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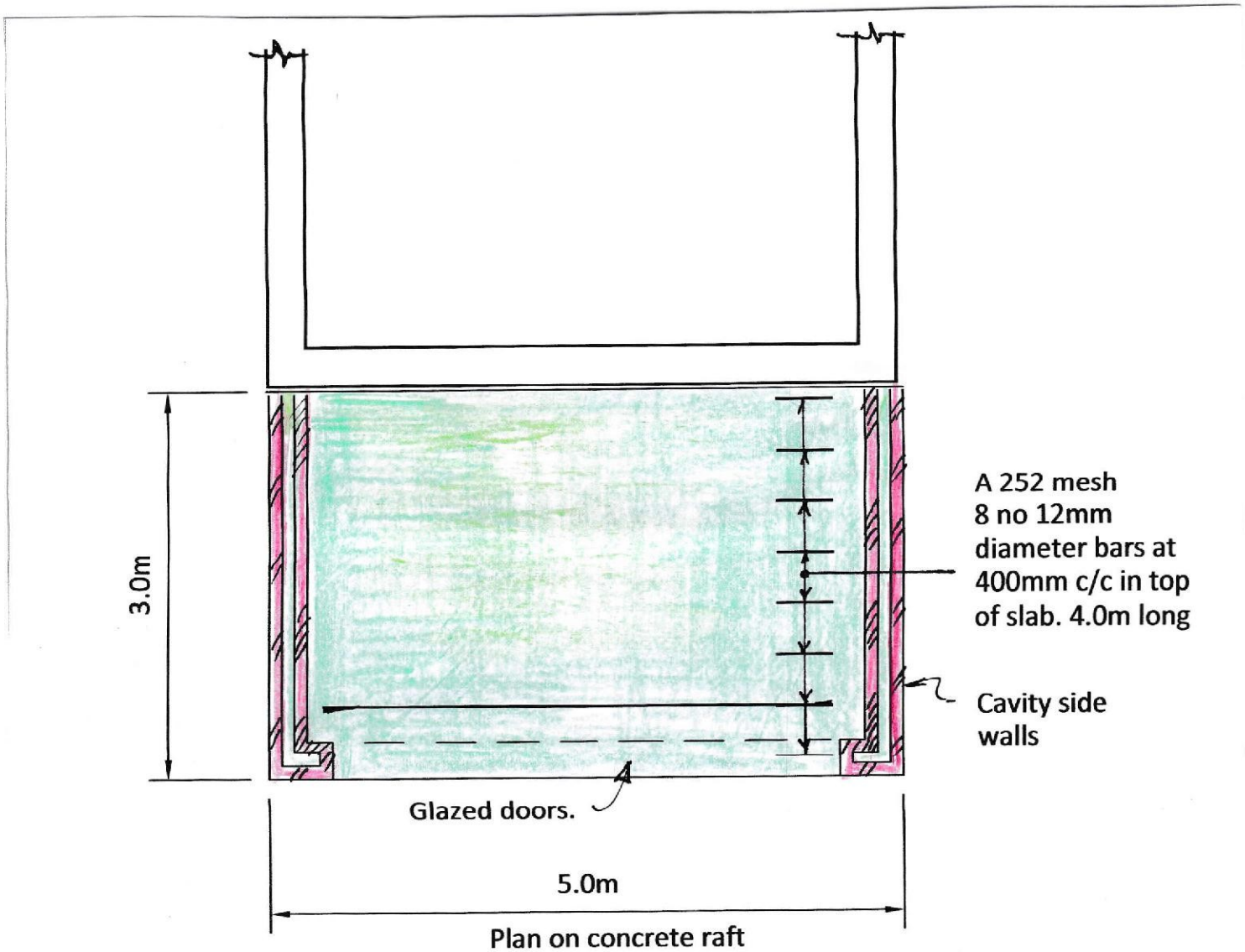
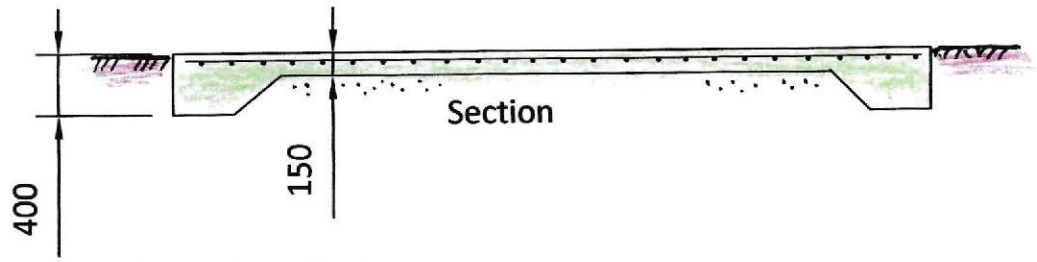
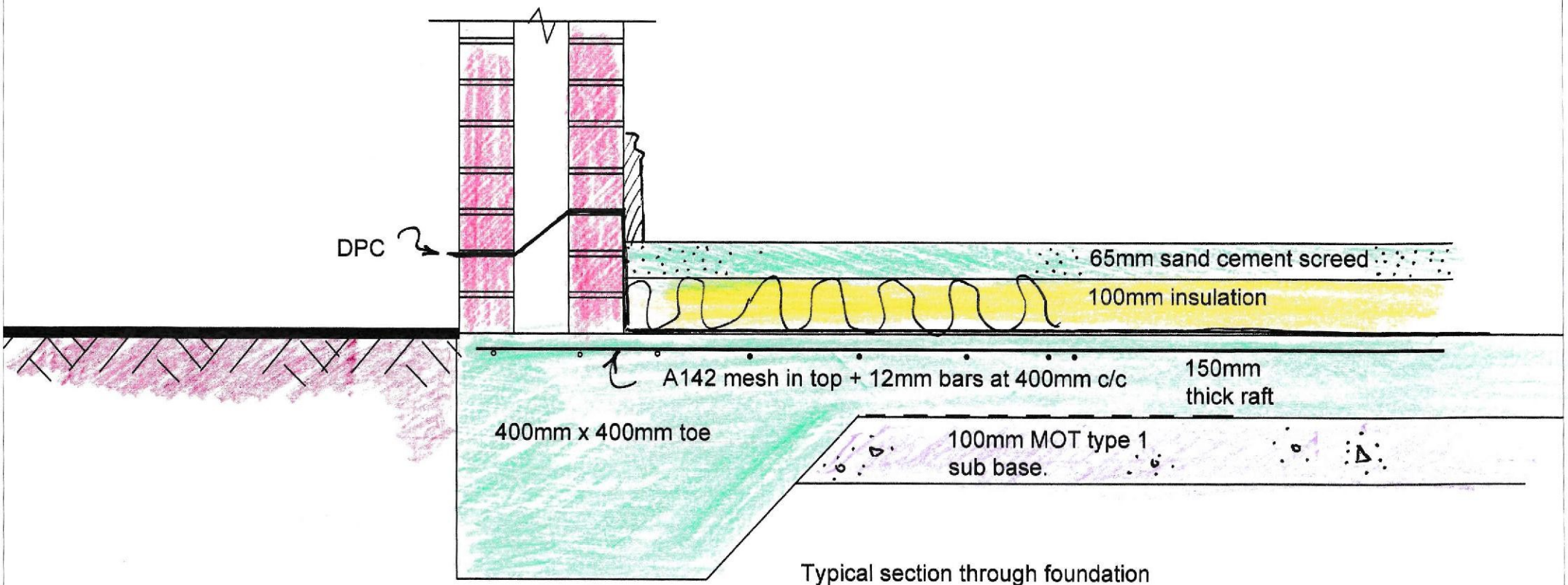
Calculations

