Fareham Office
Opus International Consultants (UK) Ltd
Modulus House
Salterns Lane
Fareham
Hampshire
PO16 0QS

PROJECT NO: 9467   SHEET NO: 13   REV:

DESIGNED: AWS   REVIEWED: DATE: APRIL 12

Telephone: 01329 822021   Facsimile: 01329 825274   email: fareham@opusinternational.co.uk

PROJECT: Travelling Barn

Aluminium Hoop Beams (Alternative to timber ribs)

For section properties refer to Appendix E

For hoop member forces refer to Appendix E   (Hoops at 3.3m c/rs)

Section classification

$$\varepsilon = (250/255)^{1/2} = 0.99$$

Bottom flange - uniform compression $\beta = 41/2.5 = 16.4$ $\beta_1 = 18 \times 0.99 = 17.8$

∴ Bottom flange is fully compact (Top flange similar)

Web - $y_o/y_c = \dfrac{31.6}{-26.4} = -1.2$ $g = 0.36$ $\beta = 0.36 \times \dfrac{41.4}{2.5} = 5.96$ Fully compact

$y_t/y_c = \dfrac{26.4}{-31.6} = -0.84$ $g = 0.43$ $\beta = 0.43 \times \dfrac{41.4}{2.5} = 7.12$ fully compact

Assume uniform axial load $g = 1.0$ $\beta = \dfrac{41.4}{2.5} = 16.56 < 17.8$ ∴ fully compact

Outstand lip   treat as equivalent reinforced lip   b = 10   t = 2.5

$\beta = 10/2.5 = 4$ $7\varepsilon = 6.93$ ∴ fully compact

$$M_{RS} = \dfrac{255 \times 10.9 \times 10^{-3}}{1.2} = 2.316 \text{ kNm}$$

$P/p_e < 2$ ∴ Hoop member restrained by canvas & guys ∴ ignore lateral torsional buckling
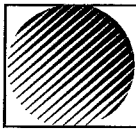
$$P_{RS} \text{ Axial} = \dfrac{255 \times 5.7 \times 10^{-1}}{1.2} = 121.13 \text{ kN}$$ $\dfrac{t/t}{} = \dfrac{1.875}{7.5} = 0.25$

From EN1993-2 Appendix D effective length for in-plane buckling = $1.05 \times s$

where s = half hoop length

$\lambda = \dfrac{4358 \times 1.05}{21.1} = 216.87$ $\lambda_{min} = 10.41$ $\lambda_1 = 0.2$ $c = 0.2$ $\lambda = 4.167$ $\psi = 0.552$ $N = 0.055$

$p_3 = 14 \text{ N/mm}^2$ $P_R = \dfrac{14 \times 5.7 \times 10^{-1}}{1.2} = 6.66 \text{ kN}$

Fareham Office
Opus International Consultants (UK) Ltd
Modulus House
Salterns Lane
Fareham
Hampshire
PO16 0QS

PROJECT NO: 9467 SHEET NO: 14 REV:

DESIGNED: AWJ REVIEWED: DATE: APRIL 12

Telephone: 01329 822021 Facsimile: 01329 825274 email: fareham@opusinternational.co.uk

PROJECT: Travelling Barn

Member Forces :-

D+W1 uls   Max tension = 3.98 kN   max BM = 0.407 kN
D+W2 uls   - " -   6.271 kN   -"-   0.028 kN·
D+W3 uls   Max comp = 1.438 kN   -"-   0.012 kN·
D+W4 uls   -"-   0.913 kN   -"-   0.356 kN/m

Section Check D+W1 worst case - $\dfrac{3.98}{121.13} + \dfrac{0.407}{2.316} = 0.209 < 1.0$ ∴ ok

Overall buckling check D+W4 worst case - $\dfrac{0.913}{6.66} + \dfrac{0.356}{2.316} + \dfrac{0.913 \times 0.356}{2 \times 6.66 \times 2.316} = 0.301 < 1.0$ ∴ ok

∴ Provide 58 × 46 × 2.5 aluminium hoop tacks at 3.3m c/c

OPUS
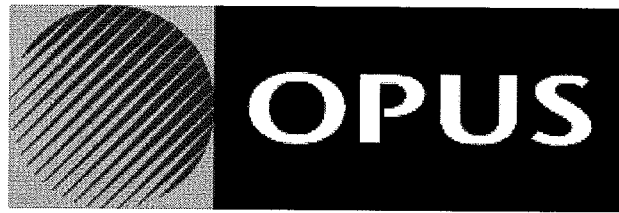
TITLE PAGE

Project: 9467 Travelling Barn - Hoop alloy

APPENDIX E

Author : AWS

Nodes: Values: 1

Node	X (m)	Z (m)	Support code	Support
1	0.0	0.0	xxf	Pinned
2	0.260	0.324		
3	0.548	0.623		
4	0.862	0.895		
5	1.199	1.138		
6	1.556	1.350		
7	1.931	1.529		
8	2.320	1.675		
9	2.720	1.785		
10	3.129	1.858		
11	3.542	1.895		
12	3.958	1.895		
13	4.371	1.858		
14	4.780	1.785		
15	5.180	1.675		
16	5.569	1.529		
17	5.944	1.350		
18	6.301	1.138		
19	6.638	0.895		
20	6.952	0.623		
21	7.240	0.324		
22	7.500	0.0	xxf	Pinned

