SOLID GEOMETRY
Structural Engineers

Job No. 00285 Sheet No. 1 Rev.

Sheet Title.

Project Title.
44 GOLDHURST TERRACE

Calc Ref. UNDERPINNING BEARING PRESSURES

Made by AG. Date OCT 2018 Chd.

LOADS ONTO UNDERPINS.

LOADS FROM PARTY WALLS.

MASONRY, 1ST TO ROOF, THICKNESS 9" (250 INC PLASTER)
HEIGHT = 8.8m, γ = 20 kN/m³ — 41.5 kN/m.

MASONRY, LOWER GND - 1ST, THICKNESS 13.5" (370 INC PLASTER)
HEIGHT = 6.2m, γ = 20 kN/m³ — 45.9 kN/m

CONCRETE, PINS THICKESS = 0.35
HEIGHT = 2.7m, γ = 24 kN/m³ — 22.7 kN/m.

LOADS FROM FLOORS.

LOADED WIDTH = 5.4/2 x 2 = 5.4m, 4 FLOORS (& NEIGHBOUR.)

DL = 0.75 kN/m²
LL = 1.5 kN/m²
SLS = 2.25 kN/m² — 48.6 kN/m.

LOADS FROM ROOF

LOADED WIDTH = 5.4/2 x 2 = 5.4m

DL = 1.2 kN/m²
LL = 0.6 kN/m²
SLS = 1.8 kN/m² — 9.7 kN/m.

TOTAL = 168.4 kN/m

TRANSFERED LOADS FROM INTERNAL WALLS — PERMANENT CONDITION.

MASONRY, LENGTH = 14m, HEIGHT = 4.0m, THICKNESS = 0.13
γ = 20 kN/m³
DL = 145.6 kN.

STUD, LENGTH = 14m, HEIGHT = 7.0m
γ = 0.4 kN/m² DL = 39.2 kN.

DISTRIBUTED OVER PERIMETER = $\frac{145.6 + 39.2}{(18.6 + 6) \times 2}$ = 3.8 kN/m

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WEIGHT OF FRONT AND BACK WALLS. - PERMANENT CONDITION

HEIGHT = 14.5m THICKNESS 13.5" (370 INC PLASTER)
LENGTH = 6 x 2 = 12m γ = 20 kN/m^3, 35% WINDOWS.

DL = 14.5 x 0.37 x 20 x 0.65 x 12 = 840 kN.

DISTRIBUTED OVER PERIMETER. = 17.0 kN/m.

TOTAL LOAD PER M = 168.4 + 3.8 + 17.0
= 189 kN/m.
(PERMANENT CONDITION)

TRANSFERED LOADS FROM INTERNAL WALLS - TEMPORARY CONDITION.

WORST CASE IS TEMPORARY WORKS WHILST INSTALLING. BEAM B13 = 280kN.

ONTO 2 PINS AT 2m LENGTH = 70 kN/m.

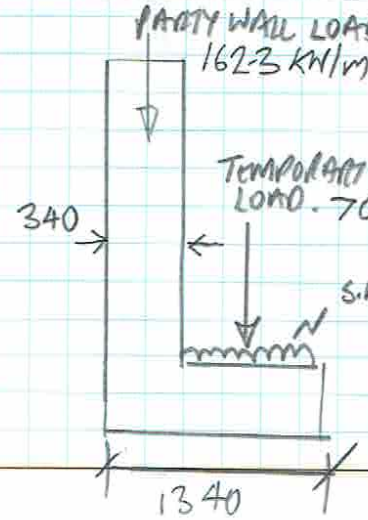
LOADS DOWN PARTY WALL

AS BEFORE MINUS 1 STOREY OF FLOOR

$\therefore$ $168.4 - \frac{5.4 \times 2.25}{2} = 162.3$ kN/m.

TOTAL LOAD PER METER AT WORST CASE PIN IN TEMPORARY CONDITION = 70 + 162.3
= 232.3 kN/m

BEARING PRESSURE IN TEMPORARY CONDITION



TEMPORARY SHORT TERM LOAD AT WORST CASE

$= \frac{162.3 + 70}{1.34} + 8 = 181.3$ kN/m^2.

