MA11229

Princess & Hanover Calculations

May 2021

Millward
consulting engineers

Introduction

Millward was instructed by the Cambridge City Council to review the structural stability and capacity of the building for accidental loading due to gas explosion.

The calculations has been carried out based on 34kN/m2 accidental design load, in accordance with BS5628-1 and Part 3 - Building Regulation.

In accordance with the noted codes, there are three routes through design for accidental damage.

Option 1 – Where there are no vertical ties in the panels nor horizontal ties within the screed on the floors. All structural members unless designed to be protected members are at risk and must be assumed to be lost following an accidental event.
Options 2 – Where the building only has horizontal ties, the building must be examined for the effect of removal of vertical members to predict the extent of damage.
Option 3 – Where the building is fully tied and has both horizontal and vertical ties, for which no removal checks required.

No vertical ties are present in the panels nor are there any horizontal ties in the floors. Therefore, the building will have to be reviewed for option 1, for which a loss of member and panel check is required for the accidental damage load.

The Hanover and Princess buildings are both masonry structures, consisting of precast concrete floors and roof with no vertical or horizontals ties present other than the precast concrete floor built into the masonry walls.

It has been understood that the building was constructed in the late 1960s prior to the Ronan Point accident which brought into force the need to check the robustness of the structural design for an accidental load of 34kN/m^2 into the building regulations 1970.

Existing plan drawings of the apartment are not available. However, the dimensions have been compared to the available drawings on Kingsway apartment blocks (Included in the calculation package) which is of the same, architectural design and closely matches to surveyed dimensions of Princess and Hanover.

A number of typical wall panels have been considered to the top floor and also the lower two floors.
The lower floors will have pre-compressive loads from the wall and floors above which will help resist the blast load from an explosion, for the purpose of these design checks external wind loads have been ignored.

All of the wall panels fail due to an accidental load of 34kN/m^2. The degree of failure varies from a factor of 1.926 to the lower floor up to 22.565 to the upper floors. These failures are significant and whilst due to the lack of structural information it is not possible to determine or predict the probable extent of the damage it is reasonable to assume that this would result in a progressive collapse of the building that would be beyond the acceptable limits of the building regulations.

The loss of a supporting wall would result in the collapse of the supported precast floor units above on either side and also some if not all of the wall to the storey above. This in turn could result in further progressive collapse due to inadequate support of the walls/floors above and additional/impact loads of the collapsing walls and floors onto the lower storey structures.

It is therefore concluded that the structure is unable to support the required accidental load and that based upon these design checks it is recommended that all gas appliances are removed from the buildings.

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Loading

Roof

Single Ply Membrane	=	0.25kN/m^2
Insulation	=	0.10kN/m^2
PC Planks(150mm)	=	3.0kN/m^2
Ceiling	=	0.20kN/m^2
Snow	=	0.5kN/m^2
Imposed	=	1.5kN/m^2

Precast Concrete Floor

150mm thick Beam & Block Floor	=	3.0kN/m^2
75mm sand cement Screed	=	1.80kN/m^2
Ceiling	=	0.20kN/m^2
Imposed	=	1.50kN/m^2

External Wall

Brickwork	=	2.10kN/m^2
Blockwork	=	1.80kN/m^2
Plaster	=	0.20kN/m^2

Internal Walls

Brickwork 220mm	=	4.4kN/m^2
Plaster	=	0.20kN/m^2

Accidental design load = 34kN/m^2

Floor	Panel	Utilisation Factor
7	Side – 10m Cavity	8.367
1	Side – 10m Cavity	1.959
Ground	Side – 10m Cavity	1.926
7	Party –7.32m	7.803
1	Party –7.32m	2.289
Ground	Party –7.32m	2.827
7	Front -4m	22.052
1	Front -4m	7.781
Ground	Front -4m	7.523
7	Internal -2.55m	22.565
1	Internal -2.55m	6.814
Ground	Internal -2.55m	12.075

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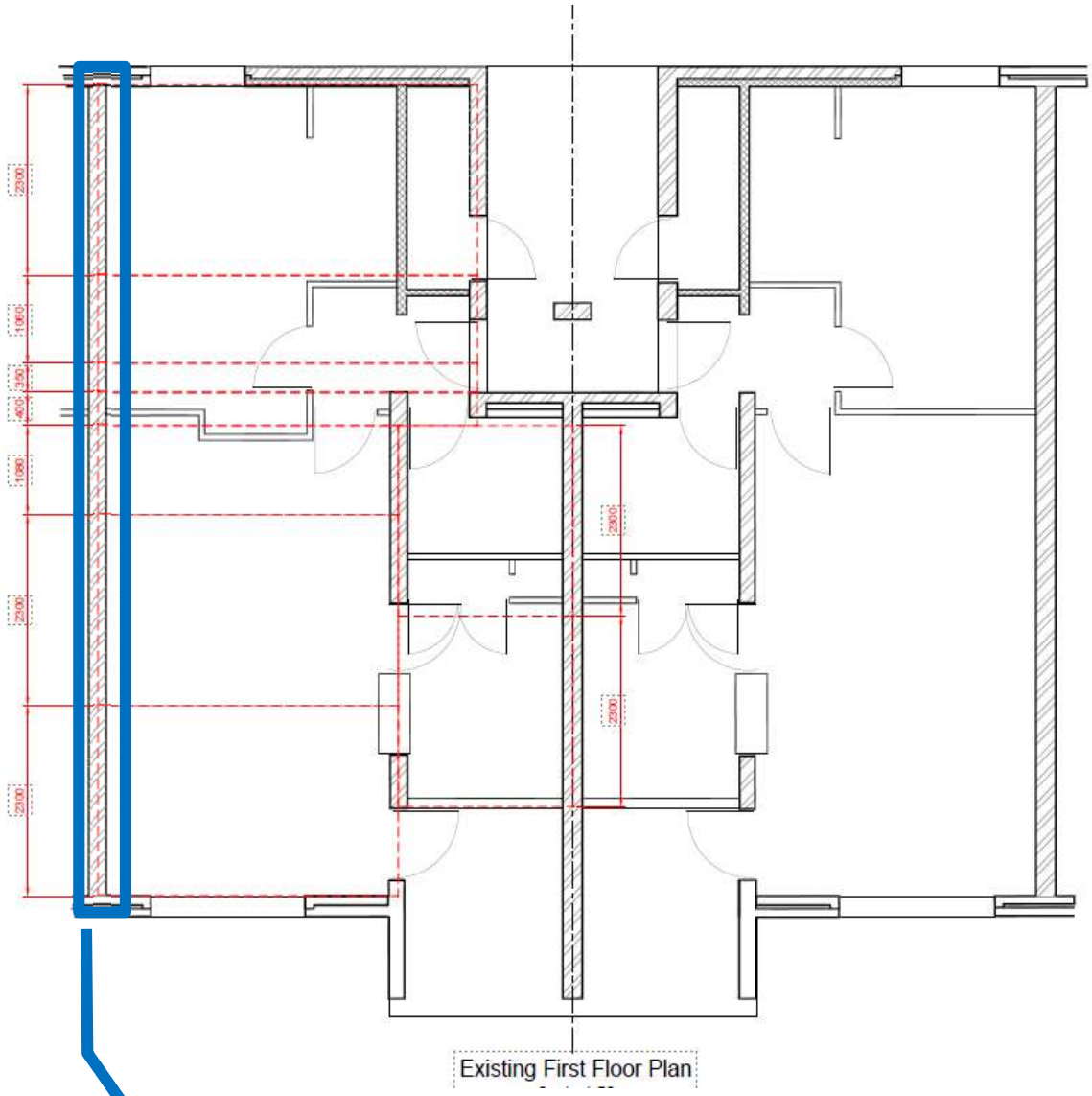
Kingsway first floor plan



	External wall - Side elevation 10m	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 1

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Far leaf*	*Units*
Masonry unit Properties			
Masonry unit product	User defined	User defined	-
Masonry unit type	Clay brick	Clay brick	-
Water absorption	7% - 12%	7% - 12%	%
Unit mean compressive strength	20.0	20.0	N/mm²
Unit minimum width as tested	102.5	102.5	mm
Unit height as tested	65.0	65.0	mm
Unit height as built	(laid normal) 65.0	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	15.0	kN/m³
Mortar property			
Mortar selection	Designated	Designated	-
Mortar designation	M4 (iii)	M4 (iii)	-

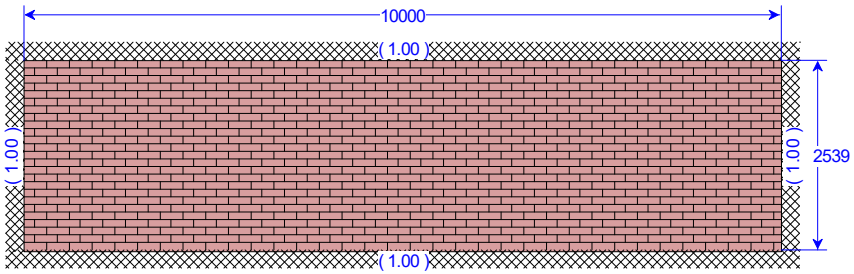
Partial safety factors for material strength

Data item	*Near leaf*	*Far leaf*
Partial safety factors		
Reinforcement tension	1.15	1.15
Masonry flexural tension	3.00	3.00
Masonry compression	3.50	3.50
Masonry shear	2.50	2.50
Masonry ties	3.50	3.50

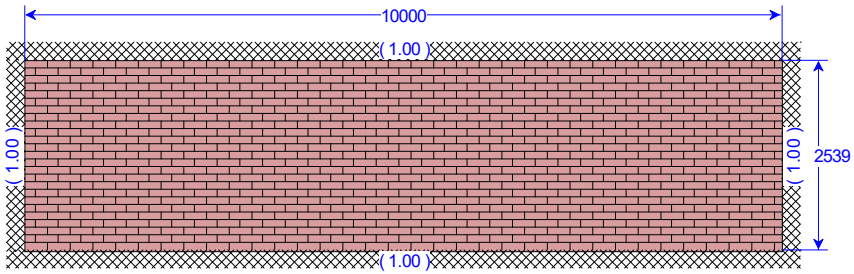
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked / Cracked
Mid height	Cracked / Cracked
Bottom edge	Cracked / Cracked
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

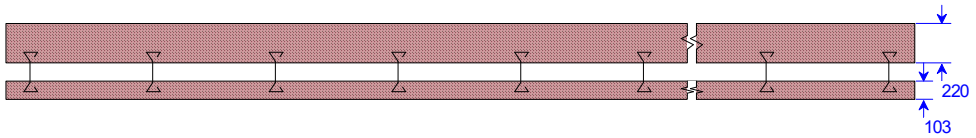
Notes:



Near leaf



Far leaf

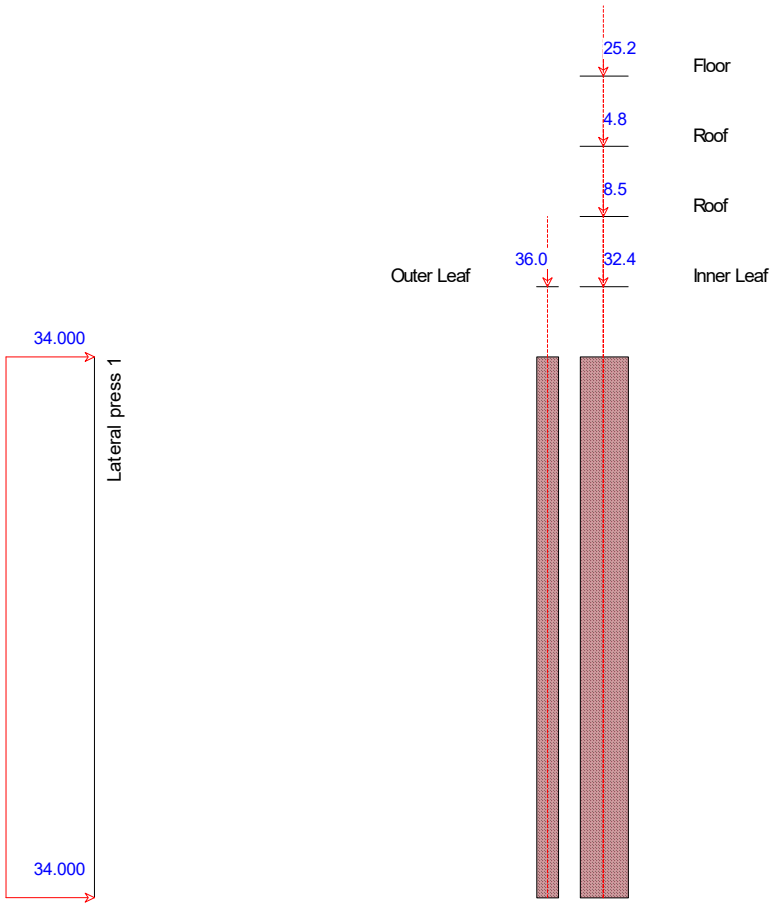


Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

CADS	External wall - Side elevation 10m	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 2

Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	External wall - Side elevation 10m	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*	*Far*
Bed joint reinforcement	No	No
DPC - top	No	No
DPC - bottom	No	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Far*	*Units*
Design code	BS 5628-1 and 2:2005		
Compression			
Narrow brick wall factor	1.00	1.00	-
Compression on bed joints	5.00	5.00	N/mm²
Compression // bed joints	5.00	5.00	N/mm²
Flexure			
Horizontal span	1.10	1.10	N/mm²
Vertical span	0.40	0.40	N/mm²

