

BUILD DESIGN

5 Elmfield Road
Cheltenham
Glos GL51 9JH
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DATE 19/01/20	SCALE	REV	CLIENT Minh Quach
DRAWN ASB	CHECKED	PROJECT No. -	SHEET No 02
			CONTRACT LIDLINGTON PLACE LONDON
STRUCTURAL CALCULATIONS			DESCRIPTION BASEMENT EXTENSION

SLIDING

RETAINING WALL ABUTS SLAB AND RESISTED AGAINST OPPOSITE RETAINING WALL

NO CHECK REQUIRED

HORIZONTAL LOADS

SURCHARGE = $0.35 \times 18 \times 0.556 \times 4.35 = 15.237 \text{ KN}$ X 2.175 = 33.14 KNM/M
RETAINED EARTH = $0.35 \times 18 \times 4.35 \times 4.35/2 = 59.6 \text{ KN/M}$ X 1.4 = 77.79 KNM/M

C OF G = $110.93/74.84 = 1.482$ TOTAL = 74.84 KN/M TOTAL = 110.93 KNM/M

VERTICAL LOADS WALL LOAD = $98.381 \text{ KN/M} \times 0.175 = 17.217 \text{ KNM/M}$

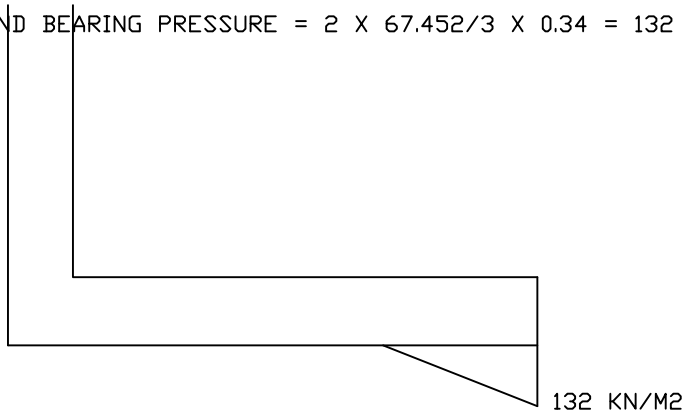
WALL STEM = $24 \times 0.32 \times 3.9 = 29.952 \text{ KN/M} \times 0.16 = 4.792 \text{ KNM/M}$
BASE = $24 \times 0.45 \times 3.5 = 37.5 \text{ KN}$ X 1.75 = 66.15 KNM/M
TOTAL = 67.452 KN/M TOTAL = 70.942 KNM/M

C OF G = $70.942/67.452 = 1.052$

x = $1.482 \times 74.84/67.482 = 1.64$

e = $1.052 + 1.64 - 1.75 = 0.942 > D/6$

MAX GROUND BEARING PRESSURE = $2 \times 67.452/3 \times 0.34 = 132 \text{ KN/M}^2 - 6 \times 4.35 = 106 \text{ KN/M}^2$



450 THICK BASE

BENDING MOMENT = $67.452 \times 2.84 = 191.56 \text{ KNM}$

ULT BENDING MOMENT = $191.56 \times 1.5 = 287.3 \text{ KNM}$

b = 1000; d = 450 - 100 = 350; f_k = 460 N/mm²; F_{cu} = 35 N/mm²

k = $287.3 \times 10000000/1000 \times 350 \times 350 \times 35 = 0.067$

z = $0.5 + 0.25 - 0.067/0.9 = 0.919$

A_{st} = $287.3 \times 1000000/460 \times 0.95 \times 350 \times 0.918 = 2046 \text{ mm}^2$

PROVIDE T25 @ 200crs(2545mm²)