STRUCTURAL ENGINEERING INFORMATION & CALCULATIONS

CONTENTS

CHESS STRUCTURAL CONSULTANTS
01923 250050
info@chessstructural.co.uk

	Job No.	3657
Project: 8 Ferdinand Place, NW1 8EY, London	Calc No.	ii
Portion: New opening and chimney support	Date	Mar-15

PROJECT DATA

PROFESSIONAL TEAM / CONTACTS

CLIENT	Danish Mirza
ARCHITECT	
ENGINEER (calculations prepared by)	Nick Edelsten C.Eng., M.I.Struct.E.

These calculations are subject to approval by Local Authority and any other interested parties.

MAIN CODES USED:

The Building Regulations – Approved document A (2000)
TRADA - DA1/2004 – Span tables for solid timber members in floors, ceilings and roofs
BS 648:1964 – Weights of building materials
BS 5268-2:2002 – Structural use of timber
BS 6399-1:1996 – Loading for buildings – Dead & imposed loads
BS 5628-1:2005 – Unreinforced masonry
BS 5950-1:2000 – Structural use of steelwork in building
BS8110-1:1997 – Structural use of concrete
BS 5977-1:1981 – Lintels

IMPOSED LOADS

Snow Load = 0.75 kN/m²
Residential accommodation = 1.50kN/m², but add 1.00 kN/m² for lightweight partition allowance where applicable.
General Office use = 2.50 kN/m²
Landings and stairs = 3.00 kN/m²
Mezzanine floor = 2.00 kN/m² (BS6399-1 activity C1 restaurants with tables)

DESIGN BRIEF & PARAMETERS

Maximum Deflection limits for steelwork to normally be set at:

- Dead = L/500 (accepted good practice limit unless precamber/loaded)
- Live = L/360 (BS5950 guidance)
- DL+LL = L/240 **(accepted good practice limit)
- Absolute maximum DL+LL deflection limit = 16mm

**However to limit vibration and to increase client levels of operational comfort increase DL+LL limit to L/360.

To design the instructed structural elements only

HEALTH & SAFETY

Where appropriate, the Client, will be the/or appoint a, Project Coordinator to act on his behalf who will ensure that where applicable the " Construction (Design and Management) Regulations 2007" are adhered to.

The Contractor must at all times operate safe working practices, , maintain the integrity of the existing structures, and conform to all the appropriate requirements of the Health & Safety Executive including the “Construction (Design and Management) Regulations 2007”.

The working methods of any hazardous operations must first be discussed with the Project Coordinator and the designer prior to commencement.

Below are identified hazards that are either impractical or uneconomic to eliminate at the design stage. The list is not exhaustive, and must be read in conjunction with the main contractors own Health & Safety policy.

Hazard	Solution/Precaution/Sequence
Demolition and creation of new openings	To be carried out in accordance with prepared demolition statement ensuring structural integrity of existing building at all times. Openings should follow published procedure in Building Research Estatablishment publication GBG20 “Removing internal loadbearing walls in older dwellings”.
Scaffolds	Scaffolds erected and used in accordance with BS5973. Scaffolds and propping must be inspected by a qualified person before use and at least once per week to ensure they are fit for use.
Personnel working at height	Works to be properly supervised with personnel provided with safe working platforms.
Lifting	Adequate means for moving and positioning elements to be available. Handling and construction to be carried out in accordance with relevant HSE 7 BS guidelines. Individuals are not to manually lift more than 25kg.

SUMMARY STRUCTURAL SPECIFICATION

Disclaimers - This specification is not to be treated as definitive or exhaustive and is not a substitute for the works implementation being undertaken by appropriately skilled personnel in accordance with current best practice. This section is to be treated as a general guide and is limited to only structure matters. Where more detailed specification or details are required they are outside the scope of this document and should be resolved by the contractor, or must be requested from the appropriate person. If in doubt ASK.

The scheme may be subject to change once the existing structure has been opened out. Any changes to the scheme, layout, or unanticipated structural arrangements must first be discussed with the engineer.

All dimensions are in millimeters. **All sizes and dimensions are estimated only, not for fabrication purposes, and must be checked on site prior to commencement and confirmed by the appropriate person prior to commencement**.

The Contractor must at all times operate safe working practices, maintain the integrity of the existing building.

Legislation - The contractor must submit a Building Notice Application OR the architect a full plans application to the relevant local authority and must ensure he gives adequate notice of commencement of works and comply with the Building Inspectors instructions.

Materials and workmanship must be of a standard conforming to the appropriate recognised authority. For example "National House Building Council", "British Standards Institution", "Department of the Environment - (Building Regulations 2000)" etc.

Be advised that the proposed works may fall under the Party Wall etc. Act 1996 and as such Notices may be required to be served on adjoining property owners.

