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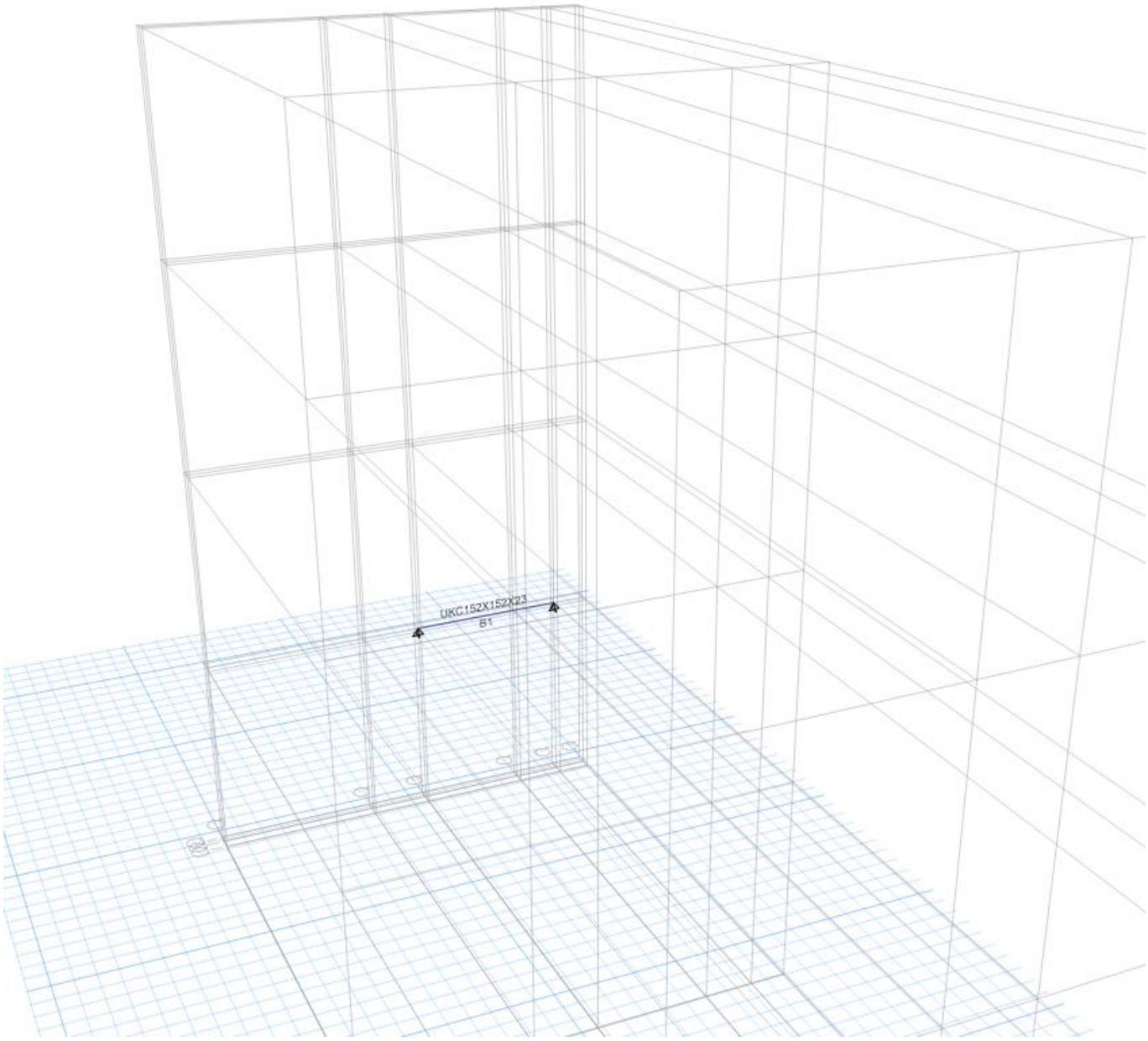
CALCULATION REPORT

REPLACING A WINDOW
BY A SLIDING DOOR
82a College Place, London,
27/06/2017



Introduction

This design is to provide confirmation of structural design and arrangement of steel beams, floor joists, roof trusses/rafters and lintels. The design is in accordance with the current British codes of practice BS 5950 .

Dead and live load assigned on beams. The software (ETABS) is used for calculation. The structure calculated under standard combinations that specified in BS standard (1.4 DL+1.6LL).

The coefficient assigned safety and all elements have enough capacity under specified loads (self-weight, live load, dead load).

NOTES:

General

- All work to be carried out in accordance with the structural calculations together with the Architects drawings and specifications.
- No construction or fabrication work is to start until these calculations have been approved by the Building Inspector.
- All dimensions given in the calculations are estimated from drawings and should not be used for construction purposes.