Bars: Values: 1

Bar	Node 1	Node 2	Section	Material	Length (m)	Gamma (Deg)
1	1	2	hoop 58x46x2.5	6082T6	0.415	0.0
2	2	3	hoop 58x46x2.5	6082T6	0.415	0.0
3	3	4	hoop 58x46x2.5	6082T6	0.415	0.0
4	4	5	hoop 58x46x2.5	6082T6	0.415	0.0
5	5	6	hoop 58x46x2.5	6082T6	0.415	0.0
6	6	7	hoop 58x46x2.5	6082T6	0.415	0.0
7	7	8	hoop 58x46x2.5	6082T6	0.415	0.0
8	8	9	hoop 58x46x2.5	6082T6	0.415	0.0
9	9	10	hoop 58x46x2.5	6082T6	0.415	0.0
10	10	11	hoop 58x46x2.5	6082T6	0.415	0.0
11	11	12	hoop 58x46x2.5	6082T6	0.415	0.0
12	12	13	hoop 58x46x2.5	6082T6	0.415	0.0
13	13	14	hoop 58x46x2.5	6082T6	0.415	0.0
14	14	15	hoop 58x46x2.5	6082T6	0.415	0.0
15	15	16	hoop 58x46x2.5	6082T6	0.415	0.0
16	16	17	hoop 58x46x2.5	6082T6	0.415	0.0
17	17	18	hoop 58x46x2.5	6082T6	0.415	0.0
18	18	19	hoop 58x46x2.5	6082T6	0.415	0.0

Bar	Node 1	Node 2	Section	Material	Length (m)	Gamma (Deg)
19	19	20	hoop 58x46x2.5	6082T6	0.415	0.0
20	20	21	hoop 58x46x2.5	6082T6	0.415	0.0
21	21	22	hoop 58x46x2.5	6082T6	0.415	0.0

Alloy Track

SECTION ANALYSIS
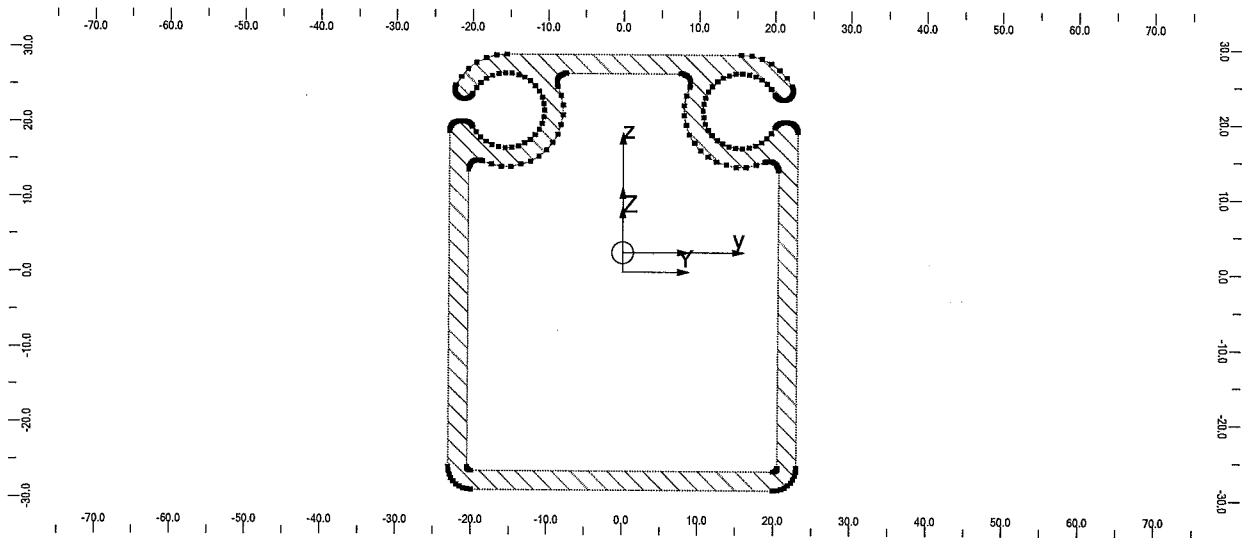
Geometry description

Point no.	Y	Z
1	−23.0 mm	−26.0 mm
2	−23.0 mm	18.7 mm
3	−23.0 mm	19.0 mm
4	−22.9 mm	19.2 mm
5	−22.8 mm	19.4 mm
6	−22.7 mm	19.6 mm
7	−22.6 mm	19.7 mm
8	−22.4 mm	19.8 mm
9	−22.2 mm	19.9 mm
10	−22.0 mm	20.0 mm
11	−21.8 mm	20.0 mm
12	−21.1 mm	20.0 mm
13	−20.9 mm	20.0 mm
14	−20.7 mm	19.9 mm
15	−20.5 mm	19.8 mm
16	−20.3 mm	19.7 mm
17	−20.1 mm	19.5 mm
18	−20.0 mm	19.3 mm