TIMBER

All timber to be preservative treated against fungal and insect attack. All softwood is to graded to C24 (European redwood / whitewood to BS 4978 SS grade) or if specifically noted otherwise to C16 (ditto GS grade) of BS EN 338 according to BS 5268: Part 2. Average moisture content at time of grading and delivery to be 18% with no piece greater than 24%. Finger jointed members are not permitted (other than in proprietary manufactured gluelam members) unless specifically approved by the engineer. Unless otherwise noted all timber sizes specified are the desired final target size to tolerance class T1 (sawn). Where T2 (machined / regularised) tolerances are required they will be so indicated.

Beams and trimmers made up of multiple timber members are to be screwed together using 8X150 Timberlok screws @ 300 cts staggered 50mm either side of centreline. Alternatively use M10 coach bolts @ 600mm cts

Refer to TRADA “Timber Frame Construction” for approved details and construction. Studwork to comprise minimum 50 x 100 mm head and anchored sole plates (doubled where supporting floors or roof trusses). Studs to be minimum 50(T1)x95(T2)mm C16 at 400cts studs with mid storey height noggins. Trimmed openings formed with cripple studs either side supporting the timber lintel. Where intersecting members/joists/frames are supported off stud walls, they are to be positioned so that they coincide with the studs below (or additional studs installed).

Lateral restraint strapping to be in accordance with current standards.

Joists under baths are to be doubled up.

No notching or cutting of engineered joists or trusses is permitted. Limited notching and drilling of solid joists is permitted subject to specific published limits.

STEELWORK

Contractor is to take site dimensions prior to ordering and to confirm that details supplied are correct and practical. Where configuration is complex or alignment critical, templates should be assembled.

Site fabrication is not permitted unless by agreement with the engineer.

Beams to be positioned so that loads from above will be concentric with the axis of the beam and not eccentric.

Contractor to submit details of all connections unless details have been supplied. All connections must be detailed so that the secondary beam provides full lateral torsional restraint to the top flange of the primary beam unless otherwise directed. Where flexible end plate connections are appropriate they will be so indicated. Connection forces will be supplied by engineer.

All steelwork to BS EN 10025, grade S275, be well wire brushed or shot blasted to remove all millscale, rust, grease etc. and then painted with zinc phosphate alkyd or epoxy primer (75dft). A further coat of MIO (50dft) (alkyd must be used if using alkyd primer) after fabrication. All damaged areas to be touched up on site.

The installation of steel beams to form new openings in existing walls should be carried out in accordance with BRE ‘Good Building Guide 20’ (Jan 1999) ‘Removing Internal loadbearing Walls’ or BRE ‘Good Building Guide 15’ (Jan 1992) ‘Removing External loadbearing Walls’ or temporary works suppliers own details. Needles should be placed no more than 1.0m apart and be propped and braced using suitable components. Slate packing between the steel beam and the underside of the wall is NOT permitted.

Temporary works to be designed by specialist contractor. New permanent beams to be preloaded during installation using either load jacks or tight driven folding steel wedges in order to minimise subsequent deflection

Where required permanent steel shims are to be used. The gap is then to be filled with 1:2 cement/sharp sand, mixed as dry as possible with "Conbex 100" cement additive, consolidated by ramming with a suitable blunt instrument until the space is completely filled. Proprietary materials to be used in accordance with the manufacturer's instructions. Spans over 4.0m should be preloaded prior to drypacking to minimize deflection.

All steelwork that is within cavity and in direct contact with the outer wall, or used as lintels (i.e. in direct contact with both inner and outer skins), to be hot dip galvanised to BS EN ISO 1461 (min 85 micron) and then painted with 2 coats “Kemira Tematar” bituminous paint to achieve a minimum DFT of 100 microns / coat. (BCSA Protection System PW-C2-B). Alternately System PW-C2-A may be used i.e. Blast clean to Sa 2½ then factory apply one coat solvent free epoxy to min 450 microns.

All steelwork that is within cavity not in contact with the outer wall (40mm minimum air gap), or is isolated from the outer wall by a layer of impermeable insulation (25mm minimum), or is in contact with an impermeable outer skin is to be shot blasted to SA2½ and then painted with an 80 micron zinc phosphate epoxy primer. In aggressive exposure conditions a 150 micron coat of “Kemira Tematar” bituminous paint to be applied after fabrication (BCSA Protection System PW-C2-S). Note that any damaged areas must be touched up on site.

Where beams are installed in pairs (say to support a cavity wall) they are to be bolted together through the web with M12 bolts @ 600mm centres. The beams are to be spaced apart using min 50mm diameter SHS (tube) at the bolt locations.

All bolts to be plated M16 (grade 8.8) unless otherwise noted. All welds to be 6mm fillet welds, unless otherwise noted.

Areas of meeting faces of HSFG bolts and splice connection plates etc. are not to be painted prior to installation but must be bare metal wire brushed or grit blasted. "Coronet" load indicating washer system to be used in accordance with manufacturer's instructions. Splice connection to be painted once connection fully assembled.

All steelwork below ground level to be encased in concrete with 100mm cover.