Steelwork

- Steelwork contractor must verify all dimensions on site before commencing any work or making any shop drawings. No dimensions to be scaled from drawings. Any discrepancies must be reported to the Engineer.
- All steel beams where seated on masonry to have concrete padstones beneath beam ends. Padstones based on engineering calculation and to match width of wall. Concrete to all pad stones to have a minimum strength of 30 N/mm2. Steel beams to have a minimum end bearing of 150mm where span of beam is parallel to wall unless noted otherwise on the details.
- Steelwork to be Mild Steel Grade S275, wire brushed to remove all oil, rust, mill scale etc. and painted with two coats of Zinc Phosphate or similar approved.
- Steelwork to be fire protected to Architects details and the satisfaction of the Building Inspector.

Health and Safety

As part of the design process the following risks have been identified for the contractor.

- As the roof construction and its support has been assumed. This should be confirmed on site prior to fabrication of the steel. If the roof is found to be carrying any water tanks local to proposed beams then the design will have to be modified.

- Elements designed in these calculations are heavier than the manual handling limit of 25 Kg and therefore the contractor will have to assess the lifting requirements.

- Contractor to be responsible to ensure that all works are carried out in a safe and workmanlike manner, to provide satisfactory temporary propping to maintain the stability of all the existing structural elements throughout the duration of the proposed works.
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- Ensure gap between new steel beams and existing masonry is packed tight. Some cosmetic cracking may occur after temporary propping is taken away as the beam deflects slightly under the new loading. Make good any cracking.

- Any walls that are supporting steelwork that are found not to be load bearing masonry or of poor construction should be reported to the Engineer.

- The CDM Regulations 2015 are applicable for all domestic and non-domestic projects.

- Under the CDM Regulations the Client has certain responsibilities, including the appointment of the Principal Contractor and a Principal Designer where more than one contractor is involved. A construction phase plan should be provided for all contracts and a health and safety file should be provided for projects where more than one contractor is involved.

- The Client has a responsibility to notify the HSE where any project is scheduled to take longer than 30 working days, have more than 20 workers working simultaneously or exceed 500 person days.
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- Asbestos may be present in older buildings. Asbestos should be dealt with in accordance with the Control of Asbestos Regulations. If major refurbishment work is being carried out then a demolition / refurbishment survey should be undertaken.

MATERIALS

1.1 Steelwork

All steelwork is to be S275 to BS 4360 or equivalent to EN code except hollow sections where on S355 is available.

1.2 Brickwork

Brickwork assumed to be constructed from units with a minimum crushing strength of 20 N/mm2 laid in grade (iii) mortar to BS 5628 or equivalent.
Characteristic compressive strength = 5.8 N/mm2 (Table 2)
Maximum local bearing stress to BS 5628= 1.5 x 5.8/3.5= 2.48 N/mm2
Internal brickwork taken as 20 N/mm2 units laid in grade (iv) mortar.
Maximum local bearing stress to BS 5628= 1.5 x 5.2/3.5= 2.22 N/mm2

1.3 Blockwork

Blockwork is grade (iv) assumed to be constructed from units with a minimum crushing strength of 2.9 N/mm2 laid in mortar to BS 5628 or equivalent. Characteristic compressive strength fk = 2.8 N/mm2 (Table 2)
Maximum local bearing stress to BS 5628= 1.5 x 2.8/3.5= 1.2 N/mm2

1 Structure Data

This chapter provides model geometry information, including items such as story levels, point coordinates, and element connectivity.

1.1 Story Data

Table 1.1 - Story Data

Name	Height mm	Elevation mm	Master Story	Similar To	Splice Story
Story4	3000	12000	Yes	None	No
Story3	3000	9000	No	Story4	No
Story2	3000	6000	No	Story4	No
Story1	3000	3000	No	Story4	No
Base	0	0	No	None	No

2 Properties

This chapter provides property information for materials, frame sections, shell sections, and links.

2.1 Materials

Table 2.1 - Material Properties - Summary

Name	Type	E MPa	ν	Unit Weight kN/m³	Design Strengths
4000Psi	Concrete	24855.58	0.2	23.5631	Fc=27.58 MPa
A416Gr270	Tendon	196500.6	0	76.9729	Fy=1689.91 MPa, Fu=1861.58 MPa
A615Gr60	Rebar	199947.98	0.3	76.9729	Fy=413.69 MPa, Fu=620.53 MPa
A992Fy50	Steel	199947.98	0.3	76.9729	Fy=344.74 MPa, Fu=448.16 MPa

