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Contract 21 Chorston Terrace. Job No. 06484 Sheet No G.1.

Location: house. Date. Feb '07 Prepared by. RM.

Ground loadings

See Roof Calculation Sheet R/1.

3rd, 2nd, 1st & Grd Floor.

LL = 1.50 kN/m²

DL = Boarding = 0.15
= Joists = 0.17
Ceiling = 0.16
/0.48 kN/m say 2.00 kN/m²

Stud walls

2 layers Plasterboard = 0.320.
Studs = 0.140.

0.460 kN/m²

NB. Hallway ground
Add. 3a. HDs = 0.72
= 2.72 kN/m
Ground Floor Hallway.

Proposed Alterations to lower Ground Floor

Beam <G/3> Span 1.8m.

Loading to Grd floor construction.

Floor = 2.00 x 3.4/2 = 3.40 kN
+ Stud wall. (0.41x3x1.8) (2.2kN doubled)
to

∴ Sw Max load = 2.2 + (3.4 x 1.8) = 8.32 kN T.L.

∴ M = 8.32 x 1.8/8 = 1.87 kNm

Ireqd 8.32 x 1.8² x 2.23 = 60.11 cm⁴

Try 178x102 UB. L 180. ry = 2.37 = 75.9. D/t = 22.
Pbc = 154 N/mm².

∴ Mb = 153 x 154 x 10⁻³ = 23.56 kNm > 1.87 kNm ∴ Use 178x102 UB

Brick bearing stress = 0.42 x 1.5 = 0.63 = 8.32/2 / 0.63 x 100 = 66.

Use 225x150 x100 wide cone. padstone.

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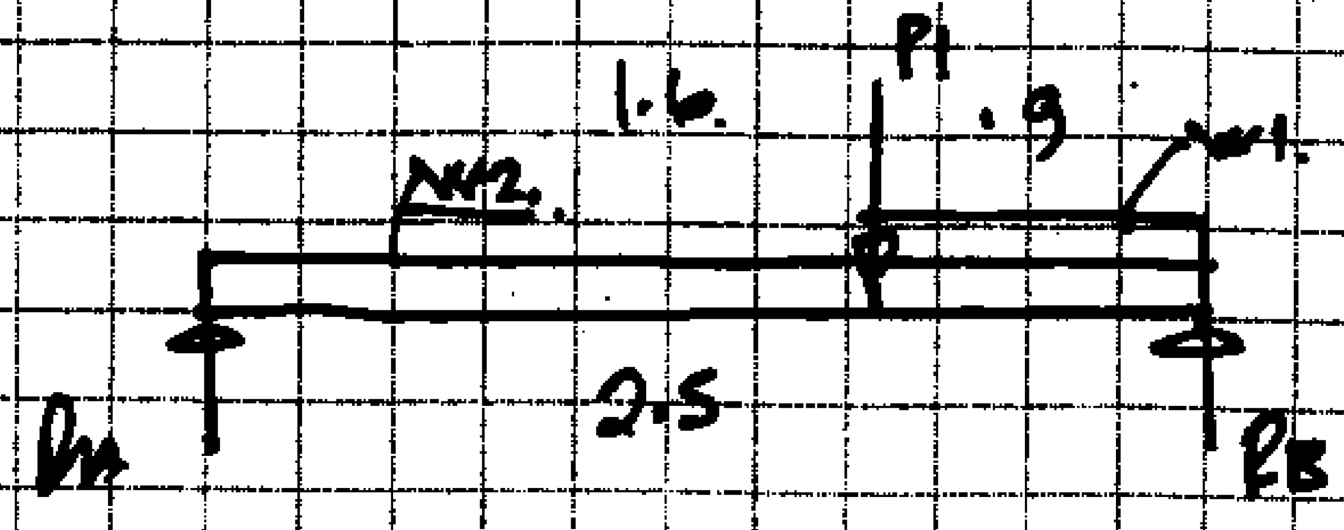
Contract 21 Chester Terrace Job No. 06485 Sheet No G2
Regent Park Date. Feb'07 Prepared by. MM.