Where gap between underside of stanchion bases and top of foundations is between 10 and 75mm,shutter and fill under a 100mm min fluid head with "Conbextra GP" (by Fosroc CCD Ltd.) ready mixed free flowing grout or similar approved in accordance with manufacturer's instructions. Space under steel to be presoaked and thoroughly cleaned prior to grouting.

Half hour fire protection to be provided to all steelwork supporting habitable floors. For beams or columns use two layers of 12.5mm plaster board nailed to timber cradles not less than 44 x 44mm at 600cts. with all joints staggered. Alternatively for columns only use one layer 9.5mm plasterboard with 1.6mm wire binding at 100mm pitch with an outer layer of 9.5mm plasterboard bonded to the first layer with multipurpose adhesive. Alternately a proprietary system may be acceptable e.g. 15mm Gyproc Glasroc S board fixed in accordance with manufacturer's instructions.

Beams are to bear concentrically onto prepared padstones by the greater of at least 100mm or the width of the padstone where bearing perpendicular to the wall, or the greater of 150mm or the length of the padstone where bearing parallel to the wall or used as a lintel unless noted otherwise. Beam to be solidly built into wall. Where beams abut over the bearing they are to be nominally "fish plate" spliced using 8mm web plates on both faces and 4 No M12 grade 4.6 bolts with the abutment being located centrally over the bearing.

Where 'Nominal Padstones' are required the contractor is to ensure that no part of the steel beam bears onto a perpend joint and that as far as possible the supporting masonry unit is to be centered under the beam. If the masonry unit is not sound in any way, it must be cut out and replaced. Slate packing is not permitted, use steel shims.

Where 'Engineering Brick Padstones' are required, two stretcher bond courses are to be installed with the top course consisting of a single centrally placed min class B semi-engineering brick in class III mortar bearing onto two lower course bricks with their perpend joint central about the beam.

Concrete padstones to be minimum grade GEN3 to BS8500.

FOUNDATIONS

Subject to site confirmation, foundations are to be concrete trenchfill type of min. size as shown .Final design and depth subject to soil conditions, root growth and drains encountered. To be to min. depth shown but also a minimum of 500mm below lowest root growth. Where desiccated clay is encountered, depth may have to be increased and anti-heave precautions taken. Foundations must be founded off non compressible firm ground, any soft or fill type material is not suitable. Where doubt exists, the engineer is to be consulted.

Final depth is to be agreed with checking authority in accordance with NHBC chapter 4.2.

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Strip & trenchfill for low rise construction to use concrete mix min. ready-mixed grade FND2 to BS8500 but may be reduced to GEN 3 to BS 8500, if not in clays or brownfield sites and sulphate content confirmed as no more than AC-1.

Notionally reinforced concrete mix to be min. grade RC35 to BS8500

There are to be no eccentricity loaded foundations.

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info@chessstructural.co.uk

	Job No.	3657
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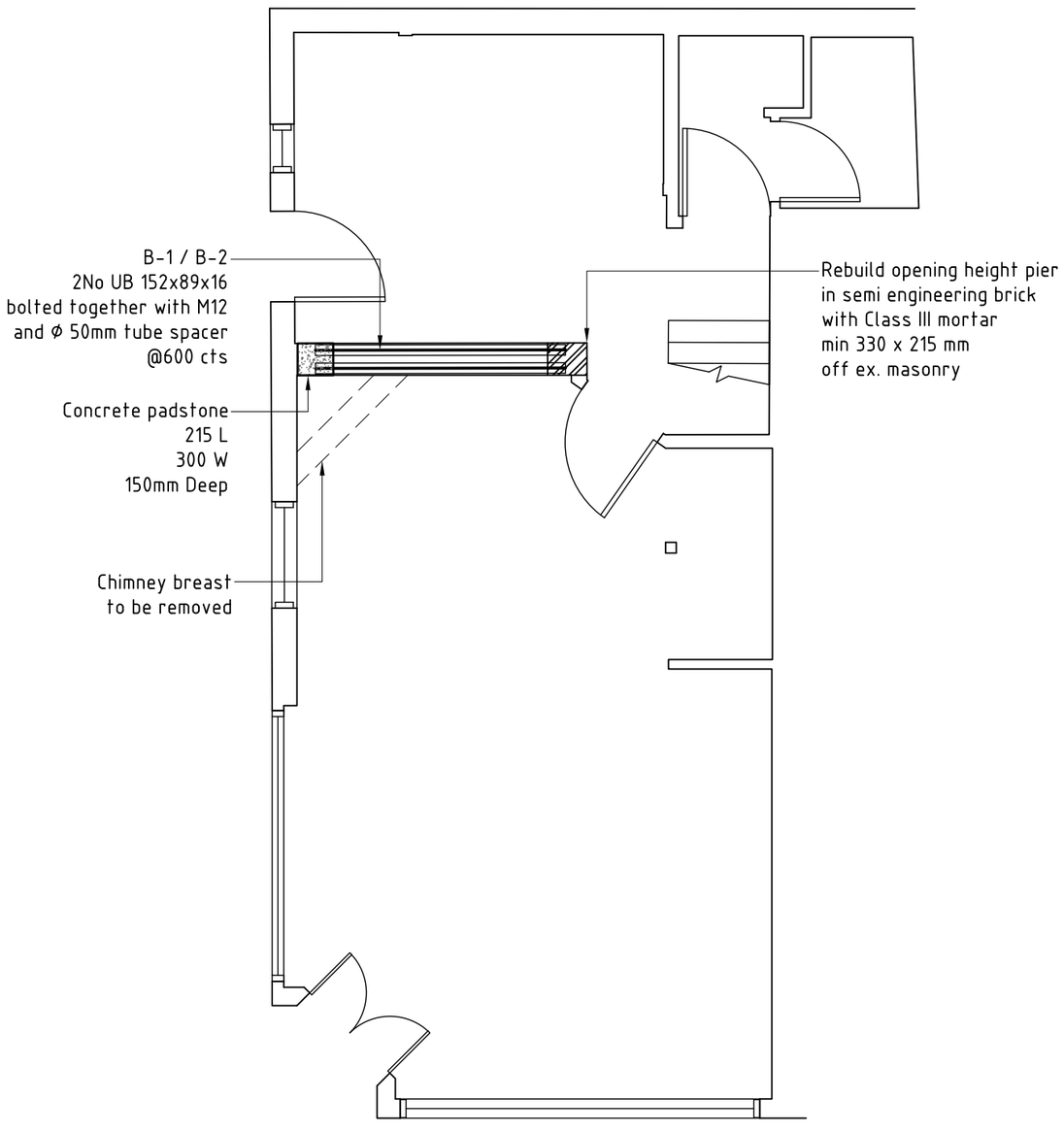
Portion: New opening and chimney support	Date	Mar-15