19	-19.5 mm	18.5 mm
20	-18.9 mm	17.9 mm
21	-18.2 mm	17.3 mm
22	-17.4 mm	16.9 mm
23	-16.6 mm	16.6 mm
24	-15.7 mm	16.5 mm
25	-14.8 mm	16.5 mm
26	-13.9 mm	16.7 mm
27	-13.1 mm	17.1 mm
28	-12.4 mm	17.6 mm
29	-11.7 mm	18.2 mm
30	-11.2 mm	18.9 mm
31	-10.8 mm	19.7 mm
32	-10.6 mm	20.6 mm
33	-10.5 mm	21.5 mm
34	-10.6 mm	22.4 mm
35	-10.8 mm	23.3 mm
36	-11.2 mm	24.1 mm
37	-11.7 mm	24.8 mm
38	-12.4 mm	25.4 mm
39	-13.1 mm	25.9 mm
40	-13.9 mm	26.3 mm
41	-14.8 mm	26.5 mm
42	-15.7 mm	26.5 mm
43	-16.6 mm	26.4 mm
44	-17.4 mm	26.1 mm
45	-18.2 mm	25.7 mm
46	-18.9 mm	25.1 mm
47	-19.5 mm	24.5 mm
48	-20.0 mm	23.7 mm
49	-20.1 mm	23.5 mm
50	-20.3 mm	23.3 mm
51	-20.5 mm	23.2 mm
52	-20.7 mm	23.1 mm
53	-20.9 mm	23.0 mm
54	-21.1 mm	23.0 mm
55	-21.3 mm	23.0 mm
56	-21.6 mm	23.1 mm
57	-21.8 mm	23.2 mm
58	-22.0 mm	23.3 mm
59	-22.1 mm	23.5 mm
60	-22.2 mm	23.7 mm
61	-22.3 mm	23.9 mm
62	-22.4 mm	24.1 mm
63	-22.4 mm	24.4 mm
64	-22.3 mm	24.6 mm
65	-22.2 mm	24.8 mm
66	-21.5 mm	26.0 mm
67	-20.6 mm	27.0 mm
68	-19.5 mm	27.9 mm
69	-18.2 mm	28.5 mm
70	-16.9 mm	28.9 mm
71	-15.5 mm	29.0 mm
72	15.5 mm	29.0 mm
73	16.9 mm	28.9 mm
74	18.2 mm	28.5 mm

75	19.5 mm	27.9 mm
76	20.6 mm	27.0 mm
77	21.5 mm	26.0 mm
78	22.2 mm	24.8 mm
79	22.3 mm	24.6 mm
80	22.4 mm	24.4 mm
81	22.4 mm	24.1 mm
82	22.3 mm	23.9 mm
83	22.2 mm	23.7 mm
84	22.1 mm	23.5 mm
85	22.0 mm	23.3 mm
86	21.8 mm	23.2 mm
87	21.6 mm	23.1 mm
88	21.3 mm	23.0 mm
89	21.1 mm	23.0 mm
90	20.9 mm	23.0 mm
91	20.7 mm	23.1 mm
92	20.5 mm	23.2 mm
93	20.3 mm	23.3 mm
94	20.1 mm	23.5 mm
95	20.0 mm	23.7 mm
96	19.5 mm	24.5 mm
97	18.9 mm	25.1 mm
98	18.2 mm	25.7 mm
99	17.4 mm	26.1 mm
100	16.6 mm	26.4 mm
101	15.7 mm	26.5 mm
102	14.8 mm	26.5 mm
103	13.9 mm	26.3 mm
104	13.1 mm	25.9 mm
105	12.4 mm	25.4 mm
106	11.7 mm	24.8 mm
107	11.2 mm	24.1 mm
108	10.8 mm	23.3 mm
109	10.6 mm	22.4 mm
110	10.5 mm	21.5 mm
111	10.6 mm	20.6 mm
112	10.8 mm	19.7 mm
113	11.2 mm	18.9 mm
114	11.7 mm	18.2 mm
115	12.4 mm	17.6 mm
116	13.1 mm	17.1 mm
117	13.9 mm	16.7 mm
118	14.8 mm	16.5 mm
119	15.7 mm	16.5 mm
120	16.6 mm	16.6 mm
121	17.4 mm	16.9 mm
122	18.2 mm	17.3 mm
123	18.9 mm	17.9 mm
124	19.5 mm	18.5 mm
125	20.0 mm	19.3 mm
126	20.1 mm	19.5 mm
127	20.3 mm	19.7 mm
128	20.5 mm	19.8 mm
129	20.7 mm	19.9 mm
130	20.9 mm	20.0 mm

131	21.1 mm	20.0 mm
132	21.8 mm	20.0 mm
133	22.0 mm	20.0 mm
134	22.2 mm	19.9 mm
135	22.4 mm	19.8 mm
136	22.6 mm	19.7 mm
137	22.7 mm	19.6 mm
138	22.8 mm	19.4 mm
139	22.9 mm	19.2 mm
140	23.0 mm	19.0 mm
141	23.0 mm	18.8 mm
142	23.0 mm	-26.0 mm
143	23.0 mm	-26.5 mm
144	22.8 mm	-27.0 mm
145	22.6 mm	-27.5 mm
146	22.3 mm	-27.9 mm
147	21.9 mm	-28.3 mm
148	21.5 mm	-28.6 mm
149	21.0 mm	-28.8 mm
150	20.5 mm	-29.0 mm
151	20.0 mm	-29.0 mm
152	-20.0 mm	-29.0 mm
153	-20.5 mm	-29.0 mm
154	-21.0 mm	-28.8 mm
155	-21.5 mm	-28.6 mm
156	-21.9 mm	-28.3 mm
157	-22.3 mm	-27.9 mm
158	-22.6 mm	-27.5 mm
159	-22.8 mm	-27.0 mm
160	-23.0 mm	-26.5 mm
161	-23.0 mm	-26.0 mm
162	-20.5 mm	-26.0 mm
163	-20.5 mm	13.6 mm
164	-20.5 mm	13.8 mm
165	-20.4 mm	14.0 mm
166	-20.3 mm	14.2 mm
167	-20.2 mm	14.4 mm
168	-20.0 mm	14.6 mm
169	-19.8 mm	14.7 mm
170	-19.6 mm	14.8 mm
171	-19.4 mm	14.8 mm
172	-19.2 mm	14.8 mm
173	-18.9 mm	14.8 mm
174	-18.7 mm	14.7 mm
175	-17.5 mm	14.3 mm
176	-16.2 mm	14.0 mm
177	-14.9 mm	14.0 mm
178	-13.6 mm	14.3 mm
179	-12.3 mm	14.7 mm
180	-11.2 mm	15.4 mm
181	-10.2 mm	16.2 mm
182	-9.4 mm	17.2 mm
183	-8.7 mm	18.3 mm
184	-8.3 mm	19.6 mm
185	-8.0 mm	20.9 mm
186	-8.0 mm	22.2 mm

