV		

ENCLOSURE CLASS = PARTIALLY ENCLOSED 3-SEC. GUST WIND SPEED = 200 mph  
GROUND ELEVATION = 0 ft FACTOR Ke = 1.00  
TORNADO SPEED = 125 mph

DESIGN RESULTS  
\*\*\*\*\*

SUMMARY OUTPUT FOR PANEL # 1  
\*\*\*\*\*

PANEL PROPERTIES  
\*\*\*\*\*

Fy = 60.00 ksi	Fu = 61.50 ksi	FUB = 74.00 ksi
Fyv = 80.00 ksi	Fybn = 63.04 ksi	Fybp = 73.34 ksi
t = 0.03 in	H = 7.50 in	DBOT = 0.31 in
ANG1 = 45.00 deg.	ANG2 = 45.00 deg.	DHOL = 0.44 in
ELBT = 7.50 in	ELTP = 1.50 in	DEND = 1.03 in
ELIP = 0.89 in	NBRW = 8 Max./Row	PALN = 64.5 in
WPAN = 18.92 lb	CDMX = 0.00 in	

PANEL DESIGN RESULTS  
\*\*\*\*\*

MAXIMUM INTERACTION FACTOR = 0.652 LOAD COMBINATION = 25  
STRENGTH INTERACTION FACTORS:  
IN COMPRESSION = 0.015 IN TENSION = 0.000  
IN BENDING = 0.526 IN SHEAR = 0.652  
CRITICAL MEMBER NUMBER = 1 CRITICAL SECTION = 1  
FACTORED AXIAL FORCE AND RESISTANCES:  
Pr = 9.55 kip Tr = 18.71 kip Pf = -0.16 kip  
UBKL = 5.289 ft ELNC = 5.289 ft FIXP = 0.000 EK = 1.000  
FACTORED SHEAR FORCES AND RESISTANCES:  
Vr = 1.41 kip Vf = 0.92 kip Vb = 30.65 kip Vbf = 0.16 kip  
FACTORED BENDING MOMENT AND RESISTANCES:  
Mrn = 2.60 kip-ft Mrnb = 2.60 kip-ft Mrnt = 6.97 kip-ft Mf = -1.37 kip-ft  
Mrp = 4.27 kip-ft Mrpb = 11.89 kip-ft Mrpt = 4.27 kip-ft Mrpo = 4.27 kip-ft

SUMMARY OUTPUT FOR PANEL # 2  
\*\*\*\*\*

PANEL PROPERTIES  
\*\*\*\*\*

Fy = 60.00 ksi	Fu = 61.50 ksi	FUB = 74.00 ksi
Fyv = 80.00 ksi	Fybn = 80.00 ksi	Fybp = 73.34 ksi
t = 0.03 in	H = 7.50 in	DBOT = 0.31 in
ANG1 = 45.00 deg.	ANG2 = 45.00 deg.	DHOL = 0.44 in
ELBT = 7.50 in	ELTP = 1.50 in	DEND = 1.03 in
ELIP = 0.89 in	NBRW = 8 Max./Row	PALN = 92.0 in
WPAN = 26.99 lb	CDMX = 0.28 in	RADS = 5.10 ft

PANEL DESIGN RESULTS  
\*\*\*\*\*

MAXIMUM INTERACTION FACTOR = 0.903 LOAD COMBINATION = 30  
STRENGTH INTERACTION FACTORS:  
IN COMPRESSION = 0.000 IN TENSION = 0.095  
IN BENDING = 0.897 IN SHEAR = 0.195  
CRITICAL MEMBER NUMBER = 15 CRITICAL SECTION = 1  
FACTORED AXIAL FORCE AND RESISTANCES:  
Pr = 9.44 kip Tr = 18.71 kip Pf = 1.77 kip  
UBKL = 13.297 ft ELNC = 11.923 ft FIXP = 0.500 EK = 0.897  
FACTORED SHEAR FORCES AND RESISTANCES:  
Vr = 1.41 kip Vf = 0.08 kip Vb = 30.65 kip Vbf = 1.77 kip  
FACTORED BENDING MOMENT AND RESISTANCES:  
Mrn = 2.46 kip-ft Mrnb = 2.46 kip-ft Mrnt = 6.47 kip-ft Mf = 2.28 kip-ft  
Mrp = 2.54 kip-ft Mrpb = 2.82 kip-ft Mrpt = 3.10 kip-ft Mrpo = 2.54 kip-ft

