

STUDIO ONE



65 Princess Street, Manchester
Structural Engineering Review – Rev. C
10 February 2021

Jonathan McArdle CEng MICE

Studio One Job Number: 031_010

65 Princess Street, Manchester
Structural Engineering Review – Rev. C

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1. Summary

This summary gives an overview of the structural engineering walkover assessment carried out by Studio One Consulting Limited to support Guy Taylor Associates' (GTA) planning submission to Manchester City Council. Commentary on the proposed end-use is provided in a later section of the report, which responds to GTA's architectural brief.

It should be noted that not all areas of the existing structure were exposed at the time of our site visit. Further works may be required (as may be informed by further areas of opening up and more structure exposed). The structural engineering walkover assessment was limited to that visible on the day of our inspection.

The summary opposite is presented on a 'traffic light' panel system:

- Red = key item requiring action
- Amber = Items presenting risk and requiring further consideration or treatment
- Green = items appearing structurally adequate

Further surveys are recommended, as follows, to inform the final scope of works:

- Further inspection pending full strip of existing fixtures and fittings, finishes to floors, walls and suspended ceilings that are not required for the proposed use
- CCTV survey of the existing drainage to check for defects and inform consideration of suitability for re-use.
- Survey of existing roof coverings may be considered.
- Timber survey by specialist may be considered and may be advisable subject to the above strip out and further inspection.

Items requiring **action**:

1. Install basement **Tanking** to all areas in the basement (walls and floor surfaces below ground level).
2. **Remove deteriorating wall** (wall in very poor structural condition) within the basement adjacent to staircase, undertake structural works to suit wall removal so as to tie in with architectural proposals.
3. Replace **damaged brickwork** (ad-hoc brick replacement) in the basement.
4. Replace spliced **rotten timber beam** over opening in basement with new beam (steelwork advisable); remove existing timber prop.
5. **Protect timber joist ends** (or replace with new with suitable detailing) where embedded into external walls and affected by (or may be affected by) water ingress.
6. **Drainage** to adjoining properties currently discharging onto the site should be diverted.
7. Brickwork outrigger construction in very poor condition to be **taken down** (re-build and/or remodel) and address associated **damp issues** to rear corner of rear courtyard.

Items presenting **risk** and requiring further consideration or treatment

8. **Given the age of the property further defects may be present and require attention.** Soft strip demolition of all existing finishes that are not being retained, such as suspended ceilings and wall linings, is advisable to inform this aspect.
9. **Lateral floor restraint straps** are unlikely to be present due to the age of the property and will require installing between the timber joists and perimeter loadbearing walls.
10. **Floor strengthening may be required in specific areas** (installation of steels to underside of floor joists. Floor at second floor is dished and may require strengthening; strengthening of further areas may be required).
11. Remove **debris** from the roof space to prevent any overloading of the ceiling structure.
12. **Survey roof coverings** and or consider re-roofing.
13. **Repointing and re-rendering** are not structural items but can help resist water penetration. Client may wish to carry out to both elevations
14. Consider **demolition of outrigger** that abuts The Waterhouse (subject to further consideration).
15. Below ground drainage may contain defects. **CCTV survey** of existing drainage is advisable to inform consideration of this aspect.

Items appearing **structurally adequate**

16. Loadbearing structural walls appear reasonable condition.
17. Majority of timber floor joists appear reasonable where inspected.
18. Existing steelwork / floor strengthening has previously been installed in some areas.

2. Introduction

Studio One Consulting Limited have been instructed to undertake a structural engineering inspection of 65 Princess Street, Manchester, M2 4EG and report on findings to support pre-planning dialogue. Studio One were instructed by email dated 09 May 2019 by Colin Shenton, and 06 February 2021 for the conversion from office to domestic residence

This report considers the existing condition of the building and works required to maintain structural robustness and condition, which is based on a limited site walkover dated 07 June 2019, and the works required for its intended use; a domestic residence.

The visual inspection of the building was carried out with opening-up of the existing structure at positions agreed with Colin Shenton Ltd and Studio One Consulting Ltd. Only structure that was visible was inspected. Further defects may be present, and may become apparent, once more of the structure is opened-up at a later date.

The proposed use is to be a domestic residence. Internal structural alterations are to be carried out to convert the current structural arrangement into a layout suitable for a domestic residence.



Figure 1 – Front elevation of 65 Princess Street

3. Condition of Existing Structure

3.1. Basement

The general condition of the basement appears to be fair, however there is evidence of water ingress to the brickwork retaining wall along the front elevation of the building. Some bricks are suffering from efflorescence attributed to water causing crystalline salt deposits on the surface.

