## PRELIMINARY PILE SIZING LOADS.

→ ASSUME 400Ø PILES @ 400 ctrs.

PILES TO SIDE OF PROPERTY:

BUILDING LOADS: DEAD ⇒ 135 kN/m × 1.2 = 162 kN/m
LIVE ⇒ 20 kN/m × 1.2 = 24 kN/m

PEDESTRIANS: 1.5 kN/m² × 2m × 0.4m × 1.2 = 1.44 kN

SOIL: 20kN/m³ × 2m × 0.4m × 1.2 × 1.5m = 29 kN

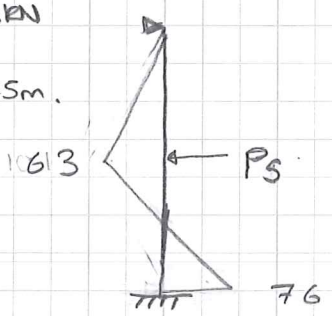
BUILDING LOADS: 162 kN/m × 0.4m ≈ 65 kN
24 kN/m × 0.4m ≈ 10 kN

∴ TOTAL PL = 1.44 + 29 + 65 + 10 = 106 kN

$P_S = \frac{1}{2} \gamma h^2 k_0 = \frac{1}{2} \times 20 kN/m^3 \times (5.5m)^2 \times 0.5 \times 1.2 = 182 kN/m$ (↑ 1.0.S.)

182 kN/m × 0.4m = 73 kN

$P_S$ = 73 kN @ $\frac{h}{2}$ = 2.75m.



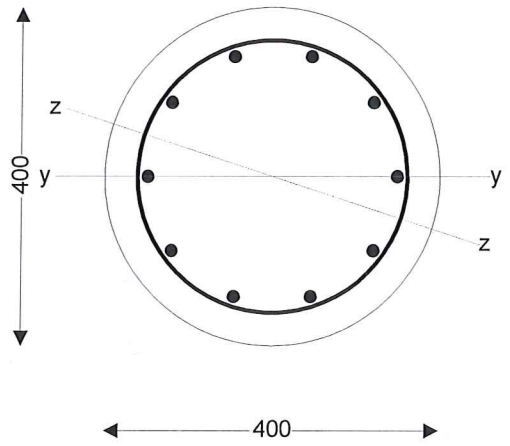

MOMENT (kNm, ULS)

| Tekla Tedds Elliottwood | Project: 81 Avenue Road, London, NW8 6JD | | | | Job no.: 2150623 | |
|---|---|---|---|---|---|---|
| | Calcs for: Preliminary Pile Sizing | | | | Start page no./Revision: 1 | |
| | Calcs by: SAm | Calcs date: 29/11/2016 | Checked by: | Checked date: | Approved by: | Approved date: |

## RC COLUMN DESIGN

**In accordance with EN1992-1-1:2004 incorporating Corrigendum January 2008 and the UK national annex**

Tedds calculation version 1.2.14




10 no. 16 mm diameter longitudinal bars
8 mm diameter links
Max link spacing 320 mm generally, 192 mm for
400 mm above and below slab/beam and at laps

### Column geometry

| | | | |
|---|---|---|---|
| Overall diameter | h= **400** mm | | |
| Clear ht bet restr about y axis | $l_y$ = **5500** mm | Clear ht bet restr about z axis | $l_z$ = **5500** mm |
| Stability in the z direction | **Unbraced** | Stability in the y direction | **Unbraced** |

### Concrete details

| | | | |
|---|---|---|---|
| Cylinder strength of concrete | $f_{ck}$ = **28** MPa | Safety factor for concrete | $\gamma_C$ = **1.50** |
| Coefficient $\alpha_{cc}$ | $\alpha_{cc}$ = **0.85** | | |
| Maximum aggregate size | $d_g$ = **20** mm | | |

### Reinforcement details

| | | | |
|---|---|---|---|
| Nominal cover to links | $c_{nom}$ = **35** mm | Longitudinal bar diameter | $\phi$ = **16** mm |
| Link diameter | $\phi_v$ = **8** mm | Total no. of longitudinal bars | N = **10** |
| Area of longitudinal reinft | $A_s$ = **2011** mm$^2$ | Safety factor for reinforcement | $\gamma_S$ = **1.15** |
| Modulus of elasticity of reinft | $E_s$ = **200000** MPa | | |

### Fire resistance details

| | | | |
|---|---|---|---|
| Fire resistance period | R = **60** min | Exposure to fire | **More than one side** |
| Ratio of fire design axial load to design resistance | | $\mu_{fi}$ = **0.70** | |

### Axial load and bending moments from frame analysis

| | | | |
|---|---|---|---|
| Design axial load | $N_{Ed}$ = **160.0** kN | | |
| Moment about y axis at top | $M_{topy}$ = **0.0** kNm | Moment about y axis at btm | $M_{btmy}$ = **80.0** kNm |
| Moment about z axis at top | $M_{topz}$ = **0.0** kNm | Moment about z axis at btm | $M_{btmz}$ = **80.0** kNm |

### Column effective length factors

| | | | |
|---|---|---|---|
| Eff length factor buck abt y axis | | $f_y$ = **1.80** | |
| | Eff length factor buck abt z axis | | $f_z$ = **1.80** |

### Check nominal cover for fire and bond requirements

| | | | |
|---|---|---|---|
| Min cover to links for bond | $c_{min,b}$ = **8** mm | Min axis distance for fire | $a_{fi}$ = **40** mm |
| Allowance for deviations | $\Delta c_{dev}$ = **10** mm | Min allowable nominal cover | $c_{nom\_min}$ = **24.0** mm |

***PASS - the nominal cover is greater than the minimum required***

| Tekla Tedds Elliottwood | Project: 81 Avenue Road, London, NW8 6JD | | | | Job no.: 2150623 | |
|---|---|---|---|---|---|---|
| | Calcs for: Preliminary Pile Sizing | | | | Start page no./Revision: 2 | |
| | Calcs by: SAm | Calcs date: 29/11/2016 | Checked by: | Checked date: | Approved by: | Approved date: |

**Column slenderness**

Slend. ratio buckling abt y $\lambda_y$ = **99.0**

Slend. limit about y $\lambda_{limy}$ = **47.4**

Slend. ratio buckling abt z $\lambda_z$ = **99.0**

Slend. limit about z $\lambda_{limz}$ = **47.4**

**Design bending moments**

Design moment about y axis $M_{Edy}$ = **84.0** kNm

Design moment about z axis $M_{Edz}$ = **84.0** kNm

**Resultant design bending moment for a circular column**

Resultant design moment $M_{Ed}$ = **118.7** kNm

**Moment of resistances**

Mt of resistance about y axis $M_{Rdy}$ = **122.8** kNm

Mt of resistance about z axis $M_{Rdz}$ = **123.6** kNm

**Minimum moment capacity with axial load $N_{Ed}$**

Minimum moment capacity $M_{Rd}$ = **122.8** kNm

***PASS - The moment capacity exceeds the resultant design bending moment***