Description	*Near*	*Far*	*Units*
Shear			
Shear without compression	0.15	0.15	N/mm²
Shear friction coefficient	0.60	0.60	-
Limiting shear	1.40	1.40	N/mm²
Vertical shear- bonded	0.50	0.50	N/mm²
Elastic modulus			
Short term	4.50	4.50	kN/mm²
Long term	2.25	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near		Far	
	Load (kN/m)	Ecc. mm	Load (kN/m)	Ecc. mm
Dead load 1	36.000	0.000	32.400	0.000
Dead load 2			8.520	0.000
Imp. Load 1			4.800	0.000
Imp. Load 2			25.200	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	24.712		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	1.926	Fail	
Load combination	0.90D+1.40Lp1		
Limiting dimension / area			
Allowable	11000		mm
Actual	10000		mm
Utilisation	0.909	Pass	

Description	*Near*	*Far*	*Status*	*Units*
Max. slenderness	27	27		
Actual	8.656	8.656		
Utilisation	0.321	0.321	Pass	

CADS	External wall - Side elevation 10m - First Floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 1

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Far leaf*	*Units*
Masonry unit Properties			
Masonry unit product	User defined	User defined	-
Masonry unit type	Clay brick	Clay brick	-
Water absorption	7% - 12%	7% - 12%	%
Unit mean compressive strength	20.0	20.0	N/mm²
Unit minimum width as tested	102.5	102.5	mm
Unit height as tested	65.0	65.0	mm
Unit height as built	(laid normal) 65.0	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	15.0	kN/m³
Mortar property			
Mortar selection	Designated	Designated	-
Mortar designation	M4 (iii)	M4 (iii)	-

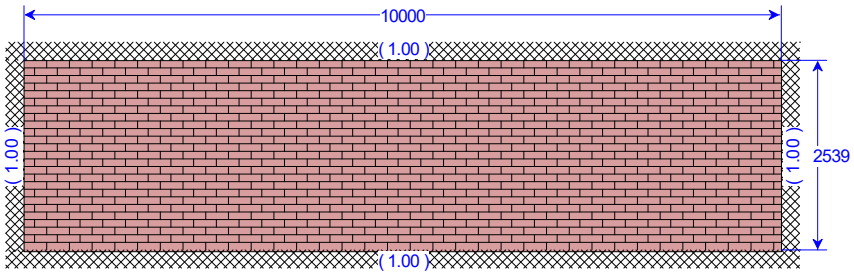
Partial safety factors for material strength

Data item	*Near leaf*	*Far leaf*
Partial safety factors		
Reinforcement tension	1.15	1.15
Masonry flexural tension	3.00	3.00
Masonry compression	3.50	3.50
Masonry shear	2.50	2.50
Masonry ties	3.50	3.50

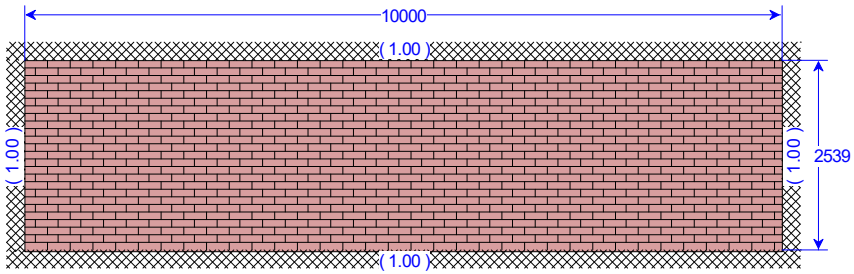
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked / Cracked
Mid height	Cracked / Cracked
Bottom edge	Cracked / Cracked
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

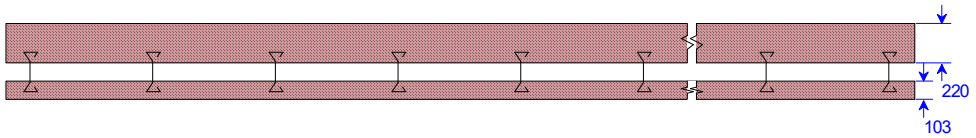
Notes:



Near leaf



Far leaf



Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

External wall - Side elevation 10m - First Floor

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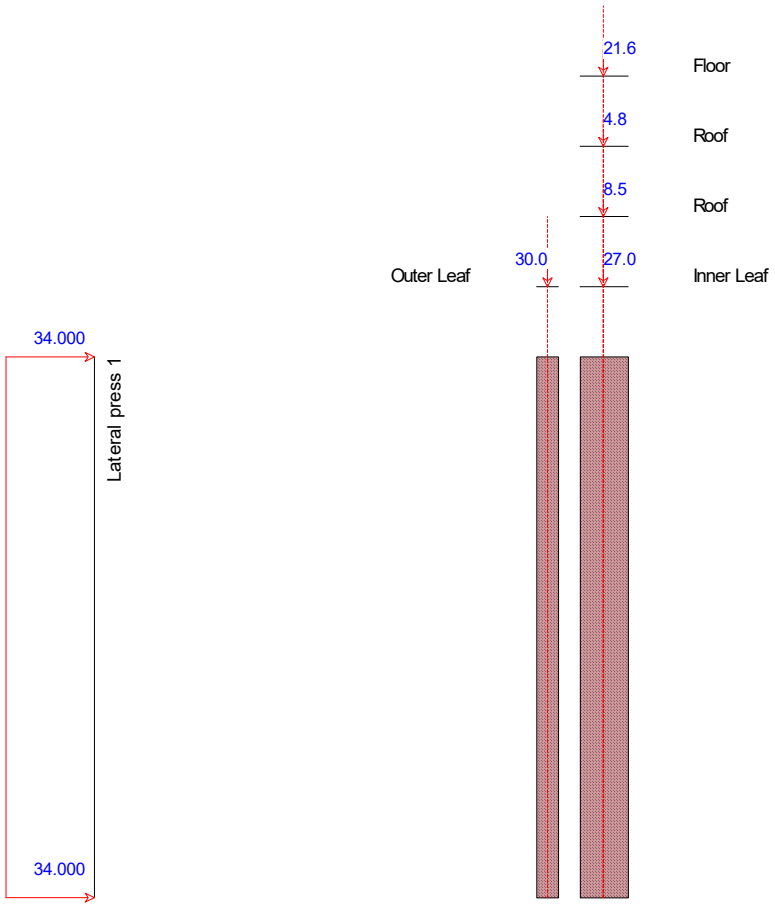
Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	External wall - Side elevation 10m - First Floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*	*Far*
Bed joint reinforcement	No	No
DPC - top	No	No
DPC - bottom	No	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Far*	*Units*
Design code	BS 5628-1 and 2:2005		
Compression			
Narrow brick wall factor	1.00	1.00	-
Compression on bed joints	5.00	5.00	N/mm²
Compression // bed joints	5.00	5.00	N/mm²
Flexure			
Horizontal span	1.10	1.10	N/mm²
Vertical span	0.40	0.40	N/mm²

Description	*Near*	*Far*	*Units*
Shear			
Shear without compression	0.15	0.15	N/mm²
Shear friction coefficient	0.60	0.60	-
Limiting shear	1.40	1.40	N/mm²
Vertical shear- bonded	0.50	0.50	N/mm²
Elastic modulus			
Short term	4.50	4.50	kN/mm²
Long term	2.25	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near		Far	
	Load (kN/m)	Ecc. mm	Load (kN/m)	Ecc. mm
Dead load 1	30.000	0.000	27.000	0.000
Dead load 2			8.520	0.000
Imp. Load 1			4.800	0.000
Imp. Load 2			21.600	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	24.297		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	1.959	Fail	
Load combination	0.90D+1.40Lp1		
Limiting dimension / area			
Allowable	11000		mm
Actual	10000		mm
Utilisation	0.909	Pass	

Description	*Near*	*Far*	*Status*	*Units*
Max. slenderness	27	27		
Actual	8.656	8.656		
Utilisation	0.321	0.321	Pass	

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Far leaf*	*Units*
Masonry unit Properties			
Masonry unit product	User defined	User defined	-
Masonry unit type	Clay brick	Clay brick	-
Water absorption	7% - 12%	7% - 12%	%
Unit mean compressive strength	20.0	20.0	N/mm²
Unit minimum width as tested	102.5	102.5	mm
Unit height as tested	65.0	65.0	mm
Unit height as built	(laid normal) 65.0	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	15.0	kN/m³
Mortar property			
Mortar selection	Designated	Designated	-
Mortar designation	M4 (iii)	M4 (iii)	-

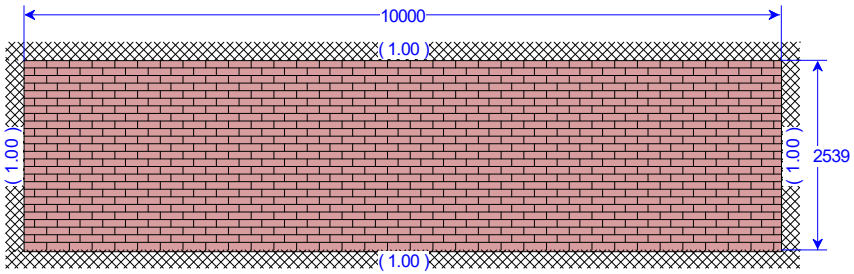
Partial safety factors for material strength

Data item	*Near leaf*	*Far leaf*
Partial safety factors		
Reinforcement tension	1.15	1.15
Masonry flexural tension	3.00	3.00
Masonry compression	3.50	3.50
Masonry shear	2.50	2.50
Masonry ties	3.50	3.50

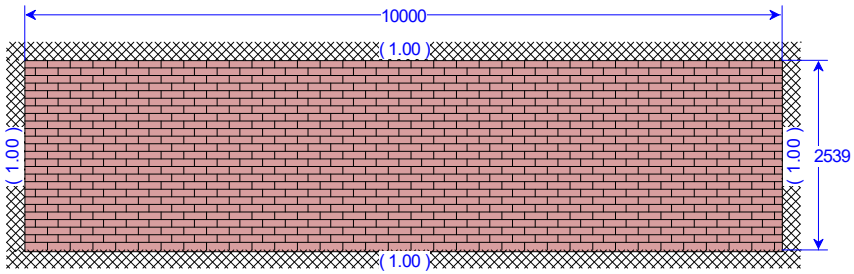
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked / Cracked
Mid height	Cracked / Cracked
Bottom edge	Cracked / Cracked
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

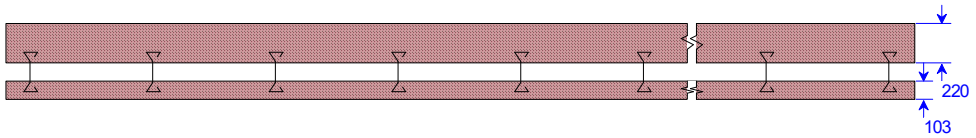
Notes:



Near leaf



Far leaf

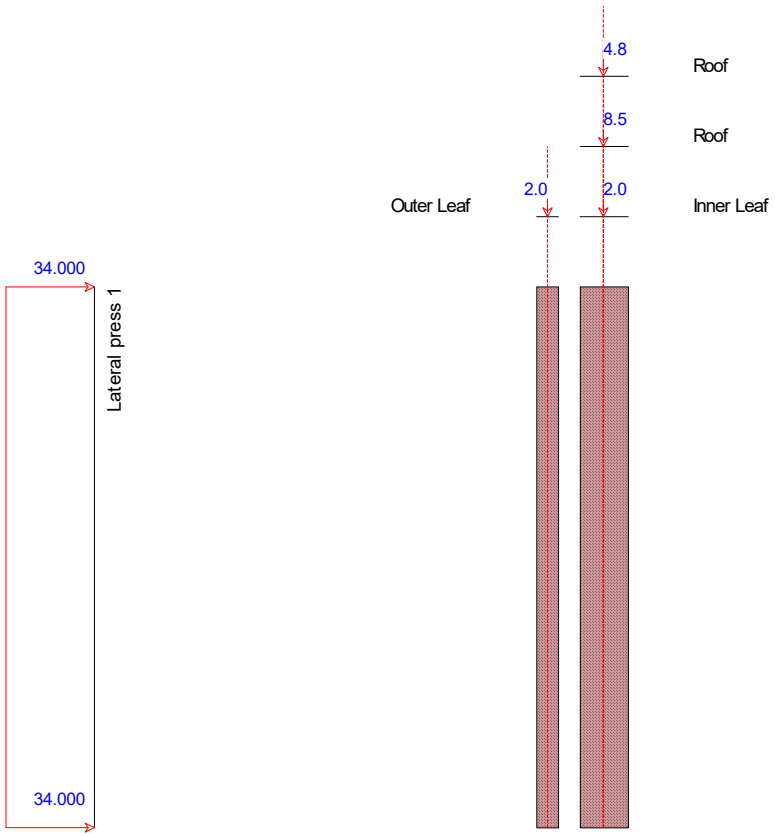


Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

CADS	External wall - Side elevation 10m - Roof	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 2

Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	External wall - Side elevation 10m - Roof	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*	*Far*
Bed joint reinforcement	No	No
DPC - top	No	No
DPC - bottom	No	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Far*	*Units*
Design code	BS 5628-1 and 2:2005		
Compression			
Narrow brick wall factor	1.00	1.00	-
Compression on bed joints	5.00	5.00	N/mm²
Compression // bed joints	5.00	5.00	N/mm²
Flexure			
Horizontal span	1.10	1.10	N/mm²
Vertical span	0.40	0.40	N/mm²