187	-8.3 mm	23.5 mm
188	-8.7 mm	24.7 mm
189	-8.8 mm	24.9 mm
190	-8.8 mm	25.2 mm
191	-8.8 mm	25.4 mm
192	-8.8 mm	25.6 mm
193	-8.7 mm	25.8 mm
194	-8.6 mm	26.0 mm
195	-8.4 mm	26.2 mm
196	-8.2 mm	26.3 mm
197	-8.0 mm	26.4 mm
198	-7.8 mm	26.5 mm
199	-7.6 mm	26.5 mm
200	7.6 mm	26.5 mm
201	7.8 mm	26.5 mm
202	8.0 mm	26.4 mm
203	8.2 mm	26.3 mm
204	8.4 mm	26.2 mm
205	8.6 mm	26.0 mm
206	8.7 mm	25.8 mm
207	8.8 mm	25.6 mm
208	8.8 mm	25.4 mm
209	8.8 mm	25.2 mm
210	8.8 mm	24.9 mm
211	8.7 mm	24.7 mm
212	8.3 mm	23.5 mm
213	8.0 mm	22.2 mm
214	8.0 mm	20.9 mm
215	8.3 mm	19.6 mm
216	8.7 mm	18.3 mm
217	9.4 mm	17.2 mm
218	10.2 mm	16.2 mm
219	11.2 mm	15.4 mm
220	12.3 mm	14.7 mm
221	13.6 mm	14.3 mm
222	14.9 mm	14.0 mm
223	16.2 mm	14.0 mm
224	17.5 mm	14.3 mm
225	18.7 mm	14.7 mm
226	18.9 mm	14.8 mm
227	19.2 mm	14.8 mm
228	19.4 mm	14.8 mm
229	19.6 mm	14.8 mm
230	19.8 mm	14.7 mm
231	20.0 mm	14.6 mm
232	20.2 mm	14.4 mm
233	20.3 mm	14.2 mm
234	20.4 mm	14.0 mm
235	20.5 mm	13.8 mm
236	20.5 mm	13.6 mm
237	20.5 mm	-26.0 mm
238	20.5 mm	-26.1 mm
239	20.5 mm	-26.2 mm
240	20.4 mm	-26.3 mm
241	20.4 mm	-26.3 mm
242	20.3 mm	-26.4 mm

243	20.3 mm	-26.4 mm
244	20.2 mm	-26.5 mm
245	20.1 mm	-26.5 mm
246	20.0 mm	-26.5 mm
247	-20.0 mm	-26.5 mm
248	-20.1 mm	-26.5 mm
249	-20.2 mm	-26.5 mm
250	-20.3 mm	-26.5 mm
251	-20.3 mm	-26.4 mm
252	-20.4 mm	-26.3 mm
253	-20.4 mm	-26.3 mm
254	-20.5 mm	-26.2 mm
255	-20.5 mm	-26.1 mm
256	-20.5 mm	-26.0 mm

General results

Area

$$A = 5.7 \text{ cm2}$$

Center of gravity

$$Y_c = -0.0 \text{ mm}$$
$$Z_c = 2.6 \text{ mm}$$

Perimeter

$$S = 256.1 \text{ mm}$$

Base material

6082T6
$$E = 70000.0 \text{ MPa}$$
$$den = 2711.4 \text{ kg/m3}$$
$$WU = 0.015 \text{ kN/m}$$

Principal system

Angle

$$alpha = 0.0 \text{ Deg}$$

Moments of inertia

$$I_x = 23.5 \text{ cm4}$$
$$I_y = 25.5 \text{ cm4}$$
$$I_z = 16.9 \text{ cm4}$$

Radii of inertia

$$i_y = 21.1 \text{ mm}$$
$$i_z = 17.2 \text{ mm}$$

Shear areas

$$A_y = 2.9 \text{ cm2}$$
$$A_z = 2.9 \text{ cm2}$$

Elastic section moduli

$$Wel_y = 8.1 \text{ cm3}$$
$$Wel_z = 7.4 \text{ cm3}$$

Shear rigidity factors

$$W_y = 1.9 \text{ cm2}$$
$$W_z = 2.3 \text{ cm2}$$

Plastic section moduli

$$Wpl_y = 10.9 \text{ cm3}$$
$$Wpl_z = 9.1 \text{ cm3}$$

Maximum distances

$$V_y = 23.0 \text{ mm}$$
$$Vp_y = 23.0 \text{ mm}$$
$$V_z = 26.4 \text{ mm}$$
$$Vp_z = 31.6 \text{ mm}$$