SUMMARY OUTPUT FOR PANEL # 3  
\*\*\*\*\*

PANEL PROPERTIES  
\*\*\*\*\*

Fy = 60.00 ksi	Fu = 61.50 ksi	FUB = 74.00 ksi
Fyv = 80.00 ksi	Fybn = 63.04 ksi	Fybp = 73.34 ksi
t = 0.03 in	H = 7.50 in	DBOT = 0.31 in
ANG1 = 45.00 deg.	ANG2 = 45.00 deg.	DHOL = 0.44 in

ELBT = 7.50 in                      ELTP = 1.50 in                      DEND = 1.03 in  
 ELIP = 0.89 in                      NBRW = 8 Max./Row                      PALN = 57.5 in  
 WPAN = 16.87 lb                      CDMX = 0.00 in

PANEL DESIGN RESULTS

\*\*\*\*\*

MAXIMUM INTERACTION FACTOR = 0.680                      LOAD COMBINATION = 32  
 STRENGTH INTERACTION FACTORS:  
   IN COMPRESSION                      = 0.000                      IN TENSION                      = 0.074  
   IN BENDING                          = 0.680                      IN SHEAR                        = 0.153  
 CRITICAL MEMBER NUMBER            = 29                          CRITICAL SECTION            = 2  
 FACTORED AXIAL FORCE AND RESISTANCES:  
   Pr = 8.87 kip                      Tr = 18.71 kip    Pf = 1.39 kip  
   UBKL = 13.297 ft    ELNC = 11.923 ft    FIXP = 0.500            EK = 0.897  
 FACTORED SHEAR FORCES AND RESISTANCES:  
   Vr = 1.41 kip    Vf = 0.01 kip    Vb = 30.65 kip    Vbf = 1.39 kip  
 FACTORED BENDING MOMENT AND RESISTANCES:  
   Mrn = 2.60 kip-ft    Mrnb = 2.60 kip-ft    Mrnt = 6.97 kip-ft    Mf = -1.77 kip-ft  
   Mrp = 4.27 kip-ft    Mrpb = 11.89 kip-ft    Mrpt = 4.27 kip-ft    Mrpo = 4.27 kip-ft

SUMMARY OUTPUT FOR PANEL # 4

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PANEL PROPERTIES

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Fy = 60.00 ksi                      Fu = 61.50 ksi                      FUB = 74.00 ksi  
 Fyv = 80.00 ksi                      Fybn = 80.00 ksi                      Fybp = 73.34 ksi  
 t = 0.03 in                          H = 7.50 in                          DBOT = 0.31 in  
 ANGL = 45.00 deg.                      ANG2 = 45.00 deg.                      DHOL = 0.44 in  
 ELBT = 7.50 in                      ELTP = 1.50 in                      DEND = 1.03 in  
 ELIP = 0.89 in                      NBRW = 8 Max./Row                      PALN = 71.5 in  
 WPAN = 20.97 lb                      CDMX = 0.28 in                      RADS = 6.25 ft

PANEL DESIGN RESULTS

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MAXIMUM INTERACTION FACTOR = 0.684                      LOAD COMBINATION = 32  
 STRENGTH INTERACTION FACTORS:  
   IN COMPRESSION                      = 0.000                      IN TENSION                      = 0.075  
   IN BENDING                          = 0.684                      IN SHEAR                        = 0.154  
 CRITICAL MEMBER NUMBER            = 32                          CRITICAL SECTION            = 1  
 FACTORED AXIAL FORCE AND RESISTANCES:  
   Pr = 9.44 kip                      Tr = 18.71 kip    Pf = 1.40 kip  
   UBKL = 13.297 ft    ELNC = 11.923 ft    FIXP = 0.500            EK = 0.897  
 FACTORED SHEAR FORCES AND RESISTANCES:  
   Vr = 1.41 kip    Vf = 0.13 kip    Vb = 30.65 kip    Vbf = 1.40 kip  
 FACTORED BENDING MOMENT AND RESISTANCES:  
   Mrn = 2.46 kip-ft    Mrnb = 2.46 kip-ft    Mrnt = 6.47 kip-ft    Mf = -1.68 kip-ft  
   Mrp = 2.57 kip-ft    Mrpb = 2.82 kip-ft    Mrpt = 3.10 kip-ft    Mrpo = 2.57 kip-ft