Description	*Near*	*Far*	*Units*
Shear			
Shear without compression	0.15	0.15	N/mm²
Shear friction coefficient	0.60	0.60	-
Limiting shear	1.40	1.40	N/mm²
Vertical shear- bonded	0.50	0.50	N/mm²
Elastic modulus			
Short term	4.50	4.50	kN/mm²
Long term	2.25	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near		Far	
	Load (kN/m)	Ecc. mm	Load (kN/m)	Ecc. mm
Dead load 1	2.000	0.000	2.000	0.000
Dead load 2			8.520	0.000
Imp. Load 1			4.800	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

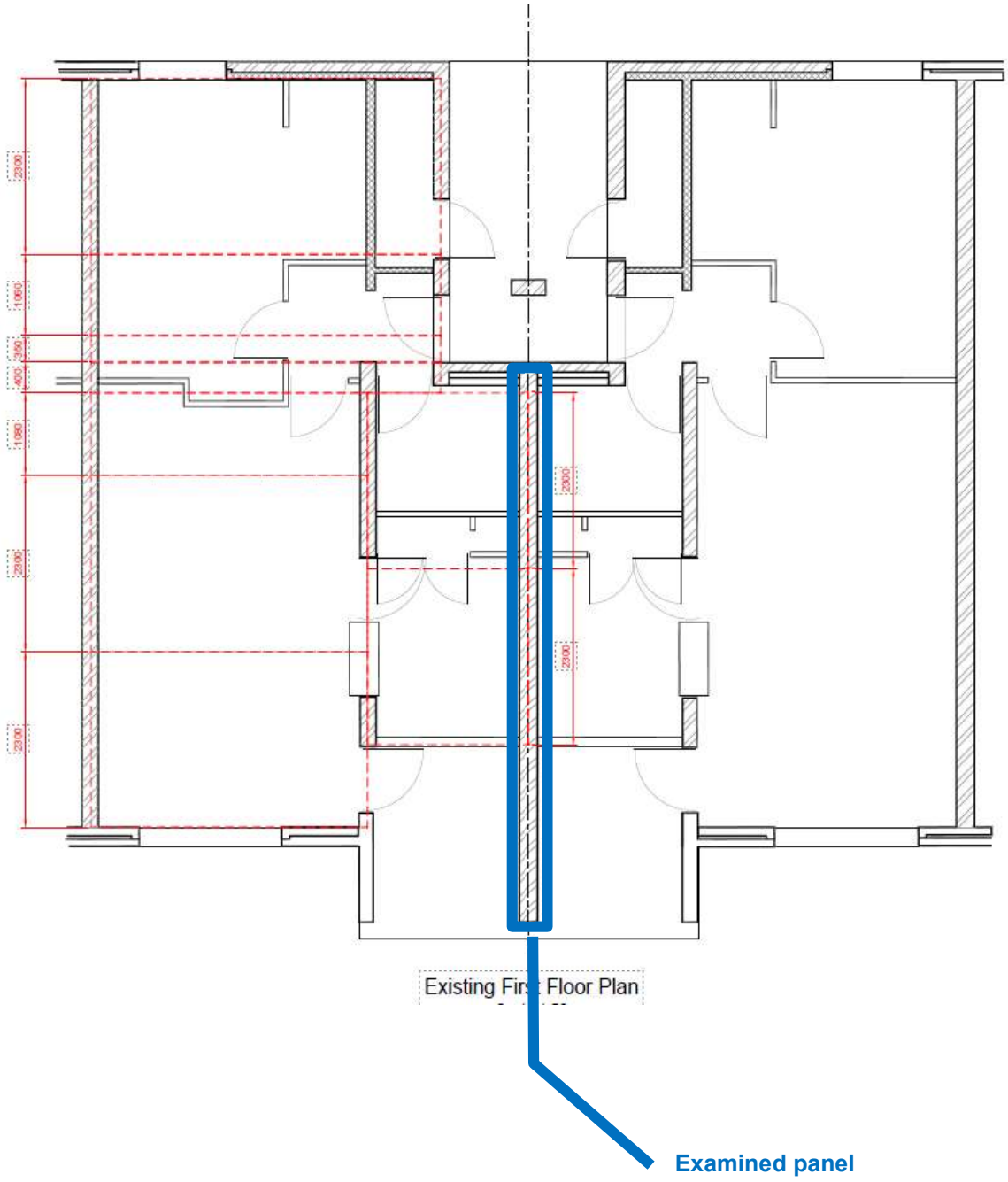
Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	5.689		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	8.367	Fail	
Load combination	0.90D+1.40Lp1		
Limiting dimension / area			
Allowable	11000		mm
Actual	10000		mm
Utilisation	0.909	Pass	

Description	*Near*	*Far*	*Status*	*Units*
Max. slenderness	27	27		
Actual	8.656	8.656		
Utilisation	0.321	0.321	Pass	

Millward consulting engineers	Project: Princess & Hanover				Job Ref.: MA11229	
	Section: Introduction & loading				Sheet no./rev.	
	Calc. by: BS	Date: May 21				

Kingsway first floor plan



MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Units*
Masonry unit Properties		
Masonry unit product	User defined	-
Masonry unit type	Clay brick	-
Water absorption	7% - 12%	%
Unit mean compressive strength	20.0	N/mm²
Unit minimum width as tested	102.5	mm
Unit height as tested	65.0	mm
Unit height as built	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	kN/m³
Mortar property		
Mortar selection	Designated	-
Mortar designation	M4 (iii)	-

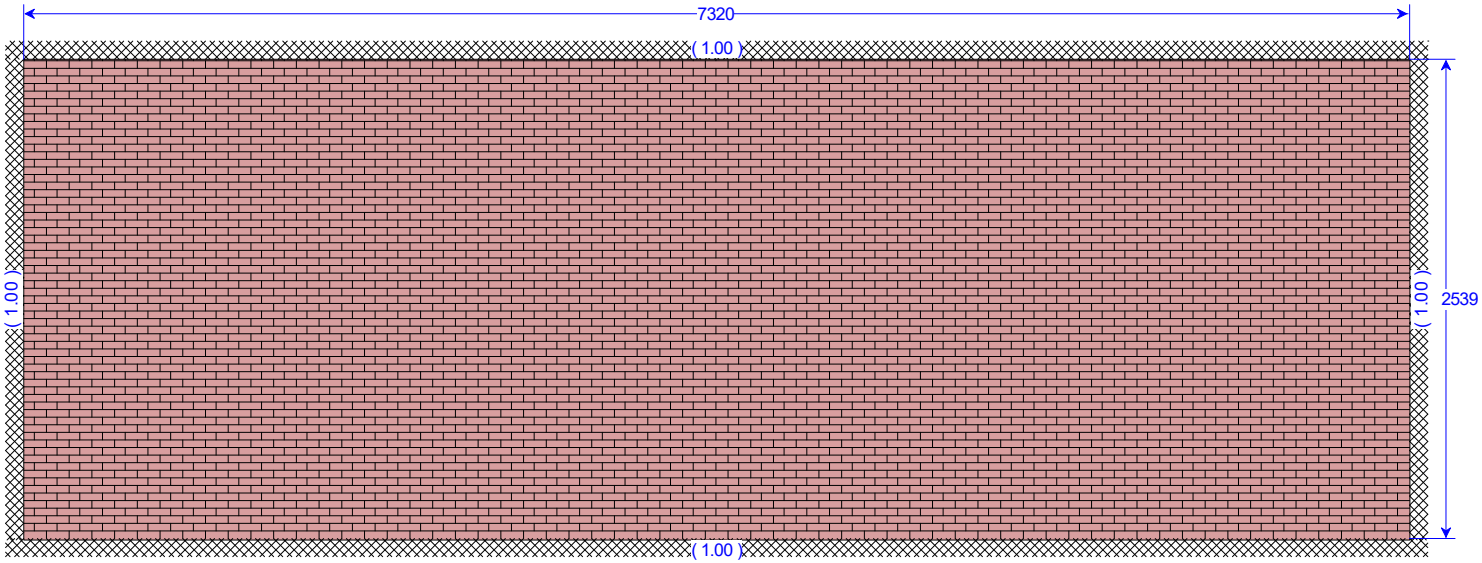
Partial safety factors for material strength

Data item	*Near leaf*
Partial safety factors	
Reinforcement tension	1.15
Masonry flexural tension	3.00
Masonry compression	3.50
Masonry shear	2.50
Masonry ties	3.50

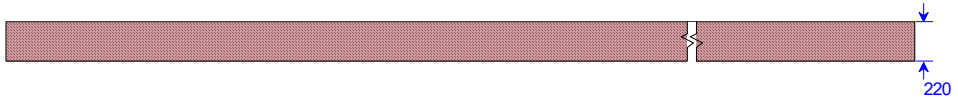
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked
Mid height	Cracked
Bottom edge	Cracked
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

Notes:



Elevation

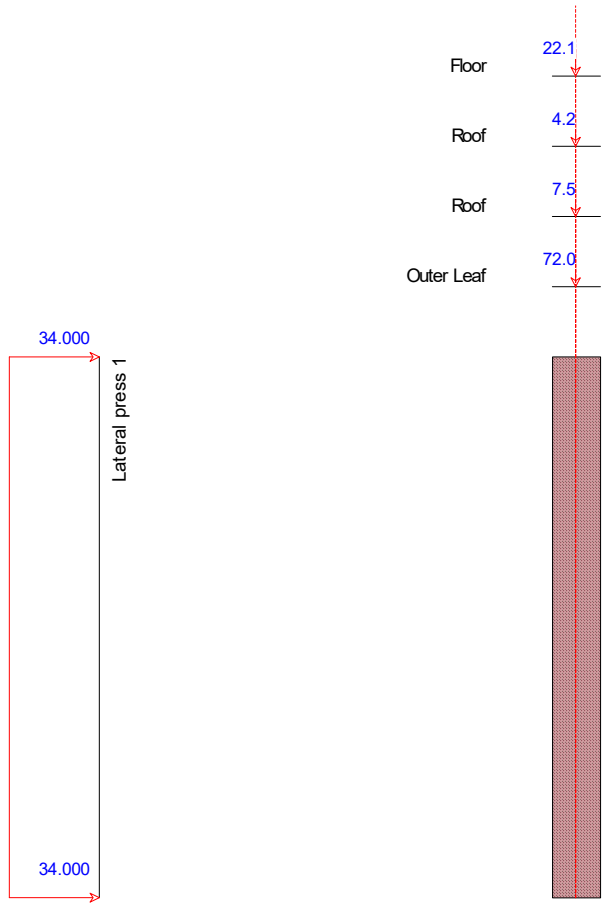


Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

CADS	Party Wall - Ground Floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 2

Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Party Wall - Ground Floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*
Bed joint reinforcement	No
DPC - top	No
DPC - bottom	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Units*
Design code	BS 5628-1 and 2:2005	
Compression		
Narrow brick wall factor	1.00	-
Compression on bed joints	5.00	N/mm²
Compression // bed joints	5.00	N/mm²
Flexure		
Horizontal span	1.10	N/mm²
Vertical span	0.40	N/mm²

Description	*Near*	*Units*
Shear		
Shear without compression	0.15	N/mm²
Shear friction coefficient	0.60	-
Limiting shear	1.40	N/mm²
Vertical shear- bonded	0.50	N/mm²
Elastic modulus		
Short term	4.50	kN/mm²
Long term	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near	
	Load (kN/m)	Ecc. mm
Dead load 1	72.000	0.000
Dead load 2	7.460	0.000
Imp. Load 1	4.200	0.000
Imp. Load 2	22.050	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	16.837		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	2.827	Fail	
Load combination	1.40D+1.20I+1.40		
Limiting dimension / area			
Allowable	11000		mm
Actual	7320		mm
Utilisation	0.665	Pass	

Description	*Near*	*Status*	*Units*
Max. slenderness ratio	27		
Actual	8.656		
Utilisation	0.321	Pass	

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Units*
Masonry unit Properties		
Masonry unit product	User defined	-
Masonry unit type	Clay brick	-
Water absorption	7% - 12%	%
Unit mean compressive strength	20.0	N/mm²
Unit minimum width as tested	102.5	mm
Unit height as tested	65.0	mm
Unit height as built	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	kN/m³
Mortar property		
Mortar selection	Designated	-
Mortar designation	M4 (iii)	-