SKETCH DETAILS

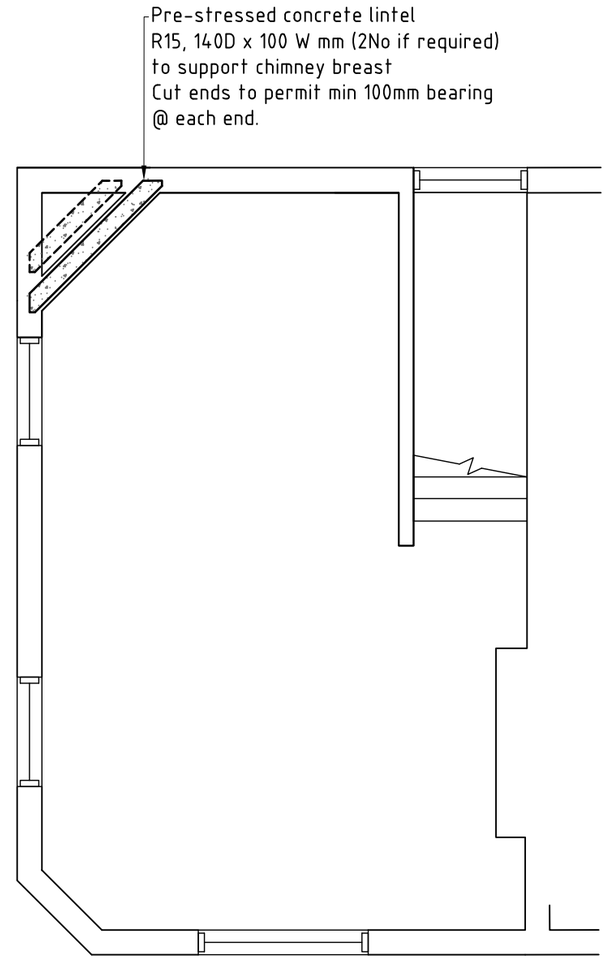
Note……

Notes

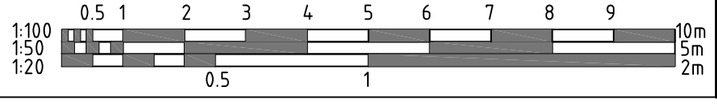
All dimensions in millimeters unless otherwise stated.
The Contractor must verify all dimensions on site before commencing on site.
This practice must be notified of any suspected discrepancies or omissions.
Any scaled dimensions to be confirmed by this practice.
Elevations are for illustrative purposes only.