2.2 Frame Sections

Table 2.2 - Frame Sections - Summary

Name	Material	Shape
ConcBm	4000Psi	Concrete Rectangular
ConcCol	4000Psi	Concrete Rectangular
SteelBm	A992Fy50	Steel I/Wide Flange
SteelCol	A992Fy50	Steel I/Wide Flange
UKB1016X305X222	A992Fy50	Steel I/Wide Flange
UKB1016X305X249	A992Fy50	Steel I/Wide Flange
UKB1016X305X314	A992Fy50	Steel I/Wide Flange
UKB1016X305X349	A992Fy50	Steel I/Wide Flange
UKB1016X305X393	A992Fy50	Steel I/Wide Flange
UKB1016X305X437	A992Fy50	Steel I/Wide Flange
UKB1016X305X487	A992Fy50	Steel I/Wide Flange
UKB1016XX305X272	A992Fy50	Steel I/Wide Flange
UKB127X76X13	A992Fy50	Steel I/Wide Flange
UKB152X89X16	A992Fy50	Steel I/Wide Flange
UKB178X102X19	A992Fy50	Steel I/Wide Flange
UKB203X102X23	A992Fy50	Steel I/Wide Flange
UKB203X133X25	A992Fy50	Steel I/Wide Flange
UKB203X133X30	A992Fy50	Steel I/Wide Flange
UKB254X102X22	A992Fy50	Steel I/Wide Flange
UKB254X102X25	A992Fy50	Steel I/Wide Flange
UKB254X102X28	A992Fy50	Steel I/Wide Flange
UKB254X146X31	A992Fy50	Steel I/Wide Flange
UKB254X146X37	A992Fy50	Steel I/Wide Flange
UKB254X146X43	A992Fy50	Steel I/Wide Flange
UKB305X102X25	A992Fy50	Steel I/Wide Flange
UKB305X102X28	A992Fy50	Steel I/Wide Flange
UKB305X102X33	A992Fy50	Steel I/Wide Flange
UKB305X127X37	A992Fy50	Steel I/Wide Flange
UKB305X127X42	A992Fy50	Steel I/Wide Flange
UKB305X127X48	A992Fy50	Steel I/Wide Flange
UKB305X165X40	A992Fy50	Steel I/Wide Flange
UKB305X165X46	A992Fy50	Steel I/Wide Flange
UKB305X165X54	A992Fy50	Steel I/Wide Flange
UKB356X127X33	A992Fy50	Steel I/Wide Flange
UKB356X127X39	A992Fy50	Steel I/Wide Flange
UKB356X171X45	A992Fy50	Steel I/Wide Flange
UKB356X171X51	A992Fy50	Steel I/Wide Flange
UKB356X171X57	A992Fy50	Steel I/Wide Flange
UKB356X171X67	A992Fy50	Steel I/Wide Flange

Name	Material	Shape
UKB406X140X39	A992Fy50	Steel I/Wide Flange
UKB406X140X46	A992Fy50	Steel I/Wide Flange
UKB406X140X53	A992Fy50	Steel I/Wide Flange
UKB406X178X54	A992Fy50	Steel I/Wide Flange
UKB406X178X60	A992Fy50	Steel I/Wide Flange
UKB406X178X67	A992Fy50	Steel I/Wide Flange
UKB406X178X74	A992Fy50	Steel I/Wide Flange
UKB406X178X85	A992Fy50	Steel I/Wide Flange
UKB457X152X52	A992Fy50	Steel I/Wide Flange
UKB457X152X60	A992Fy50	Steel I/Wide Flange
UKB457X152X67	A992Fy50	Steel I/Wide Flange
UKB457X152X74	A992Fy50	Steel I/Wide Flange
UKB457X152X82	A992Fy50	Steel I/Wide Flange
UKB457X191X106	A992Fy50	Steel I/Wide Flange
UKB457X191X133	A992Fy50	Steel I/Wide Flange
UKB457X191X161	A992Fy50	Steel I/Wide Flange
UKB457X191X67	A992Fy50	Steel I/Wide Flange
UKB457X191X74	A992Fy50	Steel I/Wide Flange
UKB457X191X82	A992Fy50	Steel I/Wide Flange
UKB457X191X89	A992Fy50	Steel I/Wide Flange
UKB457X191X98	A992Fy50	Steel I/Wide Flange
UKB533X165X66	A992Fy50	Steel I/Wide Flange
UKB533X165X74	A992Fy50	Steel I/Wide Flange
UKB533X165X85	A992Fy50	Steel I/Wide Flange
UKB533X210X101	A992Fy50	Steel I/Wide Flange
UKB533X210X109	A992Fy50	Steel I/Wide Flange
UKB533X210X122	A992Fy50	Steel I/Wide Flange
UKB533X210X138	A992Fy50	Steel I/Wide Flange
UKB533X210X82	A992Fy50	Steel I/Wide Flange
UKB533X210X92	A992Fy50	Steel I/Wide Flange
UKB533X312X150	A992Fy50	Steel I/Wide Flange
UKB533X312X182	A992Fy50	Steel I/Wide Flange
UKB533X312X219	A992Fy50	Steel I/Wide Flange
UKB533X312X272	A992Fy50	Steel I/Wide Flange
UKB610X178X100	A992Fy50	Steel I/Wide Flange
UKB610X178X82	A992Fy50	Steel I/Wide Flange
UKB610X178X92	A992Fy50	Steel I/Wide Flange
UKB610X229X101	A992Fy50	Steel I/Wide Flange
UKB610X229X113	A992Fy50	Steel I/Wide Flange
UKB610X229X125	A992Fy50	Steel I/Wide Flange
UKB610X229X140	A992Fy50	Steel I/Wide Flange
UKB610X305X149	A992Fy50	Steel I/Wide Flange
UKB610X305X179	A992Fy50	Steel I/Wide Flange
UKB610X305X238	A992Fy50	Steel I/Wide Flange
UKB686X254X125	A992Fy50	Steel I/Wide Flange
UKB686X254X140	A992Fy50	Steel I/Wide Flange
UKB686X254X152	A992Fy50	Steel I/Wide Flange
UKB686X254X170	A992Fy50	Steel I/Wide Flange
UKB762X267X134	A992Fy50	Steel I/Wide Flange
UKB762X267X147	A992Fy50	Steel I/Wide Flange
UKB762X267X173	A992Fy50	Steel I/Wide Flange
UKB762X267X197	A992Fy50	Steel I/Wide Flange
UKB838X292X176	A992Fy50	Steel I/Wide Flange
UKB838X292X194	A992Fy50	Steel I/Wide Flange
UKB838X292X226	A992Fy50	Steel I/Wide Flange
UKB914X305X201	A992Fy50	Steel I/Wide Flange
UKB914X305X224	A992Fy50	Steel I/Wide Flange

