

Structural Calculations:

Stair Tower

Client : VR Access Solutions Ltd

Ref : #1502-C1

Date : June 2017

Engineer : Ian R Hale BSc (Hons) MSc CEng MStructE

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Introduction

These calculations detail the analysis of an access tower built from modular components and tied back to a supporting structure (e.g. a building or scaffold) at every lift. It is assumed that this supporting structure is inherently stable and capable of providing a stable platform for supporting the stair with respect to horizontal restraint.

The order of design in the calculations is generally as follows:

- Components are checked for accommodating the required code value of 1 kN/m² imposed loads, with 2 kN/m² and the maximum safe working loads also considered
- The tower is analysed up to 30m for the 'In Service' condition in accordance with the requirements of BS EN 12811.
- The tower is analysed up to 30m for the 'Out of Service' condition in accordance with the requirements of BS EN 12811. This process is described in the relevant section.

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Summary of Findings:

Safe working heights, long face parallel to support structure, 1kN/m² imposed:

<u>LFP</u>	Maximum Tower Height (m)	
S – Derived specific to site	In Country	In Town
20	30	30
24	30	30
28	30	30
32	14	16
36	6	10
40	4	6
Derived from Out of Service condition. In service is acceptable up to 30m.		

Safe working heights, short face parallel to support structure, 1kN/m² imposed:

<u>SFP</u>	Maximum Tower Height (m)	
S – Derived specific to site	In Country	In Town
20	30	30
24	30	30
28	30	30
32	30	30
36	30	30
40	30	30
Derived from Out of Service condition. In service is acceptable up to 30m.		

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Component Checks

Loadings:

Individual components of the stair are checked for accommodating the loading requirements of BS EN 12811, set out as follows:

Platform Elements

UDL of 1.0kN/m² or a point load of 1.5kN. An additional check at 2.0 kN/m² is also carried out, with the maximum safe working load of the component under certain load locations also derived.

Guardrail Elements

Downward load – 1.25kN point load in the most onerous position. Treated as an accidental load.

Horizontal load – 0.3kN point load over an area of 0.3x0.3m. 0.15kN on toe boards only. The maximum safe working load of the component under certain load locations is also derived.

NB – Self weight is omitted where it is not considered to be critical.

Standards

The capacity of the standards is derived from effective lengths described in the S-Mech Report reference #1502-C2. The resulting safe axial loads are used in the design of the tower, for the specific configurations described below.

Condition	Ties	Notes	L _e (mm)	N _{safe} (kN)
LFP	Every lift	Ledger beam to 3.05m face, single tube beam to 1.65m face. 3 x guardrails present each lift.	1744	32.8
SFP	Every lift with wing brace each side every lift	Ledger beam to 3.05m face, single tube beam to 1.65m face. 3 x guardrails present each lift.	1747	32.7

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If the structure can be detailed, using appropriate bracing and restraints, such as to achieve the following effective lengths of the standards, the safe working loads are as shown:

L_e (mm)	N_{safe} (kN)
1000	62.3
1500	40.6
2000	26.6
2500	18.3
3000	13.3

Entrance Step

Internal 30w x 20d SHS 2.0 S235.

UDL = $1.0 \text{ kN/m}^2 \times (0.58 + 0.535)/2 = 0.56 \text{ kN/m}$.

Span = $0.27 - 0.03 - 0.03 = 0.21 \text{ m}$

$M_{Ed} = 0.56 \times 0.21^2/8 = 0.003 \text{ kN.m}$

$M_{z, safe} = 0.16 \text{ kN.m}$. Deflection acceptable by inspection.

Under 2.0 kN/m^2 by inspection $M_{Ed} = 0.002 \times 2 = 0.004 \text{ kN.m}$

Acceptable by inspection.

Under 1.5 kN point load:

$M_{Ed} = 1.5 \times 0.21/4 = 0.08 \text{ kN.m}$

Acceptable by inspection.

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Rear 30 30 SHS 2.0 S275.

By inspection critical over front 60 x 30 RHS.

$$\text{UDL} = 1.0 \text{ kN/m}^2 \times 0.27/2 = 0.135 \text{ kN/m.}$$

$$\text{Span} = 1.65\text{m}$$

$$M_{\text{Ed}} = 0.135 \times 1.65^2/8 = 0.05 \text{ kN.m}$$

$$M_{\text{safe}} = 0.39 \text{ kN.m therefore accept.}$$

$$I_{\text{req}} \text{ for } I/100 = 2.29 \times 0.135 \times 1.65^3 \times 100/360 = 0.25 \text{ cm}^4 (2576 \text{ mm}^4)$$

$$\text{Section } I_{yy} = 29419 \text{ mm}^4 \text{ therefore accept.}$$

$$\text{Under } 2.0 \text{ kN/m}^2 \text{ by inspection } M_{\text{Ed}} = 0.05 \times 2 = 0.1 \text{ kN.m}$$

$$I_{\text{req}} \text{ for } I/100 = 2576 \times 2 = 5152 \text{ mm}^4$$

Therefore accept under 2.0 kN/m².

Under 1.5 kN point load:

Applied over 200mm x 200mm area.

Therefore load to rear member (270 wide entrance step):

$$1.5/0.27 \times 0.17 = 0.95 \text{ kN}$$

$$M_{\text{Ed}} = 0.95 \times 1.65/4 = 0.39 \text{ kN.m}$$

$$I_{\text{req}} \text{ for } I/100 = 3.659 \times 0.95 \times 1.65^2 \times 100/360 = 2.62 \text{ cm}^4 (26287 \text{ mm}^4)$$

$$\text{Section } I_{yy} = 29419 \text{ mm}^4$$

Therefore accept under 1.5 kN point load.

Front 60 x 30 x 2 RHS

UDL acceptable by inspection of rear 30 SHS check.

Check under 1.5 kN PL.

M_{Ed} and I_{req} are as for rear SHS.

$$\text{Section } M_{\text{safe}} = 0.94 \text{ kN.m and } I_{yy} = 159499 \text{ mm}^4 \text{ therefore accept.}$$

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Edge 30 SHS 2.0 S235.

Cantilevers out from support plates.

Point load at end = 60 x 30 RHS reaction:

From rear SHS check = $0.135 \text{ kN/m} \times 1.65/2 = 0.111 \text{ kN}$.

Cantilever distance = 240 mm from centre of support plate.

$M_{Ed} = 0.111 \times 0.24 = 0.03 \text{ kN.m}$

$M_{safe} = 0.39 \text{ kN.m}$ therefore accept.

$I_{req} \text{ for } I/100 = 29.268 \times 0.111 \times 0.24^2 \times 100/180 = 0.104 \text{ cm}^4 \text{ (1039 mm}^4\text{)}$

Section $I_{yy} = 29419 \text{ mm}^4$ therefore accept.

Under 2.0 kN/m^2 by inspection $M_{Ed} = 0.03 \times 2 = 0.06 \text{ kN.m}$

$I_{req} \text{ for } I/100 = 1039 \times 2 = 2078 \text{ mm}^4$

Therefore accept under 2.0 kN/m^2 .

Under 1.5 kN point load

$M_{Ed} = 1.5 \times 0.24 = 0.36 \text{ kN.m}$

$I_{req} \text{ for } I/100 = 29.268 \times 1.5 \times 0.24^2 \times 100/180 = 1.404 \text{ cm}^4 \text{ (14048 mm}^4\text{)}$

Acceptable by inspection of capacities above.

Support Plate 6mm S235.

Must resist moment from cantilevering SHS.

Assume 50 mm width (tapering section)

$W_{el} = 6 \times 60^2/6 = 3600 \text{ mm}^3$

$M_{c,Rd} = 3600 \times 235/10^6 = 0.846 \text{ kN.m}$.

$M_{safe} = 0.846/1.65 = 0.51 \text{ kN.m}$

Critical cantilever moment = 0.36 kN.m under 1.5 kN point load.

Therefore plate is acceptable.

Maximum UDL is found to be 8.5 kN/m^2 controlled by the rear SHS member.

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Landing Platform

Internal 30 20 SHS 3.0 S235.

UDL = $1.0 \text{ kN/m}^2 \times 0.25 \text{ (c/c)} = 0.25 \text{ kN/m}$.

Span = 0.6m

$M_{Ed} = 0.25 \times 0.6^2/8 = 0.01 \text{ kN.m}$

$M_{y, safe} = 0.35 \text{ kN.m}$.

$I_{req} \text{ for } I/100 = 2.29 \times 0.25 \times 0.6^3 \times 100/360 = 0.03 \text{ cm}^4 \text{ (343 mm}^4\text{)}$

Section $I_{yy} = 28872 \text{ mm}^4$ therefore accept.

Under 2.0 kN/m^2 by inspection $M_{Ed} = 0.01 \times 2 = 0.02 \text{ kN.m}$ – acceptable.

Deflection acceptable by inspection.

Under 1.5 kN point load:

$M_{Ed} = 1.5 \times 0.6/4 = 0.23 \text{ kN.m}$

Acceptable by inspection.

Rear 60 30 SHS 2.0 S235.

Self weight of Platform = 29.1 Kg (0.285 kN)

Imposed UDL = $1.0 \text{ kN/m}^2 \times 0.6/2 = 0.3 \text{ kN/m}$

S/W UDL = $0.285/2/1.66 = 0.085 \text{ kN/m}$

Total UDL = $0.3 + 0.085 = 0.385 \text{ kN/m}$

$R = 0.07 \text{ kN (D)} \ 0.249 \text{ kN (L)}$

Span = 1.66m (centres of hooks)

$M_{Ed} = 0.385 \times 1.66^2/8 = 0.13 \text{ kN.m}$

$M_{safe} = 0.94 \text{ kN.m}$.

$I_{req} \text{ for } I/100 = 2.29 \times 0.385 \times 1.66^3 \times 100/360 = 1.12 \text{ cm}^4 \text{ (11202 mm}^4\text{)}$

Section $I_{yy} = 159499 \text{ mm}^4$ therefore accept.

Under 2.0 kN/m^2 by inspection

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$$\text{UDL} = 0.3 \times 2 = 0.6 \text{ kN/m (L)}$$

$$M_{\text{Ed}} = 0.3 \times 2 = 0.6 \text{ kN.m - acceptable.}$$

Deflection acceptable by inspection.

$$R = 0.07 \text{ kN (D)} \quad 0.498 \text{ (L)}$$

Under 1.5 kN point load:

$$M_{\text{Ed}} = 1.5 \times 1.66/4 = 0.63 \text{ kN.m}$$

$$I_{\text{req}} \text{ for } I/100 = 3.659 \times 1.5 \times 1.66^2 \times 100/360 = 4.20 \text{ cm}^4 \text{ (42011 mm}^4\text{)}$$

Acceptable by inspection of capacities.

Front 60 30 SHS 2.0 S235.

Carries platform UDL and stair flight loads.

Stair flights:

$$2\text{m stair flight self weight} = 42 \text{ Kg (0.412 kN)}$$

$$\text{Plan area} = 2.01\text{m} \times 0.71\text{m} = 1.448 \text{ m}^2$$

Total imposed load =

$$1.448 \text{ kN (1 kN/m}^2\text{)}$$

$$2.897 \text{ kN (2 kN/m}^2\text{)}$$

Therefore support reaction (four point support):

$$(1.448 + 0.412) / 4 = 0.465 \text{ kN (Imposed = 1 kN/m}^2\text{) (0.362 L 0.103 D)}$$

$$(2.897 + 0.412) / 4 = 0.827 \text{ kN (Imposed = 2 kN/m}^2\text{) (0.724 L 0.103 D)}$$

Handrails:

$$\text{Handrail post} = 5 \text{ Kg (0.049 kN)}$$

$$2\text{m Handrail} = 14 \text{ Kg (0.137 kN)}$$

$$\text{Therefore handrail load} = 0.049 + [2 \times (0.137/2)] = 0.186 \text{ kN (D).}$$

$$\text{Platform UDL} = 0.3 \text{ (L)} + 0.085 \text{ (D)} = 0.385 \text{ kN/m (from rear member check).}$$

$$\text{NB - (L)} = 0.6 \text{ kN/m at 2 kN/m}^2$$

Refer to analysis output:

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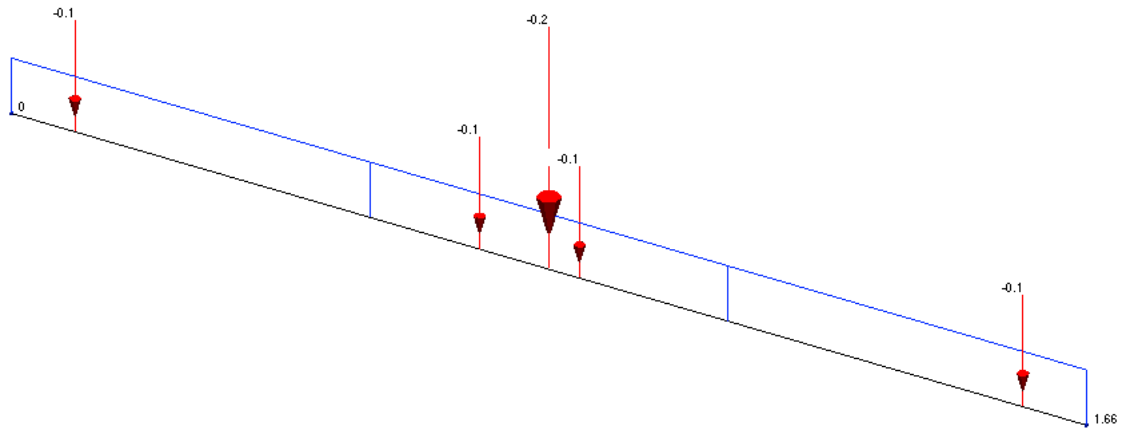
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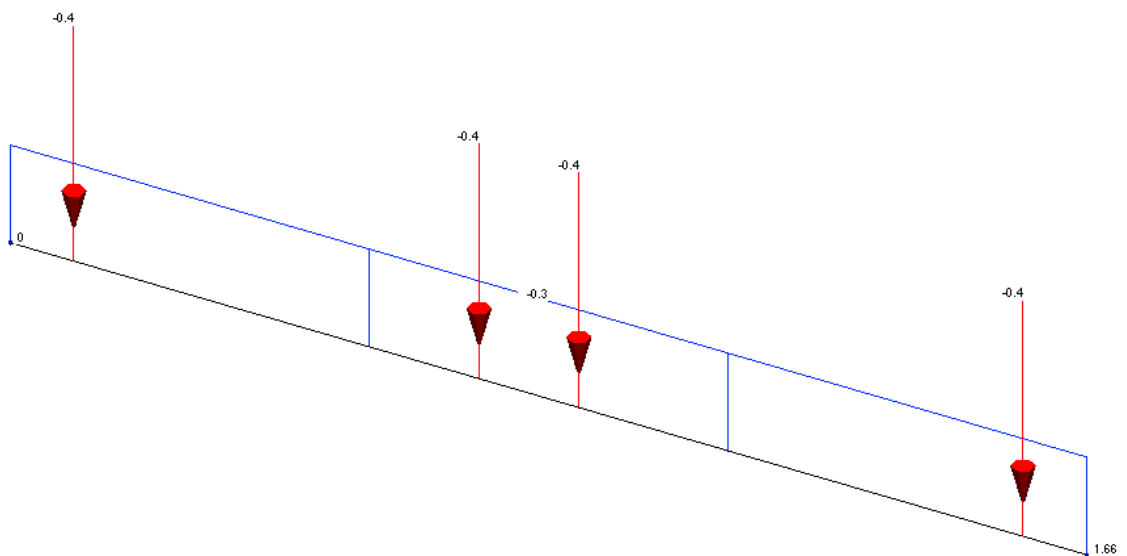
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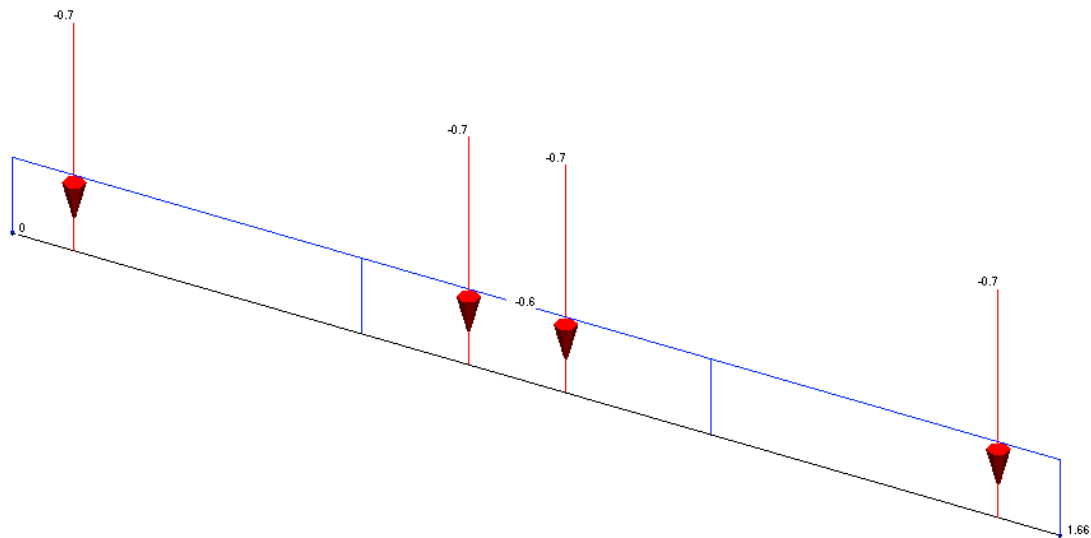
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Dead load only



Live only (1.0 kN/m²)



Live only (2.0 kN/m²)

$M_{Ed} = 1.02 \text{ kN.m}$ max in 2 kN/m^2 case.

Section $M_{y, safe} = 1.10 \text{ kN.m}$ therefore accept for all load cases.

Max deflection = $8.0 \text{ mm} < L/100$ therefore accept for 1.0 and 2.0 kN/m^2 .

For maximum safe working load, inside RHS is critical. Calculated assuming dead only on the stair (i.e. flights and rails are present but access onto the stair flight is not permitted) the platform can sustain 8.0 kN/m^2 .

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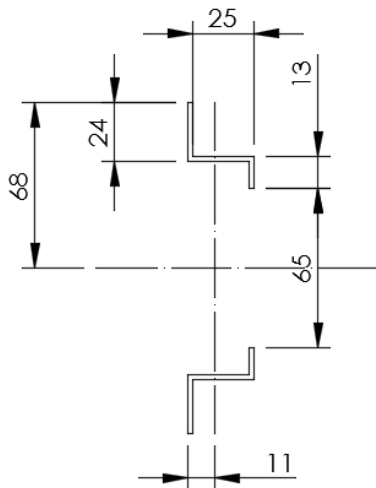
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Stair Flights

Stringer

Section properties allowing for weight relief ($t = 2.0\text{mm}$):



A: 240mm^2

I_{yy} : 562650 mm^4

I_{zz} : 25969 mm^3

$W_{el,y}$: 8274 mm^3

R_{yy} : 48.4 mm

R_{zz} : 10.4 mm

Stair width = 0.71m centres of stringers.

Imposed UDL:

$1.0\text{ kN/m}^2 \times 0.71/2 = 0.355\text{ kN/m}$

$2.0\text{ kN/m}^2 \times 0.71/2 = 0.710\text{ kN/m}$

Stair self weight = 20 Kg/l.m or 0.196 kN/l.m

Dead load therefore = 0.098 kN/m per stringer.

Analysis Results:

2.0m Flight:

D + 1.0 kN/m^2 $M=0.154\text{ kN.m}$ $\delta = 0.9\text{ mm}$

D + 1.5 kN PL $M=0.652\text{ kN.m}$ $\delta = 3.1\text{ mm}$

D + 2.0 kN/m^2 $M=0.275\text{ kN.m}$ $\delta = 1.6\text{ mm}$

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Section classification:

Classify upstand:

$$c/t = 24/2 = 12$$

$$f_y = 235 \text{ N/mm}^2 \text{ therefore } \varepsilon = 1.0$$

$c/t < 14\varepsilon$ (outstand in compression) therefore = Class 1.

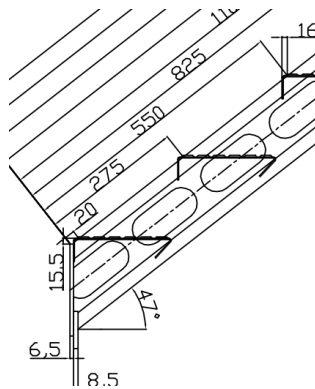
Treat as Class 3 and use elastic modulus for bending:

$$M_{C,Rd} = W_{el} \times f_y / \gamma_{M0}$$

$$M_{C,Rd} = 8274 \times 235 / 1.0 \times 10^6 = 1.944 \text{ kN.m}$$

$$M_{safe} = 1.944 / (1.1 \times 1.5) = 1.178 \text{ kN.m}$$

NB – treads act as braces across weight relief openings (see image below) and prevent longitudinal deformation. Therefore section does not need to act similar to the vierendeel principle which might occur due to the large weight relief openings.



Treads bracing across weight relief

$$\text{Shear } V_{pl,Rd} = A_v (f_y / \sqrt{3})$$

$$A_v = \text{area of end web} = 91 \times 2 = 182 \text{ mm}^2$$

$$V_{pl,Rd} = 182 \times (235 / \sqrt{3}) / 10^3 = 24.69 \text{ kN}$$

$$V_{safe} = 24.69 / 1.1 / 1.5 = 14.96 \text{ kN.}$$

Therefore stringer is acceptable.

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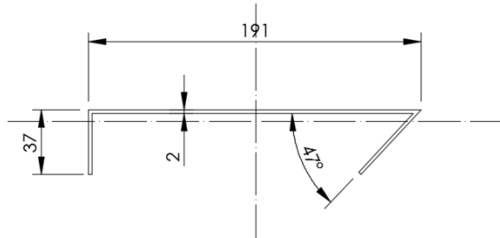
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Stair Treads

Section properties:



A: 543mm²

I_{yy}: 54870 mm⁴

I_{zz}: 2323438 mm³

W_{el,y}: 1829 mm³

Section classification:

Top section c/t = 191/2 = 96 < 124ε therefore class 3.

$$M_{C,Rd} = W_{el} \times f_y / \gamma_{M0}$$

$$M_{C,Rd} = 1829 \times 235 / 1.0 \times 10^6 = 0.430 \text{ kN.m}$$

$$M_{safe} = 0.43 / (1.1 \times 1.5) = 0.26 \text{ kN.m}$$

Tread span = 685mm. Width = 191mm.

$$\text{At } 1.0 \text{ kN/m}^2 \text{ UDL} = 1.0 \times 0.191 = 0.191 \text{ kN/m}$$

$$\text{At } 2.0 \text{ kN/m}^2 \text{ UDL} = 2.0 \times 0.191 = 0.382 \text{ kN/m}$$

$$M_{1.0} = 0.191 \times 0.685^2 / 8 = 0.011 \text{ kN.m}$$

$$M_{2.0} = 0.382 \times 0.685^2 / 8 = 0.022 \text{ kN.m}$$

$$\text{Under } 1.5 \text{ kN centre PL, } M = 1.5 \times 0.685 / 4 = 0.26 \text{ kN.m}$$

Max M (0.26) = M_{safe} therefore ok.

$$\text{Shear } V_{pl,Rd} = A_v (f_y / \sqrt{3})$$

$$A_v = \text{area of downstands only} = 37 \times 2 + 51 \times 2 = 176 \text{ mm}^2$$

$$V_{pl,Rd} = 176 \times (235 / \sqrt{3}) / 10^3 = 23.87 \text{ kN}$$

$$V_{safe} = 23.87 / 1.1 / 1.5 = 14.47 \text{ kN.}$$

Accept for 1.0 and 2.0 kN/m².

Limit maximum safe working load to 2 kN/m² arbitrary limit.

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Ledger Beam

Supports landing platforms.

Platform reactions (from landing platform check):

Outer RHS (from previous):

1.0 kN/m² = 0.07 kN (D) 0.249 (L)

2.0 kN/m² = 0.07 kN (D) 0.498 (L)

Inner RHS (from analysis output):

1.0 kN/m² = 0.37 kN (D) 0.986 (L)

2.0 kN/m² = 0.37 kN (D) 1.972 (L)

Inner RHS when loaded with single flight:

1.0 kN/m² = 0.300 kN (D) 0.794 (L) adjacent to flight

0.190 kN (D) 0.428 (L) opposite side

Top chord buckling length = 2175 mm allowing restraint from platform

From analysis of section (34 x 2.5 CHS S235) $N_{b, safe} = 6.50$ kN. $M_{safe} = 0.354$ kN.m

60 x 8 flat:

From analysis of section $M_{b, safe} = 0.68$ kN.m

30 x 8 flat:

From analysis of section $M_{b, safe} = 0.17$ kN.m

NB – compression in flats is ignored as nominal in relation to the capacity.

Forces check (refer to analysis output):

1.0 kN/m²:

Chord force = 1.81 kN, moment = 0.11 kN.m

$1.81/6.5 + 0.11/0.354 = 0.59 < 1$ therefore ok.

Flats, max bending = 0.21 kN.m (60mm plate) 0.02 kN.m (30mm plate) therefore accept.

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Accept for 1.0 kN/m²

1.5 kN point load:

Chord force = 3.5 kN, moment = 0.16 kN.m

$3.5/6.5 + 0.16/0.354 = 0.99 < 1$ therefore ok.

Flats, max bending = 0.29 kN.m (60mm plate) 0.03 kN.m (30mm plate) therefore accept.

Accept for 1.5 kN point load

2.0 kN/m²:

Chord force = 3.06 kN, moment = 0.18 kN.m

$3.06/6.5 + 0.18/0.354 = 0.98 < 1$ therefore ok.

Flats, max bending = 0.35 kN.m (60mm plate) 0.04 kN.m (30mm plate) therefore accept.

Accept for 2.0 kN/m²

Ledger beam reactions taken forward to Safe Working Height design:

D + 1.0 kN/m²:

At platform	D 0.498 kN	L 1.147 kN
-------------	------------	------------

At opposite side	D 0.094 kN	L 0.090 kN
------------------	------------	------------

With single stair flight adjacent:

At platform	D 0.434 kN	L 0.973 kN
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At opposite side	D 0.088 kN	L 0.070 kN
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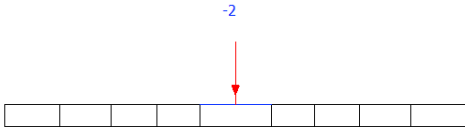
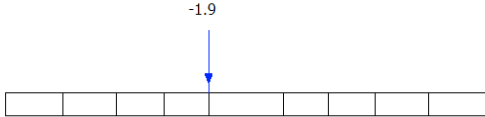
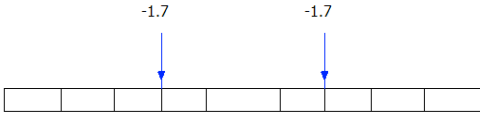
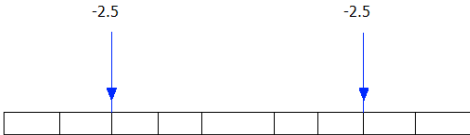
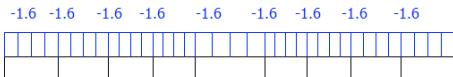
With single stair flight opposite:

At platform	D 0.334 kN	L 0.639 kN
-------------	------------	------------

At opposite side	D 0.078 kN	L 0.038 kN
------------------	------------	------------

3.05m Ledger Beam SWL assuming top chord restraint at mid span:

($N_{safe} = 11.9 \text{ kN}$ at $L_e = 1.5\text{m}$)

	Centre Point Load (A): 2.0 kN 30 Flat critical
	Centre Point Load (B): 1.9 kN 30 Flat critical
	Two Point Loads (A) 1.7 kN each 30 Flat critical
	Two Point Loads (B) 2.5 kN each 60 Flat critical. Load reduced slightly to account for holes in end flats.
	UDL 1.6 kN/m 30 Flat Critical

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Single Tube Beam

Not loaded in normal usage.

Check Max SWL.

Section = 48.3 CHS 3.0 S235.

$M_{safe} = 0.88 \text{ kN.m}$

$I_{yy} = 109996 \text{ mm}^4$

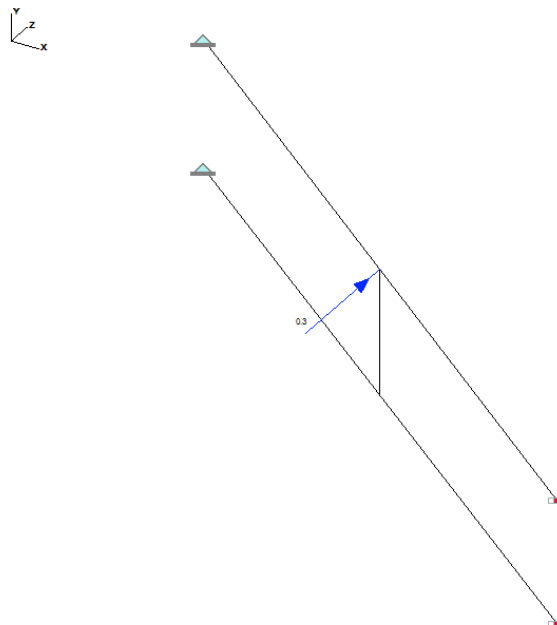
Max SWL:

Permissible UDL of $(8 \times 0.88 / 1.6^2) = 2.75 \text{ kN/m}$

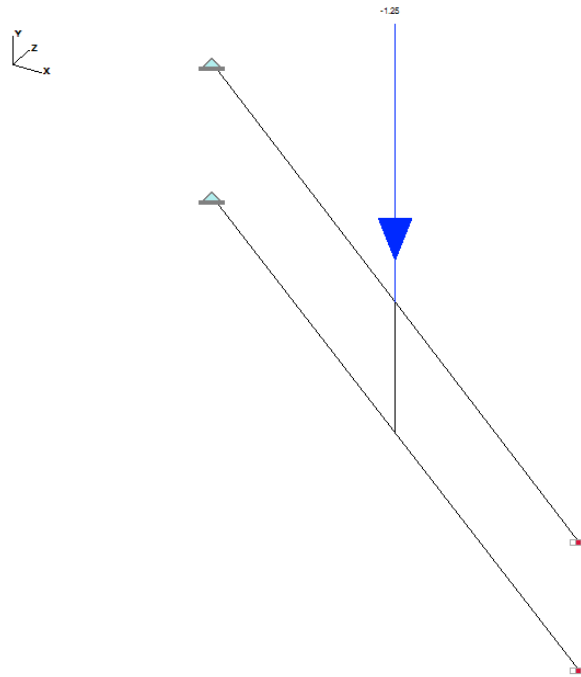
Permissible CPL of $(4 \times 0.88 / 1.6) = 2.2 \text{ kN}$

2.0m Stair Guardrail

Design loads = 0.3 kN horizontal, 1.25 kN vertical (accidental)



Horizontal Loading



Vertical (accidental) Loading

Refer to analysis output for forces:

H_z load: $M = 0.176 \text{ kN.m}$ in top tube. Deflection = 31.4mm Lateral.

V_t Load: $M = 0.268 \text{ kN.m}$. Deflection not considered in accidental case.

NB – forces in flat are nominal in all cases.

27 x 2.0 CHS S235

Tube $M_{\text{safe}} = 0.18 \text{ kN.m}$ therefore accept for horizontal.

Tube $M_{\text{c,Rd}} = 0.29 \text{ kN.m}$ (plastic) therefore accept for vertical load.

Deflection < 35mm lateral therefore accept.

Max SWL for centre point load = 0.8 kN (top tube moment critical).

Max SWL for single PL at $\frac{1}{4}$ or $\frac{3}{4}$ of length = 0.8 kN (top tube moment critical).

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Guardrail Frame

3.0M rail is analysed as worst case:

Design loads = 0.3 kN horizontal, 1.25 kN vertical (accidental)

Loads are applied at centre and at 0.65m from support to represent a load applied from the landing platform.

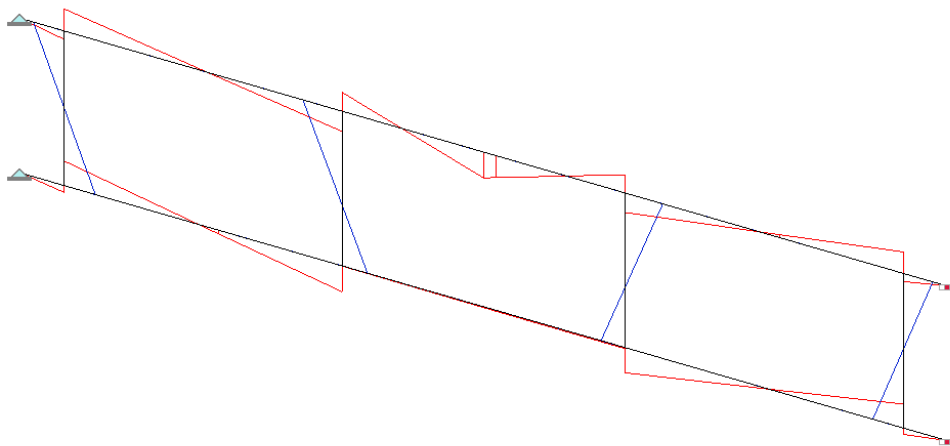
Horizontals = 27 CHS 2.5 S235

Verticals = 50w x 30d x 2.0 S235 Channel.

NB – for vertical, outstand element is given $\psi = 0.57$ to BS EN 1993-1-5:2006 table 4.22 therefore $k\sigma = 0.57$.

Outstand limit = $21\epsilon\sqrt{k\sigma} = 27.8$ (S235 therefore $\epsilon = 1.0$)

Outstand = 24, allow as class 3.



Guardrail – Typical BMD (tsp)

NB – 3D view. Rail is horizontal.

Refer to outputs for analysis and results:

Top member:

At $l_e = 3000\text{mm}$, $N_{\text{safe}} = 1.79 \text{ kN}$ $M_{\text{safe}} = 0.214 \text{ kN.m}$

$N_{b,Rd} = 2.96 \text{ kN}$ $M_{c,Rd} = 0.350 \text{ kN.m}$

D + Hz Ctr: $M = 0.137 \text{ kN.m}$ $N = 0.08 \text{ kN}$ Unity = 0.68

D + Vt Ctr $M = 0.163 \text{ kN.m}$ $N = 1.58 \text{ kN}$ Unity = 0.99

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D + Hz Edge: $M = 0.10 \text{ kN.m}$ $N = 0.08 \text{ kN}$ OK by inspection

D + Vt Edge: $M = 0.24 \text{ kN.m}$ $N = 0.80 \text{ kN}$ Unity = 0.96

Deflections = 29.48 mm (ctr) and 17.6 mm (edge) therefore accept.

Verticals:

$N_{\text{safe}} = 24.3 \text{ kN}$ $M_{\text{safe},z-z} = 0.24 \text{ kN.m}$

$N_{b,Rd} = 40.1 \text{ kN}$ $M_{C,Rd,z-z} = 0.40 \text{ kN.m}$

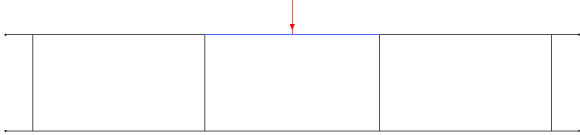
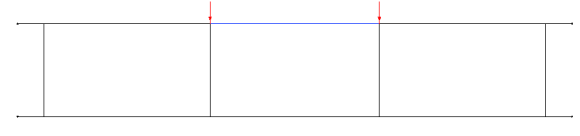
Worst case = (accidental, forces nominal under Hz load)

D + Vt Ctr. $M = 0.23 \text{ kN.m}$ $N = 0.52 \text{ kN}$ Unity = 0.59

Guardrail frame is acceptable.

3.05m Guardrail SWL **assuming top chord restraint at mid span:**

($N_{\text{safe}} = 6.3 \text{ kN}$ at $L_e = 1.5\text{m}$)

	Centre Point Load: 1.2 kN Top chord critical
	Two Point Loads: 0.7 kN each Vertical Channels critical
	UDL: 0.7 kN/m Vertical Channels critical

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1.6m Guardrail Frame

Accept for loads required by code by inspection due to significantly smaller span.

Check max SWL **assuming top chord is unrestrained:**

($N_{safe} = 5.6 \text{ kN}$ at $L_e = 1.6\text{m}$)

For load patterns as shown for the 3.05m Guardrail Frame:

CPL: 2.5 kN Vertical Channels & Top Chord critical

2PL: 1.3 kN each Vertical Channels critical

UDL: 2.2 kN/m Vertical Channels critical

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3.0m Guardrail

48.3 x 3.0 S235.

Under 0.3 kN horizontal:

$$M = 0.3 \times 3.05/4 = 0.23 \text{ kN.m}$$

$$I_{red} = 3.66 \times 0.3 \times 3.05^2 \times 120/360 \text{ (25 mm is critical)} = 34047 \text{ mm}^4$$

Under 1.25 kN vertical:

$$M = 1.25 \times 3.05/4 = 0.95 \text{ kN.m}$$

$$\text{Section } M_{safe} = 0.88 \text{ kN.m}$$

$$\text{Section } M_{C,Rd} = 1.45 \text{ kN.m}$$

$$\text{Section } I_{yy} = 109996 \text{ mm}^4$$

Therefore guardrail is acceptable.

Max SWL:

Permissible UDL of $(8 \times 0.88 / 3.05^2) = 0.76 \text{ kN/m}$ – exceeds 25mm deflection.

Limiting UDL = 0.5 kN/m for deflection.

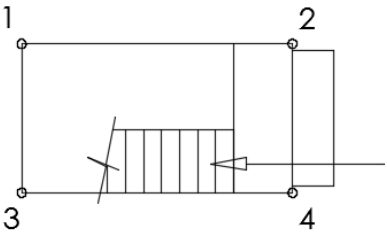
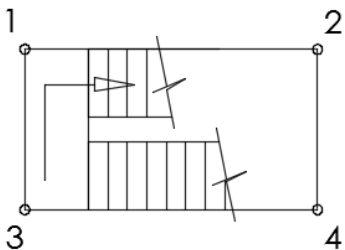
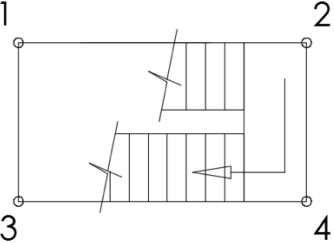
Permissible CPL of $(4 \times 0.88 / 3.05) = 1.15 \text{ kN}$ – exceeds 25mm deflection.

Limiting CPL = 0.97 kN for deflection.

Safe Working Heights

Dead, Live and Wind Loads

Dead, live and wind loads are calculated on the spreadsheet for increasing heights of the tower, for each type of landing arrangement. Dead and live applied via the ledger beam are as shown in the table below. In the calculation of safe working heights, imposed load is applied on the top 10m of the tower only.

 <u>Type 1 – Entrance RHS</u>	Stds 1,3 as Type 4/5 Std 1 D0.078 L0.038 Std 3 D0.088 L0.070 Stds 2,4 as Type 4/5 plus entrance step. Step s/w added on s/sheet. Step live = $(1.0\text{kN/m}^2 \times 1.63 \times 0.27)/2 =$ Std2,4 L = 0.22 kN
 <u>Type 2 – Mid LHS</u>	From component checks, ledger: Std1, Std3: D0.498 L1.147 Std2, Std4: D0.094 L0.090
 <u>Type 3 – Mid RHS</u>	From component checks, ledger: Std2, Std4: D0.498 L1.147 Std1, Std3: D0.094 L0.090

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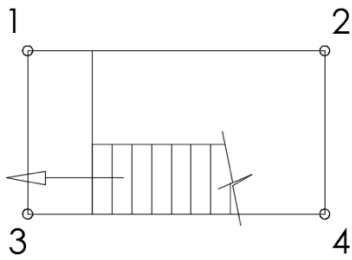
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Type 4 – Exit LHS

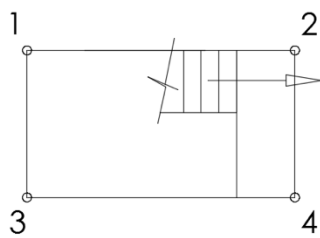
From component checks, ledger:

Std1 D0.334 L0.639

Std2 D0.078 L0.038

Std3 D0.434 L0.973

Std4 D0.088 L0.070



Type 5 – Exit RHS

Std1 D0.088 L0.070

Std2 D0.434 L0.973

Std3 D0.078 L0.038

Std4 D0.334 L0.639

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#1502 - Stair Tower - 2m Lifts

Design Data

Lift Height	2	m
Imposed Loading	1	kN/m ²
Out of Service Factor	0.25	
In Service Wind Load	0.2	kN/m ²

Element		Weight (Kg)	Load (kN) to std	Total Wind Area (Includes Curbs) m ²		Type 1 Base Lift RHS Landing	Type 2 Intermediate Lift LHS Landing	Type 3 Intermediate Lift RHS Landing	Type 4 Top Lift LHS Landing	Type 5 Top lift RHS Landing
				Wind on Side (1.65m)	Wind on Front (3.0m)					
Standard	2m	11.3	0.111	0.116	0.116	0.111	0.111	0.111	0.111	0.111
Ledger Beam Reactions includes platform/ flights/ handrail/ ledger self weight	Std 1 Dead					0.078	0.498	0.094	0.334	0.088
	Std 1 Live					0.038	1.147	0.09	0.639	0.07
	Std 2 Dead					0.328	0.094	0.498	0.078	0.434
	Std 2 Live					0.859	0.09	1.147	0.038	0.973
	Std 3 Dead					0.088	0.498	0.094	0.434	0.078
	Std 3 Live					0.07	1.147	0.09	0.973	0.038
	Std 4 Dead					0.408	0.094	0.498	0.088	0.334
	Std 4 Live					1.193	0.09	1.147	0.07	0.639
	3.0m				0.347					
Tube Beam	1.605m	6.3	0.031	0.095		0.031	0.031	0.031	0.031	0.031
Guardrail Frame	3.05m	15.4	0.076		0.495	0.076	0.076	0.076	0.076	0.076
	1.605m	10.9	0.053	0.276			0.053	0.053	0.053	0.053
Guardrail	1.605m	6.3	0.031	0.083						
	2.16m	8	0.039		0.106				0.039	0.039
	3.05m	11	0.054		0.155	0.054	0.054	0.054	0.054	0.054
Tube tie and Fitting	1m per std	6.62	0.065			0.065				
Entrance Step	1.605m DL	15.1	0.074	0.198	0.075	0.074				
Folding Guard Frame		9.2	0.045			0.045				
Stair Flight	2.0m			0.656	0.654					
Landing	1.605m			0.199	0.072					
Handrail post				0.058	0.058					
Stair Handrail	2.0m			0.118	0.297					
Top End Guard Frame		7.3	0.036							
Clip on Post		6.6	0.065							

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Total Dead Load Standard 1 (kN)		0.29	0.82	0.37	0.55	0.36
Total Dead Load Standard 2 (kN)		0.65	0.42	0.77	0.35	0.65
Total Dead Load Standard 3 (kN)		0.43	0.77	0.42	0.65	0.35
Total Dead Load Standard 4 (kN)		0.68	0.37	0.82	0.36	0.55
Total Live Load Standard 1 (kN)		0.04	1.15	0.09	0.64	0.07
Total Live Load Standard 2 (kN)		0.86	0.09	1.15	0.04	0.97
Total Live Load Standard 3 (kN)		0.07	1.15	0.09	0.97	0.04
Total Live Load Standard 4 (kN)		1.19	0.09	1.15	0.07	0.64
Landing Repeats - Dead		Number of repeats of landing arrangement - Dead				
	2	1			1	
	4	1	1			1
	6	1	1	1	1	
	8	1	2	1		1
	10	1	2	2	1	
	12	1	3	2		1
	14	1	3	3	1	
	16	1	4	3		1
	18	1	4	4	1	
	20	1	5	4		1
	22	1	5	5	1	
	24	1	6	5		1
	26	1	6	6	1	
	28	1	7	6		1
	30	1	7	7	1	
Landing Repeats - Live		Number of repeats of landing arrangement - Live				
	2					
	4					
	6					
	8					
	10					
	12					
	14					
	16					
	18					
	20					1
	22			1	1	
	24		1	1		1
	26		1	2	1	
	28		2	2		1
	30		2	3	1	

Load to Standards (kN) In Service							
	Std		2.0	4.0	6.0	8.0	10.0
Lift = 2-18m Inclusive: Dead Only	1		0.59	1.47	2.03	2.66	3.22
	2		1.01	1.73	2.19	2.91	3.38
20-30m Inclusive: Dead and Live	3		1.08	1.55	2.27	2.73	3.45
	4		1.04	1.60	2.23	2.79	3.42
			1.08	1.73	2.27	2.91	3.45
		Max Leg Load In Service					
Load to Standards (kN) Out of Service							
	Std		2.0	4.0	6.0	8.0	10.0
Lift = 2-18m Inclusive: Dead Only	1		0.59	1.47	2.03	2.66	3.22
	2		1.01	1.73	2.19	2.91	3.38
20-30m Inclusive: Dead and Live	3		1.08	1.55	2.27	2.73	3.45
	4		1.04	1.60	2.23	2.79	3.42
			1.08	1.73	2.27	2.91	3.45
		Max Leg Load O.O. Service					

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Tower Height (m)										
0	12.0	14.0	16.0	18.0	20.0	22.00	24.00	26.00	28.00	30.00
2	3.84	4.40	5.03	5.59	6.29	7.51	8.71	9.93	11.14	12.36
8	4.10	4.57	5.29	5.76	7.45	8.13	9.88	10.56	12.30	12.98
5	3.92	4.64	5.11	5.83	6.34	8.08	8.76	10.51	11.19	12.93
2	3.98	4.60	5.16	5.79	6.99	8.20	9.42	10.62	11.84	11.84
5	4.10	4.64	5.29	5.83	7.45	8.20	9.88	10.62	12.30	12.98

Tower Height (m)										
0	12.0	14.0	16.0	18.0	20.0	22.00	24.00	26.00	28.00	30.00
2	3.84	4.40	5.03	5.59	6.24	6.96	7.73	8.46	9.23	9.96
8	4.10	4.57	5.29	5.76	6.72	7.24	8.22	8.74	9.71	10.24
5	3.92	4.64	5.11	5.83	6.31	7.28	7.80	8.78	9.30	10.28
2	3.98	4.60	5.16	5.79	6.51	7.28	8.01	8.78	9.51	10.28
5	4.10	4.64	5.29	5.83	6.72	7.28	8.22	8.78	9.71	10.28

Wind Areas (Unsheeted) (m ²)		12.0m	14.0m	16.0m	18.0m	20.0m
Area (m ²) exposed to wind - Wind on Side (1.65m) (including C _p allowance) - W ₁	Std 1	0.164	0.829	0.302	0.164	0.412
	Std 2	0.314	0.302	0.829	0.740	0.164
	Std 3	0.164	0.829	0.302	0.164	0.740
	Std 4	0.602	0.302	0.829	0.412	0.164
Area (m ²) exposed to wind - Wind on Front (3.0m) (including C _p allowance) - W ₂	Std 1	0.290	1.078	0.615	0.676	0.473
	Std 2	0.326	0.537	1.155	0.537	1.017
	Std 3	0.537	1.155	0.537	1.017	0.537
	Std 4	1.182	0.615	1.078	0.473	0.676
Wind Load (kN) to relevant node from In Service Wind on Side (1.65m) - W ₁	Std 1	0.033	0.166	0.060	0.033	0.082
	Std 2	0.063	0.060	0.166	0.148	0.033
	Std 3	0.033	0.166	0.060	0.033	0.148
	Std 4	0.120	0.060	0.166	0.082	0.033
Wind Load (kN) to relevant node from In Service Wind on Front (3.0m) - W ₂	Std 1	0.058	0.216	0.123	0.135	0.095
	Std 2	0.065	0.107	0.231	0.107	0.203
	Std 3	0.107	0.231	0.107	0.203	0.107
	Std 4	0.236	0.123	0.216	0.095	0.135

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In Service Condition

Methodology

The principle interest in the derivation of the safe working heights are the forces in the standards, the decks having been checked for the required imposed loading. The output given relates to the standards and is for the following Load Cases:

1. Dead and Live
2. Dead + Live + In Service Wind on Side (1.65m)
3. Dead + Live + In Service Wind on Front (3.0m)
4. Dead + Live + NHF

To assess the standards, the following resistances are adopted. The S-Mech Ltd report #1502-C2 describes a buckling analysis on the tower, which results in effective lengths of the standards to be used in design. The derivation of the moment capacity and resulting allowable axial load is given in the relevant appendix relating to the standards:

Standards

Axial capacity at L=2.0m = 32.83 kN (LFP)

32.74 kN (SFP)

Moment Capacity = 1.36 kN.m

In Service Dead and Live

As detailed under heading 'Dead and Live Loads' previous.

In Service Wind Loads

The following section uses extracts from the design spreadsheet to explain the derivation of the In Service wind loadings.

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Element		Weight (Kg)	Load (kN) to std	Total Wind Area (includes C_{pe}) m^2	
				Wind on Side (1.65m)	Wind on Front (3.0m)
Standard	2m	11.3	0.111	0.116	0.116
Ledge Beam Reactions includes platform/ flights/ handrail/ ledger self weight	Std 1 Dead				
	Std 1 Live				
	Std 2 Dead				
	Std 2 Live				
	Std 3 Dead				
	Std 3 Live				
	Std 4 Dead				
	Std 4 Live				
	3.0m				0.347
	1.605m		0.55	0.19	
Tube Beam	1.605m	6.3	0.031	0.095	
	3.05m	15.4	0.076		0.495
Guardrail Frame	1.605m	10.9	0.053	0.276	
	1.605m	6.3	0.031	0.083	
	2.16m	8	0.039		0.106
Guardrail	3.05m	11	0.054		0.155
Tube tie and Fitting	1m per std	6.62	0.065		
Entrance Step	1.605m DL	15.1	0.074	0.198	0.075
Folding Guard Frame		9.2	0.045		
Stair Flight	2.0m			0.656	0.654
Landing	1.605m			0.199	0.072
Handrail post				0.058	0.058
Stair Handrail	2.0m			0.118	0.297
Top End Guard Frame		7.3	0.036		
Clip on Post		6.6	0.065		

For each component the area that the component presents to the wind (in each orthogonal direction) is calculated, including the allowance for C_{pe} subject to the section shape.

Element	Weight (Kg)	Load (kN) to std	Total Wind Area (includes C_{pe}) m^2		Type 1 Base Lift RHS	Type 2 Intermediate Lift LHS Landing	Type 3 Intermediate Lift RHS Landing	Type 4 Top Lift LHS Landing	Type 5 Top Lift RHS Landing
			Wind on Side (1.65m)	Wind on Front (3.0m)					
Standard	11.3	0.111	0.116	0.116	0.111	0.111	0.111	0.111	0.111
Area (m^2) exposed to wind - Wind on Side (1.65m) (including C_{pe} allowance) - W_1	Std 1		0.164	0.829	0.302	0.164	0.164	0.412	
	Std 2		0.314	0.302	0.829	0.740	0.164		
	Std 3		0.164	0.829	0.302	0.164	0.164	0.740	
	Std 4		0.602	0.302	0.829	0.412	0.164		
Area (m^2) exposed to wind - Wind on Front (3.0m) (including C_{pe} allowance) - W_2	Std 1		0.290	1.078	0.615	0.676	0.473		
	Std 2		0.326	0.537	1.155	0.537	1.017		
	Std 3		0.537	1.155	0.537	1.017	0.537		
	Std 4		1.182	0.615	1.078	0.473	0.676		
Wind Load (kN) to relevant node from in Service Wind on Side (1.65m) - W_1	Std 1		0.033	0.166	0.060	0.033	0.082		
	Std 2		0.063	0.060	0.166	0.148	0.033		
	Std 3		0.033	0.166	0.060	0.033	0.148		
	Std 4		0.120	0.060	0.166	0.082	0.033		
Wind Load (kN) to relevant node from in Service Wind on Front (3.0m) - W_2	Std 1		0.058	0.216	0.123	0.135	0.095		
	Std 2		0.085	0.107	0.231	0.107	0.203		
	Std 3		0.107	0.231	0.107	0.203	0.107		
	Std 4		0.236	0.123	0.216	0.095	0.135		

The total area attached to each standard presented to the wind at each type of platform arrangement is summed.

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Date : June 2017

Checked : IH

Approved : IH

Notional Horizontal Forces

Code requirement for NHF is 0.3kN per bay. In this case allow a bay to equal a landing, 0.15kN horizontal force is applied to each standard adjacent to the landing. This force is applied to the loaded levels only, perpendicular to the long face.

Output Checks

Unity checks on the standards and extracts of the analysis are given below to demonstrate the suitability for the In-Service condition up to 30m, where it can be seen the forces are acceptable by inspection when compared against the resistances (see heading 'Methodology'). A full output in relation to the standards members is given in the relevant appendix.

For the LFP condition, the lateral deflection of the stair was 8.5mm maximum. Lateral deflection for the SFP condition was nominal.

<u>Long Face Parallel In Service</u>					
Load Case	Description	Critical Member	Axial (kN)	Moment (kN.m)	Unity Check
1	D + L	M111	12.5	0.13	OK BI
2	DLW1	M111	12.6	0.02	OK BI
3	DLW2	M111	12.5	0.01	OK BI
4	DL NHF	M111	12.5	0.08	OK BI

<u>Short Face Parallel In Service</u>					
Load Case	Description	Critical Member	Axial (kN)	Moment (kN.m)	Unity Check
1	D + L	M111	12.5	n/a	OK BI
2	DLW1	M111	12.5	n/a	OK BI
3	DLW2	M111	12.5	n/a	OK BI
4	DL NHF	M111	12.5	n/a	OK BI

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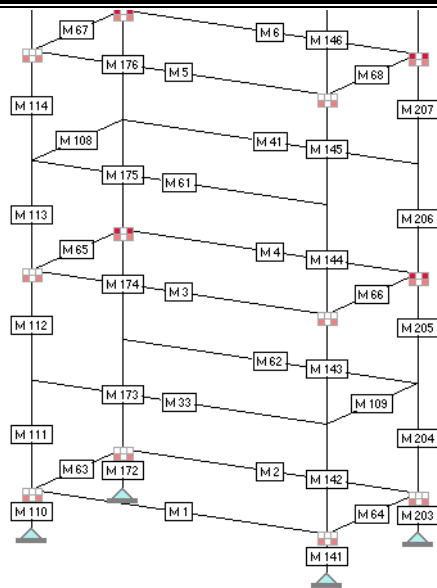
Project Ref : 1502

Engineer : IH

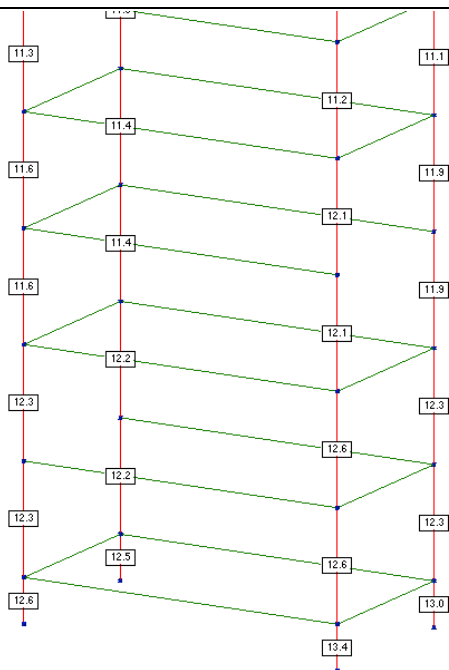
Date : June 2017

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Base of Tower (LFP) showing node and member references.



LFP In Service D L W1 Axial Force

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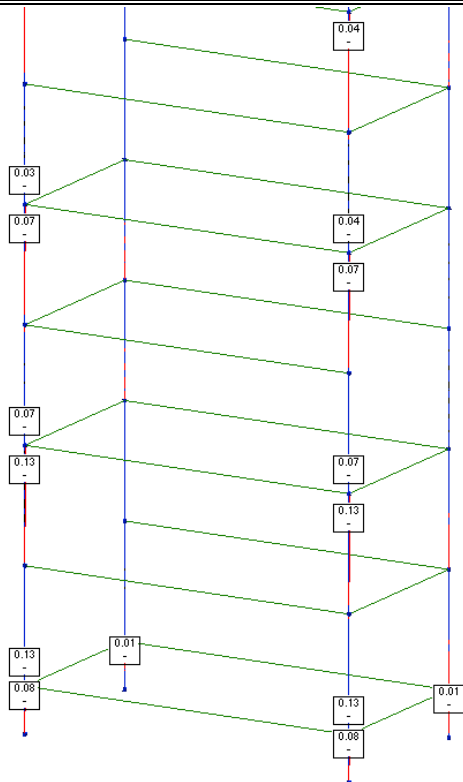
Project Ref : 1502

Engineer : IH

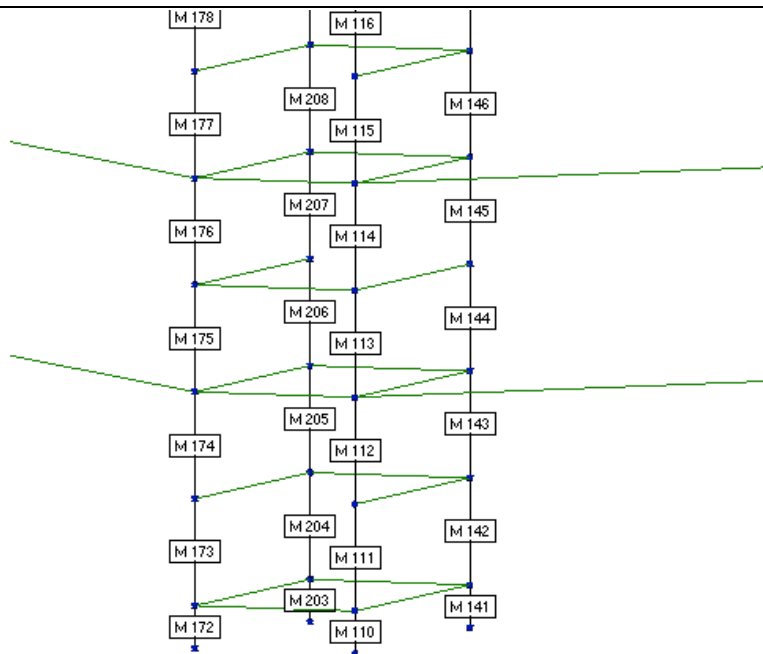
Date : June 2017

Checked : IH

Approved : IH



LFP In Service D L W1 Bending Moment



Base of Tower (SFP) showing node and member references.

S-Mech Consulting Engineering

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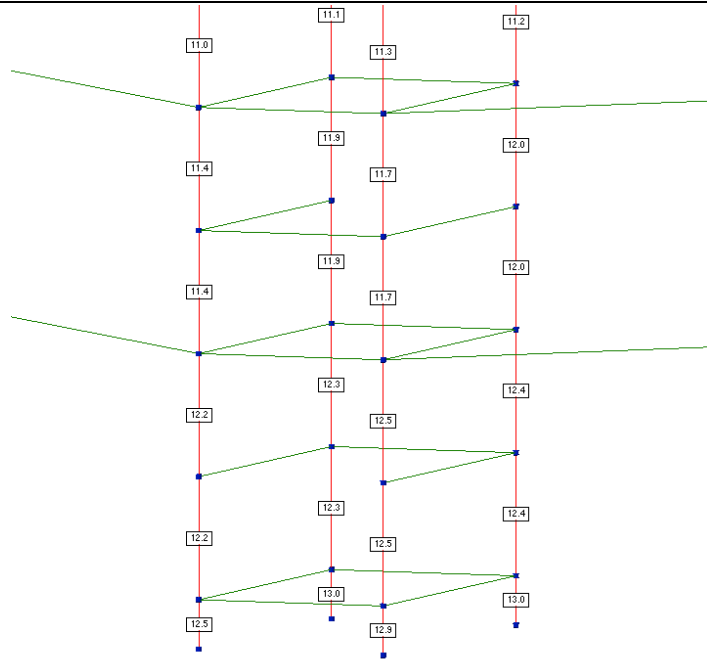
Project Ref : 1502

Engineer : IH

Date : June 2017

Checked : IH

Approved : IH



SFP In Service D L W2 Axial
Force

S-Mech Consulting Engineering

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Out of Service Condition

Applied Loading Includes:

Self weight

Live load x out of service reduction factor

Wind Loading

Wind dynamic pressure is calculated at various intensities based on a set of arbitrary S_{wind} values, these pressures are then applied to the results of a unit load analysis on the staintower at 30m height to act as wind-moment co-efficients.

By analysing using load factors of 1.0, 1.25, and 1.5 on the unit load, P_{Δ} effects can be accommodated within these bands – using the upper value for the bracket below renders the effects conservative for the analysis.

The resulting moment is then compared with the available moment and substituted into a unity check on the standard to derive residual axial buckling capacity, which is in turn compared against the number of allowable lifts this will provide.

Frame Assessments

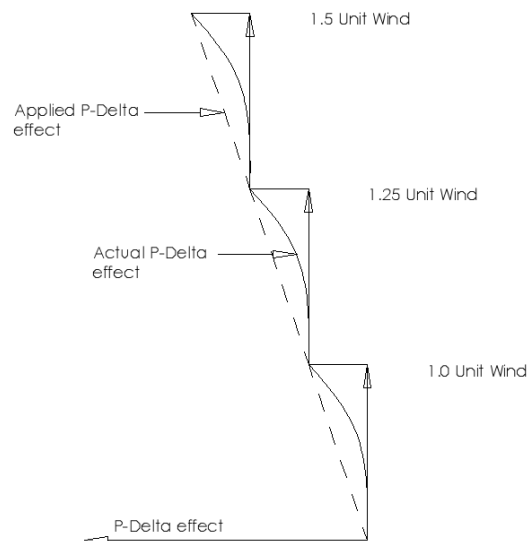
- The frames are modelled using software analysis. Geometric section properties are input as necessary, with the rotational stiffness of the ledger beam and single tube beam to standard joints included. This is represented as a spring stiffness applied to the node in the relevant axis of each of the joints.
- The frame is tied at every 2m lift height (the footlift is untied) and the short face parallel frame is also restrained with 45 degree wing braces to the front standards at every lift.

Treatment of Second Order ($P\Delta$) Effects

The analysis method is second order in compliance with the requirements of the code. This is carried out using the Newton Rhapsion Iterative Method and implemented by the frame analysis software.

As discussed previous, the moments are applied to all wind velocities below the value which they are produced by, i.e. the moment produced by a unit wind of 1.25 is used only between 1.0 and 1.25. Therefore actual moments are conservative at 1.0 and correct at 1.25.

The effect on the moments from second order effects will not be linear, instead resembling the figure below. It can therefore be seen that if the moment co-efficient, which is derived at the maximum wind pressure within the envelope (0-1.0 / 1.0-1.25 / 1.25-1.5) is applied linearly to values within the envelope, it will be conservative with respect to second order effects.