There is further evidence of deterioration of the brickwork in the basement along the rear retaining wall, party wall adjacent to the Waterhouse pub and internal wall adjacent to the staircase into the basement. Some of the brickwork was noted to crumble to touch.

Other loadbearing walls that were visible appeared to be in fair condition with some fairly minor cracking.

Where timber joists bear into the external retaining walls there is some evidence of timber degradation, most likely rot, to the joist ends. A spliced timber beam, supported by a timber prop from the existing basement floor, appears to be in poor condition.

The basement floor appears to be in fair condition. Tiled finishes were not removed during the inspection. The finishes appeared dry i.e. they were not suffering water ingress.

3.2. Ground Floor

There does not appear to be any significant signs of distress to the ground floor structure, including the floor joists and loadbearing walls.

Timber joists were visible from the basement to the underside of the ground floor and appeared to be in fair condition, with only a few areas noted that the joist ends are weak. Steelwork appeared ok where visible, however the full extent of the beams was not inspected.

No cracking was evident in the plaster to the loadbearing walls, however an independent stud has been created in front of the partition wall with The Waterhouse pub and the wall was not visible. The partition wall with the adjoining property was visible from the staircase and no sign of cracking was evident.

The underside of the floor was viewed in 5 no. locations, with joist spacings, sizes and condition noted. There is typically a mix of existing joists and new joists installed to the ground floor with varying depths, widths and spacings dependent on span. Joists were found to be in fair condition. No notching of the joists was noted however this was based on limited inspection of the 5 no. locations. The span and joist dimensions are noted on the structural drawings found within the appendix.

3.3. First Floor

Most of the existing finishes were still intact to the first floor. No movement in the loadbearing walls was noted from the interior of the building. Floor appeared to be level and was not suffering any excessive deflection (considered only by eye, floor structures have not been surveyed / measured for level by Studio One).

Floorboards from above, and suspended ceiling from below were removed in 5 no. locations. The joists were found to be trimmed around previous fireplaces. Some existing joists were doubled up with newer joists and some notching of the existing joists evident in places. Notches were typically narrow and shallow.



Figure 2 – Basement (top), underside ground floor (middle), first floor (bottom)

3.4. Second Floor

Similar construction as the first floor, with floorboards removed in 3 no. locations. The joists were found to be trimmed around previous fireplaces. Some existing joists were doubled up with newer joists and some notching of the existing joists evident in places. Notches were typically narrow and shallow.

It was noted that the room to the rear off the property had a dishing effect in the floor. This has occurred where joists have been trimmed around the fireplace where joists act as a transfer. The joist may be overloaded.

3.5. Roof

A brief view into the roof void was carried out, accessed via stepladder from the second floor through a loft hatch. Structure is timber roof trusses supported between the front and rear elevation loadbearing walls. It appears that some rafters have been replaced with new softwood timbers since they appear lighter in colour. There is a central walkway with a build-up of debris. Roof trusses appear to be in fair condition.

Roof coverings from the exterior of the building were not visible.

3.6. Front Elevation

The front elevation appears to be fair condition. There is some staining on the elevation but it does not appear that any defects are attributed to it. Rainwater goods appear to be in fair condition as viewed at street level.

3.7. Rear Elevation

The main property rear elevation appears to be in fair condition. There is some moss growth adjacent to the lightwell into the basement attributed to wet conditions. No cracking appears to be evident in the render on the external elevation from the visual inspection.

The outrigger adjacent to The Waterhouse appears to be a later addition add-on that is not in good condition. Brickwork in numerous areas appears to be in poor condition with vegetation growth at roof level. There is a large accumulation of debris within the mono pitch roof towards the gutter outlet.

A second outrigger is present that abuts the adjacent property on the opposite side to The Waterhouse, which is two storeys in height (ground + first floor) with mono pitch roof with high point on the adjacent property. Behind the outrigger is an area of brickwork construction that is in poor condition. The property to the rear discharges its roof surface water through the construction into the manhole within the property's redline boundary. There is significant vegetation growth within this small construction area, which is likely to be attributed to presence of water; potentially from the adjacent property roof discharge, or collection within the corner of the construction. Further rainwater goods from adjoining properties discharge into the site.

