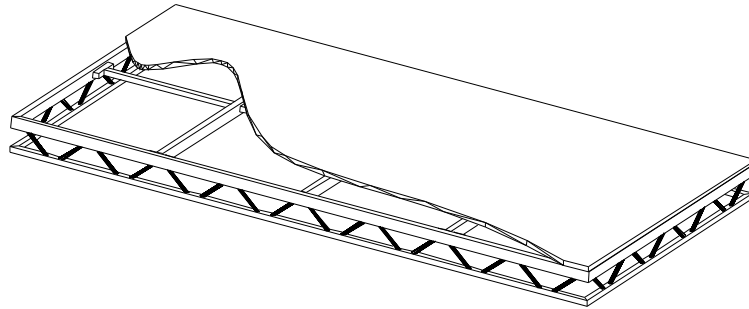




ALAN WHITE DESIGN



LITESTRUCTURES LTD LITEDECK

5kN/m² CALCS

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Sept 2004

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CALCULATION SHEET	Project : Litedeck		AWD ALAN WHITE DESIGN
	Element : Brief and Layout		
	Job Number : H0118	By : anw	Date: Sept 04
	Document No : 001	Checked :	Date:

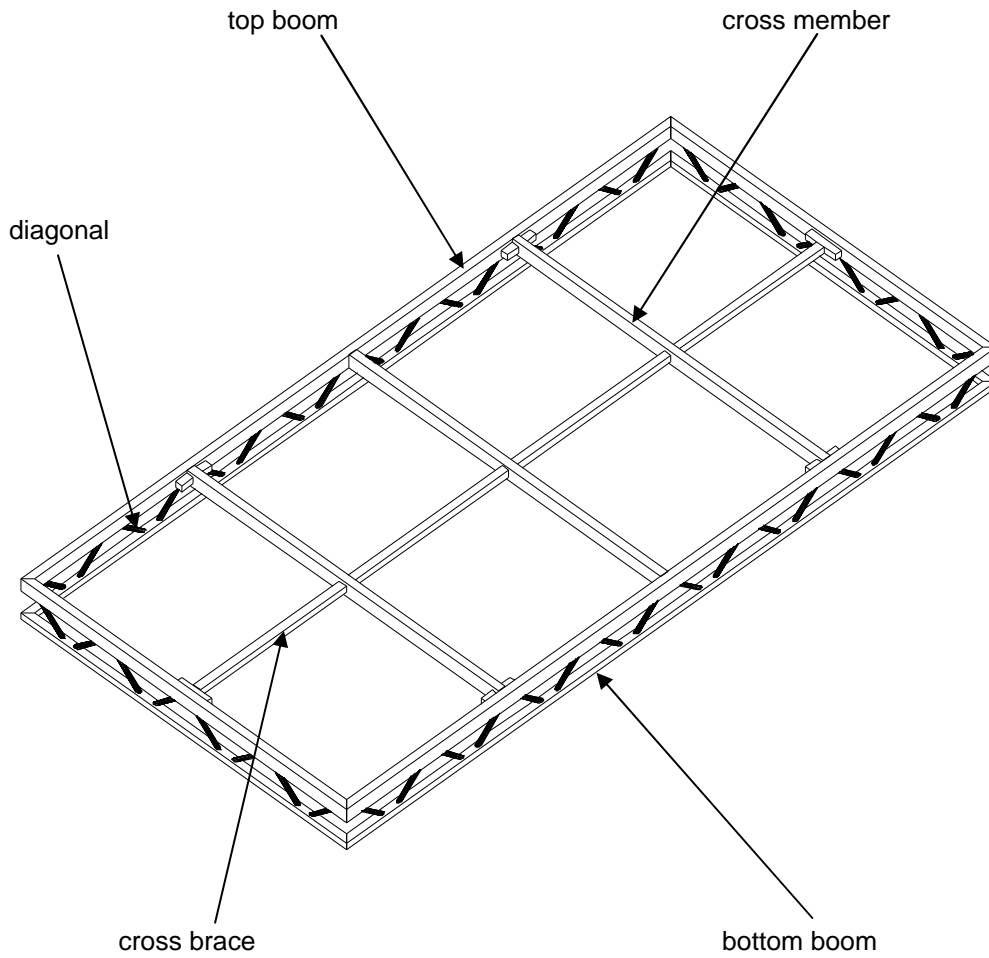
Brief

To carry out design check of LiteStructures stage deck unit to check capacity for carrying loading as described in Temporary Demountable structures and as specified by client.

drawings supplied were

- | | |
|---------------|------------------------|
| PD00724 | Handrail 8' stage unit |
| PD04298 | Corner extrusion |
| D84T PD04557B | 8' by 4' deck |
| PD04559 | Litedeck connection |
| PD04560 | Lock Pocket |

Layout



Project : Litedeck	
Element : Brief and Layout	
Job Number : H0118	By : anw
Document No : 001	Checked : Date: Sept 04

Loading

From Temporary Demountable Structures Guide, the max static load to be resisted is 5kN/m², plus a simultaneous 5% horizontal notional load

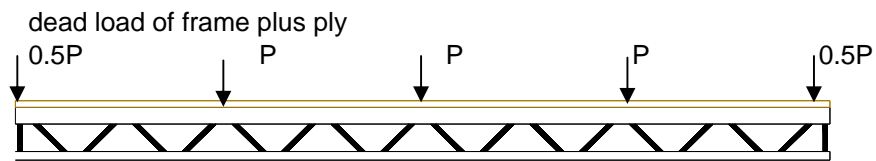
In addition the floor must be capable of supporting a 3.6kN load over an area of 50 by 50mm, with a limiting deflection of 10mm at edge

so $w_L = 5 \text{ kN/m}^2$

from ply $w_D = 0.12 \text{ kN/m}^2$

design UDL = **5.12 kN/m²**

Load case 1

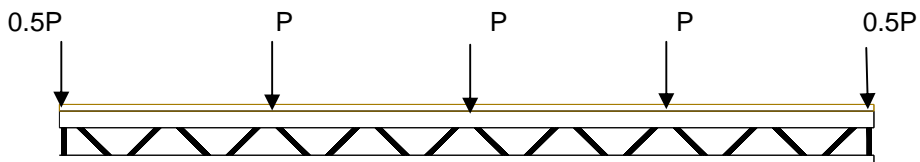


$$\begin{aligned}
 P &= w_D * 1.2/2 * 0.6 + 0.01 \\
 &= 0.12 * 1.2/2 * 0.6 + 0.01 \\
 &= \mathbf{0.05 \text{ kN}}
 \end{aligned}$$

STRAP calculates frame self weight

Load case 2

Live load UDL
on edge frame
live load is transferred by cross members



$$\begin{aligned}
 P &= 0.6 * 1.2/2 * 5 \\
 &= \mathbf{1.80 \text{ kN}}
 \end{aligned}$$

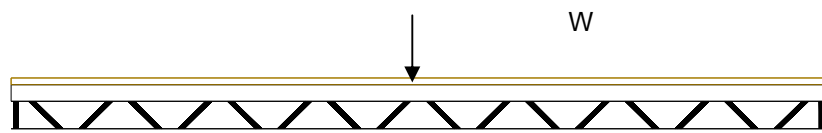
total load is $P_{tot} = 7.2 \text{ kN}$

so horizontal load is $H = 0.05 * 7.2 = 0.36 \text{ kN}$


assume this is carried by top boom only and added in after analysis

Load case 2

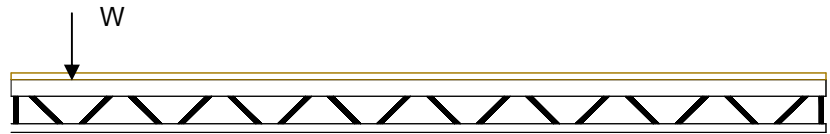
Point load



$W = 3.60 \text{ kN}$

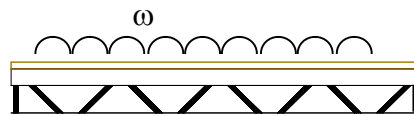
CALCULATION SHEET	Project : Litedeck			
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Load case 3 Point load at end



$$W = 3.60 \text{ kN}$$

Load case 4 end frame



$$w = 5.12 \times 0.3$$

$$= 1.54 \text{ kN/m}$$

The results for all the members in this load case were less than the above cases and this load case is not critical.

Combinations

The results are combined with dead and live load factors

$$\gamma_D = 1.20$$

$$\gamma_L = 1.33$$


combined as follows

- | | |
|--------|--------------------------------|
| Comb 1 | 1.2Self + 1.33 UDL |
| Comb 2 | 1.2Self + 1.33 point at middle |
| Comb 3 | 1.2Self + 1.33 point at end |

Design check parameters

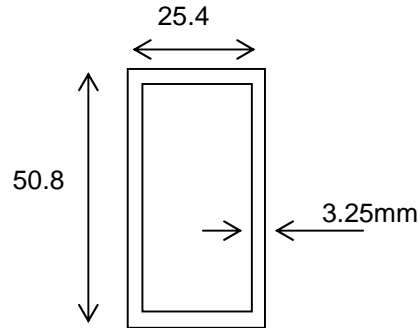
Design to BS 8118 Structural use of aluminium
 BS 5268 Structural use of timber
 IStructE Temporary demountable structures

Alloy used is 6082 T6 throughout

CALCULATION SHEET	Project : Litedeck			
	Element : Section Properties			
	Job Number : H0118	By : anw	Date: Sept 04	
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Top boom

Section is 2 by 1 by 10swg



$A = 453 \text{ mm}^2$
 $I = 140560 \text{ mm}^4$
 $S = 7114 \text{ mm}^3$
 $r_y = 10 \text{ mm}$
 $Z_y = 1750 \text{ mm}^3$

for HAZ section

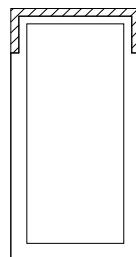
$k_z = 0.5$

lesser of


$z_0 = 20 + t_a/3$ $t_a = 3.15 \text{ mm}$
 $= 20 + 3.15/3$
 $= 21 \text{ mm}$
 or $= 3t_b^2/t_a$ $t_b = 3.15 \text{ mm}$
 $= 3 \times 3.15$
 $= 9.45 \text{ mm}$

Table 4.6

$\alpha = 1.50$
 $\eta = 1$
 $z = z_0 \alpha \eta$
 $= 9.45 \times 1.5 \times 1$
 $= \mathbf{14.18 \text{ mm}}$

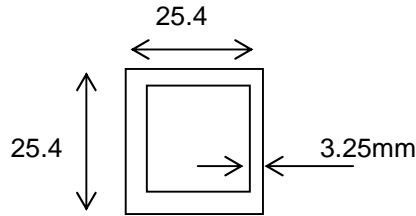


$A_e = 388 \text{ mm}^2$
 $I = 100044 \text{ mm}^4$
 $Z = 3621 \text{ mm}^3$
 $S_e = 4,526$
 $r_y = 10 \text{ mm}$

CALCULATION SHEET	Project : Litedeck			
	Element : Section Properties			
	Job Number : H0118	By : anw	Date: Sept 04	
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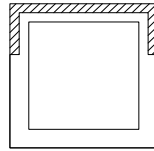
Bottom Boom

Section is 1 by 1 by 10swg



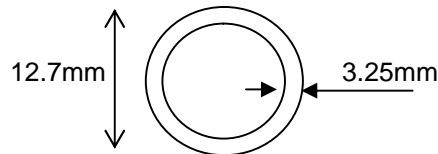
A= 288 mm²
 I= 24053 mm⁴
 S= 2409 mm³
 ry= 9 mm

For HAZ section



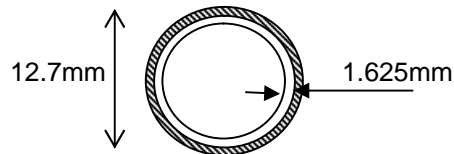
A= 223.00 mm²
 I= 14792 mm⁴
 Z= 1,051 mm³
 Se= 1,314 mm³
 rx= 8.15 mm

Diagonal




A= 96 mm²
 I= 1204 mm⁴
 S= 256 mm³
 ry= 3.53 mm

For HAZ section



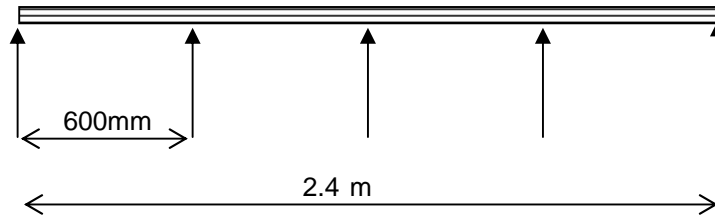
A= 40 mm²
 I= 319 mm⁴
 S= 91 mm³
 ry= 2.83 mm