Central system

Moments of inertia

I_{yc} = 25.5 cm4
I_{zc} = 16.9 cm4
I_{yczc} = 0.0 cm4

Radii of inertia

i_{yc} = 21.1 mm
i_{zc} = 17.2 mm

Maximum distances

V_{yc} = 23.0 mm
V_{pyc} = 23.0 mm
V_{zc} = 26.4 mm
V_{pzc} = 31.6 mm

Arbitrary system

System position

y_{c}' = -0.0 mm   Angle = 0.0 Deg
z_{c}' = 2.6 mm

Moments of inertia

I_{y}' = 25.5 cm4
I_{z}' = 16.9 cm4
$I_{y}'_{z}'$ = 0.0 cm4

Radii of inertia

i_{yc} = 21.1 mm
i_{zc} = 17.2 mm

First moments of area

S_{y}' = -0.0 cm3
S_{z}' = -0.0 cm3

Maximum distances

V_{y}' = 23.0 mm
V_{py}' = 23.0 mm
V_{z}' = 26.4 mm
V_{pz}' = 31.6 mm

Loads - Cases: 1to4 8 : Values: 1

Case	Load type	List
1	self-weight	1to21
1	uniform load	1to21
2	uniform load	1to4
2	uniform load	5to7 15to21
2	trapezoidal load (2p)	8
2	trapezoidal load (2p)	8
2	uniform load	9 10
2	trapezoidal load (2p)	11
2	trapezoidal load (2p)	11
2	uniform load	12 13
2	trapezoidal load (2p)	14
2	trapezoidal load (2p)	14
3	uniform load	1to7 15to21
3	uniform load	9to13
3	trapezoidal load (2p)	8
3	trapezoidal load (2p)	14
3	trapezoidal load (2p)	8
3	trapezoidal load (2p)	14
4	uniform load	1to21
8	uniform load	1to11

Case	Load values	Label
1	PZ Negative Factor=1.000	DL1
1	PZ=-0.018(kN/m)	DL1
2	PZ=0.324(kN/m) local	WIND1
2	PZ=0.596(kN/m) local	WIND1
2	PZ2=0.596(kN/m) PZ1=0.596(kN/m) X2=0.500 X1=0.0 local not project. relative	WIND1
2	PZ2=1.028(kN/m) PZ1=1.028(kN/m) X2=1.000 X1=0.500 local not project. relative	WIND1
2	PZ=1.028(kN/m) local	WIND1
2	PZ2=1.028(kN/m) PZ1=1.028(kN/m) X2=0.500 X1=0.0 local not project. relative	WIND1
2	PZ2=0.844(kN/m) PZ1=0.844(kN/m) X2=1.000 X1=0.500 local not project. relative	WIND1
2	PZ=0.844(kN/m) local	WIND1
2	PZ2=0.844(kN/m) PZ1=0.844(kN/m) X2=0.500 X1=0.0 local not project. relative	WIND1
2	PZ2=0.596(kN/m) PZ1=0.596(kN/m) X2=1.000 X1=0.500 local not project. relative	WIND1
3	PZ=1.128(kN/m) local	WIND2
3	PZ=1.160(kN/m) local	WIND2
3	PZ2=1.128(kN/m) PZ1=1.128(kN/m) X2=0.500 X1=0.0 local not project. relative	WIND2
3	PZ2=1.128(kN/m) PZ1=1.128(kN/m) X2=1.000 X1=0.500 local not project. relative	WIND2
3	PZ2=1.160(kN/m) PZ1=1.160(kN/m) X2=1.000 X1=0.500 local not project. relative	WIND2
3	PZ2=1.160(kN/m) PZ1=1.160(kN/m) X2=0.500 X1=0.0 local not project. relative	WIND2
4	PZ=-0.216(kN/m) local	WIND3
8	PZ=-0.216(kN/m) local	WIND4

Load Combination - Cases: 5to7 9to13 : Values: 1

Combinations	Name	Analysis type	Combination type	Definition
5 (C)	D+W1	Linear Combination	SLS	(1+2)*1.000
6 (C)	D+W2	Linear Combination	SLS	(1+3)*1.000
7 (C)	D+W3	Linear Combination	SLS	(1+4)*1.000
9 (C)	D+W4	Linear Combination	SLS	(1+8)*1.000
10 (C)	D+W1 uls	Linear Combination	ULS	1*0.800+2*1.200
11 (C)	D+W2 uls	Linear Combination	ULS	1*0.800+3*1.200
12 (C)	D+W3 uls	Linear Combination	ULS	(1+4)*1.200
13 (C)	D+W4 uls	Linear Combination	ULS	(1+8)*1.200