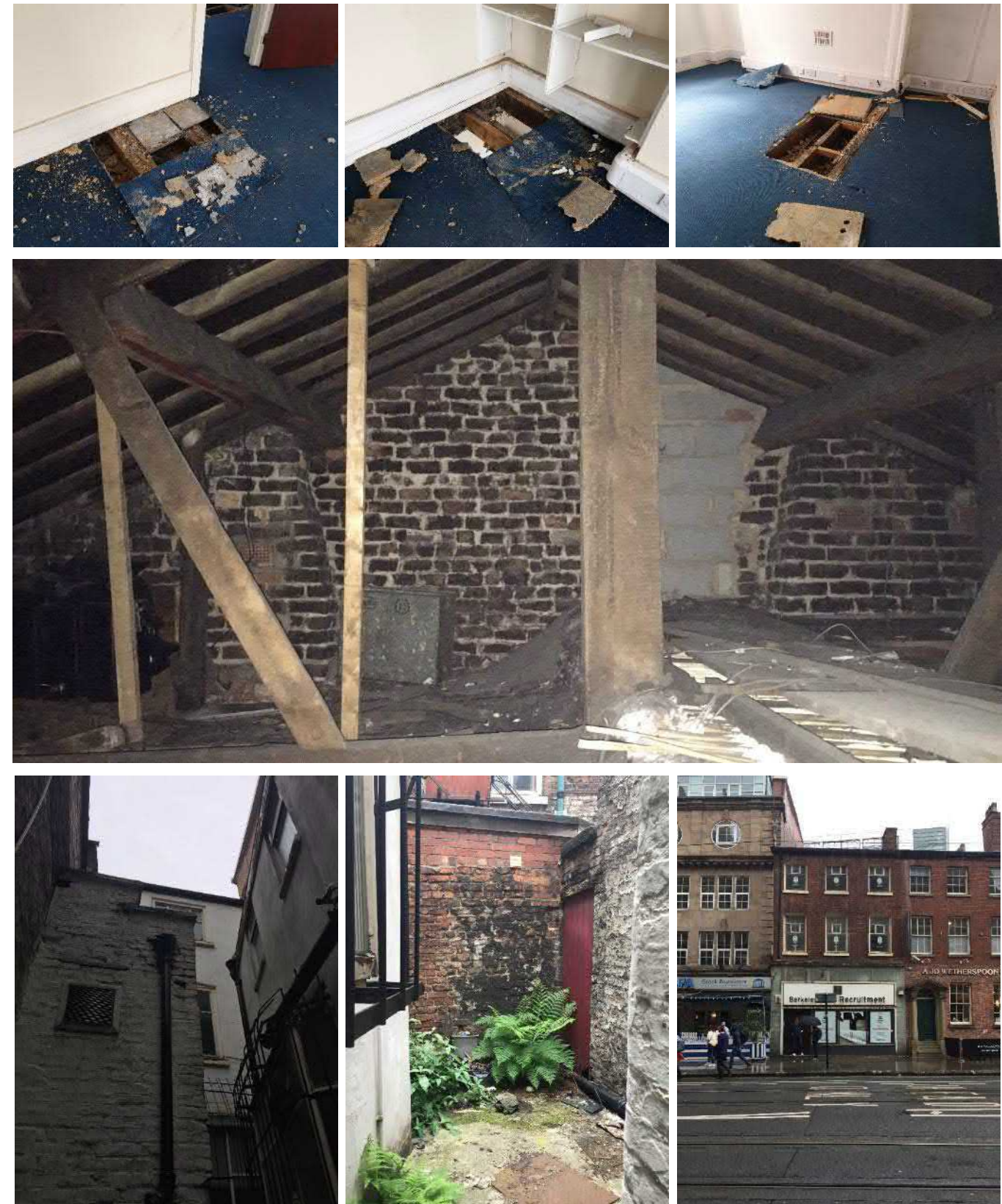


Figure 3 – Top – Second Floor Joists, Middle – Roof Void, Bottom – Rear and Front Elevations

4. Works Required in Response to Structural Condition

4.1. Basement

Where water ingress has been found on the front elevation wall it would be advisable to tank the wall to prevent further ingress and protect the wall from further deterioration. Further tanking should be undertaken to the remainder of walls and floors below ground floor levels, and also to suit the proposals that are discussed in Section 5 of this report. The partition walls are not expected to be earth retaining (it is understood the adjoining properties may have basements).

Where deterioration of the wall adjoining the staircase has occurred it would be advisable to remove the wall, which ties into the proposals discussed in Section 5.

Brickwork that has been found to be perished should be cut out and replaced with new, bedded on new mortar. There are localised instances of perished brickwork on the partition wall adjoining The Waterhouse.

4.2. Ground Floor

The water ingress adjacent to the entrance hallway should be addressed. It is not clear from the external elevation how the water is ingressing / precisely where it is leaking from.