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Approved : IH

Long Face Parallel

S-Mech Ltd

Consulting Engineering

7 Windsor Road

Chorley, Lancashire, PR7 1LN

Project: 1502

Date: May-17

Data from frame analysis/calculation

Standard Moment Capacity	Moment Coeff up to 30m Height 1.0 Unit Wind	Moment Coeff up to 30m Height 1.25 x Unit Wind	Moment Coeff up to 30m Height 1.5 x Unit Wind	Standard Strut Capacity
1.403 kN.m (From Calculation)	0.65 (Analysis LC05)	0.81 (Analysis LC07)	0.97 (From Analysis LC09)	32.83 kN

q₀ values - In Country (kN/m²) (TG20:13)

Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
C _{pe,z}	1.98	2.274	2.462	2.65	2.798	2.946	3.046	3.098	3.15	3.206	3.262	3.318	3.374	3.43
S _{wind}	20	0.334	0.384	0.416	0.448	0.473	0.498	0.515	0.523	0.532	0.542	0.551	0.560	0.579
	24	0.482	0.553	0.599	0.645	0.681	0.717	0.741	0.754	0.766	0.780	0.793	0.807	0.821
	28	0.656	0.753	0.815	0.877	0.926	0.975	1.008	1.026	1.043	1.061	1.080	1.099	1.117
	32	0.856	0.983	1.065	1.146	1.210	1.274	1.317	1.340	1.362	1.386	1.411	1.435	1.463
	36	1.084	1.245	1.347	1.450	1.531	1.612	1.667	1.696	1.724	1.755	1.785	1.816	1.847
	40	1.338	1.536	1.664	1.791	1.891	1.991	2.058	2.093	2.128	2.166	2.204	2.242	2.280

In Country Resulting Moments (kN.m)

Max Moment coefficients=	0.65	0.81	0.97											
Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
S _{wind}	20	0.217	0.250	0.270	0.291	0.307	0.323	0.334	0.340	0.346	0.352	0.358	0.364	0.370
	24	0.313	0.360	0.389	0.419	0.442	0.466	0.482	0.498	0.507	0.516	0.525	0.533	0.542
	28	0.426	0.489	0.530	0.570	0.602	0.634	0.671	0.693	0.711	0.729	0.747	0.765	0.783
	32	0.557	0.639	0.682	0.728	0.760	0.792	0.824	0.845	0.860	0.875	0.890	0.905	0.920
	36	0.878	1.008	1.070	1.132	1.185	1.238	1.278	1.299	1.321	1.345	1.368	1.392	1.415
	40	1.298	1.490	1.614	1.737	1.834	1.931	1.996	2.030	2.065	2.101	2.138	2.175	2.211

In Country Residual Axial Capacity

Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
S _{wind}	20	27.74	26.99	26.50	26.02	25.64	25.26	25.00	24.87	24.74	24.59	24.45	24.31	24.16
	24	25.50	24.42	23.72	23.03	22.48	21.93	21.56	21.37	21.18	20.97	20.76	20.55	20.35
	28	22.86	21.38	20.43	19.49	18.74	17.99	17.32	16.81	16.39	16.06	15.71	15.36	15.01
	32	19.81	17.87	16.65	15.43	14.31	13.28	12.33	11.46	10.66	9.91	9.21	8.56	7.95
	36	12.29	9.24	7.25	-0.09	-1.93	-3.77	-5.01	-5.65	-6.30	-7.00	-7.69	-8.39	-9.08
	40	2.46	-2.04	-4.93	-7.81	-10.08	-12.35	-13.88	-14.68	-15.48	-16.34	-17.20	-18.06	-18.91

In Country

Maximum Allowable Height - Out of Service

Max Height (m)

S	
20	30
24	30
28	30
32	14
36	6
40	4

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Engineer : IH

Date : June 2017

Checked : IH

Approved : IH

q _b values - In Town (kN/m ²) (TG20:13)															
	Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	C _{o,z}	1.503	1.842	2.086	2.33	2.522	2.714	2.846	2.918	2.99	3.072	3.154	3.236	3.318	3.4
S _{wind}	20	0.254	0.311	0.352	0.394	0.426	0.458	0.481	0.493	0.505	0.519	0.533	0.547	0.560	0.574
	24	0.366	0.448	0.507	0.567	0.613	0.660	0.692	0.710	0.727	0.747	0.767	0.787	0.807	0.827
	28	0.498	0.610	0.691	0.771	0.835	0.899	0.942	0.966	0.990	1.017	1.044	1.071	1.099	1.126
	32	0.650	0.797	0.902	1.008	1.091	1.174	1.231	1.262	1.293	1.328	1.364	1.399	1.435	1.470
	36	0.823	1.008	1.142	1.275	1.380	1.485	1.558	1.597	1.636	1.681	1.726	1.771	1.816	1.861
	40	1.016	1.245	1.409	1.574	1.704	1.834	1.923	1.972	2.020	2.076	2.131	2.186	2.242	2.297

In Country Resulting Moments (kN.m)															
Max Mmt coefficient=		0.65	0.81	0.97											
Height, (m)		4	6	8	10	12	14	16	18	20	22	24	26	28	30
S _{wind}	20	0.165	0.202	0.229	0.256	0.277	0.298	0.312	0.320	0.328	0.337	0.346	0.355	0.364	0.373
	24	0.238	0.291	0.330	0.368	0.399	0.429	0.450	0.461	0.473	0.486	0.499	0.512	0.525	0.538
	28	0.323	0.396	0.449	0.501	0.543	0.584	0.612	0.628	0.643	0.824	0.846	0.868	0.890	0.912
	32	0.422	0.518	0.586	0.816	0.883	0.951	0.997	1.224	1.254	1.289	1.323	1.357	1.392	1.426
	36	0.535	0.817	0.925	1.237	1.339	1.441	1.511	1.549	1.587	1.631	1.674	1.718	1.761	1.805
	40	0.985	1.207	1.367	1.527	1.653	1.779	1.865	1.912	1.960	2.013	2.067	2.121	2.175	2.228

In Country Residual Axial Capacity															
	Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
S _{wind}	20	28.97	28.10	27.47	26.84	26.35	25.86	25.52	25.33	25.15	24.94	24.73	24.52	24.31	24.09
	24	27.27	26.02	25.11	24.21	23.50	22.79	22.30	22.03	21.77	21.46	21.16	20.86	20.55	20.25
	28	25.26	23.55	22.33	21.10	20.13	19.16	18.50	18.14	17.77	13.55	13.04	12.52	12.01	11.49
	32	22.94	20.71	19.11	13.73	12.16	10.59	9.50	4.19	3.48	2.68	1.87	1.07	0.26	-0.54
	36	20.32	13.72	11.19	3.89	1.50	-0.88	-2.52	-3.42	-4.31	-5.33	-6.35	-7.37	-8.39	-9.41
	40	9.78	4.58	0.84	-2.90	-5.85	-8.79	-10.82	-11.92	-13.03	-14.28	-15.54	-16.80	-18.06	-19.33

In Town	
Maximum Allowable Height - Out of Service	
	Max Height (m)
S	
20	30
24	30
28	30
32	16
36	10
40	6

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Project Ref : 1502

Engineer : IH

Date : June 2017

Checked : IH

Approved : IH

Short Face Parallel

S-Mech Ltd	Project:	1502
Consulting Engineering	Date:	May-17
7 Windsor Road		
Chorley, Lancashire, PR7 1LN		

Data from frame analysis/calculation				
Standard Moment Capacity	Moment Coeff up to 30m Height 1.0 Unit Wind	Moment Coeff up to 30m Height 1.25 x Unit Wind	Moment Coeff up to 30m Height 1.5 x Unit Wind	Standard Strut Capacity
1.403 kN.m	0.15	0.19	0.23	32.74 kN
[From Calculation]	[Analysis LC05]	[Analysis LC07]	[From Analysis LC09]	

q_b values - In Country (kn/m^2) (TG20:13)																	
	Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30		
	$C_{e,z}$	1.98	2.274	2.462	2.65	2.798	2.946	3.046	3.098	3.15	3.206	3.262	3.318	3.374	3.43		
S_{wind}	20	0.334	0.384	0.416	0.448	0.473	0.498	0.515	0.523	0.532	0.542	0.551	0.560	0.570	0.579		
	24	0.482	0.553	0.599	0.645	0.681	0.717	0.741	0.754	0.766	0.780	0.793	0.807	0.821	0.834		
	28	0.656	0.753	0.815	0.877	0.926	0.975	1.008	1.026	1.043	1.061	1.080	1.099	1.117	1.136		
	32	0.856	0.983	1.065	1.146	1.210	1.274	1.317	1.340	1.362	1.386	1.411	1.435	1.459	1.483		
	36	1.084	1.245	1.347	1.450	1.531	1.612	1.667	1.696	1.724	1.755	1.785	1.816	1.847	1.877		
	40	1.338	1.536	1.664	1.791	1.891	1.991	2.058	2.093	2.128	2.166	2.204	2.242	2.280	2.318		

In Country Resulting Moments (kN.m)															
Max Moment coefficients= 0.15 0.19 0.23															
Height, (m)		4	6	8	10	12	14	16	18	20	22	24	26	28	30
S _{wind}	20	0.050	0.058	0.062	0.067	0.071	0.075	0.077	0.078	0.080	0.081	0.083	0.084	0.085	0.087
	24	0.072	0.083	0.090	0.097	0.102	0.107	0.111	0.113	0.115	0.117	0.119	0.121	0.123	0.125
	28	0.098	0.113	0.122	0.132	0.139	0.146	0.192	0.195	0.198	0.202	0.205	0.209	0.212	0.216
	32	0.128	0.148	0.202	0.218	0.230	0.242	0.303	0.308	0.313	0.319	0.324	0.330	0.336	0.341
	36	0.206	0.236	0.310	0.334	0.352	0.371	0.383	0.390	0.397	0.404	0.411	0.418	0.425	0.432
	40	0.308	0.353	0.383	0.412	0.435	0.458	0.473	0.481	0.490	0.498	0.507	0.516	0.524	0.532
	44	0.408	0.468	0.508	0.548	0.583	0.613	0.638	0.658	0.673	0.688	0.703	0.718	0.733	0.748

[illegible]

In Country			
Maximum Allowable Height - Out of Service			
	Max Height (m)		
\$			
20	30		
24	30		
28	30		
32	30		
36	30		
40	30		

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Date : June 2017

Checked : IH

Approved : IH

q _s values - In Town (kN/m ²) (TG20:13)														
Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
C _{ez}	1.503	1.842	2.086	2.33	2.522	2.714	2.846	2.918	2.99	3.072	3.154	3.236	3.318	3.4
S _{wind}	20	0.254	0.311	0.352	0.394	0.426	0.458	0.481	0.493	0.505	0.519	0.533	0.547	0.574
	24	0.366	0.448	0.507	0.567	0.613	0.660	0.692	0.710	0.727	0.747	0.767	0.787	0.827
	28	0.498	0.610	0.691	0.771	0.835	0.899	0.942	0.966	0.990	1.017	1.044	1.071	1.126
	32	0.650	0.797	0.902	1.008	1.091	1.174	1.231	1.262	1.293	1.328	1.364	1.399	1.470
	36	0.823	1.008	1.142	1.275	1.380	1.485	1.558	1.597	1.636	1.681	1.726	1.771	1.861
	40	1.016	1.245	1.409	1.574	1.704	1.834	1.923	1.972	2.020	2.076	2.131	2.186	2.297

In Country Resulting Moments (kN.m)														
Max Mmt coefficient=		0.15	0.19	0.23										
Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
S _{wind}	20	0.038	0.047	0.053	0.059	0.064	0.069	0.072	0.074	0.076	0.078	0.080	0.082	0.086
	24	0.055	0.067	0.076	0.085	0.092	0.099	0.104	0.106	0.109	0.112	0.115	0.118	0.124
	28	0.075	0.091	0.104	0.116	0.125	0.135	0.141	0.145	0.148	0.153	0.158	0.164	0.171
	32	0.097	0.119	0.135	0.151	0.167	0.182	0.194	0.204	0.212	0.220	0.228	0.236	0.245
	36	0.123	0.152	0.177	0.203	0.227	0.250	0.270	0.287	0.302	0.316	0.329	0.342	0.356
	40	0.234	0.286	0.324	0.362	0.392	0.422	0.442	0.453	0.465	0.477	0.490	0.503	0.528

In Country Residual Axial Capacity														
Height, (m)	4	6	8	10	12	14	16	18	20	22	24	26	28	30
S _{wind}	20	31.85	31.65	31.51	31.36	31.25	31.14	31.06	31.01	30.97	30.92	30.88	30.83	30.78
	24	31.46	31.17	30.96	30.76	30.59	30.43	30.32	30.26	30.19	30.12	30.05	29.98	29.91
	28	31.00	30.61	30.32	30.04	29.82	29.59	29.44	29.36	29.27	29.23	29.11	29.04	28.97
	32	30.46	29.95	29.58	29.27	28.90	28.54	28.28	28.07	27.90	27.75	27.61	27.46	27.35
	36	29.86	29.27	28.68	28.09	27.33	26.77	26.38	26.17	25.96	25.72	25.48	25.23	25.04
	40	27.29	26.06	25.18	24.29	23.59	22.90	22.42	22.16	21.90	21.60	21.30	21.00	20.71

In Town	
Maximum Allowable Height - Out of Service	
Max Height (m)	
20	30
24	30
28	30
32	30
36	30
40	30

S-Mech Consulting Engineering

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Project Ref : 1502

Engineer : IH

Date : June 2017

Checked : IH

Approved : IH

Appendix A – Section Analysis

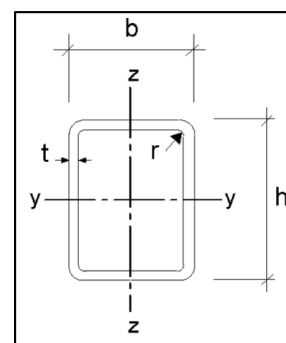
S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Entrance Step	Project#: 1502 Section: RHS-SHS Material: Steel Code: BS EN 1993-1
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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

<u>Section:</u>	<u>30 20 2 SHS</u>
Outside Height	30 mm
Inside Height	26 mm
Outside Width	20 mm
Inside Width	16 mm
Thickness	2 mm
Py	235 N/mm ²
Area	184 mm ²
I _{yy}	21565 mm ⁴
I _{zz}	11125 mm ⁴
R _{yy}	10.8 mm
R _{zz}	7.8 mm
Z _{yy}	1437.68889 mm ³
Z _{zz}	1112.53333 mm ³
S _{yy}	1796 mm ³
Weight	0.014 kN/m



Elastic Modulus

Plastic Modulus

3.0 Section Classification

Modification Factor $\varepsilon = \sqrt{(235/f_y)}$

$\varepsilon = 1$

d/t= 13

b/t= 10

Section Classification =	Side	Class 1
	Flange	Class 1

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4.0 Axial Capacity

Axial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 43.24 \text{ kN}$$

Permissible Axial Force =	26.21 kN	Ignoring Buckling
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Buckling Mode Reduction Factor } (\chi) = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad \text{For cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	0.984	0.984	0.984	0.984	0.984
ϕ	1.176	1.176	1.176	1.176	1.176
χ	0.549	0.549	0.549	0.549	0.549
$N_{b,Rd}$ (kN)	23.76	23.76	23.76	23.76	23.76
Permissible Axial Force (kN)	14.40	14.40	14.40	14.40	14.40

Axial Buckling Capacities z-z Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	1.370	1.370	1.370	1.370	1.370
ϕ	1.724	1.724	1.724	1.724	1.724
χ	0.361	0.361	0.361	0.361	0.361
$N_{b,Rd}$ (kN)	15.60	15.60	15.60	15.60	15.60
Permissible Axial Force (kN)	9.45	9.45	9.45	9.45	9.45

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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 43.24 \text{ kN}$$

Permissible Tensile Force =	26.21 kN
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6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.42 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.34 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.26 \text{ kN.m} \quad \text{Elastic Only}$$

Permissible Moment y-y =	0.26 kN.m	Class 1
Permissible Moment z-z =	0.16 kN.m	Elastic

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For RHS Section Shear Area } (A_v) = \frac{Ah}{(b+h)}$$

with load parallell to depth

$$\text{Shear Area } (A_v) = 110 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 14.98 \text{ kN}$$

Permissible Shear Resistance =	9.08 kN
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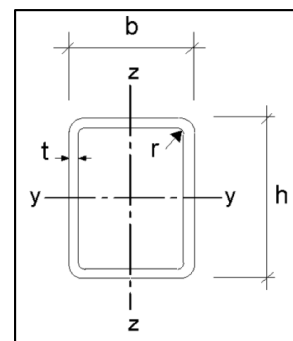
S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Entrance Step	Project#: 1502 Section: RHS-SHS Material: Steel Code: BS EN 1993-1
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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

<u>Section:</u>	<u>30 30 2 SHS</u>
Outside Height	30 mm
Inside Height	26 mm
Outside Width	30 mm
Inside Width	26 mm
Thickness	2 mm
Py	275 N/mm ²
Area	224 mm ²
I_{yy}	29419 mm ⁴
I_{zz}	29419 mm ⁴
R_{yy}	11.5 mm
R_{zz}	11.5 mm
Z_{yy}	1961.24444 mm ³
Z_{zz}	1961.24444 mm ³
S_{yy}	2356 mm ³
Weight	0.017 kN/m



Elastic Modulus

Plastic Modulus

3.0 Section Classification

Modification Factor ε =	$\sqrt{(235/f_y)}$
ε =	0.924416
d/t=	13
b/t=	15

Section Classification =	Side	Class 1
	Flange	Class 1

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4.0 Axial Capacity

Axial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 61.60 \text{ kN}$$

Permissible Axial Force =	37.33 kN	Ignoring Buckling
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Buckling Mode Reduction Factor } (\chi) = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \varepsilon$$

$$\varepsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad \text{For cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	1.005	1.005	1.005	1.005	1.005
ϕ	1.203	1.203	1.203	1.203	1.203
χ	0.537	0.537	0.537	0.537	0.537
$N_{b,Rd}$ (kN)	33.07	33.07	33.07	33.07	33.07
Permissible Axial Force (kN)	20.04	20.04	20.04	20.04	20.04

Axial Buckling Capacities z-z Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	1.005	1.005	1.005	1.005	1.005
ϕ	1.203	1.203	1.203	1.203	1.203
χ	0.537	0.537	0.537	0.537	0.537
$N_{b,Rd}$ (kN)	33.07	33.07	33.07	33.07	33.07
Permissible Axial Force (kN)	20.04	20.04	20.04	20.04	20.04

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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 61.60 \text{ kN}$$

Permissible Tensile Force =	37.33 kN
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6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.65 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.54 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.54 \text{ kN.m} \quad \text{Elastic Only}$$

Permissible Moment y-y =	0.39 kN.m	Class 1
Permissible Moment z-z =	0.33 kN.m	Elastic

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For RHS Section Shear Area } (A_v) = \frac{A h}{(b+h)}$$

with load parallell to depth

$$\text{Shear Area } (A_v) = 112 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 17.78 \text{ kN}$$

Permissible Shear Resistance =	10.78 kN
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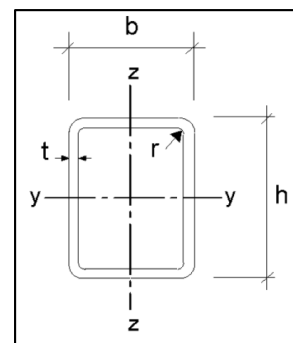
S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Entrance Step	Project#: 1502 Section: RHS-SHS Material: Steel Code: BS EN 1993-1
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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

<u>Section:</u>	<u>60 30 2 SHS</u>
Outside Height	60 mm
Inside Height	56 mm
Outside Width	30 mm
Inside Width	26 mm
Thickness	2 mm
Py	235 N/mm ²
Area	344 mm ²
I _{yy}	159499 mm ⁴
I _{zz}	52979 mm ⁴
R _{yy}	21.5 mm
R _{zz}	12.4 mm
Z _{yy}	5316.62222 mm ³
Z _{zz}	3531.91111 mm ³
S _{yy}	6616 mm ³
Weight	0.027 kN/m



Elastic Modulus

Plastic Modulus

3.0 Section Classification

Modification Factor $\varepsilon = \sqrt{(235/f_y)}$

$\varepsilon = 1$

d/t= 28

b/t= 15

Section Classification =	Side	Class 1
	Flange	Class 1

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4.0 Axial Capacity

Axial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 80.84 \text{ kN}$$

$$\text{Permissible Axial Force} = 48.99 \text{ kN} \quad \text{Ignoring Buckling}$$

Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Buckling Mode Reduction Factor } (\chi) = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad \text{For cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	0.495	0.495	0.495	0.495	0.495
ϕ	0.694	0.694	0.694	0.694	0.694
χ	0.846	0.846	0.846	0.846	0.846
$N_{b,Rd}$ (kN)	68.39	68.39	68.39	68.39	68.39
Permissible Axial Force (kN)	41.45	41.45	41.45	41.45	41.45

Axial Buckling Capacities z-z Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	0.858	0.858	0.858	0.858	0.858
ϕ	1.029	1.029	1.029	1.029	1.029
χ	0.626	0.626	0.626	0.626	0.626
$N_{b,Rd}$ (kN)	50.58	50.58	50.58	50.58	50.58
Permissible Axial Force (kN)	30.66	30.66	30.66	30.66	30.66

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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 80.84 \text{ kN}$$

Permissible Tensile Force =	48.99 kN
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6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 1.55 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 1.25 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.83 \text{ kN.m} \quad \text{Elastic Only}$$

Permissible Moment y-y =	0.94 kN.m	Class 1
Permissible Moment z-z =	0.50 kN.m	Elastic

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For RHS Section Shear Area } (A_v) = \frac{A h}{(b+h)}$$

with load parallell to depth

$$\text{Shear Area } (A_v) = 229 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 31.12 \text{ kN}$$

Permissible Shear Resistance =	18.86 kN
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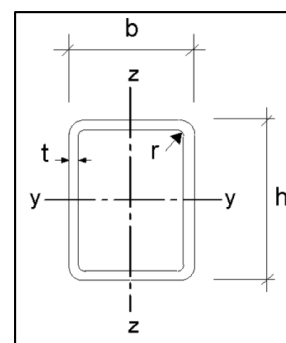
S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Landing Platform	Project#: 1502 Section: RHS-SHS Material: Steel Code: BS EN 1993-1
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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

<u>Section:</u>	<u>30 20 3 SHS</u>
Outside Height	30 mm
Inside Height	24 mm
Outside Width	20 mm
Inside Width	14 mm
Thickness	3 mm
Py	235 N/mm ²
Area	264 mm ²
I_{yy}	28872 mm ⁴
I_{zz}	14512 mm ⁴
R_{yy}	10.5 mm
R_{zz}	7.4 mm
Z_{yy}	1924.8 mm ³
Z_{zz}	1451.2 mm ³
S_{yy}	2484 mm ³
Weight	0.021 kN/m



Elastic Modulus

Plastic Modulus

3.0 Section Classification

Modification Factor $\varepsilon = \sqrt{(235/f_y)}$

$\varepsilon = 1$

$d/t = 8$

$b/t = 7$

Section Classification =	Side	Class 1
	Flange	Class 1

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4.0 Axial Capacity

Axial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 62.04 \text{ kN}$$

Permissible Axial Force =	37.60 kN	Ignoring Buckling
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Buckling Mode Reduction Factor } (\chi) = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad \text{For cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	1.018	1.018	1.018	1.018	1.018
ϕ	1.219	1.219	1.219	1.219	1.219
χ	0.529	0.529	0.529	0.529	0.529
$N_{b,Rd}$ (kN)	32.84	32.84	32.84	32.84	32.84
Permissible Axial Force (kN)	19.90	19.90	19.90	19.90	19.90

Axial Buckling Capacities z-z Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	1.436	1.436	1.436	1.436	1.436
ϕ	1.835	1.835	1.835	1.835	1.835
χ	0.336	0.336	0.336	0.336	0.336
$N_{b,Rd}$ (kN)	20.85	20.85	20.85	20.85	20.85
Permissible Axial Force (kN)	12.64	12.64	12.64	12.64	12.64

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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 62.04 \text{ kN}$$

Permissible Tensile Force =	37.60 kN
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6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.58 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.45 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.34 \text{ kN.m} \quad \text{Elastic Only}$$

Permissible Moment y-y =	0.35 kN.m	Class 1
Permissible Moment z-z =	0.21 kN.m	Elastic

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For RHS Section Shear Area } (A_v) = \frac{Ah}{(b+h)}$$

with load parallell to depth

$$\text{Shear Area } (A_v) = 158 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 21.49 \text{ kN}$$

Permissible Shear Resistance =	13.03 kN
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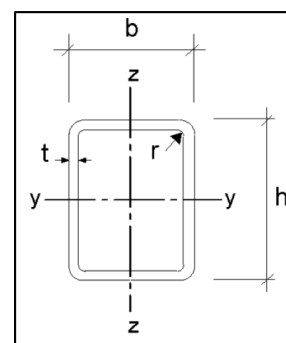
S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Landing Platform	Project#: 1502 Section: RHS-SHS Material: Steel Code: BS EN 1993-1
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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

<u>Section:</u>	<u>60 30 2 SHS</u>
Outside Height	60 mm
Inside Height	56 mm
Outside Width	30 mm
Inside Width	26 mm
Thickness	2 mm
Py	275 N/mm ²
Area	344 mm ²
I_{yy}	159499 mm ⁴
I_{zz}	52979 mm ⁴
R_{yy}	21.5 mm
R_{zz}	12.4 mm
Z_{yy}	5316.62222 mm ³
Z_{zz}	3531.91111 mm ³
S_{yy}	6616 mm ³
Weight	0.027 kN/m



Elastic Modulus

Plastic Modulus

3.0 Section Classification

Modification Factor ε =	$\sqrt{(235/f_y)}$
ε =	0.924416
d/t=	28
b/t=	15

Section Classification =	Side	Class 1
	Flange	Class 1

S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Landing Platform	Project#: 1502 Section: RHS-SHS Material: Steel Code: BS EN 1993-1
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4.0 Axial Capacity

Axial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 94.60 \text{ kN}$$

$$\text{Permissible Axial Force} = 57.33 \text{ kN} \quad \text{Ignoring Buckling}$$

Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Buckling Mode Reduction Factor } (\chi) = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad \text{For cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	0.535	0.535	0.535	0.535	0.535
ϕ	0.725	0.725	0.725	0.725	0.725
χ	0.823	0.823	0.823	0.823	0.823
$N_{b,Rd}$ (kN)	77.88	77.88	77.88	77.88	77.88
Permissible Axial Force (kN)	47.20	47.20	47.20	47.20	47.20

Axial Buckling Capacities z-z Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	0.928	0.928	0.928	0.928	0.928
ϕ	1.109	1.109	1.109	1.109	1.109
χ	0.583	0.583	0.583	0.583	0.583
$N_{b,Rd}$ (kN)	55.11	55.11	55.11	55.11	55.11
Permissible Axial Force (kN)	33.40	33.40	33.40	33.40	33.40

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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 94.60 \text{ kN}$$

Permissible Tensile Force =	57.33 kN
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6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 1.82 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 1.46 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.97 \text{ kN.m} \quad \text{Elastic Only}$$

Permissible Moment y-y =	1.10 kN.m	Class 1
Permissible Moment z-z =	0.59 kN.m	Elastic

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For RHS Section Shear Area } (A_v) = \frac{Ah}{(b+h)}$$

with load parallel to depth

$$\text{Shear Area } (A_v) = 229 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 36.41 \text{ kN}$$

Permissible Shear Resistance =	22.07 kN
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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

Section : 30 x 8

Width	30 mm	
Thickness	8 mm	
P_y	235 N/mm ²	
Area	240 mm ²	
I_{yy}	18000 mm ⁴	
I_{zz}	1280 mm ⁴	
R_{yy}	8.66 mm	
R_{zz}	2.31 mm	
Z_{yy}	1200 mm ³	Elastic Modulus
Z_{zz}	320 mm ³	
S_{yy}	1800 mm ³	Plastic Modulus
S_{zz}	480 mm ³	
Weight	0.019 kN/m	
E	205000 N/mm ²	
G	78840 N/mm ²	
Torsional Constant Factor	0.333	
I_t	5114.88 mm ⁴	Torsion Constant
I_w	0 mm ⁴	Enter 0 to ignore warping constant for conservative design of flats

3.0 Section Classification

Modification Factor $\epsilon = \sqrt{(235/f_y)}$

$\epsilon = 1$

$d/t = 3.75$

Section Classification = Class 1

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Ledger Beam

Project#: 1502

Section: FLAT

Material: Steel

Code: BS EN 1993-1

4.0 Axial CapacityAxial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 56.40 \text{ kN}$$

$$\text{Permissible Axial Force} = 34.18 \text{ kN} \quad \text{Ignoring Buckling}$$

Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

Buckling Mode Reduction Factor

$$\chi = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{l L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis

Effective Length (mm)	1000	1000	1000	1000	1000
λ	1.230	1.230	1.230	1.230	1.230
ϕ	1.508	1.508	1.508	1.508	1.508
χ	0.420	0.420	0.420	0.420	0.420
$N_{b,Rd}$ (kN)	23.68	23.68	23.68	23.68	23.68
Permissible Axial Force (kN)	14.35	14.35	14.35	14.35	14.35

Axial Buckling Capacities z-z Axis

Effective Length (mm)	1000	1000	1000	1000	1000
λ	4.611	4.611	4.611	4.611	4.611
ϕ	12.213	12.213	12.213	12.213	12.213
χ	0.043	0.043	0.043	0.043	0.043
$N_{b,Rd}$ (kN)	2.40	2.40	2.40	2.40	2.40
Permissible Axial Force (kN)	1.45	1.45	1.45	1.45	1.45

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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 56.40 \text{ kN}$$

$$\text{Permissible Tensile Force} = 34.18 \text{ kN}$$

6.0 Section Bending Capacity

Fully restrained against lateral torsional buckling:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.42 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.28 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.08 \text{ kN.m} \quad \text{Elastic Only}$$

$$\begin{array}{lll} \text{Permissible Moment y-y} = & 0.17 \text{ kN.m} & \text{Class 1} \\ \text{Permissible Moment z-z} = & 0.05 \text{ kN.m} & \text{Elastic} \end{array}$$

Lateral Torsional Buckling (Class 1/2 only)

$$\begin{array}{lll} \text{Length between restraints } (L_{cr}) = & 150 & \\ \text{Moment shape factor } (C_1) = & 2.752 & \\ \text{Imperfection Factor } (\alpha_{LT}) = & 0.76 & (0.76 \text{ for all sections other than I Sections}) \\ (\lambda_{LT,0}) = & 0.4 & (0.4 \text{ Max}) \\ (\beta) = & 0.75 & (0.75 \text{ Min}) \end{array}$$

$$\chi_{LT} = (\phi_{LT} + \sqrt{(\phi_{LT}^2 - \beta \lambda_{LT}^2)})^{-1} = 1.000 (<1)$$

$$\phi_{LT} = 0.5 [1 + \alpha_{LT} (\lambda_{LT} - \lambda_{LT,0}) + \beta \lambda_{LT}^2] = 0.466$$

$$\lambda_{LT} = 0.877 \times \sqrt{(f_y L_h / E I_T^2)} = 0.249 \text{ (to IStructE Guide)}$$

$$M_{cr} = \frac{\pi^2 E I_z}{L_{cr}^2} \left| \frac{I_w}{I_z} + \frac{L_{cr}^2 G I_T}{\pi^2 E I_z} \right|^{0.5} = 6.81 \text{ kN.m}$$

$$\begin{array}{ll} \text{Permissible Moment y-y} = & 0.171 \text{ kN.m} \\ \text{(Allowing for lateral torsional buckling)} & \end{array}$$

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Consulting Engineering

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Ledger Beam

Project#: 1502

Section: FLAT

Material: Steel

Code: BS EN 1993-1

7.0 Section Shear Capacity

Section Shear Resistance ($V_{pl,Rd}$) =
$$\frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

Allow Section Shear Area (A_v) =
$$dt$$

Shear Area (A_v) =
$$240 \quad \text{mm}^2$$

Section Shear Resistance ($V_{pl,Rd}$) =
$$32.56 \quad \text{kN}$$

Permissible Shear Resistance =
$$19.73 \quad \text{kN}$$

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Ledger Beam

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

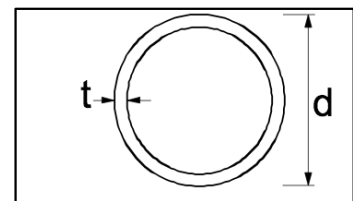
1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

Section : 34 x 2.5 CHS

Outside Dia.	34 mm
Inside Dia.	29 mm
Thickness	2.5 mm
Py	235 N/mm ²
Area	247.4 mm ²
Tube I_{yy}	30878.7 mm ⁴
R_{yy}	11.17 mm
R_{zz}	11.17 mm
Z_{yy}	1816 mm ³
S_{xx}	2486 mm ³
Weight	0.019 kN/m

**3.0 Section Classification**Modification Factor $\varepsilon = \sqrt{(235/f_y)}$

$$\varepsilon = 1$$

$$\varepsilon^2 = 1$$

$$d/t = 13.6$$

Section Classification = Class 1

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Ledger Beam

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

4.0 Axial CapacityAxial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity } N_{c,Rd} = 58.14 \quad \text{kN}$$

Permissible Axial Force =	35.24 kN	(Ignoring Buckling)
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

Buckling Mode Reduction Factor
(χ) =
(NB. $\chi \leq 1$)

$$\frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}}$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad 0.49 \text{ for cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities

Effective Length (mm)	2175	1500	1000	1000	1000	1000	1000
λ	2.073	1.430	0.953	0.953	0.953	0.953	0.953
ϕ	3.108	1.824	1.139	1.139	1.139	1.139	1.139
χ	0.184	0.338	0.568	0.568	0.568	0.568	0.568
$N_{b,Rd}$ (kN)	10.72	19.67	32.99	32.99	32.99	32.99	32.99
Permissible Axial Force (kN)	6.50	11.92	20.00	20.00	20.00	20.00	20.00

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Ledger Beam

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 58.14 \text{ kN}$$

$$\text{Permissible Tensile Force} = 35.24 \text{ kN}$$

6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{c,Rd}) = \frac{W_{pl} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Sections}$$

$$\frac{W_{el,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 0.58 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 0.43 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Permissible Moment} = 0.354 \text{ kN.m} \quad \text{Class 1}$$

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For CHS Section Shear Area } (A_v) = 2A/\pi$$

$$\text{Shear Area } (A_v) = 158 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 21.37 \text{ kN}$$

$$\text{Permissible Shear Resistance} = 12.95 \text{ kN}$$

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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

Section : 60 x 8

Width	60 mm	
Thickness	8 mm	
P_y	235 N/mm ²	
Area	480 mm ²	
I_{yy}	144000 mm ⁴	
I_{zz}	2560 mm ⁴	
R_{yy}	17.32 mm	
R_{zz}	2.31 mm	
Z_{yy}	4800 mm ³	Elastic Modulus
Z_{zz}	640 mm ³	
S_{yy}	7200 mm ³	Plastic Modulus
S_{zz}	960 mm ³	
Weight	0.037 kN/m	
E	205000 N/mm ²	
G	78840 N/mm ²	
Torsional Constant Factor	0.333	
I_t	10229.76 mm ⁴	Torsion Constant
I_w	0 mm ⁴	Enter 0 to ignore warping constant for conservative design of flats

3.0 Section Classification

Modification Factor $\epsilon = \sqrt{(235/f_y)}$

$\epsilon = 1$

$d/t = 7.5$

Section Classification = Class 1

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4.0 Axial Capacity

Axial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 112.80 \text{ kN}$$

Permissible Axial Force =	68.36 kN	Ignoring Buckling
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Buckling Mode Reduction Factor } (\chi) = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	0.615	0.615	0.615	0.615	0.615
ϕ	0.791	0.791	0.791	0.791	0.791
χ	0.777	0.777	0.777	0.777	0.777
$N_{b,Rd}$ (kN)	87.59	87.59	87.59	87.59	87.59
Permissible Axial Force (kN)	53.09	53.09	53.09	53.09	53.09

Axial Buckling Capacities z-z Axis					
Effective Length (mm)	1000	1000	1000	1000	1000
λ	4.611	4.611	4.611	4.611	4.611
ϕ	12.213	12.213	12.213	12.213	12.213
χ	0.043	0.043	0.043	0.043	0.043
$N_{b,Rd}$ (kN)	4.80	4.80	4.80	4.80	4.80
Permissible Axial Force (kN)	2.91	2.91	2.91	2.91	2.91

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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 112.80 \text{ kN}$$

$$\text{Permissible Tensile Force} = 68.36 \text{ kN}$$

6.0 Section Bending Capacity

Fully restrained against lateral torsional buckling:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 1.69 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 1.13 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.15 \text{ kN.m} \quad \text{Elastic Only}$$

Permissible Moment y-y =	0.68 kN.m	Class 1
Permissible Moment z-z =	0.09 kN.m	Elastic

Lateral Torsional Buckling (Class 1/2 only)

$$\begin{aligned} \text{Length between restraints } (L_{cr}) &= 150 \\ \text{Moment shape factor } (C_1) &= 2.752 \\ \text{Imperfection Factor } (\alpha_{LT}) &= 0.76 \quad (0.76 \text{ for all sections other than I Sections}) \\ (\lambda_{LT,0}) &= 0.4 \quad (0.4 \text{ Max}) \\ (\beta) &= 0.75 \quad (0.75 \text{ Min}) \end{aligned}$$

$$\chi_{LT} = (\phi_{LT} + \sqrt{(\phi_{LT}^2 - \beta \lambda_{LT}^2)})^{-1} = 1.000 (<1)$$

$$\phi_{LT} = 0.5 [1 + \alpha_{LT} (\lambda_{LT} - \lambda_{LT,0}) + \beta \lambda_{LT}^2] = 0.528$$

$$\lambda_{LT} = 0.877 \times \sqrt{(f_y L_h / E I_T^2)} = 0.352 \quad (\text{to IStructE Guide})$$

$$M_{cr} = \frac{\pi^2 E I_z}{L_{cr}^2} \left| \frac{I_w}{I_z} + \frac{L_{cr}^2 G I_T}{\pi^2 E I_z} \right|^{0.5} = 13.63 \text{ kN.m}$$

Permissible Moment y-y =	0.684 kN.m
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(Allowing for lateral torsional buckling)

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7.0 Section Shear Capacity

Section Shear Resistance ($V_{pl,Rd}$) =	$\frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$
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Allow Section Shear Area (A_v) =	dt
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Shear Area (A_v) =	480 mm ²
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Section Shear Resistance ($V_{pl,Rd}$) =	65.13 kN
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Permissible Shear Resistance =	39.47 kN
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Stair Guard Rail

Project#: 1502

Section: CHS

Material: Steel

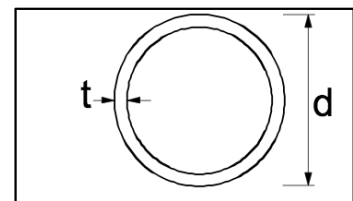
Code: BS EN 1993-1

1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section PropertiesSection : 27 x 2.0 CHS

Outside Dia.	27 mm
Inside Dia.	23 mm
Thickness	2 mm
Py	235 N/mm ²
Area	157.1 mm ²
Tube I_{yy}	12350.4 mm ⁴
R_{yy}	8.87 mm
R_{zz}	8.87 mm
Z_{yy}	915 mm ³
S_{xx}	1253 mm ³
Weight	0.012 kN/m

**3.0 Section Classification**Modification Factor $\varepsilon = \sqrt{(235/f_y)}$

$$\varepsilon = 1$$

$$\varepsilon^2 = 1$$

$$d/t = 13.5$$

Section Classification = Class 1

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Stair Guard Rail

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

4.0 Axial CapacityAxial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity } N_{c,Rd} = 36.91 \text{ kN}$$

Permissible Axial Force =	22.37 kN	(Ignoring Buckling)
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

Buckling Mode Reduction Factor
(χ) =
(NB. $\chi \leq 1$)

$$\frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}}$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad 0.49 \text{ for cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities

Effective Length (mm)	2175	1000	1000	1000	1000	1000	1000
λ	2.612	1.201	1.201	1.201	1.201	1.201	1.201
ϕ	4.503	1.466	1.466	1.466	1.466	1.466	1.466
χ	0.122	0.433	0.433	0.433	0.433	0.433	0.433
$N_{b,Rd}$ (kN)	4.52	15.99	15.99	15.99	15.99	15.99	15.99
Permissible Axial Force (kN)	2.74	9.69	9.69	9.69	9.69	9.69	9.69

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Stair Guard Rail

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 36.91 \text{ kN}$$

$$\text{Permissible Tensile Force} = 22.37 \text{ kN}$$

6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{c,Rd}) = \frac{W_{pl} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Sections}$$

$$\frac{W_{el,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 0.29 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 0.21 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Permissible Moment} = 0.178 \text{ kN.m} \quad \text{Class 1}$$

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For CHS Section Shear Area } (A_v) = 2A/\pi$$

$$\text{Shear Area } (A_v) = 100 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 13.57 \text{ kN}$$

$$\text{Permissible Shear Resistance} = 8.22 \text{ kN}$$

S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Stair Guard Rail	Project#: 1502 Section: FLAT Material: Steel Code: BS EN 1993-1
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1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

Section :	35 x 6	
Width	35 mm	
Thickness	6 mm	
P_y	235 N/mm ²	
Area	210 mm ²	
I_{yy}	21438 mm ⁴	
I_{zz}	630 mm ⁴	
R_{yy}	10.10 mm	
R_{zz}	1.73 mm	
Z_{yy}	1225 mm ³	Elastic Modulus
Z_{zz}	210 mm ³	
S_{yy}	1837.5 mm ³	Plastic Modulus
S_{zz}	315 mm ³	
Weight	0.016 kN/m	
E	205000 N/mm ²	
G	78840 N/mm ²	
Torsional Constant Factor	0.333	
I_t	2517.48 mm ⁴	Torsion Constant
I_w	0 mm ⁴	Enter 0 to ignore warping constant for conservative design of flats

3.0 Section Classification

Modification Factor ϵ =	$\sqrt{(235/f_y)}$
ϵ =	1
d/t=	5.833333

Section Classification =	Class 1
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Stair Guard Rail

Project#: 1502

Section: FLAT

Material: Steel

Code: BS EN 1993-1

4.0 Axial CapacityAxial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 49.35 \text{ kN}$$

$$\text{Permissible Axial Force} = 29.91 \text{ kN} \quad \text{Ignoring Buckling}$$

Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

Buckling Mode Reduction Factor

$$\chi = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}} \quad (\text{NB. } \chi \leq 1)$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{l L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis

Effective Length (mm)	1000	1000	1000	1000	1000
λ	1.054	1.054	1.054	1.054	1.054
ϕ	1.265	1.265	1.265	1.265	1.265
χ	0.509	0.509	0.509	0.509	0.509
$N_{b,Rd}$ (kN)	25.13	25.13	25.13	25.13	25.13
Permissible Axial Force (kN)	15.23	15.23	15.23	15.23	15.23

Axial Buckling Capacities z-z Axis

Effective Length (mm)	1000	1000	1000	1000	1000
λ	6.149	6.149	6.149	6.149	6.149
ϕ	20.860	20.860	20.860	20.860	20.860
χ	0.025	0.025	0.025	0.025	0.025
$N_{b,Rd}$ (kN)	1.21	1.21	1.21	1.21	1.21
Permissible Axial Force (kN)	0.73	0.73	0.73	0.73	0.73

S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Stair Guard Rail	Project#: 1502 Section: FLAT Material: Steel Code: BS EN 1993-1
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5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 49.35 \text{ kN}$$

$$\text{Permissible Tensile Force} = 29.91 \text{ kN}$$

6.0 Section Bending Capacity

Fully restrained against lateral torsional buckling:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{pl,y} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{el,y,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.43 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.29 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.05 \text{ kN.m} \quad \text{Elastic Only}$$

$$\begin{array}{lll} \text{Permissible Moment y-y} = & 0.17 \text{ kN.m} & \text{Class 1} \\ \text{Permissible Moment z-z} = & 0.03 \text{ kN.m} & \text{Elastic} \end{array}$$

Lateral Torsional Buckling (Class 1/2 only)

$$\begin{array}{lll} \text{Length between restraints } (L_{cr}) = & 150 & \\ \text{Moment shape factor } (C_1) = & 2.752 & \\ \text{Imperfection Factor } (\alpha_{LT}) = & 0.76 & (0.76 \text{ for all sections other than I Sections}) \\ (\lambda_{LT,0}) = & 0.4 & (0.4 \text{ Max}) \\ (\beta) = & 0.75 & (0.75 \text{ Min}) \end{array}$$

$$\chi_{LT} = (\phi_{LT} + \sqrt{(\phi_{LT}^2 - \beta \lambda_{LT}^2)})^{-1} = 1.000 (<1)$$

$$\phi_{LT} = 0.5 [1 + \alpha_{LT} (\lambda_{LT} - \lambda_{LT,0}) + \beta \lambda_{LT}^2] = 0.532$$

$$\lambda_{LT} = 0.877 \times \sqrt{(f_y L_h / E I_T^2)} = 0.359 \text{ (to IStructE Guide)}$$

$$M_{cr} = \frac{\pi^2 E I_z}{L_{cr}^2} \left| \frac{I_w}{I_z} + \frac{L_{cr}^2 G I_T}{\pi^2 E I_z} \right|^{0.5} = 3.35 \text{ kN.m}$$

$$\begin{array}{ll} \text{Permissible Moment y-y} = & 0.174 \text{ kN.m} \\ \text{(Allowing for lateral torsional buckling)} & \end{array}$$

S-Mech Ltd.

Consulting Engineering

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Stair Guard Rail

Project#: 1502

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Material: Steel

Code: BS EN 1993-1

7.0 Section Shear Capacity

Section Shear Resistance ($V_{pl,Rd}$) = $\frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$

Allow Section Shear Area (A_v) = dt

Shear Area (A_v) = 210 mm²

Section Shear Resistance ($V_{pl,Rd}$) = 28.49 kN

Permissible Shear Resistance = 17.27 kN

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Guard Rail Frame

Project#: 1502

Section: CHS

Material: Steel

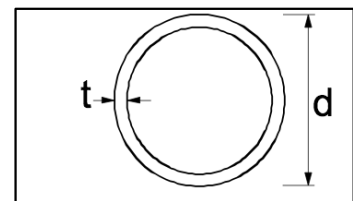
Code: BS EN 1993-1

1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section PropertiesSection : 27 x 2.5 CHS

Outside Dia.	27 mm
Inside Dia.	22 mm
Thickness	2.5 mm
Py	235 N/mm ²
Area	192.4 mm ²
Tube I_{yy}	14588.0 mm ⁴
R_{yy}	8.71 mm
R_{zz}	8.71 mm
Z_{yy}	1081 mm ³
S_{xx}	1506 mm ³
Weight	0.015 kN/m

**3.0 Section Classification**Modification Factor $\varepsilon = \sqrt{(235/f_y)}$

$$\varepsilon = 1$$

$$\varepsilon^2 = 1$$

$$d/t = 10.8$$

Section Classification = Class 1

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Guard Rail Frame

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

4.0 Axial CapacityAxial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity } N_{c,Rd} = 45.22 \text{ kN}$$

Permissible Axial Force =	27.41 kN	(Ignoring Buckling)
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

Buckling Mode Reduction Factor
(χ) =
(NB. $\chi \leq 1$)

$$\frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}}$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad 0.49 \text{ for cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities

Effective Length (mm)	3000	1500	1600	1000	1000	1000	1000
λ	3.669	1.835	1.957	1.223	1.223	1.223	1.223
ϕ	8.082	2.583	2.845	1.499	1.499	1.499	1.499
χ	0.065	0.227	0.204	0.423	0.423	0.423	0.423
$N_{b,Rd}$ (kN)	2.96	10.27	9.21	19.12	19.12	19.12	19.12
Permissible Axial Force (kN)	1.79	6.23	5.58	11.59	11.59	11.59	11.59

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Guard Rail Frame

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 45.22 \text{ kN}$$

$$\text{Permissible Tensile Force} = 27.41 \text{ kN}$$

6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{c,Rd}) = \frac{W_{pl} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Sections}$$

$$\frac{W_{el,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 0.35 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 0.25 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Permissible Moment} = 0.214 \text{ kN.m} \quad \text{Class 1}$$

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For CHS Section Shear Area } (A_v) = 2A/\pi$$

$$\text{Shear Area } (A_v) = 123 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 16.62 \text{ kN}$$

$$\text{Permissible Shear Resistance} = 10.07 \text{ kN}$$

S-Mech Ltd.**Consulting Engineering**Suite 9, Railway House,
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Guard Rail Frame

Project#: 1502

Section: PFC/RSC

Material: Steel

Code: BS EN 1993-1

1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

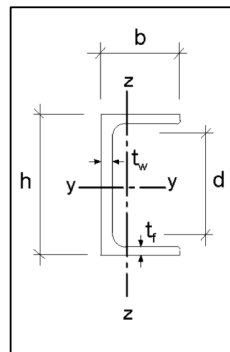
2.0 Section Properties

Section :

30 50 1.5 PFC

Outside Height (h)	30 mm
Web Inside Height	27 mm
Flange Width (b)	50 mm
Inside Flange Width	48.5 mm
Thickness (t)	1.5 mm
Py	235 N/mm ²
Area	191 mm ²
I _{yy}	32948 mm ⁴
I _{zz}	50001 mm ⁴
R _{yy}	13.15 mm
R _{zz}	16.20 mm
Neutral Axis on y	15.00 mm
Neutral Axis on Z	19.84 mm
Z _{yy}	2197 mm ³
Z _{zz}	1658 mm ³
S _{yy}	2410.875 mm ³
Weight	0.015 kN/m
E	205000 N/mm ²
G	78840 N/mm ²
I _t	142.03125 mm ⁴
I _w	0 mm ⁴

Ignoring Radii



Btm left corner as zero point

Elastic Modulus

Plastic Modulus

Torsion Constant

Enter 0 to ignore warping constant

3.0 Section ClassificationModification Factor $\varepsilon = \sqrt{(235/f_y)}$ $\varepsilon = 1$

d/t= 18

b/t= 32

Section Classification =

Web Class 1

Flange Refer to EC3-1-6

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Guard Rail Frame

Project#: 1502

Section: PFC/RSC

Material: Steel

Code: BS EN 1993-1

4.0 Axial CapacityAxial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity} = 44.77 \text{ kN}$$

$$\text{Permissible Axial Force} = 27.13 \text{ kN} \quad \text{Ignoring Buckling}$$

Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Buckling Mode Reduction Factor } (\chi) = \frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}}$$

(NB. $\chi \leq 1$)

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \varepsilon$$

$$\varepsilon = \sqrt{235/f_{ty}}$$

$$\alpha = 0.49$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities y-y Axis					
Effective Length (mm)	500	1000	1000	1000	1000
λ	0.405	0.810	0.810	0.810	0.810
ϕ	0.632	0.977	0.977	0.977	0.977
χ	0.895	0.656	0.656	0.656	0.656
$N_{b,Rd}$ (kN)	40.05	29.37	29.37	29.37	29.37
Permissible Axial Force (kN)	24.28	17.80	17.80	17.80	17.80

Axial Buckling Capacities z-z Axis					
Effective Length (mm)	500	1000	1000	1000	1000
λ	0.329	0.657	0.657	0.657	0.657
ϕ	0.586	0.828	0.828	0.828	0.828
χ	0.934	0.751	0.751	0.751	0.751
$N_{b,Rd}$ (kN)	41.83	33.62	33.62	33.62	33.62
Permissible Axial Force (kN)	25.35	20.37	20.37	20.37	20.37

5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 44.77 \text{ kN}$$

$$\text{Permissible Tensile Force} = 27.13 \text{ kN}$$

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Guard Rail Frame

Project#: 1502

Section: PFC/RSC

Material: Steel

Code: BS EN 1993-1

6.0 Section Bending CapacityFully restrained against lateral torsional buckling:

$$\text{Section Bending Resistance } (M_{cy,Rd}) = \frac{W_{ply} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Section}$$

$$\frac{W_{ely,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = \frac{W_{el,z} f_y}{\gamma_{M0}} \quad \text{Elastic Only}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.57 \quad \text{kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{cy,Rd}) = 0.52 \quad \text{kN.m} \quad \text{Class 3}$$

$$\text{Section Bending Resistance } (M_{cz,Rd}) = 0.39 \quad \text{kN.m} \quad \text{Elastic Only}$$

Permissible Moment y-y =	0.31	kN.m	Class 3
Permissible Moment z-z =	0.24	kN.m	Elastic

Lateral Torsional Buckling (Class 1/2 only)

$$\begin{aligned} \text{Length between restraints } (L_{cr}) &= 600 \\ \text{Moment shape factor } (C_1) &= 1.127 \\ \text{Imperfection Factor } (\alpha_{LT}) &= 0.76 \quad (0.76 \text{ for all sections other than I Sections}) \\ (\lambda_{LT,0}) &= 0.4 \quad (0.4 \text{ Max}) \\ (\beta) &= 0.75 \quad (0.75 \text{ Min}) \end{aligned}$$

$$\chi_{LT} = (\phi_{LT} + \sqrt{(\phi_{LT}^2 - \beta \lambda_{LT}^2)})^{-1} = 0.890 (<1)$$

$$\phi_{LT} = 0.5 [1 + \alpha_{LT} (\lambda_{LT} \lambda_{LT,0}) + \beta \lambda_{LT}^2] = 0.657$$

$$\lambda_{LT} = \sqrt{(W_{y,y} / C_1 M_{cr})} = 0.532$$

$$M_{cr} = \frac{\pi^2 E I_z}{L_{cr}^2} \left| \frac{I_w + \frac{L_{cr}^2 G I_t}{\pi^2 E I_z}}{I_z} \right|^{0.5} = 1.77 \text{ kN.m}$$

Permissible Moment y-y =	0.278 kN.m
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(Allowing for lateral torsional buckling)

S-Mech Ltd. Consulting Engineering Suite 9, Railway House, Railway Road, Chorley, PR6 0HW	Guard Rail Frame	Project#: 1502 Section: PFC/RSC Material: Steel Code: BS EN 1993-1
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7.0 Section Shear Capacity

Section Shear Resistance ($V_{pl,Rd}$) = $\frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$

For PFC Section Shear Area (A_v) = dt

Shear Area (A_v) = 41 mm²

Section Shear Resistance ($V_{pl,Rd}$) = 5.49 kN

Permissible Shear Resistance =	3.33 kN
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Single Tube Beam

Project#: 1502

Section: CHS

Material: Steel

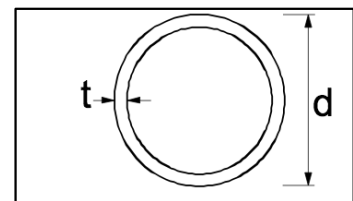
Code: BS EN 1993-1

1.0 Global Partial Factors

Cross Section Partial Factor (γ_{M0})	1
Material Partial Factor (γ_m) =	1.1
Load Partial Factor (γ_f) =	1.5

2.0 Section Properties

Section :	<u>48.3 x 3.0 CHS</u>
Outside Dia.	48.3 mm
Inside Dia.	42.3 mm
Thickness	3 mm
Py	235 N/mm ²
Area	426.9 mm ²
Tube I_{yy}	109995.8 mm ⁴
R_{yy}	16.05 mm
R_{zz}	16.05 mm
Z_{yy}	4555 mm ³
S_{xx}	6165 mm ³
Weight	0.033 kN/m

**3.0 Section Classification**Modification Factor $\varepsilon = \sqrt{(235/f_y)}$

$$\varepsilon = 1$$

$$\varepsilon^2 = 1$$

$$d/t = 16.1$$

Section Classification = Class 1

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Single Tube Beam

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

4.0 Axial CapacityAxial Capacity Ignoring Buckling

$$\text{Max Capacity } N_{c,Rd} = \frac{A f_y}{\gamma_{M0}} \quad (\text{For Class 1,2,3 Sections})$$

$$\text{Max Capacity } N_{c,Rd} = 100.33 \text{ kN}$$

Permissible Axial Force =	60.81 kN	(Ignoring Buckling)
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Buckling Capacity

$$\text{Buckling Capacity } (N_{b,Rd}) = \frac{\chi A f_y}{\gamma_{M1}} \quad (\text{For Class 1,2,3 Sections})$$

Buckling Mode Reduction Factor
(χ) =
(NB. $\chi \leq 1$)

$$\frac{1}{\phi + \sqrt{\phi^2 - \lambda^2}}$$

$$\phi = 0.5 [1 + \alpha (\lambda - 0.2) + \lambda^2]$$

$$\lambda = \frac{1 L_{cr}}{i \lambda_1}$$

$$\lambda_1 = 93.9 \epsilon$$

$$\epsilon = \sqrt{235/f_y}$$

$$\alpha = 0.49 \quad 0.49 \text{ for cold rolled hollow sects}$$

$$i = \text{Rad of gyration on relevant axis}$$

Axial Buckling Capacities

Effective Length (mm)	2175	1000	1000	1000	1000	1000	1000
λ	1.443	0.663	0.663	0.663	0.663	0.663	0.663
ϕ	1.846	0.834	0.834	0.834	0.834	0.834	0.834
χ	0.334	0.747	0.747	0.747	0.747	0.747	0.747
$N_{b,Rd}$ (kN)	33.48	74.96	74.96	74.96	74.96	74.96	74.96
Permissible Axial Force (kN)	20.29	45.43	45.43	45.43	45.43	45.43	45.43

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Single Tube Beam

Project#: 1502

Section: CHS

Material: Steel

Code: BS EN 1993-1

5.0 Tensile Capacity

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = \frac{A f_y}{\gamma_{M0}}$$

$$\text{Tensile Design Plastic Resistance } N_{pl,Rd} = 100.33 \text{ kN}$$

$$\text{Permissible Tensile Force} = 60.81 \text{ kN}$$

6.0 Section Bending Capacity

Section is not susceptible to lateral torsional buckling therefore:

$$\text{Section Bending Resistance } (M_{c,Rd}) = \frac{W_{pl} f_y}{\gamma_{M0}} \quad \text{Class 1/2 Sections}$$

$$\frac{W_{el,min} f_y}{\gamma_{M0}} \quad \text{Class 3 Sections}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 1.45 \text{ kN.m} \quad \text{Class 1/2}$$

$$\text{Section Bending Resistance } (M_{c,Rd}) = 1.07 \text{ kN.m} \quad \text{Class 3}$$

$$\text{Permissible Moment} = 0.878 \text{ kN.m} \quad \text{Class 1}$$

7.0 Section Shear Capacity

$$\text{Section Shear Resistance } (V_{pl,Rd}) = \frac{A_v(f_y/\sqrt{3})}{\gamma_{M0}}$$

$$\text{For CHS Section Shear Area } (A_v) = 2A/\pi$$

$$\text{Shear Area } (A_v) = 272 \text{ mm}^2$$

$$\text{Section Shear Resistance } (V_{pl,Rd}) = 36.88 \text{ kN}$$

$$\text{Permissible Shear Resistance} = 22.35 \text{ kN}$$

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Tel 01257 367 580 email info@s-mech.co.uk www.s-mech.co.uk

Project Ref : 1502

Engineer : IH

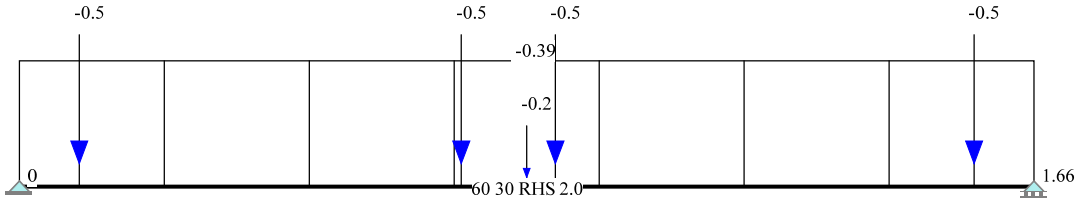
Date : June 2017

Checked : IH

Approved : IH

Appendix B – Component Check Outputs

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Load Diagram - Load Case 001 - All Groups - XYNM Loads

Frame Geometry - (Full Frame) - Front View

Not to Scale

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MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D1	Dead Load
Load Group D2	Dead Load
Load Group L1	Live Load
Load Group L2	Live Load
Load Group L3	Live Load
Load Group L5	Live Load
Load Group L6	Live Load
Load Group L7	Live Load

Load Case 001 : D plus 1.0 UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L1

Load Case 002 : D plus 1.5 kN PL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L2

Load Case 003 : D plus 2.0 kN UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L3

Load Case 004 : D only

Load Combination + 1.00 UT + 1.00 D1

Load Case 005 : D + landing + one flight only

Load Combination + 1.00 UT + 1.00 D2 + 1.00 L5

Load Case 006 : D only single flight

Load Combination + 1.00 UT + 1.00 D2

Load Case 007 : D plus max platform UDL (Stair D only)

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L6

Load Case 008 : D Plus 1.6 UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L7

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000	2	1.660	0.000	0.000

Member Properties**Member 1**

M	60 30 RHS 2.0 [I	E 210E6	G 81E6
A 3.44E-4	Ix 15.95E-8	Iy 52.98E-8	J 31.9E-8

Member Loading**Member 1**

D1 UDLY	-000.085	(kN/m)
L1 UDLY	-000.300	(kN/m)
D1 PY	-000.103 0.098	(kN,m)
L1 PY	-000.362 0.098	(kN,m)
D1 PY	-000.103 0.723	(kN,m)
L1 PY	-000.362 0.723	(kN,m)
D1 PY	-000.186 0.830	(kN,m)
D1 PY	-000.103 0.877	(kN,m)
L1 PY	-000.362 0.877	(kN,m)
D1 PY	-000.103 1.562	(kN,m)
L1 PY	-000.362 1.562	(kN,m)

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L2	PY	-001.500	0.830	(kN, m)
L3	PY	-000.724	0.098	(kN, m)
L3	PY	-000.724	0.723	(kN, m)
L3	PY	-000.724	0.877	(kN, m)
L3	PY	-000.724	1.562	(kN, m)
L3	UDLY	-000.600		(kN/m)
L5	PY	-000.362	0.098	(kN, m)
L5	PY	-000.362	0.723	(kN, m)
L5	UDLY	-000.300		(kN/m)
D2	UDLY	-000.085		(kN/m)
D2	PY	-000.103	0.098	(kN, m)
D2	PY	-000.103	0.723	(kN, m)
D2	PY	-000.142	0.830	(kN, m)
L6	UDLY	-002.400		(kN/m)
L7	UDLY	-000.480		(kN/m)
L7	PY	-000.362	0.098	(kN, m)
L7	PY	-000.362	0.723	(kN, m)
L7	PY	-000.362	0.877	(kN, m)
L7	PY	-000.362	1.562	(kN, m)

Nodal Loading and Support Conditions

NODE 1

UT Rs 1 1 1 0 0 0 (Pinned)

NODE 2

UT Rs 0 1 0 0 0 0

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Nodal Deflections Serviceability (001 : D plus 1.0 UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.52	0.00	2	0.00	0.00	0.51	0.00

Nodal Deflections Serviceability (002 : D plus 1.5 kN PL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.60	0.00	2	0.00	0.00	0.60	0.00

Nodal Deflections Serviceability (003 : D plus 2.0 kN UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.87	0.00	2	0.00	0.00	0.86	0.00

Nodal Deflections Serviceability (004 : D only)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.16	0.00	2	0.00	0.00	0.16	0.00

Nodal Deflections Serviceability (005 : D + landing + one flight only)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.35	0.00	2	0.00	0.00	0.32	0.00

Nodal Deflections Serviceability (006 : D only single flight)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.11	0.00	2	0.00	0.00	0.10	0.00

Nodal Deflections Serviceability (007 : D plus max platform UDL (Stair D only))

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.94	0.00	2	0.00	0.00	0.94	0.00

Member Forces (001 : D plus 1.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.000C 0.000C	1.359 -1.326	0.000 0.000	0.606 0.830 @	4.740 0.830 @

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Member Forces (002 : D plus 1.5 kN PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.000C 0.000C	1.123 -1.116	0.000 0.000	@ 0.817 0.830	@ 5.728 0.830

Member Forces (003 : D plus 2.0 kN UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.000C 0.000C	2.345 -2.286	0.000 0.000	@ 1.017 0.830	@ 8.018 0.830

Member Forces (004 : D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.000C 0.000C	0.373 -0.366	0.000 0.000	@ 0.194 0.830	@ 1.461 0.830

Member Forces (005 : D + landing + one flight only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.000C 0.000C	1.091 -0.621	0.000 0.000	@ 0.397 0.723	@ 3.068 0.812

Member Forces (006 : D only single flight)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.000C 0.000C	0.297 -0.192	0.000 0.000	@ 0.130 0.812	@ 0.993 0.812

Member Forces (007 : D plus max platform UDL (Stair D only))

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.000C 0.000C	2.365 -2.358	0.000 0.000	@ 1.021 0.830	@ 8.544 0.830

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Support Reactions Serviceability (001 : D plus 1.0 UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	1.359	0.000	2	0.000	1.326	0.000
Total	0.000	2.685	0.000				

Support Reactions Serviceability (002 : D plus 1.5 kN PL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	1.123	0.000	2	0.000	1.116	0.000
Total	0.000	2.239	0.000				

Support Reactions Serviceability (003 : D plus 2.0 kN UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	2.345	0.000	2	0.000	2.286	0.000
Total	0.000	4.631	0.000				

Support Reactions Serviceability (004 : D only)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	0.373	0.000	2	0.000	0.366	0.000
Total	0.000	0.739	0.000				