Name	Material	Shape
UKB914X305X253	A992Fy50	Steel I/Wide Flange
UKB914X305X289	A992Fy50	Steel I/Wide Flange
UKB914X419X343	A992Fy50	Steel I/Wide Flange
UKB914X419X388	A992Fy50	Steel I/Wide Flange
UKBP203X203X45	A992Fy50	Steel I/Wide Flange
UKBP203X203X54	A992Fy50	Steel I/Wide Flange
UKBP254X254X63	A992Fy50	Steel I/Wide Flange
UKBP254X254X71	A992Fy50	Steel I/Wide Flange
UKBP254X254X85	A992Fy50	Steel I/Wide Flange
UKBP305X305X110	A992Fy50	Steel I/Wide Flange
UKBP305X305X126	A992Fy50	Steel I/Wide Flange
UKBP305X305X149	A992Fy50	Steel I/Wide Flange
UKBP305X305X186	A992Fy50	Steel I/Wide Flange
UKBP305X305X223	A992Fy50	Steel I/Wide Flange
UKBP305X305X79	A992Fy50	Steel I/Wide Flange
UKBP305X305X88	A992Fy50	Steel I/Wide Flange
UKBP305X305X95	A992Fy50	Steel I/Wide Flange
UKBP356X368X109	A992Fy50	Steel I/Wide Flange
UKBP356X368X133	A992Fy50	Steel I/Wide Flange
UKBP356X368X152	A992Fy50	Steel I/Wide Flange
UKBP356X368X174	A992Fy50	Steel I/Wide Flange
UKC152X152X23	A992Fy50	Steel I/Wide Flange
UKC152X152X30	A992Fy50	Steel I/Wide Flange
UKC152X152X37	A992Fy50	Steel I/Wide Flange
UKC152X152X44	A992Fy50	Steel I/Wide Flange
UKC152X152X51	A992Fy50	Steel I/Wide Flange
UKC203X203X100	A992Fy50	Steel I/Wide Flange
UKC203X203X113	A992Fy50	Steel I/Wide Flange
UKC203X203X127	A992Fy50	Steel I/Wide Flange
UKC203X203X46	A992Fy50	Steel I/Wide Flange
UKC203X203X52	A992Fy50	Steel I/Wide Flange
UKC203X203X60	A992Fy50	Steel I/Wide Flange
UKC203X203X71	A992Fy50	Steel I/Wide Flange
UKC203X203X86	A992Fy50	Steel I/Wide Flange
UKC254X254X107	A992Fy50	Steel I/Wide Flange
UKC254X254X132	A992Fy50	Steel I/Wide Flange
UKC254X254X167	A992Fy50	Steel I/Wide Flange
UKC254X254X73	A992Fy50	Steel I/Wide Flange
UKC254X254X89	A992Fy50	Steel I/Wide Flange
UKC305X305X118	A992Fy50	Steel I/Wide Flange
UKC305X305X137	A992Fy50	Steel I/Wide Flange
UKC305X305X158	A992Fy50	Steel I/Wide Flange
UKC305X305X198	A992Fy50	Steel I/Wide Flange
UKC305X305X240	A992Fy50	Steel I/Wide Flange
UKC305X305X283	A992Fy50	Steel I/Wide Flange
UKC305X305X97	A992Fy50	Steel I/Wide Flange
UKC356X368X129	A992Fy50	Steel I/Wide Flange
UKC356X368X153	A992Fy50	Steel I/Wide Flange
UKC356X368X177	A992Fy50	Steel I/Wide Flange
UKC356X368X202	A992Fy50	Steel I/Wide Flange
UKC356X406X235	A992Fy50	Steel I/Wide Flange
UKC356X406X287	A992Fy50	Steel I/Wide Flange
UKC356X406X340	A992Fy50	Steel I/Wide Flange
UKC356X406X393	A992Fy50	Steel I/Wide Flange
UKC356X406X467	A992Fy50	Steel I/Wide Flange
UKC356X406X551	A992Fy50	Steel I/Wide Flange
UKC356X406X634	A992Fy50	Steel I/Wide Flange