Replace spliced timber beam with new steelwork beam allowing the timber prop to be removed. The prop does not appear to be original and may have previously installed to supplement the floor structure.

Wet floor joist ends may need to be treated in-situ or replaced and ends protected, subject to further timber investigation.

Remove wall coverings between ground floor and underside of first floor to determine whether any movement has occurred in the walls. Inspect and advise on any works required.

Install lateral restraint floor straps to joists at centres as required by the manufacturer. This is to tie the floor to the external walls for robustness.

4.3. First Floor

Remove wall coverings between first floor and underside of second floor to determine whether any movement has occurred in the walls. Inspect and advise on any works required.

Install lateral restraint floor straps to joists at centres as required by the manufacturer. This is to tie the floor to the external walls for robustness.

4.4. Second Floor

Where dishing has occurred in the floor further assessment will need to be carried out of the existing joists. Floor loading capacity is covered in the next section of the report. It is likely that additional joists are to be installed to stiffen the floor plate and existing joists lifted to make the floor level.

Remove wall coverings between second floor and eaves level to determine whether any movement has occurred in the walls. Inspect and advise on any works required.

Install lateral restraint floor straps to joists at centres as required by the manufacturer. This is to tie the floor to the external walls for robustness.

4.5. Roof

Debris accumulating next to the walkway may cause overloading of the ceiling structure. Remove debris and discard.

Carry out inspection of the roof coverings from the exterior of the building. Advise on any works required.

4.6. Front Elevation

No structural works appear to be required as viewed during the visual inspection. The Client may wish to re-point the brickwork and clean staining from the elevation if desired.

4.7. Rear Elevation

It would be advisable to clean up the rear elevation to the main property by removal of the existing render and reapplying it as it will provide a degree of weatherproofing to the external walls. Moss growth within the courtyard should be cleared.

The outrigger abutting The Waterhouse should be demolished given its poor condition, as is also part of the architectural proposals.

The area of poor brickwork to the second outrigger will need taking down and the damp addressing in the corner. Drainage currently discharging into the property from the adjacent properties should be diverted to their own system. The outrigger may wish to be cleared of existing render and render reapplied, subject to architectural requirements.

5. Structural Works to Support Architectural Brief

The structural works described below, and also as noted on the sketches found in the appendix, respond to the architectural brief. For architectural requirements refer to the Architect's information.

A suite of structural engineering details can be found in Appendix C, which detail typical structural engineering details which can be found around the proposed building refurbishment.

There are significant works required that may affect the surrounding properties. It would be advisable to appoint a party wall surveyor at the earliest opportunity to provide advice to the requirements of the Party Wall Act 1996.

5.1. Change in Use

A load appraisal has been undertaken on the existing floors to determine the change in loads from the proposed development and the residual capacity for applying superimposed dead loads, such as finishes, services, ceilings and acoustic treatment. Calculations for the load appraisal is presented in the appendix of the report. The calculations are based on a proposed imposed load for hotel loading, which is more onerous than residential loading to which the development is to be converted to. This is to allow for future flexibility if a hotel conversion is desired in the future.

According to BS 6399-1, the following imposed loading is used in the existing and proposed uses:

- **Existing** - Office – 2.5 kN/m²
- **Proposed** - Hotel – 2.0 kN/m² (note residential loading = 1.5 kN/m²)

Each use would normally also make an allowance for moveable partitions, with area load of 1.0kN/m² in addition to the imposed load noted above. There are localised increases in loading to stairwells and corridors that are used for fire escapes.

Studio One attended site on 11 July 2019 following opening up of the floor structure in 9 no. locations across the various floor plates to determine the joist span, spacing and sizes. Jonathan McArdle, Senior Engineer for Studio One, attended site to carry out the inspection.

The joists were a mix of existing timber joists and new timber joists, with varying depths and sizes according to their span length. Some joists were noted to be doubled up with new joists sitting alongside existing joists. The arrangements are shown on the structural sketches found within the appendix.

The load appraisal has found that the residual capacity of the joists in supporting superimposed dead load (finishes, ceiling + services and acoustic treatment) at the various floor levels is as follows:

- **Ground – 1.10 kN/m²**
- **First – 0.24 kN/m²**
- **Second – 0.69 kN/m²**

The residual load capacity above would be sufficient for light finishes, acoustic treatment and services. Local strengthening may be required if heavier finishes are required or local increases in loads are required, such as bathrooms with baths full of water.