CALCULATION SHEET	Project : Litedeck			
	Element : Ply			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Layout

The ply sheet deck is an exterior birch ply, 19mm thick
 It is supported on cross beams at approx 600mm centres

Service class of ply is class2



Properties

For exterior grade birch ply from BS5268

bending $\sigma_b = 7.4 \text{ N/mm}^2$

for service class 2 conditions and assuming medium term loading

$$\begin{aligned} \sigma_b &= K_{36} * 7.4 & K_{36} &= 1.33 \text{ table 33} \\ &= 1.33 * 7.4 \\ &= \mathbf{9.84 \text{ N/mm}^2} \end{aligned}$$

For exterior grade birch ply from BS5268

axial minimum $\sigma_a = 3.18 \text{ N/mm}^2$

for service class 2 conditions , ie high moisture content


$$\begin{aligned} \text{axial } \sigma_a &= K_{36} * 3.18 & K_{36} &= 1.33 \text{ table 33} \\ &= 1.33 * 3.18 \\ &= \mathbf{4.23 \text{ N/mm}^2} \end{aligned}$$

For exterior grade birch ply from BS5268

shear $\sigma_v = 0.61 \text{ N/mm}^2$

for service class 2 conditions , ie high moisture content

$$\begin{aligned} \sigma_a &= K_{36} * 0.61 & K_{36} &= 1.33 \text{ table 33} \\ &= 1.33 * 0.61 \\ &= \mathbf{0.81 \text{ N/mm}^2} \end{aligned}$$

CALCULATION SHEET	Project : Litedeck			
	Element : Ply			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Moment

for continuous beam over supports as shown above

$$\begin{aligned}
 M_{max} &= 0.107WL & W &= wL \\
 & & &= 5.12 \times 0.6 \\
 & & &= 3.07 \text{ kN} \\
 &= 0.107 \times 3.07 \times 0.6 \\
 &= 0.20 \text{ kNm}
 \end{aligned}$$

from BS5268 $Z = 57.7 \text{ cm}^3$ for 1m width

and from above

$$\sigma_b = 9.84 \text{ N/mm}^2$$

for 1m width

$$\begin{aligned}
 \text{so } M_r &= \sigma_b Z \\
 &= 9.84 \times 57.7 / 10^3 \\
 &= \mathbf{0.57 \text{ kNm}} \\
 &> \mathbf{0.20} & \text{ok}
 \end{aligned}$$

Axial - tension

from nominal load

$$\begin{aligned}
 P &= 5\% \text{ of } W \\
 &= 0.05 \times 3.07 \\
 &= 0.15 \text{ kN}
 \end{aligned}$$

from BS5268 $A = 18600 \text{ mm}^2$

and from above

$$\sigma_a = 4.23 \text{ N/mm}^2$$

$$\begin{aligned}
 P_t &= \sigma_a A \\
 &= 4.23 \times 18600 / 10^3 \\
 &= \mathbf{78.68 \text{ kN}} \\
 &> \mathbf{0.15} & \text{ok}
 \end{aligned}$$

Combined

$$\begin{aligned}
 P/P_t + M/M_r &= 0.15/78.7 + 0.2/0.57 \\
 &= \mathbf{0.35} \\
 &< \mathbf{1.00} & \text{ok}
 \end{aligned}$$

Shear

from nominal load


$$\begin{aligned}
 V &= W/2 \\
 &= 0.5 \times 3.07 \\
 &= 1.54 \text{ kN}
 \end{aligned}$$

from BS5268 $A = 18600 \text{ mm}^2$

and from above

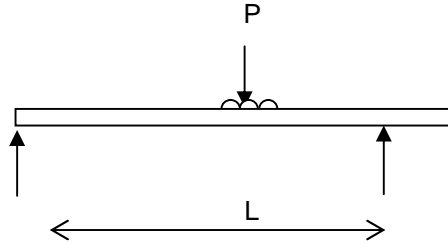
$$\sigma_v = 0.81 \text{ N/mm}^2$$

$$\begin{aligned}
 P_v &= \sigma_v A \\
 &= 0.81 \times 18600 / 10^3 \\
 &= \mathbf{15.07 \text{ kN}} \\
 &> \mathbf{1.54} & \text{ok}
 \end{aligned}$$

CALCULATION SHEET	Project : Litedeck			
	Element : Ply			
	Job Number : H0118	By : anw	Date: Sept 04	
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Point load

for design of point load in external span of continuous sheet



for live load

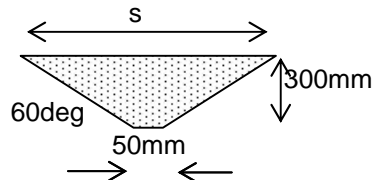
Point load P= 3.6 kN on 50 by 50 mm sq

from STRAP analysis of continuous beam external panel

M= 0.43 kNm

and for internal M= 0.36 kNm

width resisting this moment is based on 60° spread because of plies.



$$\begin{aligned} \text{so } s &= 50 + 2 \cdot 300 \tan 60 \\ &= 1.09 \text{ m} \end{aligned}$$

for 1m width as before Mr= **0.57 kNm**

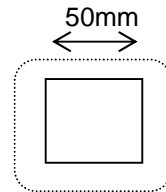
so for 1.09m width Mr= **0.62**

> **0.43** **ok**

check for punching

perimeter is

$$\begin{aligned} p &= 4 \cdot (1.5 \cdot 19 + 50 + 1.5 \cdot 19) \\ &= 428 \text{ mm} \end{aligned}$$




$$\begin{aligned} \text{so Area is } A_v &= p \cdot d \\ &= 428 \cdot 19 \\ &= 8,132 \text{ mm}^2 \end{aligned}$$

from before shear stress is

$$\sigma_v = 0.81 \text{ N/mm}^2$$

$$\begin{aligned} P_v &= \sigma_v \cdot A \\ &= 0.81 \cdot 8132 / 1E3 \\ &= \mathbf{6.59 \text{ kN}} \\ &> \mathbf{3.60} \quad \mathbf{ok} \end{aligned}$$

CALCULATION SHEET	Project : Litedeck			 ALAN WHITE DESIGN
	Element : Ply			
	Job Number : H0118	By : anw	Date: Sept 04	
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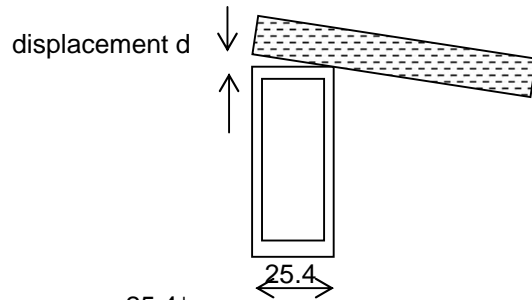
check for bearing

$$\begin{aligned}
\text{applied stress is } f &= W/A \\
&= 3.6E3/(50*50) \\
&= 1.44 \text{ N/mm}^2
\end{aligned}$$


$$\begin{aligned}
\text{bearing stress is } \sigma_{br} &= K_{36} * 2.67 && K_{36} = 1.33 \text{ table 33} \\
&= 1.33 * 2.67 \\
&= \mathbf{3.55 \text{ N/mm}^2} \\
&> \mathbf{1.44} && \mathbf{ok}
\end{aligned}$$

check for rotation at support and max displacement of 10mm from STRAP

$$\text{rotation at support is } \phi = 0.02400 \text{ radians}$$



$$\begin{aligned}
\text{displacement } d &= 25.4\phi \\
&= 25.4 * 0.024 \\
&= \mathbf{0.61 \text{ mm}} \\
&< \mathbf{10.00} && \mathbf{ok}
\end{aligned}$$

CALCULATION SHEET	Project : Litedeck			
	Element : Top Boom 25.4 by 50.8			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Results

From STRAP analysis

		5kN/m2 UDL	3.6kN point	3.6kN at end
Mmax	M=	0.22	0.27	0.37
with max compn	P=	22.91	22.05	
Max shear	V=	4.29	2.91	

Note : notional horiz force of 0.36kN to be added in either direction

Classification

4.3.1

$$\begin{aligned} \beta &= b/t \\ &= (25.4 - 2 \times 3.25) / 3.25 \\ &= 5.82 \\ \beta &= 0.35d/t \\ &= 0.35 \times (50.8 - 2 \times 3.25) / 3.25 \\ &= 4.77 \end{aligned}$$

$$\begin{aligned} \epsilon &= (250/p_0)^{0.5} \\ &= (250/255)^{0.5} \\ &= 0.99 \end{aligned}$$

$$\begin{aligned} \beta_1 &= 15\epsilon \\ &= 15 \times 0.99 \\ &= 14.85 \\ &> 5.82 \end{aligned}$$

for shear

$$\begin{aligned} d/t &= (50.8 - 2 \times 3.25) / 3.25 \\ &= 13.63 \\ &> 49\epsilon \end{aligned}$$


Section is compact

Bending capacity

4.5.2.2 and 4.5.6.8	M=	0.37 kNm	
	M _{rs} =	$p_o S_n / \gamma_m$	$p_o = 255 \text{ N/mm}^2$ $S_n = 7.114 \text{ cm}^3$ $\gamma_m = 1.2$
		$= 255 \times 7.11 / 1200$	
		1.51 kNm	
		> 0.37	ok

Shear

4.5.3.2 allowing for HAZ	V=	4.29 kN	
	V _{rs} =	$p_v A_v / \gamma_m$	$p_v = 155 \text{ N/mm}^2$ $A_v = N(0.8Dt - (1-k)dzt)$ $= 235 \text{ mm}^2$ $\gamma_m = 1.2$
		$= 155 \times 235 / 1200$	
		30.35 kN	
		> 4.29	ok

CALCULATION SHEET	Project : Litedeck			 ALAN WHITE DESIGN
	Element : Top Boom 25.4 by 50.8			
	Job Number : H0118	By : anw	Date: Sept 04	
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Lateral Torsional Buckling

allowing for softening

$$M = 0.37 \text{ kNm}$$

$$\begin{aligned}
M_{rs} &= p_o S_e / \gamma_m & p_o &= 255 \text{ N/mm}^2 \\
& & S_e &= 4.53 \text{ cm}^3 \\
& & \gamma_m &= 1.2 \\
&= 255 * 4.53 / 1200 \\
&= 0.96 \text{ kNm}
\end{aligned}$$

$$\begin{aligned}
\text{so } p_1 &= \gamma_m M_{rs} / S_n & \gamma_m &= 1.2 \\
& & S_n &= 7.114 \text{ cm}^3 \\
&= 1.2 * 0.96 \text{ E}3 / 7.114 \\
&= 161.93 \text{ N/mm}^2
\end{aligned}$$

for slenderness


$$\begin{aligned}
L_e &= 0.85L \\
&= 0.85 * 600 \\
&= 510 \text{ mm} \\
r_y &= 10 \text{ mm}
\end{aligned}$$

$$\begin{aligned}
\text{so } \lambda &= L_e / r_y \\
&= 510 / 10 \\
&= 51.00
\end{aligned}$$

table 4.9

$$p_s = 142 \text{ N/mm}^2$$

$$\begin{aligned}
\text{so } M_{rx} &= p_s S_n / \gamma_m & p_s &= 142 \text{ N/mm}^2 \\
& & S_n &= 7.11 \text{ cm}^3 \\
& & \gamma_m &= 1.2 \\
&= 142 * 7.11 / 1200 \\
&= \mathbf{0.84 \text{ kNm}} \\
&> \mathbf{0.37} & & \mathbf{ok}
\end{aligned}$$

CALCULATION SHEET	Project : Litedeck			
	Element : Top Boom 25.4 by 50.8			
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Compression

Result from analysis gives max as

$$P = 22.91 \text{ kN}$$

adding to this the notional horizontal force of 5% of applied load that is 0.36kN applied parallel to frame and factored by 1.33 for live load

$$\begin{aligned} \text{then } P &= 22.91 + 0.36 * 1.33 \\ &= \mathbf{23.39 \text{ kN}} \end{aligned}$$

$$4.7 \quad Pr = psA / \gamma_m$$

for 0.6m bracing

$$\begin{aligned} L &= 600.00 \text{ m} \\ r &= 10 \text{ mm} \\ \lambda &= KL/r & K &= 0.7 \\ &= 0.7 * 600 / 10 \\ &= 42.00 \end{aligned}$$

$$\begin{aligned} p_1 &= p_0 * A_e / A & p_0 &= 255 \text{ N/mm}^2 \\ & & A_e &= 388 \text{ mm}^2 \\ & & A &= 453 \text{ mm}^2 \\ &= 255 * 388 / 453 \\ &= 218.41 \text{ N/mm}^2 \end{aligned}$$