Support Reactions Serviceability (005 : D + landing + one flight only)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	1.091	0.000	2	0.000	0.621	0.000
Total	0.000	1.711	0.000				

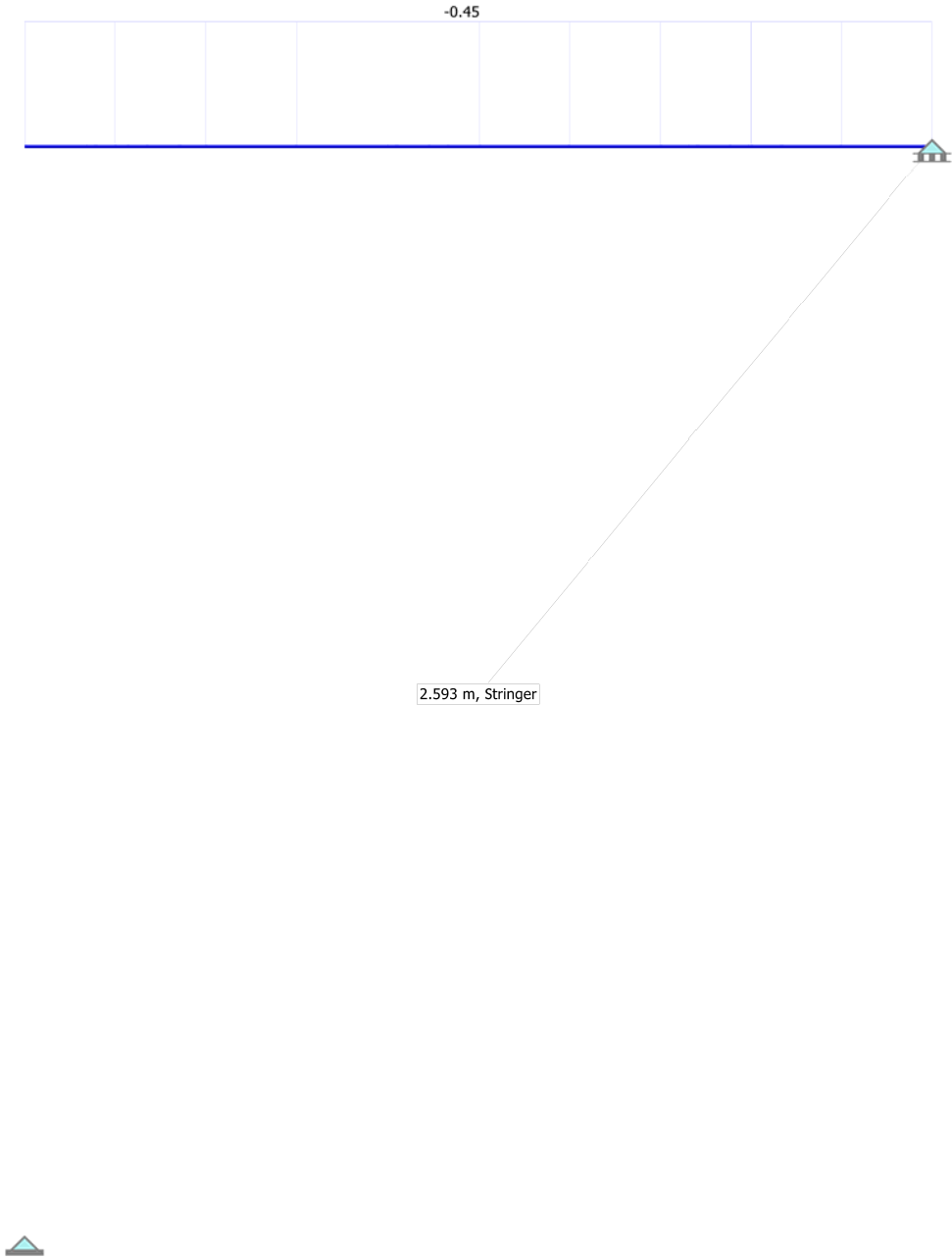
Support Reactions Serviceability (006 : D only single flight)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	0.297	0.000	2	0.000	0.192	0.000
Total	0.000	0.489	0.000				

Support Reactions Serviceability (007 : D plus max platform UDL (Stair D only))

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	2.365	0.000	2	0.000	2.358	0.000
Total	0.000	4.723	0.000				

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Load Diagram - Load Case 001 - All Groups - XYNM Loads

Frame Geometry - (Full Frame) - Front View

Not to Scale

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MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D1	Dead Load
Load Group L1	Live Load
Load Group L2	Live Load
Load Group L3	Live Load

Load Case 001 : D plus 1.0 UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L1

Load Case 002 : D plus 1.5 kN PL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L2

Load Case 003 : D plus 2.0 UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L3

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000	2	1.650	2.000	0.000

Member Properties**Member 1**

M	Stringer []	E 210E6	G 81E6	
A 2.4E-4	Ix 56.26E-8	Iy 2.597E-8	J 112.5E-8	

Member Loading**Member 1**

D1 UDL	-000.098	(kN/m)
L1 UDL	-000.355	(kN/m)
L2 PY	-001.500 1.296	(kN,m)
L3 UDL	-000.710	(kN/m)

Nodal Loading and Support Conditions**NODE 1**

UT Rs 1 1 1 0 0 0 (Pinned)

NODE 2

UT Rs 0 1 0 0 0 0

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Nodal Deflections Serviceability (001 : D plus 1.0 UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
2	0.00	0.00	0.06	0.00					

Nodal Deflections Serviceability (002 : D plus 1.5 kN PL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
2	0.00	0.00	0.21	0.00					

Nodal Deflections Serviceability (003 : D plus 2.0 UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
2	0.00	0.00	0.12	0.00					

Member Forces (001 : D plus 1.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.288C 0.288T	0.238 -0.238	0.000 0.000	@ 0.154 1.245	@ 0.913 1.296

Member Forces (002 : D plus 1.5 kN PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.641C 0.641T	0.529 -0.529	0.000 0.000	@ 0.652 1.296	@ 3.131 1.296

Member Forces (003 : D plus 2.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	1 2	0.514C 0.514T	0.424 -0.424	0.000 0.000	@ 0.275 1.245	@ 1.629 1.296

Support Reactions Serviceability (001 : D plus 1.0 UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	$R_x \rightarrow$ (kN)	$R_y \uparrow$ (kN)	$M_z \nearrow$ (kN.m)		$R_x \rightarrow$ (kN)	$R_y \uparrow$ (kN)	$M_z \nearrow$ (kN.m)
1 Total	0.000 0.000	0.374 0.747	0.000 0.000	2	0.000	0.374	0.000

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Support Reactions Serviceability (002 : D plus 1.5 kN PL)

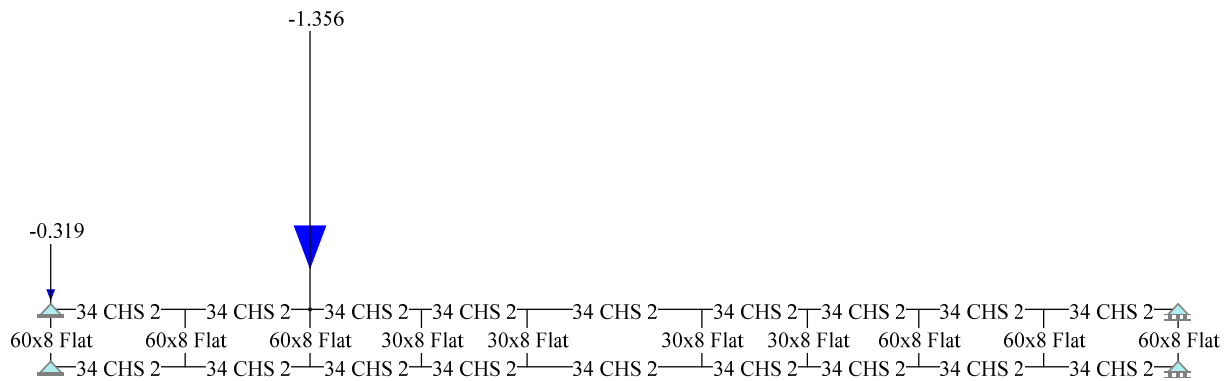
Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	0.831	0.000	2	0.000	0.831	0.000
Total	0.000	1.662	0.000				

Support Reactions Serviceability (003 : D plus 2.0 UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↻ (kN.m)
1	0.000	0.667	0.000	2	0.000	0.667	0.000
Total	0.000	1.333	0.000				

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MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D0	Dead Load
Load Group D1	Dead Load
Load Group D2	Dead Load
Load Group D3	Dead Load
Load Group L1	Live Load
Load Group L2	Live Load
Load Group L3	Live Load
Load Group L4	Live Load
Load Group L5	Live Load
Load Group L6	Live Load
Load Group L7	Live Load
Load Group L8	Live Load
Load Group L9	Live Load
Load Group A1	Dead Load

Load Case 001 : D Plus 1.0 UDL

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D1 + 1.00 L1

Load Case 002 : D Plus 2.0 UDL

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D1 + 1.00 L2

Load Case 003 : D Plus 1.5 kN PL

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D1 + 1.00 L3

Load Case 004 : D only

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D1

Load Case 005 : 1.0 L UDL Only

Load Combination + 1.00 UT + 1.00 L1

Load Case 006 : Single FLight Adjacent

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D2 + 1.00 L4

Load Case 007 : Single Flight Opposite

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D3 + 1.00 L5

Load Case 008 : Sinlge flight adj D only

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D2

Load Case 009 : Single flight opposite D only

Load Combination + 1.00 UT + 1.00 D0 + 1.00 D3

Load Case 010 : Max SWL CPL A

Load Combination + 1.00 UT + 1.00 D0 + 1.00 L6

Load Case 011 : MAX SWL CPL B

Load Combination + 1.00 UT + 1.00 D0 + 1.00 L7

Load Case 012 : Max SWL 2PL A

Load Combination + 1.00 UT + 1.00 D0 + 1.00 L8

Load Case 013 : MAX SWL 2PL B

Load Combination + 1.00 UT + 1.00 D0 + 1.00 L9

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Load Case 014 : Max SWL UDL

Load Combination + 1.00 UT + 1.00 D0 + 1.00 A1

Load Case 015 : D Plus 1.6 UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 A1

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000	2	0.350	0.000	0.000
3	0.675	0.000	0.000	4	0.965	0.000	0.000
5	1.240	0.000	0.000	6	1.695	0.000	0.000
7	1.970	0.000	0.000	8	2.260	0.000	0.000
9	2.585	0.000	0.000	10	2.935	0.000	0.000
11	0.000	0.140	0.000	12	0.350	0.140	0.000
13	0.675	0.140	0.000	14	0.965	0.140	0.000
15	1.240	0.140	0.000	16	1.695	0.140	0.000
17	1.970	0.140	0.000	18	2.260	0.140	0.000
19	2.585	0.140	0.000	20	2.935	0.140	0.000

Member Properties**Members 1-9 and 20-28**

M 34 CHS 2 [] E 210E6 G 81E6
A 2.47E-4 Ix 3.088E-8 Iy 3.088E-8 J 6.176E-8

Members 10-12 and 17-19

M 60x8 Flat [S 275]
A 4.8E-4 Ix 14.4E-8 Iy 0.256E-8 J 1.02E-8
E 205.0E6 G 78.85E6

Members 13-16

M 30x8 Flat [S 275]
A 2.4E-4 Ix 1.8E-8 Iy 0.128E-8 J 0.51E-8
E 205.0E6 G 78.85E6

Member Loading

Member Self Weight Density Load Included in Load Group D0, defined by Modulus of Elasticity

E kN/mm ²	Density kN/m ³
>= 200.00	77.01
>= 20.00	24.00
>= 2.00	10.00

Members 1-4 and 6-9

A1 UDLY -001.600 (kN/m)

Member 5

L6 PY -002.000 0.228 (kN,m)
A1 UDLY -001.600 (kN/m)

Nodal Loading and Support Conditions**NODE 11**

D1 Ls +0000.000 -0000.070 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

D1 Ls +0000.000 -0000.370 +0000.000 +0000.000 +0000.000 +0000.000

NODE 11

L1 Ls +0000.000 -0000.249 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

L1 Ls +0000.000 -0000.986 +0000.000 +0000.000 +0000.000 +0000.000

NODE 11

L2 Ls +0000.000 -0000.498 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

L2 Ls +0000.000 -0001.972 +0000.000 +0000.000 +0000.000 +0000.000

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NODE 13

L3 Ls +0000.000 -0001.500 +0000.000 +0000.000 +0000.000 +0000.000

NODE 11

L4 Ls +0000.000 -0000.249 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

L4 Ls +0000.000 -0000.794 +0000.000 +0000.000 +0000.000 +0000.000

NODE 11

D2 Ls +0000.000 -0000.070 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

D2 Ls +0000.000 -0000.300 +0000.000 +0000.000 +0000.000 +0000.000

NODE 11

L5 Ls +0000.000 -0000.249 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

L5 Ls +0000.000 -0000.428 +0000.000 +0000.000 +0000.000 +0000.000

NODE 11

D3 Ls +0000.000 -0000.070 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

D3 Ls +0000.000 -0000.190 +0000.000 +0000.000 +0000.000 +0000.000

NODE 15

L7 Ls +0000.000 -0001.900 +0000.000 +0000.000 +0000.000 +0000.000

NODES 14 and 17

L8 Ls +0000.000 -0001.700 +0000.000 +0000.000 +0000.000 +0000.000

NODES 13 and 18

L9 Ls +0000.000 -0002.500 +0000.000 +0000.000 +0000.000 +0000.000

NODE 11

G1 Ls +0000.000 -0000.398 +0000.000 +0000.000 +0000.000 +0000.000

NODE 13

G1 Ls +0000.000 -0001.135 +0000.000 +0000.000 +0000.000 +0000.000

NODES 1 and 11

UT Rs 1 1 1 0 0 0

NODES 10 and 20

UT Rs 0 1 0 0 0 0 (Vertical Restraint)

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Nodal Deflections Serviceability (001 : D Plus 1.0 UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.02	-0.45	-0.02	0.45
3	-0.01	-0.85	-0.02	0.85	4	0.00	-0.88	0.00	0.88
5	0.00	-0.85	0.01	0.85	6	0.02	-0.67	0.02	0.67
7	0.02	-0.54	0.02	0.54	8	0.03	-0.39	0.02	0.40
9	0.03	-0.22	0.03	0.22	10	0.03	0.00	0.03	0.03
11	0.00	0.00	-0.01	0.00	12	0.02	-0.45	-0.02	0.45
13	0.01	-0.85	-0.02	0.85	14	0.00	-0.88	0.00	0.88
15	0.00	-0.85	0.01	0.85	16	-0.02	-0.67	0.02	0.67
17	-0.02	-0.54	0.02	0.54	18	-0.03	-0.39	0.02	0.40
19	-0.03	-0.22	0.03	0.22	20	-0.03	0.00	0.03	0.03

Nodal Deflections Serviceability (002 : D Plus 2.0 UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.03	-0.76	-0.04	0.76
3	-0.02	-1.43	-0.03	1.43	4	-0.01	-1.48	0.00	1.48
5	0.01	-1.41	0.02	1.41	6	0.03	-1.08	0.04	1.08
7	0.04	-0.87	0.04	0.87	8	0.05	-0.63	0.04	0.63
9	0.05	-0.34	0.04	0.35	10	0.05	0.00	0.04	0.05
11	0.00	0.00	-0.01	0.00	12	0.03	-0.76	-0.04	0.76
13	0.02	-1.44	-0.03	1.44	14	0.01	-1.48	0.00	1.48
15	-0.01	-1.41	0.02	1.41	16	-0.03	-1.08	0.04	1.08
17	-0.04	-0.87	0.04	0.87	18	-0.05	-0.63	0.04	0.63
19	-0.05	-0.34	0.04	0.35	20	-0.05	0.00	0.04	0.05

Nodal Deflections Serviceability (003 : D Plus 1.5 kN PL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.02	-0.61	-0.03	0.61
3	-0.02	-1.16	-0.02	1.16	4	-0.01	-1.19	0.00	1.19
5	0.01	-1.14	0.01	1.14	6	0.02	-0.88	0.03	0.88
7	0.03	-0.71	0.03	0.71	8	0.04	-0.52	0.03	0.52
9	0.04	-0.28	0.04	0.28	10	0.04	0.00	0.04	0.04
11	0.00	0.00	-0.01	0.00	12	0.02	-0.61	-0.03	0.61
13	0.02	-1.16	-0.02	1.16	14	0.01	-1.19	0.00	1.19
15	-0.01	-1.14	0.01	1.14	16	-0.02	-0.88	0.03	0.88
17	-0.03	-0.71	0.03	0.71	18	-0.04	-0.52	0.03	0.52
19	-0.04	-0.28	0.04	0.28	20	-0.04	0.00	0.04	0.04

Nodal Deflections Serviceability (004 : D only)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	0.00	0.00	2	-0.01	-0.14	-0.01	0.14
3	-0.01	-0.27	-0.01	0.27	4	0.00	-0.29	0.00	0.29
5	0.00	-0.29	0.00	0.29	6	0.01	-0.25	0.01	0.25
7	0.01	-0.21	0.01	0.21	8	0.01	-0.16	0.01	0.16
9	0.01	-0.09	0.01	0.09	10	0.01	0.00	0.01	0.01
11	0.00	0.00	0.00	0.00	12	0.01	-0.14	-0.01	0.14
13	0.01	-0.27	-0.01	0.27	14	0.00	-0.29	0.00	0.29
15	0.00	-0.29	0.00	0.29	16	-0.01	-0.25	0.01	0.25

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Nodal Deflections Serviceability (004 : D only)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
17	-0.01	-0.21	0.01	0.21	18	-0.01	-0.16	0.01	0.16
19	-0.01	-0.09	0.01	0.09	20	-0.01	0.00	0.01	0.01

Nodal Deflections Serviceability (005 : 1.0 L UDL Only)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	0.00	0.00	2	-0.01	-0.31	-0.02	0.31
3	-0.01	-0.58	-0.01	0.58	4	0.00	-0.59	0.00	0.59
5	0.00	-0.56	0.01	0.56	6	0.01	-0.41	0.01	0.41
7	0.01	-0.33	0.02	0.33	8	0.02	-0.24	0.02	0.24
9	0.02	-0.13	0.02	0.13	10	0.02	0.00	0.02	0.02
11	0.00	0.00	0.00	0.00	12	0.01	-0.31	-0.02	0.31
13	0.01	-0.58	-0.01	0.58	14	0.00	-0.59	0.00	0.59
15	0.00	-0.56	0.01	0.56	16	-0.01	-0.41	0.01	0.41
17	-0.01	-0.33	0.02	0.33	18	-0.02	-0.24	0.02	0.24
19	-0.02	-0.13	0.02	0.13	20	-0.02	0.00	0.02	0.02

Nodal Deflections Serviceability (006 : Single FLight Adjacent)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	0.00	0.00	2	-0.01	-0.37	-0.02	0.37
3	-0.01	-0.70	-0.01	0.70	4	0.00	-0.73	0.00	0.73
5	0.00	-0.70	0.01	0.70	6	0.01	-0.55	0.02	0.56
7	0.02	-0.45	0.02	0.45	8	0.02	-0.33	0.02	0.33
9	0.03	-0.18	0.02	0.18	10	0.03	0.00	0.02	0.03
11	0.00	0.00	0.00	0.00	12	0.01	-0.37	-0.02	0.37
13	0.01	-0.70	-0.01	0.70	14	0.00	-0.73	0.00	0.73
15	0.00	-0.70	0.01	0.70	16	-0.01	-0.55	0.02	0.56
17	-0.02	-0.45	0.02	0.45	18	-0.02	-0.33	0.02	0.33
19	-0.03	-0.18	0.02	0.18	20	-0.03	0.00	0.02	0.03

Nodal Deflections Serviceability (007 : Single Flight Opposite)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	0.00	0.00	2	-0.01	-0.22	-0.01	0.22
3	-0.01	-0.42	-0.01	0.42	4	0.00	-0.44	0.00	0.44
5	0.00	-0.43	0.00	0.43	6	0.01	-0.35	0.01	0.35
7	0.01	-0.29	0.01	0.29	8	0.01	-0.22	0.01	0.22
9	0.02	-0.12	0.01	0.12	10	0.02	0.00	0.02	0.02
11	0.00	0.00	0.00	0.00	12	0.01	-0.22	-0.01	0.22
13	0.01	-0.42	-0.01	0.42	14	0.00	-0.44	0.00	0.44
15	0.00	-0.43	0.00	0.43	16	-0.01	-0.35	0.01	0.35
17	-0.01	-0.29	0.01	0.29	18	-0.01	-0.22	0.01	0.22
19	-0.02	-0.12	0.01	0.12	20	-0.02	0.00	0.02	0.02

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Nodal Deflections Serviceability (008 : Sinlge flight adj D only)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	0.00	0.00	2	0.00	-0.12	-0.01	0.12
3	0.00	-0.23	0.00	0.23	4	0.00	-0.25	0.00	0.25
5	0.00	-0.25	0.00	0.25	6	0.00	-0.22	0.01	0.22
7	0.01	-0.19	0.01	0.19	8	0.01	-0.14	0.01	0.14
9	0.01	-0.08	0.01	0.08	10	0.01	0.00	0.01	0.01
11	0.00	0.00	0.00	0.00	12	0.00	-0.12	-0.01	0.12
13	0.00	-0.23	0.00	0.23	14	0.00	-0.25	0.00	0.25
15	0.00	-0.25	0.00	0.25	16	0.00	-0.22	0.01	0.22
17	-0.01	-0.19	0.01	0.19	18	-0.01	-0.14	0.01	0.14
19	-0.01	-0.08	0.01	0.08	20	-0.01	0.00	0.01	0.01

Nodal Deflections Serviceability (009 : Single flight opposite D only)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	0.00	0.00	2	0.00	-0.09	0.00	0.09
3	0.00	-0.16	0.00	0.16	4	0.00	-0.18	0.00	0.18
5	0.00	-0.19	0.00	0.19	6	0.00	-0.17	0.00	0.17
7	0.01	-0.15	0.01	0.15	8	0.01	-0.12	0.01	0.12
9	0.01	-0.07	0.01	0.07	10	0.01	0.00	0.01	0.01
11	0.00	0.00	0.00	0.00	12	0.00	-0.09	0.00	0.09
13	0.00	-0.16	0.00	0.16	14	0.00	-0.18	0.00	0.18
15	0.00	-0.19	0.00	0.19	16	0.00	-0.17	0.00	0.17
17	-0.01	-0.15	0.01	0.15	18	-0.01	-0.12	0.01	0.12
19	-0.01	-0.07	0.01	0.07	20	-0.01	0.00	0.01	0.01

Nodal Deflections Serviceability (010 : Max SWL CPL A)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.03	-0.51	-0.04	0.51
3	-0.04	-1.05	-0.05	1.05	4	-0.03	-1.60	-0.09	1.60
5	-0.01	-2.16	-0.05	2.16	6	0.04	-2.43	0.03	2.43
7	0.07	-2.00	0.09	2.00	8	0.09	-1.46	0.08	1.47
9	0.11	-0.80	0.10	0.81	10	0.12	0.00	0.10	0.12
11	0.00	0.00	-0.01	0.00	12	0.03	-0.51	-0.04	0.51
13	0.04	-1.05	-0.05	1.05	14	0.03	-1.60	-0.08	1.60
15	0.01	-2.16	-0.09	2.16	16	-0.04	-2.43	0.07	2.43
17	-0.07	-2.00	0.08	2.00	18	-0.09	-1.46	0.08	1.47
19	-0.11	-0.80	0.10	0.81	20	-0.12	0.00	0.10	0.12

Nodal Deflections Serviceability (011 : MAX SWL CPL B)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.03	-0.55	-0.04	0.55
3	-0.04	-1.13	-0.05	1.13	4	-0.03	-1.70	-0.09	1.70
5	-0.01	-2.17	-0.03	2.17	6	0.03	-1.80	0.05	1.80
7	0.05	-1.46	0.06	1.46	8	0.07	-1.06	0.06	1.06
9	0.08	-0.58	0.07	0.58	10	0.09	0.00	0.07	0.09
11	0.00	0.00	-0.01	0.00	12	0.03	-0.55	-0.04	0.55
13	0.04	-1.13	-0.05	1.13	14	0.03	-1.70	-0.09	1.70
15	0.01	-2.17	-0.03	2.17	16	-0.03	-1.80	0.05	1.80

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Nodal Deflections Serviceability (011 : MAX SWL CPL B)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
17	-0.05	-1.46	0.06	1.46	18	-0.07	-1.06	0.06	1.06
19	-0.08	-0.58	0.07	0.58	20	-0.09	0.00	0.07	0.09

Nodal Deflections Serviceability (012 : Max SWL 2PL A)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.05	-0.81	-0.05	0.82
3	-0.06	-1.64	-0.06	1.64	4	-0.04	-2.38	-0.09	2.38
5	-0.01	-2.76	-0.04	2.76	6	0.05	-3.16	0.02	3.16
7	0.09	-2.97	0.09	2.97	8	0.13	-2.25	0.12	2.25
9	0.16	-1.23	0.14	1.24	10	0.17	0.00	0.15	0.17
11	0.00	0.00	-0.01	0.00	12	0.05	-0.81	-0.05	0.82
13	0.06	-1.64	-0.06	1.64	14	0.04	-2.38	-0.09	2.38
15	0.01	-2.76	-0.04	2.76	16	-0.05	-3.16	0.02	3.16
17	-0.09	-2.97	0.09	2.97	18	-0.13	-2.25	0.12	2.25
19	-0.16	-1.23	0.14	1.24	20	-0.17	0.00	0.15	0.17

Nodal Deflections Serviceability (013 : MAX SWL 2PL B)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.05	-1.10	-0.06	1.10
3	-0.05	-2.13	-0.06	2.13	4	-0.03	-2.50	-0.05	2.50
5	0.00	-2.80	-0.04	2.80	6	0.05	-3.26	0.01	3.26
7	0.09	-3.19	0.05	3.20	8	0.14	-2.84	0.12	2.85
9	0.19	-1.59	0.17	1.60	10	0.20	0.00	0.17	0.20
11	0.00	0.00	-0.01	0.00	12	0.05	-1.10	-0.06	1.10
13	0.05	-2.13	-0.06	2.13	14	0.03	-2.50	-0.05	2.50
15	0.00	-2.80	-0.04	2.80	16	-0.05	-3.26	0.01	3.26
17	-0.09	-3.19	0.05	3.20	18	-0.14	-2.84	0.12	2.85
19	-0.19	-1.59	0.17	1.60	20	-0.20	0.00	0.17	0.20

Nodal Deflections Serviceability (014 : Max SWL UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.01	0.00	2	-0.05	-0.93	-0.06	0.93
3	-0.05	-1.70	-0.06	1.70	4	-0.04	-2.32	-0.09	2.32
5	-0.01	-2.82	-0.05	2.82	6	0.05	-3.23	0.03	3.23
7	0.09	-2.93	0.09	2.93	8	0.13	-2.33	0.11	2.34
9	0.16	-1.36	0.15	1.37	10	0.18	0.00	0.15	0.18
11	0.00	0.00	-0.01	0.00	12	0.05	-0.93	-0.05	0.93
13	0.05	-1.70	-0.06	1.70	14	0.04	-2.32	-0.09	2.32
15	0.01	-2.82	-0.06	2.82	16	-0.05	-3.23	0.03	3.23
17	-0.09	-2.93	0.09	2.94	18	-0.13	-2.34	0.11	2.34
19	-0.16	-1.36	0.14	1.37	20	-0.18	0.00	0.15	0.18

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Member Forces (001 : D Plus 1.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	2.591T	0.661	-0.121		0.045
	12	2.591T	0.654	0.109		@ 0.084
2	12	0.435C	0.653	-0.103		0.031
	13	0.435C	0.646	0.108		@ 0.254
3	13	1.809C	-0.036	0.012		0.010
	14	1.809C	-0.042	0.001		@ 0.125
4	14	1.674C	-0.042	0.010		0.000
	15	1.674C	-0.047	-0.002		@ 0.000
5	15	1.436C	-0.049	0.015		0.015
	16	1.436C	-0.057	-0.010		@ 0.141
6	16	1.159C	-0.058	0.010		0.000
	17	1.159C	-0.064	-0.007		@ 0.000
7	17	0.925C	-0.065	0.009		0.000
	18	0.925C	-0.070	-0.010		@ 0.000
8	18	0.589C	-0.073	0.013		0.000
	19	0.589C	-0.079	-0.011		@ 0.000
9	19	0.213C	-0.082	0.015		0.000
	20	0.213C	-0.088	-0.015		@ 0.000
10	1	0.003C	-1.732	0.121		0.000
	11	0.003T	-1.732	-0.121		@ 0.000
11	2	0.004C	-3.027	0.212		0.000
	12	0.002T	-3.027	-0.212		@ 0.000
12	3	0.679C	-1.374	0.096		0.000
	13	0.673C	-1.374	-0.096		@ 0.000
13	4	0.003C	0.135	-0.009		0.000
	14	0.000C	0.135	0.009		@ 0.000
14	5	0.001C	0.238	-0.017		0.000
	15	0.002T	0.238	0.017		@ 0.000
15	6	0.001C	0.277	-0.019		0.000
	16	0.001T	0.277	0.019		@ 0.000
16	7	0.001C	0.234	-0.016		0.000
	17	0.001T	0.234	0.016		@ 0.000
17	8	0.003C	0.336	-0.024		0.000
	18	0.003T	0.336	0.024		@ 0.000
18	9	0.003C	0.377	-0.026		0.000
	19	0.003T	0.377	0.026		@ 0.000
19	10	0.003C	0.213	-0.015		0.000
	20	0.003T	0.213	0.015		@ 0.000

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Member Forces (001 : D Plus 1.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
20	1	2.591C	0.661	-0.121		0.045
	2	2.591C	0.654	0.109		@ 0.084
21	2	0.435T	0.651	-0.103		0.031
	3	0.435T	0.644	0.108		@ 0.254
22	3	1.809T	-0.034	0.011		0.010
	4	1.809T	-0.040	0.001		@ 0.125
23	4	1.674T	-0.042	0.010		0.000
	5	1.674T	-0.048	-0.002		@ 0.000
24	5	1.436T	-0.048	0.014		0.015
	6	1.436T	-0.057	-0.010		@ 0.141
25	6	1.159T	-0.058	0.010		0.000
	7	1.159T	-0.064	-0.007		@ 0.000
26	7	0.925T	-0.065	0.009		0.000
	8	0.925T	-0.070	-0.010		@ 0.000
27	8	0.589T	-0.073	0.013		0.000
	9	0.589T	-0.079	-0.011		@ 0.000
28	9	0.213T	-0.082	0.015		0.000
	10	0.213T	-0.088	-0.015		@ 0.000

Member Forces (002 : D Plus 2.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	4.330T	1.110	-0.204		0.075
	12	4.330T	1.103	0.183		@ 0.084
2	12	0.778C	1.103	-0.174		0.053
	13	0.778C	1.096	0.183		@ 0.254
3	13	3.063C	-0.081	0.023		0.019
	14	3.063C	-0.086	-0.001		@ 0.122
4	14	2.782C	-0.085	0.019		0.011
	15	2.782C	-0.090	-0.005		@ 0.105
5	15	2.330C	-0.092	0.026		0.025
	16	2.330C	-0.101	-0.018		@ 0.137
6	16	1.838C	-0.102	0.017		0.000
	17	1.838C	-0.107	-0.012		@ 0.000
7	17	1.444C	-0.109	0.015		0.000
	18	1.444C	-0.114	-0.017		@ 0.000
8	18	0.902C	-0.117	0.021		0.000
	19	0.902C	-0.123	-0.018		@ 0.000

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Member Forces (002 : D Plus 2.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
9	19	0.321C	-0.126	0.023		0.000
	20	0.321C	-0.132	-0.022		@ 0.000
10	1	0.003C	-2.912	0.204		0.000
	11	0.003T	-2.912	-0.204		@ 0.000
11	2	0.004C	-5.108	0.357		0.000
	12	0.001T	-5.108	-0.358		@ 0.000
12	3	1.170C	-2.285	0.160		0.000
	13	1.165C	-2.285	-0.160		@ 0.000
13	4	0.004C	0.281	-0.020		0.000
	14	0.001C	0.281	0.020		@ 0.000
14	5	0.001C	0.451	-0.032		0.000
	15	0.002T	0.451	0.032		@ 0.000
15	6	0.001C	0.492	-0.034		0.000
	16	0.001T	0.492	0.034		@ 0.000
16	7	0.001C	0.395	-0.028		0.000
	17	0.001T	0.395	0.028		@ 0.000
17	8	0.003C	0.542	-0.038		0.000
	18	0.003T	0.542	0.038		@ 0.000
18	9	0.003C	0.581	-0.041		0.000
	19	0.003T	0.581	0.041		@ 0.000
19	10	0.003C	0.321	-0.022		0.000
	20	0.003T	0.321	0.022		@ 0.000
20	1	4.330C	1.110	-0.204		0.075
	2	4.330C	1.104	0.184		@ 0.084
21	2	0.778T	1.099	-0.174		0.053
	3	0.778T	1.093	0.182		@ 0.254
22	3	3.063T	-0.077	0.022		0.018
	4	3.063T	-0.083	-0.001		@ 0.122
23	4	2.782T	-0.086	0.019		0.011
	5	2.782T	-0.092	-0.006		@ 0.105
24	5	2.330T	-0.092	0.026		0.025
	6	2.330T	-0.101	-0.018		@ 0.137
25	6	1.838T	-0.102	0.017		0.000
	7	1.838T	-0.107	-0.012		@ 0.000
26	7	1.444T	-0.109	0.015		0.000
	8	1.444T	-0.114	-0.017		@ 0.000
27	8	0.902T	-0.117	0.021		0.000
	9	0.902T	-0.123	-0.018		@ 0.000

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Member Forces (002 : D Plus 2.0 UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
28	9	0.321T	-0.126	0.023		0.000
	10	0.321T	-0.132	-0.022		@ 0.000

Member Forces (003 : D Plus 1.5 kN PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	3.498T	0.895	-0.164		0.060
	12	3.498T	0.888	0.148		@ 0.084
2	12	0.614C	0.887	-0.140		0.043
	13	0.614C	0.881	0.147		@ 0.254
3	13	2.463C	-0.059	0.018		0.015
	14	2.463C	-0.065	0.000		@ 0.122
4	14	2.252C	-0.064	0.014		0.000
	15	2.252C	-0.069	-0.004		@ 0.000
5	15	1.902C	-0.071	0.021		0.020
	16	1.902C	-0.080	-0.014		@ 0.137
6	16	1.513C	-0.081	0.013		0.000
	17	1.513C	-0.086	-0.010		@ 0.000
7	17	1.195C	-0.088	0.013		0.000
	18	1.195C	-0.093	-0.014		@ 0.000
8	18	0.752C	-0.096	0.017		0.000
	19	0.752C	-0.102	-0.015		@ 0.000
9	19	0.269C	-0.105	0.019		0.000
	20	0.269C	-0.111	-0.019		@ 0.000
10	1	0.003C	-2.347	0.164		0.000
	11	0.003T	-2.347	-0.164		@ 0.000
11	2	0.004C	-4.112	0.288		0.000
	12	0.001T	-4.112	-0.288		@ 0.000
12	3	0.935C	-1.849	0.129		0.000
	13	0.930C	-1.849	-0.129		@ 0.000
13	4	0.003C	0.211	-0.015		0.000
	14	0.001C	0.211	0.015		@ 0.000
14	5	0.001C	0.349	-0.024		0.000
	15	0.002T	0.349	0.024		@ 0.000
15	6	0.001C	0.389	-0.027		0.000
	16	0.001T	0.389	0.027		@ 0.000
16	7	0.001C	0.318	-0.022		0.000
	17	0.001T	0.318	0.022		@ 0.000

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Member Forces (003 : D Plus 1.5 kN PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
17	8 18	0.003C 0.003T	0.443 0.443	-0.031 0.031		0.000 @ 0.000
18	9 19	0.003C 0.003T	0.483 0.483	-0.034 0.034		0.000 @ 0.000
19	10 20	0.003C 0.003T	0.269 0.269	-0.019 0.019		0.000 @ 0.000
20	1 2	3.498C 3.498C	0.895 0.889	-0.164 0.148		0.060 @ 0.084
21	2 3	0.614T 0.614T	0.884 0.878	-0.140 0.147		0.042 @ 0.254
22	3 4	2.463T 2.463T	-0.057 -0.062	0.017 0.000		0.015 @ 0.122
23	4 5	2.252T 2.252T	-0.065 -0.071	0.015 -0.004		0.000 @ 0.000
24	5 6	1.902T 1.902T	-0.071 -0.080	0.021 -0.014		0.020 @ 0.137
25	6 7	1.513T 1.513T	-0.081 -0.087	0.013 -0.010		0.000 @ 0.000
26	7 8	1.195T 1.195T	-0.088 -0.093	0.013 -0.014		0.000 @ 0.000
27	8 9	0.752T 0.752T	-0.096 -0.102	0.017 -0.015		0.000 @ 0.000
28	9 10	0.269T 0.269T	-0.105 -0.111	0.019 -0.019		0.000 @ 0.000

Member Forces (004 : D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11 12	0.853T 0.853T	0.212 0.205	-0.039 0.034		0.014 @ 0.084
2	12 13	0.093C 0.093C	0.203 0.196	-0.032 0.033		0.000 @ 0.000
3	13 14	0.556C 0.556C	0.008 0.003	0.001 0.002	@ 0.002 0.000	0.000 @ 0.000
4	14 15	0.567C 0.567C	0.002 -0.003	0.001 0.001	@ 0.001 0.000	0.000 @ 0.000
5	15 16	0.542C 0.542C	-0.005 -0.013	0.003 -0.001	@ 0.003 0.000	0.000 @ 0.000

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Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
6	16	0.479C	-0.015	0.003		0.000
	17	0.479C	-0.020	-0.002	@ 0.000	@ 0.000
7	17	0.407C	-0.021	0.004		0.000
	18	0.407C	-0.027	-0.003	@ 0.000	@ 0.000
8	18	0.277C	-0.029	0.006		0.000
	19	0.277C	-0.035	-0.005		@ 0.000
9	19	0.105C	-0.038	0.007		0.000
	20	0.105C	-0.045	-0.007		@ 0.000
10	1	0.003C	-0.551	0.039		0.000
	11	0.003T	-0.551	-0.039		@ 0.000
11	2	0.003C	-0.945	0.066		0.000
	12	0.002T	-0.945	-0.066		@ 0.000
12	3	0.187C	-0.463	0.032		0.000
	13	0.182C	-0.463	-0.032		@ 0.000
13	4	0.002C	-0.011	0.001		0.000
	14	0.001T	-0.011	-0.001	@ 0.000	@ 0.000
14	5	0.001C	0.025	-0.002		0.000
	15	0.001T	0.025	0.002	@ 0.000	@ 0.000
15	6	0.001C	0.063	-0.004		0.000
	16	0.001T	0.063	0.004	@ 0.000	@ 0.000
16	7	0.001C	0.072	-0.005		0.000
	17	0.001T	0.072	0.005		@ 0.000
17	8	0.003C	0.130	-0.009		0.000
	18	0.003T	0.130	0.009		@ 0.000
18	9	0.003C	0.172	-0.012		0.000
	19	0.003T	0.172	0.012		@ 0.000
19	10	0.003C	0.105	-0.007		0.000
	20	0.003T	0.105	0.007		@ 0.000
20	1	0.853C	0.212	-0.039		0.014
	2	0.853C	0.205	0.034		@ 0.084
21	2	0.093T	0.202	-0.032		0.000
	3	0.093T	0.196	0.033		@ 0.000
22	3	0.556T	0.009	0.000		0.000
	4	0.556T	0.003	0.002	@ 0.000	@ 0.000
23	4	0.567T	0.002	0.001		0.000
	5	0.567T	-0.004	0.001	@ 0.000	@ 0.000
24	5	0.542T	-0.005	0.003		0.000
	6	0.542T	-0.013	-0.001	@ 0.000	@ 0.000

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Member Forces (004 : D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
25	6 7	0.479T	-0.015	0.003	@ 0.003 0.000	@ 0.000
		0.479T	-0.020	-0.002		
26	7 8	0.407T	-0.021	0.004	@ 0.004 0.000	@ 0.000
		0.407T	-0.027	-0.003		
27	8 9	0.277T	-0.029	0.006	@ 0.006 0.000	@ 0.000
		0.277T	-0.035	-0.005		
28	9 10	0.105T	-0.038	0.007	@ 0.007 0.000	@ 0.000
		0.105T	-0.045	-0.007		

Member Forces (005 : 1.0 L UDL Only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11 12	1.739T	0.449	-0.083	@ 0.083 0.084	@ 0.084
		1.739T	0.449	0.075		
2	12 13	0.343C	0.450	-0.071	@ 0.071 0.254	@ 0.022 0.254
		0.343C	0.450	0.075		
3	13 14	1.253C	-0.045	0.011	@ 0.011 0.000	@ 0.000
		1.253C	-0.045	-0.002		
4	14 15	1.107C	-0.043	0.009	@ 0.009 0.000	@ 0.000
		1.107C	-0.043	-0.003		
5	15 16	0.894C	-0.044	0.012	@ 0.012 0.000	@ 0.000
		0.894C	-0.044	-0.008		
6	16 17	0.680C	-0.044	0.007	@ 0.007 0.000	@ 0.000
		0.680C	-0.044	-0.005		
7	17 18	0.518C	-0.044	0.006	@ 0.006 0.000	@ 0.000
		0.518C	-0.044	-0.007		
8	18 19	0.312C	-0.044	0.008	@ 0.008 0.000	@ 0.000
		0.312C	-0.044	-0.007		
9	19 20	0.108C	-0.044	0.008	@ 0.008 0.000	@ 0.000
		0.108C	-0.044	-0.008		
10	1 11	0.000C	-1.181	0.083	@ 0.083 0.000	@ 0.000
		0.000C	-1.181	-0.083		
11	2 12	0.001C	-2.081	0.146	@ 0.146 0.000	@ 0.000
		0.001C	-2.081	-0.146		
12	3 13	0.492C	-0.911	0.064	@ 0.064 0.000	@ 0.000
		0.492C	-0.911	-0.064		
13	4 14	0.001C	0.146	-0.010	@ 0.010 0.000	@ 0.000
		0.001C	0.146	0.010		

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Member Forces (005 : 1.0 L UDL Only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
14	5	0.000C	0.213	-0.015		0.000
	15	0.000C	0.213	0.015		@ 0.000
15	6	0.000C	0.215	-0.015		0.000
	16	0.000C	0.215	0.015		@ 0.000
16	7	0.000C	0.161	-0.011		0.000
	17	0.000C	0.161	0.011		@ 0.000
17	8	0.000C	0.206	-0.014		0.000
	18	0.000C	0.206	0.014		@ 0.000
18	9	0.000C	0.204	-0.014		0.000
	19	0.000C	0.204	0.014		@ 0.000
19	10	0.000C	0.108	-0.008		0.000
	20	0.000C	0.108	0.008		@ 0.000
20	1	1.739C	0.449	-0.083		0.030
	2	1.739C	0.449	0.075		@ 0.084
21	2	0.343T	0.449	-0.071		0.022
	3	0.343T	0.449	0.075		@ 0.254
22	3	1.253T	-0.043	0.011		0.000
	4	1.253T	-0.043	-0.001		@ 0.000
23	4	1.107T	-0.044	0.009		0.000
	5	1.107T	-0.044	-0.003		@ 0.000
24	5	0.894T	-0.044	0.012		0.000
	6	0.894T	-0.044	-0.008		@ 0.000
25	6	0.680T	-0.044	0.007		0.000
	7	0.680T	-0.044	-0.005		@ 0.000
26	7	0.518T	-0.044	0.006		0.000
	8	0.518T	-0.044	-0.007		@ 0.000
27	8	0.312T	-0.044	0.008		0.000
	9	0.312T	-0.044	-0.007		@ 0.000
28	9	0.108T	-0.044	0.008		0.000
	10	0.108T	-0.044	-0.008		@ 0.000

Member Forces (006 : Single FLight Adjacent)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	2.129T	0.541	-0.099		0.036
	12	2.129T	0.535	0.089		@ 0.084
2	12	0.344C	0.533	-0.084		0.025
	13	0.344C	0.527	0.088		@ 0.254

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Member Forces (006 : Single FLight Adjacent)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
3	13	1.476C	-0.024	0.009		0.000
	14	1.476C	-0.030	0.001		@ 0.000
4	14	1.380C	-0.030	0.008		0.000
	15	1.380C	-0.035	-0.001		@ 0.000
5	15	1.198C	-0.037	0.011		0.012
	16	1.198C	-0.046	-0.007		@ 0.146
6	16	0.978C	-0.047	0.008		0.000
	17	0.978C	-0.052	-0.005		@ 0.000
7	17	0.787C	-0.053	0.008		0.000
	18	0.787C	-0.059	-0.008		@ 0.000
8	18	0.506C	-0.061	0.011		0.000
	19	0.506C	-0.068	-0.010		@ 0.000
9	19	0.184C	-0.070	0.013		0.000
	20	0.184C	-0.077	-0.013		@ 0.000
10	1	0.003C	-1.418	0.099		0.000
	11	0.003T	-1.418	-0.099		@ 0.000
11	2	0.003C	-2.474	0.173		0.000
	12	0.002T	-2.474	-0.173		@ 0.000
12	3	0.548C	-1.132	0.079		0.000
	13	0.543C	-1.132	-0.079		@ 0.000
13	4	0.002C	0.096	-0.007		0.000
	14	0.000C	0.096	0.007		@ 0.000
14	5	0.001C	0.182	-0.013		0.000
	15	0.002T	0.182	0.013		@ 0.000
15	6	0.001C	0.220	-0.015		0.000
	16	0.001T	0.220	0.015		@ 0.000
16	7	0.001C	0.191	-0.013		0.000
	17	0.001T	0.191	0.013		@ 0.000
17	8	0.003C	0.281	-0.020		0.000
	18	0.003T	0.281	0.020		@ 0.000
18	9	0.003C	0.322	-0.023		0.000
	19	0.003T	0.322	0.023		@ 0.000
19	10	0.003C	0.184	-0.013		0.000
	20	0.003T	0.184	0.013		@ 0.000
20	1	2.129C	0.542	-0.099		0.036
	2	2.129C	0.535	0.089		@ 0.084
21	2	0.344T	0.531	-0.084		0.025
	3	0.344T	0.525	0.088		@ 0.254

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Member Forces (006 : Single FLight Adjacent)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
22	3	1.476T	-0.023	0.009		0.000
	4	1.476T	-0.028	0.001		@ 0.000
23	4	1.380T	-0.031	0.008		0.000
	5	1.380T	-0.036	-0.001		@ 0.000
24	5	1.198T	-0.037	0.011		0.012
	6	1.198T	-0.045	-0.007		@ 0.146
25	6	0.978T	-0.047	0.008		0.000
	7	0.978T	-0.052	-0.005		@ 0.000
26	7	0.787T	-0.053	0.008		0.000
	8	0.787T	-0.059	-0.008		@ 0.000
27	8	0.506T	-0.061	0.011		0.000
	9	0.506T	-0.068	-0.010		@ 0.000
28	9	0.184T	-0.070	0.013		0.000
	10	0.184T	-0.077	-0.013		@ 0.000

Member Forces (007 : Single Flight Opposite)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	1.290T	0.325	-0.059		0.022
	12	1.290T	0.318	0.053		@ 0.084
2	12	0.179C	0.316	-0.050		0.015
	13	0.179C	0.310	0.052		@ 0.254
3	13	0.871C	-0.003	0.003	0.003	0.000
	14	0.871C	-0.008	0.002	@ 0.000	@ 0.000
4	14	0.846C	-0.009	0.004	0.004	0.000
	15	0.846C	-0.014	0.000	@ 0.000	@ 0.000
5	15	0.767C	-0.016	0.006		0.000
	16	0.767C	-0.024	-0.003		@ 0.000
6	16	0.650C	-0.026	0.005	0.005	0.000
	17	0.650C	-0.031	-0.003	@ 0.000	@ 0.000
7	17	0.537C	-0.032	0.005		0.000
	18	0.537C	-0.038	-0.005		@ 0.000
8	18	0.356C	-0.040	0.008		0.000
	19	0.356C	-0.047	-0.007		@ 0.000
9	19	0.132C	-0.049	0.009		0.000
	20	0.132C	-0.056	-0.009		@ 0.000
10	1	0.003C	-0.848	0.059		0.000
	11	0.003T	-0.848	-0.059		@ 0.000

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Member Forces (007 : Single Flight Opposite)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
11	2 12	0.003C 0.002T	-1.469 -1.469	0.103 -0.103		0.000 @ 0.000
12	3 13	0.311C 0.305C	-0.692 -0.692	0.048 -0.048		0.000 @ 0.000
13	4 14	0.002C 0.001T	0.026 0.026	-0.002 0.002	@ 0.002 0.000	0.000 @ 0.000
14	5 15	0.001C 0.001T	0.079 0.079	-0.006 0.006		0.000 @ 0.000
15	6 16	0.001C 0.001T	0.117 0.117	-0.008 0.008		0.000 @ 0.000
16	7 17	0.001C 0.001T	0.113 0.113	-0.008 0.008		0.000 @ 0.000
17	8 18	0.003C 0.003T	0.182 0.182	-0.013 0.013		0.000 @ 0.000
18	9 19	0.003C 0.003T	0.224 0.224	-0.016 0.016		0.000 @ 0.000
19	10 20	0.003C 0.003T	0.132 0.132	-0.009 0.009		0.000 @ 0.000
20	1 2	1.290C 1.290C	0.325 0.318	-0.059 0.053		0.022 @ 0.084
21	2 3	0.179T 0.179T	0.315 0.309	-0.050 0.052		0.015 @ 0.254
22	3 4	0.871T 0.871T	-0.002 -0.007	0.003 0.002	@ 0.003 0.000	0.000 @ 0.000
23	4 5	0.846T 0.846T	-0.009 -0.015	0.004 0.000	@ 0.004 0.000	0.000 @ 0.000
24	5 6	0.767T 0.767T	-0.016 -0.024	0.006 -0.003		0.000 @ 0.000
25	6 7	0.650T 0.650T	-0.026 -0.031	0.005 -0.003	@ 0.005 0.000	0.000 @ 0.000
26	7 8	0.537T 0.537T	-0.032 -0.038	0.005 -0.005		0.000 @ 0.000
27	8 9	0.356T 0.356T	-0.040 -0.047	0.008 -0.007		0.000 @ 0.000
28	9 10	0.132T 0.132T	-0.049 -0.056	0.009 -0.009		0.000 @ 0.000

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Member Forces (008 : Sinlge flight adj D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
1	11	0.729T	0.180	-0.033			0.012
	12	0.729T	0.173	0.029			@ 0.084
2	12	0.068C	0.171	-0.027			0.000
	13	0.068C	0.165	0.028			@ 0.000
3	13	0.467C	0.011	0.000	@	0.002 0.000	0.000
	14	0.467C	0.006	0.002			@ 0.000
4	14	0.489C	0.005	0.001	@	0.001 0.000	0.000
	15	0.489C	0.000	0.001			@ 0.000
5	15	0.478C	-0.002	0.002	@	0.002 0.000	0.000
	16	0.478C	-0.010	-0.001			@ 0.000
6	16	0.431C	-0.012	0.003	@	0.003 0.000	0.000
	17	0.431C	-0.017	-0.001			@ 0.000
7	17	0.370C	-0.018	0.003	@	0.003 0.000	0.000
	18	0.370C	-0.024	-0.003			@ 0.000
8	18	0.255C	-0.026	0.005			0.000
	19	0.255C	-0.032	-0.004			@ 0.000
9	19	0.097C	-0.035	0.007			0.000
	20	0.097C	-0.042	-0.007			@ 0.000
10	1	0.003C	-0.467	0.033			0.000
	11	0.003T	-0.467	-0.033			@ 0.000
11	2	0.003C	-0.798	0.056			0.000
	12	0.002T	-0.798	-0.056			@ 0.000
12	3	0.152C	-0.399	0.028			0.000
	13	0.147C	-0.399	-0.028			@ 0.000
13	4	0.002C	-0.022	0.002	@	0.002 0.000	0.000
	14	0.001T	-0.022	-0.001			@ 0.000
14	5	0.001C	0.010	-0.001	@	0.000 0.000	0.000
	15	0.001T	0.010	0.001			@ 0.000
15	6	0.001C	0.048	-0.003	@	0.003 0.000	0.000
	16	0.001T	0.048	0.003			@ 0.000
16	7	0.001C	0.061	-0.004	@	0.004 0.000	0.000
	17	0.001T	0.061	0.004			@ 0.000
17	8	0.003C	0.115	-0.008			0.000
	18	0.003T	0.115	0.008			@ 0.000
18	9	0.003C	0.158	-0.011			0.000
	19	0.003T	0.158	0.011			@ 0.000
19	10	0.003C	0.097	-0.007			0.000
	20	0.003T	0.097	0.007			@ 0.000

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Member Forces (008 : Sinlge flight adj D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
20	1	0.729C	0.180	-0.033		0.012
	2	0.729C	0.173	0.029		@ 0.084
21	2	0.068T	0.170	-0.027		0.000
	3	0.068T	0.164	0.028		@ 0.000
22	3	0.467T	0.012	0.000	0.002	0.000
	4	0.467T	0.006	0.002	@ 0.000	@ 0.000
23	4	0.489T	0.005	0.001	0.001	0.000
	5	0.489T	0.000	0.001	@ 0.000	@ 0.000
24	5	0.478T	-0.002	0.002	0.002	0.000
	6	0.478T	-0.010	-0.001	@ 0.000	@ 0.000
25	6	0.431T	-0.012	0.003	0.003	0.000
	7	0.431T	-0.017	-0.001	@ 0.000	@ 0.000
26	7	0.370T	-0.018	0.003	0.003	0.000
	8	0.370T	-0.024	-0.003	@ 0.000	@ 0.000
27	8	0.255T	-0.026	0.005		0.000
	9	0.255T	-0.032	-0.004		@ 0.000
28	9	0.097T	-0.035	0.007		0.000
	10	0.097T	-0.042	-0.007		@ 0.000

Member Forces (009 : Single flight opposite D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	0.535T	0.130	-0.023		0.000
	12	0.535T	0.123	0.021		@ 0.000
2	12	0.030C	0.120	-0.019		0.000
	13	0.030C	0.114	0.019		@ 0.000
3	13	0.327C	0.016	-0.002	0.002	0.000
	14	0.327C	0.011	0.002	@ 0.000	@ 0.000
4	14	0.365C	0.010	0.000	0.001	0.000
	15	0.365C	0.005	0.002	@ 0.000	@ 0.000
5	15	0.379C	0.003	0.001	0.001	0.000
	16	0.379C	-0.005	0.000	@ 0.000	@ 0.000
6	16	0.355C	-0.007	0.002	0.002	0.000
	17	0.355C	-0.012	-0.001	@ 0.000	@ 0.000
7	17	0.312C	-0.013	0.002	0.002	0.000
	18	0.312C	-0.019	-0.002	@ 0.000	@ 0.000
8	18	0.220C	-0.021	0.004	0.004	0.000
	19	0.220C	-0.028	-0.004	@ 0.000	@ 0.000

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Member Forces (009 : Single flight opposite D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
9	19	0.085C	-0.030	0.006		0.000
	20	0.085C	-0.037	-0.006	@	0.000
10	1	0.003C	-0.335	0.023		0.000
	11	0.003T	-0.335	-0.023	@	0.000
11	2	0.003C	-0.565	0.040		0.000
	12	0.002T	-0.565	-0.040	@	0.000
12	3	0.097C	-0.297	0.021		0.000
	13	0.092C	-0.297	-0.021	@	0.000
13	4	0.001C	-0.038	0.003	0.003	0.000
	14	0.001T	-0.038	-0.003	@ 0.000	@ 0.000
14	5	0.001C	-0.013	0.001	0.001	0.000
	15	0.001T	-0.013	-0.001	@ 0.000	@ 0.000
15	6	0.001C	0.024	-0.002	0.002	0.000
	16	0.001T	0.024	0.002	@ 0.000	@ 0.000
16	7	0.001C	0.043	-0.003	0.003	0.000
	17	0.001T	0.043	0.003	@ 0.000	@ 0.000
17	8	0.003C	0.092	-0.006		0.000
	18	0.003T	0.092	0.006	@	0.000
18	9	0.003C	0.135	-0.009		0.000
	19	0.003T	0.135	0.009	@	0.000
19	10	0.003C	0.085	-0.006		0.000
	20	0.003T	0.085	0.006	@	0.000
20	1	0.535C	0.130	-0.023		0.000
	2	0.535C	0.123	0.021	@	0.000
21	2	0.030T	0.120	-0.019		0.000
	3	0.030T	0.114	0.019	@	0.000
22	3	0.327T	0.017	-0.002	0.002	0.000
	4	0.327T	0.011	0.002	@ 0.000	@ 0.000
23	4	0.365T	0.010	0.000	0.001	0.000
	5	0.365T	0.004	0.002	@ 0.000	@ 0.000
24	5	0.379T	0.003	0.001	0.001	0.000
	6	0.379T	-0.005	0.000	@ 0.000	@ 0.000
25	6	0.355T	-0.007	0.002	0.002	0.000
	7	0.355T	-0.012	-0.001	@ 0.000	@ 0.000
26	7	0.312T	-0.013	0.002	0.002	0.000
	8	0.312T	-0.019	-0.002	@ 0.000	@ 0.000
27	8	0.220T	-0.021	0.004	0.004	0.000
	9	0.220T	-0.028	-0.004	@ 0.000	@ 0.000

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Member Forces (009 : Single flight opposite D only)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
28	9 10	0.085T 0.085T	-0.030 -0.037	0.006 -0.006		0.000 @ 0.000

Member Forces (010 : Max SWL CPL A)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11 12	4.869T 4.869T	0.697 0.690	-0.132 0.111		0.054 @ 0.088
2	12 13	1.650T 1.650T	0.686 0.679	-0.114 0.108		0.033 @ 0.072
3	13 14	1.535C 1.535C	0.707 0.701	-0.117 0.087		0.039 @ 0.081
4	14 15	3.903C 3.903C	0.533 0.528	-0.075 0.071		0.016 @ 0.063
5	15 16	6.229C 6.229C	1.164 -0.845	-0.110 -0.037	@ 0.154 0.228	0.314 @ 0.237
6	16 17	5.487C 5.487C	-0.206 -0.211	0.033 -0.024		0.010 @ 0.077
7	17 18	4.305C 4.305C	-0.380 -0.385	0.055 -0.056		0.012 @ 0.229
8	18 19	2.634C 2.634C	-0.358 -0.364	0.063 -0.054		0.022 @ 0.081
9	19 20	0.920C 0.920C	-0.368 -0.375	0.066 -0.064		0.021 @ 0.077
10	1 11	0.003C 0.003T	-1.879 -1.879	0.132 -0.132		0.000 @ 0.000
11	2 12	0.001C 0.004T	-3.218 -3.218	0.225 -0.225		0.000 @ 0.000
12	3 13	0.032C 0.027C	-3.185 -3.185	0.221 -0.225		0.000 @ 0.000
13	4 14	0.165T 0.168T	-2.368 -2.368	0.169 -0.162		0.016 @ 0.031
14	5 15	0.638C 0.636C	-2.326 -2.326	0.145 -0.181		0.023 @ 0.104
15	6 16	0.642C 0.639C	0.742 0.742	-0.034 0.070		0.014 @ 0.092
16	7 17	0.166T 0.168T	1.182 1.182	-0.086 0.079		0.000 @ 0.000

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Member Forces (010 : Max SWL CPL A)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
17	8	0.033C	1.670	-0.115		0.000
	18	0.027C	1.670	0.119		@ 0.000
18	9	0.001C	1.714	-0.120		0.000
	19	0.004T	1.714	0.120		@ 0.000
19	10	0.003C	0.920	-0.064		0.000
	20	0.003T	0.920	0.064		@ 0.000
20	1	4.869C	0.696	-0.132		0.054
	2	4.869C	0.690	0.111		@ 0.088
21	2	1.650C	0.689	-0.114		0.033
	3	1.650C	0.683	0.108		@ 0.072
22	3	1.535T	0.650	-0.112		0.042
	4	1.535T	0.645	0.075		@ 0.084
23	4	3.903T	0.810	-0.094		0.039
	5	3.903T	0.805	0.128		@ 0.198
24	5	6.229T	0.167	-0.017		0.089
	6	6.229T	0.158	0.057		@ 0.282
25	6	5.487T	-0.484	0.091		0.041
	7	5.487T	-0.489	-0.043		@ 0.094
26	7	4.305T	-0.323	0.044		0.014
	8	4.305T	-0.329	-0.051		@ 0.217
27	8	2.634T	-0.361	0.064		0.023
	9	2.634T	-0.367	-0.054		@ 0.081
28	9	0.920T	-0.368	0.066		0.021
	10	0.920T	-0.375	-0.064		@ 0.077

Member Forces (011 : MAX SWL CPL B)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	5.088T	0.754	-0.142		0.057
	12	5.088T	0.747	0.121		@ 0.088
2	12	1.601T	0.745	-0.124		0.035
	13	1.601T	0.739	0.118		@ 0.072
3	13	1.827C	0.735	-0.122		0.041
	14	1.827C	0.729	0.090		@ 0.081
4	14	4.196C	0.732	-0.076		0.046
	15	4.196C	0.727	0.125		@ 0.190
5	15	4.939C	-0.228	0.073		0.092
	16	4.939C	-0.237	-0.033		@ 0.155

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Member Forces (011 : MAX SWL CPL B)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
6	16	3.918C	-0.237	0.038		0.012
	17	3.918C	-0.242	-0.028	@	0.077
7	17	3.041C	-0.244	0.034		0.000
	18	3.041C	-0.249	-0.038	@	0.000
8	18	1.866C	-0.252	0.045		0.016
	19	1.866C	-0.258	-0.038	@	0.081
9	19	0.654C	-0.261	0.047		0.015
	20	0.654C	-0.267	-0.046	@	0.077
10	1	0.003C	-2.031	0.142		0.000
	11	0.003T	-2.031	-0.142	@	0.000
11	2	0.003C	-3.487	0.244		0.000
	12	0.003T	-3.487	-0.244	@	0.000
12	3	0.001C	-3.428	0.240		0.000
	13	0.004T	-3.428	-0.240	@	0.000
13	4	0.005C	-2.369	0.166		0.014
	14	0.003C	-2.369	-0.166	@	0.111
14	5	0.947C	-0.742	0.052		0.000
	15	0.945C	-0.742	-0.052	@	0.000
15	6	0.003C	1.020	-0.071		0.000
	16	0.000C	1.020	0.072	@	0.000
16	7	0.001C	0.877	-0.061		0.000
	17	0.002T	0.877	0.061	@	0.000
17	8	0.003C	1.176	-0.082		0.000
	18	0.002T	1.176	0.082	@	0.000
18	9	0.003C	1.212	-0.085		0.000
	19	0.003T	1.212	0.085	@	0.000
19	10	0.003C	0.654	-0.046		0.000
	20	0.003T	0.654	0.046	@	0.000
20	1	5.088C	0.754	-0.142		0.057
	2	5.088C	0.747	0.121	@	0.088
21	2	1.601C	0.745	-0.123		0.035
	3	1.601C	0.739	0.118	@	0.072
22	3	1.827T	0.737	-0.123		0.041
	4	1.827T	0.732	0.090	@	0.081
23	4	4.196T	0.727	-0.075		0.046
	5	4.196T	0.721	0.124	@	0.190
24	5	4.939T	-0.226	0.072		0.092
	6	4.939T	-0.235	-0.033	@	0.155

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Member Forces (011 : MAX SWL CPL B)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
25	6	3.918T	-0.238	0.038		0.012
	7	3.918T	-0.243	-0.028		@ 0.077
26	7	3.041T	-0.244	0.034		0.000
	8	3.041T	-0.249	-0.038		@ 0.000
27	8	1.866T	-0.252	0.045		0.016
	9	1.866T	-0.258	-0.038		@ 0.081
28	9	0.654T	-0.261	0.047		0.015
	10	0.654T	-0.267	-0.046		@ 0.077

