PROJECT **34 DELANCY STREET**

REF: **OUT PUT**

SUMMARY

DESCRIPTION

Unit Loading

BASEMENT RC RETAINING WALL

RC wall	***300 mm Thick RC***
Reinforcement	***H20 - 200 i.e. A393 Mexh Double layer top & Bottom***

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UNIT LOADINGS
PITCHED TILE ROOF

Slope = 30 °

Descriptions			Service loads Kn/m²
Tiles		=	0.6
Battens and Felt		=	0.05
Rafters		=	0.08
12.5mm Plaster board, insulation and skim		=	0.17
	Sub Total	=	0.9
Dead Loads on Plan =	0.90 x SEC (30)	Total =	1.07
		Say =	**1.10** A
Super =	0.60 (60 - 30)/ 30	=	0.60
		Say =	**0.60** B
		TOTAL A + B =	**1.70**

FLAT ROOF

Descriptions		Kn/m²
13MM Bitumen bedded chippings	=	0.20
3 Layers mineral surfaced felt	=	0.10
Composite roof boarding	=	0.10
Poldeck insulation	=	0.03
SW Joist	=	0.15
12mm Plaster board and skim	=	0.17
	Total =	**0.75**
Super	=	**0.75**
	TOTAL =	**1.50**

LOFT SPACE

		Kn/m²
SW Joists say 150 x 50	=	0.10
12.5 Plaster board	=	0.15
100 mm mineral wool	=	0.05
Total Dead Load	=	**0.30**
Super	=	**0.25**
	Total =	**0.55**

LOFT FLOOR

		Kn/m²
SW Joists say 200 x 50	=	0.15
12.5 Plaster board	=	0.15
100 mm mineral wool	=	0.05
Total Dead Load	=	**0.35**
Super	=	**1.50**
	Total =	**1.85**

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STUD WALL WITH CLAY TILES

		Kn/m^2
Clay tiles hung on battens	=	0.60
75 x 50 SW struts @ 400 C/C	=	0.10
Foil backed plaster board and skim coat	=	0.20
Insulation etc.	=	0.10
	Total =	1.00

TIMBER PARTITIONS

		Kn/m^2
100 x 50 SW studs @ 400 C/C and noggins	=	0.10
Foil backed plaster board and skim coat	=	0.30
Total		**0.40**

WALLS

		Kn/m^2
Cavity Walls 225mm	=	3.25
Solid wall 225mm	=	4.70
Block wall 100mm	=	1.40
250mm Block wall	=	2.80
150 mm block wall	=	1.90
200mm	=	2.50
Brick infill studwork	=	1.70

NOTE

The calculations are based upon the drawings supplied. Any alterations to these drawings or changes effect on site during construction, could materially effect sizes of structural members that have been designed and adopted on plan. The latter should be brought to the notice of the structural Engineer with specific instructions to prepare revised calculations to accommodate the changes made.

No inspection of the existing soil conditions has been made by the designer, and no information appertaining to the latter have been offered.

No work appertaining to the plans should be carried out until the plan and calculations have been examined by the local authority, and formal written approval obtained. Any works carried out before such approval is obtained, is done solely at contractors or owners risk.

The availability of new and or existing foundation to sustain the new loading arrangement should be verified on site and agreement reached with the Building Control Officer and appropriate changes made where applicable. The condition of all existing load bearing walls to be verified on site and agreement reached with Building Control Officer as to their suitability.

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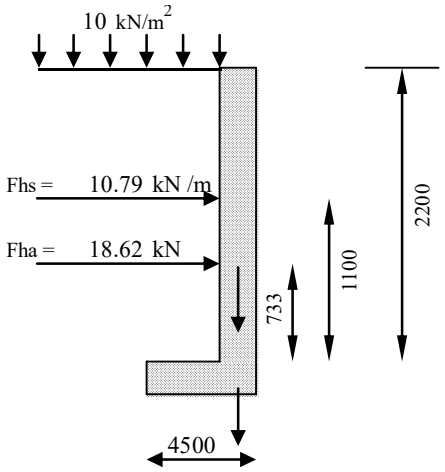
BASEMENT RC RETAINING WALL

fy	=	460	N/mm^2
fcu	=	35	N/mm^2
H(effective)	=	2.2	m
Assume wall thickness, D_w	=	300	mm To accommodate insulated wall above.
Assume Base thickness, D_b		300	mm
Angle of internal friction, ø	=	20	°
Dry density of soil, γ_d	=	1600	Kg/m^3 = 15.7 kN/m^3
Coeficient of resistance, μ	=	0.45	
Angle of internal friction between soil and wall face.δ	=	0.00	(worst conditions of soil fully saturated)