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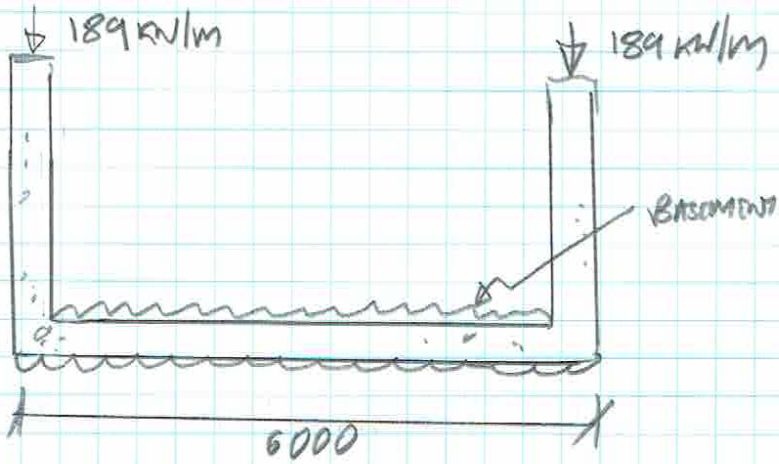
BEARING PRESSURE IN PERMANENT CONDITION -



LONG TERM BUILDING PRESSURE = $\frac{189 \times 2}{6} + 13 = 76\ KN/m^2$.

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Job No. 00285	Sheet No. 4	Rev.
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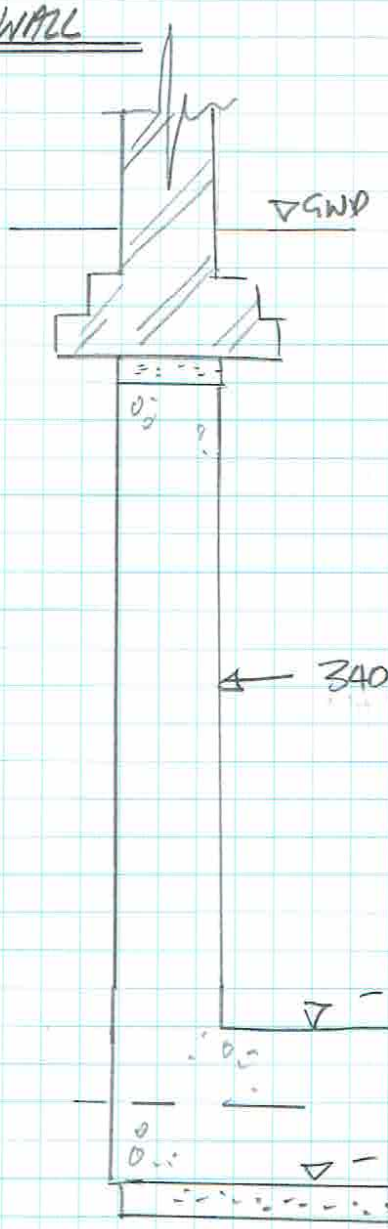
Project Title. 44 GOLDHURST TERRACE	Calc Ref. RETAINING WALL DESIGN	
	Made by AG. Date OCT 2018	Chd.

DESIGN OF BASEMENT WALL



LONDON CLAY

$\gamma = 18 kN/m^3$

$K_0 = 1.13$

WATER NOT ENCOUNTERED

SOLID GEOMETRY
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Job No. 00285 Sheet No. 5 Rev.

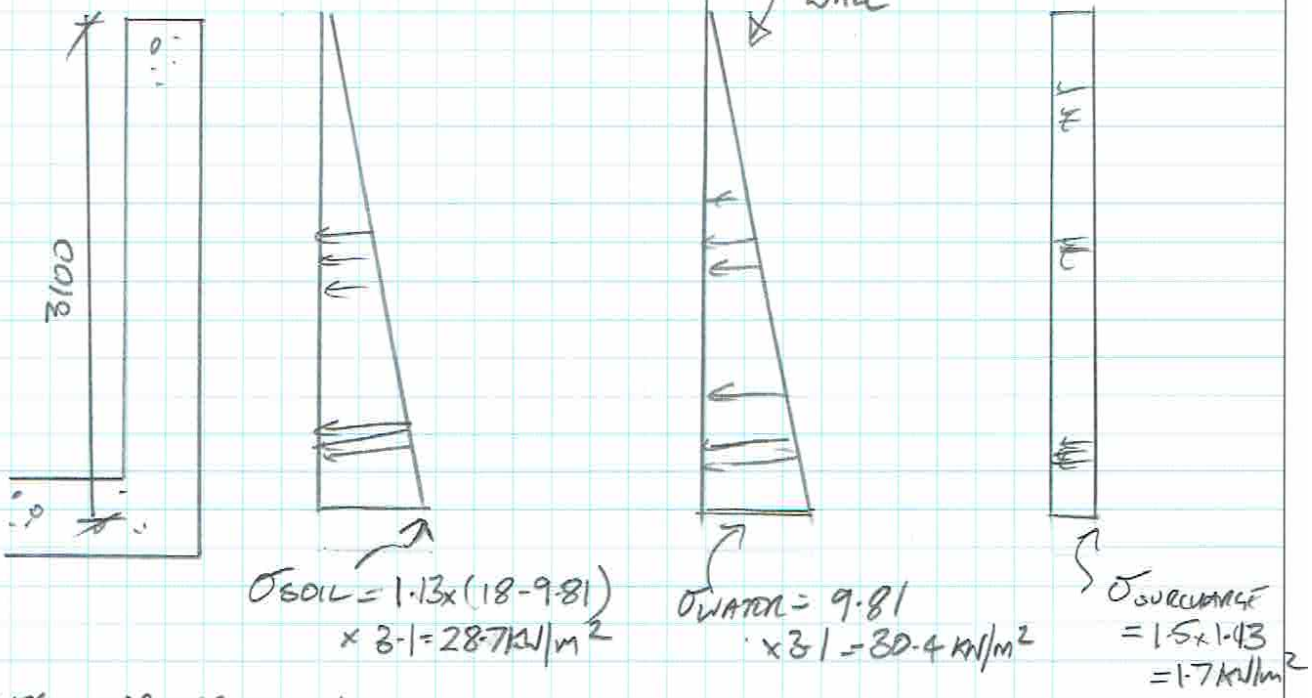
Sheet Title.