Member Forces (012 : Max SWL 2PL A)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	6.962T	1.124	-0.211		0.084
	12	6.962T	1.117	0.181		@ 0.088
2	12	1.751T	1.114	-0.184		0.051
	13	1.751T	1.108	0.177		@ 0.072
3	13	3.230C	1.109	-0.172		0.046
	14	3.230C	1.103	0.149		@ 0.070
4	14	5.551C	0.246	-0.013		0.032
	15	5.551C	0.241	0.054		@ 0.171
5	15	6.892C	0.242	-0.040		0.073
	16	6.892C	0.234	0.068		@ 0.309
6	16	7.886C	0.235	-0.002		0.046
	17	7.886C	0.230	0.062		@ 0.160
7	17	7.318C	-0.628	0.102		0.032
	18	7.318C	-0.633	-0.081		@ 0.075
8	18	4.579C	-0.632	0.111		0.039
	19	4.579C	-0.638	-0.095		@ 0.081
9	19	1.594C	-0.641	0.114		0.036
	20	1.594C	-0.648	-0.112		@ 0.077
10	1	0.003C	-3.013	0.211		0.000
	11	0.003T	-3.013	-0.211		@ 0.000
11	2	0.002C	-5.211	0.365		0.000
	12	0.003T	-5.211	-0.365		@ 0.000
12	3	0.006C	-4.980	0.348		0.000
	13	0.001C	-4.980	-0.349		@ 0.000
13	4	0.845C	-2.322	0.163		0.014
	14	0.843C	-2.322	-0.163		@ 0.111

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Member Forces (012 : Max SWL 2PL A)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
14	5	0.004C	-1.341	0.094		0.000
	15	0.001C	-1.341	-0.094	@	0.000
15	6	0.004C	-0.994	0.069		0.000
	16	0.001C	-0.994	-0.070	@	0.000
16	7	0.845C	0.568	-0.040		0.000
	17	0.843C	0.568	0.040	@	0.000
17	8	0.006C	2.739	-0.191		0.000
	18	0.001C	2.739	0.192	@	0.000
18	9	0.002C	2.985	-0.209		0.000
	19	0.003T	2.985	0.209	@	0.000
19	10	0.003C	1.594	-0.112		0.000
	20	0.003T	1.594	0.112	@	0.000
20	1	6.962C	1.124	-0.211		0.084
	2	6.962C	1.117	0.181	@	0.088
21	2	1.751C	1.115	-0.184		0.051
	3	1.751C	1.108	0.178	@	0.072
22	3	3.230T	1.102	-0.171		0.046
	4	3.230T	1.097	0.148	@	0.070
23	4	5.551T	0.252	-0.014		0.031
	5	5.551T	0.246	0.054	@	0.171
24	5	6.892T	0.242	-0.040		0.074
	6	6.892T	0.234	0.068	@	0.309
25	6	7.886T	0.230	-0.001		0.045
	7	7.886T	0.224	0.061	@	0.160
26	7	7.318T	-0.621	0.101		0.032
	8	7.318T	-0.626	-0.080	@	0.078
27	8	4.579T	-0.633	0.112		0.039
	9	4.579T	-0.639	-0.095	@	0.081
28	9	1.594T	-0.641	0.114		0.036
	10	1.594T	-0.648	-0.112	@	0.077

Member Forces (013 : MAX SWL 2PL B)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	7.568T	1.565	-0.290		0.110
	12	7.568T	1.558	0.256	@	0.084
2	12	0.337T	1.558	-0.250		0.070
	13	0.337T	1.551	0.255	@	0.254

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Member Forces (013 : MAX SWL 2PL B)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
3	13	3.898C	0.295	-0.041		0.010
	14	3.898C	0.290	0.044		@ 0.223
4	14	5.005C	0.291	-0.034		0.014
	15	5.005C	0.286	0.045		@ 0.198
5	15	6.398C	0.284	-0.052		0.068
	16	6.398C	0.275	0.075		@ 0.323
6	16	7.747C	0.273	-0.019		0.029
	17	7.747C	0.268	0.055		@ 0.173
7	17	8.699C	0.269	-0.012		0.046
	18	8.699C	0.264	0.065		@ 0.174
8	18	7.096C	-0.993	0.178		0.066
	19	7.096C	-0.999	-0.146		@ 0.085
9	19	2.478C	-0.999	0.178		0.057
	20	2.478C	-1.006	-0.173		@ 0.077
10	1	0.003C	-4.145	0.290		0.000
	11	0.003T	-4.145	-0.290		@ 0.000
11	2	0.005C	-7.231	0.506		0.000
	12	0.001T	-7.231	-0.506		@ 0.000
12	3	1.249C	-4.234	0.296		0.000
	13	1.244C	-4.234	-0.296		@ 0.000
13	4	0.004C	-1.107	0.078		0.000
	14	0.001C	-1.107	-0.077		@ 0.000
14	5	0.001C	-1.394	0.098		0.000
	15	0.002T	-1.394	-0.098		@ 0.000
15	6	0.001C	-1.348	0.094		0.000
	16	0.002T	-1.348	-0.094		@ 0.000
16	7	0.004C	-0.952	0.067		0.000
	17	0.001C	-0.952	-0.067		@ 0.000
17	8	1.249C	1.603	-0.112		0.000
	18	1.244C	1.603	0.112		@ 0.000
18	9	0.005C	4.618	-0.323		0.000
	19	0.001T	4.618	0.323		@ 0.000
19	10	0.003C	2.478	-0.174		0.000
	20	0.003T	2.478	0.173		@ 0.000
20	1	7.568C	1.565	-0.290		0.110
	2	7.568C	1.559	0.256		@ 0.084
21	2	0.337C	1.554	-0.249		0.070
	3	0.337C	1.548	0.255		@ 0.254

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Member Forces (013 : MAX SWL 2PL B)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
22	3	3.898T	0.299	-0.042		0.010
	4	3.898T	0.293	0.044		@ 0.223
23	4	5.005T	0.290	-0.034		0.014
	5	5.005T	0.284	0.045		@ 0.198
24	5	6.398T	0.284	-0.052		0.068
	6	6.398T	0.275	0.075		@ 0.323
25	6	7.747T	0.274	-0.019		0.029
	7	7.747T	0.269	0.055		@ 0.173
26	7	8.699T	0.265	-0.011		0.046
	8	8.699T	0.260	0.065		@ 0.174
27	8	7.096T	-0.989	0.177		0.066
	9	7.096T	-0.995	-0.145		@ 0.085
28	9	2.478T	-1.000	0.178		0.057
	10	2.478T	-1.006	-0.174		@ 0.077

Member Forces (014 : Max SWL UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	11	6.784T	1.593	-0.259		0.087
	12	6.784T	1.027	0.199		@ 0.081
2	12	1.301T	1.300	-0.184		0.046
	13	1.301T	0.774	0.153		@ 0.254
3	13	2.866C	1.022	-0.138		0.036
	14	2.866C	0.553	0.090		@ 0.070
4	14	5.178C	0.750	-0.071		0.029
	15	5.178C	0.305	0.074		@ 0.193
5	15	7.078C	0.616	-0.062		0.127
	16	7.078C	-0.121	0.051	@ 0.056 0.364	@ 0.278
6	16	7.610C	0.191	0.017		0.037
	17	7.610C	-0.254	0.008	@ 0.028 0.102	@ 0.135
7	17	7.125C	-0.057	0.041		0.025
	18	7.125C	-0.526	-0.043		@ 0.099
8	18	5.292C	-0.278	0.085		0.044
	19	5.292C	-0.804	-0.091		@ 0.094
9	19	2.127C	-0.531	0.129		0.053
	20	2.127C	-1.098	-0.156		@ 0.084
10	1	0.003C	-3.605	0.245		0.000
	11	0.003T	-3.605	-0.259		@ 0.000

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Member Forces (014 : Max SWL UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
11	2	0.278C	-5.484	0.385		0.000
	12	0.273C	-5.484	-0.383		@ 0.000
12	3	0.254C	-4.167	0.292		0.000
	13	0.249C	-4.167	-0.291		@ 0.000
13	4	0.200C	-2.312	0.162		0.014
	14	0.197C	-2.312	-0.161		@ 0.029
14	5	0.314C	-1.900	0.130		0.013
	15	0.311C	-1.900	-0.136		@ 0.109
15	6	0.314C	-0.532	0.040		0.000
	16	0.311C	-0.532	-0.034		@ 0.000
16	7	0.200C	0.485	-0.035		0.000
	17	0.197C	0.485	0.033		@ 0.000
17	8	0.254C	1.833	-0.129		0.000
	18	0.249C	1.833	0.128		@ 0.000
18	9	0.278C	3.165	-0.223		0.000
	19	0.273C	3.165	0.220		@ 0.000
19	10	0.003C	2.127	-0.142		0.000
	20	0.003T	2.127	0.156		@ 0.000
20	1	6.784C	1.322	-0.245		0.094
	2	6.784C	1.315	0.216		@ 0.084
21	2	1.301C	1.037	-0.169		0.045
	3	1.301C	1.031	0.167		@ 0.068
22	3	2.866T	0.777	-0.125		0.038
	4	2.866T	0.771	0.099		@ 0.075
23	4	5.178T	0.571	-0.063		0.031
	5	5.178T	0.566	0.093		@ 0.195
24	5	7.078T	0.252	-0.037		0.093
	6	7.078T	0.243	0.076		@ 0.300
25	6	7.610T	-0.071	0.036		0.038
	7	7.610T	-0.076	0.016		@ 0.129
26	7	7.125T	-0.276	0.050		0.021
	8	7.125T	-0.281	-0.031		@ 0.090
27	8	5.292T	-0.535	0.098		0.039
	9	5.292T	-0.541	-0.077		@ 0.088
28	9	2.127T	-0.819	0.146		0.047
	10	2.127T	-0.826	-0.142		@ 0.077

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Job Ref : 1502

Sheet : Ledger Beam /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

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Support Reactions Serviceability (001 : D Plus 1.0 UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	4.323	0.664	0.000	10	0.000	0.091	0.000
11	-4.323	0.982	0.000	20	0.000	0.091	0.000
Total	0.000	1.828	0.000				

Support Reactions Serviceability (002 : D Plus 2.0 UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	7.242	1.113	0.000	10	0.000	0.135	0.000
11	-7.242	1.681	0.000	20	0.000	0.135	0.000
Total	0.000	3.063	0.000				

Support Reactions Serviceability (003 : D Plus 1.5 kN PL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	5.845	0.898	0.000	10	0.000	0.114	0.000
11	-5.845	0.968	0.000	20	0.000	0.114	0.000
Total	0.000	2.093	0.000				

Support Reactions Serviceability (004 : D only)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	1.404	0.214	0.000	10	0.000	0.047	0.000
11	-1.404	0.284	0.000	20	0.000	0.047	0.000
Total	0.000	0.593	0.000				

Support Reactions Serviceability (005 : 1.0 L UDL Only)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	2.919	0.449	0.000	10	0.000	0.044	0.000
11	-2.919	0.698	0.000	20	0.000	0.044	0.000
Total	0.000	1.235	0.000				

Support Reactions Serviceability (006 : Single FLight Adjacent)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	3.547	0.544	0.000	10	0.000	0.079	0.000
11	-3.547	0.863	0.000	20	0.000	0.079	0.000
Total	0.000	1.566	0.000				

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Support Reactions Serviceability (007 : Single Flight Opposite)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	2.138	0.327	0.000	10	0.000	0.058	0.000
11	-2.138	0.646	0.000	20	0.000	0.058	0.000
Total	0.000	1.090	0.000				

Support Reactions Serviceability (008 : Single flight adj D only)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	1.197	0.182	0.000	10	0.000	0.044	0.000
11	-1.197	0.252	0.000	20	0.000	0.044	0.000
Total	0.000	0.523	0.000				

Support Reactions Serviceability (009 : Single flight opposite D only)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	0.871	0.132	0.000	10	0.000	0.039	0.000
11	-0.871	0.202	0.000	20	0.000	0.039	0.000
Total	0.000	0.413	0.000				

Support Reactions Serviceability (010 : Max SWL CPL A)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	6.748	0.699	0.000	10	0.000	0.377	0.000
11	-6.748	0.699	0.000	20	0.000	0.378	0.000
Total	0.000	2.153	0.000				

Support Reactions Serviceability (011 : MAX SWL CPL B)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	7.119	0.757	0.000	10	0.000	0.270	0.000
11	-7.119	0.757	0.000	20	0.000	0.270	0.000
Total	0.000	2.053	0.000				

Support Reactions Serviceability (012 : Max SWL 2PL A)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	9.975	1.126	0.000	10	0.000	0.650	0.000
11	-9.975	1.126	0.000	20	0.000	0.650	0.000
Total	0.000	3.553	0.000				

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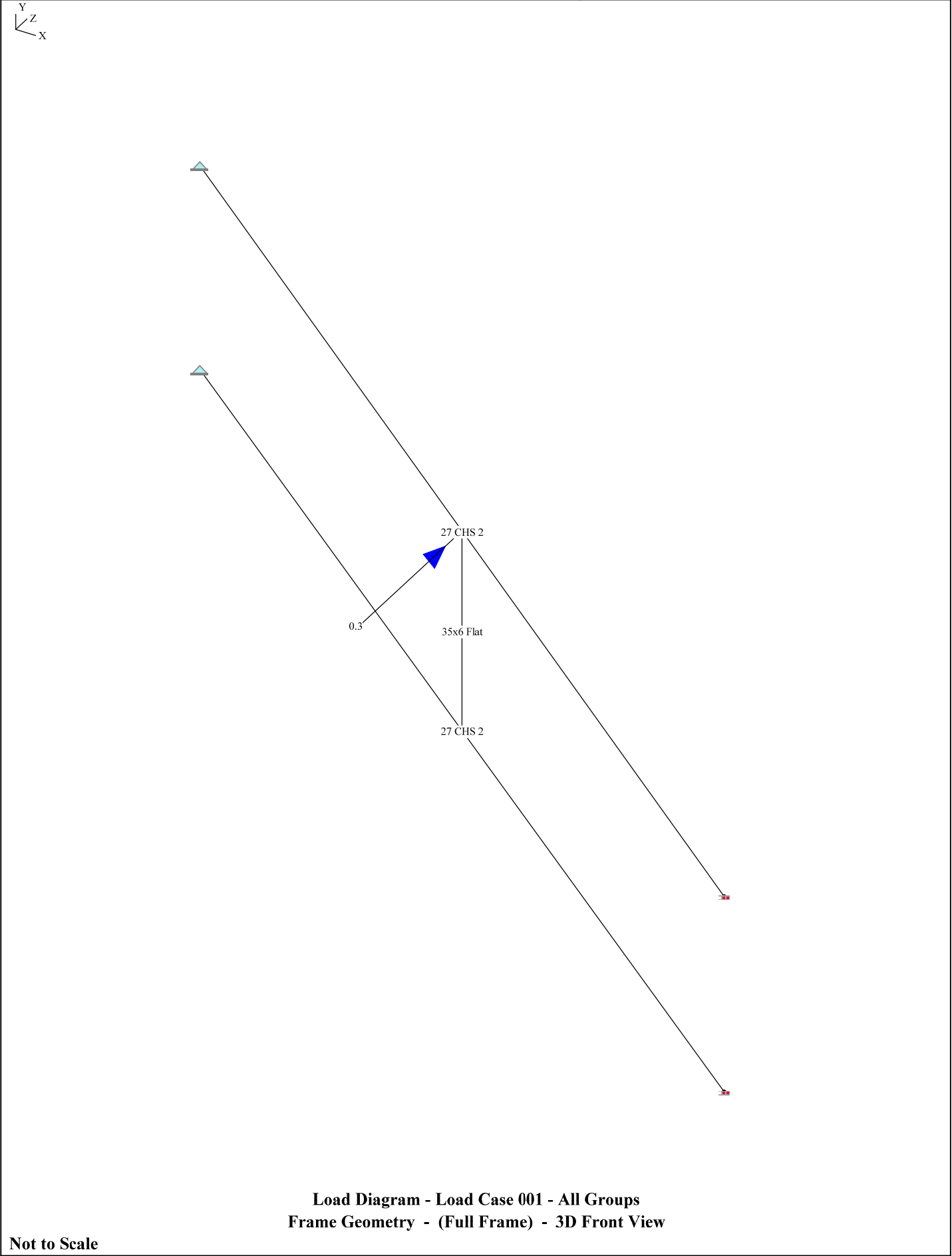
Support Reactions Serviceability (013 : MAX SWL 2PL B)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	11.713	1.568	0.000	10	0.000	1.009	0.000
11	-11.713	1.567	0.000	20	0.000	1.009	0.000
Total	0.000	5.153	0.000				

Support Reactions Serviceability (014 : Max SWL UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)		Rx→ (kN)	Ry↑ (kN)	Mz↺ (kN.m)
1	10.390	1.324	0.000	10	0.000	0.829	0.000
11	-10.390	1.596	0.000	20	0.000	1.100	0.000
Total	0.000	4.849	0.000				

S-Mech Ltd Suite 9 Railway House, Railway Road Chorley, Lancs, PR6 0HW Tel: 01257 367580 Email: info@s-mech.co.uk		12385	Job Ref : 1502 Sheet : 2m Stair Guard / Made by : IH Date : 29 June 2017 / Ver. 2016.10 Checked : IH Approved :
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MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D1	Dead Load
Load Group L1	Live Load
Load Group L2	Live Load
Load Group L3	Live Load
Load Group L4	Live Load

Load Case 001 : D Plus Hz

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L1

Load Case 002 : D Plus Vt

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L2

Load Case 003 : Max SWL CPL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L3

Load Case 004 : Max CPL 1PL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L4

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	1.650	0.000	2	0.825	0.825	0.000
3	1.650	0.000	0.000	4	0.000	2.250	0.000
5	0.825	1.413	0.000	6	1.650	0.575	0.000

Member Properties**Members 1-4**

M	27 CHS 2 []	E 210E6	G 81E6	
A 1.57E-4	Ix 1.235E-8	Iy 1.235E-8	J 2.47E-8	

Member 5

M	35x6 Flat [S 275]			
A 2.1E-4	Ix 2.144E-8	Iy 0.063E-8	J 0.25E-8	
E 205.0E6	G 78.85E6			

Member Loading

Member Self Weight Density Load Included in Load Group D1, defined by Modulus of Elasticity

E kN/mm ²	Density kN/m ³
>= 200.00	77.01
>= 20.00	24.00
>= 2.00	10.00

Members 3-4

L4 PY -000.800 0.588 (kN,m)

Nodal Loading and Support Conditions**NODE 5**

L1 Ls +0000.000 +0000.000 +0000.300 +0000.000 +0000.000 +0000.000

NODE 5

L2 Ls +0000.000 -0001.250 +0000.000 +0000.000 +0000.000 +0000.000

NODE 5

L3 Ls +0000.000 -0000.800 +0000.000 +0000.000 +0000.000 +0000.000

NODES 1 and 4

UT Rs 1 1 1 0 0 0 (Pinned)

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UT Rs 0 1 1 0 0 0

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Nodal Deflections Serviceability (001 : D Plus Hz)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	3.08	-3.07	-0.13	4.35
2	-1.15	-1.15	-0.03	1.63	3.07	-3.07	0.00	4.35
3	0.00	0.00	0.00	0.00	3.07	-3.07	0.13	4.35
4	0.00	0.00	0.00	0.00	1.42	-4.71	-0.13	4.92
5	-1.17	-1.15	31.38	31.42	3.05	-3.10	0.00	4.35
6	0.00	0.00	0.00	0.00	4.69	-1.49	0.13	4.92

Nodal Deflections Serviceability (002 : D Plus Vt)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-3.48	3.48
2	-33.15	-33.16	0.00	46.89	0.00	0.00	0.04	0.04
3	0.00	0.00	0.00	0.00	0.00	0.00	3.44	3.44
4	0.00	0.00	0.00	0.00	0.00	0.00	-3.48	3.48
5	-33.64	-33.17	0.00	47.24	0.00	0.00	0.04	0.04
6	0.04	0.00	0.00	0.04	0.00	0.00	3.44	3.44

Nodal Deflections Serviceability (003 : Max SWL CPL)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-2.27	2.27
2	-21.63	-21.64	0.00	30.59	0.00	0.00	0.02	0.02
3	0.00	0.00	0.00	0.00	0.00	0.00	2.25	2.25
4	0.00	0.00	0.00	0.00	0.00	0.00	-2.27	2.27
5	-21.95	-21.64	0.00	30.82	0.00	0.00	0.02	0.02
6	0.03	0.00	0.00	0.03	0.00	0.00	2.25	2.25

Nodal Deflections Serviceability (004 : Max CPL 1PL)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-1.58	1.58
2	-15.28	-15.30	0.00	21.63	0.00	0.00	-0.05	0.05
3	0.01	0.00	0.00	0.01	0.00	0.00	1.62	1.62
4	0.00	0.00	0.00	0.00	0.00	0.00	-2.24	2.24
5	-15.54	-15.30	0.00	21.81	0.00	0.00	0.21	0.21
6	0.00	0.00	0.00	0.00	0.00	0.00	1.50	1.50

Member Forces (001 : D Plus Hz)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	1	0.01T	0.00	0.01	0.00	0.00	0.00	0.01	0.00	1.63
	2	0.00C	0.00	0.00	0.00	0.01	0.00	@ 0.992	@ 0.000	@ 1.155
2	2	0.00C	0.00	0.00	0.00	0.01	0.00	0.01	0.00	1.63
	3	0.01C	0.00	-0.01	0.00	0.00	0.00	@ 0.992	@ 0.000	@ 1.155

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Member Forces (001 : D Plus Hz)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
3	4	0.01T	0.00	0.01	-0.15	0.00	0.00	0.01	-0.18	31.42
	5	0.00T	0.00	0.00	-0.15	0.01	-0.18	@ 1.046	@ 1.175	@ 1.175
4	5	0.00C	0.00	0.00	0.15	0.01	-0.18	0.01	-0.18	31.42
	6	0.01C	0.00	-0.01	0.15	0.00	0.00	@ 1.046	@ 1.175	@ 1.175
5	2	0.00C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	5	0.01T	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.247

Member Forces (002 : D Plus Vt)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	1	0.20T	0.00	0.24	0.00	0.00	0.00	0.27		46.89
	2	0.19T	0.00	0.23	0.00	0.27	0.00	@ 1.155		@ 1.155
2	2	0.22C	0.00	-0.22	0.00	0.26	0.00	0.27		46.89
	3	0.23C	0.00	-0.23	0.00	0.00	0.00	@ 1.155		@ 1.155
3	4	0.28T	0.00	0.23	0.00	0.00	0.00	0.27		47.25
	5	0.27T	0.00	0.22	0.00	0.27	0.00	@ 1.163		@ 1.163
4	5	0.22C	0.00	-0.22	0.00	0.26	0.00	0.27		47.25
	6	0.23C	0.00	-0.23	0.00	0.00	0.00	@ 1.163		@ 1.163
5	2	0.60C	0.00	-0.03	0.00	0.01	0.00			0.01
	5	0.59C	0.00	-0.03	0.00	-0.01	0.00			@ 0.465

Member Forces (003 : Max SWL CPL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	1	0.13T	0.00	0.16	0.00	0.00	0.00	0.17		30.59
	2	0.12T	0.00	0.15	0.00	0.18	0.00	@ 1.155		@ 1.155
2	2	0.14C	0.00	-0.14	0.00	0.17	0.00	0.17		30.59
	3	0.15C	0.00	-0.15	0.00	0.00	0.00	@ 1.155		@ 1.155
3	4	0.18T	0.00	0.15	0.00	0.00	0.00	0.17		30.83
	5	0.17T	0.00	0.14	0.00	0.17	0.00	@ 1.163		@ 1.163
4	5	0.14C	0.00	-0.14	0.00	0.17	0.00	0.17		30.83
	6	0.15C	0.00	-0.15	0.00	0.00	0.00	@ 1.163		@ 1.163
5	2	0.39C	0.00	-0.02	0.00	0.01	0.00			0.00
	5	0.38C	0.00	-0.02	0.00	-0.01	0.00			@ 0.000

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Member Forces (004 : Max CPL 1PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	1	0.31T	0.00	0.11	0.00	0.00	0.00	0.13		21.63
	2	0.30T	0.00	0.10	0.00	0.12	0.00	@ 1.167		@ 1.178
2	2	0.10C	0.00	-0.10	0.00	0.13	0.00	0.13		21.63
	3	0.11C	0.00	-0.11	0.00	0.00	0.00	@ 1.167		@ 1.178
3	4	0.10T	0.00	0.30	0.00	0.00	0.00	0.18		22.23
	5	0.48C	0.00	-0.27	0.00	0.02	0.00	@ 0.588		@ 0.983
4	5	0.08C	0.00	-0.08	0.00	0.10	0.00	0.18		22.23
	6	0.09C	0.00	-0.09	0.00	0.00	0.00	@ 0.588		@ 0.983
5	2	0.43C	0.00	0.15	0.00	-0.01	0.00			0.34
	5	0.42C	0.00	0.15	0.00	0.08	0.00			@ 0.353

Support Reactions Serviceability (001 : D Plus Hz)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	0.016	0.000	0.000	0.000	0.000
3	0.000	0.016	0.000	0.000	0.000	0.000
4	0.000	0.018	-0.150	0.000	0.000	0.000
6	0.000	0.016	-0.150	0.000	0.000	0.000
Total	0.000	0.066	-0.300	0.000	0.000	0.000

Support Reactions Serviceability (002 : D Plus Vt)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.029	0.306	0.000	0.000	0.000	0.000
3	0.000	0.325	0.000	0.000	0.000	0.000
4	-0.029	0.362	0.000	0.000	0.000	0.000
6	0.000	0.323	0.000	0.000	0.000	0.000
Total	0.000	1.316	0.000	0.000	0.000	0.000

Support Reactions Serviceability (003 : Max SWL CPL)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.019	0.202	0.000	0.000	0.000	0.000
3	0.000	0.214	0.000	0.000	0.000	0.000
4	-0.019	0.238	0.000	0.000	0.000	0.000
6	0.000	0.212	0.000	0.000	0.000	0.000
Total	0.000	0.866	0.000	0.000	0.000	0.000

S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : 2m Stair Guard /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

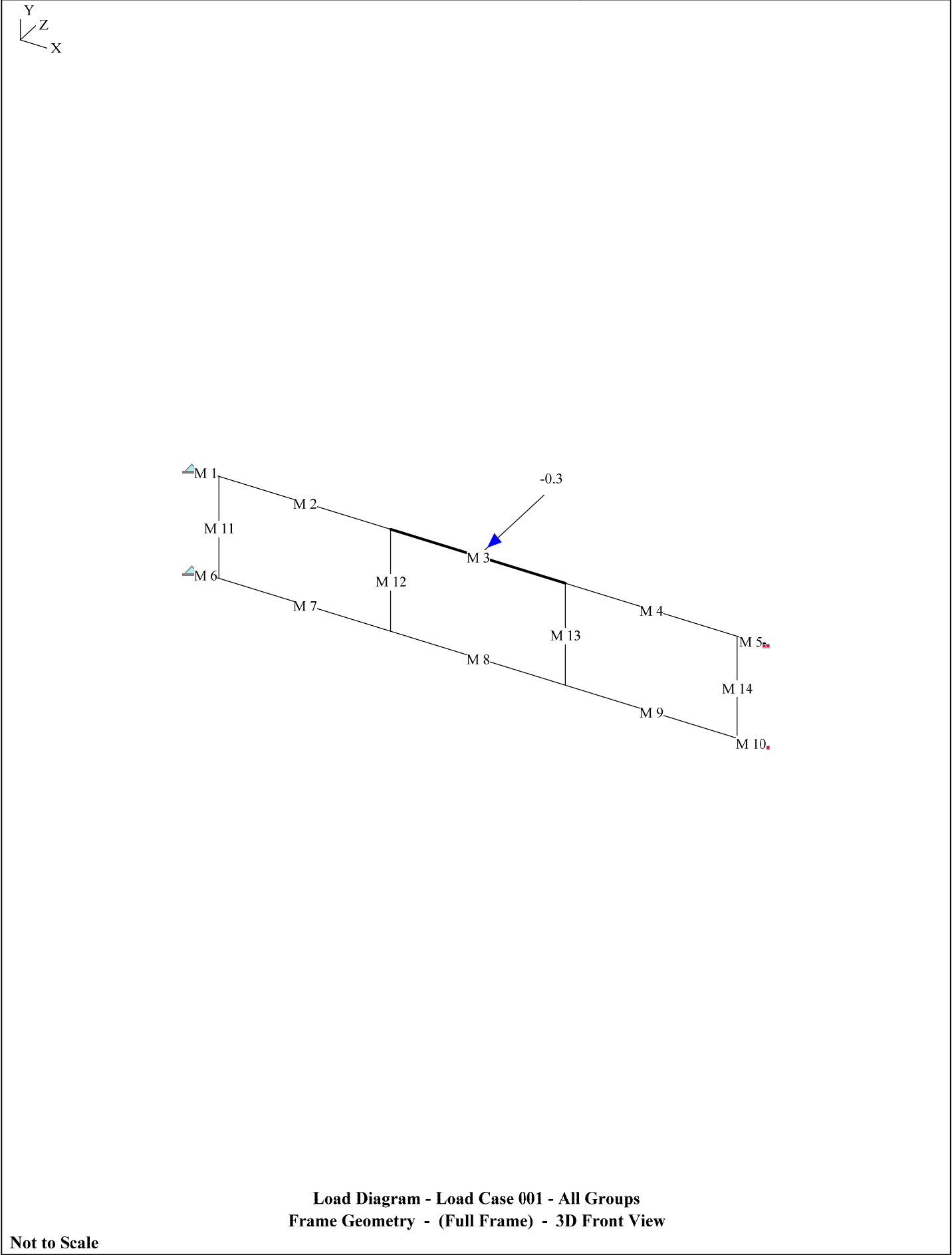
Checked : IH

Approved :

Support Reactions Serviceability (004 : Max CPL 1PL)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	R _x →(kN)	R _y ↑(kN)	R _z ↗(kN)	M _x →(kN.m)	M _y ↑(kN.m)	M _z ↗(kN.m)
1	-0.148	0.296	0.000	0.000	0.000	0.000
3	0.000	0.162	0.000	0.000	0.000	0.000
4	0.148	0.283	0.000	0.000	0.000	0.000
6	0.000	0.125	0.000	0.000	0.000	0.000
Total	0.000	0.866	0.000	0.000	0.000	0.000

S-Mech Ltd Suite 9 Railway House, Railway Road Chorley, Lancs, PR6 0HW Tel: 01257 367580 Email: info@s-mech.co.uk	12385 Job Ref : 1502 Sheet : 3m Guardrail Frame / Made by : IH Date : 29 June 2017 / Ver. 2016.10 Checked : IH Approved :
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S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502**Sheet : 3m Guardrail Frame /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :**

MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D1	Dead Load
Load Group L1	Live Load
Load Group L2	Live Load
Load Group L3	Live Load
Load Group L4	Live Load
Load Group L5	Live Load
Load Group L6	Live Load
Load Group L7	Live Load

Load Case 001 : D Plus Hz Ctr

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L1

Load Case 002 : D Plus Vt Ctr

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L2

Load Case 003 : D Plus Hz Edge

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L3

Load Case 004 : D Plus Vt Edge

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L4

Load Case 005 : Max SWL CPL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L5

Load Case 006 : Max SWL 2PL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L6

Load Case 007 : Max SWL UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L7

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000	2	0.000	0.500	0.000
3	0.142	0.000	0.000	4	0.142	0.500	0.000
5	1.042	0.000	0.000	6	1.042	0.500	0.000
7	1.958	0.000	0.000	8	1.958	0.500	0.000
9	2.858	0.000	0.000	10	2.858	0.500	0.000
11	3.000	0.000	0.000	12	3.000	0.500	0.000

Member Properties**Members 1-7 and 9-10**

M	27 CHS 2.5 []	E 210E6	G 81E6	
A 1.92E-4	Ix 1.459E-8	Iy 1.459E-8	J 2.918E-8	

Member 8

M	27 CHS 2.5 []	E 210E6	G 81E6	
A 1.92E-4	Ix 1.459E-8	Iy 1.459E-8	J 2.918E-8	

Members 11-14

M	50 30 PFC []	E 210E6	G 81E6	
A 1.91E-4	Ix 3.29E-8	Iy 5.0E-8	J 6.58E-8	

S-Mech Ltd

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Suite 9**Railway House, Railway Road****Chorley, Lancs, PR6 0HW****Tel: 01257 367580 Email: info@s-mech.co.uk****Job Ref : 1502****Sheet : 3m Guardrail Frame /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :****Member Loading**

Member Self Weight Density Load Included in Load Group D1, defined by Modulus of Elasticity

E kN/mm ²	Density kN/m ³
>= 200.00	77.01
>= 20.00	24.00
>= 2.00	10.00

Member 2

L3	PZ	-000.300	0.508	(kN, m)
L4	PY	-001.250	0.508	(kN, m)
L7	UDLY	-000.700		(kN/m)

Member 3

L1	PZ	-000.300	0.458	(kN, m)
L2	PY	-001.250	0.458	(kN, m)
L5	PY	-001.200	0.458	(kN, m)
L6	PY	-000.700	0.000	(kN, m)
L6	PY	-000.700	0.916	(kN, m)
L7	UDLY	-000.700		(kN/m)

Member 4

L7	UDLY	-000.700		(kN/m)
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Member OrientationMembers 11-14 β -090.00**Nodal Loading and Support Conditions**

NODES 1-2

UT Rs 1 1 1 0 0 0 (Pinned)

NODES 11-12

UT Rs 0 1 1 0 0 0

S-Mech Ltd

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Job Ref : 1502

Sheet : 3m Guardrail Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (001 : D PLus Hz Ctr)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	-0.05	1.51	-0.01	1.51
2	0.00	0.00	0.00	0.00	-0.05	1.65	-0.01	1.65
3	0.00	-0.02	-3.74	3.74	-0.05	1.51	-0.01	1.51
4	0.00	-0.02	-4.06	4.06	-0.05	1.62	-0.01	1.62
5	0.00	-0.44	-22.59	22.60	-0.33	0.76	0.00	0.83
6	0.00	-0.44	-25.57	25.57	-0.33	0.87	0.00	0.93
7	0.00	-0.44	-22.59	22.60	-0.33	-0.76	0.00	0.83
8	0.00	-0.44	-25.57	25.57	-0.33	-0.87	0.00	0.93
9	0.00	-0.03	-3.74	3.74	-0.05	-1.51	0.01	1.51
10	0.00	-0.03	-4.06	4.06	-0.05	-1.62	0.01	1.62
11	0.00	0.00	0.00	0.00	-0.05	-1.51	0.01	1.51
12	0.00	0.00	0.00	0.00	-0.05	-1.65	0.01	1.65

Nodal Deflections Serviceability (002 : D PLus Vt Ctr)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.16	0.16
2	0.00	0.00	0.00	0.00	0.00	0.00	-0.16	0.16
3	0.00	-0.33	0.00	0.33	0.00	0.00	-0.10	0.10
4	0.00	-0.33	0.00	0.33	0.00	0.00	-0.09	0.09
5	0.02	-8.42	0.00	8.42	0.00	0.00	-0.03	0.03
6	-0.02	-8.42	0.00	8.42	0.00	0.00	-0.16	0.16
7	0.05	-8.44	0.00	8.44	0.00	0.00	0.04	0.04
8	-0.05	-8.44	0.00	8.44	0.00	0.00	0.17	0.17
9	0.07	-0.36	0.00	0.37	0.00	0.00	0.11	0.11
10	-0.07	-0.36	0.00	0.37	0.00	0.00	0.10	0.10
11	0.07	0.00	0.00	0.07	0.00	0.00	0.17	0.17
12	-0.07	0.00	0.00	0.07	0.00	0.00	0.17	0.17

Nodal Deflections Serviceability (003 : D Plus Hz Edge)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	-0.07	1.16	-0.01	1.16
2	0.00	0.00	0.00	0.00	-0.07	1.39	-0.01	1.39
3	0.00	-0.02	-2.88	2.88	-0.07	1.16	-0.01	1.16
4	0.00	-0.02	-3.40	3.40	-0.07	1.34	-0.01	1.34
5	0.00	-0.44	-15.21	15.22	-0.27	0.32	0.00	0.41
6	0.00	-0.44	-17.63	17.63	-0.27	0.28	0.00	0.38
7	0.00	-0.44	-13.17	13.18	-0.14	-0.52	0.00	0.53
8	0.00	-0.44	-14.43	14.44	-0.14	-0.56	0.00	0.58
9	0.00	-0.03	-2.08	2.08	-0.02	-0.84	0.01	0.84
10	0.00	-0.03	-2.22	2.22	-0.02	-0.89	0.01	0.89
11	0.00	0.00	0.00	0.00	-0.02	-0.84	0.01	0.84
12	0.00	0.00	0.00	0.00	-0.02	-0.90	0.01	0.90

Nodal Deflections Serviceability (004 : D PLus Vt Edge)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.23	0.23
2	0.00	0.00	0.00	0.00	0.00	0.00	-0.20	0.20

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Sheet : 3m Guardrail Frame /

Made by : IH

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Approved :

Nodal Deflections Serviceability (004 : D PLus Vt Edge)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
3	0.00	-0.45	0.00	0.45	0.00	0.00	-0.08	0.08
4	0.00	-0.45	0.00	0.45	0.00	0.00	-0.15	0.15
5	0.02	-6.68	0.00	6.68	0.00	0.00	-0.06	0.06
6	-0.02	-6.68	0.00	6.68	0.00	0.00	0.08	0.08
7	0.03	-3.68	0.00	3.69	0.00	0.00	0.07	0.07
8	-0.03	-3.68	0.00	3.68	0.00	0.00	0.05	0.05
9	0.04	-0.16	0.00	0.17	0.00	0.00	0.05	0.05
10	-0.04	-0.16	0.00	0.17	0.00	0.00	0.05	0.05
11	0.04	0.00	0.00	0.04	0.00	0.00	0.08	0.08
12	-0.04	0.00	0.00	0.04	0.00	0.00	0.08	0.08

Nodal Deflections Serviceability (005 : Max SWL CPL)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.15	0.15
2	0.00	0.00	0.00	0.00	0.00	0.00	-0.15	0.15
3	0.00	-0.32	0.00	0.32	0.00	0.00	-0.09	0.09
4	0.00	-0.32	0.00	0.32	0.00	0.00	-0.08	0.08
5	0.02	-8.10	0.00	8.10	0.00	0.00	-0.03	0.03
6	-0.02	-8.10	0.00	8.10	0.00	0.00	-0.15	0.15
7	0.05	-8.12	0.00	8.12	0.00	0.00	0.04	0.04
8	-0.05	-8.12	0.00	8.12	0.00	0.00	0.16	0.16
9	0.07	-0.35	0.00	0.36	0.00	0.00	0.10	0.10
10	-0.07	-0.35	0.00	0.36	0.00	0.00	0.10	0.10
11	0.07	0.00	0.00	0.07	0.00	0.00	0.16	0.16
12	-0.07	0.00	0.00	0.07	0.00	0.00	0.16	0.16

Nodal Deflections Serviceability (006 : Max SWL 2PL)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	0.17
2	0.00	0.00	0.00	0.00	0.00	0.00	-0.17	0.17
3	0.00	-0.37	0.00	0.37	0.00	0.00	-0.10	0.10
4	0.00	-0.37	0.00	0.37	0.00	0.00	-0.10	0.10
5	0.02	-9.09	0.00	9.09	0.00	0.00	-0.07	0.07
6	-0.02	-9.09	0.00	9.09	0.00	0.00	-0.07	0.07
7	0.05	-9.11	0.00	9.11	0.00	0.00	0.08	0.08
8	-0.05	-9.11	0.00	9.11	0.00	0.00	0.08	0.08
9	0.07	-0.40	0.00	0.40	0.00	0.00	0.11	0.11
10	-0.07	-0.40	0.00	0.40	0.00	0.00	0.11	0.11
11	0.07	0.00	0.00	0.07	0.00	0.00	0.18	0.18
12	-0.07	0.00	0.00	0.07	0.00	0.00	0.18	0.18

Nodal Deflections Serviceability (007 : Max SWL UDL)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.21	0.21
2	0.00	0.00	0.00	0.00	0.00	0.00	-0.20	0.20
3	0.00	-0.44	0.00	0.44	0.00	0.00	-0.10	0.10
4	0.00	-0.44	0.00	0.44	0.00	0.00	-0.12	0.12

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Nodal Deflections Serviceability (007 : Max SWL UDL)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
5	0.02	-8.58	0.00	8.58	0.00	0.00	-0.06	0.06
6	-0.02	-8.58	0.00	8.58	0.00	0.00	-0.06	0.06
7	0.06	-8.60	0.00	8.60	0.00	0.00	0.08	0.08
8	-0.06	-8.60	0.00	8.60	0.00	0.00	0.08	0.08
9	0.08	-0.47	0.00	0.47	0.00	0.00	0.12	0.12
10	-0.08	-0.47	0.00	0.48	0.00	0.00	0.14	0.14
11	0.08	0.00	0.00	0.08	0.00	0.00	0.23	0.23
12	-0.08	0.00	0.00	0.08	0.00	0.00	0.22	0.22

Member Forces (001 : D PLUS Hz Ctr)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	2	0.00T	0.00	0.03	0.15	0.00	0.00	0.00		0.00
	4	0.00T	0.00	0.03	0.15	0.00	0.02	@ 0.000		@ 0.000
2	4	0.05C	0.01	0.02	0.10	-0.01	0.00			1.51
	6	0.05C	-0.01	0.01	0.10	0.01	0.09			@ 0.522
3	6	0.08C	0.00	0.01	0.15	0.00	0.07	0.00	0.14	3.88
	8	0.08C	0.00	-0.01	-0.15	0.00	0.07	@ 0.000	@ 0.458	@ 0.458
4	8	0.05C	-0.01	-0.01	-0.10	0.01	0.09			1.51
	10	0.05C	0.01	-0.02	-0.10	-0.01	0.00			@ 0.378
5	10	0.00C	0.00	-0.03	-0.15	0.00	0.02	0.00		0.00
	12	0.00C	0.00	-0.03	-0.15	0.00	0.00	@ 0.000		@ 0.000
6	1	0.00C	0.00	0.03	0.00	0.00	0.00	0.00		0.00
	3	0.00C	0.00	0.03	0.00	0.00	0.00	@ 0.000		@ 0.000
7	3	0.05T	0.01	0.02	0.05	-0.01	0.02			1.48
	5	0.05T	-0.01	0.01	0.05	0.01	0.07			@ 0.486
8	5	0.08T	0.00	0.01	0.00	0.00	0.09	0.00	0.09	3.04
	7	0.08T	0.00	-0.01	0.00	0.00	0.09	@ 0.000	@ 0.000	@ 0.458
9	7	0.05T	-0.01	-0.01	-0.05	0.01	0.07			1.48
	9	0.05T	0.01	-0.02	-0.05	-0.01	0.02			@ 0.414
10	9	0.00C	0.00	-0.03	0.00	0.00	0.00	0.00	0.00	0.00
	11	0.00C	0.00	-0.03	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
11	3	0.00C	-0.02	0.05	-0.05	-0.01	0.01			0.00
	4	0.00T	0.02	0.05	-0.05	0.01	-0.01			@ 0.000
12	5	0.00C	-0.02	-0.05	-0.03	0.01	0.01			0.00
	6	0.00T	0.02	-0.05	-0.03	-0.01	-0.01			@ 0.000
13	7	0.00C	0.02	-0.05	0.03	0.01	-0.01			0.00
	8	0.00T	-0.02	-0.05	0.03	-0.01	0.01			@ 0.000
14	9	0.00C	0.02	0.05	0.05	-0.01	-0.01			0.00
	10	0.00T	-0.02	0.05	0.05	0.01	0.01			@ 0.000

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Job Ref : 1502

Sheet : 3m Guardrail Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (002 : D Plus Vt Ctr)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	2	0.06T	0.00	0.38	0.00	0.00	0.00			0.02
	4	0.06T	0.00	0.37	0.00	0.05	0.00			@ 0.082
2	4	0.74C	0.00	0.32	0.00	-0.14	0.00			0.68
	6	0.74C	0.00	0.30	0.00	0.13	0.00			@ 0.207
3	6	1.59C	0.00	0.64	0.00	-0.13	0.00	0.16		2.30
	8	1.59C	0.00	-0.63	0.00	-0.12	0.00	@ 0.458		@ 0.458
4	8	0.78C	0.00	-0.29	0.00	0.13	0.00			0.66
	10	0.78C	0.00	-0.31	0.00	-0.14	0.00			@ 0.693
5	10	0.00C	0.00	-0.36	0.00	0.05	0.00			0.02
	12	0.00C	0.00	-0.37	0.00	0.00	0.00			@ 0.060
6	1	0.06C	0.00	0.32	0.00	0.00	0.00			0.02
	3	0.06C	0.00	0.32	0.00	0.05	0.00			@ 0.082
7	3	0.74T	0.00	0.37	0.00	-0.16	0.00			0.78
	5	0.74T	0.00	0.35	0.00	0.16	0.00			@ 0.702
8	5	1.59T	0.00	0.01	0.00	0.00	0.00	0.01		0.14
	7	1.59T	0.00	0.00	0.00	0.01	0.00	@ 0.000		@ 0.495
9	7	0.78T	0.00	-0.34	0.00	0.16	0.00			0.76
	9	0.78T	0.00	-0.36	0.00	-0.15	0.00			@ 0.207
10	9	0.00C	0.00	-0.31	0.00	0.04	0.00			0.02
	11	0.00C	0.00	-0.31	0.00	0.00	0.00			@ 0.060
11	3	0.05T	0.00	0.00	-0.80	0.00	0.20			0.08
	4	0.06T	0.00	0.00	-0.80	0.00	-0.20			@ 0.110
12	5	0.34C	0.00	0.00	-0.85	0.00	0.16			0.19
	6	0.33C	0.00	0.00	-0.85	0.00	-0.26			@ 0.350
13	7	0.34C	0.00	0.00	0.81	0.00	-0.16			0.19
	8	0.33C	0.00	0.00	0.81	0.00	0.25			@ 0.345
14	9	0.05T	0.00	0.00	0.78	0.00	-0.20			0.08
	10	0.06T	0.00	0.00	0.78	0.00	0.19			@ 0.110

Member Forces (003 : D Plus Hz Edge)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	2	0.00T	0.00	0.03	0.24	0.00	0.00	0.00		0.01
	4	0.00T	0.00	0.03	0.24	0.00	0.03	@ 0.000		@ 0.082
2	4	0.05C	0.01	0.02	0.20	-0.01	0.00		0.10	2.47
	6	0.05C	-0.01	0.01	-0.10	0.01	0.06	@ 0.508		@ 0.487
3	6	0.08C	-0.01	0.01	-0.04	0.00	0.07	0.00		1.68
	8	0.08C	0.01	-0.01	-0.04	0.00	0.03	@ 0.000		@ 0.431

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Job Ref : 1502

Sheet : 3m Guardrail Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (003 : D Plus Hz Edge)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
4	8	0.05C	-0.01	-0.01	-0.04	0.01	0.04			0.65
	10	0.05C	0.01	-0.02	-0.04	-0.01	0.00			@ 0.378
5	10	0.00C	0.00	-0.03	-0.06	0.00	0.01	0.00		0.00
	12	0.00C	0.00	-0.03	-0.06	0.00	0.00	@ 0.000		@ 0.000
6	1	0.00C	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.00C	0.00	0.03	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
7	3	0.05T	0.01	0.02	0.04	-0.01	0.03			1.66
	5	0.05T	-0.01	0.01	0.04	0.01	0.07			@ 0.477
8	5	0.08T	-0.01	0.01	-0.02	0.00	0.06	0.00		1.67
	7	0.08T	0.01	-0.01	-0.02	0.00	0.04	@ 0.000		@ 0.440
9	7	0.05T	-0.01	-0.01	-0.02	0.01	0.03			0.64
	9	0.05T	0.01	-0.02	-0.02	-0.01	0.01			@ 0.414
10	9	0.00C	0.00	-0.03	0.00	0.00	0.00	0.00	0.00	0.00
	11	0.00C	0.00	-0.03	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
11	3	0.00C	-0.03	0.04	-0.05	-0.01	0.01			0.00
	4	0.00T	0.03	0.04	-0.05	0.01	-0.01			@ 0.000
12	5	0.00C	0.01	-0.06	-0.03	0.01	0.01			0.00
	6	0.00T	-0.01	-0.06	-0.03	-0.01	-0.01			@ 0.000
13	7	0.00C	0.01	0.00	0.03	0.00	-0.01	0.00		0.00
	8	0.00T	-0.01	0.00	0.03	0.00	0.01	@ 0.000		@ 0.000
14	9	0.00C	0.01	0.02	0.05	-0.01	-0.01			0.03
	10	0.00T	-0.01	0.02	0.05	0.01	0.01			@ 0.495

Member Forces (004 : D Plus Vt Edge)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	2	0.20T	0.00	0.28	0.00	0.00	0.00			0.02
	4	0.20T	0.00	0.28	0.00	0.04	0.00			@ 0.082
2	4	0.80C	0.00	0.80	0.00	-0.24	0.00	0.17		2.11
	6	0.80C	0.00	-0.47	0.00	-0.02	0.00	@ 0.508		@ 0.533
3	6	0.78C	0.00	-0.09	0.00	0.04	0.00			0.22
	8	0.78C	0.00	-0.10	0.00	-0.05	0.00			@ 0.714
4	8	0.33C	0.00	-0.13	0.00	0.06	0.00			0.26
	10	0.33C	0.00	-0.14	0.00	-0.06	0.00			@ 0.711
5	10	0.00C	0.00	-0.14	0.00	0.02	0.00			0.00
	12	0.00C	0.00	-0.14	0.00	0.00	0.00			@ 0.000
6	1	0.20C	0.00	0.79	0.00	0.00	0.00			0.05
	3	0.20C	0.00	0.79	0.00	0.11	0.00			@ 0.082

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Sheet : 3m Guardrail Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (004 : D Plus Vt Edge)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
7	3	0.80T	0.00	0.26	0.00	-0.12	0.00			0.52
	5	0.80T	0.00	0.25	0.00	0.12	0.00			@ 0.702
8	5	0.78T	0.00	-0.14	0.00	0.07	0.00			0.48
	7	0.78T	0.00	-0.15	0.00	-0.06	0.00			@ 0.247
9	7	0.33T	0.00	-0.13	0.00	0.06	0.00			0.27
	9	0.33T	0.00	-0.14	0.00	-0.06	0.00			@ 0.702
10	9	0.00C	0.00	-0.15	0.00	0.02	0.00			0.00
	11	0.00C	0.00	-0.15	0.00	0.00	0.00			@ 0.000
11	3	0.52C	0.00	0.00	-1.01	0.00	0.23			0.15
	4	0.52C	0.00	0.00	-1.01	0.00	-0.28			@ 0.370
12	5	0.39C	0.00	0.00	0.02	0.00	0.04			0.15
	6	0.38C	0.00	0.00	0.02	0.00	0.06			@ 0.255
13	7	0.02T	0.00	0.00	0.45	0.00	-0.12			0.05
	8	0.03T	0.00	0.00	0.45	0.00	0.11			@ 0.115
14	9	0.01C	0.00	0.00	0.33	0.00	-0.08			0.03
	10	0.00C	0.00	0.00	0.33	0.00	0.08			@ 0.395

Member Forces (005 : Max SWL CPL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	2	0.06T	0.00	0.36	0.00	0.00	0.00			0.02
	4	0.06T	0.00	0.36	0.00	0.05	0.00			@ 0.082
2	4	0.71C	0.00	0.31	0.00	-0.14	0.00			0.66
	6	0.71C	0.00	0.29	0.00	0.13	0.00			@ 0.198
3	6	1.53C	0.00	0.61	0.00	-0.12	0.00	0.16		2.21
	8	1.53C	0.00	-0.60	0.00	-0.12	0.00	@ 0.458		@ 0.458
4	8	0.75C	0.00	-0.28	0.00	0.12	0.00			0.64
	10	0.75C	0.00	-0.30	0.00	-0.13	0.00			@ 0.693
5	10	0.00C	0.00	-0.35	0.00	0.05	0.00			0.02
	12	0.00C	0.00	-0.35	0.00	0.00	0.00			@ 0.060
6	1	0.06C	0.00	0.31	0.00	0.00	0.00			0.02
	3	0.06C	0.00	0.30	0.00	0.04	0.00			@ 0.082
7	3	0.71T	0.00	0.35	0.00	-0.15	0.00			0.75
	5	0.71T	0.00	0.34	0.00	0.16	0.00			@ 0.702
8	5	1.53T	0.00	0.01	0.00	0.00	0.00	0.00		0.14
	7	1.53T	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.495
9	7	0.75T	0.00	-0.33	0.00	0.15	0.00			0.73
	9	0.75T	0.00	-0.34	0.00	-0.15	0.00			@ 0.207

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Sheet : 3m Guardrail Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (005 : Max SWL CPL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
10	9	0.00C	0.00	-0.29	0.00	0.04	0.00			0.02
	11	0.00C	0.00	-0.30	0.00	0.00	0.00			@ 0.060
11	3	0.05T	0.00	0.00	-0.77	0.00	0.20			0.08
	4	0.06T	0.00	0.00	-0.77	0.00	-0.19			@ 0.110
12	5	0.33C	0.00	0.00	-0.82	0.00	0.16			0.18
	6	0.32C	0.00	0.00	-0.82	0.00	-0.25			@ 0.350
13	7	0.33C	0.00	0.00	0.78	0.00	-0.15			0.18
	8	0.32C	0.00	0.00	0.78	0.00	0.24			@ 0.345
14	9	0.05T	0.00	0.00	0.75	0.00	-0.19			0.08
	10	0.06T	0.00	0.00	0.75	0.00	0.18			@ 0.110

Member Forces (006 : Max SWL 2PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	2	0.06T	0.00	0.38	0.00	0.00	0.00			0.02
	4	0.06T	0.00	0.38	0.00	0.05	0.00			@ 0.082
2	4	0.82C	0.00	0.38	0.00	-0.17	0.00			0.75
	6	0.82C	0.00	0.37	0.00	0.17	0.00			@ 0.702
3	6	1.47C	0.00	0.71	0.00	0.01	0.00	0.01		0.31
	8	1.47C	0.00	-0.70	0.00	0.01	0.00	@ 0.000		@ 0.477
4	8	0.86C	0.00	-0.36	0.00	0.16	0.00			0.74
	10	0.86C	0.00	-0.37	0.00	-0.16	0.00			@ 0.198
5	10	0.00C	0.00	-0.37	0.00	0.05	0.00			0.02
	12	0.00C	0.00	-0.37	0.00	0.00	0.00			@ 0.060
6	1	0.06C	0.00	0.38	0.00	0.00	0.00			0.02
	3	0.06C	0.00	0.38	0.00	0.05	0.00			@ 0.082
7	3	0.82T	0.00	0.38	0.00	-0.17	0.00			0.75
	5	0.82T	0.00	0.37	0.00	0.17	0.00			@ 0.702
8	5	1.47T	0.00	0.01	0.00	0.01	0.00	0.01		0.31
	7	1.47T	0.00	0.00	0.00	0.01	0.00	@ 0.000		@ 0.476
9	7	0.86T	0.00	-0.36	0.00	0.16	0.00			0.74
	9	0.86T	0.00	-0.37	0.00	-0.16	0.00			@ 0.198
10	9	0.00C	0.00	-0.37	0.00	0.05	0.00			0.02
	11	0.00C	0.00	-0.37	0.00	0.00	0.00			@ 0.060
11	3	0.00C	0.00	0.00	-0.88	0.00	0.22			0.08
	4	0.00T	0.00	0.00	-0.88	0.00	-0.22			@ 0.395
12	5	0.35C	0.00	0.00	-0.65	0.00	0.16			0.06
	6	0.35C	0.00	0.00	-0.65	0.00	-0.16			@ 0.395

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Sheet : 3m Guardrail Frame /

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Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (006 : Max SWL 2PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
13	7	0.35C	0.00	0.00	0.61	0.00	-0.15			0.06
	8	0.35C	0.00	0.00	0.61	0.00	0.15			@ 0.395
14	9	0.00C	0.00	0.00	0.86	0.00	-0.21			0.08
	10	0.00T	0.00	0.00	0.86	0.00	0.21			@ 0.395

Member Forces (007 : Max SWL UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
1	2	0.07T	0.00	0.42	0.00	0.00	0.00			0.03
	4	0.07T	0.00	0.42	0.00	0.06	0.00			@ 0.082
2	4	0.92C	0.00	0.66	0.00	-0.20	0.00			0.95
	6	0.92C	0.00	0.01	0.00	0.11	0.00			@ 0.648
3	6	1.53C	0.00	0.33	0.00	-0.04	0.00	0.03		0.71
	8	1.53C	0.00	-0.32	0.00	-0.04	0.00	@ 0.431		@ 0.467
4	8	0.96C	0.00	0.00	0.00	0.10	0.00			0.93
	10	0.96C	0.00	-0.65	0.00	-0.19	0.00			@ 0.252
5	10	0.00C	0.00	-0.41	0.00	0.06	0.00			0.02
	12	0.00C	0.00	-0.41	0.00	0.00	0.00			@ 0.060
6	1	0.07C	0.00	0.60	0.00	0.00	0.00			0.04
	3	0.07C	0.00	0.60	0.00	0.08	0.00			@ 0.082
7	3	0.92T	0.00	0.35	0.00	-0.15	0.00			0.71
	5	0.92T	0.00	0.34	0.00	0.16	0.00			@ 0.702
8	5	1.53T	0.00	0.01	0.00	0.00	0.00	0.01		0.29
	7	1.53T	0.00	0.00	0.00	0.01	0.00	@ 0.000		@ 0.476
9	7	0.96T	0.00	-0.33	0.00	0.15	0.00			0.69
	9	0.96T	0.00	-0.34	0.00	-0.15	0.00			@ 0.198
10	9	0.00C	0.00	-0.58	0.00	0.08	0.00			0.04
	11	0.00C	0.00	-0.59	0.00	0.00	0.00			@ 0.060
11	3	0.24C	0.00	0.00	-0.99	0.00	0.24			0.11
	4	0.24C	0.00	0.00	-0.99	0.00	-0.26			@ 0.385
12	5	0.33C	0.00	0.00	-0.61	0.00	0.15			0.06
	6	0.32C	0.00	0.00	-0.61	0.00	-0.15			@ 0.105
13	7	0.33C	0.00	0.00	0.56	0.00	-0.14			0.05
	8	0.32C	0.00	0.00	0.56	0.00	0.14			@ 0.105
14	9	0.24C	0.00	0.00	0.96	0.00	-0.23			0.11
	10	0.24C	0.00	0.00	0.96	0.00	0.25			@ 0.385

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Approved :

Support Reactions Serviceability (001 : D Plus Hz Ctr)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	0.030	0.000	0.000	0.000	0.000
2	0.000	0.030	0.150	0.000	0.000	0.000
11	0.000	0.029	0.000	0.000	0.000	0.000
12	0.000	0.029	0.150	0.000	0.000	0.000
Total	0.000	0.118	0.300	0.000	0.000	0.000

Support Reactions Serviceability (002 : D Plus Vt Ctr)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.062	0.318	0.000	0.000	0.000	0.000
2	-0.062	0.376	0.000	0.000	0.000	0.000
11	0.000	0.308	0.000	0.000	0.000	0.000
12	0.000	0.366	0.000	0.000	0.000	0.000
Total	0.000	1.368	0.000	0.000	0.000	0.000

Support Reactions Serviceability (003 : D Plus Hz Edge)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	0.030	0.000	0.000	0.000	0.000
2	0.000	0.030	0.235	0.000	0.000	0.000
11	0.000	0.029	0.000	0.000	0.000	0.000
12	0.000	0.029	0.065	0.000	0.000	0.000
Total	0.000	0.118	0.300	0.000	0.000	0.000

Support Reactions Serviceability (004 : D Plus Vt Edge)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.205	0.790	0.000	0.000	0.000	0.000
2	-0.205	0.282	0.000	0.000	0.000	0.000
11	0.000	0.151	0.000	0.000	0.000	0.000
12	0.000	0.145	0.000	0.000	0.000	0.000
Total	0.000	1.368	0.000	0.000	0.000	0.000

Support Reactions Serviceability (005 : Max SWL CPL)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.060	0.307	0.000	0.000	0.000	0.000
2	-0.060	0.362	0.000	0.000	0.000	0.000
11	0.000	0.297	0.000	0.000	0.000	0.000
12	0.000	0.352	0.000	0.000	0.000	0.000
Total	0.000	1.318	0.000	0.000	0.000	0.000

S-Mech Ltd

12385

Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : 3m Guardrail Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

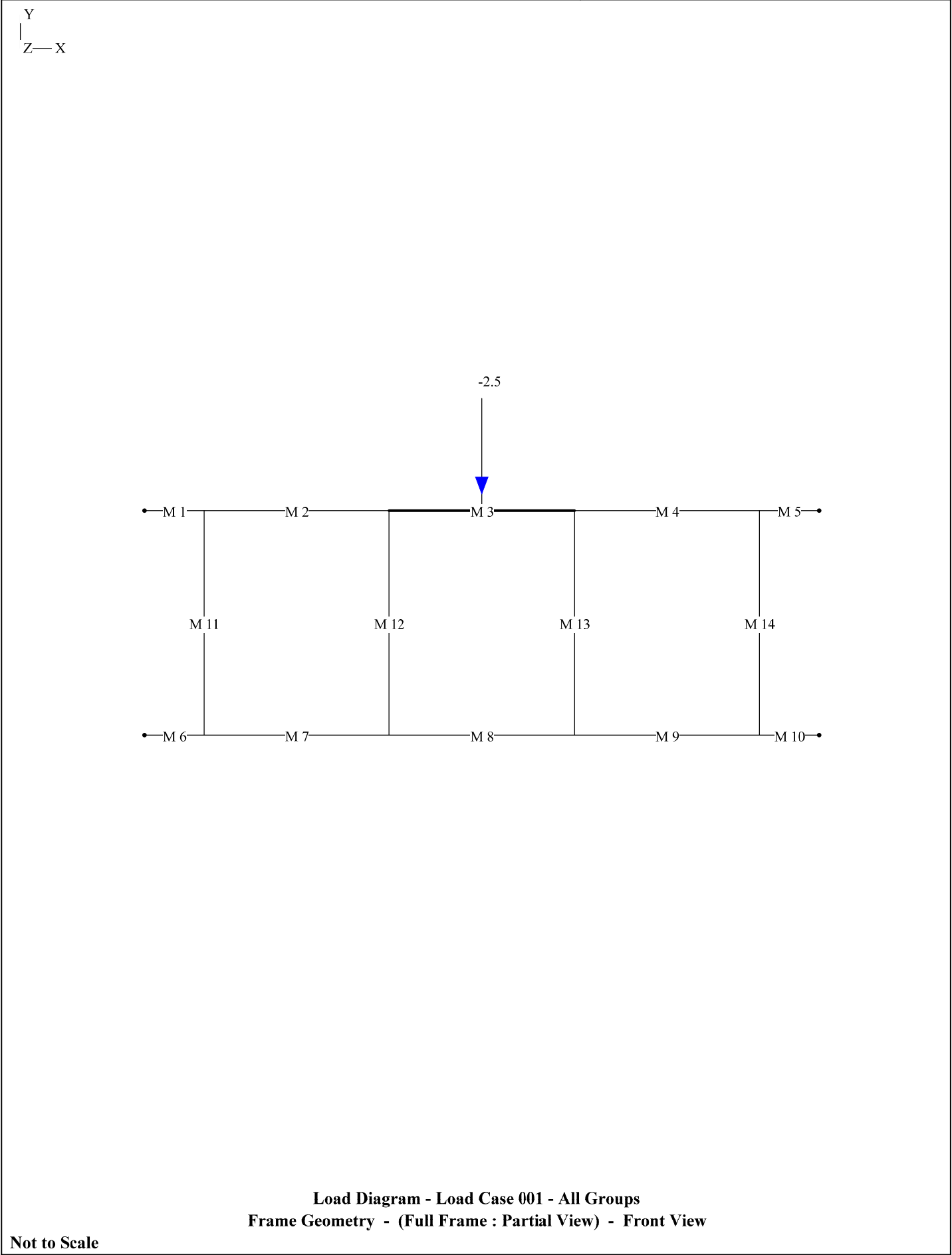
Support Reactions Serviceability (006 : Max SWL 2PL)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	R _x →(kN)	R _y ↑(kN)	R _z ↗(kN)	M _x →(kN.m)	M _y ↑(kN.m)	M _z ↗(kN.m)
1	0.063	0.385	0.000	0.000	0.000	0.000
2	-0.063	0.385	0.000	0.000	0.000	0.000
11	0.000	0.374	0.000	0.000	0.000	0.000
12	0.000	0.374	0.000	0.000	0.000	0.000
Total	0.000	1.518	0.000	0.000	0.000	0.000