SUMMARY OUTPUT FOR PANEL # 5

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PANEL PROPERTIES

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Fy = 60.00 ksi                      Fu = 61.50 ksi                      FUB = 74.00 ksi  
 Fyv = 80.00 ksi                      Fybn = 63.04 ksi                      Fybp = 73.34 ksi  
 t = 0.03 in                          H = 7.50 in                          DBOT = 0.31 in  
 ANGL = 45.00 deg.                      ANG2 = 45.00 deg.                      DHOL = 0.44 in  
 ELBT = 7.50 in                      ELTP = 1.50 in                      DEND = 1.03 in  
 ELIP = 0.89 in                      NBRW = 8 Max./Row                      PALN = 57.5 in  
 WPAN = 16.87 lb                      CDMX = 0.00 in

PANEL DESIGN RESULTS

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MAXIMUM INTERACTION FACTOR = 0.680                      LOAD COMBINATION = 30  
 STRENGTH INTERACTION FACTORS:  
   IN COMPRESSION                      = 0.000                      IN TENSION                      = 0.074  
   IN BENDING                          = 0.680                      IN SHEAR                        = 0.153  
 CRITICAL MEMBER NUMBER            = 42                          CRITICAL SECTION            = 2  
 FACTORED AXIAL FORCE AND RESISTANCES:  
   Pr = 8.87 kip                      Tr = 18.71 kip    Pf = 1.39 kip  
   UBKL = 13.297 ft    ELNC = 11.923 ft    FIXP = 0.500            EK = 0.897  
 FACTORED SHEAR FORCES AND RESISTANCES:

Vr = 1.41 kip Vf = 0.02 kip Vb = 30.65 kip Vbf= 1.39 kip  
 FACTORED BENDING MOMENT AND RESISTANCES:  
 Mrn = 2.60 kip-ft Mrnb = 2.60 kip-ft Mrnt = 6.97 kip-ft Mf = -1.77 kip-ft  
 Mrp = 4.27 kip-ft Mrpb = 11.89 kip-ft Mrpt = 4.27 kip-ft Mrpo = 4.27 kip-ft

SUMMARY OUTPUT FOR PANEL # 6

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PANEL PROPERTIES

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Fy = 60.00 ksi	Fu = 61.50 ksi	FUB = 74.00 ksi
Fyv = 80.00 ksi	Fybn = 80.00 ksi	Fybp = 73.34 ksi
t = 0.03 in	H = 7.50 in	DBOT = 0.31 in
ANG1 = 45.00 deg.	ANG2 = 45.00 deg.	DHOL = 0.44 in
ELBT = 7.50 in	ELTP = 1.50 in	DEND = 1.03 in
ELIP = 0.89 in	NBRW = 8 Max./Row	PALN = 92.0 in
WPAN = 26.99 lb	CDMX = 0.28 in	RADS = 5.10 ft

PANEL DESIGN RESULTS

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MAXIMUM INTERACTION FACTOR = 0.903 LOAD COMBINATION = 32  
 STRENGTH INTERACTION FACTORS:  
 IN COMPRESSION = 0.000 IN TENSION = 0.095  
 IN BENDING = 0.897 IN SHEAR = 0.195  
 CRITICAL MEMBER NUMBER = 56 CRITICAL SECTION = 3  
 FACTORED AXIAL FORCE AND RESISTANCES:  
 Pr = 9.44 kip Tr = 18.71 kip Pf = 1.77 kip  
 UBKL = 13.297 ft ELNC = 11.923 ft FIXP = 0.500 EK = 0.897  
 FACTORED SHEAR FORCES AND RESISTANCES:  
 Vr = 1.41 kip Vf = 0.08 kip Vb = 30.65 kip Vbf= 1.77 kip  
 FACTORED BENDING MOMENT AND RESISTANCES:  
 Mrn = 2.46 kip-ft Mrnb = 2.46 kip-ft Mrnt = 6.47 kip-ft Mf = 2.28 kip-ft  
 Mrp = 2.54 kip-ft Mrpb = 2.82 kip-ft Mrpt = 3.10 kip-ft Mrpo = 2.54 kip-ft