3 Assignments

This chapter provides a listing of the assignments applied to the model.

3.1 Joint Assignments

Table 3.1 - Joint Assignments - Summary

Story	Label	Unique Name	Diaphragm	Restraints
Story1	1	1	From Area	UX; UY; UZ
Story1	2	2	From Area	UX; UY; UZ

3.2 Frame Assignments

Table 3.2 - Frame Assignments - Summary

Story	Label	Unique Name	Design Type	Length mm	Analysis Section	Design Section	Max Station Spacing mm	Releases
Story1	B1	1	Beam	2300	UKC152X152X23	UKC152X152X23	500	Yes

4 Loads

This chapter provides loading information as applied to the model.

4.1 Load Patterns

Table 4.1 - Load Patterns

Name	Type	Self Weight Multiplier
Dead	Dead	1
Live	Live	0

4 Loads

Loading

Dead Live

External wall 225 mm solid wall
Plaster = .2
215 wall = 4.6

Total load = 4.8 kn/m2

Applied load:

B1 (rear beam)

Dead load : from first floor wall above (3)*4.8 + from second floor wall above (3)*4.8 + from 3rd floor wall above (3)*4.8 = 14.4+14.4+14.4= 43.2 kn/m

4.2 Applied Loads

4.2.1 Line Loads

Table 4.2 - Frame Loads - Distributed

Story	Label	Unique Name	Design Type	Load Pattern	LoadType	Direction	Relative Distance Start	Relative Distance End	Absolute Distance Start mm	Absolute Distance End mm	Force at Start kN/m	Force at End kN/m
Story1	B1	1	Beam	Dead	Force	Gravity	0	1	0	2300	43.2	43.2

4.3 Functions

4.3.1 Response Spectrum Functions

Table 4.3 - Response Spectrum Function - User

Name	Period sec	Acceleration	Damping %
UnifRS	0	1	5
UnifRS	1	1	

4.3.2 Time History Functions

Table 4.4 - Time History Function - User

Name	Time sec	Value
RampTH	0	0
RampTH	1	1
RampTH	4	1
UnifTH	0	1
UnifTH	1	1

4.4 Load Cases

Table 4.5 - Load Cases - Summary

Name	Type
Dead	Linear Static
Live	Linear Static

4.5 Load Combinations

Table 4.6 - Load Combinations

Name	Load Case/Combo	Scale Factor	Type	Auto
DStlS1	Dead	1.4	Linear Add	Yes
DStlS2	Dead	1.4	Linear Add	Yes
DStlS2	Live	1.6		No
DStlD1	Dead	1	Linear Add	Yes
DStlD2	Dead	1	Linear Add	Yes
DStlD2	Live	1		No

5 Analysis Results

This chapter provides analysis results.

5.1 Structure Results

Table 5.1 - Base Reactions

Load Case/Combo	FX kN	FY kN	FZ kN	MX kN-m	MY kN-m	MZ kN-m	X m	Y m	Z m
Dead	0	0	99.8734	1493.1075	-444.4367	0	0	0	0
Live	0	0	0	0	0	0	0	0	0
DStlS1	0	0	139.8228	2090.3505	-622.2113	0	0	0	0
DStlS2	0	0	139.8228	2090.3505	-622.2113	0	0	0	0
DStlD1	0	0	99.8734	1493.1075	-444.4367	0	0	0	0
DStlD2	0	0	99.8734	1493.1075	-444.4367	0	0	0	0

5.2 Point Results

Table 5.2 - Joint Reactions

Story	Joint Label	Unique Name	Load Case/Combo	FX kN	FY kN	FZ kN	MX kN-m	MY kN-m	MZ kN-m
Story1	1	1	Dead	0	0	49.9367	0	0	0
Story1	1	1	Live	0	0	0	0	0	0
Story1	1	1	DStlS1	0	0	69.9114	0	0	0
Story1	1	1	DStlS2	0	0	69.9114	0	0	0
Story1	1	1	DStlD1	0	0	49.9367	0	0	0
Story1	1	1	DStlD2	0	0	49.9367	0	0	0
Story1	2	2	Dead	0	0	49.9367	0	0	0
Story1	2	2	Live	0	0	0	0	0	0
Story1	2	2	DStlS1	0	0	69.9114	0	0	0
Story1	2	2	DStlS2	0	0	69.9114	0	0	0
Story1	2	2	DStlD1	0	0	49.9367	0	0	0
Story1	2	2	DStlD2	0	0	49.9367	0	0	0