GROUND FLOOR PLAN
Proposed



FIRST FLOOR PLAN
Proposed



Rev.	Amendments	Date

Client
Danish Mirza

Job
8 Ferdinand Place
NW1 8EY
London

Drawing Title
PROPOSED
First and Second Floor plans

CHESS STRUCTURAL CONSULTANTS
info@chessstructural.co.uk
26 Greenhill Crescent,
Watford, Herts, WD18 8JA
t 01923 250050 f 0870 7059170

Date	Scale (@A3)	Drawn	Drawing No.	Rev.
Mar-15	1:50	MG	3657-01	-

CHESS STRUCTURAL CONSULTANTS

01923 250050
info@chessstructural.co.uk

Job No. 3657

Project: 8 Ferdinand Place, NW1 8EY, London

Calc No. 1

Portion: New opening and chimney support

Date Mar-15

LOADINGS

Pitched Roof	Plain clay tiles	70	Kg/m²			
	Battens	3				
	Felt	3				
	Rafters	9				
	Purlins etc	5				
		90	Kg/m²			
	Roof Pitch	12	°	DL	0.92	kN/m²
				LL	0.75	
Flat Roof	Chippings	16	Kg/m²			
	3 Layers Felt	6				
	Boards	15				
	Joists	13				
	Plasterboard & Skim	18				
		68	Kg/m²	DL	0.68	kN/m²
				LL	0.75	
Timber Floor	Finishes	10	Kg/m²			
	Boards	12				
	Joists	15				
	Lath, Plaster & Skim	30				
		67	Kg/m²	DL	0.67	kN/m²
				LL	1.50	
Existing Wall	215 brickwork	425	Kg/m²			
	Plaster & Skim	25				
		450	Kg/m²	DL	4.50	kN/m²

STEEL ELEMENTS

B-1 / B-2 – Beams over new opening

Loads

UDL	kN/m²	dist1 (UDL)	dist2 (point)	DL (kN/m)	LL (kN/m)	
Flat Roof	0.68	1.3	1.0	0.88		
	0.75	1.3	1.0		0.98	
Pitched roof	0.92	1.3	1.0	1.20		
	0.75	1.3	1.0		0.98	
Timber Floor	0.55	1.3	1.0	0.72		
	3.00	1.3	1.0		3.90	
Ex. Solid brick wall	4.50	3.9	1.0	17.55		
				20.35	**5.85**	kN/m
				Char	26.20	kN/m
				Ult	37.84	kN/m

Beam design span (i.e. clear span + 150 + 150 mm bearings) = **2.1 m**

From subsequent sheets use **2 no 152x89x16 kg UB's** side by side, spaced and bolted together using M12 bolts + 50Ø tube web spacers @ max 600mm centers.

Padstones

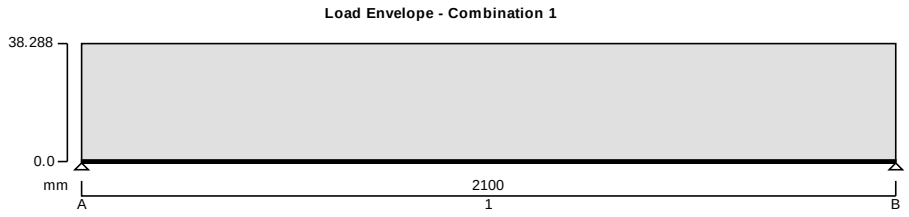
R = 40.2 kN

F_k values:
Poor/old quality stock brick walls in lime mortar use 1.8N/mm^2
Length = (40.2 x10^3 x 3.5) / (1.25 x 215 x 1.8) = 291 mm
Provide concrete padstones **215 L x 300 W x 150mm Deep**

STEEL BEAM ANALYSIS & DESIGN (BS5950)

In accordance with BS5950-1:2000 incorporating Corrigendum No.1

TEDDS calculation version 3.0.05



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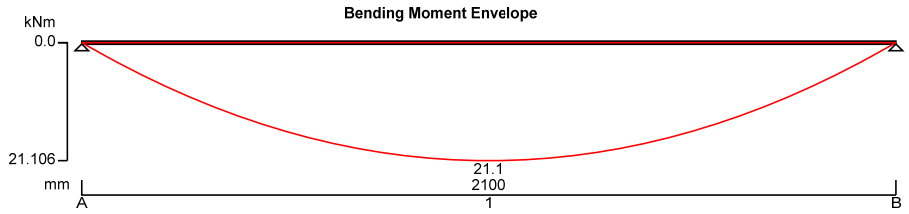
Job No. 3657

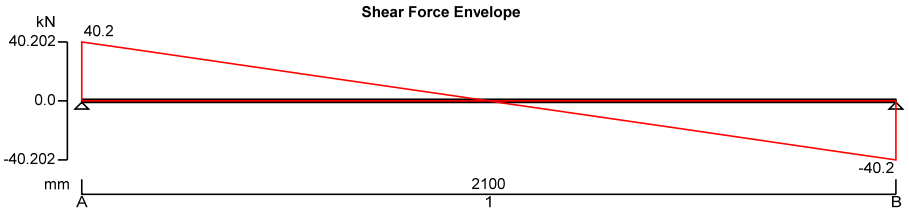
Project: 8 Ferdinand Place, NW1 8EY, London

Calc No. 3

Portion: New opening and chimney support

Date Mar-15





Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	Dead full UDL 20.35 kN/m
	Imposed full UDL 5.85 kN/m