SUMMARY OUTPUT FOR PANEL # 7

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PANEL PROPERTIES

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Fy = 60.00 ksi	Fu = 61.50 ksi	FUB = 74.00 ksi
Fyv = 80.00 ksi	Fybn = 63.04 ksi	Fybp = 73.34 ksi
t = 0.03 in	H = 7.50 in	DBOT = 0.31 in
ANG1 = 45.00 deg.	ANG2 = 45.00 deg.	DHOL = 0.44 in
ELBT = 7.50 in	ELTP = 1.50 in	DEND = 1.03 in
ELIP = 0.89 in	NBRW = 8 Max./Row	PALN = 64.5 in
WPAN = 18.92 lb	CDMX = 0.00 in	

PANEL DESIGN RESULTS

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MAXIMUM INTERACTION FACTOR = 0.652 LOAD COMBINATION = 27  
 STRENGTH INTERACTION FACTORS:  
 IN COMPRESSION = 0.015 IN TENSION = 0.000  
 IN BENDING = 0.526 IN SHEAR = 0.652  
 CRITICAL MEMBER NUMBER = 70 CRITICAL SECTION = 3  
 FACTORED AXIAL FORCE AND RESISTANCES:  
 Pr = 9.55 kip Tr = 18.71 kip Pf = -0.16 kip  
 UBKL = 5.289 ft ELNC = 5.289 ft FIXP = 0.000 EK = 1.000  
 FACTORED SHEAR FORCES AND RESISTANCES:  
 Vr = 1.41 kip Vf = 0.92 kip Vb = 30.65 kip Vbf= 0.16 kip  
 FACTORED BENDING MOMENT AND RESISTANCES:  
 Mrn = 2.60 kip-ft Mrnb = 2.60 kip-ft Mrnt = 6.97 kip-ft Mf = -1.37 kip-ft  
 Mrp = 4.27 kip-ft Mrpb = 11.89 kip-ft Mrpt = 4.27 kip-ft Mrpo = 4.27 kip-ft

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TOTAL STEEL WEIGHT OF ONE ARCH = 146.528 lbs.  
 MAXIMUM INTERACTION FACTOR IN ARCH = 0.903 AT MEMBER # 15

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ARCH BASE CONNECTION DESIGN SUMMARY

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MAXIMUM FACTORED ARCH REACTIONS:  
 Mmax = 1.54 kip-ft Tmax = 1.71 kip Vmax = 0.92 kip  
 ARCH PANEL TO CONNECTOR BOLTS DESIGN:  
 Connection Bolt Diameter = 3/8 in