Fig 4.10b gives

$$\begin{aligned} ps &= 160.00 \text{ N/mm}^2 & A &= 453 \text{ mm}^2 \\ & & \gamma_m &= 1.2 \\ Pr &= 160 * 453 / 1200 \\ &= \mathbf{60.40 \text{ kN}} \\ &> \mathbf{23.39} & & \mathbf{ok} \end{aligned}$$


Combined

check for worst moment and axial combination

$$\begin{aligned} \text{general check } P/Pr + M/M_r &= 23.39 / 60.4 + 0.27 / 1.51 \\ &= \mathbf{0.57} \\ &< \mathbf{1.00} & & \mathbf{ok} \end{aligned}$$

buckling

$$\begin{aligned} P/Pr + M/M_x + PM / (2PrM_x) &= 23.39 / 60.4 + 0.27 / 0.84 + 23.39 * 0.27 / (2 * 60.4 * 0.84) \\ &= \mathbf{0.77} \\ &< \mathbf{1} & & \mathbf{ok} \end{aligned}$$

CALCULATION SHEET	Project : Litedeck			
	Element : Top Boom 25.4 by 50.8			
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Minor axis bending


If notional force was applied in other direction

$$\begin{aligned} \text{then } M &= \gamma WL/8 & \gamma &= 1.33 \text{ FOS} \\ & & W &= 0.36 \text{ kN} \\ & & L &= 0.6 \text{ m} \\ &= 1.33 * 0.36 * 0.6 / 8 \\ &= \mathbf{0.04 \text{ kNm}} \end{aligned}$$

$$\begin{aligned} M_{ry} &= \frac{p_o Z_y}{\gamma_m} & p_o &= 255 \text{ N/mm}^2 \\ & & Z_y &= 1.75 \text{ cm}^3 \\ & & \gamma_m &= 1.2 \\ &= 255 * 1.75 / 1200 \\ &= \mathbf{0.37 \text{ kNm}} \\ &> \mathbf{0.04} & & \mathbf{ok} \end{aligned}$$

check for biaxial bending

$$\begin{aligned} P/P_r + M/M_r + M_y/M_{ry} &= 22.91/60.4 + 0.27/1.51 + 0.04/0.37 \\ &= \mathbf{0.67} \\ &< \mathbf{1.00} & & \mathbf{ok} \end{aligned}$$

CALCULATION SHEET	Project : Litedeck			
	Element : Bottom boom 25.4 by 25.4			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Results

	From STRAP analysis		
		5kN/m2 UDL	3.6kN point
Mmax	M=	0.10	0.07
with max tension	P=	22.91	22.05
Max shear	V=	3.89	2.50

Classification

4.3.1

$$\beta = b/t$$

$$= (25.4 - 2 \times 3.25) / 3.25$$

$$= 5.82$$

$$\beta = 0.35d/t$$

$$= 0.35 \times (25.4 - 2 \times 3.25) / 3.25$$

$$= 2.04$$

$$\epsilon = (250/p_0)^{0.5}$$

$$= (250/255)^{0.5}$$

$$= 0.99$$

$$\beta_1 = 15\epsilon$$

$$= 15 \times 0.99$$

$$= 14.85$$

$$> 5.82$$

for shear

$$d/t = (25.4 - 2 \times 3.25) / 3.25$$

$$= 13.63$$

$$> 49\epsilon$$

Section is compact

Bending capacity

4.5.2.2 and 4.5.6.8

$$M = 0.10 \text{ kNm}$$

$$M_{rs} = p_0 S_n / \gamma_m$$

$$= 255 \times 2.41 / 1200$$

$$= 0.51 \text{ kNm}$$

$$> 0.10 \quad \text{ok}$$

$p_0 = 255 \text{ N/mm}^2$
 $S_n = 2.41 \text{ cm}^3$
 $\gamma_m = 1.2$

Shear

4.5.3.2 allowing for HAZ

$$V = 3.89 \text{ kN}$$


$$V_{rs} = p_v A_v / \gamma_m$$

$$= 155 \times 103 / 1200$$

$$= 13.30 \text{ kN}$$

$$> 3.89 \quad \text{ok}$$

$p_v = 155 \text{ N/mm}^2$
 $A_v = N(0.8Dt - (1-k)dzt)$
 $= 103 \text{ mm}^2$
 $\gamma_m = 1.2$

CALCULATION SHEET	Project : Liteck			
	Element : Bottom boom 25.4 by 25.4			
	Job Number : H0118	By : anw	Date: Sept 04	
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Lateral Torsional Buckling

allowing for softening

$$M = 0.10 \text{ kNm}$$

$$M_{rs} = \frac{p_o S_e}{\gamma_m} \quad \begin{matrix} p_o = 255 \text{ N/mm}^2 \\ S_e = 1.31 \text{ cm}^3 \\ \gamma_m = 1.2 \end{matrix}$$

$$= \frac{255 \times 1.31}{1200}$$

$$= 0.28 \text{ kNm}$$

$$\text{so } p_1 = \frac{\gamma_m M_{rs}}{S_n} \quad \begin{matrix} \gamma_m = 1.2 \\ S_n = 2.41 \text{ cm}^3 \end{matrix}$$

$$= \frac{1.2 \times 0.28 \text{ E}3}{2.41}$$

$$= 139.42 \text{ N/mm}^2$$

for slenderness

$$L_e = 0.85L$$

$$= 0.85 \times 600$$

$$= 510 \text{ mm}$$

$$r_y = 9 \text{ mm}$$

$$\text{so } \lambda = \frac{L_e}{r_y}$$

$$= \frac{510}{9}$$

$$= 56.67$$

table 4.9

$$p_s = 122 \text{ N/mm}^2$$

$$\text{so } M_{rx} = \frac{p_s S_n}{\gamma_m} \quad \begin{matrix} p_s = 122 \text{ N/mm}^2 \\ S_n = 2.41 \text{ cm}^3 \\ \gamma_m = 1.2 \end{matrix}$$

$$= \frac{122 \times 2.41}{1200}$$

$$= 0.25 \text{ kNm}$$

$$> 0.10 \quad \text{ok}$$

Tension

4.6
for General Tension

$$T = 22.91 \text{ kN}$$

$$P_{rs} = \frac{p_o A}{\gamma_m} \quad \begin{matrix} p_o = 255 \text{ N/mm}^2 \\ A = 288 \text{ mm}^2 \\ \gamma_m = 1.2 \end{matrix}$$

$$= \frac{255 \times 288}{1200}$$

$$= 61.20 \text{ kN}$$


For local

$$P_{rs} = \frac{p_a A_n}{\gamma_m} \quad \begin{matrix} p_a = 280 \text{ N/mm}^2 \\ A_n = 223 \text{ mm}^2 \\ \gamma_m = 1.2 \end{matrix}$$

$$= \frac{280 \times 223}{1200}$$

$$= 52.03 \text{ kN}$$


$$> 22.91 \quad \text{ok}$$

CALCULATION SHEET	Project : Litedeck			 ALAN WHITE DESIGN
	Element : Bottom boom 25.4 by 25.4			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Combined

general check $P/Pr+M/Mr= 22.91/52.03+0.1/0.51$
 $=$ **0.64**
 $<$ **1.00** **ok**

buckling $P/Pr+M/Mx+PM/(2PrMx)= 22.91/52+0.1/0.25+22.91*0.1/(2*52*0.25)$
 $=$ **0.93**
 $<$ **1** **ok**

CALCULATION SHEET	Project : Litedeck			
	Element : Diagonal capacities			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Results

From STRAP analysis

		5kN/m2 UDL	3.6kN point	
max tension	T=	5.74	4.11	kN
max compression	P=	6.32	4.27	kN

Classification

4.3.1

$$\begin{aligned} \beta &= 3*((D/t)^{0.5}) \\ &= 3*(((12.7-3.25)/3.25)^{0.5}) \\ &= 5.12 \end{aligned}$$

$$\begin{aligned} \epsilon &= (250/p_0)^{0.5} \\ &= (250/255)^{0.5} \\ &= 0.99 \end{aligned}$$

$$\begin{aligned} \beta_1 &= 15\epsilon \\ &= 15*0.99 \\ &= 14.85 \\ &> 5.12 \end{aligned}$$

Section is compact

Tension


4.6 T= **5.74 kN**

for General Tension only (no local holes)

$$\begin{aligned} Prs &= p_0 A / \gamma_m && p_0 = 255 \text{N/mm}^2 \\ &&& A = 96 \text{mm}^2 \\ &&& \gamma_m = 1.2 \\ &= 255 * 96 / 1200 \\ &= \mathbf{20.40 \text{ kN}} \end{aligned}$$

for local softening

$$\begin{aligned} Prs &= p_a A_e / \gamma_m && p_a = 280 \text{N/mm}^2 \\ &&& A_e = 40 \text{mm}^2 \\ &&& \gamma_m = 1.2 \\ &= 280 * 40 / 1200 \\ &= \mathbf{9.33 \text{ kN}} \\ &> \mathbf{5.73} && \text{ok} \end{aligned}$$

CALCULATION SHEET	Project : Litedeck			
	Element : Diagonal capacities			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Compression

P= **6.32 kN**

4.7

Pr= psA/γm

L= 0.17 m

r= 3.53 mm

λ= KL/r K= 1

= 170/3.53

= 48.16

4.7.6.5

As strut is only welded at ends HAZ may be ignored

p1= 255.00 N/mm2

Fig 4.10b gives

ps= 143.00 N/mm2

A= 96mm2
γm= 1.2

Pr= 143*96/1200
= **11.44 kN**

for local squashing

Prs= paAe/γm

pa= 280N/mm2
Ae= 40mm2
γm= 1.2

= 280*40/1200

= **9.33 kN**

> **6.32** **ok**

Welds

T=

Each diagonal is welded to a box with 3mm fillet

BS8118

PRF= 0.85p_w·l_e·g_t/1.414γ_m

p_w= 190N/mm2

l_e= 1.414πd approx

= 56mm

g_t= 0.7*3 throat


= 2.1mm

γ_m= 1.3

= 0.85*190*56*2.1/(1.414*1300)

= **10.33 kN**

> **5.74** **ok**

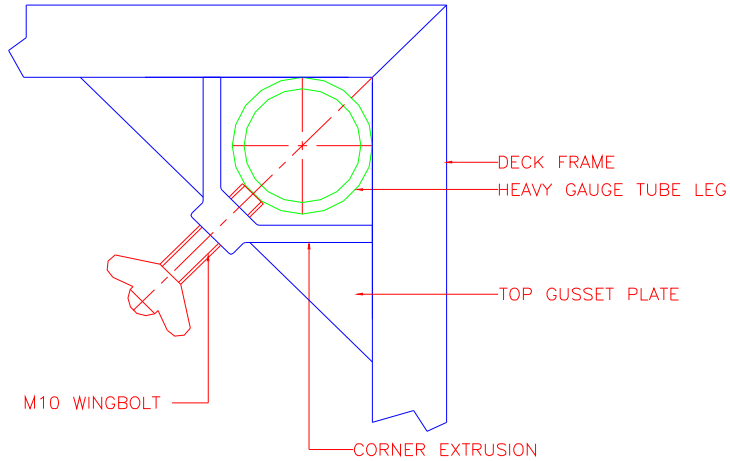
CALCULATION SHEET	Project : Liteck			
	Element : Support			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	

Result

From STRAP analysis
5kN/m2 UDL 3.6kN point
Max support load R= **4.94** 2.55 kN

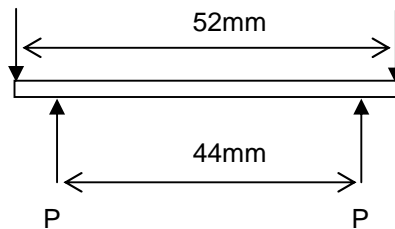
Support

Load is transferred to leg through extrusion and welded corner gusset plate



Bending in top plate

assuming conservatively load transferred from mid edge of tube
6mm thick plate




$$\begin{aligned} \text{take } P &= R/2 \\ &= 4.94/2 \\ &= \mathbf{2.47 \text{ kN}} \end{aligned}$$