Load combinations

Load combination 1	Support A	Dead × 1.40
		Imposed × 1.60
	Span 1	Dead × 1.40
		Imposed × 1.60
	Support B	Dead × 1.40
		Imposed × 1.60

Analysis results

Maximum moment;	M_{max} = **21.1** kNm;	M_{min} = **0** kNm
Maximum shear;	V_{max} = **40.2** kN;	V_{min} = **-40.2** kN
Deflection;	δ_{max} = **2** mm;	δ_{min} = **0** mm
Maximum reaction at support A;	R_{A_max} = **40.2** kN;	R_{A_min} = **40.2** kN
Unfactored dead load reaction at support A;	R_{A_Dead} = **21.7** kN	
Unfactored imposed load reaction at support A;	$R_{A\_Imposed}$ = **6.1** kN	
Maximum reaction at support B;	R_{B_max} = **40.2** kN;	R_{B_min} = **40.2** kN
Unfactored dead load reaction at support B;	R_{B_Dead} = **21.7** kN	
Unfactored imposed load reaction at support B;	$R_{B\_Imposed}$ = **6.1** kN	

Section details

Section type; **2 x UKB 152x89x16 (Tata Steel Advance)**

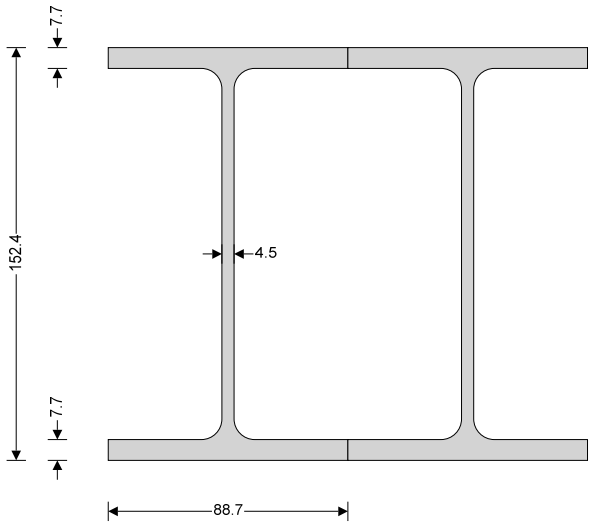
Steel grade; **S275**

From table 9: Design strength p_y

Thickness of element; max(T, t) = **7.7** mm

Design strength; p_y = **275** N/mm^2

Modulus of elasticity; E = **205000** N/mm^2



Lateral restraint

Span 1 has lateral restraint at supports only

Effective length factors

Effective length factor in major axis; K_x = **1.00**

Effective length factor in minor axis; K_y = **1.00**

Effective length factor for lateral-torsional buckling; $K_{LT.A}$ = **1.40**; + 2 × D

$K_{LT.B}$ = **1.40**; + 2 × D

Classification of cross sections - Section 3.5

$\varepsilon = \sqrt{[275\ N/mm^2 / p_y]}$ = **1.00**

Internal compression parts - Table 11

Depth of section; d = **121.8** mm

d / t = 27.1 × ε <= 80 × ε; Class 1 plastic

Outstand flanges - Table 11

Width of section; b = B / 2 = **44.4** mm

b / T = 5.8 × ε <= 9 × ε; Class 1 plastic

Section is class 1 plastic

Shear capacity - Section 4.2.3

Design shear force; F_v = max(abs(V_{max}), abs(V_{min})) = **40.2** kN

d / t < 70 × ε

Web does not need to be checked for shear buckling

Shear area; A_v = t × D = **686** mm^2

Design shear resistance; $P_v = 0.6 \times N \times p_y \times A_v$ = **226.3** kN

PASS - Design shear resistance exceeds design shear force

Moment capacity - Section 4.2.5

Design bending moment; $M = \max(\text{abs}(M_{s1\_max}), \text{abs}(M_{s1\_min}))$ = **21.1** kNm

Moment capacity low shear - cl.4.2.5.2; $M_c = N \times \min(p_y \times S_{xx}, 1.2 \times p_y \times Z_{xx})$ = **67.8** kNm

Effective length for lateral-torsional buckling - Section 4.3.5

Effective length for lateral torsional buckling; $L_E = 1.4 \times L_{s1} + 2 \times D$ = **3245** mm

Slenderness ratio; $\lambda = L_E / r_{yy}$ = **154.397**

Equivalent slenderness - Section 4.3.6.7

Buckling parameter; u = **0.890**

Torsional index; x = **19.566**

Slenderness factor; $v = 1 / [1 + 0.05 \times (\lambda / x)^2]^{0.25}$ = **0.702**

Ratio - cl.4.3.6.9; β_W = **1.000**

Equivalent slenderness - cl.4.3.6.7; $\lambda_{LT} = u \times v \times \lambda \times \sqrt{[\beta_W]}$ = **96.481**