Reactions in the coordinate system: global - Cases: 1to13 : Values: 1

Node/Case	FX (kN)	FZ (kN)	MY (kNm)
1/ 1	0.128	0.145	-0.000
1/ 2	-2.407	-2.388	-0.000
1/ 3	-3.168	-4.269	0.0
1/ 4	0.596	0.810	0.000
1/ 5 (C)	-2.279	-2.243	-0.000
1/ 6 (C)	-3.039	-4.125	-0.000
1/ 7 (C)	0.724	0.955	-0.000
1/ 8	0.126	0.578	-0.000
1/ 9 (C)	0.254	0.722	-0.000
1/ 10 (C)	-2.786	-2.750	-0.000
1/ 11 (C)	-3.699	-5.007	-0.000
1/ 12 (C)	0.869	1.146	-0.000
1/ 13 (C)	0.305	0.867	-0.000
22/ 1	-0.128	0.145	-0.000
22/ 2	2.128	-2.593	0.000
22/ 3	3.168	-4.269	-0.000
22/ 4	-0.596	0.810	0.000
22/ 5 (C)	2.000	-2.448	0.000
22/ 6 (C)	3.039	-4.125	-0.000
22/ 7 (C)	-0.724	0.955	0.000
22/ 8	-0.536	0.277	-0.000
22/ 9 (C)	-0.664	0.422	-0.000
22/ 10 (C)	2.451	-2.995	0.000
22/ 11 (C)	3.699	-5.007	-0.000
22/ 12 (C)	-0.869	1.146	0.000
22/ 13 (C)	-0.797	0.507	-0.000
Case 1	DL1		
Sum of val.	-0.000	0.290	-0.000
Sum of reac.	-0.000	0.290	-1.086
Sum of forc.	-0.000	-0.290	1.086
Check val.	-0.000	0.000	-0.000
Precision	2.55249e-013	2.80430e-027	

Node/Case	FX (kN)	FZ (kN)	MY (kNm)
Case 2	WIND1		
Sum of val.	-0.279	-4.980	0.000
Sum of reac.	-0.279	-4.980	19.444
Sum of forc.	0.279	4.980	-19.444
Check val.	0.000	-0.000	0.000
Precision	2.75403e-013	5.01184e-028	
Case 3	WIND2		
Sum of val.	0.000	-8.539	-0.000
Sum of reac.	0.000	-8.539	32.020
Sum of forc.	0.000	8.539	-32.020
Check val.	0.000	-0.000	0.000
Precision	1.32584e-014	2.59763e-030	
Case 4	WIND3		
Sum of val.	0.000	1.620	0.000
Sum of reac.	0.000	1.620	-6.075
Sum of forc.	0.000	-1.620	6.075
Check val.	0.000	-0.000	0.000
Precision	1.41088e-014	8.32358e-030	
Case 5 (C)	D+W1		
Sum of val.	-0.279	-4.691	0.000
Sum of reac.	-0.279	-4.691	18.358
Sum of forc.	0.279	4.691	-18.358
Check val.	0.000	-0.000	0.000
Precision	5.30652e-013	3.30549e-027	
Case 6 (C)	D+W2		
Sum of val.	-0.000	-8.249	-0.000
Sum of reac.	-0.000	-8.249	30.934
Sum of forc.	0.000	8.249	-30.934
Check val.	-0.000	-0.000	0.000
Precision	2.68508e-013	2.80690e-027	
Case 7 (C)	D+W3		
Sum of val.	-0.000	1.910	0.000
Sum of reac.	-0.000	1.910	-7.161
Sum of forc.	0.000	-1.910	7.161
Check val.	-0.000	0.000	-0.000
Precision	2.69358e-013	2.81262e-027	
Case 8	WIND4		
Sum of val.	-0.409	0.855	-0.000
Sum of reac.	-0.409	0.855	-2.080
Sum of forc.	0.409	-0.855	2.080
Check val.	-0.000	-0.000	-0.000

Node/Case	FX (kN)	FZ (kN)	MY (kNm)
Precision	2.28873e-012	3.03130e-024	
Case 9 (C)	D+W4		
Sum of val.	-0.409	1.145	-0.000
Sum of reac.	-0.409	1.145	-3.166
Sum of forc.	0.409	-1.145	3.166
Check val.	-0.000	-0.000	-0.000
Precision	2.54398e-012	3.03410e-024	
Case 10 (C)	D+W1 uls		
Sum of val.	-0.335	-5.745	0.000
Sum of reac.	-0.335	-5.745	22.464
Sum of forc.	0.335	5.745	-22.464
Check val.	0.000	-0.000	0.000
Precision	5.34682e-013	2.84486e-027	
Case 11 (C)	D+W2 uls		
Sum of val.	0.000	-10.015	-0.000
Sum of reac.	0.000	-10.015	37.555
Sum of forc.	0.000	10.015	-37.555
Check val.	0.000	-0.000	0.000
Precision	2.20109e-013	2.24656e-027	
Case 12 (C)	D+W3 uls		
Sum of val.	-0.000	2.292	0.000
Sum of reac.	-0.000	2.292	-8.594
Sum of forc.	0.000	-2.292	8.594
Check val.	-0.000	0.000	-0.000
Precision	3.23229e-013	3.37515e-027	
Case 13 (C)	D+W4 uls		
Sum of val.	-0.491	1.373	-0.000
Sum of reac.	-0.491	1.373	-3.799
Sum of forc.	0.491	-1.373	3.799
Check val.	-0.000	-0.000	-0.000
Precision	3.05277e-012	3.64092e-024	

Forces - Cases: 10to13 : Global extremes: 1

	Fx compression (kN)	Fx tension (kN)	FZ (kN)	MY (kNm)
MAX	1.438	-3.856	0.601	0.407
Bar	21	11	1	4
Node	22	11	2	4
Case	12 (C)	10 (C)	10 (C)	10 (C)

	Fx compression (kN)	Fx tension (kN)	FZ (kN)	MY (kNm)
MIN	0.745	-6.271	-0.547	-0.356
Bar	7	10	8	17
Node	8	11	8	17
Case	13 (C)	11 (C)	10 (C)	13 (C)

