



PHILIP GOACHER ASSOCIATES

Consulting Civil and Structural Engineers

Park House • 122A Newland Road
Worthing • West Sussex • BN11 1LB

Our Ref: DG/20133

STRUCTURAL CALCULATIONS

ON: 55-57 HIGH STREET
ARUNDEL

FOR: MRS BAUER

DATE: JUNE 2020

PREPARED BY: D GIERKE M.Eng, MSAICE

CHECKED BY: S GRAY B.Eng (Hons) PGCert



 PHILIP GOACHER ASSOCIATES Consulting Civil and Structural Engineers Park House • 122A Newland Road • Worthing • West Sussex • BN11 1LB			JOB TITLE	
			55-57 HIGH STREET ARUNDEL	
Design by DG	Checked by SG	Date JUNE 2020	Job No 20133	Data Sheet No DP
DESIGN PHILOSOPHY Existing Building The existing building was a four-storey structure which had been converted into domestic dwelling apartments. The original property was constructed having internal load bearing masonry walls, timber floors and external masonry walls. Proposed Works It is proposed to add a new front entrance door to apartment 55B, situated on the ground floor of the building. The new door will require breaking through an existing load bearing internal masonry wall between apartment 55B and the adjacent hallway. This report will focus on the structural design of the lintel required for the new entrance door opening. It is noted that the apartments above 55B were inaccessible at the time of the inspection, therefore, conservative assumptions have been made to ensure that the lintel design is adequate to support the loads from above. It is conservatively assumed that the geometry of the apartments are consistent within the building and that the internal wall, where the new opening is proposed, is continuous from the ground floor up to the roof level. It is assumed that the internal wall also supports a portion of the roof structure at roof level. All works to BCO approval.				



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DESIGNER RISK ASSESSMENT

Project Title 55-57 HIGH STREET ARUNDEL	Project No. 20133	Sheet No. DRA01
	Engineer: DG	Checked by: SG
	Date: JUNE 2020	Date: JUNE 2020
Client MRS BAUER		

The following specific risks have been identified:

Ref	Risk	Action
1	Temporary Works	The contractor is to provide all necessary temporary propping & temporary works to safely undertake the work and maintain structural stability. The contractor is to be aware that the property may be occupied during construction and temporary works loading to consider this.
2	Confirmation of Structural Layout	The assumptions made within the calculations and drawing should be confirmed on site, prior to commencement of works. Any differences should be discussed with Structural Engineer, in order to check calculations.
3	Demolition	Contractor to take all measures to control noise and dust.

Notes:

1. The works are to be carried out by an experienced competent contractor capable of managing general construction hazards.
2. The following list is limited to specific risks associated with the structural design and is to be read in conjunction with other relevant designer risk assessments.
3. The following list is not necessarily exhaustive and the contractor should carry out their own assessment of potential risks.
4. Comment is made in the Risk Assessment for future demolition and use of the building as a work place only if it is considered to be out of the ordinary.
5. The Client, designers and contractor shall be mindful of their Health and Safety obligations under the CDM (2015) Regulations.

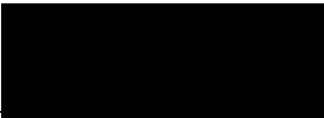
Check list: (Delete if not applicable or considered a general site risk)

Temp. stability / propping	Access	Risks to General Public	Asbestos	Confined spaces	Future maintenance
Hidden / buried services	Material handling	Hot works	Working at height	COSHH	Dismantling / demolition

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		55-57 HIGH STREET ARUNDEL	
STANDARD DATA SHEET 1	Date JUNE 2020	Job No 20133	Data Sheet No 01
LOCATION	UNFACTORED LOADS	FACTOR γ _f	FACTORED LOADS
SLOPING ROOFS (Measured on Plan) Tiles Battens and Felt Rafters Live Load Total	0.60 KN/m ² 0.10 KN/m ² 0.10 KN/m ² <u>0.75 KN/m²(max)</u> 1.55 KN/m ²	1.4 1.4 1.4 1.6	0.84 KN/m ² 0.14 KN/m ² 0.14 KN/m ² <u>1.20 KN/m²</u> 2.32 KN/m ²
FLAT ROOFS Chippings and Felt Boards, Joists and Firrings Soffit and Insulation Live Load Total	0.32 KN/m ² 0.32 KN/m ² 0.16 KN/m ² <u>0.75 KN/m²</u> 1.55 KN/m ²	1.4 1.4 1.4 1.6	0.45 KN/m ² 0.45 KN/m ² 0.22 KN/m ² <u>1.20 KN/m²</u> 2.32 KN/m ²
ROOF SPACE Joists and Insulation Soffit Live Load Total	0.10 KN/m ² 0.15 KN/m ² <u>0.25 KN/m²</u> 0.50 KN/m ²	1.4 1.4 1.6	0.14 KN/m ² 0.21 KN/m ² <u>0.40 KN/m²</u> 0.75 KN/m ²
TIMBER FLOORS Boards and Joists Soffit Live Load (Domestic) Total	0.35 KN/m ² 0.15 KN/m ² <u>1.50 KN/m²</u> 2.00 KN/m ²	1.4 1.4 1.6	0.49 KN/m ² 0.21 KN/m ² <u>2.40 KN/m²</u> 3.10 KN/m ²
TIMBER STUD WALLS Internal Studding Plasterboard and set x 2	0.10 KN/m ² <u>0.30 KN/m²</u> 0.40 KN/m ²	1.4 1.4	0.14 KN/m ² <u>0.42 KN/m²</u> 0.56 KN/m ²
Internal Studding Lath and plaster x 2	0.10 KN/m ² <u>0.50 KN/m²</u> 0.60 KN/m ²	1.4 1.4	0.14 KN/m ² <u>0.70 KN/m²</u> 0.84 KN/m ²
External Studding Plasterboard Battens, Felt and Insulation Tiles	0.10 KN/m ² 0.15 KN/m ² 0.10 KN/m ² <u>0.60 KN/m²</u> 0.95 KN/m ²	1.4 1.4 1.4 1.4	0.14 KN/m ² 0.21 KN/m ² 0.14 KN/m ² <u>0.84 KN/m²</u> 1.33 KN/m ²