Limiting slenderness - Annex B.2.2; $\lambda_{L0} = 0.4 \times (\pi^2 \times E / p_y)^{0.5}$ = **34.310**

$\lambda_{LT} > \lambda_{L0}$ - Allowance should be made for lateral-torsional buckling

Bending strength - Section 4.3.6.5

Robertson constant; α_{LT} = **7.0**

Perry factor; $\eta_{LT} = \max(\alpha_{LT} \times (\lambda_{LT} - \lambda_{L0}) / 1000, 0)$ = **0.435**

Euler stress; $p_E = \pi^2 \times E / \lambda_{LT}^2$ = **217.4** N/mm^2

$\phi_{LT} = (p_y + (\eta_{LT} + 1) \times p_E) / 2$ = **293.5** N/mm^2

Bending strength - Annex B.2.1; $p_b = p_E \times p_y / (\phi_{LT} + (\phi_{LT}^2 - p_E \times p_y)^{0.5})$ = **131.1** N/mm^2

Equivalent uniform moment factor - Section 4.3.6.6

Equivalent uniform moment factor for LTB; m_{LT} = **1.000**

Buckling resistance moment - Section 4.3.6.4

Buckling resistance moment; $M_b = N \times p_b \times S_{xx}$ = **32.3** kNm

M_b / m_{LT} = **32.3** kNm

PASS - Buckling resistance moment exceeds design bending moment

Check vertical deflection - Section 2.5.2

Consider deflection due to dead and imposed loads

Limiting deflection; $\delta_{lim} = L_{s1} / 360$ = **5.833** mm

Maximum deflection span 1; $\delta = \max(\text{abs}(\delta_{max}), \text{abs}(\delta_{min}))$ = **1.963** mm

PASS - Maximum deflection does not exceed deflection limit

MASONRY ELEMENTS

P-1 – Pier supporting B-1 / B-2

Loads
B-1 / B-2 reactions ULT: 40.2 kN

VERTICAL LOADING RECTANGULAR COLUMN (BS5628-1:2005)

TEDDS calculation version 1.0.02

Compressive strength from Table 2 BS5628:Part 1 - Clay or calcium silicate bricks

Mortar designation;	Mortar = **"iii"**
Brick compressive strength;	p_{unit} = **50.0** N/mm^2
Characteristic compressive strength;	f_k = **8.40** N/mm^2
Column width;	b = **215** mm
Column thickness;	t = **330** mm
Column height;	h = **1.10** m
Column slenderness - minor axis (Clause 24.1);	λ_t = h/t = **3.33**
Column slenderness - major axis (Clause 24.1);	λ_b = h/b = **5.12**
Maximum slenderness;	λ_{max} = max(λ_t, λ_b) = **5.12**
	Slenderness < 27 - OK
Partial safety factor for material (Table 4);	γ_m = **3.5**

Load eccentricity

Eccentricity of applied load about minor axis;	e_{xt} = **100.0** mm
Eccentricity of applied load about major axis;	e_{xb} = **20.0** mm

Capacity reduction factor: minor axis

Eccentricity due to slenderness;	e_{at} = max(0 mm, t × (((h/t)^2/2400)-0.015)) = **0.0** mm
Design eccentricity;	e_{tt} = 0.6×max(abs(e_{xt}), 0.05×t)+ e_{at} = **60.0** mm
	e_{mt} = max(abs(e_{xt}),e_{tt}) = **100.0** mm ;
Capacity reduction factors;	β_{tcalc} = max(0, 1.1 × (1 - (2 × e_{mt} / t))) = **0.43**
	β_{max} = 1.0
	β_t = min (β_{tcalc}, β_{max}) = **0.43**

Capacity reduction factor: major axis

Eccentricity due to slenderness;	e_{ab} = max(0 mm, b × (((h/b)^2/2400)-0.015)) = **0.0** mm
Design eccentricity;	e_{tb} = 0.6× max(abs(e_{xb}), 0.05×b)+ e_{ab} = **12.0** mm
	e_{mb} = max(abs(e_{xb}),e_{tb}) = **20.0** mm;
Capacity reduction factors;	β_{bcalc} = max(0, 1.1 × (1 - (2 × e_{mb} / b))) = **0.90**
	β_{max} = 1.0
	β_b = min (β_{bcalc}, β_{max}) = **0.90**
Minimum capacity reduction factor;	β_{min} = min(β_t, β_b) = **0.43**

Design vertical load resistance

Compressive strength correction factor	
Plan area of column;	A = t × b = **0.07** m^2
For small plan area (Clause 19.1.2);	c = min(1.0, 0.7+(1.5 m^{-2})×A) = **0.81**

Design vertical load resistance; DVLR = $\beta_{min} \times t \times b \times c \times f_k / \gamma_m$ = **59.504** kN

Applied factored vertical load on column; V = **40.200** kN

Column - OK

;