View - FX,MY, Cases: 10 (D+W1 uls)

My 5.e-002kNm
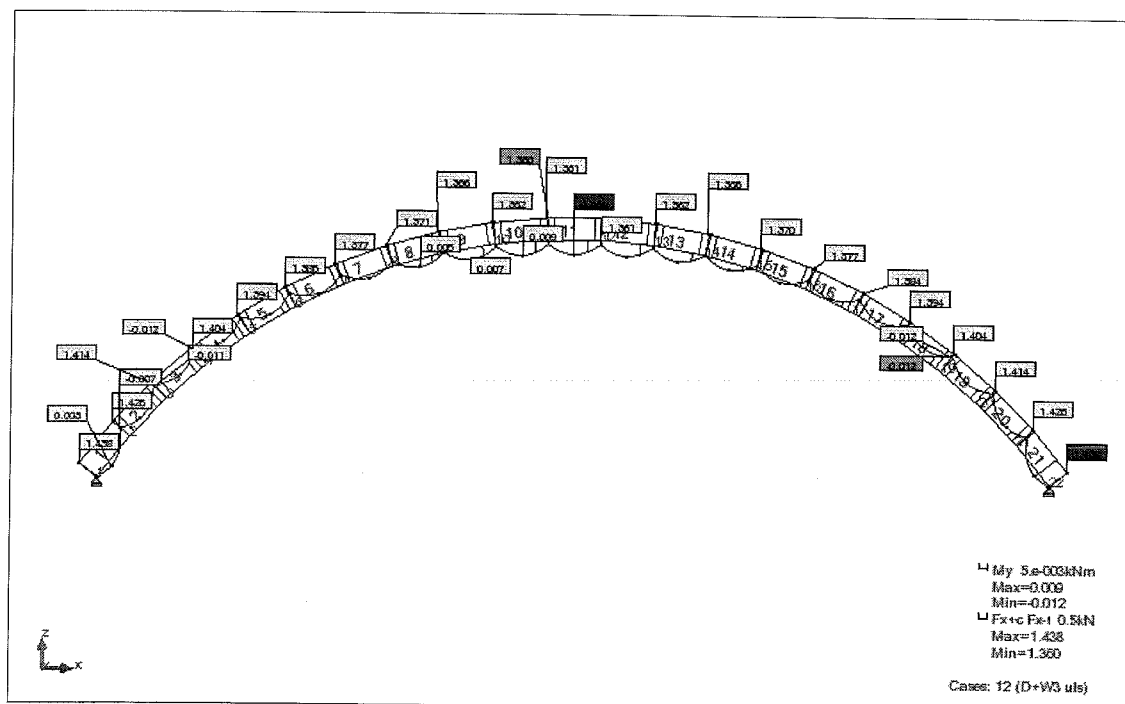Max=0.407
Min=-0.280
Fx+c Fx-t 0.1kN
Max=-3.858
Min=-3.980