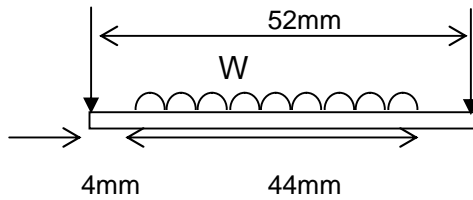
$$\begin{aligned} \text{so } M &= P \cdot (0.052 - 0.044) / 2 \\ &= 2.47 \cdot (0.052 - 0.044) / 2 \\ &= \mathbf{0.01 \text{ kNm}} \end{aligned}$$

$$\begin{aligned} Z &= bd^2/6 && b = 52\text{mm} \\ &= 52 \cdot 6^2 / 6 && d = 6\text{mm plate} \\ &= 312.00 \text{ mm}^3 \end{aligned}$$

$$\begin{aligned} \text{and } M_{rs} &= \frac{p \cdot Z}{\gamma_m} && \gamma_m = 1.2 \\ &= 255 \cdot 312 / 1.2 \cdot 10^6 \\ &= \mathbf{0.07 \text{ kNm}} \\ &> \mathbf{0.01} && \mathbf{ok} \end{aligned}$$

alternatively consider load transferred as udl

CALCULATION SHEET	Project : Litedeck			
	Element : Support			
	Job Number : H0118	By : anw	Date: Sept 04	
	Document No : 001	Checked :	Date:	



$$W = 4.94 \text{ kN}$$

$$\begin{aligned}
 \text{so moment } M &= 0.5W \cdot 0.026 - 0.25W \cdot 0.022 \\
 &= 0.5 \cdot 4.94 \cdot 0.026 - 0.25 \cdot 4.94 \cdot 0.022 \\
 &= \mathbf{0.04 \text{ kNm}} \\
 &< \mathbf{0.07} \quad \text{ok}
 \end{aligned}$$

Weld

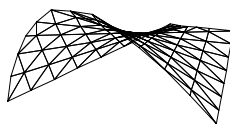
4mm welds plate to extrusion and box

$$\begin{aligned}
 \text{weld length is } L_w &= 4 \cdot 52 - 8 \text{ allowing for ends} \\
 &= 200.00 \text{ mm}
 \end{aligned}$$

$$\begin{aligned}
 \text{BS8118} \quad \text{PRF} &= 0.85 p_w \cdot l_e \cdot g_t / 1.414 \gamma_m \\
 p_w &= 190 \text{ N/mm}^2 \\
 l_e &= 200 \text{ mm} \\
 g_t &= 0.7 \cdot 4 \text{ throat} \\
 &= 2.8 \text{ mm} \\
 \gamma_m &= 1.3 \\
 &= 0.85 \cdot 190 \cdot 200 \cdot 2.8 / (1.414 \cdot 1300) \\
 &= \mathbf{49.20 \text{ kN}} \\
 &> \mathbf{4.94} \quad \text{ok}
 \end{aligned}$$

STRAP

STRUCTURAL ANALYSIS PROGRAMS



GTS CADBUILD LIMITED
Woodbrook House
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Loughborough LE11 1NH
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Alan White Design
Woodside House, 20/21 Woodside Place
Glasgow G3 7QF

Strap 9.00.00

litedeck frame 5kN/m2

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NODAL COORDINATE TABLE (units - meter)

NODE	X1	X2	X3
1	0.158	-0.013	0.000
2	0.036	0.109	0.000
3	0.320	0.109	0.000
4	0.198	-0.013	0.000
5	0.456	-0.013	0.000
6	0.334	0.109	0.000
7	0.617	0.109	0.000
8	0.495	-0.013	0.000
9	0.753	-0.013	0.000
10	0.631	0.109	0.000
11	0.915	0.109	0.000
12	0.793	-0.013	0.000
13	1.051	-0.013	0.000
14	0.929	0.109	0.000
15	1.212	0.109	0.000
16	1.090	-0.013	0.000
17	2.280	-0.013	0.000
18	2.402	0.109	0.000
19	1.983	-0.013	0.000
20	2.105	0.109	0.000
21	2.119	0.109	0.000
22	2.241	-0.013	0.000
23	1.685	-0.013	0.000
24	1.807	0.109	0.000
25	1.821	0.109	0.000
26	1.943	-0.013	0.000
27	1.524	0.109	0.000
28	1.646	-0.013	0.000
29	1.388	-0.013	0.000
30	1.510	0.109	0.000
31	1.226	0.109	0.000
32	1.348	-0.013	0.000
33	0.000	0.109	0.000
34	2.438	0.109	0.000
35	0.000	-0.013	0.000
36	2.438	-0.013	0.000

litedeck frame 5kN/m2

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NODAL RESTRAINED DOF TABLE

NODE	X1	X2	X3	X4	X5	X6
33	1	1	1	1	1	0
34	0	1	1	1	1	0

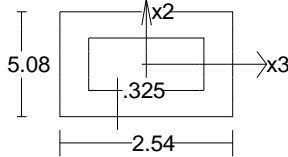
MATERIAL TABLE (units - kN meter)

NO.	Name	Modulus of Elasticity	Poisson ratio	Density	Thermal coefficient	Shear modulus
1	ALUM	0.7000E+08	0.300	0.2700E+02	0.00002300	0.2692E+08

SECTION PROPERTY TABLE (units - cm.)

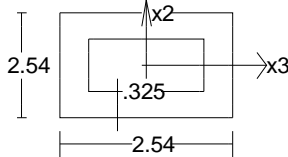
PROPERTY NO. 1

A=0.4530E+01 I2=0.4445E+01 I3=0.1406E+02 J=0.1034E+02 SF2=0.440
 Material = 1 - ALUM Perimeter=15.240 SF3=0.440
 h2=2.540 h3=5.080 e2=1.270 e3=2.540



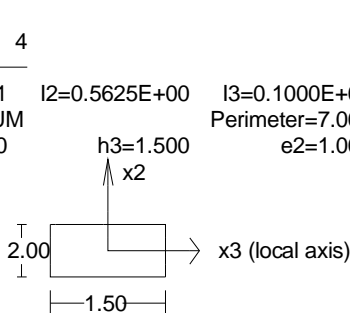
PROPERTY NO. 2

A=0.2880E+01 I2=0.2405E+01 I3=0.2405E+01 J=0.3532E+01 SF2=0.440
 Material = 1 - ALUM Perimeter=10.160 SF3=0.440
 h2=2.540 h3=2.540 e2=1.270 e3=1.270



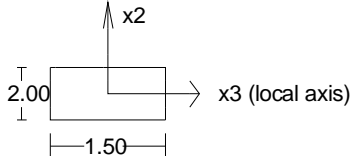
PROPERTY NO. 3

A=0.9649E+00 I2=0.1204E+00 I3=0.1204E+00 J=0.2409E+00 SF2=0.530
 Material = 1 - ALUM Perimeter=3.990 SF3=0.530
 h2=1.270 h3=1.270 e2=0.635 e3=0.635
 PIPE , Diameter= 1.270 Thickness= 0.325



PROPERTY NO. 4

A=0.3000E+01 I2=0.5625E+00 I3=0.1000E+01 J=0.1215E+01 SF2=0.850
 Material = 1 - ALUM Perimeter=7.000 SF3=0.850
 h2=2.000 h3=1.500 e2=1.000 e3=0.750



litedeck frame 5kN/m2

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BEAM CONNECTIVITY TABLE

Beam No.	JA	JB	JC/ Beta	Release AJ mvmv	Length no.	prop no.	mat no.	Beam x2 direction cosines	offs. no.
1	1	2	0	y y	0.172	3	1	-0.707 -0.707	0.000
2	3	4	0	y y	0.172	3	1	0.707 -0.707	0.000
3	5	6	0	y y	0.172	3	1	-0.707 -0.707	0.000
4	7	8	0	y y	0.172	3	1	0.707 -0.707	0.000
5	9	10	0	y y	0.172	3	1	-0.707 -0.707	0.000
6	11	12	0	y y	0.172	3	1	0.707 -0.707	0.000
7	13	14	0	y y	0.172	3	1	-0.707 -0.707	0.000
8	15	16	0	y y	0.172	3	1	0.707 -0.707	0.000
9	17	18	0	y y	0.172	3	1	-0.707 0.707	0.000
10	19	20	0	y y	0.172	3	1	-0.707 0.707	0.000
11	21	22	0	y y	0.172	3	1	0.707 0.707	0.000
12	23	24	0	y y	0.172	3	1	-0.707 0.707	0.000
13	25	26	0	y y	0.172	3	1	0.707 0.707	0.000
14	27	28	0	y y	0.172	3	1	0.707 0.707	0.000
15	29	30	0	y y	0.172	3	1	-0.707 0.707	0.000
16	31	32	0	y y	0.172	3	1	0.707 0.707	0.000
17	33	2	0		0.036	1	1	0.000 1.000	0.000
18	2	3	0		0.283	1	1	0.000 1.000	0.000
19	3	6	0		0.014	1	1	0.000 1.000	0.000
20	6	7	0		0.283	1	1	0.000 1.000	0.000
21	7	10	0		0.014	1	1	0.000 1.000	0.000
22	10	11	0		0.283	1	1	0.000 1.000	0.000
23	11	14	0		0.014	1	1	0.000 1.000	0.000
24	14	15	0		0.283	1	1	0.000 1.000	0.000
25	15	31	0		0.014	1	1	0.000 1.000	0.000
26	31	30	0		0.283	1	1	0.000 1.000	0.000
27	30	27	0		0.014	1	1	0.000 1.000	0.000
28	27	24	0		0.283	1	1	0.000 1.000	0.000
29	24	25	0		0.014	1	1	0.000 1.000	0.000
30	25	20	0		0.283	1	1	0.000 1.000	0.000
31	20	21	0		0.014	1	1	0.000 1.000	0.000
32	21	18	0		0.283	1	1	0.000 1.000	0.000
33	18	34	0		0.036	1	1	0.000 1.000	0.000
34	35	1	0		0.158	2	1	0.000 1.000	0.000
35	1	4	0		0.040	2	1	0.000 1.000	0.000
36	4	5	0		0.258	2	1	0.000 1.000	0.000
37	5	8	0		0.040	2	1	0.000 1.000	0.000
38	8	9	0		0.258	2	1	0.000 1.000	0.000
39	9	12	0		0.040	2	1	0.000 1.000	0.000
40	12	13	0		0.258	2	1	0.000 1.000	0.000
41	13	16	0		0.039	2	1	0.000 1.000	0.000
42	16	32	0		0.258	2	1	0.000 1.000	0.000
43	32	29	0		0.039	2	1	0.000 1.000	0.000
44	29	28	0		0.258	2	1	0.000 1.000	0.000
45	28	23	0		0.040	2	1	0.000 1.000	0.000
46	23	26	0		0.258	2	1	0.000 1.000	0.000
47	26	19	0		0.040	2	1	0.000 1.000	0.000
48	19	22	0		0.258	2	1	0.000 1.000	0.000
49	22	17	0		0.040	2	1	0.000 1.000	0.000
50	17	36	0		0.158	2	1	0.000 1.000	0.000
51	35	33	0		0.122	4	1	-1.000 0.000	0.000
52	36	34	0		0.122	4	1	-1.000 0.000	0.000

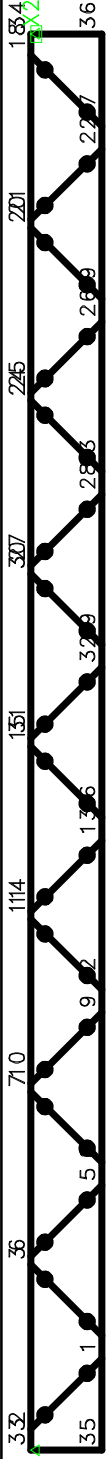
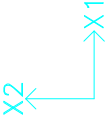
TOTAL BEAMS WEIGHT OF PROPERTY NO. 1= 0.030
 TOTAL BEAMS WEIGHT OF PROPERTY NO. 2= 0.019
 TOTAL BEAMS WEIGHT = 0.058

litedeck frame 5kN/m²

nodes

SCALE = 1:13

DATE:30/ 9/04

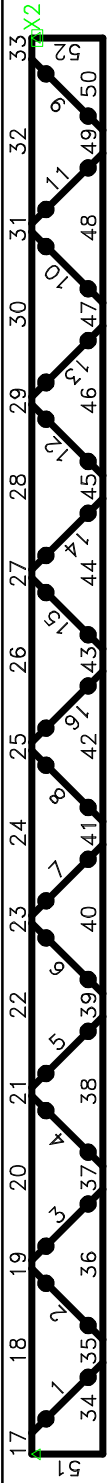


litedeck frame 5kN/m2

nodes

SCALE = 1:13

DATE:30/ 9/04



litedeck frame 5kN/m2

Prepared by: anw

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Load no. 1: dead (units - kN meter)

/ BEAM LOADS
SELF X2 -1. B 1 TO 50
/ JOINT LOADS
/ BEAM LOADS
SELF X2 -1. B 51 52
/ BEAM LOADS
CONC FX2 -0.05 FR 0.5 B 21 TO 29 BY 4
/ JOINT LOADS
FX2 -0.025 N 33 34
/ END

FORCE SUMMATION

FX1=0.
FX2=-0.2579
FX3=0.