 PHILIP GOACHER ASSOCIATES Consulting Civil and Structural Engineers Park House • 122A Newland Road • Worthing • West Sussex • BN11 1LB 		JOB TITLE 55-57 HIGH STREET ARUNDEL	
STANDARD DATA SHEET 2	Date JUNE 2020	Job No 20133	Data Sheet No 02
LOCATION	UNFACTORED LOADS	FACTOR yf	FACTORED LOADS
MASONRY WALLS 100 Lightweight Block Block Plaster x 2	1.00 KN/m ² 0.50 KN/m ² 1.50 KN/m ²	1.4 1.4	1.40 KN/m ² 0.70 KN/m ² 2.10 KN/m ²
100 Dense Block Block Plaster x 2	1.50 KN/m ² 0.50 KN/m ² 2.00 KN/m ²	1.4 1.4	2.10 KN/m ² 0.70 KN/m ² 2.80 KN/m ²
215 Block Party Wall Block Plaster x 2	3.20 KN/m ² 0.50 KN/m ² 3.70 KN/m ²	1.4 1.4	4.50 KN/m ² 0.70 KN/m ² 5.20 KN/m ²
215 Brick Party Wall Brick Plaster x 2	4.50 KN/m ² 0.50 KN/m ² 5.00 KN/m ²	1.4 1.4	6.30 KN/m ² 0.70 KN/m ² 7.00 KN/m ²
265 Cavity Wall Brick Block Plaster	2.25 KN/m ² 1.50 KN/m ² 0.25 KN/m ² 4.00 KN/m ²	1.4 1.4 1.4	3.15 KN/m ² 2.10 KN/m ² 0.35 KN/m ² 5.60 KN/m ²
<u>CODES OF PRACTICE USED IN DESIGNS</u> CONCRETE BS 8110 STEELWORK BS 5950 MASONRY BS 5628 TIMBER BS 5268 LOADING FOR BUILDINGS BS 6399 OR CP3 CHV PT2 Refer to Data Sheet 3 for standard construction notes.			

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STANDARD DATA SHEET 3	Date JUNE 2020	Job No 20133	Data Sheet No 03
CONSTRUCTION NOTES: 1) All loadings are standard loadings. Confirmation of existing materials and weights to be undertaken by others on site. 2) Calculations prepared in accordance with Architect's drawings. 3) No works should be undertaken on site until Building Regulations Approval has been granted. 4) The builder and owner are reminded that works on or adjacent to a party wall or boundary will be subject to the Party Wall etc. Act 1996 and approval from the adjoining owner must be sought 2 months prior to commencing works. Further information can be provided by this Company if required. 5) All dimensions to be taken on site and not scaled from the drawings or sketches. All details and dimensions relating to subcontractors or suppliers work must be checked and agreed between the subcontractor or supplier and the general contractor. 6) The drawings, details and sketches to be read in conjunction with all relevant Architects' and Engineers' drawings and specifications. 7) Works to comply with current Codes of Practice, British Standards and Building Regulations. 8) Contractor to expose structure to confirm span directions, support locations and details, footings etc. and to verify that all assumptions made by the Engineer are correct prior to ordering any materials or carrying out any works on site. 9) Steelwork to have two coats of red oxide primer generally and to have two further coats of bitumen paint where supported at external walls unless indicated otherwise. 10) All internal steelwork subject to fire regulations to have two layers of 12.5mm plasterboard with joints staggered or to Architect's specification to comply with Building Regulations. 11) Where timbers are bolted together the bolt holes are to be drilled no more than 2mm diameter larger than bolt diameter. Holes to be at right angles to line of timbers. The bolts are to be tightened until local crushing is apparent around the 51mm square plate washers. If timbers are not touching then timber packers are to be installed full depth of the joists/rafters to make up the gap. 12) Bearing of all new foundations to be 1000mm below external ground or to level of base of foundations to main building, whichever is deeper, unless indicated otherwise on drawings. Foundation details may have to be altered if ground conditions prove to be different from those assumed in the calculations, i.e. poorer ground conditions, obstructions or existing structures. Footings may be required to go deeper if trees are, or recently have been, in close proximity to the building. All foundations to be confirmed on site by the Building Control Officer. 13) All underpinning works to be checked and approved by the Local Authority Building Control Officer and to be carried out in accordance with our specification for underpinning. The works are to be carried out in accordance with the Construction, Design and Management Regulations 2015. The Client and contractors should ensure they comply with their duties as set out in the regulations. Refer to HSC document Managing Health and Safety in Construction (CDM 2015), Approved Code of Practice for further details.			