Connection Bolt Factored Tensile Strength = 150 ksi  
 No. of Connection Bolts on Narrow Flange Side = 2.00  
 No. of Connection Bolts on Wide Flange Side = 2.00  
 Factored Shear Capacity per Connection Bolt = 5.59 kip  
 Factored Bearing Capacity per Connection Bolt = 1.23 kip  
 Factored Tearing Out Capacity per Connection Bolt = 2.43 kip  
 Factored Slip Resistance per Connection Bolt = 0.33 kip  
 Maximum Interaction Factor for Connection Bolts = 0.631  
 Corresponding Load Combination No. = 32  
 Corresponding Arch Support No. = 2  
 Corresponding Arch Base Moment = -1.54 kip-ft  
 Corresponding Arch Base Shear Force = 0.51 kip  
 Corresponding Arch Base Axial Force = -1.58 kip  
 ANCHOR DESIGN PER ACI 318-19:  
 Seismic Design Category = B  
 Anchor Strengths in Uncracked Concrete  
 Concrete Strength = 2.50 ksi  
 Smallest Edge Distance = 7.00 in  
 Minimum Embedment Depth = 8.75 in  
 Minimum Foundation Depth = 12.75 in  
 Anchor Type = Hilti Kwik Bolt TZ2 (ICC ESR-4266)  
 Anchor Diameter = 5/8 in  
 No. of Anchors on Narrow Flange Side = 1.00  
 No. of Anchors on Wide Flange Side = 1.00  
 Factored Anchor Tensile Strength = 107 ksi  
 Maximum Interaction Factor for Anchors = 0.641  
 Corresponding Load Combination No. = 32  
 Corresponding Arch Support No. = 2  
 Corresponding Arch Base Moment Reaction = -1.54 kip-ft  
 Corresponding Arch Base Shear Reaction = 0.51 kip  
 Corresponding Arch Base Axial Reaction = -1.58 kip  
 Lowest Factored Tensile Strength per Anchor = 5.85 kip  
 Lowest Factored Shear Strength per Anchor = 6.66 kip  
 Factored Steel Strength of Anchor in Tension = 13.15 kip  
 Factored Steel Strength of Anchor in Shear = 6.66 kip  
 Factored Concrete Breakout Strength of Anchor in Tension = 9.16 kip  
 Factored Concrete Breakout Strength of Anchor in Shear = 6.66 kip  
 Factored Pullout Strength of Anchor in Tension = 5.85 kip  
 Factored Concrete Pryout Strength of Anchor in Shear = 19.73 kip  
 ARCH BRACKET STEEL THICKNESS = .075 in  
 Minimum Factored Tensile Resistance per Arch Bracket = 5.94 kip  
 Factored Pull-Over Resistance per Anchor = 7.22 kip

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 MAXIMUM INTERACTION FACTOR INCLUDING ARCH BASE = 0.903  
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## 4. Installation Requirements

SteelMaster arch panels shall be installed in accordance of the approved SteelMaster drawings and construction guidelines.

## 5. Limitations and Conditions of Use

Application of SteelMaster arch panels, including connection bolts, anchors, and horizontal loads shall be addressed on a case by case basis by a Professional Engineer licensed in Florida in accordance of the requirements of the latest edition of the Florida Building Code.

## 6. Certification of Independence

It is certified herein that:

1. The evaluator does not have, nor will acquire, a financial interest in any company manufacturing or distributing products for which the report is being issued, and
2. The evaluator does not have, nor will acquire, a financial interest in any other entity involved in the approval process of the products.