Beam. <G/1> Span 2.5m.



P. Staircase Mitre beam (...) (4.0 m..

Floor. 2.72 x 1.3/2 = 1.76 kN
wall to 1/1 up high
= 2.10 x 1.5m 3.150 k/ 4.91 kN.

∴ 4.91 x 6.0 x 4/2 = 12kN = P1.

W2 = 2.72 x 3m - 8.16 kN

W1. = Staircase - up. 3.2kN x 2 - 6.4kN/

RA = (8.16 x 1.25) + 12 x .9/2.5 + (6.4x.9) x .45/2.5 5.76

RA = 10.20 + 4.32 + 1.036 = 15.55 kN.
RB 10.20 + 7.68 + 4.72 = 22.60. kN

∴ P2 the 15.55/8.16 = 1.9 ∴ under PL.

∴ M = 15.55 x 1.6 - 8.16 x 1.6²/2 = 24.88 - 10.44 = 14.43kNm

Eq. UDL = 14.43 x 8/2.5 = 46.19 kN.

I. reqd 46.19 x 2.5² x 2.23 = 643.8 cm⁴

Try 203x133 UB 30. L = 250 ry = 3.17 = 78.8.
D/T = 21.1. Pbc = 150 N/m²

∴ Mr = 150 x 280 x 10⁻³ = 42kNm > 14.43

Use 203x133x30UB

Spreader = 22.60 x 10³/0.63 x 100 = 358
400 x 100 x 215 thick spreader

15.55 x 10³/0.63 x 100 = 246 = 300 x 100 x 150 thick spreader

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Contract 21 Chester Terrace | Job No. 06485 | Sheet No G3
Regents Park | Date. Feb '07 | Prepared by. RM.

Beam <G2>

Span. 4.2m

loading: wall. Col - 1st (b/wall). 2.5 x 3.3. 8.25

Hall floor. 2.72 x 2.5/2 = 3.50.

Main W. floor, 2.0 x .3 = 0.6.

12.350 kN/m

∴ Total load = 12.35 x 4.2 = 51.87 kN

Ra = Rb = 26 kN

M = 52 x 4.2/8 = 27.3 kNm

I (q) = 52 x 4.2² x 2.23 = 2045 cm⁴

Try 203 x 133 x 30 UB. 420/3.17 = 132. D/T = 21.5 pbc 110 N

∴ M = 280 x 110 x 10⁻³ = 30.8 kNm >

However Try 203x203 UC 46. I = 4568 > 2045

L = 420/5.13 = 81.8. D/T = 18.7. pbc 150 N/mm

∴ M = 150 x 450 x 10⁻³ = 67.5 kNm > 27.3 kNm

∴ Use 203 x 203 x 46 UC

Bearing for beam = 26 x 1.48 = 38.4 kN factored load

Use 20.4 N/mm bricks set in 1:4½.