Support Reactions Serviceability (007 : Max SWL UDL)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	R _x →(kN)	R _y ↑(kN)	R _z ↗(kN)	M _x →(kN.m)	M _y ↑(kN.m)	M _z ↗(kN.m)
1	0.068	0.598	0.000	0.000	0.000	0.000
2	-0.068	0.423	0.000	0.000	0.000	0.000
11	0.000	0.587	0.000	0.000	0.000	0.000
12	0.000	0.412	0.000	0.000	0.000	0.000
Total	0.000	2.019	0.000	0.000	0.000	0.000

S-Mech Ltd Suite 9 Railway House, Railway Road Chorley, Lancs, PR6 0HW Tel: 01257 367580 Email: info@s-mech.co.uk 12385	Job Ref : 1502 Sheet : 1.6m Guard Frame / Made by : IH Date : 29 June 2017 / Ver. 2016.10 Checked : IH Approved :
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S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : 1.6m Guard Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D1	Dead Load
Load Group L5	Live Load
Load Group L6	Live Load
Load Group L7	Live Load

Load Case 001 : Max SWL CPL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L5

Load Case 002 : Max SWL 2PL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L6

Load Case 003 : Max SWL UDL

Load Combination + 1.00 UT + 1.00 D1 + 1.00 L7

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000	2	0.000	0.500	0.000
3	0.142	0.000	0.000	4	0.142	0.500	0.000
5	0.582	0.000	0.000	6	0.582	0.500	0.000
7	1.024	0.000	0.000	8	1.024	0.500	0.000
9	1.464	0.000	0.000	10	1.464	0.500	0.000
11	1.606	0.000	0.000	12	1.606	0.500	0.000

Member Properties**Members 1-7 and 9-10**

M	27 CHS 2.5 []	E 210E6	G 81E6	
A 1.92E-4	Ix 1.459E-8	Iy 1.459E-8	J 2.918E-8	

Member 8

M	27 CHS 2.5 []	E 210E6	G 81E6	
A 1.92E-4	Ix 1.459E-8	Iy 1.459E-8	J 2.918E-8	

Members 11-14

M	50 30 PFC []	E 210E6	G 81E6	
A 1.91E-4	Ix 3.295E-8	Iy 50.0E-8	J 6.58E-8	

Member Loading

Member Self Weight Density Load Included in Load Group D1, defined by Modulus of Elasticity

E kN/mm ²	Density kN/m ³
>= 200.00	77.01
>= 20.00	24.00
>= 2.00	10.00

Members 1-2 and 4-5

L7 UDLY -002.200 (kN/m)

Member 3

L5 PY	-002.500	0.221	(kN,m)
L6 PY	-001.300	0.000	(kN,m)
L6 PY	-001.300	0.442	(kN,m)
L7 UDLY	-002.200		(kN/m)

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Member Orientation

Members 11-14 B +090.00

Nodal Loading and Support Conditions

NODES 1-2
 UT Rs 1 1 1 0 0 0 (Pinned)
NODES 11-12
 UT Rs 0 1 1 0 0 0

S-Mech Ltd

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Suite 9

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Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : 1.6m Guard Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (001 : Max SWL CPL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.13	0.00	2	0.00	0.00	-0.13	0.00
3	0.00	-0.23	-0.01	0.23	5	0.01	-1.80	0.00	1.80
6	-0.01	-1.81	-0.02	1.81	7	0.03	-1.81	0.01	1.81
8	-0.03	-1.82	0.02	1.82	9	0.04	-0.24	0.02	0.25
10	-0.04	-0.24	0.02	0.25	11	0.04	0.00	0.14	0.04
12	-0.04	0.00	0.14	0.04					

Nodal Deflections Serviceability (002 : Max SWL 2PL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.14	0.00	2	0.00	0.00	-0.14	0.00
3	0.00	-0.24	-0.01	0.24	5	0.01	-1.86	0.00	1.86
6	-0.01	-1.87	0.00	1.87	7	0.03	-1.86	0.01	1.86
8	-0.03	-1.87	0.01	1.87	9	0.04	-0.25	0.02	0.25
10	-0.04	-0.25	0.02	0.25	11	0.04	0.00	0.14	0.04
12	-0.04	0.00	0.14	0.04					

Nodal Deflections Serviceability (003 : Max SWL UDL)

Node	Nodal Def. (mm and Degrees)				Node	Nodal Def. (mm and Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY		$\delta X \rightarrow$	$\delta Y \uparrow$	$\Phi Z \nearrow$	δXY
1	0.00	0.00	-0.17	0.00	2	0.00	0.00	-0.18	0.00
3	0.00	-0.29	-0.01	0.29	5	0.01	-1.53	0.00	1.53
6	-0.01	-1.53	0.00	1.53	7	0.02	-1.53	0.01	1.53
8	-0.02	-1.54	0.01	1.54	9	0.03	-0.30	0.02	0.30
10	-0.03	-0.31	0.02	0.31	11	0.03	0.00	0.17	0.03
12	-0.03	0.00	0.18	0.03					

Member Forces (001 : Max SWL CPL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	2	0.094T	0.660	0.000		0.040
	4	0.094T	0.658	0.094		@ 0.082
2	4	0.851C	0.641	-0.141		0.146
	6	0.851C	0.634	0.139		@ 0.092
3	6	1.703C	1.268	-0.137	@ 0.143	0.406
	8	1.703C	-1.239	-0.130		@ 0.221
4	8	0.902C	-0.605	0.133		0.139
	10	0.902C	-0.612	-0.135		@ 0.348
5	10	0.000C	-0.629	0.089		0.038
	12	0.000C	-0.631	0.000		@ 0.060
6	1	0.094C	0.658	0.000		0.039
	3	0.094C	0.655	0.093		@ 0.082

S-Mech Ltd

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Suite 9

Railway House, Railway Road

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Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : 1.6m Guard Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (001 : Max SWL CPL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
7	3 5	0.851T 0.851T	0.665 0.659	-0.144 0.147		0.156 @ 0.343
8	5 7	1.703T 1.703T	0.018 0.011	-0.003 0.004	@ 0.004 0.000	0.000 @ 0.000
9	7 9	0.902T 0.902T	-0.630 -0.636	0.140 -0.138		0.149 @ 0.097
10	9 11	0.000C 0.000C	-0.626 -0.628	0.089 0.000		0.038 @ 0.060
11	3 4	0.010T 0.017T	-0.945 -0.945	0.238 -0.235		0.000 @ 0.000
12	5 6	0.641C 0.634C	-0.851 -0.851	0.150 -0.276		0.023 @ 0.340
13	7 8	0.641C 0.634C	0.800 0.800	-0.137 0.263		0.023 @ 0.335
14	9 10	0.010T 0.017T	0.902 0.902	-0.227 0.224		0.000 @ 0.000

Member Forces (002 : Max SWL 2PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	2 4	0.090T 0.090T	0.683 0.681	0.000 0.097		0.041 @ 0.082
2	4 6	0.889C 0.889C	0.679 0.673	-0.148 0.149		0.155 @ 0.348
3	6 8	1.489C 1.489C	1.317 -1.289	-0.001 0.005	@ 0.005 0.000	0.018 @ 0.266
4	8 10	0.938C 0.938C	-0.645 -0.651	0.143 -0.142		0.149 @ 0.092
5	10 12	0.000C 0.000C	-0.653 -0.655	0.093 0.000		0.039 @ 0.060
6	1 3	0.090C 0.090C	0.683 0.681	0.000 0.097		0.041 @ 0.082
7	3 5	0.889T 0.889T	0.676 0.669	-0.147 0.149		0.154 @ 0.348
8	5 7	1.489T 1.489T	0.017 0.011	-0.001 0.005	@ 0.005 0.000	0.018 @ 0.265
9	7 9	0.938T 0.938T	-0.641 -0.648	0.142 -0.141		0.148 @ 0.092

S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : 1.6m Guard Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (002 : Max SWL 2PL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
10	9	0.000C	-0.653	0.093		0.039
	11	0.000C	-0.656	0.000		@ 0.060
11	3	0.006C	-0.979	0.244		0.000
	4	0.002T	-0.979	-0.245		@ 0.000
12	5	0.652C	-0.601	0.150		0.000
	6	0.645C	-0.601	-0.151		@ 0.000
13	7	0.652C	0.551	-0.138		0.000
	8	0.645C	0.551	0.138		@ 0.000
14	9	0.006C	0.938	-0.234		0.000
	10	0.002T	0.938	0.235		@ 0.000

Member Forces (003 : Max SWL UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
1	2	0.087T	0.967	0.000		0.052
	4	0.087T	0.653	0.115		@ 0.081
2	4	0.904C	0.994	-0.146		0.158
	6	0.904C	0.019	0.077		@ 0.321
3	6	1.362C	0.503	-0.037	@ 0.020	0.085
	8	1.362C	-0.476	-0.031		@ 0.225
4	8	0.952C	0.008	0.071		0.152
	10	0.952C	-0.966	-0.140		@ 0.123
5	10	0.000C	-0.626	0.111		0.051
	12	0.000C	-0.940	0.000		@ 0.061
6	1	0.087C	0.865	0.000		0.052
	3	0.087C	0.863	0.123		@ 0.082
7	3	0.904T	0.515	-0.112		0.118
	5	0.904T	0.508	0.113		@ 0.343
8	5	1.362T	0.017	-0.002	@ 0.004	0.014
	7	1.362T	0.010	0.004		@ 0.274
9	7	0.952T	-0.481	0.107		0.112
	9	0.952T	-0.488	-0.106		@ 0.097
10	9	0.000C	-0.836	0.119		0.050
	11	0.000C	-0.838	0.000		@ 0.060
11	3	0.348C	-0.991	0.235		0.012
	4	0.341C	-0.991	-0.261		@ 0.380
12	5	0.491C	-0.458	0.115		0.000
	6	0.484C	-0.458	-0.114		@ 0.000

S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : 1.6m Guard Frame /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces (003 : Max SWL UDL)

Mem ber No.	Node End1 End2	Axial Force (kN)	Shear Force (kN)	Bending Moment (kN.m)	Maximum Moment (kN.m @ m)	Maximum Deflection (mm @ m)
13	7	0.491C	0.410	-0.103		0.000
	8	0.484C	0.410	0.102		@ 0.000
14	9	0.348C	0.952	-0.225		0.012
	10	0.341C	0.952	0.251		@ 0.380

Support Reactions Serviceability (001 : Max SWL CPL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	R _x → (kN)	R _y ↑ (kN)	M _z ↻ (kN.m)		R _x → (kN)	R _y ↑ (kN)	M _z ↻ (kN.m)
1	0.094	0.658	0.000	2	-0.094	0.660	0.000
11	0.000	0.628	0.000	12	0.000	0.631	0.000
Total	0.000	2.577	0.000				

Support Reactions Serviceability (002 : Max SWL 2PL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	R _x → (kN)	R _y ↑ (kN)	M _z ↻ (kN.m)		R _x → (kN)	R _y ↑ (kN)	M _z ↻ (kN.m)
1	0.090	0.683	0.000	2	-0.090	0.683	0.000
11	0.000	0.656	0.000	12	0.000	0.655	0.000
Total	0.000	2.677	0.000				

Support Reactions Serviceability (003 : Max SWL UDL)

Node	Support Reactions (kN and kN.m)			Node	Support Reactions (kN and kN.m)		
	R _x → (kN)	R _y ↑ (kN)	M _z ↻ (kN.m)		R _x → (kN)	R _y ↑ (kN)	M _z ↻ (kN.m)
1	0.087	0.865	0.000	2	-0.087	0.967	0.000
11	0.000	0.838	0.000	12	0.000	0.940	0.000
Total	0.000	3.610	0.000				

S-Mech Consulting Engineering

7 Windsor Road, Chorley, Lancashire, PR7 1LN

Tel 01257 367 580 email info@s-mech.co.uk www.s-mech.co.uk

Project Ref : 1502

Engineer : IH

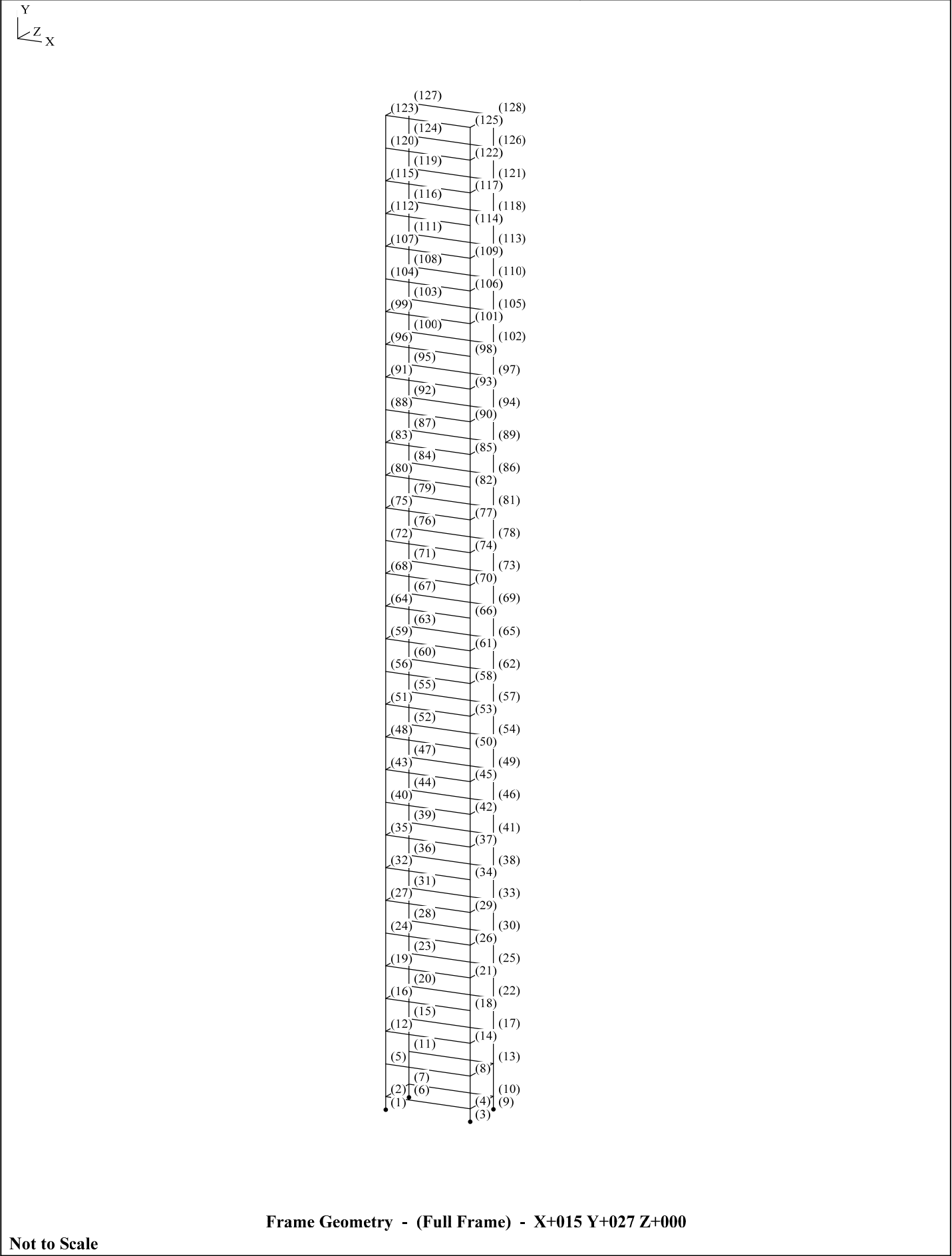
Date : June 2017

Checked : IH

Approved : IH

Appendix C – Long Face Parallel Output

S-Mech Ltd Suite 9 Railway House, Railway Road Chorley, Lancs, PR6 0HW Tel: 01257 367580 Email: info@s-mech.co.uk	12385 Job Ref : 1502 Sheet : Stair Tower LFP / Made by : IH Date : 29 June 2017 / Ver. 2016.10 Checked : IH Approved :
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S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D1	Dead Load
Load Group L1	Live Load
Load Group W1	Wind Load
Load Group W2	Wind Load
Load Group H1	Live Load

Load Case 001 : IS - Dead Live

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 002 : IS - Dead Live W1

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1 + 0.20 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 003 : IS - Dead Live W2

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1 + 0.20 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 004 : IS - Dead Live + 0.3 NHF

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1 + 1.00 H1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 005 : OOS - Dead + 0.25 Live + Unit W1

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.00 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 006 : OOS - Dead + 0.25 Live + Unit W2

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.00 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.25 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.25 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.50 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.50 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	0.000	2	0.000	0.400	0.000
3	3.000	0.000	0.000	4	3.000	0.400	0.000
5	0.000	1.400	0.000	6	0.000	0.000	1.600
7	0.000	0.400	1.600	8	3.000	1.400	0.000
9	3.000	0.000	1.600	10	3.000	0.400	1.600
11	0.000	1.400	1.600	12	0.000	2.400	0.000
13	3.000	1.400	1.600	14	3.000	2.400	0.000
15	0.000	2.400	1.600	16	0.000	3.400	0.000
17	3.000	2.400	1.600	18	3.000	3.400	0.000
19	0.000	4.400	0.000	20	0.000	3.400	1.600

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Suite 9**Railway House, Railway Road****Chorley, Lancs, PR6 0HW****Tel: 01257 367580 Email: info@s-mech.co.uk****Job Ref : 1502****Sheet : Stair Tower LFP /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :**

21	3.000	4.400	0.000	22	3.000	3.400	1.600
23	0.000	4.400	1.600	24	0.000	5.400	0.000
25	3.000	4.400	1.600	26	3.000	5.400	0.000
27	0.000	6.400	0.000	28	0.000	5.400	1.600
29	3.000	6.400	0.000	30	3.000	5.400	1.600
31	0.000	6.400	1.600	32	0.000	7.400	0.000
33	3.000	6.400	1.600	34	3.000	7.400	0.000
35	0.000	8.400	0.000	36	0.000	7.400	1.600
37	3.000	8.400	0.000	38	3.000	7.400	1.600
39	0.000	8.400	1.600	40	0.000	9.400	0.000
41	3.000	8.400	1.600	42	3.000	9.400	0.000
43	0.000	10.400	0.000	44	0.000	9.400	1.600
45	3.000	10.400	0.000	46	3.000	9.400	1.600
47	0.000	10.400	1.600	48	0.000	11.400	0.000
49	3.000	10.400	1.600	50	3.000	11.400	0.000
51	0.000	12.400	0.000	52	0.000	11.400	1.600
53	3.000	12.400	0.000	54	3.000	11.400	1.600
55	0.000	12.400	1.600	56	0.000	13.400	0.000
57	3.000	12.400	1.600	58	3.000	13.400	0.000
59	0.000	14.400	0.000	60	0.000	13.400	1.600
61	3.000	14.400	0.000	62	3.000	13.400	1.600
63	0.000	14.400	1.600	64	0.000	15.400	0.000
65	3.000	14.400	1.600	66	3.000	15.400	0.000
67	0.000	15.400	1.600	68	0.000	16.400	0.000
69	3.000	15.400	1.600	70	3.000	16.400	0.000
71	0.000	16.400	1.600	72	0.000	17.400	0.000
73	3.000	16.400	1.600	74	3.000	17.400	0.000
75	0.000	18.400	0.000	76	0.000	17.400	1.600
77	3.000	18.400	0.000	78	3.000	17.400	1.600
79	0.000	18.400	1.600	80	0.000	19.400	0.000
81	3.000	18.400	1.600	82	3.000	19.400	0.000
83	0.000	20.400	0.000	84	0.000	19.400	1.600
85	3.000	20.400	0.000	86	3.000	19.400	1.600
87	0.000	20.400	1.600	88	0.000	21.400	0.000
89	3.000	20.400	1.600	90	3.000	21.400	0.000
91	0.000	22.400	0.000	92	0.000	21.400	1.600
93	3.000	22.400	0.000	94	3.000	21.400	1.600
95	0.000	22.400	1.600	96	0.000	23.400	0.000
97	3.000	22.400	1.600	98	3.000	23.400	0.000
99	0.000	24.400	0.000	100	0.000	23.400	1.600
101	3.000	24.400	0.000	102	3.000	23.400	1.600
103	0.000	24.400	1.600	104	0.000	25.400	0.000
105	3.000	24.400	1.600	106	3.000	25.400	0.000
107	0.000	26.400	0.000	108	0.000	25.400	1.600
109	3.000	26.400	0.000	110	3.000	25.400	1.600
111	0.000	26.400	1.600	112	0.000	27.400	0.000
113	3.000	26.400	1.600	114	3.000	27.400	0.000
115	0.000	28.400	0.000	116	0.000	27.400	1.600
117	3.000	28.400	0.000	118	3.000	27.400	1.600
119	0.000	28.400	1.600	120	0.000	29.400	0.000
121	3.000	28.400	1.600	122	3.000	29.400	0.000
123	0.000	30.400	0.000	124	0.000	29.400	1.600
125	3.000	30.400	0.000	126	3.000	29.400	1.600
127	0.000	30.400	1.600	128	3.000	30.400	1.600

Member Properties**Members 1-32**M
A 4.95E-4LB [] E 210E6
Ix 248.6E-8G 81E6
Iy 4.95E-8

J 497.2E-8

Members 33-62 and 95-109M
A 3.18E-4GR [] E 210E6
Ix 6.55E-8G 81E6
Iy 6.55E-8

J 13.09E-8

Members 63-94

M

STB [] E 210E6

G 81E6

S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

A 4.27E-4

Ix 11.0E-8

Iy 11.0E-8

J 22.0E-8

Members 110-233

M

Std [] E 210E6

G 81E6

A 4.53E-4

Ix 11.59E-8

Iy 11.59E-8

J 23.17E-8

Member Loading**Member End Releases**

Symbols	End 1 torsion-minor-major	End 2 torsion-minor-major	O Released	® Fixed			
33	®®®®®®	34	®®®®®®	35	®®®®®®	36	®®®®®®
37	®®®®®®	38	®®®®®®	39	®®®®®®	40	®®®®®®
41	®®®®®®	42	®®®®®®	43	®®®®®®	44	®®®®®®
45	®®®®®®	46	®®®®®®	47	®®®®®®	48	®®®®®®
49	®®®®®®	50	®®®®®®	51	®®®®®®	52	®®®®®®
53	®®®®®®	54	®®®®®®	55	®®®®®®	56	®®®®®®
57	®®®®®®	58	®®®®®®	59	®®®®®®	60	®®®®®®
61	®®®®®®	62	®®®®®®	95	®®®®®®	96	®®®®®®
97	®®®®®®	98	®®®®®®	99	®®®®®®	100	®®®®®®
101	®®®®®®	102	®®®®®®	103	®®®®®®	104	®®®®®®
105	®®®®®®	106	®®®®®®	107	®®®®®®	108	®®®®®®
109	®®®®®®						

Nodal Loading and Support Conditions

NODE 7

D1 Ls +0000.000 -0000.290 +0000.000 +0000.000 +0000.000 +0000.000

NODE 10

D1 Ls +0000.000 -0000.650 +0000.000 +0000.000 +0000.000 +0000.000

NODE 2

D1 Ls +0000.000 -0000.430 +0000.000 +0000.000 +0000.000 +0000.000

NODE 4

D1 Ls +0000.000 -0000.680 +0000.000 +0000.000 +0000.000 +0000.000

NODES 15, 31, 47, 63, 79, 95 and 111

D1 Ls +0000.000 -0000.820 +0000.000 +0000.000 +0000.000 +0000.000

NODES 17, 33, 49, 65, 81, 97 and 113

D1 Ls +0000.000 -0000.420 +0000.000 +0000.000 +0000.000 +0000.000

NODES 12, 27, 43, 59, 75, 91 and 107

D1 Ls +0000.000 -0000.770 +0000.000 +0000.000 +0000.000 +0000.000

NODES 14, 29, 45, 61, 77, 93 and 109

D1 Ls +0000.000 -0000.370 +0000.000 +0000.000 +0000.000 +0000.000

NODES 23, 39, 55, 71, 87, 103 and 119

D1 Ls +0000.000 -0000.370 +0000.000 +0000.000 +0000.000 +0000.000

NODES 25, 41, 57, 73, 89, 105 and 121

D1 Ls +0000.000 -0000.770 +0000.000 +0000.000 +0000.000 +0000.000

NODES 19, 35, 51, 68, 83, 99 and 115

D1 Ls +0000.000 -0000.420 +0000.000 +0000.000 +0000.000 +0000.000

NODES 21, 37, 53, 70, 85, 101 and 117

D1 Ls +0000.000 -0000.820 +0000.000 +0000.000 +0000.000 +0000.000

NODE 127

D1 Ls +0000.000 -0000.550 +0000.000 +0000.000 +0000.000 +0000.000

NODE 128

D1 Ls +0000.000 -0000.350 +0000.000 +0000.000 +0000.000 +0000.000

NODE 123

D1 Ls +0000.000 -0000.650 +0000.000 +0000.000 +0000.000 +0000.000

NODE 125

D1 Ls +0000.000 -0000.360 +0000.000 +0000.000 +0000.000 +0000.000

NODE 127

L1 Ls +0000.000 -0000.640 +0000.000 +0000.000 +0000.000 +0000.000

NODE 128

L1 Ls +0000.000 -0000.040 +0000.000 +0000.000 +0000.000 +0000.000

NODE 123

L1 Ls +0000.000 -0000.970 +0000.000 +0000.000 +0000.000 +0000.000

NODE 125

L1 Ls +0000.000 -0000.070 +0000.000 +0000.000 +0000.000 +0000.000

NODES 87, 103 and 119

S-Mech Ltd

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Suite 9**Railway House, Railway Road****Chorley, Lancs, PR6 0HW****Tel: 01257 367580 Email: info@s-mech.co.uk****Job Ref : 1502****Sheet : Stair Tower LFP /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :**

L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 89, 105 and 121
 L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 83, 99 and 115
 L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 85, 101 and 117
 L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 95 and 111
 L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 97 and 113
 L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 91 and 107
 L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 93 and 109
 L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 7
 W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 10
 W1 Ls +0000.314 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 2
 W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 4
 W1 Ls +0000.602 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 15, 31, 47, 63, 79, 95 and 111
 W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 17, 33, 49, 65, 81, 97 and 113
 W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 12, 27, 43, 59, 75, 91 and 107
 W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 14, 29, 45, 61, 77, 93 and 109
 W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 23, 39, 55, 71, 87, 103 and 119
 W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 25, 41, 57, 73, 89, 105 and 121
 W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 19, 35, 51, 68, 83, 99 and 115
 W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODES 21, 37, 53, 70, 85, 101 and 117
 W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 127
 W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 128
 W1 Ls +0000.740 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 123
 W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 125
 W1 Ls +0000.412 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000
 NODE 7
 W2 Ls +0000.000 +0000.000 +0000.290 +0000.000 +0000.000 +0000.000
 NODE 10
 W2 Ls +0000.000 +0000.000 +0000.326 +0000.000 +0000.000 +0000.000
 NODE 2
 W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000
 NODE 4
 W2 Ls +0000.000 +0000.000 +0001.182 +0000.000 +0000.000 +0000.000
 NODES 15, 31, 47, 63, 79, 95 and 111
 W2 Ls +0000.000 +0000.000 +0001.078 +0000.000 +0000.000 +0000.000
 NODES 17, 33, 49, 65, 81, 97 and 113
 W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000
 NODES 12, 27, 43, 59, 75, 91 and 107
 W2 Ls +0000.000 +0000.000 +0001.155 +0000.000 +0000.000 +0000.000
 NODES 14, 29, 45, 61, 77, 93 and 109
 W2 Ls +0000.000 +0000.000 +0000.615 +0000.000 +0000.000 +0000.000
 NODES 23, 39, 55, 71, 87, 103 and 119
 W2 Ls +0000.000 +0000.000 +0000.615 +0000.000 +0000.000 +0000.000
 NODES 25, 41, 57, 73, 89, 105 and 121
 W2 Ls +0000.000 +0000.000 +0001.155 +0000.000 +0000.000 +0000.000

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Suite 9**Railway House, Railway Road****Chorley, Lancs, PR6 0HW****Tel: 01257 367580 Email: info@s-mech.co.uk****Job Ref : 1502****Sheet : Stair Tower LFP /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :**

NODES 19, 35, 51, 68, 83, 99 and 115

W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000

NODES 21, 37, 53, 70, 85, 101 and 117

W2 Ls +0000.000 +0000.000 +0001.078 +0000.000 +0000.000 +0000.000

NODE 127

W2 Ls +0000.000 +0000.000 +0000.676 +0000.000 +0000.000 +0000.000

NODE 128

W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000

NODE 123

W2 Ls +0000.000 +0000.000 +0001.017 +0000.000 +0000.000 +0000.000

NODE 125

W2 Ls +0000.000 +0000.000 +0000.473 +0000.000 +0000.000 +0000.000

NODES 4, 10, 12, 15, 21, 25, 27, 31, 37, 41, 43, 47, 53, 57, 59, 63, 70, 73, 75,
79, 85, 89, 91, 95, 101, 105, 107, 111, 117, 121, 123 and 127

H1 Ls +0000.150 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 1, 3, 6 and 9

UT Rs 1 1 1 0 0 0 (Pinned)

NODES 15, 17, 23, 25, 31, 33, 39, 41, 47, 49, 55, 57, 63, 65, 71, 73, 79, 81,
87, 89, 95, 97, 103, 105, 111, 113, 119, 121 and 127-128

UT Rs 1 0 1 0 0 0 (Horizontally Restraint)

NODES 2, 4, 7, 10, 12, 14-15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39,
41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 68, 70-71, 73, 75, 77, 79,
81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113,
115, 117, 119, 121, 123, 125 and 127-128

UT Springs 0000.000 0000.000 0000.000 0105.370 0000.000 0104.540

S-Mech Ltd

12385

Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

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Date : 29 June 2017 / Ver. 2016.10

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Approved :

Nodal Deflections Serviceability (001 : IS - Dead Live)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
5	0.00	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
8	0.00	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
11	0.00	-0.18	0.00	0.18	0.00	0.00	0.00	0.00
12	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
13	0.00	-0.18	0.00	0.18	0.00	0.00	0.00	0.00
14	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
15	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
16	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
17	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
18	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
19	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
20	0.00	-0.43	0.00	0.43	0.00	0.00	0.00	0.00
21	0.00	-0.57	0.00	0.57	0.00	0.00	0.00	0.00
22	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
23	0.00	-0.55	0.00	0.55	0.00	0.00	0.00	0.00
24	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
25	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
26	0.00	-0.69	0.00	0.69	0.00	0.00	0.00	0.00
27	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
28	0.00	-0.66	0.00	0.66	0.00	0.00	0.00	0.00
29	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
30	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
31	0.00	-0.78	0.00	0.78	0.00	0.00	0.00	0.00
32	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
33	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
34	0.00	-0.92	0.00	0.92	0.00	0.00	0.00	0.00
35	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
36	0.00	-0.88	0.00	0.88	0.00	0.00	0.00	0.00
37	0.00	-1.03	0.00	1.03	0.00	0.00	0.00	0.00
38	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
39	0.00	-0.99	0.00	0.99	0.00	0.00	0.00	0.00
40	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
41	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
42	0.00	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
43	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
44	0.00	-1.09	0.00	1.09	0.00	0.00	0.00	0.00
45	0.00	-1.24	0.00	1.24	0.00	0.00	0.00	0.00
46	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
47	0.00	-1.20	0.00	1.20	0.00	0.00	0.00	0.00
48	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
49	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
50	0.00	-1.34	0.00	1.34	0.00	0.00	0.00	0.00
51	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
52	0.00	-1.29	0.00	1.29	0.00	0.00	0.00	0.00
53	0.00	-1.44	0.00	1.44	0.00	0.00	0.00	0.00
54	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
55	0.00	-1.39	0.00	1.39	0.00	0.00	0.00	0.00
56	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
57	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
58	0.00	-1.54	0.00	1.54	0.00	0.00	0.00	0.00

S-Mech Ltd

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Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (001 : IS - Dead Live)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
59	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
60	0.00	-1.48	0.00	1.48	0.00	0.00	0.00	0.00
61	0.00	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
62	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
63	0.00	-1.57	0.00	1.57	0.00	0.00	0.00	0.00
64	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
65	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
66	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
67	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
68	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
69	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
70	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
71	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
72	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
73	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
74	0.00	-1.89	0.00	1.89	0.00	0.00	0.00	0.00
75	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
76	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
77	0.00	-1.97	0.00	1.97	0.00	0.00	0.00	0.00
78	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
79	0.00	-1.88	0.00	1.88	0.00	0.00	0.00	0.00
80	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
81	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
82	0.00	-2.04	0.00	2.04	0.00	0.00	0.00	0.00
83	0.01	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
84	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
85	0.01	-2.12	0.00	2.12	0.00	0.00	0.00	0.00
86	0.00	-2.03	0.00	2.03	0.00	0.00	0.00	0.00
87	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
88	0.01	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
89	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
90	0.01	-2.17	0.00	2.17	0.00	0.00	0.00	0.00
91	0.01	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
92	0.00	-2.09	0.00	2.09	0.00	0.00	0.00	0.00
93	0.01	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
94	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
95	0.00	-2.15	0.00	2.15	0.00	0.00	0.00	0.00
96	0.01	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
97	0.00	-2.21	0.00	2.21	0.00	0.00	0.00	0.00
98	0.01	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
99	0.01	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
100	0.00	-2.19	0.00	2.19	0.00	0.00	0.00	0.00
101	0.01	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
102	0.00	-2.26	0.00	2.26	0.00	0.00	0.00	0.00
103	0.00	-2.24	0.00	2.24	0.00	0.00	0.00	0.00
104	0.01	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
105	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
106	0.01	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
107	0.01	-2.41	0.00	2.41	0.00	0.00	0.00	0.00
108	0.00	-2.27	0.00	2.27	0.00	0.00	0.00	0.00
109	0.01	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
110	0.00	-2.34	0.00	2.34	0.00	0.00	0.00	0.00
111	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
112	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
113	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
114	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
115	0.00	-2.46	0.00	2.46	0.00	0.00	0.00	0.00
116	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00

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Nodal Deflections Serviceability (001 : IS - Dead Live)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
117	0.00	-2.44	0.00	2.44	0.00	0.00	0.00	0.00
118	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
119	0.00	-2.35	0.00	2.35	0.00	0.00	0.00	0.00
120	0.00	-2.47	0.00	2.47	0.00	0.00	0.00	0.00
121	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
122	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
123	-0.01	-2.49	0.00	2.49	0.00	0.00	0.00	0.00
124	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
125	-0.01	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
126	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
127	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
128	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00

Nodal Deflections Serviceability (002 : IS - Dead Live W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	-0.02	-0.05	0.05
2	0.26	-0.05	0.00	0.26	0.00	-0.02	-0.01	0.02
3	0.00	0.00	0.00	0.00	0.00	-0.02	-0.05	0.05
4	0.26	-0.06	0.00	0.26	0.00	-0.02	-0.01	0.02
5	2.19	-0.19	0.00	2.20	0.00	-0.07	-0.16	0.17
6	0.00	0.00	0.00	0.00	0.00	-0.02	-0.01	0.02
7	0.03	-0.05	0.00	0.06	0.00	-0.02	0.00	0.02
8	2.19	-0.19	0.01	2.20	0.00	-0.07	-0.16	0.17
9	0.00	0.00	0.00	0.00	0.00	-0.02	-0.01	0.02
10	0.03	-0.05	0.00	0.06	0.00	-0.02	0.00	0.02
11	0.02	-0.18	0.00	0.18	0.00	-0.07	0.00	0.07
12	4.12	-0.32	0.01	4.13	0.00	-0.12	-0.01	0.12
13	0.02	-0.18	0.00	0.18	0.00	-0.07	0.00	0.07
14	4.12	-0.33	0.01	4.13	0.00	-0.12	-0.01	0.12
15	0.00	-0.31	0.00	0.31	0.00	-0.12	0.00	0.12
16	5.19	-0.44	0.02	5.21	0.00	-0.15	-0.08	0.17
17	0.00	-0.31	0.00	0.31	0.00	-0.12	0.00	0.12
18	5.19	-0.46	0.02	5.21	0.00	-0.15	-0.09	0.17
19	6.22	-0.57	0.02	6.24	0.00	-0.18	-0.01	0.18
20	0.00	-0.43	0.00	0.43	0.00	-0.15	0.00	0.15
21	6.22	-0.58	0.02	6.25	0.00	-0.18	-0.01	0.18
22	0.00	-0.44	0.00	0.44	0.00	-0.15	0.00	0.15
23	0.00	-0.55	0.00	0.55	0.00	-0.18	0.00	0.18
24	6.79	-0.68	0.03	6.82	0.00	-0.19	-0.05	0.20
25	0.00	-0.56	0.00	0.56	0.00	-0.18	0.00	0.18
26	6.79	-0.70	0.03	6.83	0.00	-0.19	-0.04	0.20
27	7.34	-0.80	0.03	7.38	0.00	-0.21	0.00	0.21
28	0.00	-0.66	0.00	0.66	0.00	-0.19	0.00	0.19
29	7.34	-0.82	0.03	7.38	0.00	-0.21	0.00	0.21
30	0.00	-0.68	0.00	0.68	0.00	-0.19	0.00	0.19
31	0.00	-0.78	0.00	0.78	0.00	-0.21	0.00	0.21
32	7.64	-0.91	0.04	7.70	0.00	-0.22	-0.02	0.22
33	0.00	-0.80	0.00	0.80	0.00	-0.21	0.00	0.21
34	7.64	-0.93	0.04	7.70	0.00	-0.22	-0.02	0.22
35	7.93	-1.03	0.04	8.00	0.00	-0.23	0.00	0.23
36	0.00	-0.88	0.00	0.88	0.00	-0.22	0.00	0.22
37	7.94	-1.05	0.04	8.00	0.00	-0.23	0.00	0.23
38	0.00	-0.91	0.00	0.91	0.00	-0.22	0.00	0.22
39	0.00	-0.99	0.00	0.99	0.00	-0.23	0.00	0.23
40	8.10	-1.13	0.04	8.18	0.00	-0.23	-0.01	0.23

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Nodal Deflections Serviceability (002 : IS - Dead Live W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
41	0.00	-1.02	0.00	1.02	0.00	-0.23	0.00	0.23
42	8.10	-1.15	0.04	8.18	0.00	-0.23	-0.01	0.23
43	8.26	-1.24	0.04	8.35	0.00	-0.24	0.00	0.24
44	0.00	-1.09	0.00	1.09	0.00	-0.23	0.00	0.23
45	8.25	-1.26	0.04	8.35	0.00	-0.24	0.00	0.24
46	0.00	-1.13	0.00	1.13	0.00	-0.23	0.00	0.23
47	0.00	-1.20	0.00	1.20	0.00	-0.24	0.00	0.24
48	8.34	-1.34	0.04	8.45	0.00	-0.24	-0.01	0.24
49	0.00	-1.23	0.00	1.23	0.00	-0.24	0.00	0.24
50	8.34	-1.36	0.04	8.45	0.00	-0.24	-0.01	0.24
51	8.42	-1.44	0.04	8.54	0.00	-0.24	0.00	0.24
52	0.00	-1.29	0.00	1.29	0.00	-0.24	0.00	0.24
53	8.42	-1.46	0.05	8.55	0.00	-0.24	0.00	0.24
54	0.00	-1.33	0.00	1.33	0.00	-0.24	0.00	0.24
55	0.00	-1.39	0.00	1.39	0.00	-0.24	0.00	0.24
56	8.47	-1.53	0.04	8.61	0.00	-0.24	0.00	0.24
57	0.00	-1.43	0.00	1.43	0.00	-0.24	0.00	0.24
58	8.47	-1.55	0.05	8.61	0.00	-0.24	0.00	0.24
59	8.51	-1.62	0.04	8.66	0.00	-0.25	0.00	0.25
60	0.00	-1.48	0.00	1.48	0.00	-0.24	0.00	0.24
61	8.51	-1.64	0.05	8.67	0.00	-0.25	0.00	0.25
62	0.00	-1.53	0.00	1.53	0.00	-0.24	0.00	0.24
63	0.00	-1.57	0.00	1.57	0.00	-0.25	0.00	0.25
64	8.53	-1.71	0.05	8.70	0.00	-0.25	0.00	0.25
65	0.00	-1.62	0.00	1.62	0.00	-0.25	0.00	0.25
66	8.53	-1.73	0.05	8.70	0.00	-0.25	0.00	0.25
67	0.00	-1.65	0.00	1.65	0.00	-0.25	0.00	0.25
68	8.55	-1.80	0.04	8.73	0.00	-0.25	0.00	0.25
69	0.00	-1.71	0.00	1.71	0.00	-0.25	0.00	0.25
70	8.55	-1.82	0.05	8.74	0.00	-0.25	0.00	0.25
71	0.00	-1.73	0.00	1.73	0.00	-0.25	0.00	0.25
72	8.55	-1.88	0.04	8.75	0.00	-0.25	0.00	0.25
73	0.00	-1.79	0.00	1.79	0.00	-0.25	0.00	0.25
74	8.55	-1.90	0.05	8.76	0.00	-0.25	0.00	0.25
75	8.55	-1.96	0.04	8.77	0.00	-0.25	0.00	0.25
76	0.00	-1.81	0.00	1.81	0.00	-0.25	0.00	0.25
77	8.55	-1.98	0.05	8.78	0.00	-0.25	0.00	0.25
78	0.00	-1.87	0.00	1.87	0.00	-0.25	0.00	0.25
79	0.00	-1.89	0.00	1.89	0.00	-0.25	0.00	0.25
80	8.54	-2.03	0.05	8.78	0.00	-0.25	0.00	0.25
81	0.00	-1.95	0.00	1.95	0.00	-0.25	0.00	0.25
82	8.54	-2.05	0.05	8.78	0.00	-0.25	0.00	0.25
83	8.52	-2.11	0.04	8.78	0.00	-0.25	0.00	0.25
84	0.00	-1.95	0.00	1.95	0.00	-0.25	0.00	0.25
85	8.53	-2.13	0.05	8.79	0.00	-0.25	0.00	0.25
86	0.00	-2.03	0.00	2.03	0.00	-0.25	0.00	0.25
87	0.00	-2.02	0.00	2.02	0.00	-0.25	0.00	0.25
88	8.49	-2.18	0.04	8.77	0.00	-0.25	0.00	0.25
89	0.00	-2.10	0.00	2.10	0.00	-0.25	0.00	0.25
90	8.49	-2.18	0.05	8.77	0.00	-0.25	0.00	0.25
91	8.45	-2.25	0.04	8.75	0.00	-0.24	0.00	0.24
92	0.00	-2.09	0.00	2.09	0.00	-0.25	0.00	0.25
93	8.45	-2.24	0.05	8.74	0.00	-0.24	0.00	0.24
94	0.00	-2.16	0.00	2.16	0.00	-0.25	0.00	0.25
95	0.00	-2.15	0.00	2.15	0.00	-0.24	0.00	0.24
96	8.38	-2.29	0.04	8.69	0.00	-0.24	0.01	0.24
97	0.00	-2.21	0.00	2.21	0.00	-0.24	0.00	0.24
98	8.38	-2.29	0.05	8.69	0.00	-0.24	0.01	0.24

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Nodal Deflections Serviceability (002 : IS - Dead Live W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
99	8.31	-2.34	0.04	8.63	0.00	-0.24	0.00	0.24
100	0.00	-2.19	0.00	2.19	0.00	-0.24	0.00	0.24
101	8.31	-2.34	0.04	8.63	0.00	-0.24	0.00	0.24
102	0.00	-2.26	0.00	2.26	0.00	-0.24	0.00	0.24
103	0.00	-2.24	0.00	2.24	0.00	-0.24	0.00	0.24
104	8.18	-2.38	0.04	8.52	0.00	-0.24	0.01	0.24
105	0.00	-2.31	0.00	2.31	0.00	-0.24	0.00	0.24
106	8.18	-2.37	0.04	8.52	0.00	-0.24	0.01	0.24
107	8.05	-2.43	0.04	8.40	0.00	-0.23	0.00	0.23
108	0.00	-2.28	0.00	2.28	0.00	-0.24	0.00	0.24
109	8.04	-2.40	0.04	8.39	0.00	-0.23	0.00	0.23
110	0.00	-2.34	0.00	2.34	0.00	-0.24	0.00	0.24
111	0.00	-2.31	0.00	2.31	0.00	-0.23	0.00	0.23
112	7.81	-2.45	0.04	8.19	0.00	-0.22	0.02	0.23
113	0.00	-2.37	0.00	2.37	0.00	-0.23	0.00	0.23
114	7.81	-2.42	0.04	8.18	0.00	-0.22	0.02	0.23
115	7.57	-2.47	0.03	7.97	0.00	-0.22	0.00	0.22
116	0.00	-2.33	0.00	2.33	0.00	-0.22	0.00	0.22
117	7.57	-2.45	0.04	7.96	0.00	-0.22	0.00	0.22
118	0.00	-2.40	0.00	2.40	0.00	-0.22	0.00	0.22
119	0.00	-2.35	0.00	2.35	0.00	-0.22	0.00	0.22
120	7.17	-2.49	0.03	7.59	0.00	-0.21	0.03	0.21
121	0.00	-2.42	0.00	2.42	0.00	-0.22	0.00	0.22
122	7.17	-2.45	0.03	7.57	0.00	-0.21	0.03	0.21
123	6.76	-2.51	0.03	7.21	0.00	-0.20	0.00	0.20
124	0.00	-2.36	0.00	2.36	0.00	-0.21	0.00	0.21
125	6.76	-2.45	0.03	7.19	0.00	-0.20	0.00	0.20
126	0.00	-2.42	0.00	2.42	0.00	-0.21	0.00	0.21
127	0.00	-2.37	0.00	2.37	0.00	-0.20	0.00	0.20
128	0.00	-2.43	0.00	2.43	0.00	-0.20	0.00	0.20

Nodal Deflections Serviceability (003 : IS - Dead Live W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02
2	0.00	-0.05	0.13	0.14	0.01	0.00	0.00	0.01
3	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04
4	0.00	-0.05	0.20	0.21	0.01	0.00	0.00	0.01
5	0.00	-0.19	0.11	0.22	-0.01	0.00	0.00	0.01
6	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02
7	0.00	-0.05	0.13	0.14	0.01	0.00	0.00	0.01
8	0.00	-0.19	0.16	0.25	-0.01	0.00	0.00	0.01
9	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04
10	0.00	-0.05	0.20	0.21	0.01	0.00	0.00	0.01
11	0.00	-0.18	0.11	0.21	-0.01	0.00	0.00	0.01
12	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
13	0.00	-0.18	0.16	0.25	-0.01	0.00	0.00	0.01
14	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
15	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
16	0.00	-0.44	-0.01	0.44	0.00	0.00	0.00	0.00
17	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
18	0.00	-0.44	-0.01	0.44	0.00	0.00	0.00	0.00
19	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
20	0.00	-0.43	-0.01	0.43	0.00	0.00	0.00	0.00
21	0.00	-0.57	0.00	0.57	0.00	0.00	0.00	0.00
22	0.00	-0.44	-0.01	0.44	0.00	0.00	0.00	0.00

S-Mech Ltd

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (003 : IS - Dead Live W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
23	0.00	-0.55	0.00	0.55	0.00	0.00	0.00	0.00
24	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
25	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
26	0.00	-0.69	0.00	0.69	0.00	0.00	0.00	0.00
27	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
28	0.00	-0.66	0.00	0.66	0.00	0.00	0.00	0.00
29	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
30	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
31	0.00	-0.78	0.00	0.78	0.00	0.00	0.00	0.00
32	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
33	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
34	0.00	-0.92	0.00	0.92	0.00	0.00	0.00	0.00
35	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
36	0.00	-0.88	0.00	0.88	0.00	0.00	0.00	0.00
37	0.00	-1.03	0.00	1.03	0.00	0.00	0.00	0.00
38	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
39	0.00	-0.99	0.00	0.99	0.00	0.00	0.00	0.00
40	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
41	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
42	0.00	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
43	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
44	0.00	-1.09	0.00	1.09	0.00	0.00	0.00	0.00
45	0.00	-1.24	0.00	1.24	0.00	0.00	0.00	0.00
46	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
47	0.00	-1.20	0.00	1.20	0.00	0.00	0.00	0.00
48	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
49	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
50	0.00	-1.34	0.00	1.34	0.00	0.00	0.00	0.00
51	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
52	0.00	-1.29	0.00	1.29	0.00	0.00	0.00	0.00
53	0.00	-1.44	0.00	1.44	0.00	0.00	0.00	0.00
54	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
55	0.00	-1.39	0.00	1.39	0.00	0.00	0.00	0.00
56	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
57	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
58	0.00	-1.54	0.00	1.54	0.00	0.00	0.00	0.00
59	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
60	0.00	-1.48	0.00	1.48	0.00	0.00	0.00	0.00
61	0.00	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
62	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
63	0.00	-1.57	0.00	1.57	0.00	0.00	0.00	0.00
64	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
65	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
66	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
67	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
68	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
69	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
70	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
71	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
72	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
73	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
74	0.00	-1.89	0.00	1.89	0.00	0.00	0.00	0.00
75	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
76	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
77	0.00	-1.97	0.00	1.97	0.00	0.00	0.00	0.00
78	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
79	0.00	-1.88	0.00	1.88	0.00	0.00	0.00	0.00
80	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00

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Approved :

Nodal Deflections Serviceability (003 : IS - Dead Live W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
81	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
82	0.00	-2.04	0.00	2.04	0.00	0.00	0.00	0.00
83	0.01	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
84	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
85	0.01	-2.12	0.00	2.12	0.00	0.00	0.00	0.00
86	0.00	-2.03	0.00	2.03	0.00	0.00	0.00	0.00
87	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
88	0.01	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
89	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
90	0.01	-2.17	0.00	2.17	0.00	0.00	0.00	0.00
91	0.01	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
92	0.00	-2.09	0.00	2.09	0.00	0.00	0.00	0.00
93	0.01	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
94	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
95	0.00	-2.15	0.00	2.15	0.00	0.00	0.00	0.00
96	0.01	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
97	0.00	-2.21	0.00	2.21	0.00	0.00	0.00	0.00
98	0.01	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
99	0.01	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
100	0.00	-2.19	0.00	2.19	0.00	0.00	0.00	0.00
101	0.01	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
102	0.00	-2.26	0.00	2.26	0.00	0.00	0.00	0.00
103	0.00	-2.24	0.00	2.24	0.00	0.00	0.00	0.00
104	0.01	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
105	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
106	0.01	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
107	0.01	-2.41	0.00	2.41	0.00	0.00	0.00	0.00
108	0.00	-2.27	0.00	2.27	0.00	0.00	0.00	0.00
109	0.01	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
110	0.00	-2.34	0.00	2.34	0.00	0.00	0.00	0.00
111	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
112	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
113	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
114	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
115	0.00	-2.46	0.00	2.46	0.00	0.00	0.00	0.00
116	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
117	0.00	-2.44	0.00	2.44	0.00	0.00	0.00	0.00
118	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
119	0.00	-2.35	0.00	2.35	0.00	0.00	0.00	0.00
120	0.00	-2.47	0.00	2.47	0.00	0.00	0.00	0.00
121	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
122	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
123	-0.01	-2.49	0.00	2.49	0.00	0.00	0.00	0.00
124	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
125	-0.01	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
126	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
127	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
128	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00

Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	-0.01	-0.04	0.04
2	0.19	-0.05	0.00	0.20	0.00	-0.01	-0.01	0.01
3	0.00	0.00	0.00	0.00	0.00	-0.01	-0.04	0.04
4	0.20	-0.06	0.00	0.20	0.00	-0.01	-0.01	0.01

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Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
5	1.47	-0.18	0.00	1.49	0.00	-0.04	-0.11	0.11
6	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.02
7	0.06	-0.05	0.00	0.08	0.00	-0.01	0.00	0.01
8	1.47	-0.19	0.00	1.49	0.00	-0.04	-0.10	0.11
9	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.02
10	0.06	-0.05	0.00	0.08	0.00	-0.01	0.00	0.01
11	0.04	-0.18	0.00	0.18	0.00	-0.04	0.00	0.04
12	2.75	-0.32	0.00	2.76	0.00	-0.08	-0.01	0.08
13	0.04	-0.18	0.00	0.19	0.00	-0.04	0.00	0.04
14	2.74	-0.32	0.01	2.76	0.00	-0.08	-0.01	0.08
15	0.00	-0.31	0.00	0.31	0.00	-0.08	0.00	0.08
16	3.45	-0.44	0.01	3.48	0.00	-0.10	-0.06	0.11
17	0.00	-0.31	0.00	0.31	0.00	-0.08	0.00	0.08
18	3.45	-0.45	0.01	3.48	0.00	-0.10	-0.06	0.11
19	4.13	-0.56	0.01	4.17	0.00	-0.12	0.00	0.12
20	0.00	-0.43	0.00	0.43	0.00	-0.10	0.00	0.10
21	4.13	-0.58	0.01	4.17	0.00	-0.12	0.00	0.12
22	0.00	-0.44	0.00	0.44	0.00	-0.10	0.00	0.10
23	0.00	-0.55	0.00	0.55	0.00	-0.12	0.00	0.12
24	4.51	-0.68	0.01	4.56	0.00	-0.13	-0.03	0.13
25	0.00	-0.56	0.00	0.56	0.00	-0.12	0.00	0.12
26	4.51	-0.70	0.01	4.56	0.00	-0.13	-0.03	0.13
27	4.87	-0.80	0.01	4.93	0.00	-0.14	0.00	0.14
28	0.00	-0.66	0.00	0.66	0.00	-0.13	0.00	0.13
29	4.87	-0.81	0.02	4.93	0.00	-0.14	0.00	0.14
30	0.00	-0.68	0.00	0.68	0.00	-0.13	0.00	0.13
31	0.00	-0.78	0.00	0.78	0.00	-0.14	0.00	0.14
32	5.07	-0.91	0.02	5.15	0.00	-0.15	-0.02	0.15
33	0.00	-0.80	0.00	0.80	0.00	-0.14	0.00	0.14
34	5.07	-0.93	0.02	5.15	0.00	-0.15	-0.02	0.15
35	5.26	-1.02	0.02	5.36	0.00	-0.15	0.00	0.15
36	0.00	-0.88	0.00	0.88	0.00	-0.15	0.00	0.15
37	5.26	-1.04	0.02	5.37	0.00	-0.15	0.00	0.15
38	0.00	-0.91	0.00	0.91	0.00	-0.15	0.00	0.15
39	0.00	-0.99	0.00	0.99	0.00	-0.15	0.00	0.15
40	5.37	-1.12	0.02	5.49	0.00	-0.15	-0.01	0.15
41	0.00	-1.02	0.00	1.02	0.00	-0.15	0.00	0.15
42	5.37	-1.15	0.02	5.49	0.00	-0.15	-0.01	0.15
43	5.48	-1.23	0.02	5.61	0.00	-0.16	0.00	0.16
44	0.00	-1.09	0.00	1.09	0.00	-0.15	0.00	0.15
45	5.47	-1.25	0.02	5.62	0.00	-0.16	0.00	0.16
46	0.00	-1.13	0.00	1.13	0.00	-0.15	0.00	0.15
47	0.00	-1.20	0.00	1.20	0.00	-0.16	0.00	0.16
48	5.53	-1.33	0.02	5.69	0.00	-0.16	0.00	0.16
49	0.00	-1.23	0.00	1.23	0.00	-0.16	0.00	0.16
50	5.53	-1.35	0.02	5.70	0.00	-0.16	0.00	0.16
51	5.59	-1.43	0.02	5.77	0.00	-0.16	0.00	0.16
52	0.00	-1.29	0.00	1.29	0.00	-0.16	0.00	0.16
53	5.59	-1.45	0.02	5.78	0.00	-0.16	0.00	0.16
54	0.00	-1.33	0.00	1.33	0.00	-0.16	0.00	0.16
55	0.00	-1.39	0.00	1.39	0.00	-0.16	0.00	0.16
56	5.62	-1.52	0.02	5.82	0.00	-0.16	0.00	0.16
57	0.00	-1.43	0.00	1.43	0.00	-0.16	0.00	0.16
58	5.62	-1.55	0.02	5.83	0.00	-0.16	0.00	0.16
59	5.65	-1.61	0.02	5.88	0.00	-0.16	0.00	0.16
60	0.00	-1.48	0.00	1.48	0.00	-0.16	0.00	0.16
61	5.65	-1.64	0.02	5.88	0.00	-0.16	0.00	0.16
62	0.00	-1.53	0.00	1.53	0.00	-0.16	0.00	0.16

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Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
63	0.00	-1.57	0.00	1.57	0.00	-0.16	0.00	0.16
64	5.67	-1.70	0.02	5.92	0.00	-0.16	0.00	0.16
65	0.00	-1.62	0.00	1.62	0.00	-0.16	0.00	0.16
66	5.67	-1.73	0.02	5.93	0.00	-0.16	0.00	0.16
67	0.00	-1.65	0.00	1.65	0.00	-0.16	0.00	0.16
68	5.69	-1.79	0.02	5.96	0.00	-0.16	0.00	0.16
69	0.00	-1.71	0.00	1.71	0.00	-0.16	0.00	0.16
70	5.69	-1.82	0.02	5.97	0.00	-0.16	0.00	0.16
71	0.00	-1.73	0.00	1.73	0.00	-0.16	0.00	0.16
72	5.70	-1.87	0.02	6.00	0.00	-0.16	0.00	0.16
73	0.00	-1.79	0.00	1.79	0.00	-0.16	0.00	0.16
74	5.70	-1.90	0.02	6.00	0.00	-0.16	0.00	0.16
75	5.71	-1.95	0.02	6.03	0.00	-0.16	0.00	0.16
76	0.00	-1.81	0.00	1.81	0.00	-0.16	0.00	0.16
77	5.71	-1.98	0.02	6.04	0.00	-0.16	0.00	0.16
78	0.00	-1.87	0.00	1.87	0.00	-0.16	0.00	0.16
79	0.00	-1.88	0.00	1.88	0.00	-0.16	0.00	0.16
80	5.71	-2.02	0.02	6.06	0.00	-0.17	0.00	0.17
81	0.00	-1.95	0.00	1.95	0.00	-0.16	0.00	0.16
82	5.71	-2.05	0.02	6.07	0.00	-0.17	0.00	0.17
83	5.72	-2.09	0.02	6.09	0.00	-0.17	0.00	0.17
84	0.00	-1.95	0.00	1.95	0.00	-0.17	0.00	0.17
85	5.72	-2.13	0.02	6.11	0.00	-0.17	0.00	0.17
86	0.00	-2.03	0.00	2.03	0.00	-0.17	0.00	0.17
87	0.00	-2.02	0.00	2.02	0.00	-0.17	0.00	0.17
88	5.73	-2.16	0.02	6.12	0.00	-0.17	0.00	0.17
89	0.00	-2.10	0.00	2.10	0.00	-0.17	0.00	0.17
90	5.73	-2.19	0.02	6.13	0.00	-0.17	0.00	0.17
91	5.73	-2.23	0.02	6.15	0.00	-0.17	0.00	0.17
92	0.00	-2.09	0.00	2.09	0.00	-0.17	0.00	0.17
93	5.73	-2.24	0.02	6.15	0.00	-0.17	0.00	0.17
94	0.00	-2.16	0.00	2.16	0.00	-0.17	0.00	0.17
95	0.00	-2.15	0.00	2.15	0.00	-0.17	0.00	0.17
96	5.73	-2.28	0.02	6.17	0.00	-0.17	0.00	0.17
97	0.00	-2.21	0.00	2.21	0.00	-0.17	0.00	0.17
98	5.73	-2.29	0.02	6.17	0.00	-0.17	0.00	0.17
99	5.73	-2.33	0.02	6.18	0.00	-0.17	0.00	0.17
100	0.00	-2.19	0.00	2.19	0.00	-0.17	0.00	0.17
101	5.73	-2.34	0.02	6.19	0.00	-0.17	0.00	0.17
102	0.00	-2.26	0.00	2.26	0.00	-0.17	0.00	0.17
103	0.00	-2.24	0.00	2.24	0.00	-0.17	0.00	0.17
104	5.73	-2.37	0.02	6.20	0.00	-0.17	0.00	0.17
105	0.00	-2.31	0.00	2.31	0.00	-0.17	0.00	0.17
106	5.73	-2.37	0.02	6.21	0.00	-0.17	0.00	0.17
107	5.73	-2.41	0.02	6.22	0.00	-0.17	0.00	0.17
108	0.00	-2.27	0.00	2.27	0.00	-0.17	0.00	0.17
109	5.73	-2.40	0.02	6.21	0.00	-0.17	0.00	0.17
110	0.00	-2.34	0.00	2.34	0.00	-0.17	0.00	0.17
111	0.00	-2.31	0.00	2.31	0.00	-0.17	0.00	0.17
112	5.73	-2.43	0.02	6.23	0.00	-0.17	0.00	0.17
113	0.00	-2.37	0.00	2.37	0.00	-0.17	0.00	0.17
114	5.73	-2.43	0.02	6.22	0.00	-0.17	0.00	0.17
115	5.73	-2.45	0.02	6.23	0.00	-0.17	0.00	0.17
116	0.00	-2.33	0.00	2.33	0.00	-0.17	0.00	0.17
117	5.73	-2.45	0.02	6.23	0.00	-0.17	0.00	0.17
118	0.00	-2.40	0.00	2.40	0.00	-0.17	0.00	0.17
119	0.00	-2.35	0.00	2.35	0.00	-0.17	0.00	0.17
120	5.73	-2.47	0.02	6.24	0.00	-0.17	0.00	0.17

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
121	0.00	-2.42	0.00	2.42	0.00	-0.17	0.00	0.17
122	5.73	-2.46	0.02	6.23	0.00	-0.17	0.00	0.17
123	5.72	-2.49	0.02	6.24	0.00	-0.17	0.00	0.17
124	0.00	-2.36	0.00	2.36	0.00	-0.17	0.00	0.17
125	5.72	-2.46	0.02	6.23	0.00	-0.17	0.00	0.17
126	0.00	-2.42	0.00	2.42	0.00	-0.17	0.00	0.17
127	0.00	-2.37	0.00	2.37	0.00	-0.17	0.00	0.17
128	0.00	-2.43	0.00	2.43	0.00	-0.17	0.00	0.17