5.2. Basement and Foundations

It is proposed to demolish the existing outrigger adjacent to The Waterhouse to facilitate the installation of new patio area. The outrigger will likely have shallow foundations that will need to be grubbed up as part of the works. Any interface with the existing buildings will need to be made good with any perished bricks replaced.

It would be prudent to externally tank the outrigger walls to prevent any further water ingress into the basement. Works will need to be coordinated with the existing drainage that is found within the courtyard and drainage may need to be temporarily or permanently diverted.

The existing area of poor condition brickwork found to the rear of the property is proposed to be demolished and new single storey structure to accommodate bathroom at ground floor. New foundations will be required, which will need to be founded at the same depth as the existing foundations to prevent any surcharging on the existing foundations. Drainage above roof level in this area will need to be diverted. The new structure is to be a standalone structure of similar construction to the existing, which will need to be tied laterally to the existing structures surrounding it.

The existing wall found to be in poor condition within the basement is proposed to be demolished to create a larger opening. A further opening is proposed in the wall perpendicular to it. Steelwork beams will need to be installed over the openings bearing on padstones at the ends where bearing onto the existing brickwork walls. The bearing end walls will need to be prepared and made good, with any areas of poor condition brickwork replaced. Temporary works will need to be considered within the basement area. Long spanning beams may need to be spliced to assist in delivery and installation on the constrained site.

To the rear of the building a new steelwork beam has previously been installed built off pier on a footing. The beam is proposed to be lifted so that it is flush with the ceiling and the pier removed. A new beam is installed in its place, with temporary works installed to support the ground floor joists. Padstone to be installed below the bearing of the beam. This beam will bear on/into the web of the new beam installed as part of the opening works. As previous, a new beam may be brought to site to be spliced so aid delivery and installation within the tight space in the basement.

Existing opening within the wall towards the front of the property is to be infilled either with new brickwork toothed into the existing, or with new wall starters.

5.3. Ground Floor

The existing floor to the front of the property is understood to not be original, therefore it is proposed to lift the level of this floor to match the level of the rear of the property. New steel beams may be required subject to assessment of the existing beams. Raised steel will need to bear on padstones at both ends on the brickwork walls at basement level. New joists will be installed on the raised beams. To access the raised portion of the property a new staircase will be required from the main entrance, which may be of a variety of construction methods e.g. timber, steelwork, glass etc.

To complement the proposed raised ground floor, the front elevation will be slightly altered with new windows and areas of infill.

In partitioning the large room at ground floor, the wall is to be reinstated in blockwork, timber stud or cold rolled stud.

Towards the staircase the wall to the right-hand side is proposed to be removed as it is understood not to be original. This wall is to be removed full height to reveal the handrails as per the architectural intent. Support for the stairs will need to be investigated as new support (by steel or timber) may be required.

Just beyond the staircase a new infill section of wall is proposed to match the existing wall line. This will align with the steelwork in forming the new opening in the basement, and construction can be in brickwork, timber stud or cold rolled stud.

A new timber bay window is proposed to the rear of the property. New lintel may be required over the opening.

5.4. First Floor

No significant structural works are required at first floor level in response to the architectural brief beyond what is required as noted in Section 4.

Non-loadbearing walls are to be removed from the outrigger to the rear of the property. The wall to the staircase is also to be removed as previously noted.

5.5. Second Floor

A small area of infill is proposed to the existing wall at second floor. No other structural works are proposed.

5.6. Roof

No works are proposed to the roof.

5.7. External Elevations

Minor alterations to the front elevation are proposed. At ground floor, existing window openings are proposed to be blocked up and new window openings formed at a higher level that complement the proposed ground floor level.

5.8. Below Ground Drainage

Where possible, it is anticipated on reusing the existing drainage that connects into the mains. The extent of the existing drainage is not yet understood therefore it would be advisable to have a CCTV survey carried out of the existing site to connect into the mains. This will

determine the condition and capacity of the existing system and whether it is suitable for reuse.