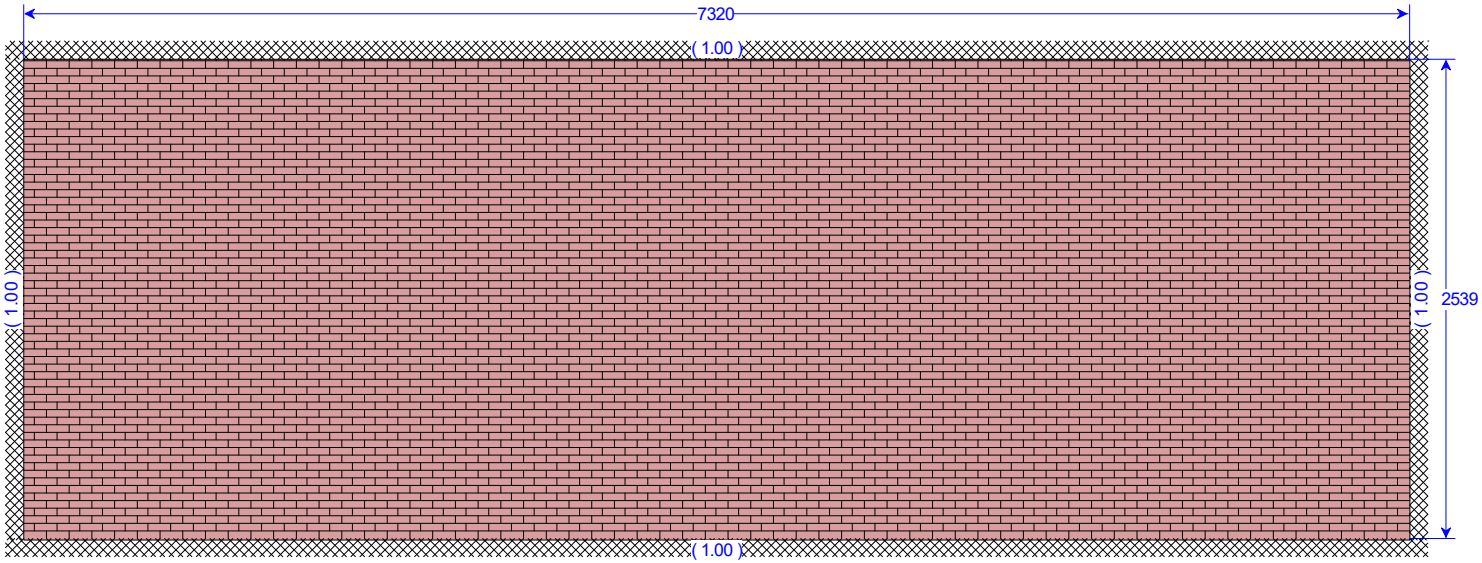
Partial safety factors for material strength

Data item	*Near leaf*
Partial safety factors	
Reinforcement tension	1.15
Masonry flexural tension	3.00
Masonry compression	3.50
Masonry shear	2.50
Masonry ties	3.50

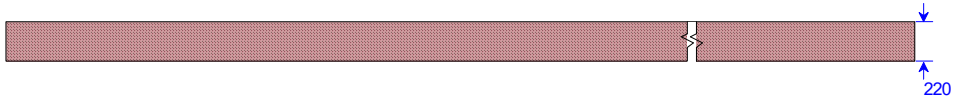
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked
Mid height	Cracked
Bottom edge	Cracked
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

Notes:



Elevation



Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

Party Wall - First Floor

Job No	MA11229
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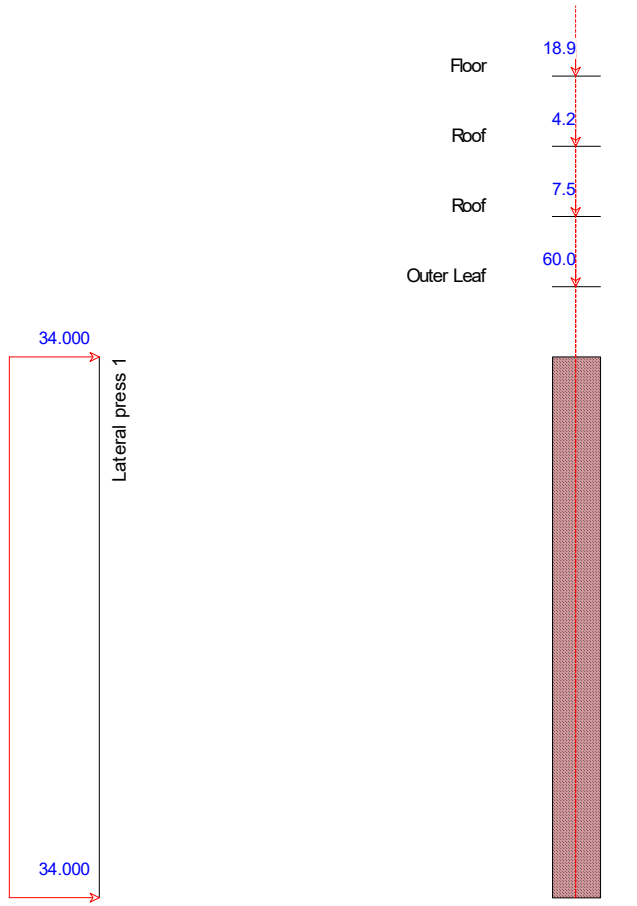
Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Party Wall - First Floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*
Bed joint reinforcement	No
DPC - top	No
DPC - bottom	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Units*	*Description*	*Near*	*Units*
Design code	BS 5628-1 and 2:2005		Shear		
Compression			Shear without compression	0.15	N/mm²
Narrow brick wall factor	1.00	-	Shear friction coefficient	0.60	-
Compression on bed joints	5.00	N/mm²	Limiting shear	1.40	N/mm²
Compression // bed joints	5.00	N/mm²	Vertical shear- bonded	0.50	N/mm²
Flexure			Elastic modulus		
Horizontal span	1.10	N/mm²	Short term	4.50	kN/mm²
Vertical span	0.40	N/mm²	Long term	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near	
	Load (kN/m)	Ecc. mm
Dead load 1	60.000	0.000
Dead load 2	7.460	0.000
Imp. Load 1	4.200	0.000
Imp. Load 2	18.900	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*	*Description*	*Near*	*Status*	*Units*
Lateral load capacity	20.796		kN/m²	Max. slenderness ratio	27		
Design uniform load	47.600		kN/m²	Actual	8.656		
Utilisation	2.289	Fail		Utilisation	0.321	Pass	
Load combination	0.90D+1.40Lp1						
Limiting dimension / area							
Allowable	11000		mm				
Actual	7320		mm				
Utilisation	0.665	Pass					

	Party Wall - 10m - Roof	Job No	MA11229
		Job Ref	
		Designed By	
		Checked By	
		Date	24/ 5/2021
		Revision No	
		Calc No	
		Page No	1

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Units*
Masonry unit Properties		
Masonry unit product	User defined	-
Masonry unit type	Clay brick	-
Water absorption	7% - 12%	%
Unit mean compressive strength	20.0	N/mm²
Unit minimum width as tested	102.5	mm
Unit height as tested	65.0	mm
Unit height as built	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	kN/m³
Mortar property		
Mortar selection	Designated	-
Mortar designation	M4 (iii)	-

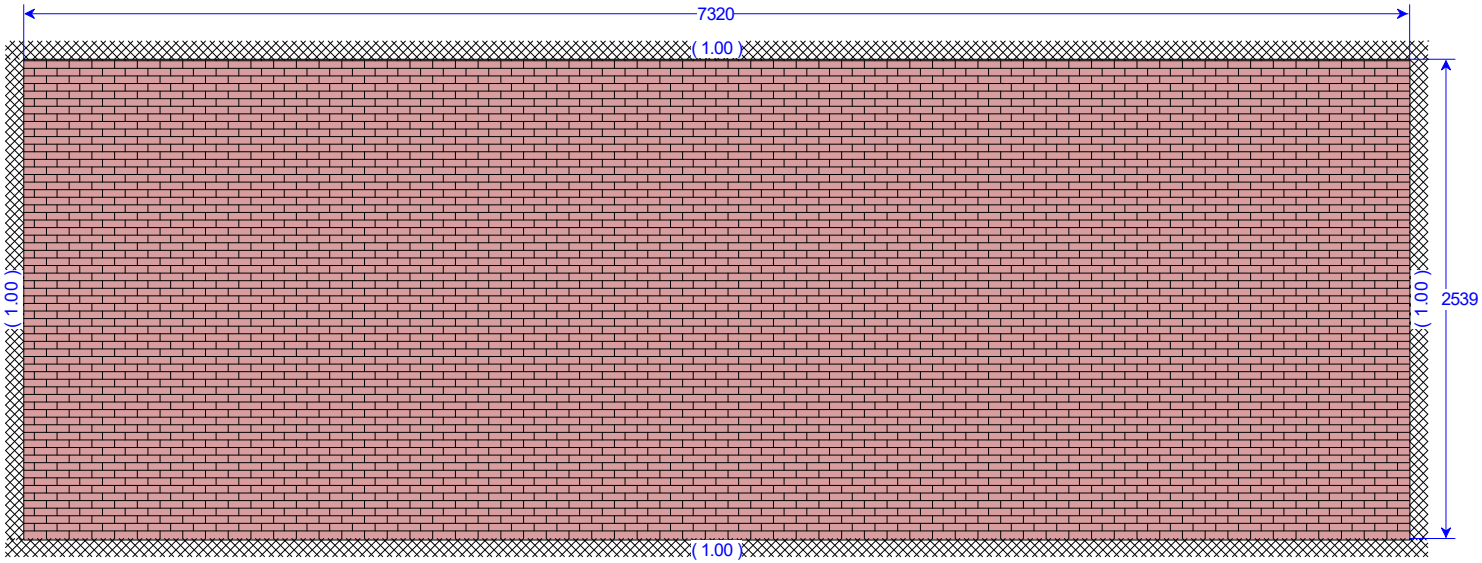
Partial safety factors for material strength

Data item	*Near leaf*
Partial safety factors	
Reinforcement tension	1.15
Masonry flexural tension	3.00
Masonry compression	3.50
Masonry shear	2.50
Masonry ties	3.50

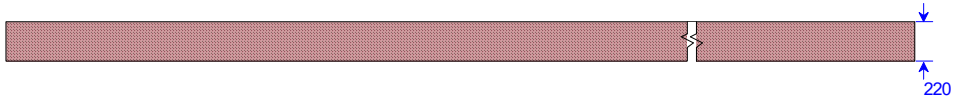
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked
Mid height	Cracked
Bottom edge	Cracked
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

Notes:



Elevation



Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

Party Wall - 10m - Roof

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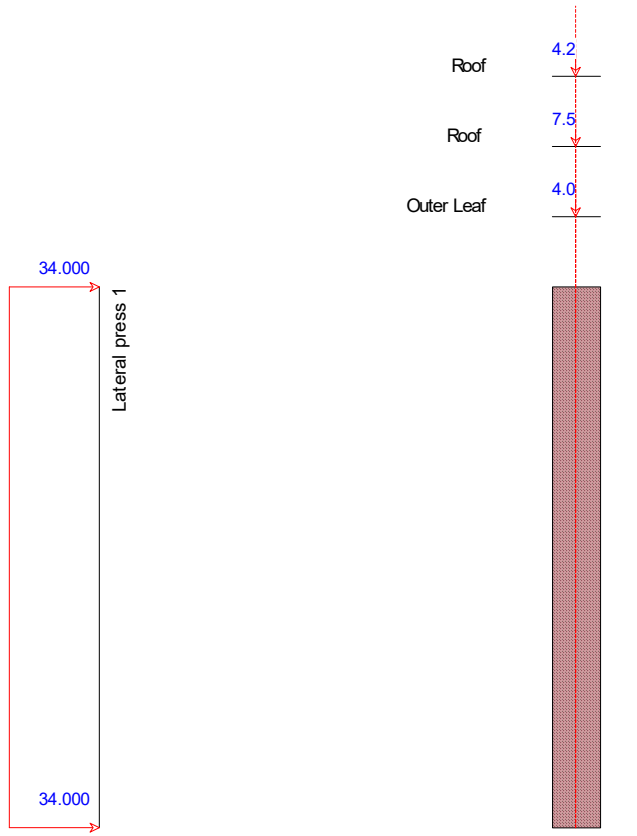
Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Party Wall - 10m - Roof	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*
Bed joint reinforcement	No
DPC - top	No
DPC - bottom	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Units*	*Description*	*Near*	*Units*
Design code	BS 5628-1 and 2:2005		Shear		
Compression			Shear without compression	0.15	N/mm²
Narrow brick wall factor	1.00	-	Shear friction coefficient	0.60	-
Compression on bed joints	5.00	N/mm²	Limiting shear	1.40	N/mm²
Compression // bed joints	5.00	N/mm²	Vertical shear- bonded	0.50	N/mm²
Flexure			Elastic modulus		
Horizontal span	1.10	N/mm²	Short term	4.50	kN/mm²
Vertical span	0.40	N/mm²	Long term	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near	
	Load (kN/m)	Ecc. mm
Dead load 1	4.000	0.000
Dead load 2	7.460	0.000
Imp. Load 1	4.200	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