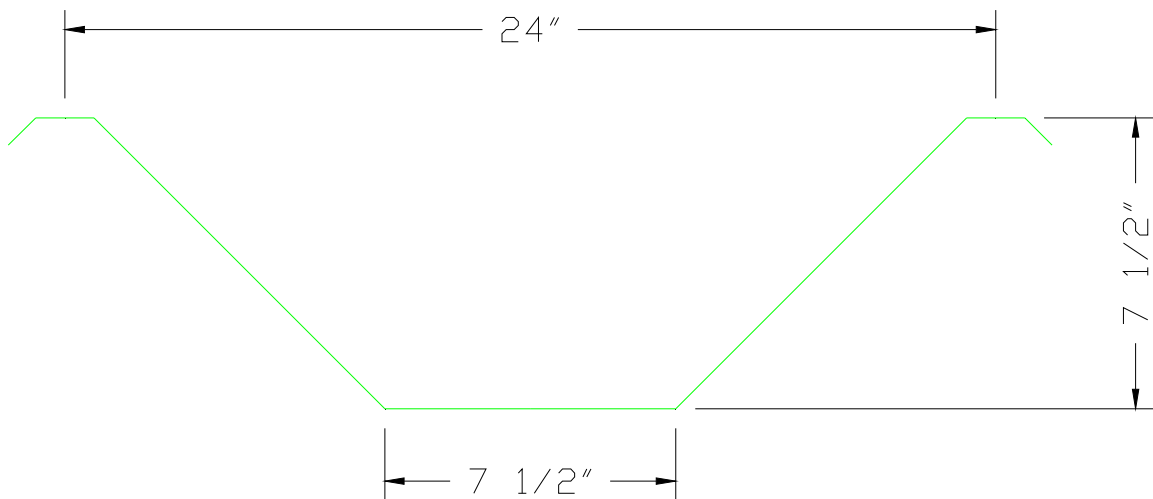


Figure 1. SteelMaster Arch Panel Cross Section

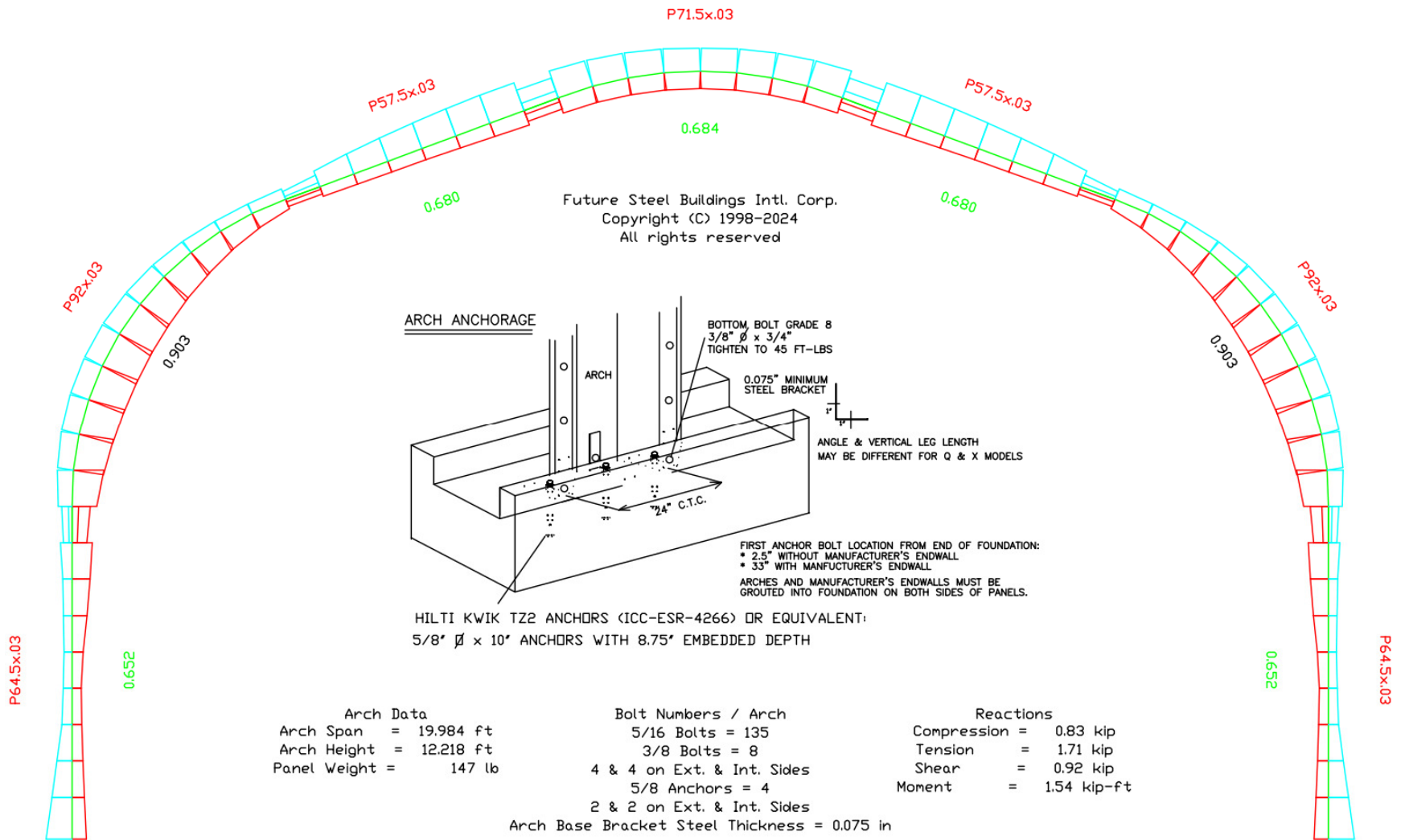


Figure 2. Moment Envelope, Panel Tags & Maximum Interaction Factors for A20-12 (20 psf Live, 200 mph Wind, HVHZ, 125 mph Tornado)