Load no. 2: applied 5kN (units - kN meter)

/ BEAM LOADS
/ JOINT LOADS
/ BEAM LOADS
/ JOINT LOADS
/ BEAM LOADS
CONC FX2 -1.8 FR 0.5 B 21 TO 29 BY 4
/ JOINT LOADS
FX2 -0.9 N 33 34
/ END

FORCE SUMMATION

FX1=0.
FX2=-7.2
FX3=0.

Load no. 3: point load (units - kN meter)

/ BEAM LOADS
CONC FX2 -3.6 FR 0.5 B 25
/ END

FORCE SUMMATION

FX1=0.
FX2=-3.6
FX3=0.

litedeck frame 5kN/m2

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Load no. 4: Point load at end (units - kN meter)

/ BEAM LOADS

CONC FX2 -3.6 FR 0.5 B 18

/ END STATIC

FORCE SUMMATION

FX1=0.

FX2=-3.6

FX3=0.

litedeck frame 5kN/m2

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COMBINATIONS TABLE

Comb.

BS8118 comb 5kN UDL
1 1 * 1.20 + 2 * 1.33
BS8118 comb 3.6kN Point load
2 1 * 1.20 + 3 * 1.33
BS8118 comb 3.6kN at end
3 1 * 1.20 + 4 * 1.33

litedeck frame 5kN/m2

Prepared by: anw

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Date: 30/ 9/04

STATIC DEFLECTIONS for combination 1 (Units: meter)
BS8118 comb 5kN UDL

Node	X1	X2	X6
1	-0.00143	-0.00219	-0.0163864
2	0.00000	-0.00056	-0.0147366
3	-0.00004	-0.00449	-0.0133175
4	-0.00142	-0.00289	-0.0160193
5	-0.00130	-0.00615	-0.0134337
6	-0.00005	-0.00469	-0.0132395
7	-0.00017	-0.00802	-0.0098825
8	-0.00127	-0.00673	-0.0131995
9	-0.00105	-0.00914	-0.0079797
10	-0.00018	-0.00817	-0.0096354
11	-0.00035	-0.01022	-0.0052567
12	-0.00101	-0.00947	-0.0075371
13	-0.00075	-0.01074	-0.0036563
14	-0.00036	-0.01029	-0.0050749
15	-0.00055	-0.01109	-0.0001516
16	-0.00070	-0.01089	-0.0031494
17	0.00031	-0.00219	0.0163864
18	-0.00111	-0.00056	0.0147366
19	0.00018	-0.00615	0.0134337
20	-0.00107	-0.00469	0.0132395
21	-0.00107	-0.00449	0.0133175
22	0.00030	-0.00289	0.0160193
23	-0.00006	-0.00914	0.0079797
24	-0.00094	-0.00817	0.0096354
25	-0.00095	-0.00802	0.0098825
26	0.00016	-0.00673	0.0131995
27	-0.00077	-0.01022	0.0052567
28	-0.00010	-0.00947	0.0075371
29	-0.00037	-0.01074	0.0036563
30	-0.00076	-0.01029	0.0050749
31	-0.00056	-0.01109	0.0001516
32	-0.00041	-0.01089	0.0031494
33	0.00000	0.00000	-0.0147507
34	-0.00111	0.00000	0.0147507
35	-0.00143	0.00000	-0.0119142
36	0.00032	0.00000	0.0119142
MAX.	-0.00143	-0.01109	-0.0163864
NODE	35	15	1

litedeck frame 5kN/m2

Prepared by: anw

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BEAM RESULTS for combination 1 (Units: kN, kN*meter)
BS8118 comb 5kN UDL

BEAM RESULTS for combination 1 (Units: kN, kN*meter)
BS8118 comb 5kN UDL

Bm.	Node	Axial	V2	M3	Bm.	Node	Axial	V2	M3	
1	1	-5.743	0.000	0.000	18	2	4.885	-0.174	-0.074	
	fr=0.50		0.000	0.000		3	-4.885	0.179	0.024	
	2	5.743	0.000	0.000		19	3	9.357	4.293	-0.024
2	3	6.324	0.000	0.000	6		-9.357	-4.293	0.085	
	fr=0.50		0.000	0.000	20		6	13.423	0.226	-0.085
	4	-6.324	0.000	0.000		7	-13.423	-0.222	0.148	
3	5	-5.750	0.000	0.000	21	7	17.246	4.045	-0.148	
	fr=0.50		0.000	0.000		10	-17.246	-1.591	0.188	
	6	5.751	0.000	0.000	22	10	19.089	-0.252	-0.188	
4	7	5.406	0.000	0.000		11	-19.089	0.256	0.116	
	fr=0.50		0.000	0.000		23	11	20.760	1.415	-0.116
	8	-5.407	0.000	0.000	14		-20.760	-1.414	0.136	
5	9	-2.606	0.000	0.000	24	14	21.925	0.249	-0.136	
	fr=0.50		0.000	0.000		15	-21.925	-0.244	0.206	
	10	2.606	0.000	0.000	25	15	22.908	1.227	-0.206	
6	11	2.363	0.000	0.000		fr=0.50		1.227	-0.215	
	fr=0.50		0.000	0.000		31	-22.908	1.227	0.206	
	12	-2.363	0.000	0.000	26	31	21.925	-0.244	-0.206	
7	13	-1.648	0.000	0.000		30	-21.925	0.249	0.136	
	fr=0.50		0.000	0.000		27	30	20.760	-1.414	-0.136
	14	1.648	0.000	0.000	27		-20.760	1.415	0.116	
8	15	1.390	0.000	0.000	28	27	19.089	0.256	-0.116	
	fr=0.50		0.000	0.000		24	-19.089	-0.252	0.188	
	16	-1.390	0.000	0.000	29	24	17.246	-1.591	-0.188	
9	17	-5.743	0.000	0.000		25	-17.246	4.045	0.148	
	fr=0.50		0.000	0.000		30	25	13.423	-0.222	-0.148
	18	5.743	0.000	0.000	20		-13.423	0.226	0.085	
10	19	-5.750	0.000	0.000	31	20	9.357	-4.293	-0.085	
	fr=0.50		0.000	0.000		21	-9.357	4.293	0.024	
	20	5.751	0.000	0.000		32	21	4.885	0.179	-0.024
11	21	6.324	0.000	0.000	18		-4.885	-0.174	0.074	
	fr=0.50		0.000	0.000	33		18	0.824	-3.887	-0.074
	22	-6.324	0.000	0.000		34	-0.824	3.887	-0.067	
12	23	-2.605	0.000	0.000	34	35	-0.824	-0.173	0.034	
	fr=0.50		0.000	0.000		1	0.824	0.174	-0.061	
	24	2.606	0.000	0.000	35	1	-4.885	3.886	0.061	
13	25	5.406	0.000	0.000		4	4.885	-3.886	0.093	
	fr=0.50		0.000	0.000		36	4	-9.357	-0.586	-0.093
	26	-5.407	0.000	0.000	5		9.357	0.588	-0.059	
14	27	2.363	0.000	0.000	37	5	-13.423	3.478	0.059	
	fr=0.50		0.000	0.000		8	13.423	-3.477	0.079	
	28	-2.363	0.000	0.000	38	8	-17.246	-0.346	-0.079	
15	29	-1.648	0.000	0.000		9	17.246	0.348	-0.011	
	fr=0.50		0.000	0.000		39	9	-19.089	1.494	0.011
	30	1.648	0.000	0.000	12		19.089	-1.493	0.048	
16	31	1.390	0.000	0.000						
	fr=0.50		0.000	0.000						
	32	-1.390	0.000	0.000						
17	33	0.824	3.887	0.067						
	2	-0.824	-3.887	0.074						

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**BEAM RESULTS for combination 1 (Units: kN, kN*meter)
 BS8118 comb 5kN UDL**

Bm.	Node	Axial	V2	M3
40	12	-20.760	-0.178	-0.048
	13	20.760	0.180	0.002
41	13	-21.925	0.985	-0.002
	16	21.925	-0.985	0.041
42	16	-22.908	0.001	-0.041
	fr=0.35		0.000	-0.041
	32	22.908	0.001	0.041
43	32	-21.925	-0.984	-0.041
	29	21.925	0.985	0.002
44	29	-20.760	0.180	-0.002
	28	20.760	-0.178	0.048
45	28	-19.089	-1.493	-0.048
	23	19.089	1.494	-0.011
46	23	-17.246	0.348	0.011
	26	17.246	-0.346	0.079
47	26	-13.423	-3.477	-0.079
	19	13.423	3.478	-0.059
48	19	-9.357	0.588	0.059
	22	9.357	-0.586	0.093
49	22	-4.885	-3.886	-0.093
	17	4.885	3.886	-0.061
50	17	-0.824	0.174	0.061
	36	0.824	-0.173	-0.034
51	35	0.173	-0.824	-0.034
	33	-0.171	0.824	-0.067
52	36	0.173	0.824	0.034
	34	-0.171	-0.824	0.067
MAXIMUM		22.908	4.293	-0.215
Beam no.		42	31	25

litedeck frame 5kN/m2

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REACTIONS for combination 1 (Units: kN, kN*meter)
BS8118 comb 5kN UDL

Node	X1	X2	X6
33	0.000	4.943	0.000
34	0.000	4.943	0.000
SUM	0.000	9.886	0.000

STATIC DEFLECTIONS for combination 2 (Units: meter)
BS8118 comb 3.6kN Point load

Node	X1	X2	X6
1	-0.00114	-0.00171	-0.0125402
2	0.00000	-0.00043	-0.0114377
3	-0.00003	-0.00351	-0.0104319
4	-0.00114	-0.00225	-0.0122930
5	-0.00106	-0.00483	-0.0106244
6	-0.00003	-0.00366	-0.0103745
7	-0.00012	-0.00635	-0.0086171
8	-0.00104	-0.00528	-0.0104169
9	-0.00088	-0.00739	-0.0084125
10	-0.00012	-0.00648	-0.0085006
11	-0.00025	-0.00849	-0.0057960
12	-0.00085	-0.00775	-0.0080133
13	-0.00063	-0.00907	-0.0046589
14	-0.00026	-0.00858	-0.0056427
15	-0.00044	-0.00952	-0.0001886
16	-0.00059	-0.00927	-0.0042703
17	0.00025	-0.00171	0.0125402
18	-0.00089	-0.00043	0.0114377
19	0.00016	-0.00483	0.0106244
20	-0.00086	-0.00366	0.0103745
21	-0.00086	-0.00351	0.0104319
22	0.00024	-0.00225	0.0122930
23	-0.00001	-0.00739	0.0084125
24	-0.00077	-0.00648	0.0085006
25	-0.00078	-0.00635	0.0086171
26	0.00015	-0.00528	0.0104169
27	-0.00064	-0.00849	0.0057960
28	-0.00004	-0.00775	0.0080133
29	-0.00027	-0.00907	0.0046589
30	-0.00063	-0.00858	0.0056427
31	-0.00045	-0.00952	0.0001886
32	-0.00030	-0.00927	0.0042703
33	0.00000	0.00000	-0.0114467
34	-0.00089	0.00000	0.0114467
35	-0.00115	0.00000	-0.0095178
36	0.00025	0.00000	0.0095178
MAX. NODE	-0.00115 35	-0.00952 15	-0.0125402 1

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BEAM RESULTS for combination 2 (Units: kN, kN*meter)
BS8118 comb 3.6kN Point load

BEAM RESULTS for combination 2 (Units: kN, kN*meter)
BS8118 comb 3.6kN Point load

