Michael Evans & Associates Ltd

Consulting Structural & Civil Engineers

34 Station Road, Draycott, Derbyshire DE72 3QB
Tel : 01332 871 840 - Fax : 01332 871 841
www.mevans.co.uk

Structural Calculations

In respect of

CAPITAL COMPACTORS, BARNSLEY FOUNDATION

Client

Midbrook Enterprises Limited

Architect

Job No 15-129

March 2015

Issue no	Date	Description
3	2015-03-10	Fire boundary check added, (sheet 2 & SK1)
2	2015-03-09	Rear wall to be blockwork, (sheets 1, 2 & SK1 revised)
1	2015-03-09	First issue

7.6

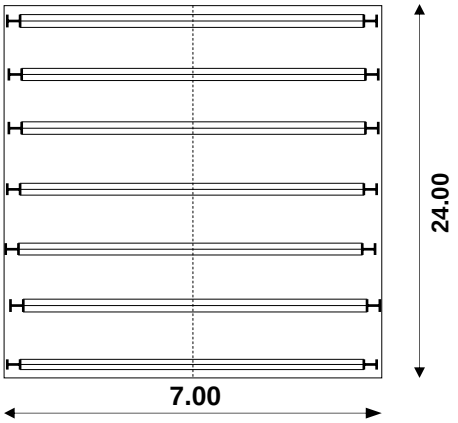
Michael Evans & Associates Ltd
CONSULTING STRUCTURAL ENGINEERS
34 Station Road, Draycott, Derbyshire, DE72 3QB.
Tel. 01332 871840
Fax. 01332 871841

Date.	Project No.	Sheet No.
Mar-15	15-129	CAPITAL COMPACTORS, BARNSLEY 1A

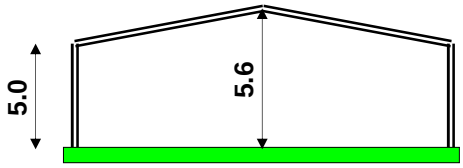
Project.	By.	Checked.	Issue	Rev
CAPITAL COMPACTORS, BARNSLEY	RS		3	

Rev A 9.03.2015 Rear wall now blockwork

Dimensions are for design purposes only



Max design cc of frames = 4.60 m



Treat as "pinned" based portal

An inspection of borehole archives held by British Geological Surveys indicate a number of borehole some 200m to the north east. The boreholes generally suggest shallow fill, (up to about 0.7m), overlying clays and weathered mudstones.

We understand there are no trees in the vicinity of the proposals

Assume formation comprises soft to firm soils with a bearing capacity > 40 kN/m^2

Assume 200 mm thick slab, (no joints).

Basic load for proposed portal framed store, (all cold rolled sections), abstracted from calculation file NQ1762 by BW Industries:

	Vertical	Horizontal	
Dead	**3.4 kN$_{service}$**	**0.5 kN$_{service}$**	
Live	**9.7 kN$_{service}$**	**1.5 kN$_{service}$**	
Total	**13.1 kN$_{service}$ ↓**	**2.0 kN$_{service}$ →**	(horizontal thrust taken by slab-ignore)

Floor	**200 slab**	**4.80**
	imposed (general storage**)**	**7.50**
		12.30 kN/m^2

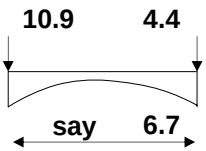
EO rear blockwork wall 5.0 @ 1.30 = 6.5 kN/m

Assume stanchion reaction spread along 3.0 m of slab = 13.1 / 3.00 = 4.4 kN/m$_{service}$
Rear wall 10.9 kN/m$_{service}$

Consider bearing pressures

Assume perimeter loading transferred to ground via parabolic distribution

bearing pressure at edge = $2\left(\frac{10.9 + 4.37}{6.7}\right)$ = 4.55 kN/m^2



self weight of slab	**4.8**
super	**7.5**
	16.8 kN/m^2

CONSIDERED ACCEPTABLE

Michael Evans & Associates Ltd
CONSULTING STRUCTURAL ENGINEERS
34 Station Road, Draycott, Derbyshire, DE72 3QB.
Tel. 01332 871840
Fax. 01332 871841

Date. Mar-2015	Project No. 15-129	Sheet No. CAPITAL COMPACTORS, BARNSLEY 2B	
Project. CAPITAL COMPACTORS, BARNSLEY	By. RS	Checked.	Issue 3 Rev

Rev A 9.03.2015 rebar increased
Rev B 10.03.2015 fire bdry condition checked

Assess bending in slab d = 200 - 40 - 20 = 0.140 m assume f_{cu} 35 N/mm^2

M_{serv} = W L / 16 = (10.9 + 4.4) 6.7 / 16 = 6.38 kNm$_{serv}$ say 9.57 kNm$_{ult}$/m (γf=1.5)

Check A 393 fabric M/bd^{2}f$_{cu}$ = 0.0139 z/d= 0.98

Mr = 0.95 0.460 0.95 0.140 393 = 22.8 kN-m > 9.6 OK

Consider possibility of soft spot beneath raft (say 3m diameter or 1.5m cantilever)

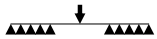
span M_{serv} say = w L^2 / 16 = 12.3 3.0^2 / 16 = 6.9 kNm$_{serv}$ say 10.4 kNm$_{ult}$ (γf=1.5)