Appendix A – Structural Sketches

NOTES

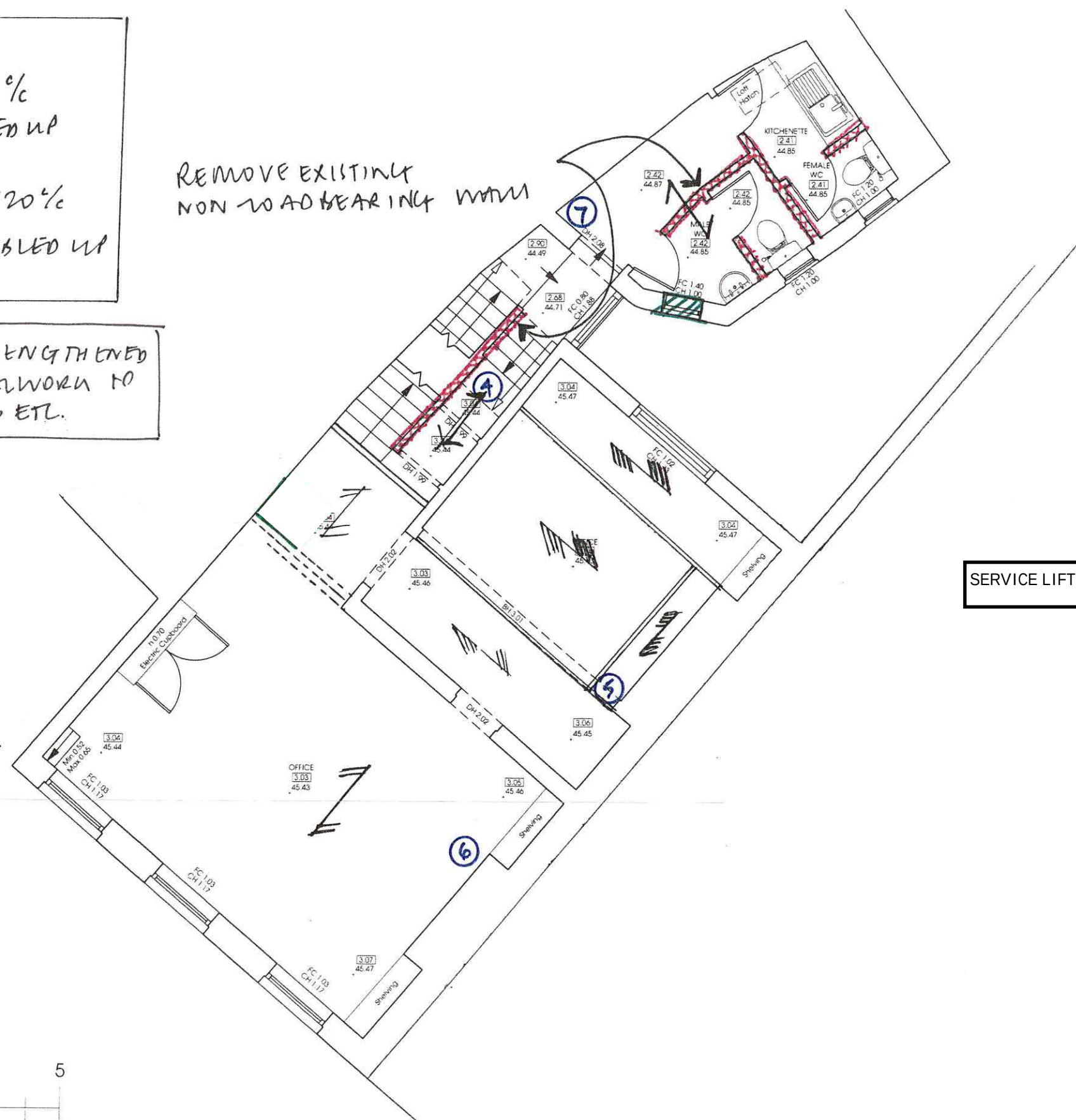
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FLOR JOIST KEN

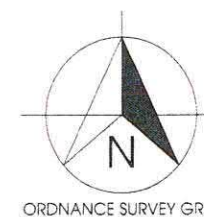
-  - 160x60 @ 470°/c
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@ 370°/c
-  - 200x63 @ 420°/c
-  - 190x60 DOUBLE UP
@ 390°/c

ALL FLOOR TO BE STRENGTHENED
AS NECESSARY (STEELWORK TO
UNDERSIDE OF JOISTS ETC.

REMOVE EXISTING
NON-ROAD BEARING MATR



SERVICE LIFT OMITTED FROM SCHEME



NOTES

- 1) ALL DIMENSIONS TO BE CHECKED ON SITE AND NOT SCALED FROM THIS DRAWING
- 2) MAJOR DIMENSIONS SHALL BE INFORMED IN WRITING OF ANY DISCREPANCIES
- 3) ALL DIMENSIONS ARE IN METRES ONLY
- 4) THE ORIGIN AND ORIENTATION OF THE SURVEY GIVEN RELATE TO A GPS RE TO ORDNANCE SURVEY (GRID)
- 5) ALL LEVELS ARE BASED ON A GPS RE TO ORDNANCE SURVEY (GRID)