Bm.	Node	Axial	V2	M3	Bm.	Node	Axial	V2	M3
1	1	-3.872	0.000	0.000	18	2	3.298	-0.106	-0.050
	fr=0.50	0.000	0.000	0.000		3	-3.298	0.110	0.020
	2	3.872	0.000	0.000	19	3	6.316	2.909	-0.020
2	3	4.269	0.000	0.000		6	-6.316	-2.908	0.061
	fr=0.50	0.000	0.000	0.000	20	6	9.220	0.005	-0.061
3	4	-4.270	0.000	0.000		fr=0.95	0.001	-0.061	0.061
	5	-4.106	0.000	0.000	7	-9.220	-0.001	0.061	
fr=0.50	0.000	0.000	0.000	21	7	12.071	2.852	-0.061	
6	4.106	0.000	0.000		10	-12.071	-2.792	0.101	
4	7	4.033	0.000	0.000	22	10	14.912	-0.049	-0.101
	fr=0.50	0.000	0.000	0.000		11	-14.912	0.054	0.087
5	8	-4.033	0.000	0.000	23	11	17.743	2.776	-0.087
	9	-4.017	0.000	0.000		14	-17.743	-2.776	0.126
fr=0.50	0.000	0.000	0.000	24	14	20.069	0.450	-0.126	
10	4.018	0.000	0.000		15	-20.069	-0.445	0.253	
6	11	4.002	0.000	0.000	25	15	22.048	2.424	-0.253
	fr=0.50	0.000	0.000	0.000		fr=0.50	2.424	-0.270	0.253
7	12	-4.003	0.000	0.000	31	-22.048	2.424	0.253	
	13	-3.290	0.000	0.000	26	31	20.069	-0.445	-0.253
fr=0.50	0.000	0.000	0.000	30		-20.069	0.450	0.126	
8	14	3.290	0.000	0.000	27	30	17.743	-2.776	-0.126
	15	2.798	0.000	0.000		27	-17.743	2.776	0.087
fr=0.50	0.000	0.000	0.000	28	27	14.912	0.054	-0.087	
16	-2.799	0.000	0.000		24	-14.912	-0.049	0.101	
9	17	-3.872	0.000	0.000	29	24	12.072	-2.792	-0.101
	fr=0.50	0.000	0.000	0.000		25	-12.072	2.852	0.061
10	18	3.872	0.000	0.000	30	25	9.220	-0.001	-0.061
	19	-4.106	0.000	0.000		20	-9.220	0.005	0.061
fr=0.50	0.000	0.000	0.000	31	20	6.316	-2.908	-0.061	
20	4.106	0.000	0.000		21	-6.316	2.909	0.020	
11	21	4.269	0.000	0.000	32	21	3.298	0.110	-0.020
	fr=0.50	0.000	0.000	0.000		18	-3.298	-0.106	0.050
12	22	-4.270	0.000	0.000	33	18	0.560	-2.632	-0.050
	23	-4.017	0.000	0.000		34	-0.560	2.633	-0.045
fr=0.50	0.000	0.000	0.000	34	35	-0.560	-0.115	0.023	
24	4.018	0.000	0.000		1	0.560	0.117	-0.041	
13	25	4.033	0.000	0.000	35	1	-3.298	2.621	0.041
	fr=0.50	0.000	0.000	0.000		4	3.298	-2.621	0.062
14	26	-4.033	0.000	0.000	36	4	-6.316	-0.399	-0.062
	27	4.002	0.000	0.000		5	6.316	0.401	-0.041
fr=0.50	0.000	0.000	0.000	37	5	-9.220	2.502	0.041	
28	-4.003	0.000	0.000		8	9.220	-2.502	0.058	
15	29	-3.290	0.000	0.000	38	8	-12.071	-0.350	-0.058
	fr=0.50	0.000	0.000	0.000		9	12.071	0.353	-0.032
16	30	3.290	0.000	0.000	39	9	-14.912	2.488	0.032
	31	2.798	0.000	0.000		12	14.912	-2.488	0.066
fr=0.50	0.000	0.000	0.000						
17	32	-2.799	0.000	0.000					
	33	0.560	2.633	0.045					
2	-0.560	-2.632	0.050						

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**BEAM RESULTS for combination 2 (Units: kN, kN*meter)
 BS8118 comb 3.6kN Point load**

Bm.	Node	Axial	V2	M3
40	12	-17.743	-0.343	-0.066
	13	17.743	0.345	-0.023
41	13	-20.069	1.981	0.023
	16	20.069	-1.980	0.056
42	16	-22.048	0.001	-0.056
	fr=0.35		0.000	-0.056
	32	22.048	0.001	0.056
43	32	-20.069	-1.980	-0.056
	29	20.069	1.981	-0.023
44	29	-17.743	0.345	0.023
	28	17.743	-0.343	0.066
45	28	-14.912	-2.488	-0.066
	23	14.912	2.488	-0.032
46	23	-12.071	0.353	0.032
	26	12.071	-0.350	0.058
47	26	-9.220	-2.502	-0.058
	19	9.220	2.502	-0.041
48	19	-6.316	0.401	0.041
	22	6.316	-0.399	0.062
49	22	-3.298	-2.621	-0.062
	17	3.298	2.621	-0.041
50	17	-0.560	0.117	0.041
	36	0.560	-0.115	-0.023
51	35	0.115	-0.560	-0.023
	33	-0.114	0.560	-0.045
52	36	0.115	0.560	0.023
	34	-0.114	-0.560	0.045
MAXIMUM		22.048	2.909	-0.270
Beam no.		42	31	25

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REACTIONS for combination 2 (Units: kN, kN*meter)
BS8118 comb 3.6kN Point load

Node	X1	X2	X6
33	0.000	2.549	0.000
34	0.000	2.549	0.000
SUM	0.000	5.098	0.000

STATIC DEFLECTIONS for combination 3 (Units: meter)
BS8118 comb 3.6kN at end

Node	X1	X2	X6
1	-0.00039	-0.00082	-0.0068643
2	0.00000	-0.00031	-0.0077155
3	-0.00003	-0.00161	-0.0018718
4	-0.00039	-0.00112	-0.0064978
5	-0.00031	-0.00190	-0.0010998
6	-0.00004	-0.00164	-0.0018741
7	-0.00009	-0.00212	-0.0012937
8	-0.00030	-0.00194	-0.0011151
9	-0.00023	-0.00226	-0.0007598
10	-0.00009	-0.00214	-0.0012372
11	-0.00014	-0.00234	-0.0002228
12	-0.00022	-0.00228	-0.0005924
13	-0.00016	-0.00234	0.0003436
14	-0.00014	-0.00234	-0.0001781
15	-0.00018	-0.00228	0.0006725
16	-0.00015	-0.00232	0.0004488
17	0.00000	-0.00038	0.0027431
18	-0.00026	-0.00010	0.0025382
19	-0.00001	-0.00108	0.0023754
20	-0.00025	-0.00082	0.0023370
21	-0.00025	-0.00078	0.0023477
22	0.00000	-0.00050	0.0026975
23	-0.00004	-0.00168	0.0019082
24	-0.00024	-0.00146	0.0019695
25	-0.00024	-0.00143	0.0019925
26	-0.00002	-0.00118	0.0023398
27	-0.00021	-0.00194	0.0014395
28	-0.00005	-0.00176	0.0018398
29	-0.00009	-0.00211	0.0012780
30	-0.00021	-0.00196	0.0014101
31	-0.00018	-0.00227	0.0007125
32	-0.00010	-0.00216	0.0011863
33	0.00000	0.00000	-0.0076665
34	-0.00026	0.00000	0.0025400
35	-0.00040	0.00000	-0.0032844
36	0.00000	0.00000	0.0021791
MAX.	-0.00040	-0.00234	-0.0077155
NODE	35	13	2

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BEAM RESULTS for combination 3 (Units: kN, kN*meter)
BS8118 comb 3.6kN at end

BEAM RESULTS for combination 3 (Units: kN, kN*meter)
BS8118 comb 3.6kN at end

Bm.	Node	Axial	V2	M3	Bm.	Node	Axial	V2	M3
1	1	-3.299	0.000	0.000	18	2	3.471	2.151	-0.068
	fr=0.50	0.000	0.000	0.000		3	-3.471	2.641	-0.001
2	2	3.299	0.000	0.000	19	3	6.095	-0.017	0.001
	fr=0.50	0.000	0.000	0.000		6	-6.095	0.017	-0.002
3	3	3.711	0.000	0.000	20	6	5.922	0.156	0.002
	fr=0.50	0.000	0.000	0.000		7	-5.922	-0.152	0.042
4	4	-3.711	0.000	0.000	21	7	5.445	-0.326	-0.042
	fr=0.50	0.000	0.000	0.000		10	-5.445	0.386	0.037
5	5	0.245	0.000	0.000	22	10	5.068	-0.010	-0.037
	fr=0.50	0.000	0.000	0.000		11	-5.068	0.014	0.033
6	6	-0.245	0.000	0.000	23	11	4.734	-0.348	-0.033
	fr=0.50	0.000	0.000	0.000		14	-4.734	0.348	0.028
7	7	-0.675	0.000	0.000	24	14	4.377	0.009	-0.028
	fr=0.50	0.000	0.000	0.000		15	-4.377	-0.005	0.030
8	8	0.674	0.000	0.000	25	15	4.002	-0.371	-0.030
	fr=0.50	0.000	0.000	0.000		31	-4.002	0.431	0.025
9	9	0.532	0.000	0.000	26	31	3.573	-0.002	-0.025
	fr=0.50	0.000	0.000	0.000		30	-3.573	0.006	0.024
10	10	-0.532	0.000	0.000	27	30	3.136	-0.443	-0.024
	fr=0.50	0.000	0.000	0.000		27	-3.136	0.443	0.017
11	11	-0.472	0.000	0.000	28	27	2.683	0.010	-0.017
	fr=0.50	0.000	0.000	0.000		24	-2.683	-0.005	0.019
12	12	0.472	0.000	0.000	29	24	2.222	-0.456	-0.019
	fr=0.50	0.000	0.000	0.000		25	-2.222	0.516	0.013
13	13	0.506	0.000	0.000	30	25	1.708	-0.002	-0.013
	fr=0.50	0.000	0.000	0.000		20	-1.708	0.007	0.011
14	14	-0.505	0.000	0.000	31	20	1.177	-0.538	-0.011
	fr=0.50	0.000	0.000	0.000		21	-1.177	0.538	0.004
15	15	-0.531	0.000	0.000	32	21	0.616	0.022	-0.004
	fr=0.50	0.000	0.000	0.000		18	-0.616	-0.018	0.009
16	16	0.530	0.000	0.000	33	18	0.105	-0.493	-0.009
	fr=0.50	0.000	0.000	0.000		34	-0.105	0.494	-0.008
17	17	-0.723	0.000	0.000	34	35	-1.138	0.077	0.044
	fr=0.50	0.000	0.000	0.000		1	1.138	-0.076	-0.032
18	18	0.723	0.000	0.000	35	1	-3.471	2.408	0.032
	fr=0.50	0.000	0.000	0.000		4	3.471	-2.408	0.063
19	19	-0.751	0.000	0.000	36	4	-6.095	-0.216	-0.063
	fr=0.50	0.000	0.000	0.000		5	6.095	0.219	0.007
20	20	0.751	0.000	0.000	37	5	-5.922	-0.392	-0.007
	fr=0.50	0.000	0.000	0.000		8	5.922	0.393	-0.008
21	21	0.793	0.000	0.000	38	8	-5.445	0.084	0.008
	fr=0.50	0.000	0.000	0.000		9	5.445	-0.082	0.013
22	22	-0.793	0.000	0.000	39	9	-5.068	-0.295	-0.013
	fr=0.50	0.000	0.000	0.000		12	5.068	0.295	0.001
23	23	-0.652	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
24	24	0.652	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
25	25	0.727	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
26	26	-0.727	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
27	27	0.641	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
28	28	-0.641	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
29	29	-0.617	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
30	30	0.618	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
31	31	0.607	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
32	32	-0.607	0.000	0.000					
	fr=0.50	0.000	0.000	0.000					
33	33	1.138	4.485	0.095					
	2	-1.138	-4.485	0.068					

litedeck frame 5kN/m2

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**BEAM RESULTS for combination 3 (Units: kN, kN*meter)
 BS8118 comb 3.6kN at end**

<i>Bm.</i>	<i>Node</i>	<i>Axial</i>	<i>V2</i>	<i>M3</i>
40	12	-4.735	0.038	-0.001
	13	4.735	-0.036	0.011
41	13	-4.377	-0.322	-0.011
	16	4.377	0.322	-0.002
42	16	-4.002	0.053	0.002
	32	4.002	-0.050	0.011
43	32	-3.573	-0.379	-0.011
	29	3.573	0.379	-0.004
44	29	-3.136	0.057	0.004
	28	3.136	-0.055	0.011
45	28	-2.683	-0.399	-0.011
	23	2.683	0.399	-0.005
46	23	-2.222	0.061	0.005
	26	2.222	-0.059	0.011
47	26	-1.708	-0.455	-0.011
	19	1.708	0.456	-0.008
48	19	-1.177	0.075	0.008
	22	1.177	-0.073	0.012
49	22	-0.616	-0.488	-0.012
	17	0.616	0.489	-0.008
50	17	-0.105	0.022	0.008
	36	0.105	-0.021	-0.004
51	35	-0.077	-1.138	-0.044
	33	0.078	1.138	-0.095
52	36	0.021	0.105	0.004
	34	-0.020	-0.105	0.008
MAXIMUM		-6.095	4.485	-0.373
Beam no.		19	17	18

litedeck frame 5kN/m2

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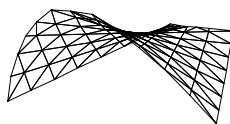
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REACTIONS for combination 3 (Units: kN, kN*meter)
BS8118 comb 3.6kN at end