< 22.8 kN-m OK

cant M_{serv} say = wl^2 / 4 (two-way) = 16.8 1.5^2 / 4 = 9.5 kNm$_{serv}$ say 14.2 kNm$_{ult}$ (γf=1.5)

< 22.8 kN-m OK

Consider possibility of soft spot beneath stanchion load



M_{serv} say = W L / 8 = 13.1 3.0 / 8 = 4.9 kNm$_{serv}$ say 7.4 kNm$_{ult}$

Rear wall say additional 6.5 3.0 = 19.5 kN$_{serv}$

M_{serv} say = W L / 8 = 32.6 3.0 / 8 = 12.2 kNm$_{serv}$ say 18.3 kNm$_{ult}$

Assume width of slab contributing to perimeter is 1.0 m, i.e. M = 18.3 kNm$_{ult}$/m (γf=1.5)

< 22.8 kN-m OK

ADOPT 200 mm SLAB WITH A 393 FABRIC TOP & BOTTOM

Consider Fire Boundary Condition

From BW Industries' sheet 50 Frame vertical load 6.9 kN

Overturning moment 8.0 kNm$_{serv}$

Assume moment spread over 2.0 m length of slab = 4.0 kNm$_{serv}$ say 4.2 kNm$_{ult}$

Check resistance to overturning at say 1.0 m from slab edge (γf=1.05)

Resistance due to self weight of frame and self weight of slab

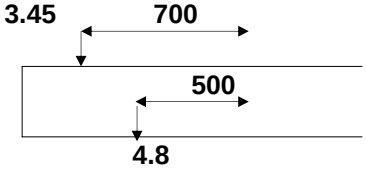
M_r say 3.45 0.7 + 4.8 0.5 = 4.8

Bending resistance of slab = 22.8

Total Resistance = 27.7 kNm$_{ult}$

> 4.2 kNm$_{ult}$

SATISFACTORY



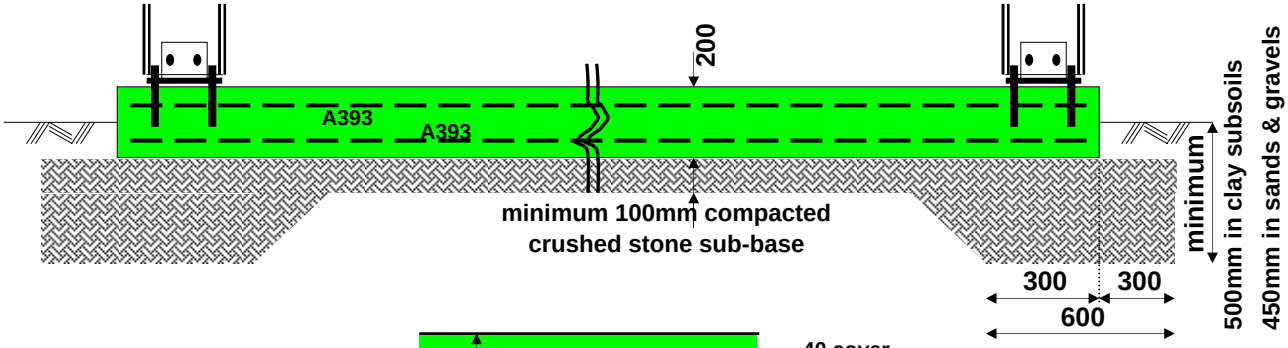
BASIC SLAB SATISFACTORY FOR FIRE BOUNDARY CONDITION

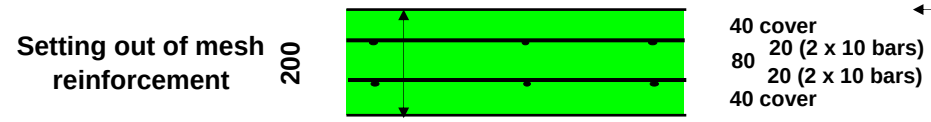
Michael Evans & Associates Ltd
CONSULTING STRUCTURAL ENGINEERS
34 Station Road, Draycott, Derbyshire, DE72 3QB.
Tel. 01332 871840
Fax. 01332 871841

Date. Mar-2015	Project No. 15-129	Sheet No. CAPITAL COMPACTORS, BARNSLEY SK1B	
Project. CAPITAL COMPACTORS, BARNSLEY	By. RS	Checked.	Issue 3 Rev

Rev A 9.03.2015 rebar increased
Rev B 10.03.2015 fire bdry note deleted

ADOPT 200 mm SLAB WITH A 393 FABRIC TOP & BOTTOM





NOTES

SUB-BASE — All topsoil to be removed and replaced with crushed stone and compacted in maximum 150mm thick layers. Minimum allowable ground bearing capacity to be not less than 40kN/m2. Sub-base to be blinded, prior to laying of polythene damp proof membrane.

SLAB — 200mm thick power floated slab, concrete grade 28/35, (minimum cement content 300kg/m3, maximum water / cement ratio 0.6, maximum aggregate size 20mm). (Slab may be cast without joints).

REINFORCEMENT — Minimum cover 40mm. Minimum laps to fabric to be 400mm. Fabric to be nestled and joints staggered to minimise congestion at laps, (or use mesh with flying ends)

DPM — Damp proofing to architects details.