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	55-57 HIGH STREET, ARUNDEL				20133	
	Section				Sheet no./rev.	
	NEW LINTEL DESIGN				4	
	Calc. by	Date	Chk'd by	Date	App'd by	Date
	DG	JUNE '20	SG	JUNE '20		

New Ground Floor Lintel

Contractor to confirm the thickness of the internal wall before ordering the new lintel.

1. Assuming the wall is 215mm thick:

Loading

DL = Masonry (1.25m x 5.0kN/m²) = 6.25kN/m (from top of lintel to 1st floor)

Masonry (2.65m x 5.0kN/m²) = 13.25kN/m (from 1st floor to 2nd floor)

Masonry (2.65m x 5.0kN/m²) = 13.25kN/m (from 2nd floor to 3rd floor)

Masonry (2.65m x 5.0kN/m²) = 13.25kN/m (from 3rd floor to roof)

Floor (8.8m/2 x 0.5kN/m²) = 2.2kN/m (1st floor)

Floor (8.8m/2 x 0.5kN/m²) = 2.2kN/m (2st floor)

Floor (8.8m/2 x 0.5kN/m²) = 2.2kN/m (3rd floor)

Roof (8.8m/2 x 0.8kN/m²) = 3.52kN/m

Total DL = 55.85kN/m

LL = Floor (8.8m/2 x 1.5kN/m²) = 6.6kN/m (1st floor)

Floor (8.8m/2 x 1.5kN/m²) = 6.6kN/m (2st floor)

Floor (8.8m/2 x 1.5kN/m²) = 6.6kN/m (3rd floor)

Roof (8.8m/2 x 0.75kN/m²) = 3.3kN/m

Total LL = 23.1kN/m

Design

Clear span of lintel = 900mm (design span = 1200mm)

Service moment = $wl^2/8 = ((55.85\text{kN/m} + 23.1\text{kN/m}) \times 1.2^2) / 8 = \underline{14.211\text{kNm}}$

Provide min. **2No. R22A (215mm deep x 100mm wide)** pre-stressed concrete lintel supplied by Supreme Concrete, or similar approved. To be installed with 150mm end bearings.

2. Assuming the wall is 100mm thick:

Loading

DL = Masonry (1.25m x 2.5kN/m²) = 3.13kN/m (from top of lintel to 1st floor)

Masonry (2.65m x 2.5kN/m²) = 6.63kN/m (from 1st floor to 2nd floor)

Masonry (2.65m x 2.5kN/m²) = 6.63kN/m (from 2nd floor to 3rd floor)

Masonry (2.65m x 2.5kN/m²) = 6.63kN/m (from 3rd floor to roof)

Floor (8.8m/2 x 0.5kN/m²) = 2.2kN/m (1st floor)

Floor (8.8m/2 x 0.5kN/m²) = 2.2kN/m (2st floor)

Floor (8.8m/2 x 0.5kN/m²) = 2.2kN/m (3rd floor)

Roof (8.8m/2 x 0.8kN/m²) = 3.52kN/m

Total DL = 33.14kN/m

LL = Floor (8.8m/2 x 1.5kN/m²) = 6.6kN/m (1st floor)

Floor (8.8m/2 x 1.5kN/m²) = 6.6kN/m (2st floor)

Floor (8.8m/2 x 1.5kN/m²) = 6.6kN/m (3rd floor)

Roof (8.8m/2 x 0.75kN/m²) = 3.3kN/m

Total LL = 23.1kN/m

Design

Clear span of lintel = 900mm (design span = 1200mm)

Service moment = $wl^2/8 = ((33.14\text{kN/m} + 23.1\text{kN/m}) \times 1.2^2) / 8 = \underline{10.123\text{kNm}}$

Provide min. **R22A (215mm deep x 100mm wide)** pre-stressed concrete lintel supplied by Supreme Concrete, or similar approved. To be installed with 150mm end bearings.