Project Title.
44 GOLDHURST TERRACE

Calc Ref. RETAINING WALL DESIGN.

Made by A-G Date OCT 2018 Chd.

LOADS ONTO RETAINING WALL



MOMENTS APPLIED TO WALL

$M_{SOIL} = 28.7 \times 3.1/2 \times 3.1/3 = 46.0$ KN-m/m

$M_{WATER} = 30.4 \times 3.1/2 \times 3.1/3 = 48.7$ KN-m/m

$M_{SURCHARGE} = 1.7 \times 3.1 \times \frac{3.1}{2} = 8.2$ KN-m/m

ULTIMATE MOMENT = (MAX CREDIBLE WATER LEVEL.)

$M_{ULT} = 1.4 \times 46.0 + 1.2 \times 48.7 + 1.6 \times 8.2$

$= 136.0$ KN-m

DESIGN PARAMETERS FOR WALL

ADOPT C40 CONCRETE

COVER - EXTERNAL FACE 50mm
COVER - INTERNAL FACE 30mm,
ADOPT T25 BARS BOTH FACES.

$d = 340 - 50 - 25/2 = 277$mm.

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Job No. 00285 Sheet No. 6 Rev.

Sheet Title.

Project Title.
44 GOLDHURST TERRACE

Calc Ref. RETAINING WALL DESIGN -

Made by A.G. Date OCT 2018. Chd.

DESIGN WALL IN BENDING

$$K = \frac{M}{bd^2 f_{cu}} = \frac{136.0 \times 10^6}{1000 \times 277^2 \times 40} = 0.044$$

$$\therefore z = 0.95d = 263\text{ mm}$$

$$A_{s\,req} = \frac{136.0 \times 10^6}{0.87 \times 500 \times 263} = 1189\ mm^2/m$$

CONSIDER DEFLECTION

ADOPT T25 BARS BOTH FACES AT 150 c/c $A_{s\,prov} = 3272\ mm^2/m$
$A_{s\,prov} = 3272\ mm^2/m$

$$f_s = \frac{2}{3} \frac{f_y A_{s\,req}}{A_{s\,prov}} = \frac{2 \times 500 \times 1189}{3 \times 3272} = 121\ N/mm^2$$

$$\frac{M}{bd^2} = \frac{136.0 \times 10^6}{1000 \times 277^2} = 1.77$$

$$\text{MOD FACTOR} = 0.55 + \frac{477 - 121}{120 \times (0.9 + 1.77)} = 1.66.$$

CONSIDER COMPRESSION STEEL

$$100\,\frac{A_{s'\,prov}}{bd} = \frac{100 \times 3272}{1000 \times 277} = 1.18$$

MOD FACTOR = 1.28

$\therefore$ ALLOWABLE SPAN/EFFECTIVE DEPTH = $1.66 \times 1.28 \times 7 = 14.9$

ACTUAL SPAN/EFFECTIVE DEPTH = $3100/277 = 11.2$ $\therefore$ OK.