<i>Node</i>	<i>X1</i>	<i>X2</i>	<i>X6</i>
33	0.000	4.593	0.000
34	0.000	0.504	0.000
SUM	0.000	5.098	0.000

STRAP

STRUCTURAL ANALYSIS PROGRAMS



GTS CADBUILD LIMITED
 Woodbrook House
 30 Bridge Street
 Loughborough LE11 1NH
 Tel:(0)1509 260559
 Fax:(0)1509 269221

Alan White Design
 Woodside House, 20/21 Woodside Place
 Glasgow G3 7QF

Strap 9.00.00

litedeck end frame 5kN/m2

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NODAL COORDINATE TABLE (units - meter)

NODE	X1	X2	X3
1	0.158	-0.013	0.000
2	0.036	0.109	0.000
3	0.320	0.109	0.000
4	0.198	-0.013	0.000
5	0.456	-0.013	0.000
6	0.334	0.109	0.000
7	0.617	0.109	0.000
8	0.495	-0.013	0.000
9	0.753	-0.013	0.000
10	0.631	0.109	0.000
11	0.915	0.109	0.000
12	0.793	-0.013	0.000
13	1.051	-0.013	0.000
14	0.929	0.109	0.000
15	1.212	0.109	0.000
16	1.090	-0.013	0.000
31	1.226	0.109	0.000
32	1.226	-0.013	0.000
33	0.000	0.109	0.000
35	0.000	-0.013	0.000

NODAL RESTRAINED DOF TABLE

NODE	X1	X2	X3	X4	X5	X6
31	0	1	1	1	1	0
33	1	1	1	1	1	0

MATERIAL TABLE (units - kN meter)

NO.	Name	Modulus of Elasticity	Poisson ratio	Density	Thermal coefficient	Shear modulus
1	ALUM	0.7000E+08	0.300	0.2700E+02	0.00002300	0.2692E+08

litedeck end frame 5kN/m2

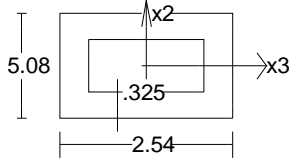
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SECTION PROPERTY TABLE (units - cm.)

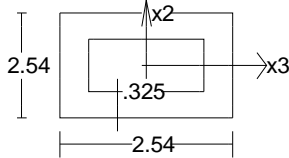
PROPERTY NO. 1

A=0.4530E+01 I2=0.4445E+01 I3=0.1406E+02 J=0.1034E+02 SF2=0.440
 Material = 1 - ALUM Perimeter=15.240 SF3=0.440
 h2=2.540 h3=5.080 e2=1.270 e3=2.540



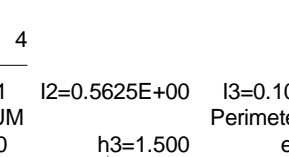
PROPERTY NO. 2

A=0.2880E+01 I2=0.2405E+01 I3=0.2405E+01 J=0.3532E+01 SF2=0.440
 Material = 1 - ALUM Perimeter=10.160 SF3=0.440
 h2=2.540 h3=2.540 e2=1.270 e3=1.270



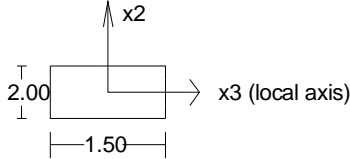
PROPERTY NO. 3

A=0.9649E+00 I2=0.1204E+00 I3=0.1204E+00 J=0.2409E+00 SF2=0.530
 Material = 1 - ALUM Perimeter=3.990 SF3=0.530
 h2=1.270 h3=1.270 e2=0.635 e3=0.635
 PIPE, Diameter= 1.270 Thickness= 0.325



PROPERTY NO. 4

A=0.3000E+01 I2=0.5625E+00 I3=0.1000E+01 J=0.1215E+01 SF2=0.850
 Material = 1 - ALUM Perimeter=7.000 SF3=0.850
 h2=2.000 h3=1.500 e2=1.000 e3=0.750



litedeck end frame 5kN/m2

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BEAM CONNECTIVITY TABLE

Beam No.	JA	JB	JC/ Beta	Release AJ mvmv	Length no.	prop no.	mat no.	Beam x2 direction cosines	offs. no.
1	1	2	0	y y	0.172	3	1	-0.707 -0.707	0.000
2	3	4	0	y y	0.172	3	1	0.707 -0.707	0.000
3	5	6	0	y y	0.172	3	1	-0.707 -0.707	0.000
4	7	8	0	y y	0.172	3	1	0.707 -0.707	0.000
5	9	10	0	y y	0.172	3	1	-0.707 -0.707	0.000
6	11	12	0	y y	0.172	3	1	0.707 -0.707	0.000
7	13	14	0	y y	0.172	3	1	-0.707 -0.707	0.000
8	15	16	0	y y	0.172	3	1	0.707 -0.707	0.000
17	33	2	0		0.036	1	1	0.000 1.000	0.000
18	2	3	0		0.283	1	1	0.000 1.000	0.000
19	3	6	0		0.014	1	1	0.000 1.000	0.000
20	6	7	0		0.283	1	1	0.000 1.000	0.000
21	7	10	0		0.014	1	1	0.000 1.000	0.000
22	10	11	0		0.283	1	1	0.000 1.000	0.000
23	11	14	0		0.014	1	1	0.000 1.000	0.000
24	14	15	0		0.283	1	1	0.000 1.000	0.000
25	15	31	0		0.014	1	1	0.000 1.000	0.000
34	35	1	0		0.158	2	1	0.000 1.000	0.000
35	1	4	0		0.040	2	1	0.000 1.000	0.000
36	4	5	0		0.258	2	1	0.000 1.000	0.000
37	5	8	0		0.040	2	1	0.000 1.000	0.000
38	8	9	0		0.258	2	1	0.000 1.000	0.000
39	9	12	0		0.040	2	1	0.000 1.000	0.000
40	12	13	0		0.258	2	1	0.000 1.000	0.000
41	13	16	0		0.039	2	1	0.000 1.000	0.000
42	16	32	0		0.136	2	1	0.000 1.000	0.000
51	35	33	0		0.122	4	1	-1.000 0.000	0.000
52	32	31	0		0.122	1	1	-1.000 0.000	0.000

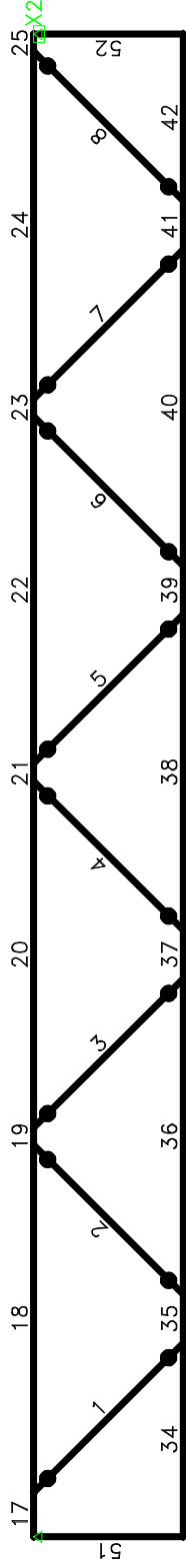
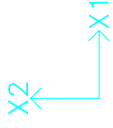
TOTAL BEAMS WEIGHT OF PROPERTY NO. 1= 0.016
 TOTAL BEAMS WEIGHT = 0.031

litedeck end frame 5kN/m²

beams

SCALE = 1:6.1

DATE:30/ 9/04

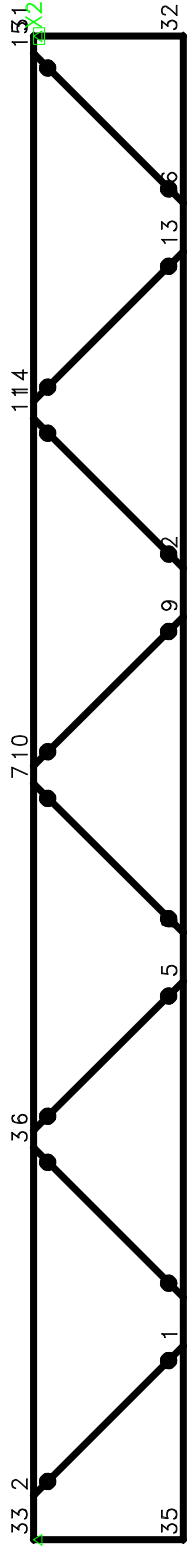
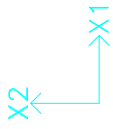


litedeck end frame 5kN/m²

nodes

SCALE = 1:6.1

DATE:30/ 9/04



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Load no. 1: dead (units - kN meter)

/ BEAM LOADS
SELF X2 -1. B 1 TO 50
/ JOINT LOADS
/ BEAM LOADS
SELF X2 -1. B 51 52
/ BEAM LOADS
/ JOINT LOADS
/ BEAM LOADS
/ JOINT LOADS
FX2 -0.025 N 34
/ END

FORCE SUMMATION

FX1=0.
FX2=-0.0306
FX3=0.

Load no. 2: applied 5kN (units - kN meter)

/ BEAM LOADS
/ JOINT LOADS
/ BEAM LOADS
/ JOINT LOADS
/ BEAM LOADS
/ JOINT LOADS
/ BEAM LOADS
CONC FX2 -1.8 FR 0.5 B 29
/ JOINT LOADS
FX2 -0.9 N 34
/ BEAM LOADS
DIST FX2 -1.54 B 17 TO 25
/ END

FORCE SUMMATION

FX1=0.
FX2=-1.8885
FX3=0.

Load no. 3: point load (units - kN meter)

/ BEAM LOADS
/ BEAM LOADS
CONC FX2 -3.6 XP 0.0071 B 21
/ END

FORCE SUMMATION

FX1=0.
FX2=-3.6
FX3=0.

litedeck end frame 5kN/m2

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Load no. 4: Point load at end (units - kN meter)

/ BEAM LOADS

CONC FX2 -3.6 FR 0.5 B 18

/ END STATIC

FORCE SUMMATION

FX1=0.

FX2=-3.6

FX3=0.

litedeck end frame 5kN/m2

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COMBINATIONS TABLE

Comb.