30 Hobart Quay, Eastbourne.
BN23 5PB

This calculation considers the foundation for the new rear conservatory.
The conservatory abuts the rear of the main house. The sub-soil is "Beach gravel"
It is proposed to use a concrete raft 150mm thick as a foundation
The raft slab will spread the loads of the single storey brick and block side walls
onto the "beach" subsoil. The slab will span left to right.
The applied ground bearing pressure will be 6 kN/m^2 - which is very low.
The sketch below shows the proposed conservatory building and the concrete raft.







Typical section through foundation
and side cavity brick wall
Scale 1:10

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Extension roof load :-

External Wall

Outer leaf of brickwork (0.102x2200)	= 225 kg/m^2
Inner leaf block (0.105x1200)	= 125 kg/m^2
Plaster on inner face	= 10 kg/m^2
Total	= 360 kg/m^2
External wall - Load units	**= 3.6 kN/m^2**

Glazed roof

12mm thick glazing	= 30 kg/m^2
Aluminium glazing bars	= 15 kg/m^2
Total dead load	= 45 kg/m^2
In load units – dead load	= 0.45 kN/m^2
Imposed load	= 0.85 kN/m^2
Roof lights	**= 1.4 kN/m^2**

Raft foundation – Reinforcement for 150mm thick concrete slab.

Loads onto the raft. **From the flat roofed conservatory**

Summation of loads onto the raft from the rear extension:-

Plan size of raft = 5.0m x 3.0m = 15 m^2

Element	Area (m^2)	Intensity of load (kN/m^2)	Load onto raft (kN)
Extension roof	5.0x3.0 = 15.0	1.4	21.0
External wall	6.0 x 2.4 = 14.4	3.6	52.0
Glazed doors	5.0x2.1 = 10.5	1.1	12.0
Total load onto soil under raft causing bending			**85.0 kN**

The 150mm raft will be cast onto the "Beach" sub-soil. .
This will give the bending moment to the slab in the 5.0m side direction.
However, bending will be induced into the front to back direction.
Therefore a square mesh will be placed.

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The stress under the raft will be = Total load / area of raft
= 85/15
= **5.7 kN/m²**

Consider 1m width of slab and calculate the bending moment in this strip.
The load from the structure will be supported on the sides of the raft.
Therefore the slab will span 4.7m from the centres of the two side walls
then the bending moment $=(wxL^2)/8$
$= (5.7x4.7^2)/8$

Maximum applied BM = 15.74 kN.m

This figure should be factored up by 1.4 – therefore the BM = 22 kN.m
If we use a grade of concrete, fcu = 30 N/mm²
And HT reinforcement , fy = 460 N/mm²
Ultimate bending moment = 22 kN.m = 22000000 N.mm

Concrete raft as a foundation

150mm slab - the reinforcement is as follows
Effective depth of slab, d, will be 150mm – 30 (cover) = 120mm

The area of the main tensile reinforcement can be calculated as follows
by referring to the chart No 2 of BS 8110 - 3:1985

$M/b.d^2 = 22000000/(1000.120.120) = 1.54$

From chart No 2 $100.As/bd = 0.4$ therefore $As = 0.4xbxd/100 = 480mm^2$

use A252 mesh + 12mm diameter bars at 400mm c/c in top
which gives an area = 252 + 282 = 534 mm²
The A252 mesh and 12mm bar reinforcement to be supported on 120mm spacers.
A 450mm square toe is required to the sides and rear perimeter to prevent frost damage.
A sub base of 100mm of MOT type 1 sub base is required.