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FLOOR PLAN SYMBOLS

20.50 Total Level
 3.20 Floor to Joist Height
 14.30 Floor to Ceiling Height
 12.50 Joist Level
 6.00 Total Ceiling Height

→ Slope Above Joists (add)
 → Slope w/ Overhead Slope Joists (add)
 → Non-Struct. w/ Overhead Slope Joists
 → Roof Slope (Slope Joists)
 → Structural Ceiling Vault or Vault
 → Non-Structural Ceiling (vault/flat) Vault

REASON

REV	DATE	AMENDMENTS	IN
THIS DRAWING IS FOR THE FOLLOWING PURPOSE ONLY			
PRELIMINARY ☐	FINAL ☐	CONSTRUCTION ☐	
NOTES ☐	MEASURED SURVEY ☒	CONTRACT ☐	

TITLE

First Floor Plan

My Happy Place 2 Ltd
Shenton House
3 Oxford Street
Manchester, M2 3WQ

PROJECT NAME
65 Princess Street
Manchester
M2 3FX

malcolm holt

The Lexicon
10-12 Mount Street
Manchester M2 5NT

10.02.21
REV. B

ollis.com

042

PLANT	PLANT
PLANT	PLANT

200	100
-----	-----

100

PROPOSED FIRST FLOOR

Jm to a S.O.
10.07.19

16.01.20
REV. A
P02

NOT FOR CONSTRUCTION

Scale Bar (m)



Appendix B – Floor Joist Capacity Structural Assessment



65 Princess Street, Manchester
Floor Joist Capacity Structural Assessment

Studio One Job Number 031_010

12 July 2019

65 Princess Street
Floor Joist Capacity Structural Assessment

Contents

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1 – 2	Introduction; Design considerations
J/1	Timber Joist Loadings
J/2	Superimposed Dead Load Capacities
J/3 – J/5	Joist Number Assignment
J/6 – J/35	Timber Joist Calculations

Calculations prepared by: SG
Reviewed by: JM, JP

65 Princess Street Floor Joist Capacity Structural Assessment

Introduction

These calculations appraise the structural capacity of existing timber floor joists at 65 Princess Street, Manchester. This appraisal is intended to inform an understanding of the capacity of the floors to support building fabric (finishes, partitions etc). Appraisal findings are presented as 'extra over capacity' above that required to support imposed (live) loads for the proposed boutique hotel use.

These calculations are based on assumed timber strength (actual timber grade has not been verified).

The appraisal has been informed by limited opening up an inspection; it has been assumed that joists exposed at opening up positions are representative of the general condition and sizing of floor joists to floor plates.

This appraisal considers joist capacity only. Trimmers / beam capacities have not been considered. It is anticipated that historic trimmer joists to chimney breasts may be present and that these trimmers may have reduced structural capacity compared to that indicated by floor joists alone, as is normal. As such the capacities derived by this appraisal will not be representative of the full floor plate capacities unless strengthening works are first undertaken.

Imposed Design load

A proposed imposed load of 2.0 kN/m² has been adopted in accordance with BS 6399-1. Although some areas may have partitions, partition loading has not been considered.

Key design codes:

BS 6399: Part 1: Code of practice for dead and imposed loads

BS 5268: Part 2: Structural use of timber

Calculation sheet

Job No 031/010

Sheet No 5/1

Project 63 PRINCESS STREET

Engineer SG

Date 11/07/19

Element TIMBER JOIST LOADING

Checked by JM

Date 12.07.19

EXISTING DEAD LOAD

LIGHT FINISHES	SAY = 0.10 kN/m ²
25mm BOARDS @ 8kN/m ³	0.25 x 8 = 0.20 kN/m ²
JOISTS (NOMINAL)	SAY = 0.20 kN/m ²
PLASTER	SAY = 0.25 kN/m ²
SKELLES	SAY = 0.05 kN/m ²
	<u>Σ = 0.50 kN/m²</u>

PROPOSED IMPOSED LOAD

HOTEL = 2.0 kN/m² 1.4kN POINT LOAD.

The proposed end use of the development is to be a residential house. The loads used in this back-analysis is therefore conservative since in the design hotel use is adopted. There will therefore be a higher residual capacity for a residential house over the hotel.