5.3 Line Results

Table 5.3 - Beam Forces

Story	Beam	Unique Name	Load Case/Combo	Station m	P kN	V2 kN	V3 kN	T kN-m	M2 kN-m	M3 kN-m
Story1	B1	1	Dead	0	0	-49.9367	0	0	0	0
Story1	B1	1	Dead	0.46	0	-29.962	0	0	0	18.3767
Story1	B1	1	Dead	0.92	0	-9.9873	0	0	0	27.5651
Story1	B1	1	Dead	1.38	0	9.9873	0	0	0	27.5651
Story1	B1	1	Dead	1.84	0	29.962	0	0	0	18.3767
Story1	B1	1	Dead	2.3	0	49.9367	0	0	0	0
Story1	B1	1	Live	0	0	0	0	0	0	0
Story1	B1	1	Live	0.46	0	0	0	0	0	0
Story1	B1	1	Live	0.92	0	0	0	0	0	0
Story1	B1	1	Live	1.38	0	0	0	0	0	0
Story1	B1	1	Live	1.84	0	0	0	0	0	0
Story1	B1	1	Live	2.3	0	0	0	0	0	0
Story1	B1	1	DStlS1	0	0	-69.9114	0	0	0	0
Story1	B1	1	DStlS1	0.46	0	-41.9468	0	0	0	25.7274
Story1	B1	1	DStlS1	0.92	0	-13.9823	0	0	0	38.5911
Story1	B1	1	DStlS1	1.38	0	13.9823	0	0	0	38.5911
Story1	B1	1	DStlS1	1.84	0	41.9468	0	0	0	25.7274
Story1	B1	1	DStlS1	2.3	0	69.9114	0	0	0	0
Story1	B1	1	DStlS2	0	0	-69.9114	0	0	0	0

Story	Beam	Unique Name	Load Case/Combo	Station m	P kN	V2 kN	V3 kN	T kN-m	M2 kN-m	M3 kN-m
Story1	B1	1	DStlS2	0.46	0	-41.9468	0	0	0	25.7274
Story1	B1	1	DStlS2	0.92	0	-13.9823	0	0	0	38.5911
Story1	B1	1	DStlS2	1.38	0	13.9823	0	0	0	38.5911
Story1	B1	1	DStlS2	1.84	0	41.9468	0	0	0	25.7274
Story1	B1	1	DStlS2	2.3	0	69.9114	0	0	0	0
Story1	B1	1	DStlD1	0	0	-49.9367	0	0	0	0
Story1	B1	1	DStlD1	0.46	0	-29.962	0	0	0	18.3767
Story1	B1	1	DStlD1	0.92	0	-9.9873	0	0	0	27.5651
Story1	B1	1	DStlD1	1.38	0	9.9873	0	0	0	27.5651
Story1	B1	1	DStlD1	1.84	0	29.962	0	0	0	18.3767
Story1	B1	1	DStlD1	2.3	0	49.9367	0	0	0	0
Story1	B1	1	DStlD2	0	0	-49.9367	0	0	0	0
Story1	B1	1	DStlD2	0.46	0	-29.962	0	0	0	18.3767
Story1	B1	1	DStlD2	0.92	0	-9.9873	0	0	0	27.5651
Story1	B1	1	DStlD2	1.38	0	9.9873	0	0	0	27.5651
Story1	B1	1	DStlD2	1.84	0	29.962	0	0	0	18.3767
Story1	B1	1	DStlD2	2.3	0	49.9367	0	0	0	0

6 Design Data

This chapter provides design data and results.

6.1 Steel Frame Design

Table 6.1 - Steel Frame Preferences - BS 5950-2000

Item	Value
Multi-Response Design	Step-by-Step - All
Frame Type	Moment Frame
Consider Deflection?	Yes
DL Ratio	120
SDL+LL Ratio	120
LL Ratio	360
Total Ratio	240
Total Camber Limit	240
Pattern Live Load Factor	0.75
D/C Ratio Limit	0.95

Table 6.2 - Steel Frame Overwrites - BS 5950-2000 (Part 1 of 4)

Story	Label	Unique Name	Design Type	Design Section	Frame Type	Check Deflection?	Deflection Type	DL Ratio	SDL+LL Ratio
Story1	B1	1	Beam	Program Determined	Moment Frame	Yes	Ratio	120	120

Table 6.2 - Steel Frame Overwrites - BS 5950-2000 (Part 2 of 4)

Story	Label	Unique Name	LL Ratio	Total Ratio	Camber Ratio	DL Absolute mm	SDL+LL Absolute mm	LL Absolute mm	Total Absolute mm	Camber Absolute mm	Camber mm
Story1	B1	1	360	240	240						0