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Job No. 00285	Sheet No. 7.	Rev.
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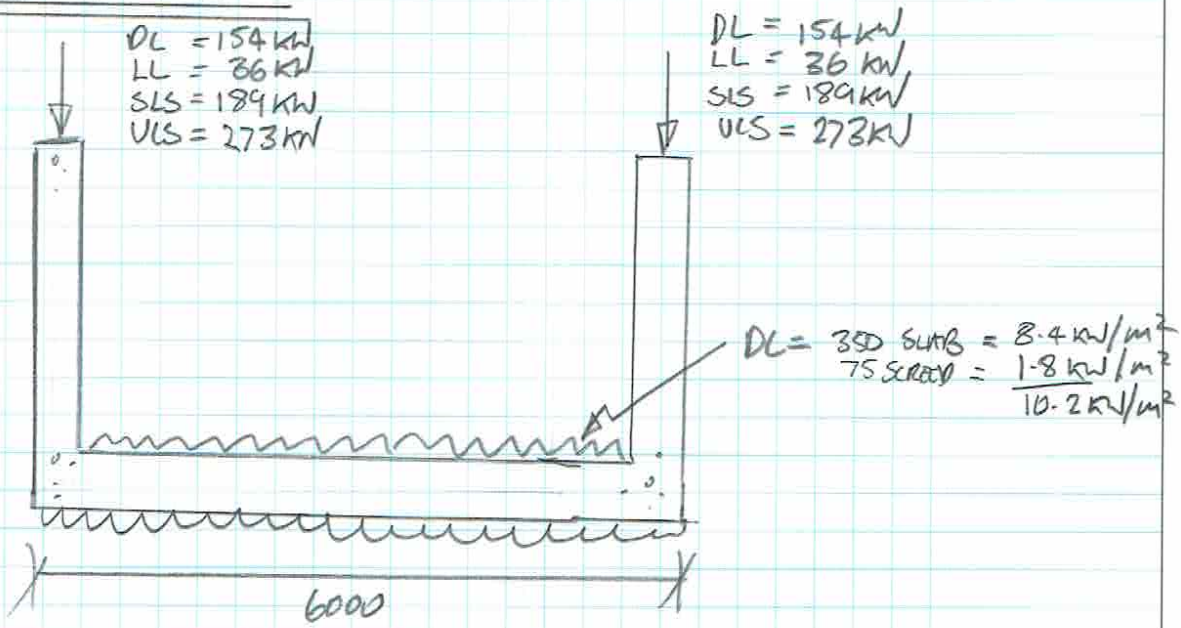
Project Title. 44 GOLDHURST TERRACE	Calc Ref. BASEMENT SLAB DESIGN -	
	Made by A-G	Date OCT 2018 Chd.

DESIGN OF BASEMENT SLAB.



CALCULATE UDL'S APPLIED TO SLAB

$$w = \frac{273 \times 2}{6} - 10.2 = 80.8 \text{ kN/m}^2 \text{ (ULS)}$$

$$w_{DEAD} = \frac{154 \times 2}{6} + 10.2 = 61.5 \text{ kN/m}^2 \text{ BY INSPECTION ROUGHLY OK.}$$

DESIGN SLAB IN BENDING.

$$M_{ULT} = 80.8 \times 5.7^2/8 = 328.1 \text{ kN-m/m.}$$

$$d = 350 - 50 - \frac{25}{2} = 287 \text{ mm}$$

$$K = \frac{M}{bd^2 f_{cu}} = \frac{328.1 \times 10^6}{1000 \times 287^2 \times 40} = 0.10$$

$$\therefore z = 0.87d = 251 \text{ mm}$$

$$A_{s req} = \frac{328.1 \times 10^6}{0.87 \times 500 \times 251} = 3004 \text{ mm}^2/\text{m.}$$

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Job No. 00285 Sheet No. 8. Rev.

Sheet Title.

Project Title.
44 GOLDWATER TERRACE.

Calc Ref. BASEMENT SLAB DESIGN.

Made by A.H. Date OCT 2018 Chd.

CONSIDER DEFLECTION.

SPAN / EFFECTIVE DEPTH = 5700/287 = 19.9.

ADOPT T25's @ 150 c/c TOP AND BOTTOM. 3272 mm²/m.

$$f_s = \frac{2}{3} \frac{f_y A_{s\,req}}{A_{s\,prov}} = \frac{2 \times 500 \times 3004}{3 \times 3272} = 306 \text{ N/mm}^2$$

$$\frac{M}{bd^2} = \frac{328.1 \times 10^6}{1000 \times 287^2} = 3.98$$

$$\text{MOD FACTOR} = 0.55 + \frac{477 - 306}{120 \times (0.9 + 3.98)} = 0.84$$

CONSIDER COMPRESSION STEEL

$$100\,\frac{A_s'\,prov}{bd} = \frac{100 \times 3272}{1000 \times 287} = 1.14$$

MOD FACTOR = 1.28

∴ ALLOWABLE SPAN / EFFECTIVE DEPTH = 0.84 × 1.28 × 20 = 21.5
> 19.9 ∴
OK.