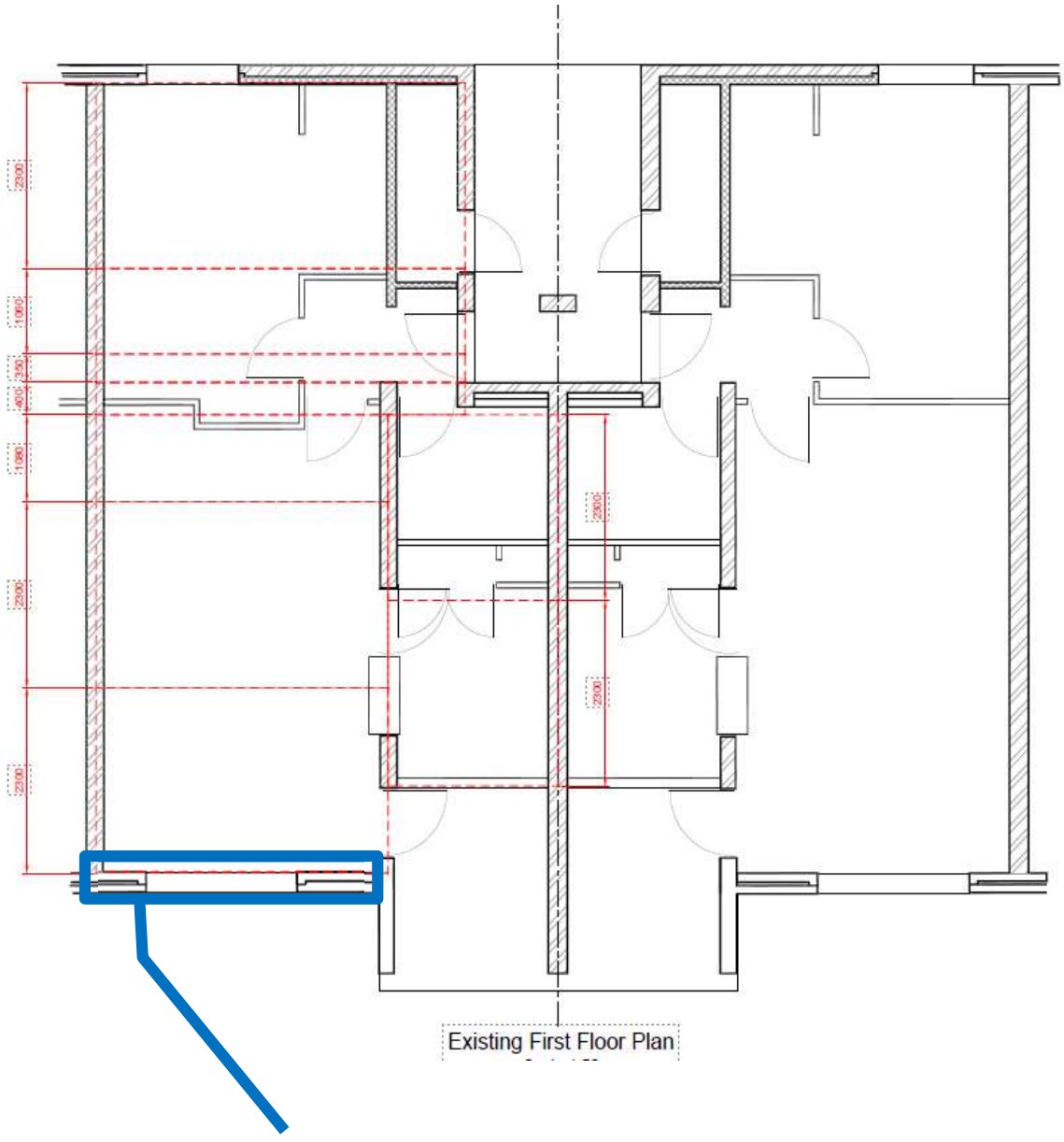
Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*	*Description*	*Near*	*Status*	*Units*
Lateral load capacity	6.101		kN/m²	Max. slenderness ratio	27		
Design uniform load	47.600		kN/m²	Actual	8.656		
Utilisation	7.803	Fail		Utilisation	0.321	Pass	
Load combination	0.90D+1.40Lp1						
Limiting dimension / area							
Allowable	11000		mm				
Actual	7320		mm				
Utilisation	0.665	Pass					

Millward consulting engineers	Project: Princess & Hanover				Job Ref.: MA11229	
	Section: Introduction & loading				Sheet no./rev.:	
	Calc. by: BS	Date: May 21				

Kingsway first floor plan



Examined panel

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Far leaf*	*Units*
Masonry unit Properties			
Masonry unit product	User defined	User defined	-
Masonry unit type	Clay brick	Aggregate concrete block	-
Water absorption	7% - 12%	N/a	%
Unit mean compressive strength	20.0	7.3	N/mm²
Unit minimum width as tested	102.5	100.0	mm
Unit height as tested	65.0	215.0	mm
Unit height as built	(laid normal) 65.0	(laid upright) 215.0	mm
Density of wall / leaf as built	15.0	15.0	kN/m³
Mortar property			
Mortar selection	Designated	Designated	-
Mortar designation	M4 (iii)	M4 (iii)	-

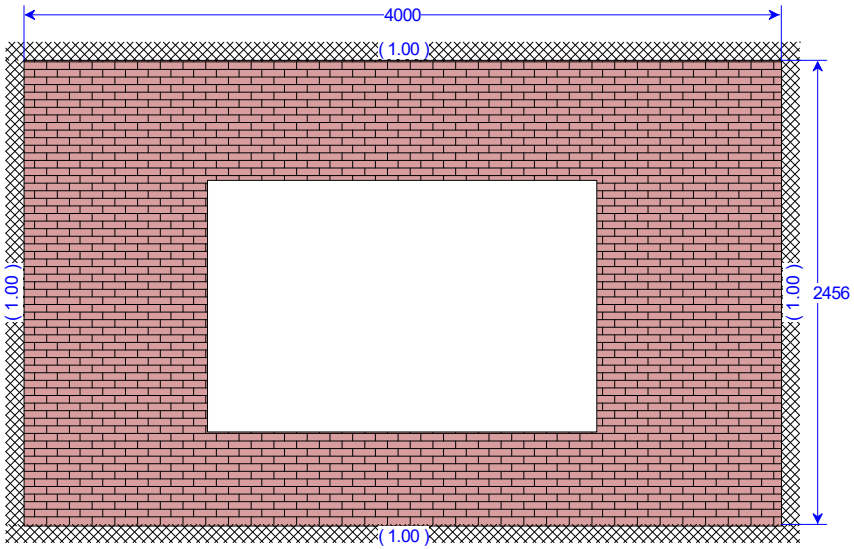
Partial safety factors for material strength

Data item	*Near leaf*	*Far leaf*
Partial safety factors		
Reinforcement tension	1.15	1.15
Masonry flexural tension	3.00	3.00
Masonry compression	3.50	3.50
Masonry shear	2.50	2.50
Masonry ties	3.50	3.50

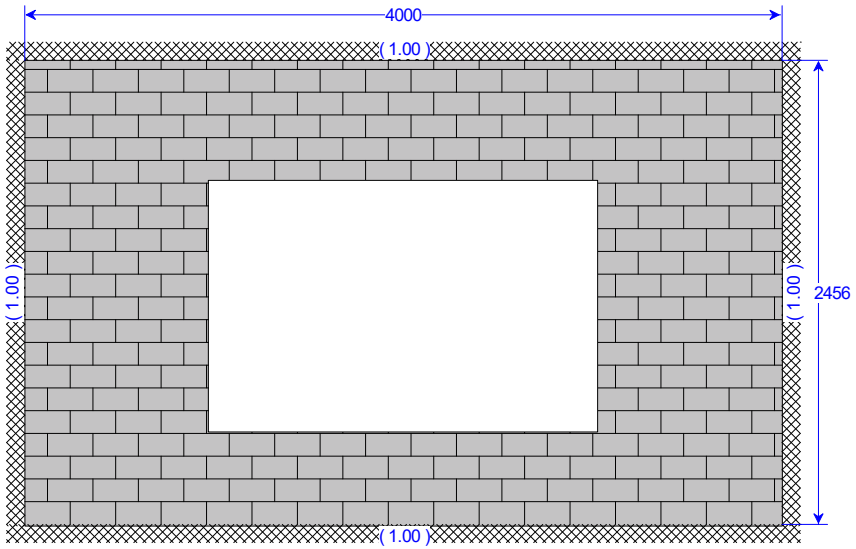
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked / Cracked
Mid height	Cracked / Cracked
Bottom edge	Cracked / Cracked
Opening effects	
Opening - edge influence angle	
Left / right edge (deg)	30
Top / bottom edge (deg)	30
Maximum strip width / span ratio	0.25
Maximum strip width / cantilever ratio	0.50
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

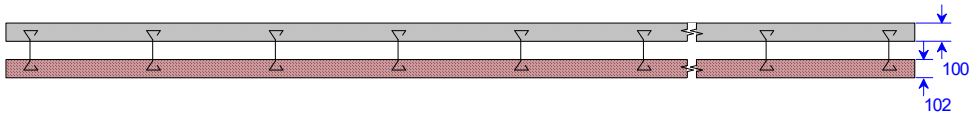
Notes:



Near leaf



Far leaf

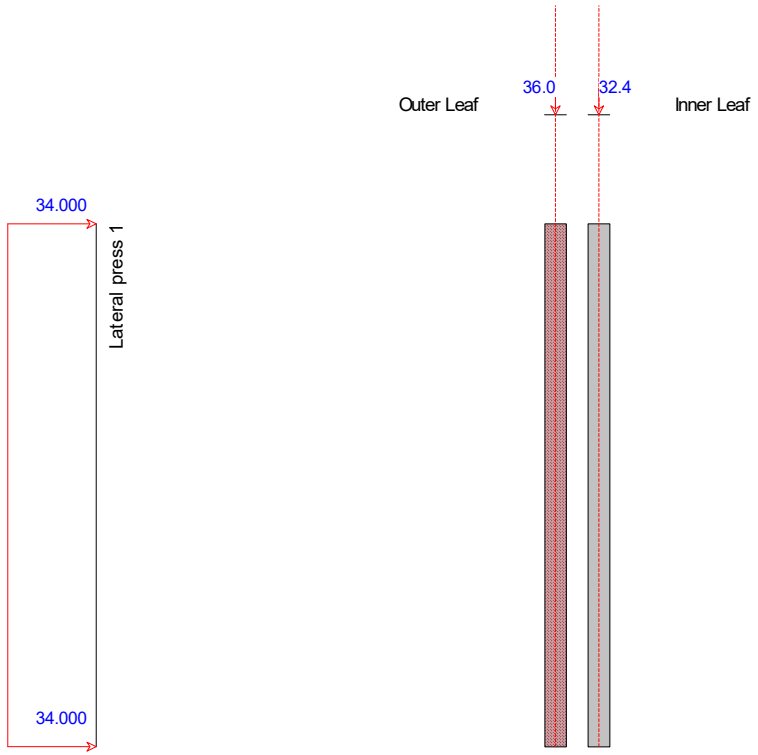


Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

CADS	Front Elevation - Ground Floor	Job No Job Ref Designed By Checked By Date 11/ 6/2021 Revision No Calc No Page No 2

Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Front Elevation - Ground Floor	Job No Job Ref Designed By Checked By Date 11/ 6/2021 Revision No Calc No Page No 3

Data item	*Near*	*Far*
Bed joint reinforcement	No	No
DPC - top	No	No
DPC - bottom	No	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Far*	*Units*
Design code	BS 5628-1 and 2:2005		
Compression			
Narrow brick wall factor	1.15	1.00	-
Compression on bed joints	5.75	6.40	N/mm²
Compression // bed joints	5.75	6.40	N/mm²
Flexure			
Horizontal span	1.10	0.60	N/mm²
Vertical span	0.40	0.25	N/mm²

Description	*Near*	*Far*	*Units*
Shear			
Shear without compression	0.15	0.15	N/mm²
Shear friction coefficient	0.60	0.60	-
Limiting shear	1.40	1.40	N/mm²
Vertical shear- bonded	0.50	0.35	N/mm²
Elastic modulus			
Short term	4.50	5.76	kN/mm²
Long term	2.25	2.88	kN/mm²

Characteristic vertical loads

Load category name	Near		Far	
	Load (kN/m)	Ecc. mm	Load (kN/m)	Ecc. mm
Dead load 1	36.000	0.000	32.400	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	6.328		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	7.523	Fail	
Load combination	1.40D+1.40Lp1		
Limiting dimension / area			
Allowable	6733		mm
Actual	4000		mm
Utilisation	0.594	Pass	

Description	*Near*	*Far*	*Status*	*Units*
Max. slenderness	27	27		
Actual	13.678	13.678		
Utilisation	0.507	0.507	Pass	

CADS	Front elevation with window openings - First floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 1

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*		*Far leaf*	*Units*
Masonry unit Properties				
Masonry unit product		User defined	User defined	-
Masonry unit type		Clay brick	Aggregate concrete block	-
Water absorption		7% - 12%	N/a	%
Unit mean compressive strength		20.0	7.3	N/mm²
Unit minimum width as tested		102.5	100.0	mm
Unit height as tested		65.0	215.0	mm
Unit height as built		(laid normal) 65.0	(laid upright) 215.0	mm
Density of wall / leaf as built		20.0	18.0	kN/m³
Mortar property				
Mortar selection		Designated	Designated	-
Mortar designation		M4 (iii)	M4 (iii)	-
Damp proof course properties	*Top*	*Bottom*		
DPC type	Polyethylene	Polyethylene		-
Characteristic compressive strength	> Masonry	> Masonry		N/mm²
Characteristic flexural strength	0.20	0.20		N/mm²
Characteristic initial shear strength	0.15	0.15		N/mm²
Shear-friction coefficient	0.60	0.60		-

Partial safety factors for material strength

Data item	*Near leaf*	*Far leaf*
Partial safety factors		
Reinforcement tension	1.15	1.15
Masonry flexural tension	3.00	3.00
Masonry compression	3.50	3.50
Masonry shear	2.50	2.50
Masonry ties	3.50	3.50