Nodal Deflections Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	-0.08	-0.25	0.26
2	1.29	-0.04	-0.01	1.29	0.00	-0.08	-0.05	0.09
3	0.00	0.00	0.00	0.00	0.01	-0.08	-0.25	0.26
4	1.30	-0.05	0.03	1.30	0.00	-0.08	-0.05	0.09
5	10.83	-0.22	0.10	10.83	0.01	-0.32	-0.79	0.86
6	0.00	0.00	0.00	0.00	0.00	-0.08	-0.03	0.08
7	0.14	-0.04	-0.01	0.14	0.00	-0.08	0.00	0.08
8	10.83	-0.25	0.12	10.83	0.00	-0.32	-0.77	0.83
9	0.00	0.00	0.00	0.00	0.01	-0.08	-0.03	0.08
10	0.14	-0.04	0.03	0.15	0.00	-0.08	0.00	0.08
11	0.08	-0.15	0.00	0.17	0.00	-0.32	0.01	0.32
12	20.33	-0.41	0.26	20.34	0.00	-0.57	-0.05	0.57
13	0.08	-0.15	0.04	0.17	0.00	-0.32	-0.02	0.32
14	20.33	-0.45	0.26	20.33	0.00	-0.57	-0.05	0.57
15	0.00	-0.25	0.00	0.25	0.00	-0.57	0.00	0.57
16	25.66	-0.52	0.42	25.67	0.01	-0.72	-0.42	0.84
17	0.00	-0.25	0.00	0.25	0.00	-0.57	0.00	0.57
18	25.66	-0.58	0.43	25.67	0.01	-0.72	-0.43	0.84
19	30.78	-0.64	0.59	30.79	0.00	-0.88	-0.03	0.88
20	0.00	-0.35	0.00	0.35	0.00	-0.72	-0.01	0.72
21	30.79	-0.70	0.60	30.80	0.00	-0.88	-0.03	0.88
22	0.00	-0.35	0.00	0.35	0.00	-0.72	0.00	0.72
23	0.00	-0.44	0.00	0.44	0.00	-0.88	0.00	0.88
24	33.65	-0.74	0.71	33.67	0.01	-0.96	-0.23	0.99
25	0.00	-0.45	0.00	0.45	0.00	-0.88	0.00	0.88
26	33.65	-0.80	0.71	33.67	0.01	-0.96	-0.22	0.99
27	36.42	-0.84	0.82	36.44	0.00	-1.05	-0.01	1.05
28	0.00	-0.53	0.00	0.53	0.00	-0.96	0.00	0.96
29	36.41	-0.89	0.83	36.43	0.00	-1.05	-0.02	1.05
30	0.00	-0.53	0.00	0.54	0.00	-0.96	-0.01	0.96
31	0.00	-0.62	0.00	0.62	0.00	-1.05	0.00	1.05
32	37.97	-0.92	0.90	37.99	0.00	-1.09	-0.12	1.10
33	0.00	-0.62	0.00	0.62	0.00	-1.05	0.00	1.05
34	37.97	-0.98	0.91	37.99	0.00	-1.09	-0.13	1.10
35	39.46	-1.01	0.97	39.48	0.00	-1.14	-0.01	1.14
36	0.00	-0.71	0.00	0.71	0.00	-1.09	0.00	1.09
37	39.47	-1.06	0.98	39.49	0.00	-1.14	-0.01	1.14
38	0.00	-0.71	0.00	0.71	0.00	-1.09	0.00	1.09
39	0.00	-0.79	0.00	0.79	0.00	-1.14	0.00	1.14
40	40.30	-1.09	1.01	40.33	0.00	-1.16	-0.07	1.16
41	0.00	-0.80	0.00	0.80	0.00	-1.14	0.00	1.14
42	40.30	-1.14	1.02	40.33	0.00	-1.16	-0.07	1.16
43	41.11	-1.17	1.05	41.14	0.00	-1.19	0.00	1.19
44	0.00	-0.87	0.00	0.87	0.00	-1.16	0.00	1.16

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
45	41.11	-1.21	1.06	41.14	0.00	-1.19	0.00	1.19
46	0.00	-0.87	0.00	0.87	0.00	-1.16	0.00	1.16
47	0.00	-0.94	0.00	0.94	0.00	-1.19	0.00	1.19
48	41.56	-1.24	1.08	41.59	0.00	-1.20	-0.03	1.20
49	0.00	-0.95	0.00	0.95	0.00	-1.19	0.00	1.19
50	41.56	-1.28	1.09	41.59	0.00	-1.20	-0.04	1.20
51	41.99	-1.31	1.10	42.02	0.00	-1.21	0.00	1.21
52	0.00	-1.01	0.00	1.01	0.00	-1.20	0.00	1.20
53	42.00	-1.34	1.11	42.03	0.00	-1.21	0.00	1.21
54	0.00	-1.02	0.00	1.02	0.00	-1.20	0.00	1.20
55	0.00	-1.08	0.00	1.08	0.00	-1.21	0.00	1.21
56	42.22	-1.38	1.11	42.26	0.00	-1.22	-0.02	1.22
57	0.00	-1.09	0.00	1.09	0.00	-1.21	0.00	1.21
58	42.22	-1.40	1.12	42.26	0.00	-1.22	-0.02	1.22
59	42.45	-1.45	1.12	42.49	0.00	-1.23	0.00	1.23
60	0.00	-1.15	0.00	1.15	0.00	-1.22	0.00	1.22
61	42.44	-1.46	1.13	42.48	0.00	-1.23	0.00	1.23
62	0.00	-1.16	0.00	1.16	0.00	-1.22	0.00	1.22
63	0.00	-1.21	0.00	1.21	0.00	-1.23	0.00	1.23
64	42.55	-1.51	1.13	42.59	0.00	-1.23	-0.01	1.23
65	0.00	-1.22	0.00	1.22	0.00	-1.23	0.00	1.23
66	42.55	-1.52	1.14	42.59	0.00	-1.23	-0.01	1.23
67	0.00	-1.27	0.00	1.27	0.00	-1.23	0.00	1.23
68	42.64	-1.57	1.13	42.68	0.00	-1.23	0.00	1.23
69	0.00	-1.28	0.00	1.28	0.00	-1.23	0.00	1.23
70	42.65	-1.57	1.14	42.69	0.00	-1.23	0.00	1.23
71	0.00	-1.33	0.00	1.33	0.00	-1.23	0.00	1.23
72	42.66	-1.63	1.13	42.70	0.00	-1.23	0.00	1.23
73	0.00	-1.34	0.00	1.34	0.00	-1.23	0.00	1.23
74	42.66	-1.62	1.14	42.70	0.00	-1.23	0.00	1.23
75	42.67	-1.68	1.13	42.72	0.00	-1.23	0.00	1.23
76	0.00	-1.38	0.00	1.38	0.00	-1.23	0.00	1.23
77	42.66	-1.67	1.14	42.71	0.00	-1.23	0.00	1.23
78	0.00	-1.39	0.00	1.39	0.00	-1.23	0.00	1.23
79	0.00	-1.43	0.00	1.43	0.00	-1.23	0.00	1.23
80	42.59	-1.73	1.13	42.65	0.00	-1.23	0.01	1.23
81	0.00	-1.45	0.00	1.45	0.00	-1.23	0.00	1.23
82	42.60	-1.71	1.14	42.64	0.00	-1.23	0.01	1.23
83	42.51	-1.78	1.12	42.57	0.00	-1.23	0.00	1.23
84	0.00	-1.48	0.00	1.48	0.00	-1.23	0.00	1.23
85	42.52	-1.75	1.14	42.57	0.00	-1.23	0.00	1.23
86	0.00	-1.49	0.00	1.49	0.00	-1.23	0.00	1.23
87	0.00	-1.52	0.00	1.52	0.00	-1.23	0.00	1.23
88	42.34	-1.82	1.12	42.39	0.00	-1.22	0.01	1.22
89	0.00	-1.54	0.00	1.54	0.00	-1.23	0.00	1.23
90	42.34	-1.79	1.12	42.39	0.00	-1.22	0.01	1.22
91	42.16	-1.87	1.11	42.21	0.00	-1.22	0.00	1.22
92	0.00	-1.56	0.00	1.56	0.00	-1.22	0.00	1.22
93	42.15	-1.82	1.12	42.20	0.00	-1.22	0.00	1.22
94	0.00	-1.58	0.00	1.58	0.00	-1.22	0.00	1.22
95	0.00	-1.60	0.00	1.60	0.00	-1.22	0.00	1.22
96	41.80	-1.90	1.09	41.86	0.00	-1.21	0.03	1.21
97	0.00	-1.61	0.00	1.61	0.00	-1.22	0.00	1.22
98	41.80	-1.85	1.10	41.86	0.00	-1.21	0.03	1.21
99	41.44	-1.93	1.07	41.50	0.00	-1.20	0.00	1.20
100	0.00	-1.63	0.00	1.63	0.00	-1.21	0.00	1.21
101	41.45	-1.87	1.08	41.50	0.00	-1.20	0.00	1.20
102	0.00	-1.64	0.00	1.64	0.00	-1.21	0.00	1.21

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
103	0.00	-1.66	0.00	1.66	0.00	-1.20	0.00	1.20
104	40.81	-1.96	1.04	40.87	0.00	-1.18	0.05	1.18
105	0.00	-1.67	0.00	1.67	0.00	-1.20	0.00	1.20
106	40.81	-1.89	1.04	40.87	0.00	-1.18	0.05	1.18
107	40.15	-1.99	1.00	40.21	0.00	-1.16	0.01	1.16
108	0.00	-1.68	0.00	1.68	0.00	-1.18	0.00	1.18
109	40.15	-1.91	1.01	40.20	0.00	-1.16	0.01	1.16
110	0.00	-1.69	0.00	1.69	0.00	-1.18	0.00	1.18
111	0.00	-1.70	0.00	1.70	0.00	-1.16	0.00	1.16
112	39.01	-2.00	0.95	39.07	0.00	-1.12	0.09	1.13
113	0.00	-1.71	0.00	1.71	0.00	-1.16	0.00	1.16
114	39.01	-1.92	0.96	39.07	0.00	-1.12	0.09	1.13
115	37.83	-2.02	0.89	37.89	0.00	-1.09	0.01	1.09
116	0.00	-1.72	0.00	1.72	0.00	-1.12	0.00	1.12
117	37.83	-1.94	0.90	37.89	0.00	-1.09	0.01	1.09
118	0.00	-1.73	0.00	1.73	0.00	-1.12	0.00	1.12
119	0.00	-1.73	0.00	1.73	0.00	-1.09	0.00	1.09
120	35.82	-2.04	0.80	35.89	0.00	-1.04	0.17	1.05
121	0.00	-1.74	0.00	1.74	0.00	-1.09	0.00	1.09
122	35.82	-1.94	0.81	35.88	0.00	-1.04	0.16	1.05
123	33.84	-2.05	0.71	33.91	0.00	-0.99	0.01	0.99
124	0.00	-1.74	0.00	1.74	0.00	-1.04	0.00	1.04
125	33.84	-1.95	0.72	33.90	0.00	-0.99	0.01	0.99
126	0.00	-1.75	0.01	1.75	0.00	-1.04	0.01	1.04
127	0.00	-1.74	0.00	1.74	0.00	-0.99	0.00	0.99
128	0.00	-1.75	0.00	1.75	0.00	-0.99	0.00	0.99

Nodal Deflections Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.11
2	0.00	-0.04	0.63	0.63	0.04	0.00	0.00	0.04
3	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.19
4	0.00	-0.05	1.01	1.01	0.05	0.00	0.00	0.05
5	0.00	-0.15	0.55	0.57	-0.03	0.00	0.00	0.03
6	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.11
7	0.00	-0.04	0.63	0.63	0.04	0.00	0.00	0.04
8	0.00	-0.15	0.80	0.81	-0.05	0.00	0.00	0.05
9	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.19
10	0.00	-0.05	1.00	1.00	0.05	0.00	0.00	0.05
11	0.00	-0.15	0.54	0.56	-0.04	0.00	0.00	0.04
12	0.01	-0.25	0.02	0.25	-0.01	0.00	0.00	0.01
13	0.00	-0.15	0.80	0.81	-0.05	0.00	0.00	0.05
14	0.01	-0.25	0.01	0.25	-0.01	0.00	0.00	0.01
15	0.00	-0.25	0.00	0.25	-0.01	0.00	0.00	0.01
16	0.00	-0.35	-0.04	0.35	0.00	0.00	0.00	0.00
17	0.00	-0.25	0.00	0.25	-0.01	0.00	0.00	0.01
18	0.00	-0.35	-0.04	0.35	0.00	0.00	0.00	0.00
19	0.00	-0.44	0.01	0.44	0.00	0.00	0.00	0.00
20	0.00	-0.34	-0.04	0.34	0.00	0.00	0.00	0.00
21	0.00	-0.44	0.02	0.44	0.00	0.00	0.00	0.00
22	0.00	-0.34	-0.06	0.35	0.00	0.00	0.00	0.00
23	0.00	-0.43	0.00	0.43	0.00	0.00	0.00	0.00
24	0.00	-0.53	0.02	0.53	0.00	0.00	0.00	0.00
25	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
26	0.00	-0.53	0.01	0.53	0.00	0.00	0.00	0.00

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
27	0.00	-0.62	0.02	0.62	0.00	0.00	0.00	0.00
28	0.00	-0.52	0.00	0.52	0.00	0.00	0.00	0.00
29	0.00	-0.62	0.01	0.62	0.00	0.00	0.00	0.00
30	0.00	-0.53	0.01	0.53	0.00	0.00	0.00	0.00
31	0.00	-0.61	0.00	0.61	0.00	0.00	0.00	0.00
32	0.00	-0.71	0.01	0.71	0.00	0.00	0.00	0.00
33	0.00	-0.62	0.00	0.62	0.00	0.00	0.00	0.00
34	0.00	-0.70	0.02	0.70	0.00	0.00	0.00	0.00
35	0.00	-0.79	0.01	0.79	0.00	0.00	0.00	0.00
36	0.00	-0.69	0.01	0.69	0.00	0.00	0.00	0.00
37	0.00	-0.79	0.02	0.79	0.00	0.00	0.00	0.00
38	0.00	-0.70	0.00	0.70	0.00	0.00	0.00	0.00
39	0.00	-0.78	0.00	0.78	0.00	0.00	0.00	0.00
40	0.00	-0.87	0.02	0.87	0.00	0.00	0.00	0.00
41	0.00	-0.79	0.00	0.79	0.00	0.00	0.00	0.00
42	0.00	-0.87	0.01	0.87	0.00	0.00	0.00	0.00
43	0.00	-0.95	0.02	0.95	0.00	0.00	0.00	0.00
44	0.00	-0.85	0.00	0.85	0.00	0.00	0.00	0.00
45	0.00	-0.94	0.01	0.94	0.00	0.00	0.00	0.00
46	0.00	-0.86	0.01	0.86	0.00	0.00	0.00	0.00
47	0.00	-0.93	0.00	0.93	0.00	0.00	0.00	0.00
48	0.00	-1.02	0.01	1.02	0.00	0.00	0.00	0.00
49	0.00	-0.94	0.00	0.94	0.00	0.00	0.00	0.00
50	0.00	-1.01	0.02	1.01	0.00	0.00	0.00	0.00
51	0.00	-1.09	0.01	1.09	0.00	0.00	0.00	0.00
52	0.00	-1.00	0.01	1.00	0.00	0.00	0.00	0.00
53	0.00	-1.09	0.02	1.09	0.00	0.00	0.00	0.00
54	0.00	-1.01	0.00	1.01	0.00	0.00	0.00	0.00
55	0.00	-1.07	0.00	1.07	0.00	0.00	0.00	0.00
56	0.00	-1.15	0.02	1.15	0.00	0.00	0.00	0.00
57	0.00	-1.08	0.00	1.08	0.00	0.00	0.00	0.00
58	0.00	-1.15	0.01	1.15	0.00	0.00	0.00	0.00
59	0.00	-1.22	0.02	1.22	0.00	0.00	0.00	0.00
60	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
61	0.00	-1.21	0.01	1.21	0.00	0.00	0.00	0.00
62	0.00	-1.14	0.01	1.14	0.00	0.00	0.00	0.00
63	0.00	-1.20	0.00	1.20	0.00	0.00	0.00	0.00
64	0.00	-1.28	0.01	1.28	0.00	0.00	0.00	0.00
65	0.00	-1.21	0.00	1.21	0.00	0.00	0.00	0.00
66	0.00	-1.27	0.02	1.27	0.00	0.00	0.00	0.00
67	0.00	-1.25	0.01	1.25	0.00	0.00	0.00	0.00
68	0.00	-1.33	0.01	1.33	0.00	0.00	0.00	0.00
69	0.00	-1.27	0.00	1.27	0.00	0.00	0.00	0.00
70	0.00	-1.33	0.02	1.33	0.00	0.00	0.00	0.00
71	0.00	-1.31	0.00	1.31	0.00	0.00	0.00	0.00
72	0.00	-1.39	0.02	1.39	0.00	0.00	0.00	0.00
73	0.00	-1.32	0.00	1.32	0.00	0.00	0.00	0.00
74	0.00	-1.38	0.01	1.38	0.00	0.00	0.00	0.00
75	0.00	-1.44	0.02	1.44	0.00	0.00	0.00	0.00
76	0.00	-1.36	0.00	1.36	0.00	0.00	0.00	0.00
77	0.00	-1.43	0.01	1.43	0.00	0.00	0.00	0.00
78	0.00	-1.38	0.01	1.38	0.00	0.00	0.00	0.00
79	0.00	-1.41	0.00	1.41	0.00	0.00	0.00	0.00
80	0.00	-1.49	0.01	1.49	0.00	0.00	0.00	0.00
81	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
82	0.00	-1.48	0.02	1.48	0.00	0.00	0.00	0.00
83	0.00	-1.53	0.01	1.53	0.00	0.00	0.00	0.00
84	0.00	-1.45	0.01	1.45	0.00	0.00	0.00	0.00

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
85	0.00	-1.53	0.02	1.53	0.00	0.00	0.00	0.00
86	0.00	-1.47	0.00	1.47	0.00	0.00	0.00	0.00
87	0.00	-1.50	0.00	1.50	0.00	0.00	0.00	0.00
88	0.00	-1.57	0.02	1.57	0.00	0.00	0.00	0.00
89	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
90	0.00	-1.56	0.01	1.56	0.00	0.00	0.00	0.00
91	0.00	-1.61	0.02	1.61	0.00	0.00	0.00	0.00
92	0.00	-1.54	0.00	1.54	0.00	0.00	0.00	0.00
93	0.00	-1.60	0.01	1.60	0.00	0.00	0.00	0.00
94	0.00	-1.55	0.01	1.55	0.00	0.00	0.00	0.00
95	0.00	-1.58	0.00	1.58	0.00	0.00	0.00	0.00
96	0.00	-1.64	0.01	1.64	0.00	0.00	0.00	0.00
97	0.00	-1.59	0.00	1.59	0.00	0.00	0.00	0.00
98	0.00	-1.63	0.02	1.63	0.00	0.00	0.00	0.00
99	0.00	-1.67	0.01	1.67	0.00	0.00	0.00	0.00
100	0.00	-1.60	0.01	1.60	0.00	0.00	0.00	0.00
101	0.00	-1.66	0.02	1.66	0.00	0.00	0.00	0.00
102	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
103	0.00	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
104	0.00	-1.70	0.02	1.70	0.00	0.00	0.00	0.00
105	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
106	0.00	-1.68	0.01	1.68	0.00	0.00	0.00	0.00
107	0.00	-1.72	0.02	1.72	0.00	0.00	0.00	0.00
108	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
109	0.00	-1.70	0.01	1.70	0.00	0.00	0.00	0.00
110	0.00	-1.67	0.01	1.67	0.00	0.00	0.00	0.00
111	0.00	-1.68	0.00	1.68	0.00	0.00	0.00	0.00
112	0.00	-1.74	0.01	1.74	0.00	0.00	0.00	0.00
113	0.00	-1.69	0.00	1.69	0.00	0.00	0.00	0.00
114	0.00	-1.72	0.02	1.72	0.00	0.00	0.00	0.00
115	0.00	-1.75	0.01	1.75	0.00	0.00	0.00	0.00
116	0.00	-1.69	0.01	1.69	0.00	0.00	0.00	0.00
117	0.00	-1.73	0.02	1.73	0.00	0.00	0.00	0.00
118	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
119	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
120	-0.01	-1.76	0.01	1.76	0.00	0.00	0.00	0.00
121	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
122	-0.01	-1.74	0.01	1.74	0.00	0.00	0.00	0.00
123	-0.01	-1.77	0.02	1.77	0.00	0.00	0.00	0.00
124	0.00	-1.71	0.00	1.71	0.00	0.00	0.00	0.00
125	-0.01	-1.74	0.01	1.74	0.00	0.00	0.00	0.00
126	0.00	-1.72	0.01	1.72	0.00	0.00	0.00	0.00
127	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
128	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00

Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	8.08C	0.00	1.32	0.02	0.00	0.00			0.22
	2	8.08C	0.00	1.32	0.02	0.53	0.01			@ 0.232
111	2	8.44C	0.10	0.79	-0.01	-0.79	0.01			2.07
	5	8.44C	-0.10	0.79	-0.01	0.00	0.00			@ 0.420

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
112	5	8.44C	0.10	0.79	-0.01	0.00	0.00			2.08
	12	8.44C	-0.10	0.79	-0.01	0.79	-0.01			@ 0.580
113	12	8.42C	0.06	0.46	-0.01	-0.43	0.01			1.04
	16	8.42C	-0.06	0.46	-0.01	0.04	0.00			@ 0.410
114	16	8.42C	0.06	0.46	-0.01	-0.02	0.00			1.10
	19	8.42C	-0.06	0.46	-0.01	0.44	-0.01			@ 0.580
115	19	8.41C	0.03	0.22	-0.01	-0.22	0.01			0.57
	24	8.41C	-0.03	0.22	-0.01	0.00	0.00			@ 0.420
116	24	8.41C	0.03	0.22	-0.01	0.00	0.00			0.61
	27	8.41C	-0.03	0.22	-0.01	0.23	-0.01			@ 0.580
117	27	7.87C	0.02	0.13	-0.01	-0.12	0.01			0.30
	32	7.87C	-0.02	0.13	-0.01	0.01	0.00			@ 0.410
118	32	7.87C	0.02	0.13	-0.01	-0.01	0.00			0.32
	35	7.87C	-0.02	0.13	-0.01	0.13	-0.01			@ 0.580
119	35	7.58C	0.01	0.07	-0.01	-0.06	0.01			0.17
	40	7.58C	-0.01	0.07	-0.01	0.00	0.00			@ 0.420
120	40	7.58C	0.01	0.06	-0.01	0.00	0.00			0.18
	43	7.58C	-0.01	0.06	-0.01	0.07	-0.01			@ 0.570
121	43	6.89C	0.01	0.04	-0.01	-0.03	0.01			0.09
	48	6.89C	-0.01	0.04	-0.01	0.00	0.00			@ 0.410
122	48	6.89C	0.01	0.04	0.00	0.00	0.00		0.00	0.09
	51	6.89C	-0.01	0.04	0.00	0.04	0.00	@ 0.000	@ 0.000	@ 0.580
123	51	6.52C	0.00	0.02	0.00	-0.02	0.00		0.00	0.05
	56	6.52C	0.00	0.02	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
124	56	6.52C	0.00	0.02	0.00	0.00	0.00		0.00	0.05
	59	6.52C	0.00	0.02	0.00	0.02	0.00	@ 0.000	@ 0.000	@ 0.580
125	59	5.78C	0.00	0.01	-0.01	-0.01	0.00		0.00	0.02
	64	5.78C	0.00	0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
126	64	5.78C	0.00	0.01	0.00	0.00	0.00		0.00	0.02
	68	5.78C	0.00	0.01	0.00	0.01	0.00	@ 0.000	@ 0.000	@ 0.580
127	68	5.39C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	0.01
	72	5.39C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
128	72	5.39C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	0.01
	75	5.39C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.570
129	75	4.63C	0.00	-0.01	0.00	0.01	0.00		0.00	0.02
	80	4.63C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
130	80	4.63C	0.00	-0.01	0.00	0.00	0.00		0.00	0.02
	83	4.63C	0.00	-0.01	0.00	-0.01	0.00	@ 0.000	@ 0.000	@ 0.580

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Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
131	83	4.20C	0.00	-0.01	0.00	0.01	0.00		0.00	0.04
	88	4.20C	0.00	-0.01	0.00	0.00	0.00	@	0.000	@ 0.430
132	88	4.20C	0.00	-0.01	0.00	0.00	0.00		0.00	0.04
	91	4.20C	0.00	-0.01	0.00	-0.01	0.00	@	0.000	@ 0.580
133	91	3.14C	0.00	-0.03	0.00	0.03	0.00		0.00	0.07
	96	3.14C	0.00	-0.03	0.00	0.00	0.00	@	0.000	@ 0.420
134	96	3.14C	0.00	-0.03	0.00	0.00	0.00		0.00	0.07
	99	3.14C	0.00	-0.03	0.00	-0.03	0.00	@	0.000	@ 0.590
135	99	2.67C	-0.01	-0.05	0.00	0.05	0.00		0.00	0.14
	104	2.67C	0.01	-0.05	0.00	0.00	0.00	@	0.000	@ 0.420
136	104	2.67C	-0.01	-0.05	0.00	0.00	0.00		0.00	0.13
	107	2.67C	0.01	-0.05	0.00	-0.05	0.00	@	0.000	@ 0.580
137	107	1.55C	-0.01	-0.10	0.00	0.10	0.00		0.00	0.24
	112	1.55C	0.01	-0.10	0.00	-0.01	0.00	@	0.000	@ 0.420
138	112	1.55C	-0.01	-0.10	0.00	0.01	0.00		0.00	0.23
	115	1.55C	0.01	-0.10	0.00	-0.09	0.00	@	0.000	@ 0.590
139	115	0.97C	-0.02	-0.17	0.00	0.16	0.00		0.00	0.43
	120	0.97C	0.02	-0.17	0.00	0.00	0.00	@	0.000	@ 0.420
140	120	0.97C	-0.02	-0.17	0.00	0.00	0.00		0.00	0.44
	123	0.97C	0.02	-0.17	0.00	-0.17	0.00	@	0.000	@ 0.580
141	3	11.95C	0.00	1.31	-0.02	0.00	0.00			0.22
	4	11.95C	0.00	1.31	-0.02	0.53	-0.01			@ 0.232
142	4	10.48C	0.10	0.87	0.00	-0.81	0.00		0.00	2.01
	8	10.48C	-0.10	0.87	0.00	0.05	0.00	@	0.000	@ 0.410
143	8	10.48C	0.10	0.87	-0.01	-0.05	0.00			2.02
	14	10.48C	-0.10	0.87	-0.01	0.81	-0.01			@ 0.590
144	14	9.40C	0.06	0.42	-0.01	-0.41	0.01			1.07
	18	9.40C	-0.06	0.42	-0.01	0.01	0.00			@ 0.420
145	18	9.40C	0.06	0.42	-0.01	0.01	0.00			1.13
	21	9.40C	-0.06	0.42	-0.01	0.42	-0.01			@ 0.580
146	21	8.21C	0.03	0.25	-0.01	-0.23	0.01			0.56
	26	8.21C	-0.03	0.25	-0.01	0.02	0.00			@ 0.410
147	26	8.21C	0.03	0.25	-0.01	-0.01	0.00			0.59
	29	8.21C	-0.03	0.25	-0.01	0.23	-0.01			@ 0.580
148	29	7.66C	0.02	0.12	-0.01	-0.12	0.01			0.31
	34	7.66C	-0.02	0.12	-0.01	0.00	0.00			@ 0.420
149	34	7.66C	0.02	0.12	-0.01	0.00	0.00			0.33
	37	7.66C	-0.02	0.12	-0.01	0.12	-0.01			@ 0.580

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
150	37	6.75C	0.01	0.07	-0.01	-0.07	0.01			0.16
	42	6.75C	-0.01	0.07	-0.01	0.01	0.00			@ 0.410
151	42	6.75C	0.01	0.07	-0.01	0.00	0.00			0.17
	45	6.75C	-0.01	0.07	-0.01	0.07	-0.01			@ 0.580
152	45	6.34C	0.01	0.03	-0.01	-0.03	0.01			0.09
	50	6.34C	-0.01	0.03	-0.01	0.00	0.00			@ 0.420
153	50	6.34C	0.01	0.03	-0.01	0.00	0.00			0.10
	53	6.34C	-0.01	0.03	-0.01	0.04	-0.01			@ 0.570
154	53	5.51C	0.00	0.02	0.00	-0.02	0.00		0.00	0.04
	58	5.51C	0.00	0.02	0.00	0.00	0.00	@	0.000	@ 0.410
155	58	5.51C	0.00	0.02	-0.01	0.00	0.00			0.05
	61	5.51C	0.00	0.02	-0.01	0.02	-0.01			@ 0.590
156	61	5.14C	0.00	0.01	0.00	-0.01	0.00		0.00	0.02
	66	5.14C	0.00	0.01	0.00	0.00	0.00	@	0.000	@ 0.420
157	66	5.14C	0.00	0.01	0.00	0.00	0.00		0.00	0.03
	70	5.14C	0.00	0.01	0.00	0.01	0.00	@	0.000	@ 0.580
158	70	4.33C	0.00	0.00	0.00	0.00	0.00		0.00	0.01
	74	4.33C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.430
159	74	4.33C	0.00	0.00	0.00	0.00	0.00		0.00	0.01
	77	4.33C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.590
160	77	3.98C	0.00	-0.01	0.00	0.01	0.00		0.00	0.02
	82	3.98C	0.00	-0.01	0.00	0.00	0.00	@	0.000	@ 0.420
161	82	3.98C	0.00	-0.01	0.00	0.00	0.00		0.00	0.02
	85	3.98C	0.00	-0.01	0.00	0.00	0.00	@	0.000	@ 0.580
162	85	2.90C	0.00	-0.02	0.00	0.02	0.00		0.00	0.04
	90	2.90C	0.00	-0.02	0.00	0.00	0.00	@	0.000	@ 0.420
163	90	2.90C	0.00	-0.02	0.00	0.00	0.00		0.00	0.04
	93	2.90C	0.00	-0.02	0.00	-0.01	0.00	@	0.000	@ 0.590
164	93	2.55C	0.00	-0.03	0.00	0.03	0.00		0.00	0.07
	98	2.55C	0.00	-0.03	0.00	0.00	0.00	@	0.000	@ 0.420
165	98	2.55C	0.00	-0.03	0.00	0.00	0.00		0.00	0.07
	101	2.55C	0.00	-0.03	0.00	-0.03	0.00	@	0.000	@ 0.580
166	101	1.50C	-0.01	-0.06	0.00	0.05	0.00		0.00	0.13
	106	1.50C	0.01	-0.06	0.00	0.00	0.00	@	0.000	@ 0.420
167	106	1.50C	-0.01	-0.06	0.00	0.00	0.00		0.00	0.13
	109	1.50C	0.01	-0.06	0.00	-0.05	0.00	@	0.000	@ 0.590
168	109	1.21C	-0.01	-0.09	0.00	0.09	0.00		0.00	0.25
	114	1.21C	0.01	-0.09	0.00	0.00	0.00	@	0.000	@ 0.420

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				x-x	y-y	x-x	y-y	x-x	y-y	
169	114	1.21C	-0.01	-0.09	0.00	0.00	0.00		0.00	0.23
	117	1.21C	0.01	-0.09	0.00	-0.09	0.00	@ 0.000	@ 0.000	@ 0.580
170	117	0.27C	-0.02	-0.18	0.00	0.17	0.00		0.00	0.42
	122	0.27C	0.02	-0.18	0.00	-0.01	0.00	@ 0.000	@ 0.000	@ 0.410
171	122	0.27C	-0.02	-0.18	0.00	0.01	0.00		0.00	0.43
	125	0.27C	0.02	-0.18	0.00	-0.17	0.00	@ 0.000	@ 0.000	@ 0.590
172	6	10.23C	0.00	0.16	0.02	0.00	0.00			0.03
	7	10.23C	0.00	0.16	0.02	0.07	0.01			@ 0.232
173	7	9.98C	0.10	-0.01	0.00	0.01	0.00		0.00	0.03
	11	9.98C	-0.10	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
174	11	9.98C	0.10	-0.01	0.00	0.00	0.00		0.00	0.02
	15	9.98C	-0.10	-0.01	0.00	-0.01	0.00	@ 0.000	@ 0.000	@ 0.580
175	15	9.13C	0.06	-0.04	0.00	0.01	0.00		0.00	0.05
	20	9.13C	-0.06	-0.04	0.00	-0.03	0.00	@ 0.000	@ 0.000	@ 0.660
176	20	9.13C	0.06	-0.04	0.00	0.03	0.00		0.00	0.05
	23	9.13C	-0.06	-0.04	0.00	-0.01	0.00	@ 0.000	@ 0.000	@ 0.350
177	23	8.74C	0.03	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	28	8.74C	-0.03	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
178	28	8.74C	0.03	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	31	8.74C	-0.03	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
179	31	7.90C	0.02	-0.01	0.00	0.00	0.00		0.00	0.02
	36	7.90C	-0.02	-0.01	0.00	-0.01	0.00	@ 0.000	@ 0.000	@ 0.590
180	36	7.90C	0.02	-0.01	0.00	0.01	0.00		0.00	0.02
	39	7.90C	-0.02	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
181	39	7.52C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	44	7.52C	-0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
182	44	7.52C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	47	7.52C	-0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
183	47	6.68C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	52	6.68C	-0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.450
184	52	6.68C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	55	6.68C	-0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.570
185	55	6.29C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	60	6.29C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
186	60	6.29C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	63	6.29C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
187	63	5.45C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.01
	67	5.45C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440

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Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
188	67	5.45C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	71	5.45C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.590
189	71	5.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	76	5.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
190	76	5.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	79	5.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
191	79	4.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	84	4.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
192	84	4.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	87	4.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.590
193	87	3.81C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	92	3.81C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
194	92	3.81C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	95	3.81C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
195	95	2.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	100	2.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.450
196	100	2.68C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.01
	103	2.68C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.570
197	103	2.27C	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	108	2.27C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
198	108	2.27C	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	111	2.27C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
199	111	1.14C	-0.01	0.01	0.00	0.00	0.00		0.00	0.01
	116	1.14C	0.01	0.01	0.00	0.01	0.00		@ 0.000	@ 0.540
200	116	1.14C	-0.01	0.01	0.00	-0.01	0.00		0.00	0.01
	119	1.14C	0.01	0.01	0.00	0.00	0.00		@ 0.000	@ 0.450
201	119	0.73C	-0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.01
	124	0.73C	0.02	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
202	124	0.73C	-0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	127	0.73C	0.02	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.570
203	9	10.54C	0.00	0.18	-0.03	0.00	0.00			0.03
	10	10.54C	0.00	0.18	-0.03	0.07	-0.01			@ 0.232
204	10	9.85C	0.10	-0.09	0.00	0.03	0.00		0.00	0.07
	13	9.85C	-0.10	-0.09	0.00	-0.05	0.00		@ 0.000	@ 0.700
205	13	9.85C	0.10	-0.09	0.01	0.06	0.00		0.00	0.07
	17	9.85C	-0.10	-0.09	0.01	-0.03	0.00		@ 0.000	@ 0.310
206	17	9.42C	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	22	9.42C	-0.06	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420

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				x-x	y-y	x-x	y-y	x-x	y-y	
207	22	9.42C	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	25	9.42C	-0.06	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
208	25	8.63C	0.03	-0.02	-0.01	0.01	0.01			0.03
	30	8.63C	-0.03	-0.02	-0.01	-0.02	0.00			@ 0.640
209	30	8.63C	0.03	-0.02	0.00	0.02	0.00		0.00	0.03
	33	8.63C	-0.03	-0.02	0.00	-0.01	0.00	@ 0.000	@ 0.000	@ 0.370
210	33	8.19C	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	38	8.19C	-0.02	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
211	38	8.19C	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	41	8.19C	-0.02	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
212	41	7.40C	0.01	-0.01	-0.01	0.00	0.01	0.00		0.01
	46	7.40C	-0.01	-0.01	-0.01	0.00	0.00	@ 0.000		@ 0.460
213	46	7.40C	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	49	7.40C	-0.01	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.510
214	49	6.96C	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	54	6.96C	-0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
215	54	6.96C	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	57	6.96C	-0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
216	57	6.17C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.01
	62	6.17C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
217	62	6.17C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	65	6.17C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.560
218	65	5.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	69	5.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
219	69	5.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	73	5.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
220	73	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	78	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
221	78	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	81	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.570
222	81	4.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	86	4.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
223	86	4.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	89	4.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.580
224	89	3.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	94	3.43C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
225	94	3.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	97	3.43C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.560

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Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
226	97	2.97C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	102	2.97C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
227	102	2.97C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.97C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.90C	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	110	1.90C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.460
229	110	1.90C	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	113	1.90C	0.01	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.510
230	113	1.44C	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.44C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.44C	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.44C	0.01	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.37C	-0.02	0.02	-0.01	-0.01	0.00		0.00	0.02
	126	0.37C	0.02	0.02	-0.01	0.01	0.00		@ 0.000	@ 0.630
233	126	0.37C	-0.02	0.02	0.00	-0.01	0.00		0.00	0.02
	128	0.37C	0.02	0.02	0.00	0.00	0.00		@ 0.000	@ 0.390

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.19C	0.00	0.00	-0.49	0.00	0.00	0.00		0.08
	2	10.19C	0.00	0.00	-0.49	0.00	-0.20	@ 0.000		@ 0.232
111	2	9.86C	0.00	0.00	0.05	0.00	-0.06	0.00		0.21
	5	9.86C	0.00	0.00	0.05	0.00	-0.02	@ 0.000		@ 0.450
112	5	9.86C	0.00	0.00	0.05	0.00	-0.01	0.00		0.07
	12	9.86C	0.00	0.00	0.05	0.00	0.04	@ 0.000		@ 0.630
113	12	9.07C	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.03
	16	9.07C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.480
114	16	9.07C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
	19	9.07C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
115	19	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
117	27	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
124	56	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	59	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
125	59	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
129	75	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
131	83	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	88	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
132	88	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	91	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
133	91	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
136	104	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	107	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
137	107	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.19C	0.00	0.00	-0.90	0.00	0.00	0.00		0.15
	4	10.19C	0.00	0.00	-0.90	0.00	-0.36	@ 0.000		@ 0.232
142	4	9.64C	0.00	0.00	0.08	0.00	-0.10	0.00		0.30
	8	9.64C	0.00	0.00	0.08	0.00	-0.02	@ 0.000		@ 0.440
143	8	9.64C	0.00	0.00	0.08	0.00	-0.02	0.00		0.12
	14	9.64C	0.00	0.00	0.08	0.00	0.06	@ 0.000		@ 0.620
144	14	9.24C	0.00	0.00	-0.01	0.00	0.01	0.00		0.04
	18	9.24C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.460
145	18	9.24C	0.00	0.00	-0.01	0.00	0.00	0.00		0.00
	21	9.24C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.000
146	21	8.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.43C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
147	26	8.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.43C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
148	29	8.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
149	34	8.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
150	37	7.24C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.24C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
151	42	7.24C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.24C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
152	45	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
153	50	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
154	53	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
155	58	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
156	61	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
157	66	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
158	70	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
159	74	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
160	77	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
161	82	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
162	85	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
164	93	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	10.08C	0.00	0.00	-0.49	0.00	0.00	0.00	0.00	0.08
	7	10.08C	0.00	0.00	-0.49	0.00	-0.20	@ 0.000		@ 0.232
173	7	9.69C	0.00	0.00	0.05	0.00	-0.07	0.00		0.21
	11	9.69C	0.00	0.00	0.05	0.00	-0.02	@ 0.000		@ 0.450
174	11	9.69C	0.00	0.00	0.06	0.00	-0.01	0.00		0.08
	15	9.69C	0.00	0.00	0.06	0.00	0.04	@ 0.000		@ 0.630
175	15	8.89C	0.00	0.00	-0.01	0.00	0.01	0.00		0.03
	20	8.89C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.440

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Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
176	20	8.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	8.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
181	39	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
183	47	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
186	60	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	63	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
187	63	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
190	76	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	79	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
191	79	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
194	92	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	95	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
195	95	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
198	108	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	111	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
199	111	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.34C	0.00	0.00	-0.89	0.00	0.00	0.00	0.00	0.15
	10	10.34C	0.00	0.00	-0.89	0.00	-0.36	@ 0.000	@ 0.000	@ 0.232
204	10	9.57C	0.00	0.00	0.08	0.00	-0.09	0.00	0.00	0.29
	13	9.57C	0.00	0.00	0.08	0.00	-0.02	@ 0.000	@ 0.000	@ 0.450
205	13	9.57C	0.00	0.00	0.09	0.00	-0.02	0.00	0.00	0.12
	17	9.57C	0.00	0.00	0.09	0.00	0.07	@ 0.000	@ 0.000	@ 0.630
206	17	9.18C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.04
	22	9.18C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.460
207	22	9.18C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
	25	9.18C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.000
208	25	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
209	30	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
210	33	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
211	38	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
212	41	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
213	46	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
214	49	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
215	54	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
216	57	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
217	62	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.60C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
219	69	5.60C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
220	73	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
221	78	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
224	89	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	7.57C	0.00	1.59	0.03	0.00	0.00			0.27
	2	7.57C	0.00	1.59	0.03	0.63	0.01			@ 0.232
111	2	8.10C	0.12	0.95	-0.01	-0.95	0.01			2.49
	5	8.10C	-0.12	0.95	-0.01	0.00	0.00			@ 0.420
112	5	8.10C	0.12	0.95	-0.01	0.00	0.00			2.50
	12	8.10C	-0.12	0.95	-0.01	0.95	-0.01			@ 0.580
113	12	8.23C	0.08	0.55	-0.01	-0.51	0.01			1.25
	16	8.23C	-0.08	0.55	-0.01	0.04	0.00			@ 0.410
114	16	8.23C	0.08	0.55	-0.02	-0.03	0.00			1.31
	19	8.23C	-0.08	0.55	-0.02	0.52	-0.02			@ 0.580
115	19	8.31C	0.04	0.27	-0.01	-0.26	0.01			0.69
	24	8.31C	-0.04	0.27	-0.01	0.00	0.00			@ 0.420
116	24	8.31C	0.04	0.27	-0.01	0.00	0.00			0.73
	27	8.31C	-0.04	0.27	-0.01	0.27	-0.01			@ 0.580
117	27	7.82C	0.02	0.16	-0.01	-0.15	0.01			0.36
	32	7.82C	-0.02	0.16	-0.01	0.01	0.00			@ 0.410
118	32	7.82C	0.02	0.16	-0.01	-0.01	0.00			0.38
	35	7.82C	-0.02	0.16	-0.01	0.15	-0.01			@ 0.580
119	35	7.56C	0.01	0.08	-0.01	-0.08	0.01			0.20
	40	7.56C	-0.01	0.08	-0.01	0.00	0.00			@ 0.420
120	40	7.56C	0.01	0.08	-0.01	0.00	0.00			0.21
	43	7.56C	-0.01	0.08	-0.01	0.08	-0.01			@ 0.580
121	43	6.89C	0.01	0.05	-0.01	-0.04	0.01			0.10
	48	6.89C	-0.01	0.05	-0.01	0.00	0.00			@ 0.410
122	48	6.89C	0.01	0.04	-0.01	0.00	0.00			0.11
	51	6.89C	-0.01	0.04	-0.01	0.04	-0.01			@ 0.580
123	51	6.53C	0.00	0.02	-0.01	-0.02	0.01			0.06
	56	6.53C	0.00	0.02	-0.01	0.00	0.00			@ 0.420
124	56	6.53C	0.00	0.02	-0.01	0.00	0.00			0.06
	59	6.53C	0.00	0.02	-0.01	0.02	-0.01			@ 0.570
125	59	5.81C	0.00	0.01	-0.01	-0.01	0.01			0.03
	64	5.81C	0.00	0.01	-0.01	0.00	0.00			@ 0.410

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Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
126	64	5.81C	0.00	0.01	-0.01	0.00	0.00			0.03
	68	5.81C	0.00	0.01	-0.01	0.01	-0.01			@ 0.570
127	68	5.42C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	72	5.42C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
128	72	5.42C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	75	5.42C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.570
129	75	4.67C	0.00	-0.01	-0.01	0.01	0.01			0.02
	80	4.67C	0.00	-0.01	-0.01	0.00	0.00			@ 0.420
130	80	4.67C	0.00	-0.01	0.00	0.00	0.00		0.00	0.02
	83	4.67C	0.00	-0.01	0.00	-0.01	-0.01	@ 0.000		@ 0.580
131	83	4.24C	0.00	-0.02	-0.01	0.02	0.01			0.05
	88	4.24C	0.00	-0.02	-0.01	0.00	0.00			@ 0.420
132	88	4.24C	0.00	-0.02	-0.01	0.00	0.00			0.04
	91	4.24C	0.00	-0.02	-0.01	-0.02	-0.01			@ 0.580
133	91	3.18C	-0.01	-0.04	-0.01	0.03	0.01			0.09
	96	3.18C	0.01	-0.04	-0.01	0.00	0.00			@ 0.420
134	96	3.18C	-0.01	-0.04	0.00	0.00	0.00		0.00	0.08
	99	3.18C	0.01	-0.04	0.00	-0.03	-0.01	@ 0.000		@ 0.590
135	99	2.71C	-0.01	-0.06	0.00	0.06	0.00		0.00	0.16
	104	2.71C	0.01	-0.06	0.00	0.00	0.00	@ 0.000		@ 0.420
136	104	2.71C	-0.01	-0.06	0.00	0.00	0.00		0.00	0.15
	107	2.71C	0.01	-0.06	0.00	-0.06	0.00	@ 0.000		@ 0.580
137	107	1.58C	-0.02	-0.12	0.00	0.11	0.00		0.00	0.29
	112	1.58C	0.02	-0.12	0.00	-0.01	0.00	@ 0.000		@ 0.420
138	112	1.58C	-0.02	-0.12	0.00	0.01	0.00		0.00	0.27
	115	1.58C	0.02	-0.12	0.00	-0.11	0.00	@ 0.000		@ 0.590
139	115	0.98C	-0.03	-0.20	0.00	0.20	0.00		0.00	0.52
	120	0.98C	0.03	-0.20	0.00	0.00	0.00	@ 0.000		@ 0.420
140	120	0.98C	-0.03	-0.20	0.00	0.00	0.00		0.00	0.53
	123	0.98C	0.03	-0.20	0.00	-0.20	0.00	@ 0.000		@ 0.580
141	3	12.22C	0.00	1.58	-0.03	0.00	0.00			0.27
	4	12.22C	0.00	1.58	-0.03	0.63	-0.01			@ 0.232
142	4	10.58C	0.12	1.04	0.00	-0.97	0.01		0.01	2.41
	8	10.58C	-0.12	1.04	0.00	0.07	0.01	@ 0.000		@ 0.410
143	8	10.58C	0.12	1.04	-0.02	-0.06	0.01			2.42
	14	10.58C	-0.12	1.04	-0.02	0.98	-0.01			@ 0.590
144	14	9.37C	0.08	0.50	-0.01	-0.49	0.02			1.28
	18	9.37C	-0.08	0.50	-0.01	0.01	0.00			@ 0.420

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
145	18	9.37C	0.08	0.50	-0.02	0.01	0.00			1.35
	21	9.37C	-0.08	0.50	-0.02	0.51	-0.01			@ 0.580
146	21	8.12C	0.04	0.30	-0.01	-0.27	0.01			0.67
	26	8.12C	-0.04	0.30	-0.01	0.02	0.00			@ 0.410
147	26	8.12C	0.04	0.29	-0.02	-0.01	0.00			0.71
	29	8.12C	-0.04	0.29	-0.02	0.28	-0.01			@ 0.580
148	29	7.53C	0.02	0.14	-0.01	-0.14	0.01			0.37
	34	7.53C	-0.02	0.14	-0.01	0.00	0.00			@ 0.420
149	34	7.53C	0.02	0.14	-0.01	0.00	0.00			0.39
	37	7.53C	-0.02	0.14	-0.01	0.15	-0.01			@ 0.580
150	37	6.61C	0.01	0.09	-0.01	-0.08	0.01			0.19
	42	6.61C	-0.01	0.09	-0.01	0.01	0.00			@ 0.410
151	42	6.61C	0.01	0.09	-0.01	0.00	0.00			0.20
	45	6.61C	-0.01	0.09	-0.01	0.08	-0.01			@ 0.580
152	45	6.19C	0.01	0.04	-0.01	-0.04	0.01			0.11
	50	6.19C	-0.01	0.04	-0.01	0.00	0.00			@ 0.420
153	50	6.19C	0.01	0.04	-0.01	0.00	0.00			0.11
	53	6.19C	-0.01	0.04	-0.01	0.04	-0.01			@ 0.580
154	53	5.36C	0.00	0.02	-0.01	-0.02	0.01			0.05
	58	5.36C	0.00	0.02	-0.01	0.00	0.00			@ 0.410
155	58	5.36C	0.00	0.02	-0.01	0.00	0.00			0.06
	61	5.36C	0.00	0.02	-0.01	0.02	-0.01			@ 0.580
156	61	5.00C	0.00	0.01	-0.01	-0.01	0.01			0.03
	66	5.00C	0.00	0.01	-0.01	0.00	0.00			@ 0.420
157	66	5.00C	0.00	0.01	-0.01	0.00	0.00			0.03
	70	5.00C	0.00	0.01	-0.01	0.01	-0.01			@ 0.580
158	70	4.20C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	74	4.20C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.430
159	74	4.20C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	77	4.20C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.590
160	77	3.86C	0.00	-0.01	-0.01	0.01	0.01			0.02
	82	3.86C	0.00	-0.01	-0.01	0.00	0.00			@ 0.430
161	82	3.86C	0.00	-0.01	-0.01	0.00	0.00			0.02
	85	3.86C	0.00	-0.01	-0.01	-0.01	-0.01			@ 0.580
162	85	2.79C	0.00	-0.02	0.00	0.02	0.00		0.00	0.05
	90	2.79C	0.00	-0.02	0.00	0.00	0.00	@ 0.000		@ 0.420
163	90	2.79C	0.00	-0.02	-0.01	0.00	0.00			0.04
	93	2.79C	0.00	-0.02	-0.01	-0.02	-0.01			@ 0.590

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Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
164	93	2.45C	-0.01	-0.03	0.00	0.03	0.00		0.00	0.09
	98	2.45C	0.01	-0.03	0.00	0.00	0.00	@	0.000	@ 0.430
165	98	2.45C	-0.01	-0.03	0.00	0.00	0.00		0.00	0.08
	101	2.45C	0.01	-0.03	0.00	-0.03	0.00	@	0.000	@ 0.580
166	101	1.41C	-0.01	-0.07	0.00	0.06	0.00		0.00	0.16
	106	1.41C	0.01	-0.07	0.00	0.00	0.00	@	0.000	@ 0.420
167	106	1.41C	-0.01	-0.07	0.00	0.01	0.00		0.00	0.15
	109	1.41C	0.01	-0.07	0.00	-0.06	0.00	@	0.000	@ 0.590
168	109	1.14C	-0.02	-0.11	0.00	0.11	0.00		0.00	0.29
	114	1.14C	0.02	-0.11	0.00	0.00	0.00	@	0.000	@ 0.420
169	114	1.14C	-0.02	-0.11	0.00	0.00	0.00		0.00	0.28
	117	1.14C	0.02	-0.11	0.00	-0.11	0.00	@	0.000	@ 0.580
170	117	0.24C	-0.03	-0.22	0.00	0.21	0.00		0.00	0.51
	122	0.24C	0.03	-0.22	0.00	-0.02	0.00	@	0.000	@ 0.410
171	122	0.24C	-0.03	-0.22	0.00	0.01	0.00		0.00	0.52
	125	0.24C	0.03	-0.22	0.00	-0.21	0.00	@	0.000	@ 0.590
172	6	10.34C	0.00	0.20	0.02	0.00	0.00			0.03
	7	10.34C	0.00	0.20	0.02	0.08	0.01			@ 0.232
173	7	10.09C	0.12	-0.01	0.00	0.01	0.00		0.00	0.03
	11	10.09C	-0.12	-0.01	0.00	0.00	0.00	@	0.000	@ 0.430
174	11	10.09C	0.12	-0.01	0.00	0.00	0.00		0.00	0.03
	15	10.09C	-0.12	-0.01	0.00	-0.01	0.00	@	0.000	@ 0.580
175	15	9.24C	0.08	-0.05	-0.01	0.02	0.01			0.06
	20	9.24C	-0.08	-0.05	-0.01	-0.04	0.00			@ 0.660
176	20	9.24C	0.08	-0.05	0.00	0.03	0.00		0.00	0.06
	23	9.24C	-0.08	-0.05	0.00	-0.02	0.00	@	0.000	@ 0.350
177	23	8.84C	0.04	0.00	-0.01	0.00	0.01		0.00	0.02
	28	8.84C	-0.04	0.00	-0.01	0.00	0.00	@	0.000	@ 0.420
178	28	8.84C	0.04	0.00	-0.01	0.00	0.00		0.00	0.02
	31	8.84C	-0.04	0.00	-0.01	0.00	-0.01	@	0.000	@ 0.580
179	31	7.99C	0.02	-0.02	-0.01	0.01	0.01			0.02
	36	7.99C	-0.02	-0.02	-0.01	-0.01	0.00			@ 0.560
180	36	7.99C	0.02	-0.01	-0.01	0.01	0.00			0.02
	39	7.99C	-0.02	-0.01	-0.01	0.00	-0.01			@ 0.440
181	39	7.60C	0.01	0.00	-0.01	0.00	0.01		0.00	0.02
	44	7.60C	-0.01	0.00	-0.01	0.00	0.00	@	0.000	@ 0.420
182	44	7.60C	0.01	0.00	-0.01	0.00	0.00		0.00	0.02
	47	7.60C	-0.01	0.00	-0.01	0.00	-0.01	@	0.000	@ 0.580

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Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
183	47	6.75C	0.01	0.00	-0.01	0.00	0.01	0.00		0.02
	52	6.75C	-0.01	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.440
184	52	6.75C	0.01	0.00	-0.01	0.00	0.00	0.00		0.02
	55	6.75C	-0.01	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.570
185	55	6.35C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	60	6.35C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
186	60	6.35C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	63	6.35C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
187	63	5.51C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	67	5.51C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.430
188	67	5.51C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	71	5.51C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.590
189	71	5.11C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	76	5.11C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
190	76	5.11C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	79	5.11C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
191	79	4.26C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	84	4.26C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.430
192	84	4.26C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	87	4.26C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.590
193	87	3.84C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	92	3.84C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
194	92	3.84C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	95	3.84C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
195	95	2.71C	-0.01	0.00	-0.01	0.00	0.01	0.00		0.02
	100	2.71C	0.01	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.440
196	100	2.71C	-0.01	0.00	-0.01	0.00	0.00	0.00		0.02
	103	2.71C	0.01	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
197	103	2.29C	-0.01	0.00	-0.01	0.00	0.01	0.00		0.02
	108	2.29C	0.01	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
198	108	2.29C	-0.01	0.00	-0.01	0.00	0.00	0.00		0.02
	111	2.29C	0.01	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
199	111	1.16C	-0.02	0.01	-0.01	0.00	0.01			0.02
	116	1.16C	0.02	0.01	-0.01	0.01	0.00			@ 0.520
200	116	1.16C	-0.02	0.01	-0.01	-0.01	0.00			0.02
	119	1.16C	0.02	0.01	-0.01	0.00	-0.01			@ 0.480
201	119	0.74C	-0.03	0.00	-0.01	0.00	0.01	0.00		0.02
	124	0.74C	0.03	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.410

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				x-x	y-y	x-x	y-y	x-x	y-y	
202	124	0.74C	-0.03	0.00	-0.01	0.00	0.00	0.00		0.02
	127	0.74C	0.03	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.570
203	9	10.66C	0.00	0.22	-0.03	0.00	0.00			0.04
	10	10.66C	0.00	0.22	-0.03	0.09	-0.01			@ 0.232
204	10	9.96C	0.12	-0.10	-0.01	0.04	0.00		0.00	0.08
	13	9.96C	-0.12	-0.10	-0.01	-0.06	0.00	@ 0.000		@ 0.700
205	13	9.96C	0.12	-0.11	0.01	0.07	-0.01			0.09
	17	9.96C	-0.12	-0.11	0.01	-0.04	0.00			@ 0.310
206	17	9.53C	0.08	0.00	-0.01	0.00	0.01	0.00		0.02
	22	9.53C	-0.08	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
207	22	9.53C	0.08	0.00	-0.01	0.00	0.00	0.00		0.02
	25	9.53C	-0.08	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
208	25	8.73C	0.04	-0.03	-0.01	0.01	0.01			0.03
	30	8.73C	-0.04	-0.03	-0.01	-0.02	0.00			@ 0.630
209	30	8.73C	0.04	-0.03	0.00	0.02	0.00		0.00	0.03
	33	8.73C	-0.04	-0.03	0.00	-0.01	-0.01	@ 0.000		@ 0.380
210	33	8.28C	0.02	0.00	-0.01	0.00	0.01	0.00		0.02
	38	8.28C	-0.02	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
211	38	8.28C	0.02	0.00	-0.01	0.00	0.00	0.00		0.02
	41	8.28C	-0.02	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
212	41	7.48C	0.01	-0.01	-0.01	0.00	0.01			0.02
	46	7.48C	-0.01	-0.01	-0.01	-0.01	0.00			@ 0.450
213	46	7.48C	0.01	-0.01	-0.01	0.01	0.00			0.02
	49	7.48C	-0.01	-0.01	-0.01	0.00	-0.01			@ 0.520
214	49	7.03C	0.01	0.00	-0.01	0.00	0.01	0.00		0.02
	54	7.03C	-0.01	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
215	54	7.03C	0.01	0.00	-0.01	0.00	0.00	0.00		0.02
	57	7.03C	-0.01	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
216	57	6.23C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	62	6.23C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
217	62	6.23C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	65	6.23C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.560
218	65	5.78C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	69	5.78C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
219	69	5.78C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	73	5.78C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
220	73	4.99C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	78	4.99C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.410

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				x-x	y-y	x-x	y-y	x-x	y-y	
221	78	4.99C	0.00	0.00	-0.01	0.00	0.00	0.00		0.02
	81	4.99C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.570
222	81	4.54C	0.00	0.00	-0.01	0.00	0.01	0.00		0.02
	86	4.54C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
223	86	4.54C	0.00	0.00	-0.01	0.00	0.00	0.00		0.01
	89	4.54C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
224	89	3.46C	0.00	0.00	-0.01	0.00	0.01	0.00		0.01
	94	3.46C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
225	94	3.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	97	3.46C	0.00	0.00	0.00	0.00	-0.01	@ 0.000	@ 0.000	@ 0.560
226	97	3.00C	-0.01	0.00	-0.01	0.00	0.01	0.00		0.01
	102	3.00C	0.01	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.420
227	102	3.00C	-0.01	0.00	-0.01	0.00	0.00	0.00		0.01
	105	3.00C	0.01	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
228	105	1.92C	-0.01	0.01	-0.01	0.00	0.01	0.00		0.02
	110	1.92C	0.01	0.01	-0.01	0.00	0.00	@ 0.000		@ 0.450
229	110	1.92C	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
	113	1.92C	0.01	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.530
230	113	1.46C	-0.02	0.00	-0.01	0.00	0.01	0.00		0.01
	118	1.46C	0.02	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.430
231	118	1.46C	-0.02	0.00	-0.01	0.00	0.00	0.00		0.01
	121	1.46C	0.02	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.580
232	121	0.38C	-0.03	0.02	-0.01	-0.01	0.01			0.02
	126	0.38C	0.03	0.02	-0.01	0.01	0.00	@		@ 0.610
233	126	0.38C	-0.03	0.02	-0.01	-0.01	0.00			0.03
	128	0.38C	0.03	0.02	-0.01	0.01	-0.01	@		@ 0.410

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.18C	0.00	0.00	-0.59	0.00	0.00	0.00		0.10
	2	10.18C	0.00	0.00	-0.59	0.00	-0.24	@ 0.000		@ 0.232
111	2	9.86C	0.00	0.00	0.06	0.00	-0.08	0.00		0.25
	5	9.86C	0.00	0.00	0.06	0.00	-0.02	@ 0.000		@ 0.450
112	5	9.86C	0.00	0.00	0.07	0.00	-0.02	0.00		0.09
	12	9.86C	0.00	0.00	0.07	0.00	0.05	@ 0.000		@ 0.630
113	12	9.07C	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.04
	16	9.07C	0.00	0.00	0.00	0.00	0.01	@ 0.000	@ 0.000	@ 0.480

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
114	16	9.07C	0.00	0.00	-0.01	0.00	0.00	0.00		0.00
	19	9.07C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.000
115	19	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
117	27	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
124	56	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	59	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
125	59	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
129	75	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
131	83	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	88	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
132	88	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	91	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Approved :

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
133	91	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
136	104	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	107	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
137	107	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.17C	0.00	0.00	-1.08	0.00	0.00	0.00	0.00	0.18
	4	10.17C	0.00	0.00	-1.08	0.00	-0.43	@ 0.000		@ 0.232
142	4	9.64C	0.00	0.00	0.09	0.00	-0.12	0.00		0.36
	8	9.64C	0.00	0.00	0.09	0.00	-0.02	@ 0.000		@ 0.440
143	8	9.64C	0.00	0.00	0.10	0.00	-0.02	0.00		0.15
	14	9.64C	0.00	0.00	0.10	0.00	0.08	@ 0.000		@ 0.620
144	14	9.24C	0.00	0.00	-0.01	0.00	0.01	0.00		0.05
	18	9.24C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.460
145	18	9.24C	0.00	0.00	-0.01	0.00	0.00	0.00		0.00
	21	9.24C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.000
146	21	8.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
147	26	8.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
148	29	8.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
149	34	8.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
150	37	7.23C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.23C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
151	42	7.23C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.23C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
152	45	6.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
153	50	6.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
154	53	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
155	58	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
156	61	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
157	66	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
158	70	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
159	74	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
160	77	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
161	82	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
162	85	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
164	93	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	10.09C	0.00	0.00	-0.59	0.00	0.00	0.00	0.00	0.10
	7	10.09C	0.00	0.00	-0.59	0.00	-0.24	@ 0.000		@ 0.232
173	7	9.69C	0.00	0.00	0.06	0.00	-0.08	0.00	0.00	0.25
	11	9.69C	0.00	0.00	0.06	0.00	-0.02	@ 0.000		@ 0.450
174	11	9.69C	0.00	0.00	0.07	0.00	-0.02	0.00	0.00	0.09
	15	9.69C	0.00	0.00	0.07	0.00	0.05	@ 0.000		@ 0.630
175	15	8.90C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.04
	20	8.90C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.440
176	20	8.90C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
	23	8.90C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
181	39	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
183	47	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
186	60	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	63	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
187	63	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
190	76	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	79	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
191	79	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
194	92	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	95	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
195	95	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
198	108	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	111	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
199	111	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.36C	0.00	0.00	-1.07	0.00	0.00	0.00		0.18
	10	10.36C	0.00	0.00	-1.07	0.00	-0.43	@ 0.000		@ 0.232
204	10	9.56C	0.00	0.00	0.09	0.00	-0.11	0.00		0.35
	13	9.56C	0.00	0.00	0.09	0.00	-0.02	@ 0.000		@ 0.450
205	13	9.56C	0.00	0.00	0.10	0.00	-0.02	0.00		0.15
	17	9.56C	0.00	0.00	0.10	0.00	0.08	@ 0.000		@ 0.630
206	17	9.17C	0.00	0.00	-0.01	0.00	0.01	0.00		0.05
	22	9.17C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.460
207	22	9.17C	0.00	0.00	-0.01	0.00	0.00	0.00		0.00
	25	9.17C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.000
208	25	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
209	30	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
210	33	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
211	38	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
212	41	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
213	46	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
214	49	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
215	54	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
216	57	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
217	62	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.60C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
219	69	5.60C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
220	73	4.83C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.83C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
221	78	4.83C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.83C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
224	89	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
228	105	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.19C	0.00	1.59	-0.59	0.00	0.00	0.00		0.27
	2	10.19C	0.00	1.59	-0.59	0.63	-0.24	@ 0.000		@ 0.232
111	2	9.86C	0.12	0.95	0.06	-0.95	-0.08	0.00		2.49
	5	9.86C	-0.12	0.95	0.06	0.00	-0.02	@ 0.000		@ 0.420
112	5	9.86C	0.12	0.95	0.07	0.00	-0.02	0.00		2.50
	12	9.86C	-0.12	0.95	0.07	0.95	0.05	@ 0.000		@ 0.580
113	12	9.07C	0.08	0.55	-0.01	-0.51	0.01	0.00	0.01	1.25
	16	9.07C	-0.08	0.55	-0.01	0.04	0.01	@ 0.000	@ 0.000	@ 0.410
114	16	9.07C	0.08	0.55	-0.02	-0.03	0.00	0.00	0.00	1.31
	19	9.07C	-0.08	0.55	-0.02	0.52	-0.02	@ 0.000	@ 0.000	@ 0.580
115	19	8.65C	0.04	0.27	-0.01	-0.26	0.01	0.00	0.00	0.69
	24	8.65C	-0.04	0.27	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
116	24	8.65C	0.04	0.27	-0.01	0.00	0.00	0.00	0.00	0.73
	27	8.65C	-0.04	0.27	-0.01	0.27	-0.01	@ 0.000	@ 0.000	@ 0.580
117	27	7.88C	0.02	0.16	-0.01	-0.15	0.01	0.00	0.00	0.36
	32	7.88C	-0.02	0.16	-0.01	0.01	0.00	@ 0.000	@ 0.000	@ 0.410
118	32	7.88C	0.02	0.16	-0.01	-0.01	0.00	0.00	0.00	0.38
	35	7.88C	-0.02	0.16	-0.01	0.15	-0.01	@ 0.000	@ 0.000	@ 0.580
119	35	7.58C	0.01	0.08	-0.01	-0.08	0.01	0.00	0.00	0.20
	40	7.58C	-0.01	0.08	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
120	40	7.58C	0.01	0.08	-0.01	0.00	0.00	0.00	0.00	0.21
	43	7.58C	-0.01	0.08	-0.01	0.08	-0.01	@ 0.000	@ 0.000	@ 0.580