Cases: 10 (D+W1 uls)
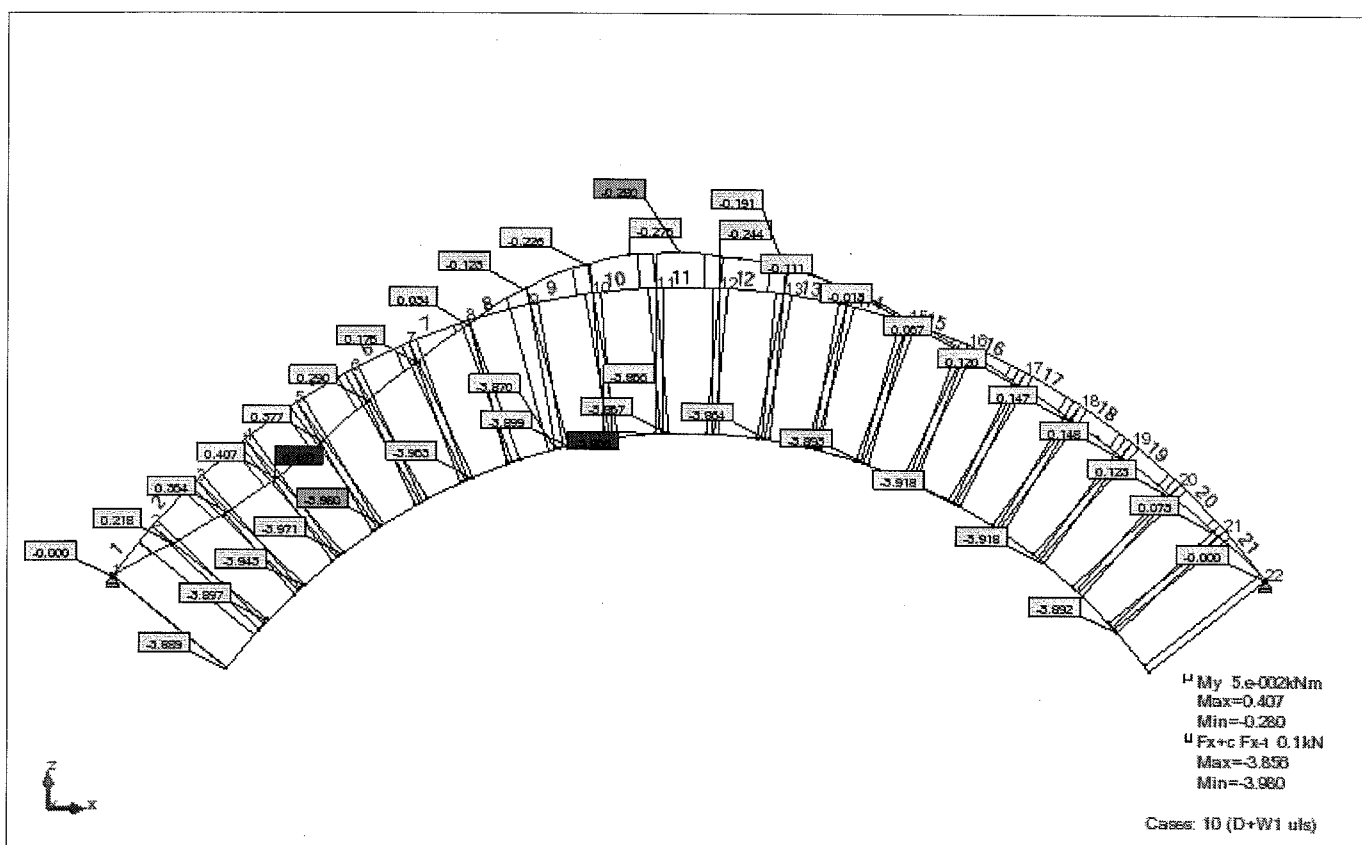
View - FX,MY, Cases: 11 (D+W2 uls)
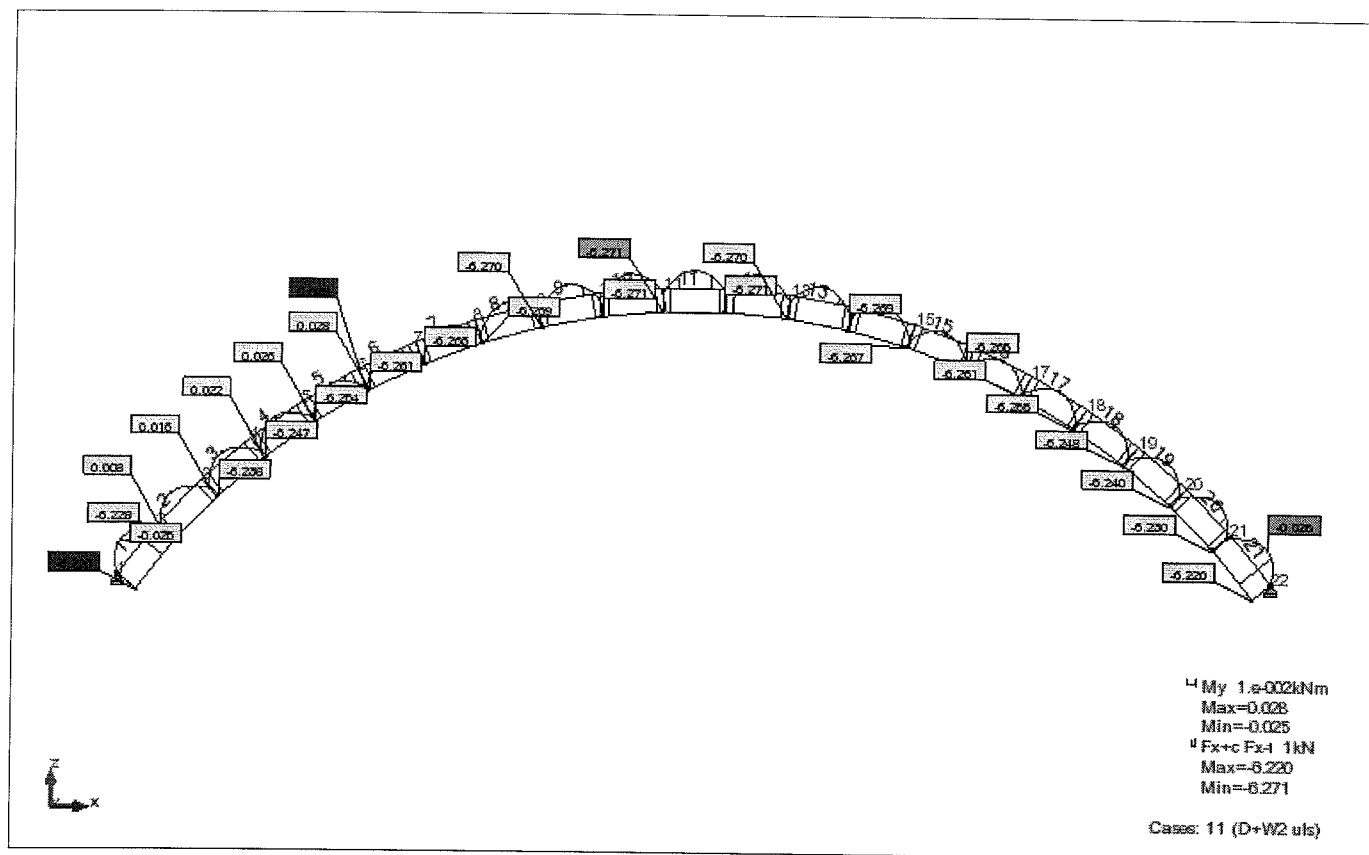
View - FX,MY, Cases: 12 (D+W3 uls)

View - FX,MY, Cases: 13 (D+W4 uls)

My 0.1kNm
Max=0.325
Min=-0.355
Fx+c Fx-t 0.2kN
Max=0.913
Min=0.745

Cases: 13 (D+W4 uls)