Try 215 x 215 piers tied to existing walls

∴ Max width 340mm (eff). area pier 215 x 215

fk = 6.4 N/mm² γm = 3.5. β 2500/340 = 7.35 ∴ 0.88

Area red. 0.76 ∴ (6.4 x 215 x 215 x 0.88 x 0.76)/3.5 = 56.5 kN > 38.4

∴ OK Use

215 x 215 Pier

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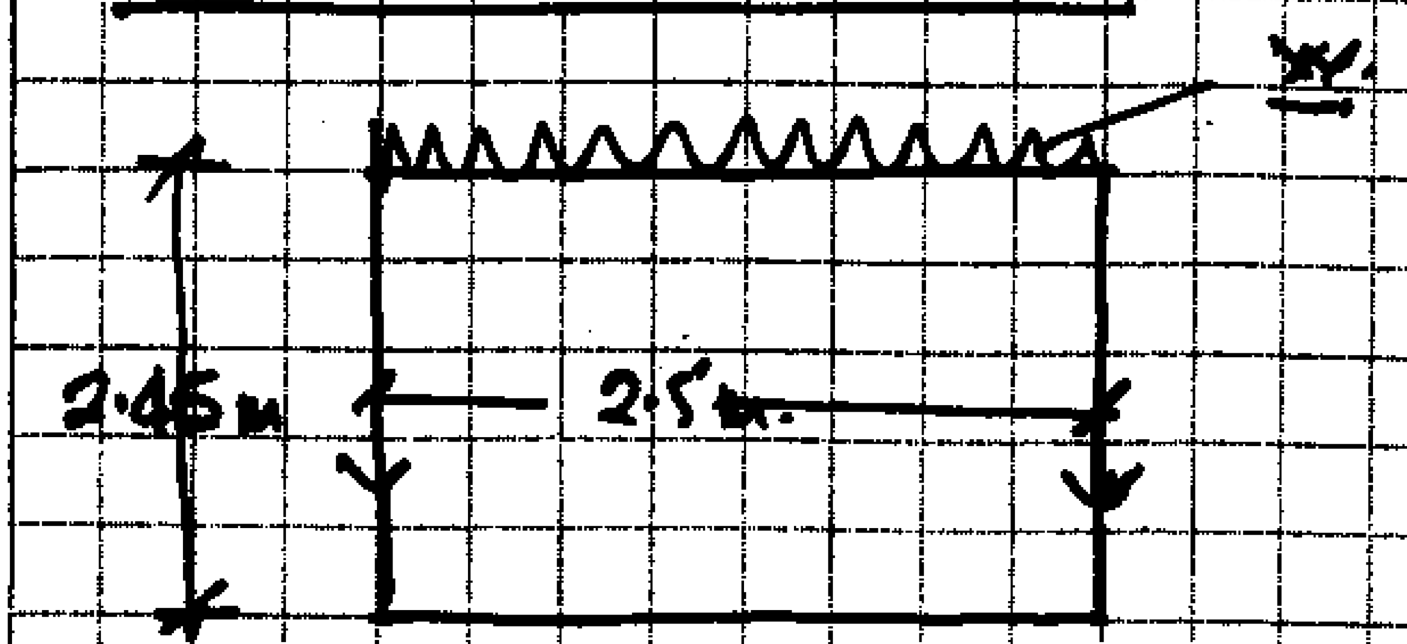
Contract 21 Chester Terrace Regents Park | Job No. 06485 | Sheet No G4.
Date. Feb '07 | Prepared by. RM.

Box Frame "A"



Loading

Roof = 0.

3rd Floor = 2.0 x 7/2 = 7.0

2nd Floor = 2.0 x 7/2 = 7.0

1st Floor = 2.0 x 7/2 = 7.0

Grd Floor = 2.72 x 1.3/2 = 1.76.

Walls Grd – 3rd Floor = 10.2 x 2.5 = 25.50 / 48.26 kN/m

Sw B/b Parapet = 3 x 3.5 x (1.2 kN/m²) 12.60

60.86 kN

∴ Grd Floor Beam = 60.86 x 2.5 = 152 kN   Reaction = 76 kN

M = 152 x 2.5/8 = 47.5 kNm

Beam supports 215mm wall. Try 203x203x46 UC

Le 250 ry = 5.13 = 48.73 D/T 18.2. Pbc = 180 N/mm²

∴ Mc = 180 x 450 x 10^{-3} = 81.0 kNm > 47.5 kNm   Use 203x203x46 UC

Check Col. Sa. Horizontal load = 10% vertical load = 15.2 kN

∴ M = 15.2 x 1.2/2 = ± 10. kNm. Frame braced.