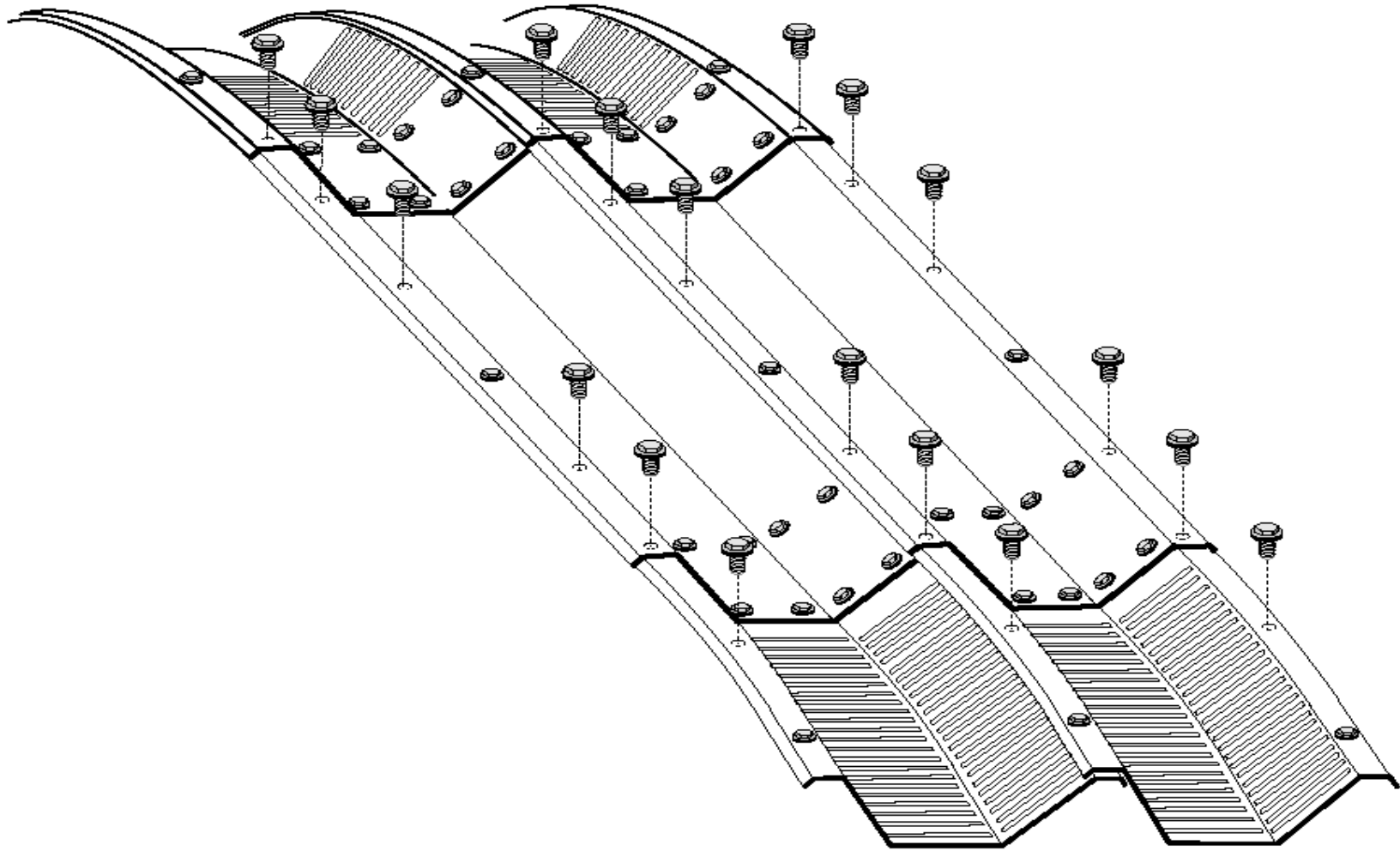


Figure 3. SteelMaster Arch Panel to Panel Connection with ASTM A307 5/16" Diameter Bolts and Nuts at 7" Spacing Along Panel Length (Washers not required)