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Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
121	43	6.89C	0.01	0.05	-0.01	-0.04	0.01	0.00	0.00	0.10
	48	6.89C	-0.01	0.05	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
122	48	6.89C	0.01	0.04	-0.01	0.00	0.00	0.00	0.00	0.11
	51	6.89C	-0.01	0.04	-0.01	0.04	-0.01	@ 0.000	@ 0.000	@ 0.580
123	51	6.53C	0.00	0.02	-0.01	-0.02	0.01	0.00	0.00	0.06
	56	6.53C	0.00	0.02	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
124	56	6.53C	0.00	0.02	-0.01	0.00	0.00	0.00	0.00	0.06
	59	6.53C	0.00	0.02	-0.01	0.02	-0.01	@ 0.000	@ 0.000	@ 0.570
125	59	5.81C	0.00	0.01	-0.01	-0.01	0.01	0.00	0.00	0.03
	64	5.81C	0.00	0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
126	64	5.81C	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.03
	68	5.81C	0.00	0.01	-0.01	0.01	-0.01	@ 0.000	@ 0.000	@ 0.570
127	68	5.42C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	72	5.42C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
128	72	5.42C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	75	5.42C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.570
129	75	4.67C	0.00	-0.01	-0.01	0.01	0.01	0.00	0.00	0.02
	80	4.67C	0.00	-0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
130	80	4.67C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.02
	83	4.67C	0.00	-0.01	0.00	-0.01	-0.01	@ 0.000	@ 0.000	@ 0.580
131	83	4.24C	0.00	-0.02	-0.01	0.02	0.01	0.00	0.00	0.05
	88	4.24C	0.00	-0.02	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
132	88	4.24C	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	0.04
	91	4.24C	0.00	-0.02	-0.01	-0.02	-0.01	@ 0.000	@ 0.000	@ 0.580
133	91	3.18C	-0.01	-0.04	-0.01	0.03	0.01	0.00	0.00	0.09
	96	3.18C	0.01	-0.04	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
134	96	3.18C	-0.01	-0.04	0.00	0.00	0.00	0.00	0.00	0.08
	99	3.18C	0.01	-0.04	0.00	-0.03	-0.01	@ 0.000	@ 0.000	@ 0.590
135	99	2.71C	-0.01	-0.06	0.00	0.06	0.00	0.00	0.00	0.16
	104	2.71C	0.01	-0.06	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
136	104	2.71C	-0.01	-0.06	0.00	0.00	0.00	0.00	0.00	0.15
	107	2.71C	0.01	-0.06	0.00	-0.06	0.00	@ 0.000	@ 0.000	@ 0.580
137	107	1.58C	-0.02	-0.12	0.00	0.11	0.00	0.00	0.00	0.29
	112	1.58C	0.02	-0.12	0.00	-0.01	0.00	@ 0.000	@ 0.000	@ 0.420
138	112	1.58C	-0.02	-0.12	0.00	0.01	0.00	0.00	0.00	0.27
	115	1.58C	0.02	-0.12	0.00	-0.11	0.00	@ 0.000	@ 0.000	@ 0.590
139	115	0.98C	-0.03	-0.20	0.00	0.20	0.00	0.00	0.00	0.52
	120	0.98C	0.03	-0.20	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
140	120	0.98C	-0.03	-0.20	0.00	0.00	0.00	0.00	0.00	0.53
	123	0.98C	0.03	-0.20	0.00	-0.20	0.00	@ 0.000	@ 0.000	@ 0.580
141	3	12.22C	0.00	1.58	-1.08	0.00	0.00	0.00	0.00	0.27
	4	12.22C	0.00	1.58	-1.08	0.63	-0.43	@ 0.000		@ 0.232
142	4	10.58C	0.12	1.04	0.09	-0.97	-0.12	0.00	0.01	2.41
	8	10.58C	-0.12	1.04	0.09	0.07	-0.02	@ 0.000	@ 0.000	@ 0.410
143	8	10.58C	0.12	1.04	0.10	-0.06	-0.02	0.00		2.42
	14	10.58C	-0.12	1.04	0.10	0.98	0.08	@ 0.000		@ 0.590
144	14	9.40C	0.08	0.50	-0.01	-0.49	0.02	0.00		1.28
	18	9.40C	-0.08	0.50	-0.01	0.01	0.00	@ 0.000		@ 0.420
145	18	9.40C	0.08	0.50	-0.02	0.01	0.00	0.00		1.35
	21	9.40C	-0.08	0.50	-0.02	0.51	-0.01	@ 0.000		@ 0.580
146	21	8.43C	0.04	0.30	-0.01	-0.27	0.01	0.00	0.00	0.67
	26	8.43C	-0.04	0.30	-0.01	0.02	0.00	@ 0.000	@ 0.000	@ 0.410
147	26	8.43C	0.04	0.29	-0.02	-0.01	0.00	0.00	0.00	0.71
	29	8.43C	-0.04	0.29	-0.02	0.28	-0.01	@ 0.000	@ 0.000	@ 0.580
148	29	8.06C	0.02	0.14	-0.01	-0.14	0.01	0.00	0.00	0.37
	34	8.06C	-0.02	0.14	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
149	34	8.06C	0.02	0.14	-0.01	0.00	0.00	0.00	0.00	0.39
	37	8.06C	-0.02	0.14	-0.01	0.15	-0.01	@ 0.000	@ 0.000	@ 0.580
150	37	7.24C	0.01	0.09	-0.01	-0.08	0.01	0.00	0.00	0.19
	42	7.24C	-0.01	0.09	-0.01	0.01	0.00	@ 0.000	@ 0.000	@ 0.410
151	42	7.24C	0.01	0.09	-0.01	0.00	0.00	0.00	0.00	0.20
	45	7.24C	-0.01	0.09	-0.01	0.08	-0.01	@ 0.000	@ 0.000	@ 0.580
152	45	6.87C	0.01	0.04	-0.01	-0.04	0.01	0.00	0.00	0.11
	50	6.87C	-0.01	0.04	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
153	50	6.87C	0.01	0.04	-0.01	0.00	0.00	0.00	0.00	0.11
	53	6.87C	-0.01	0.04	-0.01	0.04	-0.01	@ 0.000	@ 0.000	@ 0.580
154	53	6.05C	0.00	0.02	-0.01	-0.02	0.01	0.00	0.00	0.05
	58	6.05C	0.00	0.02	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
155	58	6.05C	0.00	0.02	-0.01	0.00	0.00	0.00	0.00	0.06
	61	6.05C	0.00	0.02	-0.01	0.02	-0.01	@ 0.000	@ 0.000	@ 0.580
156	61	5.68C	0.00	0.01	-0.01	-0.01	0.01	0.00	0.00	0.03
	66	5.68C	0.00	0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
157	66	5.68C	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.03
	70	5.68C	0.00	0.01	-0.01	0.01	-0.01	@ 0.000	@ 0.000	@ 0.580
158	70	4.86C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	74	4.86C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.430

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
159	74	4.86C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	77	4.86C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.590
160	77	4.49C	0.00	-0.01	-0.01	0.01	0.01	0.00	0.00	0.02
	82	4.49C	0.00	-0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
161	82	4.49C	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.02
	85	4.49C	0.00	-0.01	-0.01	-0.01	-0.01	@ 0.000	@ 0.000	@ 0.580
162	85	3.38C	0.00	-0.02	0.00	0.02	0.00	0.00	0.00	0.05
	90	3.38C	0.00	-0.02	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
163	90	3.38C	0.00	-0.02	-0.01	0.00	0.00	0.00	0.00	0.04
	93	3.38C	0.00	-0.02	-0.01	-0.02	-0.01	@ 0.000	@ 0.000	@ 0.590
164	93	2.99C	-0.01	-0.03	0.00	0.03	0.00	0.00	0.00	0.09
	98	2.99C	0.01	-0.03	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
165	98	2.99C	-0.01	-0.03	0.00	0.00	0.00	0.00	0.00	0.08
	101	2.99C	0.01	-0.03	0.00	-0.03	0.00	@ 0.000	@ 0.000	@ 0.580
166	101	1.88C	-0.01	-0.07	0.00	0.06	0.00	0.00	0.00	0.16
	106	1.88C	0.01	-0.07	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
167	106	1.88C	-0.01	-0.07	0.00	0.01	0.00	0.00	0.00	0.15
	109	1.88C	0.01	-0.07	0.00	-0.06	0.00	@ 0.000	@ 0.000	@ 0.590
168	109	1.49C	-0.02	-0.11	0.00	0.11	0.00	0.00	0.00	0.29
	114	1.49C	0.02	-0.11	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
169	114	1.49C	-0.02	-0.11	0.00	0.00	0.00	0.00	0.00	0.28
	117	1.49C	0.02	-0.11	0.00	-0.11	0.00	@ 0.000	@ 0.000	@ 0.580
170	117	0.38C	-0.03	-0.22	0.00	0.21	0.00	0.00	0.00	0.51
	122	0.38C	0.03	-0.22	0.00	-0.02	0.00	@ 0.000	@ 0.000	@ 0.410
171	122	0.38C	-0.03	-0.22	0.00	0.01	0.00	0.00	0.00	0.52
	125	0.38C	0.03	-0.22	0.00	-0.21	0.00	@ 0.000	@ 0.000	@ 0.590
172	6	10.34C	0.00	0.20	-0.59	0.00	0.00	0.00		0.10
	7	10.34C	0.00	0.20	-0.59	0.08	-0.24	@ 0.000		@ 0.232
173	7	10.09C	0.12	-0.01	0.06	0.01	-0.08	0.00	0.00	0.25
	11	10.09C	-0.12	-0.01	0.06	0.00	-0.02	@ 0.000	@ 0.000	@ 0.450
174	11	10.09C	0.12	-0.01	0.07	0.00	-0.02	0.00	0.00	0.09
	15	10.09C	-0.12	-0.01	0.07	-0.01	0.05	@ 0.000	@ 0.000	@ 0.630
175	15	9.24C	0.08	-0.05	-0.01	0.02	0.01	0.00	0.00	0.06
	20	9.24C	-0.08	-0.05	-0.01	-0.04	0.00	@ 0.000	@ 0.000	@ 0.660
176	20	9.24C	0.08	-0.05	-0.01	0.03	0.00	0.00	0.00	0.06
	23	9.24C	-0.08	-0.05	-0.01	-0.02	0.00	@ 0.000	@ 0.000	@ 0.350
177	23	8.84C	0.04	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	28	8.84C	-0.04	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
178	28	8.84C	0.04	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	31	8.84C	-0.04	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
179	31	7.99C	0.02	-0.02	-0.01	0.01	0.01	0.00	0.00	0.02
	36	7.99C	-0.02	-0.02	-0.01	-0.01	0.00	@ 0.000	@ 0.000	@ 0.560
180	36	7.99C	0.02	-0.01	-0.01	0.01	0.00	0.00	0.00	0.02
	39	7.99C	-0.02	-0.01	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.440
181	39	7.60C	0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	44	7.60C	-0.01	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
182	44	7.60C	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	47	7.60C	-0.01	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
183	47	6.75C	0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	52	6.75C	-0.01	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
184	52	6.75C	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	55	6.75C	-0.01	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.570
185	55	6.35C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	60	6.35C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
186	60	6.35C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	63	6.35C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
187	63	5.51C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	67	5.51C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
188	67	5.51C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	71	5.51C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.590
189	71	5.11C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	76	5.11C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
190	76	5.11C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	79	5.11C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
191	79	4.26C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	84	4.26C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
192	84	4.26C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	87	4.26C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.590
193	87	3.84C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	92	3.84C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
194	92	3.84C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	95	3.84C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
195	95	2.71C	-0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	100	2.71C	0.01	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
196	100	2.71C	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	103	2.71C	0.01	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
197	103	2.29C	-0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	108	2.29C	0.01	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
198	108	2.29C	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	111	2.29C	0.01	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
199	111	1.16C	-0.02	0.01	-0.01	0.00	0.01	0.00	0.00	0.02
	116	1.16C	0.02	0.01	-0.01	0.01	0.00	@ 0.000	@ 0.000	@ 0.520
200	116	1.16C	-0.02	0.01	-0.01	-0.01	0.00	0.00	0.00	0.02
	119	1.16C	0.02	0.01	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.480
201	119	0.74C	-0.03	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	124	0.74C	0.03	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
202	124	0.74C	-0.03	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	127	0.74C	0.03	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.570
203	9	10.66C	0.00	0.22	-1.07	0.00	0.00	0.00		0.18
	10	10.66C	0.00	0.22	-1.07	0.09	-0.43	@ 0.000		@ 0.232
204	10	9.96C	0.12	-0.10	0.09	0.04	-0.11	0.00	0.00	0.35
	13	9.96C	-0.12	-0.10	0.09	-0.06	-0.02	@ 0.000	@ 0.000	@ 0.450
205	13	9.96C	0.12	-0.11	0.10	0.07	-0.02	0.00	0.00	0.15
	17	9.96C	-0.12	-0.11	0.10	-0.04	0.08	@ 0.000	@ 0.000	@ 0.630
206	17	9.53C	0.08	0.00	-0.01	0.00	0.01	0.00	0.00	0.05
	22	9.53C	-0.08	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.460
207	22	9.53C	0.08	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	25	9.53C	-0.08	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
208	25	8.73C	0.04	-0.03	-0.01	0.01	0.01	0.00	0.00	0.03
	30	8.73C	-0.04	-0.03	-0.01	-0.02	0.00	@ 0.000	@ 0.000	@ 0.630
209	30	8.73C	0.04	-0.03	0.00	0.02	0.00	0.00	0.00	0.03
	33	8.73C	-0.04	-0.03	0.00	-0.01	-0.01	@ 0.000	@ 0.000	@ 0.380
210	33	8.28C	0.02	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	38	8.28C	-0.02	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
211	38	8.28C	0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	41	8.28C	-0.02	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
212	41	7.48C	0.01	-0.01	-0.01	0.00	0.01	0.00	0.00	0.02
	46	7.48C	-0.01	-0.01	-0.01	-0.01	0.00	@ 0.000	@ 0.000	@ 0.450
213	46	7.48C	0.01	-0.01	-0.01	0.01	0.00	0.00	0.00	0.02
	49	7.48C	-0.01	-0.01	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.520
214	49	7.03C	0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	54	7.03C	-0.01	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
215	54	7.03C	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	57	7.03C	-0.01	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
216	57	6.23C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	62	6.23C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
217	62	6.23C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	65	6.23C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.560
218	65	5.78C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	69	5.78C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
219	69	5.78C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	73	5.78C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
220	73	4.99C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	78	4.99C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.410
221	78	4.99C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02
	81	4.99C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.570
222	81	4.54C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.02
	86	4.54C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
223	86	4.54C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.01
	89	4.54C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
224	89	3.46C	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.01
	94	3.46C	0.00	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
225	94	3.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	97	3.46C	0.00	0.00	0.00	0.00	-0.01	@ 0.000	@ 0.000	@ 0.560
226	97	3.00C	-0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.01
	102	3.00C	0.01	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.420
227	102	3.00C	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.01
	105	3.00C	0.01	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
228	105	1.92C	-0.01	0.01	-0.01	0.00	0.01	0.00	0.00	0.02
	110	1.92C	0.01	0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.450
229	110	1.92C	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
	113	1.92C	0.01	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.530
230	113	1.46C	-0.02	0.00	-0.01	0.00	0.01	0.00	0.00	0.01
	118	1.46C	0.02	0.00	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
231	118	1.46C	-0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.01
	121	1.46C	0.02	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.580
232	121	0.38C	-0.03	0.02	-0.01	-0.01	0.01	0.00	0.00	0.02
	126	0.38C	0.03	0.02	-0.01	0.01	0.00	@ 0.000	@ 0.000	@ 0.610
233	126	0.38C	-0.03	0.02	-0.01	-0.01	0.00	0.00	0.00	0.03
	128	0.38C	0.03	0.02	-0.01	0.01	-0.01	@ 0.000	@ 0.000	@ 0.410

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Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	7.57C	0.00	0.00	0.03	0.00	0.00			0.08
	2	7.57C	0.00	0.00	0.03	0.00	0.01			@ 0.232
111	2	8.10C	0.00	0.00	-0.01	0.00	0.01			0.21
	5	8.10C	0.00	0.00	-0.01	0.00	0.00			@ 0.450
112	5	8.10C	0.00	0.00	-0.01	0.00	0.00			0.07
	12	8.10C	0.00	0.00	-0.01	0.00	-0.01			@ 0.630
113	12	8.23C	0.00	0.00	0.00	0.00	0.01			0.03
	16	8.23C	0.00	0.00	0.00	0.00	0.00			@ 0.480
114	16	8.23C	0.00	0.00	-0.01	0.00	0.00			0.00
	19	8.23C	0.00	0.00	-0.01	0.00	0.00			@ 0.000
115	19	8.31C	0.00	0.00	0.00	0.00	0.00			0.00
	24	8.31C	0.00	0.00	0.00	0.00	0.00			@ 0.000
116	24	8.31C	0.00	0.00	0.00	0.00	0.00			0.00
	27	8.31C	0.00	0.00	0.00	0.00	0.00			@ 0.000
117	27	7.82C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	32	7.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
118	32	7.82C	0.00	0.00	0.00	0.00	0.00			0.00
	35	7.82C	0.00	0.00	0.00	0.00	0.00			@ 0.000
119	35	7.46C	0.00	0.00	0.00	0.00	0.00			0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00			@ 0.000
120	40	7.46C	0.00	0.00	0.00	0.00	0.00			0.00
	43	7.46C	0.00	0.00	0.00	0.00	0.00			@ 0.000
121	43	6.69C	0.00	0.00	0.00	0.00	0.00			0.00
	48	6.69C	0.00	0.00	0.00	0.00	0.00			@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
124	56	6.27C	0.00	0.00	0.00	0.00	0.00			0.00
	59	6.27C	0.00	0.00	0.00	0.00	0.00			@ 0.000
125	59	5.50C	0.00	0.00	0.00	0.00	0.00			0.00
	64	5.50C	0.00	0.00	0.00	0.00	0.00			@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
127	68	5.09C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	72	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
128	72	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
129	75	4.32C	0.00	0.00	0.00	0.00	0.00			0.00
	80	4.32C	0.00	0.00	0.00	0.00	0.00			@ 0.000
130	80	4.32C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	83	4.32C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
131	83	3.88C	0.00	0.00	0.00	0.00	0.00			0.00
	88	3.88C	0.00	0.00	0.00	0.00	0.00			@ 0.000
132	88	3.88C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	91	3.88C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
133	91	2.82C	0.00	0.00	0.00	0.00	0.00			0.00
	96	2.82C	0.00	0.00	0.00	0.00	0.00			@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
136	104	2.38C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	107	2.38C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
137	107	1.33C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	112	1.33C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
138	112	1.33C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
141	3	10.17C	0.00	0.00	-0.02	0.00	0.00			0.15
	4	10.17C	0.00	0.00	-0.02	0.00	-0.01			@ 0.232
142	4	9.64C	0.00	0.00	0.00	0.00	0.01			0.30
	8	9.64C	0.00	0.00	0.00	0.00	0.01			@ 0.440
143	8	9.64C	0.00	0.00	-0.02	0.00	0.01			0.12
	14	9.64C	0.00	0.00	-0.02	0.00	-0.01			@ 0.620
144	14	9.24C	0.00	0.00	-0.01	0.00	0.01			0.04
	18	9.24C	0.00	0.00	-0.01	0.00	0.00			@ 0.460
145	18	9.24C	0.00	0.00	-0.01	0.00	0.00			0.00
	21	9.24C	0.00	0.00	-0.01	0.00	-0.01			@ 0.000
146	21	8.12C	0.00	0.00	0.00	0.00	0.00			0.00
	26	8.12C	0.00	0.00	0.00	0.00	0.00			@ 0.000
147	26	8.12C	0.00	0.00	0.00	0.00	0.00			0.00
	29	8.12C	0.00	0.00	0.00	0.00	0.00			@ 0.000

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Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
148	29	7.53C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	34	7.53C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
149	34	7.53C	0.00	0.00	0.00	0.00	0.00			0.00
	37	7.53C	0.00	0.00	0.00	0.00	0.00			@ 0.000
150	37	6.61C	0.00	0.00	0.00	0.00	0.00			0.00
	42	6.61C	0.00	0.00	0.00	0.00	0.00			@ 0.000
151	42	6.61C	0.00	0.00	0.00	0.00	0.00			0.00
	45	6.61C	0.00	0.00	0.00	0.00	0.00			@ 0.000
152	45	6.19C	0.00	0.00	0.00	0.00	0.00			0.00
	50	6.19C	0.00	0.00	0.00	0.00	0.00			@ 0.000
153	50	6.19C	0.00	0.00	0.00	0.00	0.00			0.00
	53	6.19C	0.00	0.00	0.00	0.00	0.00			@ 0.000
154	53	5.36C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	58	5.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
155	58	5.36C	0.00	0.00	0.00	0.00	0.00			0.00
	61	5.36C	0.00	0.00	0.00	0.00	0.00			@ 0.000
156	61	5.00C	0.00	0.00	0.00	0.00	0.00			0.00
	66	5.00C	0.00	0.00	0.00	0.00	0.00			@ 0.000
157	66	5.00C	0.00	0.00	0.00	0.00	0.00			0.00
	70	5.00C	0.00	0.00	0.00	0.00	0.00			@ 0.000
158	70	4.20C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	74	4.20C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
159	74	4.20C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	77	4.20C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
160	77	3.86C	0.00	0.00	0.00	0.00	0.00			0.00
	82	3.86C	0.00	0.00	0.00	0.00	0.00			@ 0.000
161	82	3.86C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	85	3.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
162	85	2.79C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	90	2.79C	0.00	0.00	0.00	0.00	0.00		@ 0.000	@ 0.000
163	90	2.79C	0.00	0.00	0.00	0.00	0.00			0.00
	93	2.79C	0.00	0.00	0.00	0.00	0.00			@ 0.000
164	93	2.45C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	98	2.45C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
165	98	2.45C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	101	2.45C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
166	101	1.41C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	106	1.41C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000

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				x-x	y-y	x-x	y-y	x-x	y-y	
167	106	1.41C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	109	1.41C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
168	109	1.14C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	114	1.14C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
169	114	1.14C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	117	1.14C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
170	117	0.24C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	122	0.24C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
171	122	0.24C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	125	0.24C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
172	6	10.08C	0.00	0.00	0.02	0.00	0.00			0.03
	7	10.08C	0.00	0.00	0.02	0.00	0.01			@ 0.232
173	7	9.69C	0.00	0.00	0.00	0.00	0.00			0.03
	11	9.69C	0.00	0.00	0.00	0.00	0.00			@ 0.430
174	11	9.69C	0.00	0.00	0.00	0.00	0.00			0.02
	15	9.69C	0.00	0.00	0.00	0.00	0.00			@ 0.580
175	15	8.89C	0.00	0.00	0.00	0.00	0.00			0.03
	20	8.89C	0.00	0.00	0.00	0.00	0.00			@ 0.440
176	20	8.89C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	23	8.89C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
177	23	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.52C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
178	28	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.52C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
179	31	7.70C	0.00	0.00	0.00	0.00	0.00			0.00
	36	7.70C	0.00	0.00	0.00	0.00	0.00			@ 0.000
180	36	7.70C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	39	7.70C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
181	39	7.33C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	44	7.33C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
182	44	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.33C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
183	47	6.51C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	52	6.51C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000

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				x-x	y-y	x-x	y-y	x-x	y-y	
186	60	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	63	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
187	63	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
189	71	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
190	76	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	79	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
191	79	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
194	92	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	95	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
195	95	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
198	108	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	111	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
199	111	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.00	0.00	0.00	0.00			@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00			@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
203	9	10.34C	0.00	0.00	-0.03	0.00	0.00			0.03
	10	10.34C	0.00	0.00	-0.03	0.00	-0.01			@ 0.232
204	10	9.56C	0.00	0.00	-0.01	0.00	0.00			0.07
	13	9.56C	0.00	0.00	-0.01	0.00	0.00			@ 0.700

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
205	13	9.56C	0.00	0.00	0.01	0.00	0.00			0.07
	17	9.56C	0.00	0.00	0.01	0.00	0.00			@ 0.310
206	17	9.17C	0.00	0.00	0.00	0.00	0.00	0.00		0.01
	22	9.17C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.420
207	22	9.17C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	25	9.17C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
208	25	8.40C	0.00	0.00	0.00	0.00	0.00			0.00
	30	8.40C	0.00	0.00	0.00	0.00	0.00			@ 0.000
209	30	8.40C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	33	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
210	33	7.98C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	38	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
211	38	7.98C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	41	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
212	41	7.21C	0.00	0.00	0.00	0.00	0.00			0.00
	46	7.21C	0.00	0.00	0.00	0.00	0.00			@ 0.000
213	46	7.21C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	49	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
214	49	6.79C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	54	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
215	54	6.79C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	57	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
216	57	6.02C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	62	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
217	62	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.60C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	69	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
219	69	5.60C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	73	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
220	73	4.83C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	78	4.83C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
221	78	4.83C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.83C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	86	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000

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Made by : IH

Date : 29 June 2017 / Ver. 2016.10

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Approved :

Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
224	89	3.36C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	94	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	102	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
228	105	1.86C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	110	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	118	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00			0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00			@ 0.000
233	126	0.36C	0.00	0.00	0.00	0.00	0.00		0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Support Reactions Serviceability (001 : IS - Dead Live)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	12.905	0.000	0.000	0.000	0.000
3	0.000	13.063	0.000	0.000	0.000	0.000
6	0.000	12.463	0.000	0.000	0.000	0.000
9	0.000	12.975	0.000	0.000	0.000	0.000
Total	0.000	51.407	0.000	0.000	0.000	0.000

Support Reactions Serviceability (002 : IS - Dead Live W1)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	-0.202	12.589	0.000	0.000	0.000	0.000
3	-0.200	13.362	0.000	0.000	0.000	0.000
6	-0.025	12.464	0.000	0.000	0.000	0.000
9	-0.028	12.985	0.000	0.000	0.000	0.000
Total	-6.878	51.400	0.012	0.000	0.000	0.085

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Support Reactions Serviceability (003 : IS - Dead Live W2)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	12.891	-0.075	0.000	0.000	0.000
3	0.000	13.044	-0.139	0.000	0.000	0.000
6	0.000	12.473	-0.075	0.000	0.000	0.000
9	0.000	12.989	-0.138	0.000	0.000	0.000
Total	0.000	51.397	-10.484	-0.070	0.000	0.000

Support Reactions Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	-0.157	12.656	0.000	0.000	0.000	0.000
3	-0.157	13.303	0.000	0.000	0.000	0.000
6	-0.057	12.449	0.000	0.000	0.000	0.000
9	-0.060	12.992	0.000	0.000	0.000	0.000
Total	-4.800	51.400	0.006	0.000	0.000	0.051

Support Reactions Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	-1.030	8.561	0.018	0.000	0.000	0.000
3	-1.013	11.667	-0.018	0.000	0.000	0.000
6	-0.127	10.145	0.013	0.000	0.000	0.000
9	-0.141	10.437	-0.020	0.000	0.000	0.000
Total	-34.391	40.810	-0.013	0.000	0.000	0.456

Support Reactions Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	10.206	-0.376	0.000	0.000	0.000
3	0.000	10.213	-0.696	0.000	0.000	0.000
6	0.000	10.064	-0.376	0.000	0.000	0.000
9	0.000	10.324	-0.690	0.000	0.000	0.000
Total	0.000	40.807	-52.428	-0.272	0.000	0.000

S-Mech Consulting Engineering

7 Windsor Road, Chorley, Lancashire, PR7 1LN

Tel 01257 367 580 email info@s-mech.co.uk www.s-mech.co.uk

Project Ref : 1502

Engineer : IH

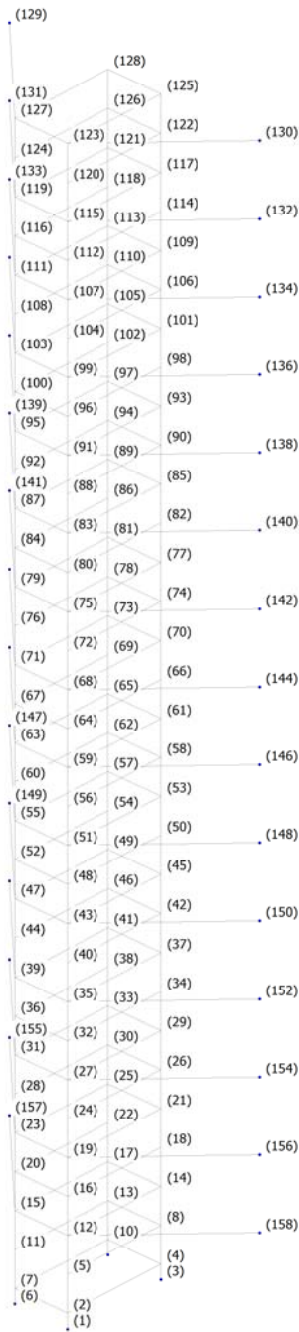
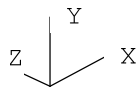
Date : June 2017

Checked : IH

Approved : IH

Appendix D – Short Face Parallel Output

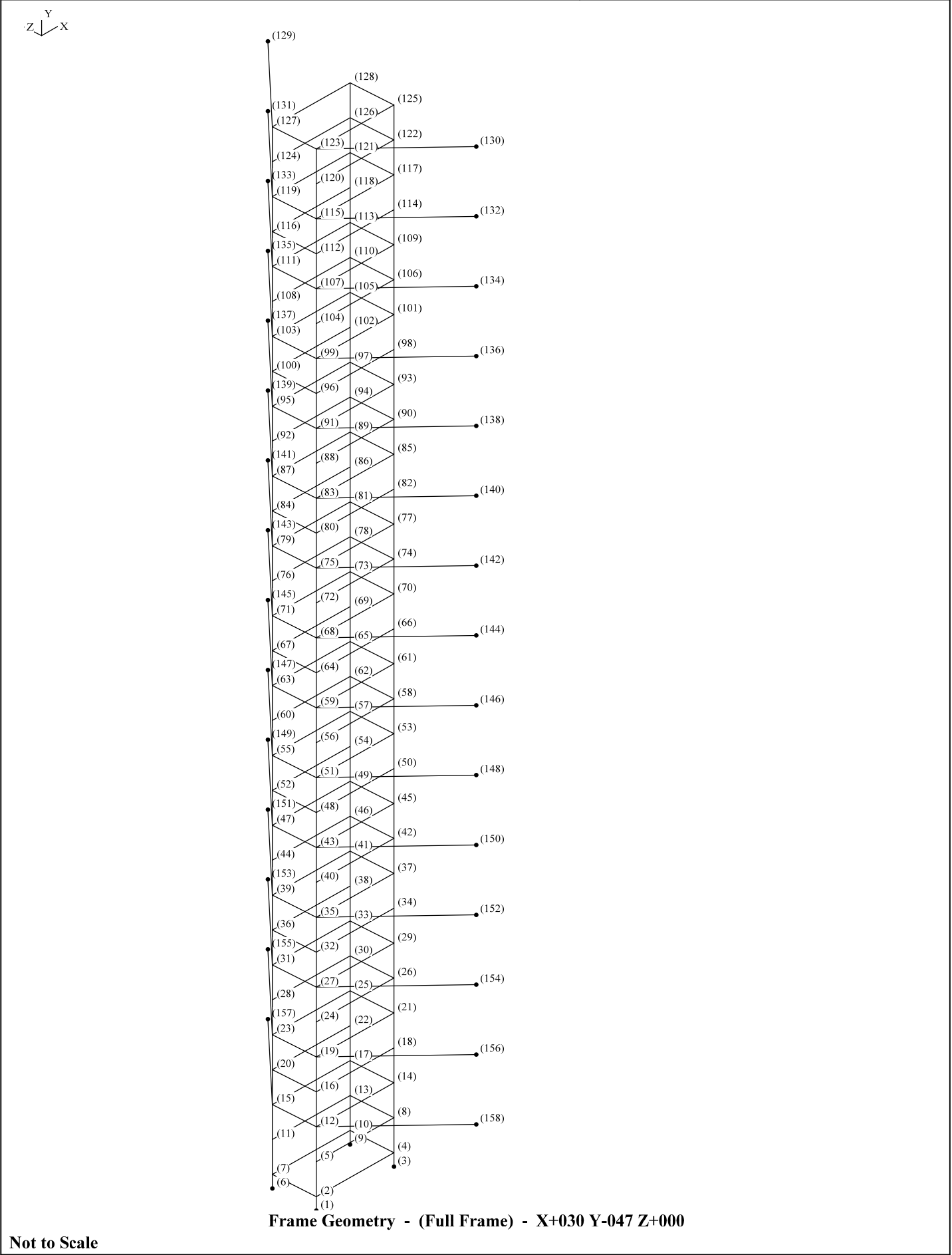
S-Mech Ltd Suite 9 Railway House, Railway Road Chorley, Lancs, PR6 0HW Tel: 01257 367580 Email: info@s-mech.co.uk	12385 Job Ref : 1502 Sheet : Stair Tower LFP / Made by : IH Date : 29 June 2017 / Ver. 2016.10 Checked : IH Approved :
--	---



Frame Geometry - (Full Frame) - X+030 Y-047 Z+000

Not to Scale

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MasterFrame Data File

Loading Cases and Load Combination

Load Group Labels

Load Group UT	Unity Load Factor (All Cases)
Load Group D1	Dead Load
Load Group L1	Live Load
Load Group W1	Wind Load
Load Group W2	Wind Load
Load Group H1	Live Load

Load Case 001 : IS - Dead Live

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 002 : IS - Dead Live W1

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1 + 0.20 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 003 : IS - Dead Live W2

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1 + 0.20 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 004 : IS - Dead Live + 0.3 NHF

Load Combination	+ 1.00 UT + 1.00 D1 + 1.00 L1 + 1.00 H1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 005 : OOS - Dead + 0.25 Live + Unit W1

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.00 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 006 : OOS - Dead + 0.25 Live + Unit W2

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.00 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.25 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.25 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.50 W1
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

Load Case 010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2

Load Combination	+ 1.00 UT + 1.00 D1 + 0.25 L1 + 1.50 W2
Second Order Analysis	P-Delta Analysis using the Newton-Raphson Method

The Nodal Co-ordinates

Node	X (m)	Y (m)	Z (m)	Node	X (m)	Y (m)	Z (m)
1	0.000	0.000	3.000	2	0.000	0.400	3.000
3	3.000	0.000	3.000	4	3.000	0.400	3.000
5	0.000	1.400	3.000	6	0.000	0.000	4.600
7	0.000	0.400	4.600	8	3.000	1.400	3.000
9	3.000	0.000	4.600	10	3.000	0.400	4.600
11	0.000	1.400	4.600	12	0.000	2.400	3.000
13	3.000	1.400	4.600	14	3.000	2.400	3.000
15	0.000	2.400	4.600	16	0.000	3.400	3.000
17	3.000	2.400	4.600	18	3.000	3.400	3.000
19	0.000	4.400	3.000	20	0.000	3.400	4.600

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Suite 9**Railway House, Railway Road****Chorley, Lancs, PR6 0HW****Tel: 01257 367580 Email: info@s-mech.co.uk****Job Ref : 1502****Sheet : Stair Tower LFP /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :**

21	3.000	4.400	3.000	22	3.000	3.400	4.600
23	0.000	4.400	4.600	24	0.000	5.400	3.000
25	3.000	4.400	4.600	26	3.000	5.400	3.000
27	0.000	6.400	3.000	28	0.000	5.400	4.600
29	3.000	6.400	3.000	30	3.000	5.400	4.600
31	0.000	6.400	4.600	32	0.000	7.400	3.000
33	3.000	6.400	4.600	34	3.000	7.400	3.000
35	0.000	8.400	3.000	36	0.000	7.400	4.600
37	3.000	8.400	3.000	38	3.000	7.400	4.600
39	0.000	8.400	4.600	40	0.000	9.400	3.000
41	3.000	8.400	4.600	42	3.000	9.400	3.000
43	0.000	10.400	3.000	44	0.000	9.400	4.600
45	3.000	10.400	3.000	46	3.000	9.400	4.600
47	0.000	10.400	4.600	48	0.000	11.400	3.000
49	3.000	10.400	4.600	50	3.000	11.400	3.000
51	0.000	12.400	3.000	52	0.000	11.400	4.600
53	3.000	12.400	3.000	54	3.000	11.400	4.600
55	0.000	12.400	4.600	56	0.000	13.400	3.000
57	3.000	12.400	4.600	58	3.000	13.400	3.000
59	0.000	14.400	3.000	60	0.000	13.400	4.600
61	3.000	14.400	3.000	62	3.000	13.400	4.600
63	0.000	14.400	4.600	64	0.000	15.400	3.000
65	3.000	14.400	4.600	66	3.000	15.400	3.000
67	0.000	15.400	4.600	68	0.000	16.400	3.000
69	3.000	15.400	4.600	70	3.000	16.400	3.000
71	0.000	16.400	4.600	72	0.000	17.400	3.000
73	3.000	16.400	4.600	74	3.000	17.400	3.000
75	0.000	18.400	3.000	76	0.000	17.400	4.600
77	3.000	18.400	3.000	78	3.000	17.400	4.600
79	0.000	18.400	4.600	80	0.000	19.400	3.000
81	3.000	18.400	4.600	82	3.000	19.400	3.000
83	0.000	20.400	3.000	84	0.000	19.400	4.600
85	3.000	20.400	3.000	86	3.000	19.400	4.600
87	0.000	20.400	4.600	88	0.000	21.400	3.000
89	3.000	20.400	4.600	90	3.000	21.400	3.000
91	0.000	22.400	3.000	92	0.000	21.400	4.600
93	3.000	22.400	3.000	94	3.000	21.400	4.600
95	0.000	22.400	4.600	96	0.000	23.400	3.000
97	3.000	22.400	4.600	98	3.000	23.400	3.000
99	0.000	24.400	3.000	100	0.000	23.400	4.600
101	3.000	24.400	3.000	102	3.000	23.400	4.600
103	0.000	24.400	4.600	104	0.000	25.400	3.000
105	3.000	24.400	4.600	106	3.000	25.400	3.000
107	0.000	26.400	3.000	108	0.000	25.400	4.600
109	3.000	26.400	3.000	110	3.000	25.400	4.600
111	0.000	26.400	4.600	112	0.000	27.400	3.000
113	3.000	26.400	4.600	114	3.000	27.400	3.000
115	0.000	28.400	3.000	116	0.000	27.400	4.600
117	3.000	28.400	3.000	118	3.000	27.400	4.600
119	0.000	28.400	4.600	120	0.000	29.400	3.000
121	3.000	28.400	4.600	122	3.000	29.400	3.000
123	0.000	30.400	3.000	124	0.000	29.400	4.600
125	3.000	30.400	3.000	126	3.000	29.400	4.600
127	0.000	30.400	4.600	128	3.000	30.400	4.600
129	3.000	30.400	7.600	130	3.000	30.400	0.000
131	3.000	28.400	7.600	132	3.000	28.400	0.000
133	3.000	26.400	7.600	134	3.000	26.400	0.000
135	3.000	24.400	7.600	136	3.000	24.400	0.000
137	3.000	22.400	7.600	138	3.000	22.400	0.000
139	3.000	20.400	7.600	140	3.000	20.400	0.000
141	3.000	18.400	7.600	142	3.000	18.400	0.000
143	3.000	16.400	7.600	144	3.000	16.400	0.000
145	3.000	14.400	7.600	146	3.000	14.400	0.000
147	3.000	12.400	7.600	148	3.000	12.400	0.000
149	3.000	10.400	7.600	150	3.000	10.400	0.000
151	3.000	8.400	7.600	152	3.000	8.400	0.000
153	3.000	6.400	7.600	154	3.000	6.400	0.000
155	3.000	4.400	7.600	156	3.000	4.400	0.000

S-Mech Ltd

12385

Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

157 3.000 2.400 7.600 158 3.000 2.400 0.000

Member Properties

Members 1-32

M	LB [] E 210E6	G 81E6	
A 4.95E-4	Ix 248.6E-8	Iy 4.95E-8	J 497.2E-8

Members 33-62 and 95-109

M	GR [] E 210E6	G 81E6	
A 3.18E-4	Ix 6.55E-8	Iy 6.55E-8	J 13.09E-8

Members 63-94

M	STB [] E 210E6	G 81E6	
A 4.27E-4	Ix 11.0E-8	Iy 11.0E-8	J 22.0E-8

Members 110-263

M	Std [] E 210E6	G 81E6	
A 4.53E-4	Ix 11.59E-8	Iy 11.59E-8	J 23.17E-8

Member Loading**Member End Releases**

Symbols	End 1 torsion-minor-major	End 2 torsion-minor-major	O Released	@ Fixed
33 @OO @OO	34 @OO @OO	35 @OO @OO	36 @OO @OO	
37 @OO @OO	38 @OO @OO	39 @OO @OO	40 @OO @OO	
41 @OO @OO	42 @OO @OO	43 @OO @OO	44 @OO @OO	
45 @OO @OO	46 @OO @OO	47 @OO @OO	48 @OO @OO	
49 @OO @OO	50 @OO @OO	51 @OO @OO	52 @OO @OO	
53 @OO @OO	54 @OO @OO	55 @OO @OO	56 @OO @OO	
57 @OO @OO	58 @OO @OO	59 @OO @OO	60 @OO @OO	
61 @OO @OO	62 @OO @OO	95 @OO @OO	96 @OO @OO	
97 @OO @OO	98 @OO @OO	99 @OO @OO	100 @OO @OO	
101 @OO @OO	102 @OO @OO	103 @OO @OO	104 @OO @OO	
105 @OO @OO	106 @OO @OO	107 @OO @OO	108 @OO @OO	
109 @OO @OO	234 @OO @RR	235 @OO @RR	236 @OO @RR	
237 @OO @RR	238 @OO @RR	239 @OO @RR	240 @OO @RR	
241 @OO @RR	242 @OO @RR	243 @OO @RR	244 @OO @RR	
245 @OO @RR	246 @OO @RR	247 @OO @RR	248 @OO @RR	
249 @OO @RR	250 @OO @RR	251 @OO @RR	252 @OO @RR	
253 @OO @RR	254 @OO @RR	255 @OO @RR	256 @OO @RR	
257 @OO @RR	258 @OO @RR	259 @OO @RR	260 @OO @RR	
261 @OO @RR	262 @OO @RR	263 @OO @RR		

Nodal Loading and Support Conditions

NODE 7

D1 Ls +0000.000 -0000.290 +0000.000 +0000.000 +0000.000 +0000.000

NODE 10

D1 Ls +0000.000 -0000.650 +0000.000 +0000.000 +0000.000 +0000.000

NODE 2

D1 Ls +0000.000 -0000.430 +0000.000 +0000.000 +0000.000 +0000.000

NODE 4

D1 Ls +0000.000 -0000.680 +0000.000 +0000.000 +0000.000 +0000.000

NODES 15, 31, 47, 63, 79, 95 and 111

D1 Ls +0000.000 -0000.820 +0000.000 +0000.000 +0000.000 +0000.000

NODES 17, 33, 49, 65, 81, 97 and 113

D1 Ls +0000.000 -0000.420 +0000.000 +0000.000 +0000.000 +0000.000

NODES 12, 27, 43, 59, 75, 91 and 107

D1 Ls +0000.000 -0000.770 +0000.000 +0000.000 +0000.000 +0000.000

NODES 14, 29, 45, 61, 77, 93 and 109

D1 Ls +0000.000 -0000.370 +0000.000 +0000.000 +0000.000 +0000.000

NODES 23, 39, 55, 71, 87, 103 and 119

D1 Ls +0000.000 -0000.370 +0000.000 +0000.000 +0000.000 +0000.000

NODES 25, 41, 57, 73, 89, 105 and 121

D1 Ls +0000.000 -0000.770 +0000.000 +0000.000 +0000.000 +0000.000

S-Mech Ltd

12385

Suite 9**Railway House, Railway Road****Chorley, Lancs, PR6 0HW****Tel: 01257 367580 Email: info@s-mech.co.uk****Job Ref : 1502****Sheet : Stair Tower LFP /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :**

NODES 19, 35, 51, 68, 83, 99 and 115

D1 Ls +0000.000 -0000.420 +0000.000 +0000.000 +0000.000 +0000.000

NODES 21, 37, 53, 70, 85, 101 and 117

D1 Ls +0000.000 -0000.820 +0000.000 +0000.000 +0000.000 +0000.000

NODE 127

D1 Ls +0000.000 -0000.550 +0000.000 +0000.000 +0000.000 +0000.000

NODE 128

D1 Ls +0000.000 -0000.350 +0000.000 +0000.000 +0000.000 +0000.000

NODE 123

D1 Ls +0000.000 -0000.650 +0000.000 +0000.000 +0000.000 +0000.000

NODE 125

D1 Ls +0000.000 -0000.360 +0000.000 +0000.000 +0000.000 +0000.000

NODE 127

L1 Ls +0000.000 -0000.640 +0000.000 +0000.000 +0000.000 +0000.000

NODE 128

L1 Ls +0000.000 -0000.040 +0000.000 +0000.000 +0000.000 +0000.000

NODE 123

L1 Ls +0000.000 -0000.970 +0000.000 +0000.000 +0000.000 +0000.000

NODE 125

L1 Ls +0000.000 -0000.070 +0000.000 +0000.000 +0000.000 +0000.000

NODES 87, 103 and 119

L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000

NODES 89, 105 and 121

L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000

NODES 83, 99 and 115

L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000

NODES 85, 101 and 117

L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000

NODES 95 and 111

L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000

NODES 97 and 113

L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000

NODES 91 and 107

L1 Ls +0000.000 -0001.150 +0000.000 +0000.000 +0000.000 +0000.000

NODES 93 and 109

L1 Ls +0000.000 -0000.090 +0000.000 +0000.000 +0000.000 +0000.000

NODE 7

W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 10

W1 Ls +0000.314 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 2

W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 4

W1 Ls +0000.602 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 15, 31, 47, 63, 79, 95 and 111

W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 17, 33, 49, 65, 81, 97 and 113

W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 12, 27, 43, 59, 75, 91 and 107

W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 14, 29, 45, 61, 77, 93 and 109

W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 23, 39, 55, 71, 87, 103 and 119

W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 25, 41, 57, 73, 89, 105 and 121

W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 19, 35, 51, 68, 83, 99 and 115

W1 Ls +0000.302 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 21, 37, 53, 70, 85, 101 and 117

W1 Ls +0000.829 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 127

W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 128

W1 Ls +0000.740 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 123

W1 Ls +0000.164 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 125

S-Mech Ltd

12385

Suite 9**Railway House, Railway Road****Chorley, Lancs, PR6 0HW****Tel: 01257 367580 Email: info@s-mech.co.uk****Job Ref : 1502****Sheet : Stair Tower LFP /****Made by : IH****Date : 29 June 2017 / Ver. 2016.10****Checked : IH****Approved :**

W1 Ls +0000.412 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODE 7

W2 Ls +0000.000 +0000.000 +0000.290 +0000.000 +0000.000 +0000.000

NODE 10

W2 Ls +0000.000 +0000.000 +0000.326 +0000.000 +0000.000 +0000.000

NODE 2

W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000

NODE 4

W2 Ls +0000.000 +0000.000 +0001.182 +0000.000 +0000.000 +0000.000

NODES 15, 31, 47, 63, 79, 95 and 111

W2 Ls +0000.000 +0000.000 +0001.078 +0000.000 +0000.000 +0000.000

NODES 17, 33, 49, 65, 81, 97 and 113

W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000

NODES 12, 27, 43, 59, 75, 91 and 107

W2 Ls +0000.000 +0000.000 +0001.155 +0000.000 +0000.000 +0000.000

NODES 14, 29, 45, 61, 77, 93 and 109

W2 Ls +0000.000 +0000.000 +0000.615 +0000.000 +0000.000 +0000.000

NODES 23, 39, 55, 71, 87, 103 and 119

W2 Ls +0000.000 +0000.000 +0000.615 +0000.000 +0000.000 +0000.000

NODES 25, 41, 57, 73, 89, 105 and 121

W2 Ls +0000.000 +0000.000 +0001.155 +0000.000 +0000.000 +0000.000

NODES 19, 35, 51, 68, 83, 99 and 115

W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000

NODES 21, 37, 53, 70, 85, 101 and 117

W2 Ls +0000.000 +0000.000 +0001.078 +0000.000 +0000.000 +0000.000

NODE 127

W2 Ls +0000.000 +0000.000 +0000.676 +0000.000 +0000.000 +0000.000

NODE 128

W2 Ls +0000.000 +0000.000 +0000.537 +0000.000 +0000.000 +0000.000

NODE 123

W2 Ls +0000.000 +0000.000 +0001.017 +0000.000 +0000.000 +0000.000

NODE 125

W2 Ls +0000.000 +0000.000 +0000.473 +0000.000 +0000.000 +0000.000

NODES 4, 10, 12, 15, 21, 25, 27, 31, 37, 41, 43, 47, 53, 57, 59, 63, 70, 73, 75, 79, 85, 89, 91, 95, 101, 105, 107, 111, 117, 121, 123 and 127

H1 Ls +0000.150 +0000.000 +0000.000 +0000.000 +0000.000 +0000.000

NODES 1, 3, 6, 9 and 129-158

UT Rs 1 1 1 0 0 0 (Pinned)

NODES 14, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 61, 65, 70, 73, 77, 81, 85, 89, 93, 97, 101, 105, 109, 113, 117, 121, 125 and 128

UT Rs 1 0 1 0 0 0 (Horizontally Restraint)

NODES 2, 4, 7, 10, 12, 14-15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 68, 70-71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125 and 127-128

UT Springs 0000.000 0000.000 0000.000 0105.370 0000.000 0104.540

S-Mech Ltd

12385

Suite 9

Railway House, Railway Road

Chorley, Lancs, PR6 0HW

Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (001 : IS - Dead Live)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
5	0.00	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
8	0.00	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	-0.05	0.00	0.05	0.00	0.00	0.00	0.00
11	0.00	-0.18	0.00	0.18	0.00	0.00	0.00	0.00
12	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
13	0.00	-0.18	0.00	0.18	0.00	0.00	0.00	0.00
14	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
15	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
16	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
17	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
18	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
19	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
20	0.00	-0.43	0.00	0.43	0.00	0.00	0.00	0.00
21	0.00	-0.57	0.00	0.57	0.00	0.00	0.00	0.00
22	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
23	0.00	-0.55	0.00	0.55	0.00	0.00	0.00	0.00
24	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
25	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
26	0.00	-0.69	0.00	0.69	0.00	0.00	0.00	0.00
27	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
28	0.00	-0.66	0.00	0.66	0.00	0.00	0.00	0.00
29	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
30	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
31	0.00	-0.78	0.00	0.78	0.00	0.00	0.00	0.00
32	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
33	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
34	0.00	-0.92	0.00	0.92	0.00	0.00	0.00	0.00
35	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
36	0.00	-0.88	0.00	0.88	0.00	0.00	0.00	0.00
37	0.00	-1.03	0.00	1.03	0.00	0.00	0.00	0.00
38	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
39	0.00	-0.99	0.00	0.99	0.00	0.00	0.00	0.00
40	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
41	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
42	0.00	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
43	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
44	0.00	-1.09	0.00	1.09	0.00	0.00	0.00	0.00
45	0.00	-1.24	0.00	1.24	0.00	0.00	0.00	0.00
46	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
47	0.00	-1.20	0.00	1.20	0.00	0.00	0.00	0.00
48	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
49	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
50	0.00	-1.34	0.00	1.34	0.00	0.00	0.00	0.00
51	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
52	0.00	-1.29	0.00	1.29	0.00	0.00	0.00	0.00
53	0.00	-1.44	0.00	1.44	0.00	0.00	0.00	0.00
54	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
55	0.00	-1.39	0.00	1.39	0.00	0.00	0.00	0.00
56	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
57	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
58	0.00	-1.54	0.00	1.54	0.00	0.00	0.00	0.00

S-Mech Ltd

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Nodal Deflections Serviceability (001 : IS - Dead Live)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
59	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
60	0.00	-1.48	0.00	1.48	0.00	0.00	0.00	0.00
61	0.00	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
62	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
63	0.00	-1.57	0.00	1.57	0.00	0.00	0.00	0.00
64	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
65	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
66	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
67	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
68	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
69	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
70	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
71	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
72	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
73	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
74	0.00	-1.89	0.00	1.89	0.00	0.00	0.00	0.00
75	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
76	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
77	0.00	-1.97	0.00	1.97	0.00	0.00	0.00	0.00
78	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
79	0.00	-1.88	0.00	1.88	0.00	0.00	0.00	0.00
80	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
81	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
82	0.00	-2.04	0.00	2.04	0.00	0.00	0.00	0.00
83	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
84	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
85	0.00	-2.12	0.00	2.12	0.00	0.00	0.00	0.00
86	0.00	-2.03	0.00	2.03	0.00	0.00	0.00	0.00
87	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
88	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
89	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
90	0.00	-2.17	0.00	2.17	0.00	0.00	0.00	0.00
91	0.00	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
92	0.00	-2.09	0.00	2.09	0.00	0.00	0.00	0.00
93	0.00	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
94	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
95	0.00	-2.15	0.00	2.15	0.00	0.00	0.00	0.00
96	0.00	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
97	0.00	-2.21	0.00	2.21	0.00	0.00	0.00	0.00
98	0.00	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
99	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
100	0.00	-2.19	0.00	2.19	0.00	0.00	0.00	0.00
101	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
102	0.00	-2.26	0.00	2.26	0.00	0.00	0.00	0.00
103	0.00	-2.24	0.00	2.24	0.00	0.00	0.00	0.00
104	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
105	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
106	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
107	0.00	-2.41	0.00	2.41	0.00	0.00	0.00	0.00
108	0.00	-2.27	0.00	2.27	0.00	0.00	0.00	0.00
109	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
110	0.00	-2.34	0.00	2.34	0.00	0.00	0.00	0.00
111	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
112	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
113	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
114	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
115	0.00	-2.46	0.00	2.46	0.00	0.00	0.00	0.00
116	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00

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Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (001 : IS - Dead Live)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
117	0.00	-2.44	0.00	2.44	0.00	0.00	0.00	0.00
118	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
119	0.00	-2.35	0.00	2.35	0.00	0.00	0.00	0.00
120	0.00	-2.47	0.00	2.47	0.00	0.00	0.00	0.00
121	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
122	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
123	0.00	-2.49	0.00	2.49	0.00	0.00	0.00	0.00
124	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
125	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
126	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
127	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
128	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
130	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
131	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
132	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
133	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
134	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
135	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
136	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
137	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
138	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
139	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
140	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
141	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
142	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
143	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
144	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
145	0.00	0.00	0.00	0.00	-0.02	0.00	0.01	0.02
146	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
147	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
148	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
149	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
150	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
151	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
152	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
153	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
154	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
155	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
156	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
157	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Nodal Deflections Serviceability (002 : IS - Dead Live W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.02
2	0.07	-0.05	0.00	0.09	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.02
4	0.08	-0.05	0.00	0.09	0.00	0.00	0.00	0.00
5	0.05	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.01
7	0.05	-0.05	0.00	0.07	0.00	0.00	0.00	0.00
8	0.05	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.01
10	0.05	-0.05	0.00	0.07	0.00	0.00	0.00	0.00

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Made by : IH

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Nodal Deflections Serviceability (002 : IS - Dead Live W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
11	0.03	-0.18	0.00	0.18	0.00	0.00	0.00	0.00
12	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
13	0.03	-0.18	0.00	0.19	0.00	0.00	0.00	0.00
14	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
15	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
16	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
17	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
18	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
19	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
20	0.00	-0.43	0.00	0.43	0.00	0.00	0.00	0.00
21	0.00	-0.57	0.00	0.57	0.00	0.00	0.00	0.00
22	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
23	0.00	-0.55	0.00	0.55	0.00	0.00	0.00	0.00
24	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
25	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
26	0.00	-0.69	0.00	0.69	0.00	0.00	0.00	0.00
27	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
28	0.00	-0.66	0.00	0.66	0.00	0.00	0.00	0.00
29	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
30	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
31	0.00	-0.78	0.00	0.78	0.00	0.00	0.00	0.00
32	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
33	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
34	0.00	-0.92	0.00	0.92	0.00	0.00	0.00	0.00
35	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
36	0.00	-0.88	0.00	0.88	0.00	0.00	0.00	0.00
37	0.00	-1.03	0.00	1.03	0.00	0.00	0.00	0.00
38	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
39	0.00	-0.99	0.00	0.99	0.00	0.00	0.00	0.00
40	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
41	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
42	0.00	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
43	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
44	0.00	-1.09	0.00	1.09	0.00	0.00	0.00	0.00
45	0.00	-1.24	0.00	1.24	0.00	0.00	0.00	0.00
46	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
47	0.00	-1.20	0.00	1.20	0.00	0.00	0.00	0.00
48	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
49	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
50	0.00	-1.34	0.00	1.34	0.00	0.00	0.00	0.00
51	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
52	0.00	-1.29	0.00	1.29	0.00	0.00	0.00	0.00
53	0.00	-1.44	0.00	1.44	0.00	0.00	0.00	0.00
54	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
55	0.00	-1.39	0.00	1.39	0.00	0.00	0.00	0.00
56	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
57	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
58	0.00	-1.54	0.00	1.54	0.00	0.00	0.00	0.00
59	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
60	0.00	-1.48	0.00	1.48	0.00	0.00	0.00	0.00
61	0.00	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
62	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
63	0.00	-1.57	0.00	1.57	0.00	0.00	0.00	0.00
64	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
65	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
66	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
67	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
68	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00

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Date : 29 June 2017 / Ver. 2016.10

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Nodal Deflections Serviceability (002 : IS - Dead Live W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
69	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
70	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
71	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
72	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
73	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
74	0.00	-1.89	0.00	1.89	0.00	0.00	0.00	0.00
75	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
76	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
77	0.00	-1.97	0.00	1.97	0.00	0.00	0.00	0.00
78	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
79	0.00	-1.88	0.00	1.88	0.00	0.00	0.00	0.00
80	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
81	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
82	0.00	-2.04	0.00	2.04	0.00	0.00	0.00	0.00
83	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
84	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
85	0.00	-2.12	0.00	2.12	0.00	0.00	0.00	0.00
86	0.00	-2.03	0.00	2.03	0.00	0.00	0.00	0.00
87	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
88	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
89	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
90	0.00	-2.17	0.00	2.17	0.00	0.00	0.00	0.00
91	0.00	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
92	0.00	-2.09	0.00	2.09	0.00	0.00	0.00	0.00
93	0.00	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
94	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
95	0.00	-2.15	0.00	2.15	0.00	0.00	0.00	0.00
96	0.00	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
97	0.00	-2.21	0.00	2.21	0.00	0.00	0.00	0.00
98	0.00	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
99	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
100	0.00	-2.19	0.00	2.19	0.00	0.00	0.00	0.00
101	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
102	0.00	-2.26	0.00	2.26	0.00	0.00	0.00	0.00
103	0.00	-2.24	0.00	2.24	0.00	0.00	0.00	0.00
104	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
105	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
106	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
107	0.00	-2.41	0.00	2.41	0.00	0.00	0.00	0.00
108	0.00	-2.27	0.00	2.27	0.00	0.00	0.00	0.00
109	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
110	0.00	-2.34	0.00	2.34	0.00	0.00	0.00	0.00
111	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
112	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
113	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
114	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
115	0.00	-2.46	0.00	2.46	0.00	0.00	0.00	0.00
116	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
117	0.00	-2.44	0.00	2.44	0.00	0.00	0.00	0.00
118	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
119	0.00	-2.35	0.00	2.35	0.00	0.00	0.00	0.00
120	0.00	-2.47	0.00	2.47	0.00	0.00	0.00	0.00
121	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
122	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
123	0.00	-2.49	0.00	2.49	0.00	0.00	0.00	0.00
124	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
125	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
126	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00

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Nodal Deflections Serviceability (002 : IS - Dead Live W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
127	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
128	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
130	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
131	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
132	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
133	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
134	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
135	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
136	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
137	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
138	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
139	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
140	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
141	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
142	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
143	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
144	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
145	0.00	0.00	0.00	0.00	-0.02	0.00	0.01	0.02
146	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
147	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
148	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
149	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
150	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
151	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
152	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
153	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
154	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
155	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
156	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
157	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Nodal Deflections Serviceability (003 : IS - Dead Live W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02
2	0.00	-0.05	0.13	0.14	0.01	0.00	0.00	0.01
3	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04
4	0.00	-0.05	0.20	0.21	0.01	0.00	0.00	0.01
5	0.00	-0.19	0.12	0.22	-0.01	0.00	0.00	0.01
6	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02
7	0.00	-0.05	0.13	0.14	0.01	0.00	0.00	0.01
8	0.00	-0.19	0.16	0.25	-0.01	0.00	0.00	0.01
9	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04
10	0.00	-0.05	0.20	0.21	0.01	0.00	0.00	0.01
11	0.00	-0.18	0.12	0.22	-0.01	0.00	0.00	0.01
12	0.01	-0.32	0.03	0.32	0.00	0.00	0.00	0.00
13	0.00	-0.18	0.16	0.24	-0.01	0.00	0.00	0.01
14	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
15	-0.01	-0.31	0.03	0.31	0.00	0.00	0.00	0.00
16	0.00	-0.44	0.01	0.44	0.00	0.00	0.00	0.00
17	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
18	0.00	-0.44	-0.01	0.44	0.00	0.00	0.00	0.00
19	0.00	-0.56	0.01	0.56	0.00	0.00	0.00	0.00
20	0.00	-0.43	0.01	0.43	0.00	0.00	0.00	0.00