BS8118 comb 5kN UDL
1 1 * 1.20 + 2 * 1.33
BS8118 comb 3.6kN Point load
2 1 * 1.20 + 3 * 1.33
BS8118 comb 3.6kN at end
3 1 * 1.20 + 4 * 1.33

litedeck end frame 5kN/m2

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STATIC DEFLECTIONS for combination 1 (Units: meter)
BS8118 comb 5kN UDL

Node	X1	X2	X6
1	-0.00009	-0.00021	-0.0019598
2	0.00000	-0.00007	-0.0017205
3	-0.00001	-0.00042	-0.0008656
4	-0.00008	-0.00030	-0.0018662
5	-0.00005	-0.00050	-0.0004796
6	-0.00001	-0.00044	-0.0008469
7	-0.00004	-0.00055	0.0000652
8	-0.00005	-0.00052	-0.0004629
9	-0.00001	-0.00050	0.0006828
10	-0.00004	-0.00055	0.0000904
11	-0.00006	-0.00039	0.0010420
12	-0.00001	-0.00047	0.0007216
13	0.00002	-0.00024	0.0016635
14	-0.00006	-0.00037	0.0010650
15	-0.00007	-0.00002	0.0011800
16	0.00003	-0.00016	0.0016984
31	-0.00007	0.00000	0.0011227
32	0.00003	0.00000	0.0008585
33	0.00000	0.00000	-0.0017246
35	-0.00009	0.00000	-0.0007518
MAX. NODE	-0.00009 35	-0.00055 7	-0.0019598 1

BEAM RESULTS for combination 1 (Units: kN, kN*meter)
BS8118 comb 5kN UDL

Bm.	Node	Axial	V2	M3
1	1	-1.396	0.000	0.000
	fr=0.50		0.000	0.000
	2	1.396	0.000	0.000
2	3	1.507	0.000	0.000
	fr=0.50		0.000	0.000
	4	-1.507	0.000	0.000
3	5	-0.560	0.000	0.000
	fr=0.50		0.000	0.000
	6	0.561	0.000	0.000
4	7	0.391	0.000	0.000
	fr=0.50		0.000	0.000
	8	-0.391	0.000	0.000
5	9	0.497	0.000	0.000
	fr=0.50		0.000	0.000
	10	-0.497	0.000	0.000
6	11	-0.614	0.000	0.000
	fr=0.50		0.000	0.000
	12	0.613	0.000	0.000
7	13	1.259	0.000	0.000
	fr=0.50		0.000	0.000
	14	-1.258	0.000	0.000
8	15	-1.222	0.000	0.000
	fr=0.50		0.000	0.000
	16	1.221	0.000	0.000

BEAM RESULTS for combination 1 (Units: kN, kN*meter)
BS8118 comb 5kN UDL

Bm.	Node	Axial	V2	M3
17	33	0.268	1.299	0.022
	2	-0.268	-1.224	0.024
18	2	1.255	0.237	-0.024
	fr=0.40		0.003	-0.037
	3	-1.255	0.348	0.008
19	3	2.321	0.718	-0.008
	6	-2.321	-0.688	0.018
20	6	2.717	0.292	-0.018
	fr=0.50		0.000	-0.039
	7	-2.717	0.293	0.018
21	7	2.994	-0.016	-0.018
	10	-2.994	0.046	0.017
22	10	2.643	0.306	-0.017
	fr=0.50		0.013	-0.040
	11	-2.643	0.279	0.021
23	11	2.209	-0.713	-0.021
	14	-2.209	0.743	0.011
24	14	1.319	0.147	-0.011
	fr=0.25		0.001	-0.016
	15	-1.319	0.437	-0.030
25	15	0.455	-1.301	0.030
	31	-0.455	1.331	-0.049

litedeck end frame 5kN/m2

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**BEAM RESULTS for combination 1 (Units: kN, kN*meter)
 BS8118 comb 5kN UDL**

<i>Bm.</i>	<i>Node</i>	<i>Axial</i>	<i>V2</i>	<i>M3</i>
34	35	-0.268	-0.026	0.011
	1	0.268	0.028	-0.015
35	1	-1.255	0.959	0.015
	4	1.255	-0.959	0.023
36	4	-2.321	-0.107	-0.023
	5	2.321	0.110	-0.005
37	5	-2.717	0.287	0.005
	8	2.717	-0.286	0.006
38	8	-2.994	0.009	-0.006
	9	2.994	-0.007	0.008
39	9	-2.643	-0.345	-0.008
	12	2.643	0.345	-0.005
40	12	-2.209	0.089	0.005
	13	2.209	-0.086	0.017
41	13	-1.319	-0.804	-0.017
	16	1.319	0.804	-0.014
42	16	-0.455	0.059	0.014
	32	0.455	-0.058	-0.006
51	35	0.026	-0.268	-0.011
	33	-0.025	0.268	-0.022
52	32	0.058	0.455	0.006
	31	-0.056	-0.455	0.049
MAXIMUM		-2.994	1.331	0.049
Beam no.		21	25	52

litedeck end frame 5kN/m2

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REACTIONS for combination 1 (Units: kN, kN*meter)
BS8118 comb 5kN UDL

Node	X1	X2	X6
31	0.000	1.275	0.000
33	0.000	1.274	0.000
SUM	0.000	2.548	0.000

STATIC DEFLECTIONS for combination 2 (Units: meter)
BS8118 comb 3.6kN Point load

Node	X1	X2	X6
1	-0.00026	-0.00055	-0.0050947
2	0.00000	-0.00016	-0.0040149
3	-0.00003	-0.00115	-0.0031959
4	-0.00025	-0.00078	-0.0048586
5	-0.00017	-0.00146	-0.0030341
6	-0.00003	-0.00120	-0.0031553
7	-0.00011	-0.00176	0.0000305
8	-0.00016	-0.00161	-0.0029862
9	-0.00003	-0.00157	0.0034306
10	-0.00011	-0.00175	0.0002908
11	-0.00018	-0.00110	0.0035552
12	-0.00001	-0.00140	0.0035202
13	0.00006	-0.00067	0.0045102
14	-0.00019	-0.00105	0.0036041
15	-0.00021	-0.00005	0.0030131
16	0.00007	-0.00045	0.0046390
31	-0.00021	0.00000	0.0029063
32	0.00008	0.00000	0.0024355
33	0.00000	0.00000	-0.0040248
35	-0.00026	0.00000	-0.0022316
MAX. NODE	-0.00026 35	-0.00176 7	-0.0050947 1

litedeck end frame 5kN/m2

Prepared by: anw

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**BEAM RESULTS for combination 2 (Units: kN, kN*meter)
 BS8118 comb 3.6kN Point load**

**BEAM RESULTS for combination 2 (Units: kN, kN*meter)
 BS8118 comb 3.6kN Point load**

Bm.	Node	Axial	V2	M3	Bm.	Node	Axial	V2	M3
1	1	-3.695	0.000	0.000	36	4	-6.002	-0.368	-0.060
	fr=0.50		0.000	0.000		5	6.002	0.371	-0.036
	2	3.695	0.000	0.000	37	5	-8.284	1.911	0.036
2	3	4.054	0.000	0.000		8	8.284	-1.910	0.040
	fr=0.50		0.000	0.000	38	8	-10.178	0.017	-0.040
	4	-4.054	0.000	0.000		9	10.178	-0.014	0.044
3	5	-3.226	0.000	0.000	39	9	-8.143	-2.021	-0.044
	fr=0.50		0.000	0.000		12	8.143	2.021	-0.036
	6	3.227	0.000	0.000	40	12	-5.790	0.332	0.036
4	7	2.677	0.000	0.000		13	5.790	-0.329	0.049
	fr=0.50		0.000	0.000	41	13	-3.258	-2.204	-0.049
	8	-2.678	0.000	0.000		16	3.258	2.204	-0.038
5	9	2.877	0.000	0.000	42	16	-0.894	0.159	0.038
	fr=0.50		0.000	0.000		32	0.894	-0.158	-0.017
	10	-2.877	0.000	0.000	51	35	0.112	-0.523	-0.022
6	11	-3.327	0.000	0.000		33	-0.111	0.523	-0.042
	fr=0.50		0.000	0.000	52	32	0.158	0.894	0.017
	12	3.327	0.000	0.000		31	-0.156	-0.894	0.093
7	13	3.582	0.000	0.000	MAXIMUM		-10.178	2.776	-0.190
	fr=0.50		0.000	0.000	Beam no.	21	23	21	
	14	-3.582	0.000	0.000					
8	15	-3.342	0.000	0.000					
	fr=0.50		0.000	0.000					
	16	3.342	0.000	0.000					
17	33	0.523	2.480	0.042					
	2	-0.523	-2.479	0.048					
18	2	3.136	-0.134	-0.048					
	3	-3.136	0.138	0.009					
19	3	6.002	2.728	-0.009					
	6	-6.002	-2.728	0.048					
20	6	8.284	0.446	-0.048					
	7	-8.284	-0.442	0.173					
21	7	10.178	2.335	-0.173					
	fr=0.50		-2.453	-0.190					
	10	-10.178	2.453	0.173					
22	10	8.143	-0.419	-0.173					
	11	-8.143	0.423	0.054					
23	11	5.790	-2.776	-0.054					
	14	-5.790	2.776	0.014					
24	14	3.258	-0.244	-0.014					
	15	-3.258	0.248	-0.055					
25	15	0.894	-2.611	0.055					
	31	-0.894	2.612	-0.093					
34	35	-0.523	-0.112	0.022					
	1	0.523	0.114	-0.039					
35	1	-3.136	2.499	0.039					
	4	3.136	-2.499	0.060					

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REACTIONS for combination 2 (Units: kN, kN*meter)
BS8118 comb 3.6kN Point load

Node	X1	X2	X6
31	0.000	2.456	0.000
33	0.000	2.369	0.000
SUM	0.000	4.825	0.000

STATIC DEFLECTIONS for combination 3 (Units: meter)
BS8118 comb 3.6kN at end

Node	X1	X2	X6
1	-0.00013	-0.00044	-0.0041489
2	0.00000	-0.00022	-0.0051992
3	-0.00003	-0.00083	0.0004659
4	-0.00013	-0.00063	-0.0038270
5	-0.00006	-0.00082	0.0012693
6	-0.00003	-0.00082	0.0004534
7	-0.00007	-0.00070	0.0007024
8	-0.00005	-0.00076	0.0012174
9	-0.00001	-0.00058	0.0011733
10	-0.00007	-0.00068	0.0007364
11	-0.00009	-0.00040	0.0012590
12	-0.00001	-0.00053	0.0012738
13	0.00001	-0.00024	0.0015820
14	-0.00009	-0.00038	0.0012773
15	-0.00010	-0.00002	0.0011447
16	0.00002	-0.00017	0.0016100
31	-0.00010	0.00000	0.0011132
32	0.00002	0.00000	0.0009733
33	0.00000	0.00000	-0.0051485
35	-0.00014	0.00000	-0.0011128
MAX. NODE	-0.00014 35	-0.00083 3	-0.0051992 2

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**BEAM RESULTS for combination 3 (Units: kN, kN*meter)
 BS8118 comb 3.6kN at end**

**BEAM RESULTS for combination 3 (Units: kN, kN*meter)
 BS8118 comb 3.6kN at end**

Bm.	Node	Axial	V2	M3	Bm.	Node	Axial	V2	M3
1	1	-2.602	0.000	0.000	36	4	-4.958	-0.145	-0.052
	fr=0.50		0.000	0.000		5	4.958	0.147	0.014
	2	2.602	0.000	0.000	37	5	-4.266	-0.839	-0.014
2	3	2.942	0.000	0.000		8	4.266	0.840	-0.019
	fr=0.50		0.000	0.000	38	8	-3.281	0.145	0.019
	4	-2.942	0.000	0.000		9	3.281	-0.142	0.018
3	5	0.979	0.000	0.000	39	9	-2.439	-0.701	-0.018
	fr=0.50		0.000	0.000		12	2.439	0.701	-0.010
	6	-0.978	0.000	0.000	40	12	-1.647	0.091	0.010
4	7	-1.392	0.000	0.000		13	1.647	-0.088	0.014
	fr=0.50		0.000	0.000	41	13	-0.934	-0.624	-0.014
	8	1.392	0.000	0.000		16	0.934	0.625	-0.011
5	9	1.192	0.000	0.000	42	16	-0.261	0.048	0.011
	fr=0.50		0.000	0.000		32	0.261	-0.047	-0.005
	10	-1.191	0.000	0.000	51	35	-0.098	-1.037	-0.040
6	11	-1.120	0.000	0.000		33	0.099	1.037	-0.086
	fr=0.50		0.000	0.000	52	32	0.047	0.261	0.005
	12	1.120	0.000	0.000		31	-0.045	-0.261	0.027
7	13	1.008	0.000	0.000	MAXIMUM		-4.958	4.012	-0.366
	fr=0.50		0.000	0.000	Beam no.	19	17	18	
	14	-1.007	0.000	0.000					
8	15	-0.952	0.000	0.000					
	fr=0.50		0.000	0.000					
	16	0.952	0.000	0.000					
17	33	1.037	4.012	0.086					
	2	-1.037	-4.012	0.059					
18	2	2.877	2.171	-0.059					
	fr=0.50		-2.619	-0.366					
	3	-2.877	2.621	-0.005					
19	3	4.958	-0.541	0.005					
	6	-4.958	0.541	-0.013					
20	6	4.266	0.151	0.013					
	7	-4.266	-0.147	0.030					
21	7	3.281	-0.838	-0.030					
	10	-3.281	0.838	0.018					
22	10	2.439	0.004	-0.018					
	fr=0.95		0.000	-0.018					
	11	-2.439	0.000	0.018					
23	11	1.647	-0.793	-0.018					
	14	-1.647	0.793	0.007					
24	14	0.934	-0.081	-0.007					
	15	-0.934	0.085	-0.016					
25	15	0.261	-0.758	0.016					
	31	-0.261	0.759	-0.027					
34	35	-1.037	0.098	0.040					
	1	1.037	-0.097	-0.025					
35	1	-2.877	1.936	0.025					
	4	2.877	-1.936	0.052					

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REACTIONS for combination 3 (Units: kN, kN*meter)
BS8118 comb 3.6kN at end

<i>Node</i>	<i>X1</i>	<i>X2</i>	<i>X6</i>
31	0.000	0.713	0.000
33	0.000	4.111	0.000
SUM	0.000	4.825	0.000