Table 6.2 - Steel Frame Overwrites - BS 5950-2000 (Part 3 of 4)

Story	Label	Unique Name	Net Area Ratio	LLRF	Unbraced Length Ratio Major	Unbraced Length Ratio Minor	Effective Length Factor Major	Effective Length Factor Minor	Uniform Moment Factor (m Major)	Uniform Moment Factor (m Minior)	Eqv. Uniform Moment factor (mLT)
Story1	B1	1	1	1	1	1	1	1	0.95	1	1

Table 6.2 - Steel Frame Overwrites - BS 5950-2000 (Part 4 of 4)

Story	Label	Unique Name	Yield stress, Fy MPa	Compressive Capacity, Pc kN	Tensile Capacity, Pt kN	Major Bending Capacity, Mc3 kN-m	Minor Bending Capacity, Mc2 kN-m	Buckling Resistance Moment, Mb kN-m	Major Shear Capacity, Pv2 kN
Story1	B1	1	0	751.6583	999.7399	56.5515	18.1203	49.1273	182.8324

Table 6.2 - Steel Frame Overwrites - BS 5950-2000 (Part 5 of 4)

Story	Label	Unique Name	Minor Shear Capacity, Pv3 kN	D/C Ratio Limit
Story1	B1	1	385.3331	0.95

Table 6.3 - Steel Beam Envelope

Label	Story	Section	Moment Interaction Check	PMM Combo	V22 Ratio	V33 Ratio	Class	Conn. V I-End kN	Conn. V J-End kN
B1	Story1	UKC152X152X23	0.786 = 0 + 0.786 + 0	DStlS2	0.382	0	Class 3	0	0

Table 6.4 - Steel Frame Summary - BS 5950-2000 (Part 1 of 2)

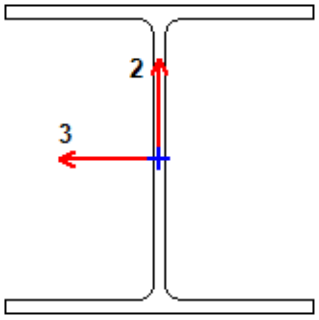
Story	Label	Unique Name	Design Type	Design Section	Status	PMM Combo	PMM Ratio	P Ratio	M Major Ratio	M Minor Ratio
Story1	B1	1	Beam	UKC152X152X23	No Message	DStlS2(C)	0.786	0	0.786	0

Table 6.4 - Steel Frame Summary - BS 5950-2000 (Part 2 of 2)

Story	Label	Unique Name	V Major Combo	V Major Ratio	V Minor Combo	V Minor Ratio
Story1	B1	1	DStlS2	0.382	DStlS2	0

ETABS 2016 Steel Frame Design

BS 5950-2000 Steel Section Check (Envelope Details)



Element Details

Level	Element	Unique Name	Section	Combo	Location	Frame Type	Classification
Story1	B1	1	UKC152X152X23	DStlS2	1380	Moment Resisting Frame	Class 3

Section Properties

A (cm^2)	I_{33} (cm^4)	r_{33} (mm)	W_{el33} (cm^3)	A_{v3} (cm^2)	W_{pl33} (cm^3)
29	1250	65.7	164	17.2	182

J (cm^4)	I_{22} (cm^4)	r_{22} (mm)	W_{el22} (cm^3)	A_{v2} (cm^2)	W_{pl22} (cm^3)	C_w (cm^6)
4.6	400	37.1	52.6	8.8	80	21177

Material Properties

E (MPa)	f_y (MPa)
199947.98	344.74

LLRF and Demand/Capacity Ratio

L (mm)	LLRF	Stress Ratio Limit
2300.0	1	0.95

Demand/Capacity (D/C) Ratio (4.8.3.3.1-2)

D/C Ratio	Axial Ratio	Flexural Ratio$_{Major}$	Flexural Ratio$_{Minor}$
0.786	0 +	0.786 +	0

Stress Check forces and Moments

Location (mm)	N (kN)	M_{33} (kN-m)	M_{22} (kN-m)	V_2 (kN)	V_3 (kN)
1380	0	38.5911	0	13.9823	0

Axial Force & Biaxial Moment Design Factors (4.8.3.3.1-2)

	L Factor	K	m Factor	m_{LT}
Major Bending	1	1	0.95	1

	L Factor	K	m Factor	m_{LT}
Minor Bending	1	1	1	

Axial Force and Capacities

N Force (kN)	N_t Strength (kN)	N_c Strength (kN)	N_c Major (kN)	N_c Minor (kN)
0	999.7399	751.6583	952.1213	751.6583

Moments and Capacities

	M Moment (kN-m)	M_c Capacity (kN-m)	M_b Strength (kN-m)
Major Bending	38.5911	56.5515	49.1273
Minor Bending	0	18.1203	