S-Mech Ltd

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (003 : IS - Dead Live W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
21	0.00	-0.57	0.00	0.57	0.00	0.00	0.00	0.00
22	0.00	-0.44	-0.01	0.44	0.00	0.00	0.00	0.00
23	0.00	-0.55	0.01	0.55	0.00	0.00	0.00	0.00
24	0.00	-0.68	0.02	0.68	0.00	0.00	0.00	0.00
25	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
26	0.00	-0.69	0.00	0.69	0.00	0.00	0.00	0.00
27	0.01	-0.80	0.03	0.80	0.00	0.00	0.00	0.00
28	0.00	-0.66	0.02	0.66	0.00	0.00	0.00	0.00
29	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
30	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
31	-0.01	-0.78	0.03	0.78	0.00	0.00	0.00	0.00
32	0.00	-0.91	0.02	0.91	0.00	0.00	0.00	0.00
33	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
34	0.00	-0.92	0.00	0.92	0.00	0.00	0.00	0.00
35	0.00	-1.02	0.01	1.02	0.00	0.00	0.00	0.00
36	0.00	-0.88	0.02	0.88	0.00	0.00	0.00	0.00
37	0.00	-1.03	0.00	1.03	0.00	0.00	0.00	0.00
38	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
39	0.00	-0.99	0.01	0.99	0.00	0.00	0.00	0.00
40	0.00	-1.13	0.02	1.13	0.00	0.00	0.00	0.00
41	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
42	0.00	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
43	0.01	-1.23	0.03	1.23	0.00	0.00	0.00	0.00
44	0.00	-1.09	0.02	1.09	0.00	0.00	0.00	0.00
45	0.00	-1.24	0.00	1.24	0.00	0.00	0.00	0.00
46	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
47	-0.01	-1.20	0.03	1.20	0.00	0.00	0.00	0.00
48	0.00	-1.33	0.02	1.33	0.00	0.00	0.00	0.00
49	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
50	0.00	-1.34	0.00	1.34	0.00	0.00	0.00	0.00
51	0.00	-1.43	0.01	1.43	0.00	0.00	0.00	0.00
52	0.00	-1.29	0.02	1.29	0.00	0.00	0.00	0.00
53	0.00	-1.44	0.00	1.44	0.00	0.00	0.00	0.00
54	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
55	0.00	-1.39	0.01	1.39	0.00	0.00	0.00	0.00
56	0.00	-1.52	0.02	1.52	0.00	0.00	0.00	0.00
57	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
58	0.00	-1.54	0.00	1.54	0.00	0.00	0.00	0.00
59	0.01	-1.62	0.03	1.62	0.00	0.00	0.00	0.00
60	0.00	-1.48	0.02	1.48	0.00	0.00	0.00	0.00
61	0.00	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
62	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
63	-0.01	-1.57	0.03	1.57	0.00	0.00	0.00	0.00
64	0.00	-1.70	0.02	1.70	0.00	0.00	0.00	0.00
65	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
66	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
67	0.00	-1.65	0.02	1.65	0.00	0.00	0.00	0.00
68	0.00	-1.79	0.01	1.79	0.00	0.00	0.00	0.00
69	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
70	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
71	0.00	-1.73	0.01	1.73	0.00	0.00	0.00	0.00
72	0.00	-1.87	0.02	1.87	0.00	0.00	0.00	0.00
73	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
74	0.00	-1.89	0.00	1.89	0.00	0.00	0.00	0.00
75	0.01	-1.95	0.03	1.95	0.00	0.00	0.00	0.00
76	0.00	-1.81	0.02	1.81	0.00	0.00	0.00	0.00
77	0.00	-1.97	0.00	1.97	0.00	0.00	0.00	0.00
78	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (003 : IS - Dead Live W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
79	-0.01	-1.88	0.03	1.88	0.00	0.00	0.00	0.00
80	0.00	-2.02	0.02	2.02	0.00	0.00	0.00	0.00
81	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
82	0.00	-2.04	0.00	2.04	0.00	0.00	0.00	0.00
83	0.00	-2.10	0.01	2.10	0.00	0.00	0.00	0.00
84	0.00	-1.95	0.02	1.95	0.00	0.00	0.00	0.00
85	0.00	-2.12	0.00	2.12	0.00	0.00	0.00	0.00
86	0.00	-2.03	0.00	2.03	0.00	0.00	0.00	0.00
87	0.00	-2.02	0.01	2.02	0.00	0.00	0.00	0.00
88	0.00	-2.16	0.02	2.16	0.00	0.00	0.00	0.00
89	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
90	0.00	-2.17	0.00	2.17	0.00	0.00	0.00	0.00
91	0.01	-2.23	0.03	2.23	0.00	0.00	0.00	0.00
92	0.00	-2.09	0.02	2.09	0.00	0.00	0.00	0.00
93	0.00	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
94	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
95	-0.01	-2.15	0.03	2.15	0.00	0.00	0.00	0.00
96	0.00	-2.28	0.02	2.28	0.00	0.00	0.00	0.00
97	0.00	-2.21	0.00	2.21	0.00	0.00	0.00	0.00
98	0.00	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
99	0.00	-2.33	0.01	2.33	0.00	0.00	0.00	0.00
100	0.00	-2.19	0.02	2.19	0.00	0.00	0.00	0.00
101	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
102	0.00	-2.26	0.00	2.26	0.00	0.00	0.00	0.00
103	0.00	-2.24	0.01	2.24	0.00	0.00	0.00	0.00
104	0.00	-2.37	0.02	2.37	0.00	0.00	0.00	0.00
105	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
106	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
107	0.01	-2.41	0.03	2.41	0.00	0.00	0.00	0.00
108	0.00	-2.28	0.02	2.28	0.00	0.00	0.00	0.00
109	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
110	0.00	-2.34	0.00	2.34	0.00	0.00	0.00	0.00
111	-0.01	-2.31	0.03	2.31	0.00	0.00	0.00	0.00
112	0.00	-2.43	0.02	2.43	0.00	0.00	0.00	0.00
113	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
114	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
115	0.00	-2.46	0.01	2.46	0.00	0.00	0.00	0.00
116	0.00	-2.33	0.02	2.33	0.00	0.00	0.00	0.00
117	0.00	-2.44	0.00	2.44	0.00	0.00	0.00	0.00
118	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
119	0.00	-2.35	0.01	2.35	0.00	0.00	0.00	0.00
120	0.00	-2.47	0.02	2.47	0.00	0.00	0.00	0.00
121	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
122	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
123	0.01	-2.49	0.02	2.49	0.00	0.00	0.00	0.00
124	0.00	-2.36	0.02	2.36	0.00	0.00	0.00	0.00
125	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
126	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
127	0.00	-2.37	0.02	2.37	0.00	0.00	0.00	0.00
128	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
130	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
131	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
132	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
133	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
134	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
135	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
136	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (003 : IS - Dead Live W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
137	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
138	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
139	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
140	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
141	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
142	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
143	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
144	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
145	0.00	0.00	0.00	0.00	-0.02	0.00	0.01	0.02
146	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
147	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
148	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
149	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
150	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
151	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
152	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
153	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
154	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
155	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
156	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
157	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.02
2	0.07	-0.05	0.00	0.09	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.02
4	0.08	-0.05	0.00	0.09	0.00	0.00	0.00	0.00
5	0.04	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.02
7	0.07	-0.05	0.00	0.09	0.00	0.00	0.00	0.00
8	0.04	-0.19	0.00	0.19	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.02
10	0.08	-0.05	0.00	0.09	0.00	0.00	0.00	0.00
11	0.04	-0.18	0.00	0.19	0.00	0.00	0.00	0.00
12	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
13	0.04	-0.18	0.00	0.19	0.00	0.00	0.00	0.00
14	0.00	-0.32	0.00	0.32	0.00	0.00	0.00	0.00
15	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
16	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
17	0.00	-0.31	0.00	0.31	0.00	0.00	0.00	0.00
18	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
19	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
20	0.00	-0.43	0.00	0.43	0.00	0.00	0.00	0.00
21	0.00	-0.57	0.00	0.57	0.00	0.00	0.00	0.00
22	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
23	0.00	-0.55	0.00	0.55	0.00	0.00	0.00	0.00
24	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00
25	0.00	-0.56	0.00	0.56	0.00	0.00	0.00	0.00
26	0.00	-0.69	0.00	0.69	0.00	0.00	0.00	0.00
27	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
28	0.00	-0.66	0.00	0.66	0.00	0.00	0.00	0.00
29	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
30	0.00	-0.68	0.00	0.68	0.00	0.00	0.00	0.00

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
31	0.00	-0.78	0.00	0.78	0.00	0.00	0.00	0.00
32	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
33	0.00	-0.80	0.00	0.80	0.00	0.00	0.00	0.00
34	0.00	-0.92	0.00	0.92	0.00	0.00	0.00	0.00
35	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
36	0.00	-0.88	0.00	0.88	0.00	0.00	0.00	0.00
37	0.00	-1.03	0.00	1.03	0.00	0.00	0.00	0.00
38	0.00	-0.91	0.00	0.91	0.00	0.00	0.00	0.00
39	0.00	-0.99	0.00	0.99	0.00	0.00	0.00	0.00
40	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
41	0.00	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
42	0.00	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
43	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
44	0.00	-1.09	0.00	1.09	0.00	0.00	0.00	0.00
45	0.00	-1.24	0.00	1.24	0.00	0.00	0.00	0.00
46	0.00	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
47	0.00	-1.20	0.00	1.20	0.00	0.00	0.00	0.00
48	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
49	0.00	-1.23	0.00	1.23	0.00	0.00	0.00	0.00
50	0.00	-1.34	0.00	1.34	0.00	0.00	0.00	0.00
51	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
52	0.00	-1.29	0.00	1.29	0.00	0.00	0.00	0.00
53	0.00	-1.44	0.00	1.44	0.00	0.00	0.00	0.00
54	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
55	0.00	-1.39	0.00	1.39	0.00	0.00	0.00	0.00
56	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
57	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
58	0.00	-1.54	0.00	1.54	0.00	0.00	0.00	0.00
59	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
60	0.00	-1.48	0.00	1.48	0.00	0.00	0.00	0.00
61	0.00	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
62	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
63	0.00	-1.57	0.00	1.57	0.00	0.00	0.00	0.00
64	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
65	0.00	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
66	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
67	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
68	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
69	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
70	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
71	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
72	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
73	0.00	-1.79	0.00	1.79	0.00	0.00	0.00	0.00
74	0.00	-1.89	0.00	1.89	0.00	0.00	0.00	0.00
75	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
76	0.00	-1.81	0.00	1.81	0.00	0.00	0.00	0.00
77	0.00	-1.97	0.00	1.97	0.00	0.00	0.00	0.00
78	0.00	-1.87	0.00	1.87	0.00	0.00	0.00	0.00
79	0.00	-1.88	0.00	1.88	0.00	0.00	0.00	0.00
80	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
81	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
82	0.00	-2.04	0.00	2.04	0.00	0.00	0.00	0.00
83	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
84	0.00	-1.95	0.00	1.95	0.00	0.00	0.00	0.00
85	0.00	-2.12	0.00	2.12	0.00	0.00	0.00	0.00
86	0.00	-2.03	0.00	2.03	0.00	0.00	0.00	0.00
87	0.00	-2.02	0.00	2.02	0.00	0.00	0.00	0.00
88	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00

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Date : 29 June 2017 / Ver. 2016.10

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Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
89	0.00	-2.10	0.00	2.10	0.00	0.00	0.00	0.00
90	0.00	-2.17	0.00	2.17	0.00	0.00	0.00	0.00
91	0.00	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
92	0.00	-2.09	0.00	2.09	0.00	0.00	0.00	0.00
93	0.00	-2.23	0.00	2.23	0.00	0.00	0.00	0.00
94	0.00	-2.16	0.00	2.16	0.00	0.00	0.00	0.00
95	0.00	-2.15	0.00	2.15	0.00	0.00	0.00	0.00
96	0.00	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
97	0.00	-2.21	0.00	2.21	0.00	0.00	0.00	0.00
98	0.00	-2.28	0.00	2.28	0.00	0.00	0.00	0.00
99	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
100	0.00	-2.19	0.00	2.19	0.00	0.00	0.00	0.00
101	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
102	0.00	-2.26	0.00	2.26	0.00	0.00	0.00	0.00
103	0.00	-2.24	0.00	2.24	0.00	0.00	0.00	0.00
104	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
105	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
106	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
107	0.00	-2.41	0.00	2.41	0.00	0.00	0.00	0.00
108	0.00	-2.27	0.00	2.27	0.00	0.00	0.00	0.00
109	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
110	0.00	-2.34	0.00	2.34	0.00	0.00	0.00	0.00
111	0.00	-2.31	0.00	2.31	0.00	0.00	0.00	0.00
112	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
113	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
114	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
115	0.00	-2.46	0.00	2.46	0.00	0.00	0.00	0.00
116	0.00	-2.33	0.00	2.33	0.00	0.00	0.00	0.00
117	0.00	-2.44	0.00	2.44	0.00	0.00	0.00	0.00
118	0.00	-2.39	0.00	2.39	0.00	0.00	0.00	0.00
119	0.00	-2.35	0.00	2.35	0.00	0.00	0.00	0.00
120	0.00	-2.47	0.00	2.47	0.00	0.00	0.00	0.00
121	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
122	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
123	0.00	-2.49	0.00	2.49	0.00	0.00	0.00	0.00
124	0.00	-2.36	0.00	2.36	0.00	0.00	0.00	0.00
125	0.00	-2.45	0.00	2.45	0.00	0.00	0.00	0.00
126	0.00	-2.42	0.00	2.42	0.00	0.00	0.00	0.00
127	0.00	-2.37	0.00	2.37	0.00	0.00	0.00	0.00
128	0.00	-2.43	0.00	2.43	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
130	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
131	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
132	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
133	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
134	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
135	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
136	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
137	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
138	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
139	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
140	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
141	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.03
142	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.03
143	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
144	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
145	0.00	0.00	0.00	0.00	-0.02	0.00	0.01	0.02
146	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02

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Nodal Deflections Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
147	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
148	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
149	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
150	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
151	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
152	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
153	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
154	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
155	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
156	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
157	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Nodal Deflections Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
1	0.00	0.00	0.00	0.00	0.00	0.00	-0.08	0.08
2	0.37	-0.04	0.00	0.37	0.00	0.00	-0.01	0.01
3	0.00	0.00	0.00	0.00	0.00	0.00	-0.08	0.08
4	0.38	-0.04	0.00	0.38	0.00	0.00	-0.01	0.01
5	0.22	-0.15	0.00	0.27	0.00	0.00	0.02	0.02
6	0.00	0.00	0.00	0.00	0.00	0.00	-0.05	0.05
7	0.24	-0.04	0.00	0.24	0.00	0.00	0.00	0.01
8	0.22	-0.14	0.00	0.27	0.00	0.00	0.02	0.02
9	0.00	0.00	0.00	0.00	0.00	0.00	-0.05	0.05
10	0.24	-0.04	0.00	0.24	0.00	0.00	0.00	0.01
11	0.14	-0.14	0.00	0.20	0.00	0.00	0.01	0.01
12	0.02	-0.25	0.00	0.25	0.00	0.00	0.00	0.00
13	0.14	-0.14	0.00	0.20	0.00	0.00	0.01	0.01
14	0.00	-0.25	0.00	0.25	0.00	0.00	0.00	0.00
15	0.02	-0.25	0.00	0.25	0.00	0.00	0.00	0.00
16	0.00	-0.35	0.00	0.35	0.00	0.00	0.00	0.00
17	0.00	-0.25	0.00	0.25	0.00	0.00	0.00	0.00
18	0.00	-0.34	0.00	0.34	0.00	0.00	0.00	0.00
19	0.01	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
20	0.00	-0.34	0.00	0.34	0.00	0.00	0.00	0.00
21	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
22	0.00	-0.34	0.00	0.34	0.00	0.00	0.00	0.00
23	0.01	-0.43	0.00	0.43	0.00	0.00	0.00	0.00
24	0.01	-0.53	0.00	0.53	0.00	0.00	0.00	0.00
25	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
26	0.01	-0.53	0.00	0.53	0.00	0.00	0.00	0.00
27	0.02	-0.62	0.00	0.62	0.00	0.00	0.00	0.00
28	0.01	-0.52	0.00	0.52	0.00	0.00	0.00	0.00
29	0.00	-0.62	0.00	0.62	0.00	0.00	0.00	0.00
30	0.01	-0.53	0.00	0.53	0.00	0.00	0.00	0.00
31	0.02	-0.61	0.00	0.61	0.00	0.00	0.00	0.00
32	0.01	-0.71	0.00	0.71	0.00	0.00	0.00	0.00
33	0.00	-0.61	0.00	0.61	0.00	0.00	0.00	0.00
34	0.01	-0.70	0.00	0.70	0.00	0.00	0.00	0.00
35	0.01	-0.79	0.00	0.79	0.00	0.00	0.00	0.00
36	0.01	-0.69	0.00	0.69	0.00	0.00	0.00	0.00
37	0.00	-0.79	0.00	0.79	0.00	0.00	0.00	0.00
38	0.01	-0.70	0.00	0.70	0.00	0.00	0.00	0.00
39	0.01	-0.77	0.00	0.77	0.00	0.00	0.00	0.00
40	0.01	-0.87	0.00	0.87	0.00	0.00	0.00	0.00

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Nodal Deflections Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
41	0.00	-0.78	0.00	0.78	0.00	0.00	0.00	0.00
42	0.01	-0.86	0.00	0.86	0.00	0.00	0.00	0.00
43	0.02	-0.95	0.00	0.95	0.00	0.00	0.00	0.00
44	0.01	-0.85	0.00	0.85	0.00	0.00	0.00	0.00
45	0.00	-0.94	0.00	0.94	0.00	0.00	0.00	0.00
46	0.01	-0.86	0.00	0.86	0.00	0.00	0.00	0.00
47	0.02	-0.93	0.00	0.93	0.00	0.00	0.00	0.00
48	0.01	-1.02	0.00	1.02	0.00	0.00	0.00	0.00
49	0.00	-0.93	0.00	0.93	0.00	0.00	0.00	0.00
50	0.01	-1.01	0.00	1.01	0.00	0.00	0.00	0.00
51	0.01	-1.09	0.00	1.09	0.00	0.00	0.00	0.00
52	0.01	-1.00	0.00	1.00	0.00	0.00	0.00	0.00
53	0.00	-1.08	0.00	1.08	0.00	0.00	0.00	0.00
54	0.01	-1.01	0.00	1.01	0.00	0.00	0.00	0.00
55	0.01	-1.07	0.00	1.07	0.00	0.00	0.00	0.00
56	0.01	-1.15	0.00	1.15	0.00	0.00	0.00	0.00
57	0.00	-1.08	0.00	1.08	0.00	0.00	0.00	0.00
58	0.01	-1.15	0.00	1.15	0.00	0.00	0.00	0.00
59	0.02	-1.22	0.00	1.22	0.00	0.00	0.00	0.00
60	0.01	-1.13	0.00	1.13	0.00	0.00	0.00	0.00
61	0.00	-1.21	0.00	1.21	0.00	0.00	0.00	0.00
62	0.01	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
63	0.02	-1.19	0.00	1.19	0.00	0.00	0.00	0.00
64	0.01	-1.28	0.00	1.28	0.00	0.00	0.00	0.00
65	0.00	-1.20	0.00	1.20	0.00	0.00	0.00	0.00
66	0.01	-1.27	0.00	1.27	0.00	0.00	0.00	0.00
67	0.01	-1.25	0.00	1.25	0.00	0.00	0.00	0.00
68	0.01	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
69	0.01	-1.26	0.00	1.26	0.00	0.00	0.00	0.00
70	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
71	0.01	-1.31	0.00	1.31	0.00	0.00	0.00	0.00
72	0.01	-1.39	0.00	1.39	0.00	0.00	0.00	0.00
73	0.00	-1.32	0.00	1.32	0.00	0.00	0.00	0.00
74	0.01	-1.38	0.00	1.38	0.00	0.00	0.00	0.00
75	0.02	-1.44	0.00	1.44	0.00	0.00	0.00	0.00
76	0.01	-1.36	0.00	1.36	0.00	0.00	0.00	0.00
77	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
78	0.01	-1.37	0.00	1.37	0.00	0.00	0.00	0.00
79	0.02	-1.41	0.00	1.41	0.00	0.00	0.00	0.00
80	0.01	-1.49	0.00	1.49	0.00	0.00	0.00	0.00
81	0.00	-1.42	0.00	1.42	0.00	0.00	0.00	0.00
82	0.01	-1.48	0.00	1.48	0.00	0.00	0.00	0.00
83	0.01	-1.53	0.00	1.53	0.00	0.00	0.00	0.00
84	0.01	-1.45	0.00	1.45	0.00	0.00	0.00	0.00
85	0.00	-1.53	0.00	1.53	0.00	0.00	0.00	0.00
86	0.01	-1.47	0.00	1.47	0.00	0.00	0.00	0.00
87	0.01	-1.50	0.00	1.50	0.00	0.00	0.00	0.00
88	0.01	-1.57	0.00	1.57	0.00	0.00	0.00	0.00
89	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
90	0.01	-1.56	0.00	1.56	0.00	0.00	0.00	0.00
91	0.02	-1.61	0.00	1.61	0.00	0.00	0.00	0.00
92	0.01	-1.54	0.00	1.54	0.00	0.00	0.00	0.00
93	0.00	-1.60	0.00	1.60	0.00	0.00	0.00	0.00
94	0.01	-1.55	0.00	1.55	0.00	0.00	0.00	0.00
95	0.02	-1.57	0.00	1.57	0.00	0.00	0.00	0.00
96	0.01	-1.64	0.00	1.64	0.00	0.00	0.00	0.00
97	0.00	-1.59	0.00	1.59	0.00	0.00	0.00	0.00
98	0.01	-1.63	0.00	1.63	0.00	0.00	0.00	0.00

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
99	0.01	-1.67	0.00	1.67	0.00	0.00	0.00	0.00
100	0.01	-1.60	0.00	1.60	0.00	0.00	0.00	0.00
101	0.00	-1.66	0.00	1.66	0.00	0.00	0.00	0.00
102	0.01	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
103	0.01	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
104	0.01	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
105	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
106	0.01	-1.68	0.00	1.68	0.00	0.00	0.00	0.00
107	0.02	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
108	0.01	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
109	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
110	0.01	-1.67	0.00	1.67	0.00	0.00	0.00	0.00
111	0.02	-1.68	0.00	1.68	0.00	0.00	0.00	0.00
112	0.01	-1.74	0.00	1.74	0.00	0.00	0.00	0.00
113	0.00	-1.69	0.00	1.69	0.00	0.00	0.00	0.00
114	0.01	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
115	0.01	-1.75	0.00	1.75	0.00	0.00	0.00	0.00
116	0.01	-1.69	0.00	1.69	0.00	0.00	0.00	0.00
117	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
118	0.01	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
119	0.01	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
120	0.00	-1.76	0.00	1.76	0.00	0.00	0.00	0.00
121	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
122	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
123	0.00	-1.77	0.00	1.77	0.00	0.00	0.00	0.00
124	0.00	-1.71	0.00	1.71	0.00	0.00	0.00	0.00
125	0.00	-1.74	0.00	1.74	0.00	0.00	0.00	0.00
126	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
127	0.00	-1.71	0.00	1.71	0.00	0.00	0.00	0.00
128	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
130	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
131	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
132	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
133	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
134	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
135	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
136	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
137	0.00	0.00	0.00	0.00	-0.02	0.00	0.01	0.02
138	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
139	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
140	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
141	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
142	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
143	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
144	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
145	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
146	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
147	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
148	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
149	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
150	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
151	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
152	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
153	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
154	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\Phi X \rightarrow$	$\Phi Y \uparrow$	$\Phi Z \nearrow$	ΦXYZ
157	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Nodal Deflections Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\Phi X \rightarrow$	$\Phi Y \uparrow$	$\Phi Z \nearrow$	ΦXYZ
1	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.12
2	0.00	-0.04	0.64	0.64	0.04	0.00	0.00	0.04
3	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.19
4	0.00	-0.05	1.01	1.01	0.05	0.00	0.00	0.05
5	0.01	-0.15	0.62	0.63	-0.03	0.00	0.00	0.03
6	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.12
7	0.00	-0.04	0.64	0.64	0.04	0.00	0.00	0.04
8	0.01	-0.15	0.80	0.81	-0.05	0.00	0.00	0.05
9	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.19
10	0.00	-0.05	1.00	1.00	0.05	0.00	0.00	0.05
11	-0.01	-0.15	0.61	0.63	-0.03	0.00	0.00	0.03
12	0.03	-0.25	0.14	0.29	-0.01	0.00	0.00	0.01
13	-0.01	-0.15	0.80	0.81	-0.05	0.00	0.00	0.05
14	0.00	-0.25	0.00	0.25	-0.01	0.00	0.00	0.01
15	-0.03	-0.25	0.14	0.28	-0.01	0.00	0.00	0.01
16	0.01	-0.35	0.06	0.35	0.00	0.00	0.00	0.00
17	0.00	-0.25	0.00	0.25	-0.01	0.00	0.00	0.01
18	0.01	-0.35	-0.05	0.35	0.00	0.00	0.00	0.00
19	0.02	-0.44	0.07	0.45	0.00	0.00	0.00	0.00
20	-0.01	-0.34	0.06	0.35	0.00	0.00	0.00	0.00
21	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
22	-0.01	-0.34	-0.05	0.35	0.00	0.00	0.00	0.00
23	-0.02	-0.43	0.07	0.44	0.00	0.00	0.00	0.00
24	0.01	-0.53	0.10	0.54	0.00	0.00	0.00	0.00
25	0.00	-0.44	0.00	0.44	0.00	0.00	0.00	0.00
26	0.01	-0.53	0.00	0.53	0.00	0.00	0.00	0.00
27	0.03	-0.62	0.13	0.64	0.00	0.00	0.00	0.00
28	-0.01	-0.52	0.10	0.53	0.00	0.00	0.00	0.00
29	0.00	-0.62	0.00	0.62	0.00	0.00	0.00	0.00
30	-0.01	-0.53	0.00	0.53	0.00	0.00	0.00	0.00
31	-0.03	-0.61	0.13	0.63	0.00	0.00	0.00	0.00
32	0.01	-0.71	0.10	0.71	0.00	0.00	0.00	0.00
33	0.00	-0.62	0.00	0.62	0.00	0.00	0.00	0.00
34	0.01	-0.70	0.00	0.70	0.00	0.00	0.00	0.00
35	0.02	-0.79	0.07	0.79	0.00	0.00	0.00	0.00
36	-0.01	-0.69	0.10	0.70	0.00	0.00	0.00	0.00
37	0.00	-0.79	0.00	0.79	0.00	0.00	0.00	0.00
38	-0.01	-0.70	0.00	0.70	0.00	0.00	0.00	0.00
39	-0.02	-0.78	0.07	0.78	0.00	0.00	0.00	0.00
40	0.01	-0.87	0.10	0.87	0.00	0.00	0.00	0.00
41	0.00	-0.79	0.00	0.79	0.00	0.00	0.00	0.00
42	0.01	-0.87	0.00	0.87	0.00	0.00	0.00	0.00
43	0.03	-0.95	0.13	0.96	0.00	0.00	0.00	0.00
44	-0.01	-0.85	0.10	0.86	0.00	0.00	0.00	0.00
45	0.00	-0.94	0.00	0.94	0.00	0.00	0.00	0.00
46	-0.01	-0.86	0.00	0.86	0.00	0.00	0.00	0.00
47	-0.03	-0.93	0.13	0.94	0.00	0.00	0.00	0.00
48	0.01	-1.02	0.10	1.02	0.00	0.00	0.00	0.00
49	0.00	-0.94	0.00	0.94	0.00	0.00	0.00	0.00
50	0.01	-1.01	0.00	1.01	0.00	0.00	0.00	0.00

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
51	0.02	-1.09	0.07	1.09	0.00	0.00	0.00	0.00
52	-0.01	-1.00	0.10	1.00	0.00	0.00	0.00	0.00
53	0.00	-1.09	0.00	1.09	0.00	0.00	0.00	0.00
54	-0.01	-1.01	0.00	1.01	0.00	0.00	0.00	0.00
55	-0.02	-1.07	0.07	1.07	0.00	0.00	0.00	0.00
56	0.01	-1.15	0.10	1.16	0.00	0.00	0.00	0.00
57	0.00	-1.08	0.00	1.08	0.00	0.00	0.00	0.00
58	0.01	-1.15	0.00	1.15	0.00	0.00	0.00	0.00
59	0.03	-1.22	0.13	1.23	0.00	0.00	0.00	0.00
60	-0.01	-1.13	0.10	1.14	0.00	0.00	0.00	0.00
61	0.00	-1.21	0.00	1.21	0.00	0.00	0.00	0.00
62	-0.01	-1.14	0.00	1.14	0.00	0.00	0.00	0.00
63	-0.03	-1.20	0.13	1.20	0.00	0.00	0.00	0.00
64	0.01	-1.28	0.10	1.28	0.00	0.00	0.00	0.00
65	0.00	-1.21	0.00	1.21	0.00	0.00	0.00	0.00
66	0.01	-1.27	0.00	1.27	0.00	0.00	0.00	0.00
67	-0.01	-1.25	0.10	1.26	0.00	0.00	0.00	0.00
68	0.02	-1.33	0.07	1.34	0.00	0.00	0.00	0.00
69	-0.01	-1.27	0.00	1.27	0.00	0.00	0.00	0.00
70	0.00	-1.33	0.00	1.33	0.00	0.00	0.00	0.00
71	-0.02	-1.31	0.07	1.31	0.00	0.00	0.00	0.00
72	0.01	-1.39	0.10	1.39	0.00	0.00	0.00	0.00
73	0.00	-1.32	0.00	1.32	0.00	0.00	0.00	0.00
74	0.01	-1.38	0.00	1.38	0.00	0.00	0.00	0.00
75	0.03	-1.44	0.13	1.45	0.00	0.00	0.00	0.00
76	-0.01	-1.36	0.10	1.36	0.00	0.00	0.00	0.00
77	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
78	-0.01	-1.38	0.00	1.38	0.00	0.00	0.00	0.00
79	-0.03	-1.41	0.13	1.42	0.00	0.00	0.00	0.00
80	0.01	-1.49	0.10	1.49	0.00	0.00	0.00	0.00
81	0.00	-1.43	0.00	1.43	0.00	0.00	0.00	0.00
82	0.01	-1.48	0.00	1.48	0.00	0.00	0.00	0.00
83	0.02	-1.53	0.07	1.53	0.00	0.00	0.00	0.00
84	-0.01	-1.45	0.10	1.46	0.00	0.00	0.00	0.00
85	0.00	-1.53	0.00	1.53	0.00	0.00	0.00	0.00
86	-0.01	-1.47	0.00	1.47	0.00	0.00	0.00	0.00
87	-0.02	-1.50	0.07	1.50	0.00	0.00	0.00	0.00
88	0.01	-1.57	0.10	1.58	0.00	0.00	0.00	0.00
89	0.00	-1.52	0.00	1.52	0.00	0.00	0.00	0.00
90	0.01	-1.56	0.00	1.56	0.00	0.00	0.00	0.00
91	0.03	-1.61	0.13	1.62	0.00	0.00	0.00	0.00
92	-0.01	-1.54	0.10	1.54	0.00	0.00	0.00	0.00
93	0.00	-1.60	0.00	1.60	0.00	0.00	0.00	0.00
94	-0.01	-1.55	0.00	1.55	0.00	0.00	0.00	0.00
95	-0.03	-1.58	0.13	1.58	0.00	0.00	0.00	0.00
96	0.01	-1.64	0.10	1.65	0.00	0.00	0.00	0.00
97	0.00	-1.59	0.00	1.59	0.00	0.00	0.00	0.00
98	0.01	-1.63	0.00	1.63	0.00	0.00	0.00	0.00
99	0.02	-1.67	0.07	1.67	0.00	0.00	0.00	0.00
100	-0.01	-1.60	0.10	1.61	0.00	0.00	0.00	0.00
101	0.00	-1.66	0.00	1.66	0.00	0.00	0.00	0.00
102	-0.01	-1.62	0.00	1.62	0.00	0.00	0.00	0.00
103	-0.02	-1.63	0.07	1.63	0.00	0.00	0.00	0.00
104	0.01	-1.70	0.10	1.70	0.00	0.00	0.00	0.00
105	0.00	-1.65	0.00	1.65	0.00	0.00	0.00	0.00
106	0.01	-1.68	0.00	1.68	0.00	0.00	0.00	0.00
107	0.03	-1.72	0.13	1.73	0.00	0.00	0.00	0.00
108	-0.01	-1.66	0.10	1.66	0.00	0.00	0.00	0.00

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Nodal Deflections Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Nodal Displacements (mm)				Nodal Rotations (Degrees)			
	$\delta X \rightarrow$	$\delta Y \uparrow$	$\delta Z \nearrow$	δXYZ	$\phi X \rightarrow$	$\phi Y \uparrow$	$\phi Z \nearrow$	ϕXYZ
109	0.00	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
110	-0.01	-1.67	0.00	1.67	0.00	0.00	0.00	0.00
111	-0.03	-1.68	0.13	1.68	0.00	0.00	0.00	0.00
112	0.01	-1.74	0.10	1.74	0.00	0.00	0.00	0.00
113	0.00	-1.69	0.00	1.69	0.00	0.00	0.00	0.00
114	0.01	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
115	0.02	-1.75	0.07	1.75	0.00	0.00	0.00	0.00
116	-0.01	-1.69	0.10	1.69	0.00	0.00	0.00	0.00
117	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
118	-0.01	-1.70	0.00	1.70	0.00	0.00	0.00	0.00
119	-0.02	-1.70	0.07	1.70	0.00	0.00	0.00	0.00
120	0.01	-1.76	0.08	1.76	0.00	0.00	0.00	0.00
121	0.00	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
122	0.01	-1.74	0.00	1.74	0.00	0.00	0.00	0.00
123	0.02	-1.77	0.10	1.77	0.00	0.00	0.00	0.00
124	-0.01	-1.71	0.08	1.71	0.00	0.00	0.00	0.00
125	0.00	-1.74	0.00	1.74	0.00	0.00	0.00	0.00
126	-0.01	-1.72	0.00	1.72	0.00	0.00	0.00	0.00
127	-0.02	-1.72	0.10	1.72	0.00	0.00	0.00	0.00
128	0.00	-1.73	0.00	1.73	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
130	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
131	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
132	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
133	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
134	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
135	0.00	0.00	0.00	0.00	-0.02	0.00	0.02	0.02
136	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
137	0.00	0.00	0.00	0.00	-0.02	0.00	0.01	0.02
138	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.02
139	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
140	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
141	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
142	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
143	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
144	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
145	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.02
146	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
147	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
148	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
149	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
150	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
151	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
152	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
153	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.01
154	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
156	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
157	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.01
158	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.18C	0.00	0.46	0.00	0.00	0.00		0.00	0.08
	2	10.18C	0.00	0.46	0.00	0.19	0.00	@ 0.000	@ 0.000	@ 0.232
111	2	9.85C	0.00	-0.02	0.00	0.02	0.00		0.00	0.06
	5	9.85C	0.00	-0.02	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
112	5	9.85C	0.00	-0.02	0.00	0.00	0.00		0.00	0.04
	12	9.85C	0.00	-0.02	0.00	-0.02	0.00	@ 0.000	@ 0.000	@ 0.590
113	12	9.07C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	16	9.07C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
114	16	9.07C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	19	9.07C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
115	19	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
117	27	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
124	56	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	59	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
125	59	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
129	75	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
131	83	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	88	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
132	88	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	91	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
133	91	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
136	104	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	107	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
137	107	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.38C	0.00	0.47	0.00	0.00	0.00		0.00	0.08
	4	10.38C	0.00	0.47	0.00	0.19	0.00		@ 0.000	@ 0.232
142	4	9.61C	0.00	-0.02	0.00	0.02	0.00		0.00	0.07
	8	9.61C	0.00	-0.02	0.00	0.00	0.00		@ 0.000	@ 0.430
143	8	9.60C	0.00	-0.02	0.00	0.00	0.00		0.00	0.05
	14	9.60C	0.00	-0.02	0.00	-0.02	0.00		@ 0.000	@ 0.600
144	14	9.25C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18	9.25C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
145	18	9.25C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	21	9.25C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
146	21	8.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.43C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
147	26	8.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.43C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
148	29	8.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
149	34	8.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
150	37	7.24C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.24C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
151	42	7.24C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.24C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
152	45	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
153	50	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
154	53	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
155	58	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
156	61	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
157	66	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
158	70	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
159	74	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
160	77	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
161	82	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
162	85	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
164	93	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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				x-x	y-y	x-x	y-y	x-x	y-y	
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	9.94C	0.00	0.30	0.00	0.00	0.00		0.00	0.05
	7	9.94C	0.00	0.30	0.00	0.12	0.00		@ 0.000	@ 0.232
173	7	9.72C	0.00	-0.01	0.00	0.01	0.00		0.00	0.04
	11	9.72C	0.00	-0.01	0.00	0.00	0.00		@ 0.000	@ 0.430
174	11	9.72C	0.00	-0.01	0.00	0.00	0.00		0.00	0.03
	15	9.72C	0.00	-0.01	0.00	-0.01	0.00		@ 0.000	@ 0.590
175	15	8.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	20	8.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
176	20	8.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	8.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
181	39	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
183	47	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
186	60	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	63	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
187	63	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
190	76	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	79	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
191	79	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
194	92	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	95	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
195	95	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
198	108	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	111	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
199	111	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.30C	0.00	0.30	0.00	0.00	0.00		0.00	0.05
	10	10.30C	0.00	0.30	0.00	0.12	0.00	@ 0.000	@ 0.000	@ 0.232
204	10	9.59C	0.00	-0.01	0.00	0.01	0.00		0.00	0.04
	13	9.59C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
205	13	9.59C	0.00	-0.01	0.00	0.00	0.00		0.00	0.03
	17	9.59C	0.00	-0.01	0.00	-0.01	0.00	@	0.000	@ 0.600
206	17	9.17C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	22	9.17C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
207	22	9.17C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25	9.17C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
208	25	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
209	30	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
210	33	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
211	38	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
212	41	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
213	46	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
214	49	6.80C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.80C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
215	54	6.80C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.80C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
216	57	6.03C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.03C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
217	62	6.03C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.03C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
218	65	5.61C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.61C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
219	69	5.61C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.61C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
220	73	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.84C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
221	78	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.84C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
222	81	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (007 : OOS - Dead + 0.25 Live + 1.25 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
224	89	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.18C	0.00	0.00	-0.49	0.00	0.00	0.00	0.00	0.08
	2	10.18C	0.00	0.00	-0.49	0.00	-0.20	@ 0.000		@ 0.232
111	2	9.85C	0.00	0.00	0.04	0.00	-0.06	0.00		0.20
	5	9.85C	0.00	0.00	0.04	0.00	-0.02	@ 0.000		@ 0.450
112	5	9.85C	0.00	0.00	0.05	0.00	-0.01	0.00		0.06
	12	9.85C	0.00	0.00	0.05	0.00	0.04	@ 0.000		@ 0.640
113	12	9.06C	0.00	-0.01	0.00	0.00	0.01	0.00	0.01	0.02
	16	9.06C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.470
114	16	9.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	19	9.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
115	19	8.64C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.64C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.64C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.64C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
117	27	7.88C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.88C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
124	56	6.27C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	59	6.27C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
125	59	5.50C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.08C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.08C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.08C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	75	5.08C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
129	75	4.31C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.31C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.31C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.31C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
131	83	3.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	88	3.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
132	88	3.87C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	91	3.87C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
133	91	2.82C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
136	104	2.38C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	107	2.38C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
137	107	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.19C	0.00	0.00	-0.90	0.00	0.00	0.00		0.15
	4	10.19C	0.00	0.00	-0.90	0.00	-0.36	@ 0.000		@ 0.232
142	4	9.64C	0.00	0.00	0.08	0.00	-0.10	0.00		0.30
	8	9.64C	0.00	0.00	0.08	0.00	-0.02	@ 0.000		@ 0.440
143	8	9.64C	0.00	0.00	0.08	0.00	-0.02	0.00		0.13
	14	9.64C	0.00	0.00	0.08	0.00	0.06	@ 0.000		@ 0.630
144	14	9.24C	0.00	0.00	-0.01	0.00	0.01	0.00		0.04
	18	9.24C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.460
145	18	9.24C	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
	21	9.24C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.000
146	21	8.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
147	26	8.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
148	29	8.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
149	34	8.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
150	37	7.23C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.23C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
151	42	7.23C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.23C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
152	45	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
153	50	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
154	53	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
155	58	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
156	61	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
157	66	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.68C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
158	70	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
159	74	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
160	77	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
161	82	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
162	85	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
164	93	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	10.09C	0.00	0.00	-0.49	0.00	0.00	0.00		0.08
	7	10.09C	0.00	0.00	-0.49	0.00	-0.20	@ 0.000		@ 0.232
173	7	9.70C	0.00	0.00	0.04	0.00	-0.06	0.00		0.20
	11	9.70C	0.00	0.00	0.04	0.00	-0.02	@ 0.000		@ 0.450

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Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
174	11	9.70C	0.00	0.00	0.05	0.00	-0.01	0.00		0.06
	15	9.70C	0.00	0.00	0.05	0.00	0.04	@ 0.000		@ 0.640
175	15	8.90C	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.02
	20	8.90C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.470
176	20	8.90C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	8.90C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.53C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.53C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.53C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.53C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.71C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.71C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
181	39	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.33C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.33C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
183	47	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
186	60	6.14C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	63	6.14C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
187	63	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.95C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.95C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
190	76	4.95C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	79	4.95C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
191	79	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
194	92	3.73C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	95	3.73C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
195	95	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
198	108	2.22C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	111	2.22C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
199	111	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.34C	0.00	0.00	-0.89	0.00	0.00	0.00		0.15
	10	10.34C	0.00	0.00	-0.89	0.00	-0.36	@ 0.000		@ 0.232
204	10	9.57C	0.00	0.00	0.08	0.00	-0.10	0.00		0.30
	13	9.57C	0.00	0.00	0.08	0.00	-0.02	@ 0.000		@ 0.450
205	13	9.57C	0.00	0.00	0.09	0.00	-0.02	0.00		0.12
	17	9.57C	0.00	0.00	0.09	0.00	0.07	@ 0.000		@ 0.630
206	17	9.18C	0.00	0.00	-0.01	0.00	0.01	0.00		0.04
	22	9.18C	0.00	0.00	-0.01	0.00	0.00	@ 0.000		@ 0.460
207	22	9.18C	0.00	0.00	-0.01	0.00	0.00	0.00		0.00
	25	9.18C	0.00	0.00	-0.01	0.00	-0.01	@ 0.000		@ 0.000
208	25	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
209	30	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
210	33	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
211	38	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Tel: 01257 367580 Email: info@s-mech.co.uk

Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
212	41	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
213	46	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
214	49	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
215	54	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
216	57	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
217	62	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.61C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.61C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
219	69	5.61C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.61C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
220	73	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
221	78	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
224	89	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (008 : OOS - Dead + 0.25 Live + 1.25 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.16C	0.00	0.56	0.00	0.00	0.00		0.00	0.09
	2	10.16C	0.00	0.56	0.00	0.22	0.00	@ 0.000	@ 0.000	@ 0.232
111	2	9.85C	0.00	-0.03	0.00	0.03	0.00		0.00	0.08
	5	9.85C	0.00	-0.03	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
112	5	9.85C	0.00	-0.02	0.00	0.00	0.00		0.00	0.05
	12	9.85C	0.00	-0.02	0.00	-0.02	0.00	@ 0.000	@ 0.000	@ 0.590
113	12	9.07C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	16	9.07C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
114	16	9.07C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	19	9.07C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
115	19	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
117	27	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
124	56	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	59	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
125	59	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
129	75	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
131	83	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	88	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
132	88	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	91	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
133	91	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
136	104	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	107	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
137	107	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.40C	0.00	0.57	0.00	0.00	0.00		0.00	0.10
	4	10.40C	0.00	0.57	0.00	0.23	0.00	@	0.000	@ 0.232
142	4	9.60C	0.00	-0.03	0.00	0.03	0.00		0.00	0.08
	8	9.60C	0.00	-0.03	0.00	0.00	0.00	@	0.000	@ 0.430

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				x-x	y-y	x-x	y-y	x-x	y-y	
143	8	9.60C	0.00	-0.03	0.00	0.00	0.00		0.00	0.06
	14	9.60C	0.00	-0.03	0.00	-0.02	0.00	@	0.000	@ 0.600
144	14	9.25C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18	9.25C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
145	18	9.25C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	21	9.25C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
146	21	8.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.43C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
147	26	8.43C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.43C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
148	29	8.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.06C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
149	34	8.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.06C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
150	37	7.24C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.24C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
151	42	7.24C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.24C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
152	45	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.87C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
153	50	6.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.87C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
154	53	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.05C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
155	58	6.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.05C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
156	61	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.68C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
157	66	5.68C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.68C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
158	70	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
159	74	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
160	77	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000
161	82	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	0.00	0.00	0.00	0.00	@	0.000	@ 0.000

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				x-x	y-y	x-x	y-y	x-x	y-y	
162	85	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
164	93	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	9.93C	0.00	0.36	0.00	0.00	0.00		0.00	0.06
	7	9.93C	0.00	0.36	0.00	0.14	0.00		@ 0.000	@ 0.232
173	7	9.72C	0.00	-0.02	0.00	0.02	0.00		0.00	0.05
	11	9.72C	0.00	-0.02	0.00	0.00	0.00		@ 0.000	@ 0.430
174	11	9.72C	0.00	-0.01	0.00	0.00	0.00		0.00	0.03
	15	9.72C	0.00	-0.01	0.00	-0.01	0.00		@ 0.000	@ 0.590
175	15	8.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	20	8.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
176	20	8.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	8.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
181	39	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
183	47	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
186	60	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	63	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
187	63	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
190	76	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	79	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
191	79	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
194	92	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	95	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
195	95	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
198	108	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	111	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
199	111	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.31C	0.00	0.36	0.00	0.00	0.00		0.00	0.06
	10	10.31C	0.00	0.36	0.00	0.14	0.00	@ 0.000	@ 0.000	@ 0.232
204	10	9.59C	0.00	-0.01	0.00	0.02	0.00		0.00	0.05
	13	9.59C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
205	13	9.59C	0.00	-0.02	0.00	0.00	0.00		0.00	0.04
	17	9.59C	0.00	-0.02	0.00	-0.02	0.00	@ 0.000	@ 0.000	@ 0.600
206	17	9.17C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	22	9.17C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
207	22	9.17C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25	9.17C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
208	25	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
209	30	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
210	33	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
211	38	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
212	41	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
213	46	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
214	49	6.80C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.80C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
215	54	6.80C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.80C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
216	57	6.03C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.03C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
217	62	6.03C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.03C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.61C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.61C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (009 : OOS - Dead + 0.25 Live + 1.5 x Unit W1)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
219	69	5.61C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.61C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
220	73	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
221	78	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
224	89	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.16C	0.00	0.00	-0.59	0.00	0.00	0.00		0.10
	2	10.16C	0.00	0.00	-0.59	0.00	-0.24	@ 0.000		@ 0.232
111	2	9.86C	0.00	0.00	0.05	0.00	-0.07	0.00		0.24
	5	9.86C	0.00	0.00	0.05	0.00	-0.02	@ 0.000		@ 0.450

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Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
112	5	9.86C	0.00	0.01	0.06	0.00	-0.02	0.00		0.08
	12	9.86C	0.00	0.01	0.06	0.00	0.04	@ 0.000		@ 0.640
113	12	9.06C	0.00	-0.01	0.00	0.00	0.01	0.00	0.01	0.03
	16	9.06C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.470
114	16	9.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	19	9.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
115	19	8.64C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.64C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.64C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.64C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
117	27	7.87C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.87C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
124	56	6.27C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	59	6.27C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
125	59	5.50C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.08C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.08C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.08C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	75	5.08C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
129	75	4.31C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.31C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.31C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.31C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
131	83	3.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	88	3.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
132	88	3.87C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	91	3.87C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
133	91	2.82C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
136	104	2.38C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	107	2.38C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
137	107	1.33C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.17C	0.00	0.00	-1.08	0.00	0.00	0.00	0.00	0.18
	4	10.17C	0.00	0.00	-1.08	0.00	-0.43	@ 0.000		@ 0.232
142	4	9.64C	0.00	0.00	0.09	0.00	-0.12	0.00	0.00	0.36
	8	9.64C	0.00	0.00	0.09	0.00	-0.02	@ 0.000		@ 0.440
143	8	9.64C	0.00	0.00	0.10	0.00	-0.02	0.00	0.00	0.15
	14	9.64C	0.00	0.00	0.10	0.00	0.08	@ 0.000		@ 0.630
144	14	9.24C	0.00	0.01	-0.01	0.00	0.01	0.00	0.00	0.05
	18	9.24C	0.00	0.01	-0.01	0.00	0.00	@ 0.000		@ 0.460
145	18	9.24C	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
	21	9.24C	0.00	-0.01	-0.01	0.00	-0.01	@ 0.000		@ 0.000
146	21	8.42C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.42C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
147	26	8.42C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.42C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
148	29	8.05C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.05C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
149	34	8.05C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.05C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
150	37	7.23C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.23C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
151	42	7.23C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.23C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
152	45	6.86C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.86C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
153	50	6.86C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.86C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
154	53	6.04C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.04C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
155	58	6.04C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.04C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
156	61	5.67C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.67C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
157	66	5.67C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.67C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
158	70	4.86C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
159	74	4.86C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
160	77	4.49C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
161	82	4.49C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
162	85	3.38C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
164	93	2.99C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	10.10C	0.00	0.00	-0.59	0.00	0.00	0.00		0.10
	7	10.10C	0.00	0.00	-0.59	0.00	-0.24	@ 0.000		@ 0.232
173	7	9.70C	0.00	0.00	0.05	0.00	-0.07	0.00		0.24
	11	9.70C	0.00	0.00	0.05	0.00	-0.02	@ 0.000		@ 0.450
174	11	9.70C	0.00	-0.01	0.06	0.00	-0.02	0.00		0.08
	15	9.70C	0.00	-0.01	0.06	0.00	0.04	@ 0.000		@ 0.640
175	15	8.90C	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.03
	20	8.90C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.470
176	20	8.90C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	8.90C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.53C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.53C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.53C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.53C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.71C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.71C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
181	39	7.34C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.34C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.34C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.34C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
183	47	6.51C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
186	60	6.14C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	63	6.14C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
187	63	5.32C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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				x-x	y-y	x-x	y-y	x-x	y-y	
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.95C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.95C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
190	76	4.95C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	79	4.95C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
191	79	4.12C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
194	92	3.73C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	95	3.73C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
195	95	2.62C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
198	108	2.22C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	111	2.22C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
199	111	1.11C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.36C	0.00	0.00	-1.07	0.00	0.00	0.00	0.00	0.18
	10	10.36C	0.00	0.00	-1.07	0.00	-0.43	@ 0.000	@ 0.000	@ 0.232
204	10	9.56C	0.00	0.00	0.09	0.00	-0.11	0.00	0.00	0.36
	13	9.56C	0.00	0.00	0.09	0.00	-0.02	@ 0.000	@ 0.000	@ 0.450
205	13	9.56C	0.00	0.00	0.10	0.00	-0.02	0.00	0.00	0.15
	17	9.56C	0.00	0.00	0.10	0.00	0.08	@ 0.000	@ 0.000	@ 0.630
206	17	9.18C	0.00	-0.01	-0.01	0.00	0.01	0.00	0.00	0.05
	22	9.18C	0.00	-0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.460

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Checked : IH

Approved :

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
207	22	9.18C	0.00	0.01	-0.01	0.00	0.00	0.00		0.00
	25	9.18C	0.00	0.01	-0.01	0.00	-0.01	@ 0.000		@ 0.000
208	25	8.40C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
209	30	8.40C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
210	33	7.98C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
211	38	7.98C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
212	41	7.21C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
213	46	7.21C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
214	49	6.79C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.79C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
215	54	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
216	57	6.02C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.02C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
217	62	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.60C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.60C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
219	69	5.60C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
220	73	4.84C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.84C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
221	78	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
224	89	3.36C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (010 : OOS - Dead + 0.25 Live + 1.5 x Unit W2)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
226	97	2.92C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.86C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.18C	0.00	0.56	-0.59	0.00	0.00	0.00	0.00	0.10
	2	10.18C	0.00	0.56	-0.59	0.22	-0.24	@ 0.000	@ 0.000	@ 0.232
111	2	9.86C	0.00	-0.03	0.05	0.03	-0.07	0.00	0.00	0.24
	5	9.86C	0.00	-0.03	0.05	0.00	-0.02	@ 0.000	@ 0.000	@ 0.450
112	5	9.86C	0.00	-0.02	0.06	0.00	-0.02	0.00	0.00	0.08
	12	9.86C	0.00	-0.02	0.06	-0.02	0.04	@ 0.000	@ 0.000	@ 0.640
113	12	9.07C	0.00	-0.01	0.00	0.00	0.01	0.00	0.01	0.03
	16	9.07C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.470
114	16	9.07C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	19	9.07C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
115	19	8.65C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.65C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.65C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.65C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
117	27	7.88C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.88C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
124	56	6.27C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	59	6.27C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
125	59	5.50C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.09C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.09C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.09C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	75	5.09C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
129	75	4.32C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.32C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
131	83	3.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	88	3.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.430
132	88	3.88C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	91	3.88C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
133	91	2.82C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
136	104	2.38C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	107	2.38C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
137	107	1.33C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Approved :

Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.40C	0.00	0.57	-1.08	0.00	0.00	0.00	0.00	0.18
	4	10.40C	0.00	0.57	-1.08	0.23	-0.43	@ 0.000	@ 0.000	@ 0.232
142	4	9.64C	0.00	-0.03	0.09	0.03	-0.12	0.00	0.00	0.36
	8	9.64C	0.00	-0.03	0.09	0.00	-0.02	@ 0.000	@ 0.000	@ 0.440
143	8	9.64C	0.00	-0.03	0.10	0.00	-0.02	0.00	0.00	0.15
	14	9.64C	0.00	-0.03	0.10	-0.02	0.08	@ 0.000	@ 0.000	@ 0.630
144	14	9.25C	0.00	0.01	-0.01	0.00	0.01	0.00	0.00	0.05
	18	9.25C	0.00	0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.460
145	18	9.25C	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
	21	9.25C	0.00	-0.01	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.000
146	21	8.43C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.43C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
147	26	8.43C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.43C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
148	29	8.06C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.06C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
149	34	8.06C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.06C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
150	37	7.24C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.24C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
151	42	7.24C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.24C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
152	45	6.87C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.87C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
153	50	6.87C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.87C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
154	53	6.05C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.05C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
155	58	6.05C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.05C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
156	61	5.68C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.68C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
157	66	5.68C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.68C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
158	70	4.86C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
159	74	4.86C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
160	77	4.49C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
161	82	4.49C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
162	85	3.38C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
164	93	2.99C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	10.10C	0.00	0.36	-0.59	0.00	0.00	0.00	0.00	0.10
	7	10.10C	0.00	0.36	-0.59	0.14	-0.24	@ 0.000	@ 0.000	@ 0.232
173	7	9.72C	0.00	-0.02	0.05	0.02	-0.07	0.00	0.00	0.24
	11	9.72C	0.00	-0.02	0.05	0.00	-0.02	@ 0.000	@ 0.000	@ 0.450
174	11	9.72C	0.00	-0.01	0.06	0.00	-0.02	0.00	0.00	0.08
	15	9.72C	0.00	-0.01	0.06	-0.01	0.04	@ 0.000	@ 0.000	@ 0.640
175	15	8.90C	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.03
	20	8.90C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.470

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
176	20	8.90C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	8.90C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.53C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.53C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.53C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.53C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.71C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.71C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
181	39	7.34C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.34C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.34C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.34C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
183	47	6.51C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
186	60	6.14C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	63	6.14C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
187	63	5.32C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.95C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.95C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
190	76	4.95C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	79	4.95C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
191	79	4.12C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
194	92	3.73C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	95	3.73C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
195	95	2.62C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.440
198	108	2.22C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
	111	2.22C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.610
199	111	1.11C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.36C	0.00	0.36	-1.07	0.00	0.00	0.00	0.00	0.18
	10	10.36C	0.00	0.36	-1.07	0.14	-0.43	@ 0.000	@ 0.000	@ 0.232
204	10	9.59C	0.00	-0.01	0.09	0.02	-0.11	0.00	0.00	0.36
	13	9.59C	0.00	-0.01	0.09	0.00	-0.02	@ 0.000	@ 0.000	@ 0.450
205	13	9.59C	0.00	-0.02	0.10	0.00	-0.02	0.00	0.00	0.15
	17	9.59C	0.00	-0.02	0.10	-0.02	0.08	@ 0.000	@ 0.000	@ 0.630
206	17	9.18C	0.00	-0.01	-0.01	0.00	0.01	0.00	0.00	0.05
	22	9.18C	0.00	-0.01	-0.01	0.00	0.00	@ 0.000	@ 0.000	@ 0.460
207	22	9.18C	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.00
	25	9.18C	0.00	0.01	-0.01	0.00	-0.01	@ 0.000	@ 0.000	@ 0.000
208	25	8.40C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
209	30	8.40C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
210	33	7.98C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
211	38	7.98C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
212	41	7.21C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
213	46	7.21C	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
214	49	6.80C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.80C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
215	54	6.80C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.80C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
216	57	6.03C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.03C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
217	62	6.03C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.03C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.61C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.61C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
219	69	5.61C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.61C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
220	73	4.84C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.84C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
221	78	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
224	89	3.36C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.86C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	-0.01	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (Maximum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
110	1	10.16C	0.00	0.00	0.00	0.00	0.00		0.00	0.08
	2	10.16C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.232
111	2	9.85C	0.00	0.00	0.00	0.00	0.00			0.06
	5	9.85C	0.00	0.00	0.00	0.00	0.00			@ 0.430
112	5	9.85C	0.00	0.01	0.00	0.00	0.00			0.04
	12	9.85C	0.00	0.01	0.00	0.00	0.00			@ 0.590
113	12	9.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	16	9.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
114	16	9.06C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	19	9.06C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
115	19	8.64C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	24	8.64C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
116	24	8.64C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27	8.64C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
117	27	7.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	32	7.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
118	32	7.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	35	7.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
119	35	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	40	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
120	40	7.46C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	43	7.46C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
121	43	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	48	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
122	48	6.69C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	51	6.69C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
123	51	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	56	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
124	56	6.27C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	59	6.27C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
125	59	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	64	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

S-Mech Ltd

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Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
126	64	5.50C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	68	5.50C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
127	68	5.08C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	72	5.08C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
128	72	5.08C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75	5.08C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
129	75	4.31C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	80	4.31C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
130	80	4.31C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	83	4.31C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
131	83	3.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	88	3.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
132	88	3.87C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	91	3.87C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
133	91	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	96	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
134	96	2.82C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	2.82C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
135	99	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	104	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
136	104	2.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	107	2.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
137	107	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	112	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
138	112	1.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	115	1.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
139	115	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	120	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
140	120	0.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	123	0.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
141	3	10.17C	0.00	0.00	0.00	0.00	0.00			0.08
	4	10.17C	0.00	0.00	0.00	0.00	0.00			@ 0.232
142	4	9.60C	0.00	0.00	0.00	0.00	0.00			0.07
	8	9.60C	0.00	0.00	0.00	0.00	0.00			@ 0.430
143	8	9.60C	0.00	0.00	0.00	0.00	0.00			0.05
	14	9.60C	0.00	0.00	0.00	0.00	0.00			@ 0.600
144	14	9.24C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18	9.24C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000

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Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
145	18	9.24C	0.00	0.00	0.00	0.00	0.00	0.00		0.00
	21	9.24C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
146	21	8.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	26	8.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
147	26	8.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	29	8.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
148	29	8.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	34	8.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
149	34	8.05C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	37	8.05C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
150	37	7.23C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42	7.23C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
151	42	7.23C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	45	7.23C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
152	45	6.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	50	6.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
153	50	6.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	53	6.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
154	53	6.04C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	58	6.04C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
155	58	6.04C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	61	6.04C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
156	61	5.67C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	66	5.67C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
157	66	5.67C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	70	5.67C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
158	70	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	74	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
159	74	4.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	77	4.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
160	77	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	82	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
161	82	4.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	85	4.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
162	85	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	90	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
163	90	3.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	93	3.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
164	93	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	98	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
165	98	2.99C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	101	2.99C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
166	101	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	106	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
167	106	1.88C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	109	1.88C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
168	109	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	114	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
169	114	1.49C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	117	1.49C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
170	117	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	122	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
171	122	0.38C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	125	0.38C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
172	6	9.93C	0.00	0.00	0.00	0.00	0.00			0.05
	7	9.93C	0.00	0.00	0.00	0.00	0.00			@ 0.232
173	7	9.70C	0.00	0.00	0.00	0.00	0.00			0.04
	11	9.70C	0.00	0.00	0.00	0.00	0.00			@ 0.430
174	11	9.70C	0.00	0.00	0.00	0.00	0.00			0.03
	15	9.70C	0.00	0.00	0.00	0.00	0.00			@ 0.590
175	15	8.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	20	8.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
176	20	8.89C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	23	8.89C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
177	23	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
178	28	8.52C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31	8.52C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
179	31	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
180	36	7.70C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	39	7.70C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
181	39	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	44	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
182	44	7.33C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	47	7.33C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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				x-x	y-y	x-x	y-y	x-x	y-y	
183	47	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	52	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
184	52	6.51C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	55	6.51C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
185	55	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	60	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
186	60	6.14C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	63	6.14C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
187	63	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	67	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
188	67	5.32C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	71	5.32C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
189	71	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	76	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
190	76	4.94C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	79	4.94C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
191	79	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	84	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
192	84	4.12C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	87	4.12C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
193	87	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	92	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
194	92	3.73C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	95	3.73C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
195	95	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
196	100	2.62C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103	2.62C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
197	103	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	108	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
198	108	2.22C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	111	2.22C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
199	111	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	116	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
200	116	1.11C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	119	1.11C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
201	119	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	124	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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				x-x	y-y	x-x	y-y	x-x	y-y	
202	124	0.71C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	127	0.71C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
203	9	10.30C	0.00	0.00	0.00	0.00	0.00			0.05
	10	10.30C	0.00	0.00	0.00	0.00	0.00			@ 0.232
204	10	9.56C	0.00	0.00	0.00	0.00	0.00			0.04
	13	9.56C	0.00	0.00	0.00	0.00	0.00			@ 0.440
205	13	9.56C	0.00	0.00	0.00	0.00	0.00			0.03
	17	9.56C	0.00	0.00	0.00	0.00	0.00			@ 0.600
206	17	9.17C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	22	9.17C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
207	22	9.17C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25	9.17C	0.00	0.00	0.00	0.00	0.00	@ 0.000		@ 0.000
208	25	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	30	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
209	30	8.40C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	33	8.40C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
210	33	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	38	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
211	38	7.98C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	41	7.98C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
212	41	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	46	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
213	46	7.21C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	49	7.21C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
214	49	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	54	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
215	54	6.79C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	57	6.79C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
216	57	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	62	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
217	62	6.02C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	65	6.02C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
218	65	5.60C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	69	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
219	69	5.60C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	73	5.60C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
220	73	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	78	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Member Forces Ultimate (Minimum Values)

Mem ber No.	Node End1 End2	Axial Force (kN)	Torque Moment (kN.m)	Shear Force (kN)		Bending Moment (kN.m)		Maximum Moment (kN.m @ m)		Maximum Deflection (mm @ m)
				x-x	y-y	x-x	y-y	x-x	y-y	
221	78	4.84C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81	4.84C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
222	81	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	86	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
223	86	4.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	89	4.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
224	89	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	94	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
225	94	3.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	97	3.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
226	97	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	102	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
227	102	2.92C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105	2.92C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
228	105	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	110	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
229	110	1.86C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	113	1.86C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
230	113	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
231	118	1.42C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	121	1.42C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
232	121	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000
233	126	0.36C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128	0.36C	0.00	0.00	0.00	0.00	0.00	@ 0.000	@ 0.000	@ 0.000

Support Reactions Serviceability (001 : IS - Dead Live)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	12.903	0.000	0.000	0.000	0.000
3	0.000	13.062	0.000	0.000	0.000	0.000
6	0.000	12.461	0.000	0.000	0.000	0.000
9	0.000	12.974	0.000	0.000	0.000	0.000
Total	-0.004	51.400	0.001	0.000	0.000	0.000

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Job Ref : 1502

Sheet : Stair Tower LFP /

Made by : IH

Date : 29 June 2017 / Ver. 2016.10

Checked : IH

Approved :

Support Reactions Serviceability (002 : IS - Dead Live W1)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	-0.073	12.889	0.000	0.000	0.000	0.000
3	-0.074	13.076	0.000	0.000	0.000	0.000
6	-0.046	12.453	0.000	0.000	0.000	0.000
9	-0.046	12.983	0.000	0.000	0.000	0.000
Total	-6.865	51.400	-0.001	0.000	0.000	0.000

Support Reactions Serviceability (003 : IS - Dead Live W2)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	12.889	-0.076	0.000	0.000	0.000
3	0.000	13.044	-0.139	0.000	0.000	0.000
6	0.000	12.475	-0.076	0.000	0.000	0.000
9	0.000	12.989	-0.138	0.000	0.000	0.000
Total	0.000	51.396	-10.484	-0.071	0.000	0.000

Support Reactions Serviceability (004 : IS - Dead Live + 0.3 NHF)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	-0.071	12.889	0.000	0.000	0.000	0.000
3	-0.073	13.076	0.000	0.000	0.000	0.000
6	-0.071	12.447	0.000	0.000	0.000	0.000
9	-0.073	12.987	0.000	0.000	0.000	0.000
Total	-4.834	51.400	0.001	0.000	0.000	0.000

Support Reactions Serviceability (005 : OOS - Dead + 0.25 Live + Unit W1)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	-0.362	10.195	0.000	0.000	0.000	0.000
3	-0.367	10.364	0.000	0.000	0.000	0.000
6	-0.231	9.957	0.000	0.000	0.000	0.000
9	-0.232	10.289	0.000	0.000	0.000	0.000
Total	-34.391	40.805	0.000	0.000	0.000	0.024

Support Reactions Serviceability (006 : OOS - Dead + 0.25 Live + Unit W2)

Node	Directional Reactions (kN)			Moment Reactions (kN.m)		
	Rx→(kN)	Ry↑(kN)	Rz↗(kN)	Mx→(kN.m)	My↑(kN.m)	Mz↗(kN.m)
1	0.000	10.199	-0.380	0.000	0.000	0.000
3	0.000	10.213	-0.695	0.000	0.000	0.000
6	0.000	10.070	-0.379	0.000	0.000	0.000
9	0.000	10.324	-0.689	0.000	0.000	0.000
Total	0.000	40.807	-52.428	-0.277	0.000	0.000