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Contract 21 Chester Terrace. Job No. 06 485 Sheet No G5

Regents Park. Date. Feb. 07. Prepared by. KM.

Col Centre   Try 203x203 UC 46

P = 76 kN   Area. 58.7 cm²   Ix = 450.

ry = 5.13.   L = 2400 x 0.85 = 2040 mm   Pbc = 180 N/mm

L/r = 204/5.13 = 39.7 . 139 N/mm   Mx 10 kNm

$f_c = \frac{76 \times 10^3}{58.7 \times 10^2} = 12.9\ N/mm^2$ $12.9/139 = 0.093$

$f_{bc} = 10 \times 10^3 / 450 = 22.5\ N/mm$ $\frac{22.5}{180} = 0.123$

0.216 < 1.0

∴ Card Beam as Beam at Gnd Floor level

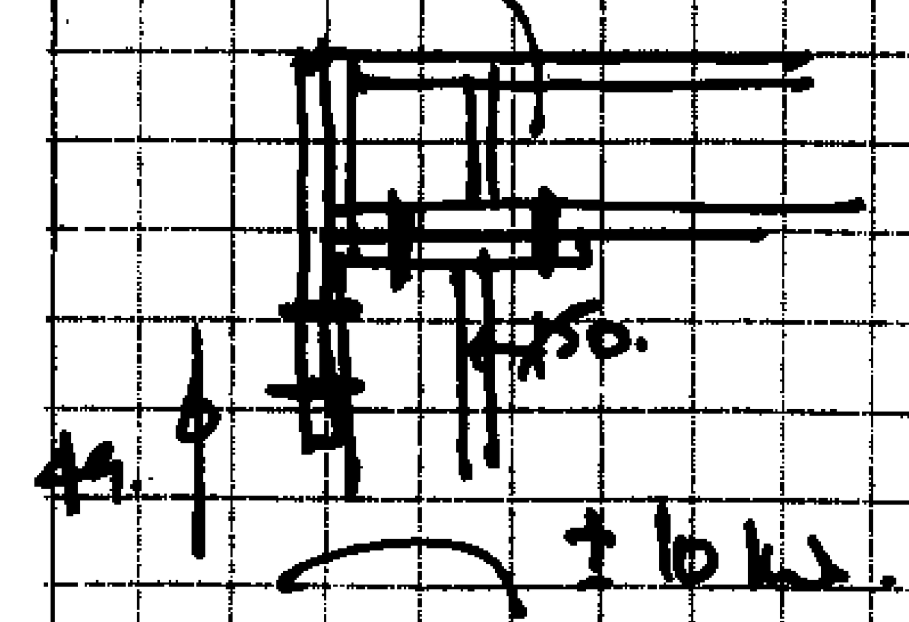
= 203x203x46 UC

Connection:

Use M20/16 grade 8.8 bolt

10/.203 = 49 kN.

∴ Provide 12mm plate welded to UC beams. 6mm full profile fillet welds.



+ 1

Using grade 8.8 bolts to resist shear 49 kN

Provide 4 M20 grade 8.8 bolts

Capacity = 200 kN . ish

Check tension. 2No bolts

= 10/.253 = 39 kN   19.5 kN/bolt

∴ Use 4 M20 grade 8.8 bolts cap & base plates.

2No bolts = 137.4 kN > 39 kN

∴ Ok.

Check plates

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Contract 21 Chester Terrace Job No. 06 485 Sheet No G6

Regent Park. Date. Feb '07 Prepared by. DM.

Base frame cont'd

Tension : Two bolts 39.kN. @ 0.05 fr face of col.

$\therefore M = 39.0 \times 0.05 = \underline{1.98\,kNm}$ (moment in plate)

$\therefore$ 200 wide $\sqrt{\dfrac{1.98 \times 6}{200 \times 180}} = 18.03$

Use 20mm thick Cap & base plates welded to UC with full profile 6mm fillet welds.

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