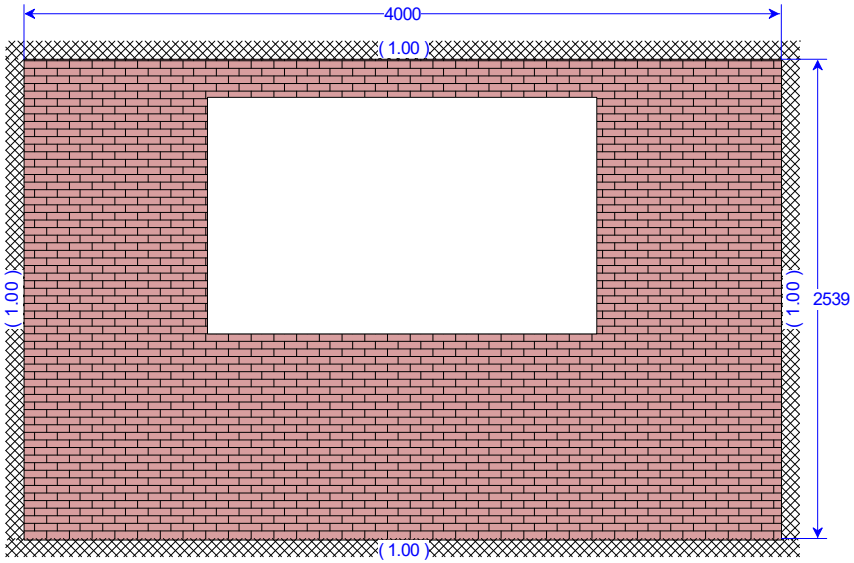
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked / Cracked
Mid height	Cracked / Cracked
Bottom edge	Cracked / Cracked
Opening effects	
Opening - edge influence angle	
Left / right edge (deg)	30
Top / bottom edge (deg)	30
Maximum strip width / span ratio	0.25
Maximum strip width / cantilever ratio	0.50
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125

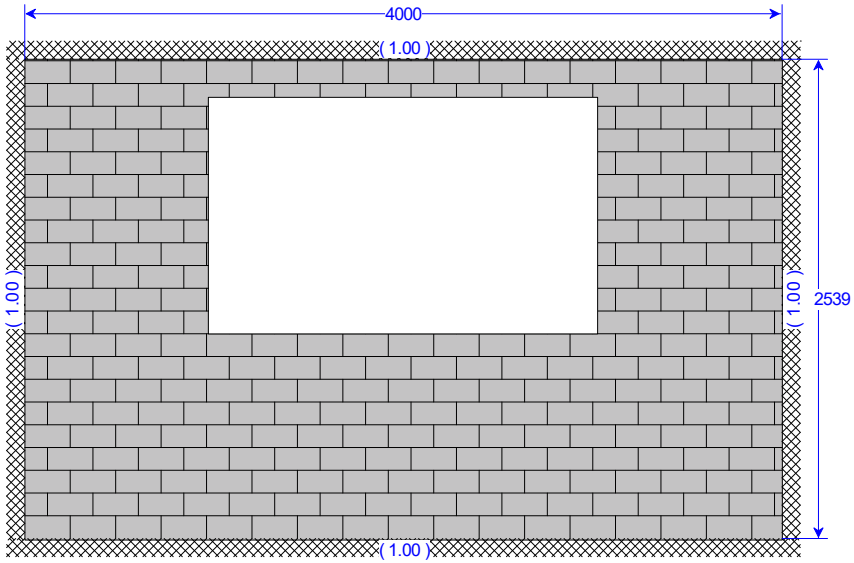
Calculation options(Contd.)

Maximum absolute deflection (mm)	20.00

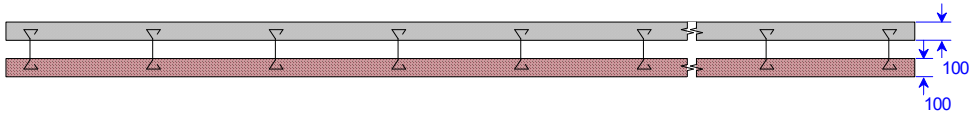
Notes:



Near leaf



Far leaf

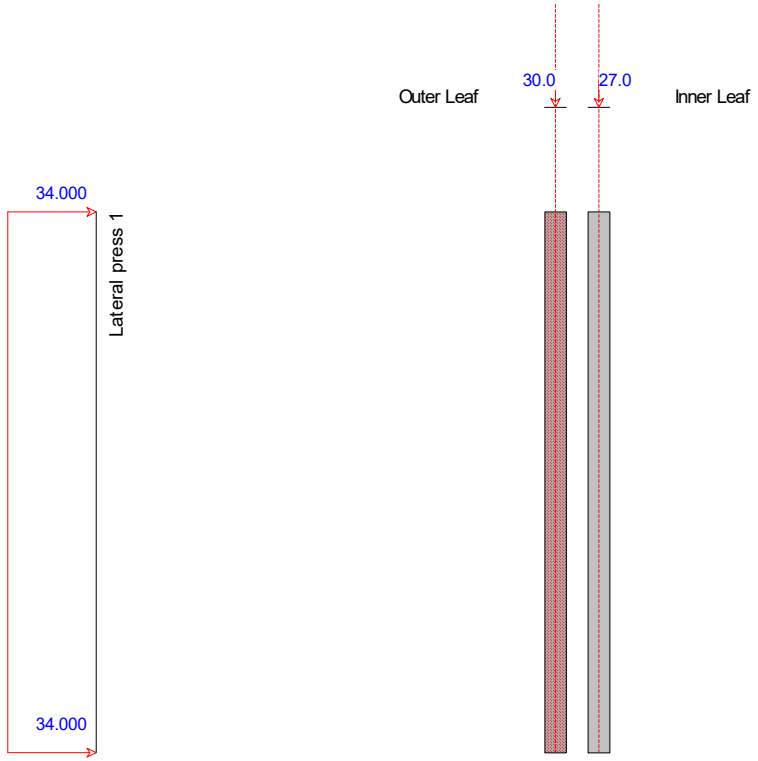


Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

CADS	Front elevation with window openings - First floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Front elevation with window openings - First floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 4

CADS	Front elevation with window openings - First floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 5

Data item	*Near*	*Far*
Bed joint reinforcement	No	No
DPC - top	Yes	No
DPC - bottom	Yes	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Far*	*Units*
Design code	BS 5628-1 and 2:2005		
Compression			
Narrow brick wall factor	1.15	1.00	-
Compression on bed joints	5.75	6.40	N/mm²
Compression // bed joints	5.75	6.40	N/mm²
Flexure			
Horizontal span	1.10	0.60	N/mm²
Vertical span	0.40	0.25	N/mm²

Description	*Near*	*Far*	*Units*
Shear			
Shear without compression	0.15	0.15	N/mm²
Shear friction coefficient	0.60	0.60	-
Limiting shear	1.40	1.40	N/mm²
Vertical shear- bonded	0.50	0.35	N/mm²
Elastic modulus			
Short term	4.50	5.76	kN/mm²
Long term	2.25	2.88	kN/mm²

Characteristic vertical loads

Load category name	Near		Far	
	Load (kN/m)	Ecc. mm	Load (kN/m)	Ecc. mm
Dead load 1	30.000	0.000	27.000	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	6.118		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	7.781	Fail	
Load combination	0.90D+1.40Lp1		
Limiting dimension / area			
Allowable	6666		mm
Actual	4000		mm
Utilisation	0.600	Pass	

Description	*Near*	*Far*	*Status*	*Units*
Max. slenderness	27	27		
Actual	14.282	14.282		
Utilisation	0.529	0.529	Pass	

CADS	Front elevation with window openings at 7th floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 1

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*		*Far leaf*	*Units*
Masonry unit Properties				
Masonry unit product		User defined	User defined	-
Masonry unit type		Clay brick	Aggregate concrete block	-
Water absorption		7% - 12%	N/a	%
Unit mean compressive strength		20.0	7.3	N/mm²
Unit minimum width as tested		102.5	100.0	mm
Unit height as tested		65.0	215.0	mm
Unit height as built		(laid normal) 65.0	(laid upright) 215.0	mm
Density of wall / leaf as built		20.0	18.0	kN/m³
Mortar property				
Mortar selection		Designated	Designated	-
Mortar designation		M4 (iii)	M4 (iii)	-
Damp proof course properties	*Top*	*Bottom*		
DPC type	Polyethylene	Polyethylene		-
Characteristic compressive strength	> Masonry	> Masonry		N/mm²
Characteristic flexural strength	0.20	0.20		N/mm²
Characteristic initial shear strength	0.15	0.15		N/mm²
Shear-friction coefficient	0.60	0.60		-

Partial safety factors for material strength

Data item	*Near leaf*	*Far leaf*
Partial safety factors		
Reinforcement tension	1.15	1.15
Masonry flexural tension	3.00	3.00
Masonry compression	3.50	3.50
Masonry shear	2.50	2.50
Masonry ties	3.50	3.50

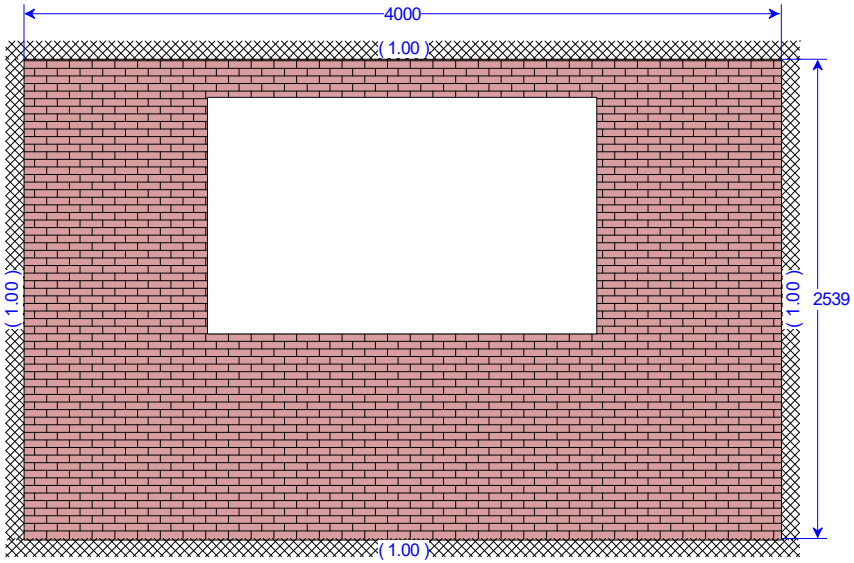
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked / Cracked
Mid height	Cracked / Cracked
Bottom edge	Cracked / Cracked
Opening effects	
Opening - edge influence angle	
Left / right edge (deg)	30
Top / bottom edge (deg)	30
Maximum strip width / span ratio	0.25
Maximum strip width / cantilever ratio	0.50
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125

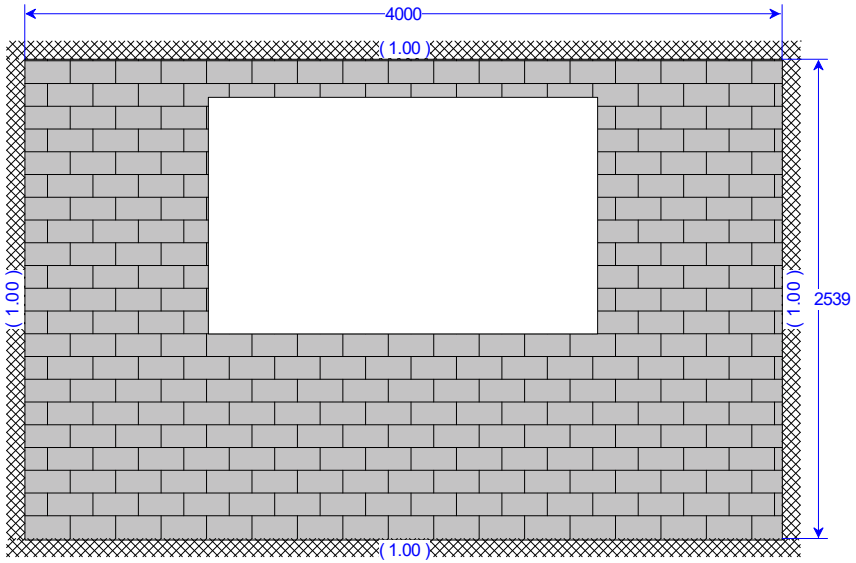
Calculation options(Contd.)