K_a	=	(1.0 - Sin20) / (1.0 + Sin20)	=	0.49		
Active H. Force,F_{ah}	=	K_a * γ_d * $H^2/2$ =	0.49 * 15.7 * 2.20^2 /2	=	18.62 kN	---- A
Over Turning Moment, M1	=	P_{ah} * H /3.0	= 18.62 * 2.2 / 3.0	=	13.66 kN/m	---- B
Table 1 Super Imposed Load, ws	=	10.00 kN/m^2				
Active Horizontal Force, F_{hs}	=	**Ka ws H**	= 0.49 * 10.0 * 2.20	=	10.79 kN	---- C
Over Turning Moment, M2		F_a * H / 2	= **10.79 * 2.20 /2**	=	**11.87** kNm	
Total Horizontal Force, **Fha**	=	18.62 + 10.79	= 29.41 kN	(B + D)		
Factored force.	=	29.41 * 2	58.82 kN			
Total Moment	=	13.66 + 11.87	= 25.52 kNm			
Mu	=	25.52 * 2	= 51.04 kNm			



SLIDE CHECK

Self wt. of RC wall	=	2.20 * 0.30 * 24	= *15.84* kN/m		
Wt. of wall above.	=		= kN/m	*Assume wall openig 30 %*	
Roof Load	=		= kN/m		
Total			= 15.8 kN/m	A	
Self wt. of Base	=	4.50 * 0.30 * 24	= *32.4* kN/m	B	
			=	C	
Total Wt. A + B + C	=		= **48.2** kN/m		
Frictional resistance force.	=	0.45 * 4.50 * 48.24	= **97.69** kN		
Sliding force	=		= **58.82** < 97.69	PASS	

Additionally, floor to be resisted by the existing foundation of the rear exten.

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OVERTURNING CHECK

RESTRAINING MOMENT

Due to wall	= 15.84 * 4499.85	=	69 kNm	
Due to Base	= 32.40 * 2.25	=	72.9 kNm	
Due to Soil behind	= 0.00 * 2.40	=	0.0 kNm	
Total Restraining moment	= 68.90 + 72.90 + 0.00	=	142 > 51.04	PASS
Overturning Moment	=			

NOTE *All horizontal forces will neutarlized with opposite forces.*

	RC WALL	
Mu kNm	51.0	
D_w	300 Base thickness	
fcu	35	
fy	460	
b	1000	
d	250	
bυ	1000	
K = M /(f_{cu} * b * d^2)	0.023	
la = 0.5+(0.25-K/0.9)^0.5 ≤ 0.95	0.95	
z = la * d	238	
Ast = M / (0.95 * fy * z) mm^2	492	
Tension Reinforcement	**H 20 - 200**	
As Provided mm^2	1570 > 492 PASS	
As Ratio = 100 * *As* /(3.14 * D^2 /4)	4.44	
d'	Not req.	
d' / d	Not req.	
As' req. = (k-0.156)*fcu * b *d2 /{0.95*fy(d-d')}		
Compression Reinforcement		
As' Provided.= mm^2		
As' Ratio= 100 * *As'* /(B * D)		
As'Prov - As'req. AsProv - Asreq.		
Shear Vs =	58.8	
υ = Vs/(b*D) = 58,819 /(1000 * 300) =	0.20	
100 * As /(b_v*d) ≤ 3	0.63	
400 / d ≥ 1	1.60	
Tablr 3.8 υc = 0.79{100*As/(bv*d)}$^{1/3}$ *(400/d)$^{1/4}$/γ_m	0.76 > 0.20 PASS	

Provide;

RC wall 300 mm Thick RC

Reinforcement H20 - 200 i.e. A393 Mexh Double layer top & Bottom