CHESS STRUCTURAL CONSULTANTS

01923 250050
info@chessstructural.co.uk

Job No. 3657

Project: 8 Ferdinand Place, NW1 8EY, London

Calc No. 8

Portion: New opening and chimney support

Date Mar-15

CL-1 – Concrete lintel

Loads

Point load	kN/m²	dist1 (UDL)	dist2 (point)	DL (kN)	LL (kN)
Ex. Masonry wall	4.15	1.1	1.0	4.57	
				4.57	**0.00 kN**

Char	4.57 kN
Ult	6.39 kN

Point	Load [kNm]	Span [m]	Bending moment [kNm]	Point load [kN]
Char	4.57	1.2	1.37	4.6
Ult	6.40	1.2	1.92	6.4

Beam design span (i.e. clear span + 100 + 100 mm bearings) = **1.8 m**

Provide pre-stressed concrete lintel R15, 140D x 100 W

LOAD/SPAN TABLE - TOTAL UNIFORMLY DISTRIBUTED SERVICE LOADS (KN)

Note: The self weight of the lintel must be subtracted from the load given

	Section	P100	P150	P220	P255	S10	R15	R15A	R22	R22A	S15	R21	R21A
	Profile	*65x100*	*65x140*	*65x215*	*65x255*	*100x100*	*100x140*	*140x100*	*100x215*	*215x100*	*150x140*	*140x215*	*215x140*
Manufacture size to order	Clear Span	Service Moment (KNm) 0.75	1.03	2.46	2.76	1.68	2.57	3.37	3.62	7.05	7.46	6.99	10.86
600	300	13.33	18.31	35.61	41.15	24.60	39.25	41.79	56.78	59.42	49.75	73.90	73.90
750	450	10.00	13.73	32.80	36.80	22.40	34.27	41.79	48.27	59.42	49.75	73.90	73.90
900	600	8.00	10.99	26.24	29.44	17.92	27.41	35.95	38.61	59.42	49.75	73.90	73.90
1050	750	6.67	9.16	21.87	24.53	14.93	22.84	29.96	32.18	59.42	49.75	62.13	73.90
1200	900	5.71	7.85	18.74	21.03	12.80	19.58	25.68	27.58	53.71	49.75	53.26	73.90
1350	1050	5.00	6.87	16.40	18.40	11.20	17.13	22.47	24.13	47.00	49.75	46.60	72.40
1500	1200	4.44	6.10	14.58	16.36	9.96	15.23	19.97	21.45	41.78	44.21	41.42	64.36
1650	1350	4.00	5.49	13.12	14.72	8.96	13.71	17.97	19.31	37.60	39.79	37.28	57.92
1800	1500	3.64	4.99	11.93	13.38	8.15	12.46	16.34	17.55	34.18	36.17	33.89	52.65
2100	1650	3.33	4.58	10.93	12.27	7.47	11.42	14.98	16.09	31.33	33.16	31.07	48.27
2100	1800	3.08	4.23	10.09	11.32	6.89	10.54	13.83	14.85	28.92	30.61	28.68	44.55
2400	1950	2.86	3.92	9.37	10.51	6.40	9.79	12.84	13.79	26.86	28.42	26.63	41.37
2400	2100	2.67	3.66	8.75	9.81	5.97	9.14	11.98	12.87	25.07	26.52	24.85	38.61
2700	2250	2.50	3.43	8.20	9.20	5.60	8.57	11.23	12.07	23.50	24.87	23.30	36.20
2700	2400	2.35	3.23	7.72	8.66	5.27	8.06	10.57	11.36	22.12	23.40	21.93	34.07
3000	2550	2.22	3.05	7.29	8.18	4.98	7.61	9.99	10.73	20.89	22.10	20.71	32.18
3000	2700	2.11	2.89	6.91	7.75	4.72	7.21	9.46	10.16	19.79	20.94	19.62	30.48
3300	2850	2.00	2.75	6.56	7.36	4.48	6.85	8.99	9.65	18.80	19.89	18.64	28.96
3300	3000	1.90	2.62	6.25	7.01	4.27	6.53	8.56	9.19	17.90	18.95	17.75	27.58
3600	3150	1.82	2.50	5.96	6.69	4.07	6.23	8.17	8.78	17.09	18.08	16.95	26.33
3600	3300	1.74	2.39	5.70	6.40	3.90	5.96	7.81	8.39	16.35	17.30	16.21	25.18
*4200	3450	-	-	-	-	-	5.71	7.49	8.04	15.67	16.58	15.53	24.13
*4200	3600	-	-	-	-	-	5.48	7.19	7.72	15.04	15.91	14.91	23.17
*4200	3750	-	-	-	-	-	5.27	6.91	7.43	14.46	15.30	14.34	22.28
*4200	3900	-	-	-	-	-	5.08	6.66	7.15	13.93	14.74	13.81	21.45
	Lintel weight Kg per metre	14.27	19.38	32.20	35.61	22.91	30.91	30.91	45.59	45.59	42.19	63.83	63.83

(End)