Maximum absolute deflection (mm)	20.00

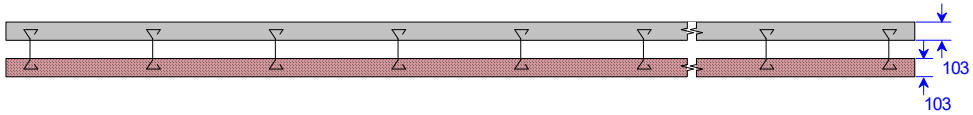
Notes:



Near leaf



Far leaf

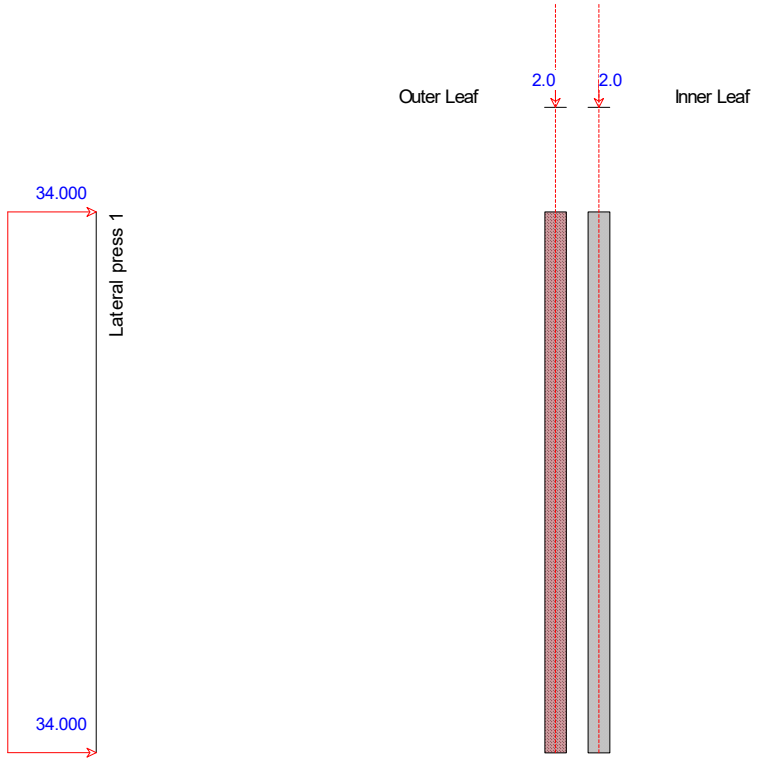


Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

CADS	Front elevation with window openings at 7th floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Front elevation with window openings at 7th floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 4

CADS	Front elevation with window openings at 7th floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 5

Data item	*Near*	*Far*
Bed joint reinforcement	No	No
DPC - top	Yes	No
DPC - bottom	Yes	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Far*	*Units*
Design code	BS 5628-1 and 2:2005		
Compression			
Narrow brick wall factor	1.00	1.00	-
Compression on bed joints	5.00	6.40	N/mm²
Compression // bed joints	5.00	6.40	N/mm²
Flexure			
Horizontal span	1.10	0.59	N/mm²
Vertical span	0.40	0.25	N/mm²

Description	*Near*	*Far*	*Units*
Shear			
Shear without compression	0.15	0.15	N/mm²
Shear friction coefficient	0.60	0.60	-
Limiting shear	1.40	1.40	N/mm²
Vertical shear- bonded	0.50	0.35	N/mm²
Elastic modulus			
Short term	4.50	5.76	kN/mm²
Long term	2.25	2.88	kN/mm²

Characteristic vertical loads

Load category name	Near		Far	
	Load (kN/m)	Ecc. mm	Load (kN/m)	Ecc. mm
Dead load 1	2.000	0.000	2.000	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

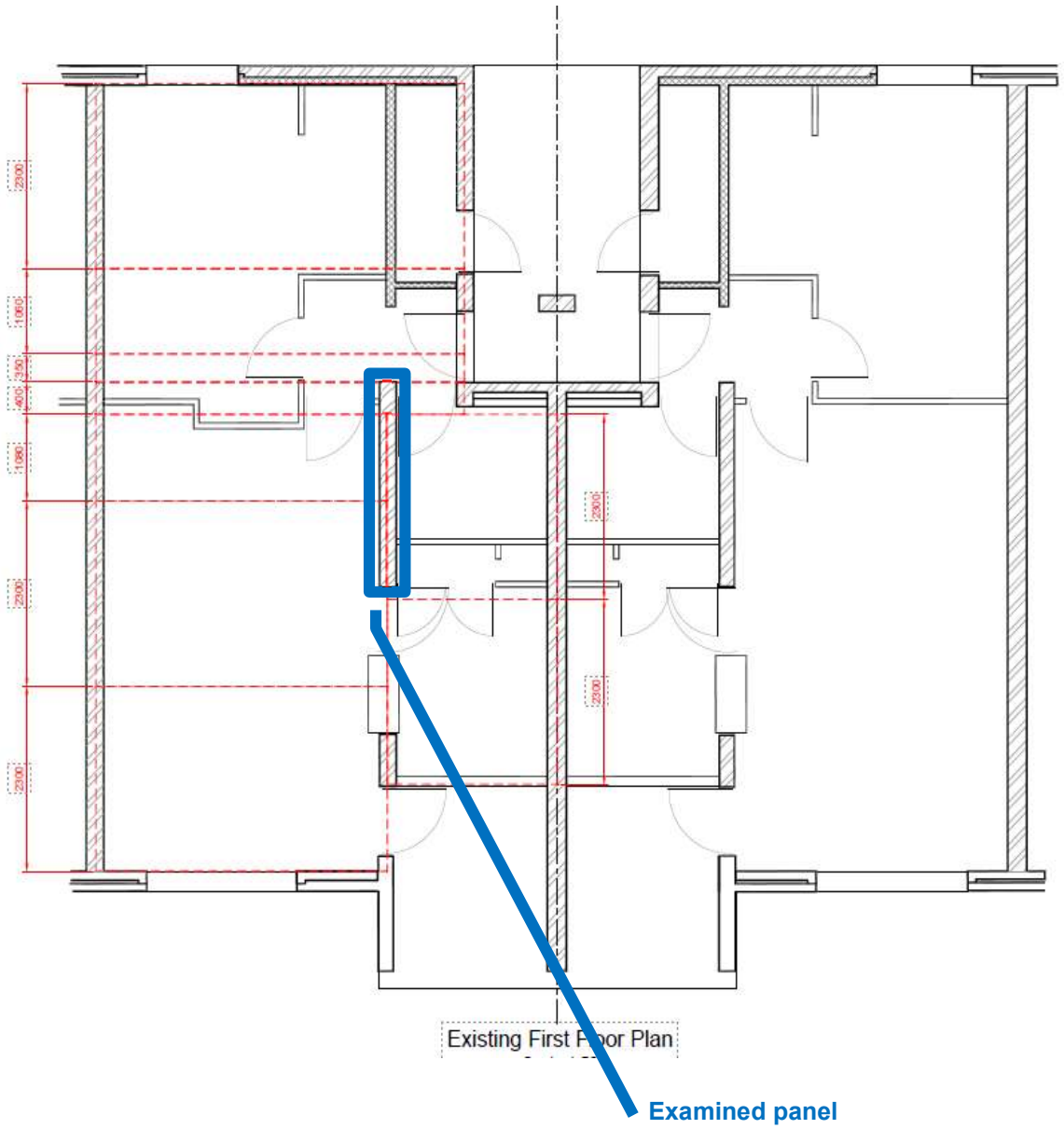
Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	2.159		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	22.052	Fail	
Load combination	0.90D+1.40Lp1		
Limiting dimension / area			
Allowable	6866		mm
Actual	4000		mm
Utilisation	0.583	Pass	

Description	*Near*	*Far*	*Status*	*Units*
Max. slenderness	27	27		
Actual	13.866	13.866		
Utilisation	0.514	0.514	Pass	

	Project				Job Ref.	
Millward consulting engineers	Princess & Hanover				MA11229	
	Section				Sheet no./rev.	
	Introduction & loading					
	Calc. by	Date				
	BS	May 21				

Kingsway first floor plan



MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Units*
Masonry unit Properties		
Masonry unit product	User defined	-
Masonry unit type	Clay brick	-
Water absorption	7% - 12%	%
Unit mean compressive strength	20.0	N/mm²
Unit minimum width as tested	220.0	mm
Unit height as tested	65.0	mm
Unit height as built	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	kN/m³
Mortar property		
Mortar selection	Designated	-
Mortar designation	M4 (iii)	-

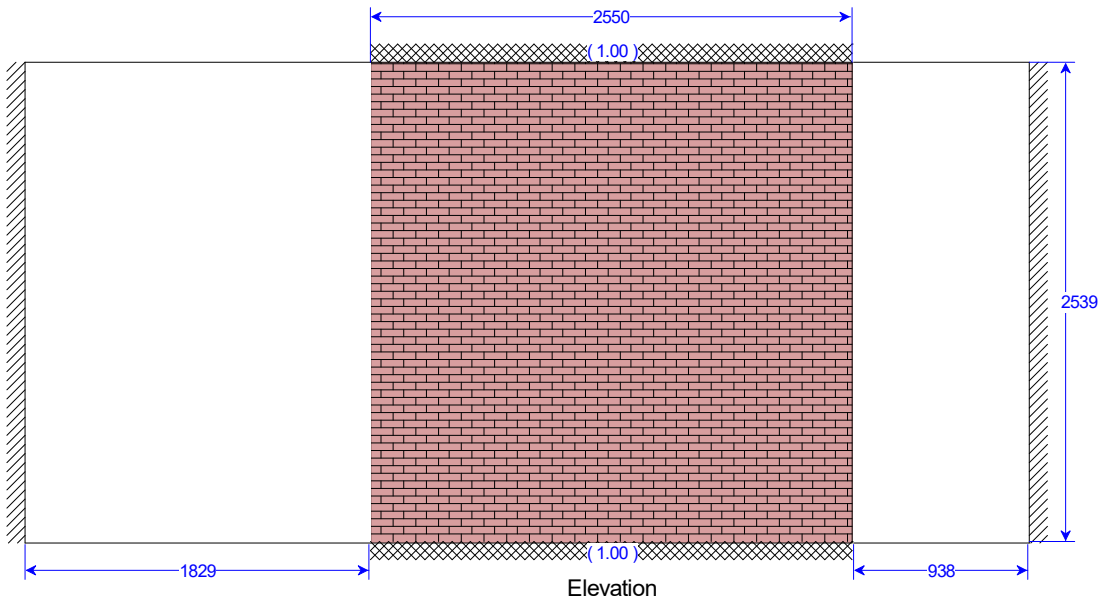
Partial safety factors for material strength

Data item	*Near leaf*
Partial safety factors	
Reinforcement tension	1.15
Masonry flexural tension	3.00
Masonry compression	3.50
Masonry shear	2.50
Masonry ties	3.50

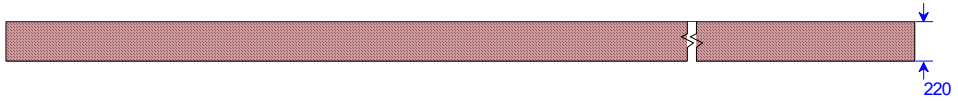
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked
Mid height	Cracked
Bottom edge	Cracked
Opening effects	
Opening - edge influence angle	
Left / right edge (deg)	30
Top / bottom edge (deg)	30
Maximum strip width / span ratio	0.25
Maximum strip width / cantilever ratio	0.50
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

Notes:



Elevation



Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

Internal Wall -Ground Floor

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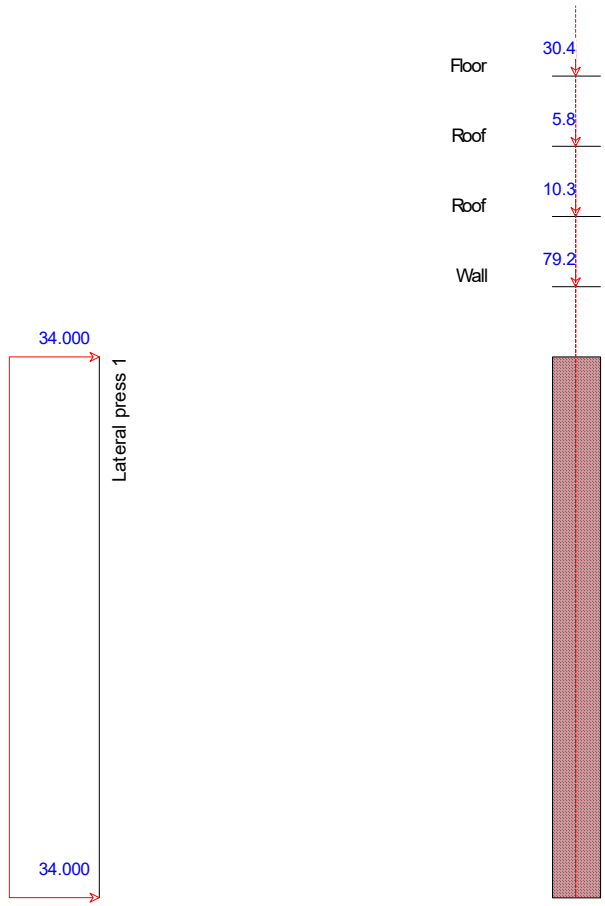
Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Internal Wall -Ground Floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*
Bed joint reinforcement	No
DPC - top	No
DPC - bottom	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Units*
Design code	BS 5628-1 and 2:2005	
Compression		
Narrow brick wall factor	1.15	-
Compression on bed joints	5.75	N/mm²
Compression // bed joints	5.75	N/mm²
Flexure		
Horizontal span	1.10	N/mm²
Vertical span	0.40	N/mm²

Description	*Near*	*Units*
Shear		
Shear without compression	0.15	N/mm²
Shear friction coefficient	0.60	-
Limiting shear	1.40	N/mm²
Vertical shear- bonded	0.50	N/mm²
Elastic modulus		
Short term	4.50	kN/mm²
Long term	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near	
	Load (kN/m)	Ecc. mm
Dead load 1	79.200	0.000
Dead load 2	10.300	0.000
Imp. Load 1	5.800	0.000
Imp. Load 2	30.450	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	3.942		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	12.075	Fail	
Load combination	1.40D+1.20I+1.40		
Limiting dimension / area			
Allowable	11000		mm
Actual	2539		mm
Utilisation	0.231	Pass	

Description	*Near*	*Status*	*Units*
Max. slenderness ratio	27		
Actual	8.656		
Utilisation	0.321	Pass	

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Units*
Masonry unit Properties		
Masonry unit product	User defined	-
Masonry unit type	Clay brick	-
Water absorption	7% - 12%	%
Unit mean compressive strength	20.0	N/mm²
Unit minimum width as tested	220.0	mm
Unit height as tested	65.0	mm
Unit height as built	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	kN/m³
Mortar property		
Mortar selection	Designated	-
Mortar designation	M4 (iii)	-