Shear Design

	F_v Force (kN)	N_v Strength (kN)	Stress Ratio
Major Shear	69.9114	182.8324	0.382
Minor Shear	0	385.3331	0

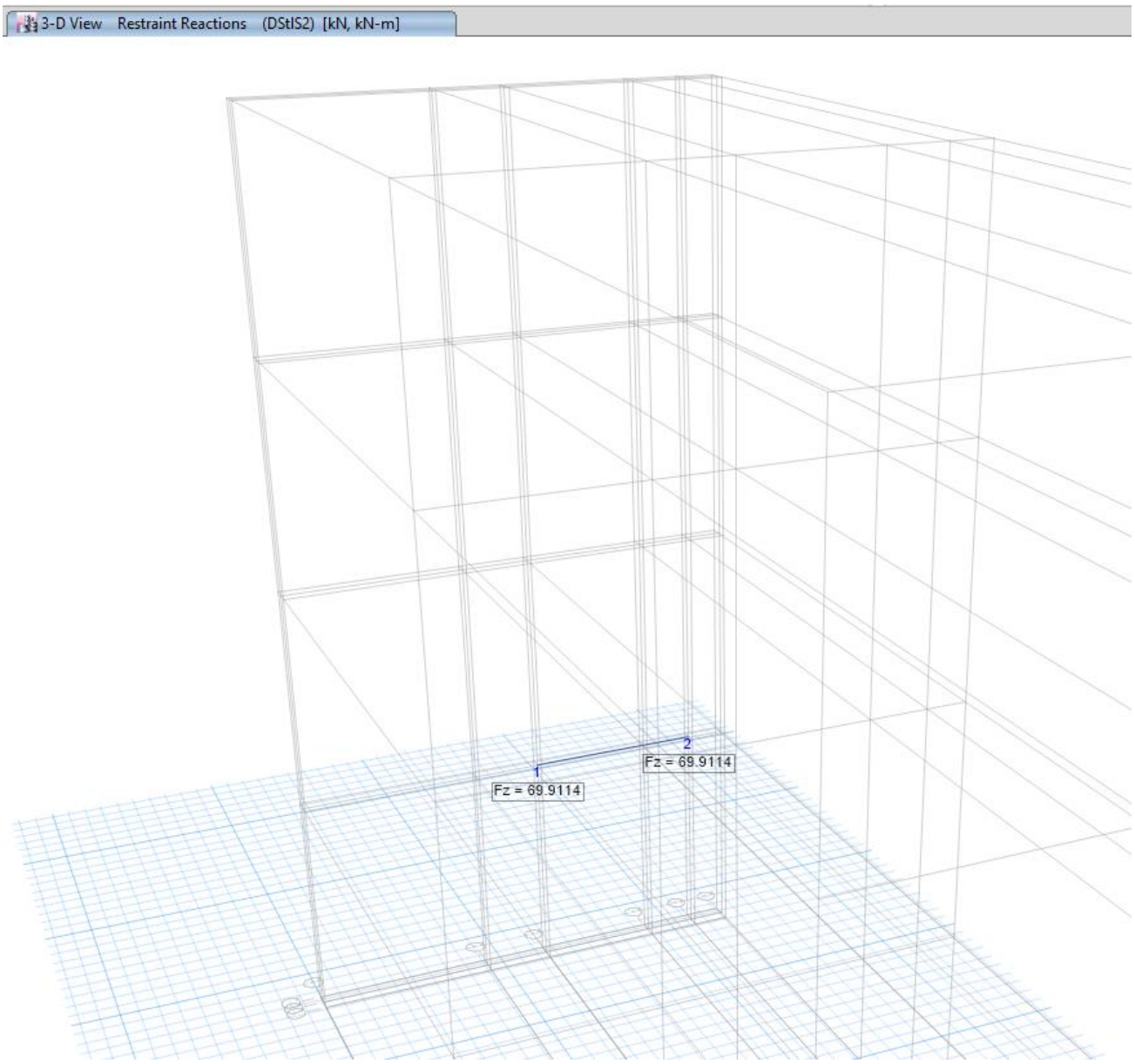
Element Details

Level	Element	Unique Name	Element Type	Section
Story1	B1	1	Moment Resisting Frame	UKC152X152X23

DEFLECTION DESIGN

Deflection Type	Deflection Value mm	Deflection Limit mm	Deflection Ratio	Load Combo	Station Location mm	Check Status
Dead Load	5.8	19.2	0.304	DStlD2	1380	OK
Super DL + Live Load	0	19.2	0	DStlD2	2300	OK
Live Load	0	6.4	0	DStlD2	2300	OK
Total Load	5.8	9.6	0.609	DStlD2	1380	OK
Total - Camber	5.8	9.6	0.609	DStlD2	1380	OK

PADSTONE CALCULATION



Padstone type 1:

Max reaction under the factored load= 70 kn
Use padstone 400*300*225depth