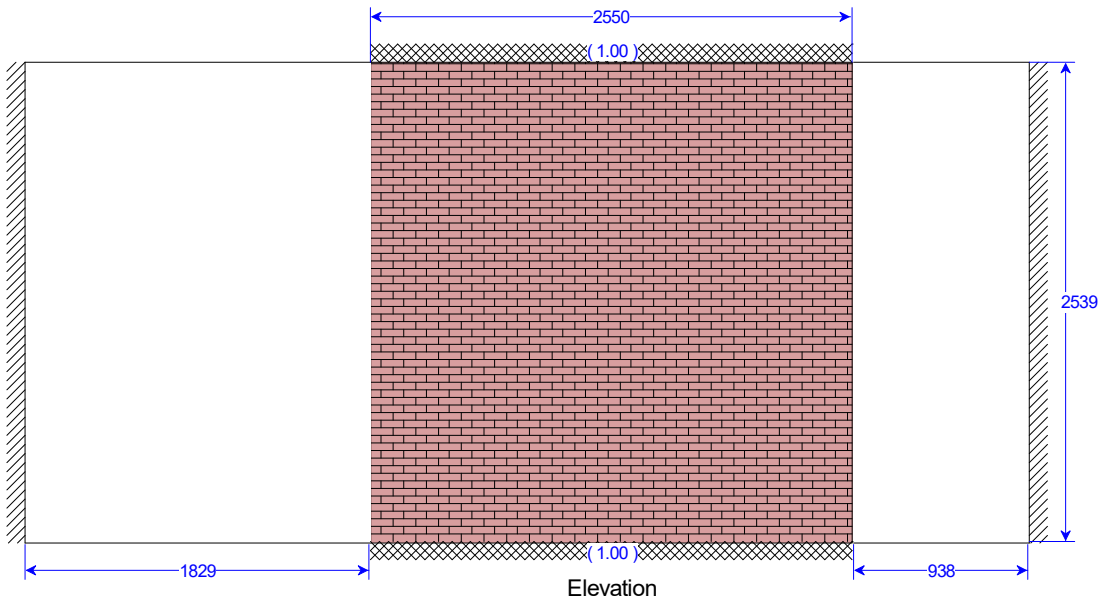
Partial safety factors for material strength

Data item	*Near leaf*
Partial safety factors	
Reinforcement tension	1.15
Masonry flexural tension	3.00
Masonry compression	3.50
Masonry shear	2.50
Masonry ties	3.50

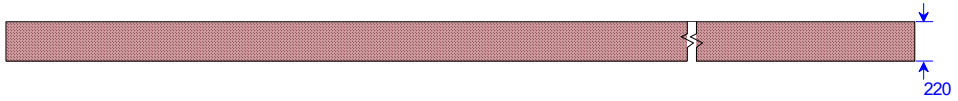
Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked
Mid height	Cracked
Bottom edge	Cracked
Opening effects	
Opening - edge influence angle	
Left / right edge (deg)	30
Top / bottom edge (deg)	30
Maximum strip width / span ratio	0.25
Maximum strip width / cantilever ratio	0.50
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

Notes:



Elevation



Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

Internal Wall - First Floor

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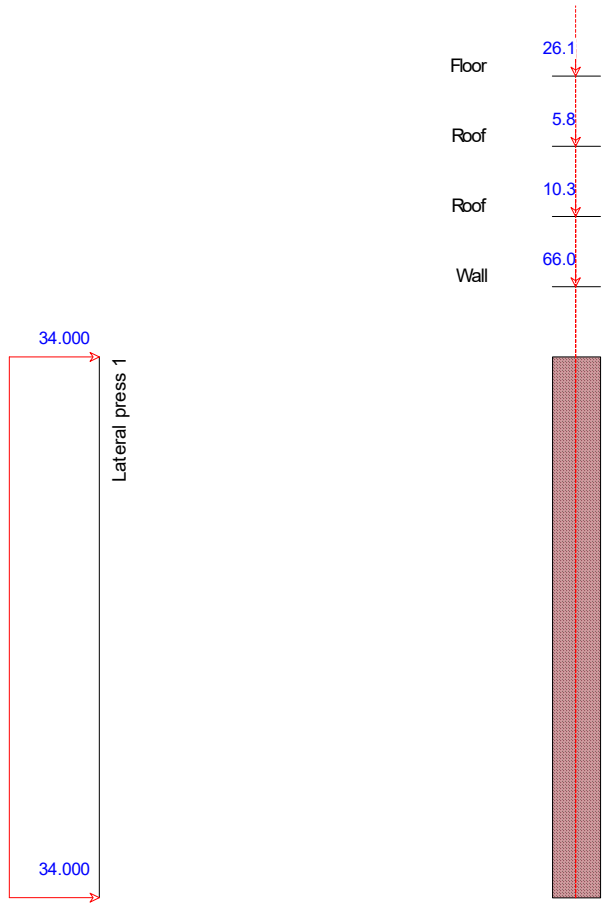
Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Internal Wall - First Floor	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*
Bed joint reinforcement	No
DPC - top	No
DPC - bottom	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Units*	*Description*	*Near*	*Units*
Design code	BS 5628-1 and 2:2005		Shear		
Compression			Shear without compression	0.15	N/mm²
Narrow brick wall factor	1.15	-	Shear friction coefficient	0.60	-
Compression on bed joints	5.75	N/mm²	Limiting shear	1.40	N/mm²
Compression // bed joints	5.75	N/mm²	Vertical shear- bonded	0.50	N/mm²
Flexure			Elastic modulus		
Horizontal span	1.10	N/mm²	Short term	4.50	kN/mm²
Vertical span	0.40	N/mm²	Long term	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near	
	Load (kN/m)	Ecc. mm
Dead load 1	66.000	0.000
Dead load 2	10.300	0.000
Imp. Load 1	5.800	0.000
Imp. Load 2	26.100	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*	*Description*	*Near*	*Status*	*Units*
Lateral load capacity	6.986		kN/m²	Max. slenderness ratio	27		
Design uniform load	47.600		kN/m²	Actual	8.656		
Utilisation	6.814	Fail		Utilisation	0.321	Pass	
Load combination	1.40D+1.20I+1.40						
Limiting dimension / area							
Allowable	11000		mm				
Actual	2539		mm				
Utilisation	0.231	Pass					

MATERIAL AND DESIGN DATA

Material properties

Data item	*Near leaf*	*Units*
Masonry unit Properties		
Masonry unit product	User defined	-
Masonry unit type	Clay brick	-
Water absorption	7% - 12%	%
Unit mean compressive strength	20.0	N/mm²
Unit minimum width as tested	220.0	mm
Unit height as tested	65.0	mm
Unit height as built	(laid normal) 65.0	mm
Density of wall / leaf as built	15.0	kN/m³
Mortar property		
Mortar selection	Designated	-
Mortar designation	M4 (iii)	-

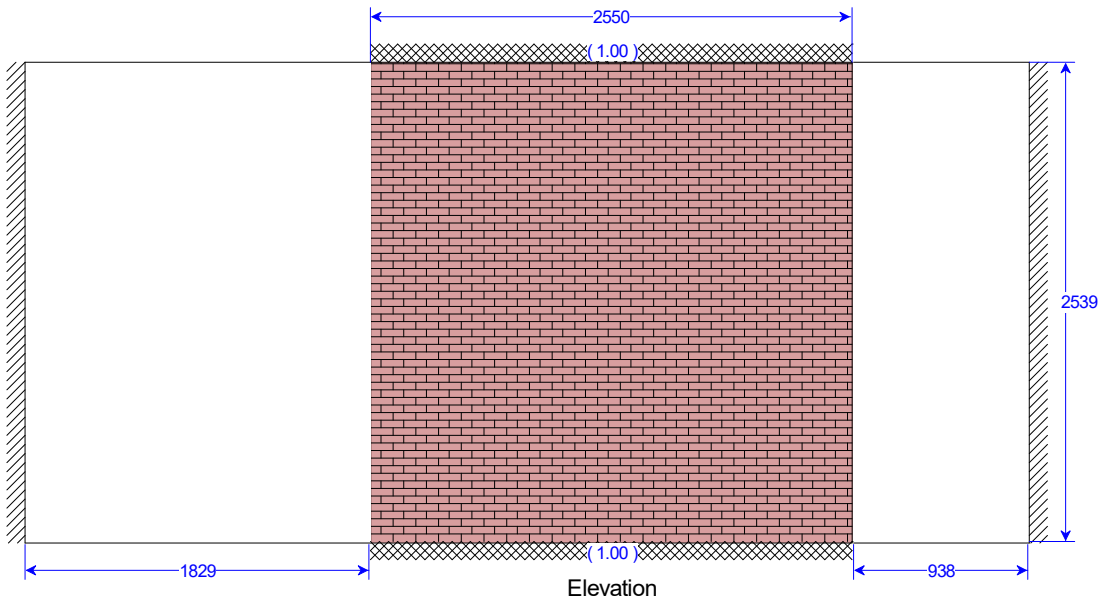
Partial safety factors for material strength

Data item	*Near leaf*
Partial safety factors	
Reinforcement tension	1.15
Masonry flexural tension	3.00
Masonry compression	3.50
Masonry shear	2.50
Masonry ties	3.50

Calculation options

Data item	*Options*
Section analysis	
Vertical load capacity check	Yes
Include eccentricity due to slenderness	Yes
Section resistance moment option (Near/Far)	
Top edge	Cracked
Mid height	Cracked
Bottom edge	Cracked
Opening effects	
Opening - edge influence angle	
Left / right edge (deg)	30
Top / bottom edge (deg)	30
Maximum strip width / span ratio	0.25
Maximum strip width / cantilever ratio	0.50
Dimension and deflection limits	
Design code	BS 5628-1 and 2:2005
Maximum slenderness ratio	27
Limiting dimensions check	Yes
Minimum span/deflection ratio	250
Minimum cantilever/deflection ratio	125
Maximum absolute deflection (mm)	20.00

Notes:



Elevation

Sectional plan

Note: Figures in brackets eg: (1.00) shown in elevation indicate user defined proportional fixity/continuity factor applied before allowing for openings.

Internal Wall - Roof

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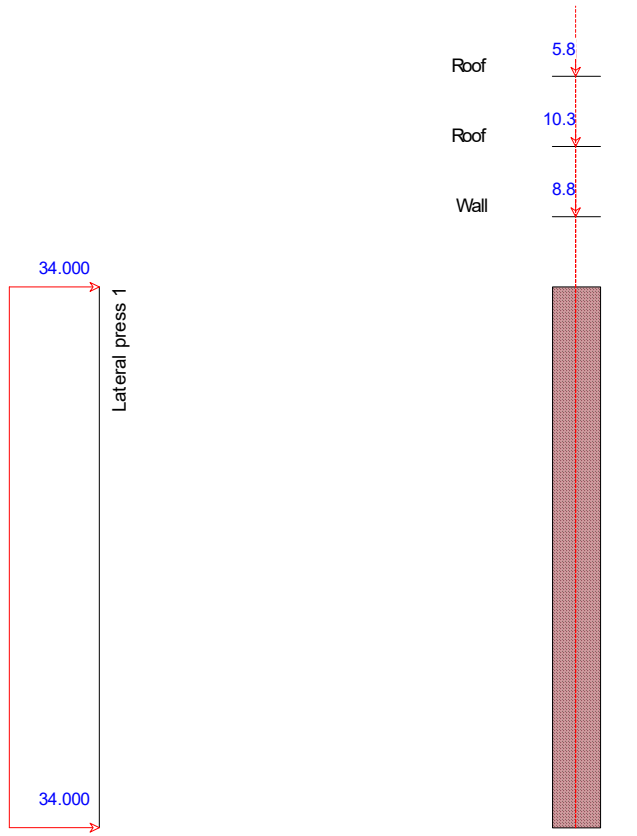
Units:
Vertical load - kN/m
Eccentricity - mm
Lateral pressure - kN/m²



Load view

CADS	Internal Wall - Roof	Job No MA11229 Job Ref Designed By Checked By Date 24/ 5/2021 Revision No Calc No Page No 3

Data item	*Near*
Bed joint reinforcement	No
DPC - top	No
DPC - bottom	No

Note:
1.For details of masonry units, bed joint reinforcement and damp proof course refer to 'Material and design data'
2.For details of wall ties (if specified) refer to 'Concise' or 'Detailed' report.

Masonry characteristic strengths

Description	*Near*	*Units*
Design code	BS 5628-1 and 2:2005	
Compression		
Narrow brick wall factor	1.15	-
Compression on bed joints	5.75	N/mm²
Compression // bed joints	5.75	N/mm²
Flexure		
Horizontal span	1.10	N/mm²
Vertical span	0.40	N/mm²

Description	*Near*	*Units*
Shear		
Shear without compression	0.15	N/mm²
Shear friction coefficient	0.60	-
Limiting shear	1.40	N/mm²
Vertical shear- bonded	0.50	N/mm²
Elastic modulus		
Short term	4.50	kN/mm²
Long term	2.25	kN/mm²

Characteristic vertical loads

Load category name	Near	
	Load (kN/m)	Ecc. mm
Dead load 1	8.800	0.000
Dead load 2	10.300	0.000
Imp. Load 1	5.800	0.000

Characteristic lateral wind pressure

Category name	Pres. top kN/m²	Pres. Bottom kN/m²
Lateral press 1	34.000	34.000

Characteristic lateral line load

Category name	Load kN/m	Height from bottom mm

Note: For details of more than two loads please refer detailed report

Summary results (critical load combinations)

Description	*Wall*	*Status*	*Units*
Lateral load capacity	2.109		kN/m²
Design uniform load	47.600		kN/m²
Utilisation	22.565	Fail	
Load combination	0.90D+1.40Lp1		
Limiting dimension / area			
Allowable	11000		mm
Actual	2539		mm
Utilisation	0.231	Pass	

Description	*Near*	*Status*	*Units*
Max. slenderness ratio	27		
Actual	8.656		
Utilisation	0.321	Pass	