		Dimensions					Permissible	Applied			
Joist	Location	h (mm)	b (mm)	Spacing	L (mm)	Assumed Strength Class	σ_p (N/mm ²)	σ_{II} (N/mm ²)	$\sigma_{residual}$ (N/mm ²)	Status	DL Capacity (kN/m)
1	Ground Floor	70	90	400	1500	C16	6.656	2.438	4.218	Pass	1.10
2	Ground Floor	225	75	450	1930	C16	6.017	0.7	5.317	Pass	7.23
3	Ground Floor	150	75	420	2360	C16	6.292	2.164	4.128	Pass	1.67
4	Ground Floor	175	50	420	1860	C16	6.186	1.468	4.718	Pass	2.78
5	First Floor	160	60	470	2700	C16	6.247	3.45	2.797	Pass	0.79
6	First Floor	170	120	370	4570	C16	6.206	3.622	2.584	Pass	0.57
7	First Floor	200	63	420	4285	C16	6.096	4.8	1.296	Pass	0.24
8	First Floor	190	60	390	3430	C16	6.13	3.319	2.811	Pass	0.69
9	Second Floor	180	130	450	4570	C16	6.167	3.611	2.556	Pass	0.69
10	Second Floor	200	60	345	3500	C16	6.096	2.781	3.315	Pass	0.87

= doubled up joist

Note: Strength Class has been assumed based on limited visual inspection. Strength Class has not been verified.

NOTES

1. SOME BRICKWORK WITH NEED MITTING OUT AND REPLACING ON APPROX BASIS. DEMOLISHED WALLS TO BE MADE GOOD.
2. LATERAL FLOOR RESTRAINT STRAPS TO BE INSTALLED TO PERIMETER JOIST TO 'TIE' BUILDING TOGETHER
3. WORKS SUBJECT TO FURTHER NEW INFILL BUILD OFF N OPENING UP / ASSESSMENT. HEAVY UNDER. TIE TO

 = $90 \times 70 @ 400\%$
 = $225 \times 75 @ 450\%$
 = $150 \times 75 @ 420\%$
 = $175 \times 50 @ 420\%$

REMOVE EXISTING WALL.
NOT EXPECTED TO BE
WALL BEARING

ADDRESS WATERWORKS

EXISTING GROUND FLOOR
LEVEL TO BE RAISED TO
MATCH ORIGINAL
BUILDING LEVEL. EXISTING
JOISTS TO BE RAISED.

now start to access
higher level

PRINCESS STREET



NEW INFIL BUILD OFF NEW
TEAM UNDER. TIE TO
EXISTING BRUNNEN WITH
WALL STAKES | TOOTHED
BRUNNEN

- NEW DAM WITH SUPPORTING EXISTING GROUND FLOOD WHERE BRIMORN PIER REMOVED. / BRIMORN WAS REMOVED

- INFLU TO EXISTING WAN, TIED TO EXISTING WITH WAN STARTERS | TOOTHED WORK

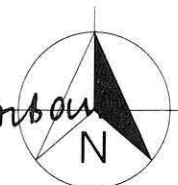
EXISTING BEAMS TO BE RAISED TO NEW GROUND FLOOR LEVEL. REUSE SUBJECT TO FURTHER ASSESSMENT

- DRAINAGE FROM
TO BE DIVERTED.

NEW 2 STORY STRUCTURE
ON NEW FOOTINGS LOADED
AT SAME LEVEL AS EXISTING
FOOTINGS.

- EXISTING OUTRIGGER TO BE DEMOLISHED + WAYS TO BE MADE GOOD.

- NOW LIGHTEN WITH RETAINING WALL TO PERIMETER.



ORDNANCE SURVEY GRID

NOTES

- 1) ALL DIMENSIONS TO BE CHECKED ON SITE AND NOT SCALED FROM THIS DRAWING
- 2) MALCOLM HOLLIS SHALL BE INFORMED IN WRITING OF ANY DISCREPANCIES
- 3) ALL DIMENSIONS ARE IN METRES ONLY
- 4) THE ORIGIN AND ORIENTATION OF THE SURVEY GRID RELATE TO A GPS TIE TO ORDINANCE SURVEY GRID
- 5) ALL LEVELS ARE BASED ON A GPS TIE TO FOS LEVEL DATUM

KEY

[illegible]

FLOOR PLAN SYMBOLS

25.50 Spot Level
5.70 Floor to Soffit Height
12.70 Riser to Ceiling Height
22.00 Soffit Level
12.70 Riser to Ceiling Level
Star Arrow (soffit up)
Structural Overhead Slope (soffit up)
Non-Struct. or Overhead Slope (soffit up)
Riser Slope (soffit down)
Structural Ceiling (soffit/soffit)
Non-Structural Ceiling (soffit/soffit)

REVISION:

REV.	DATE	AMENDMENTS	INIT.
THIS DRAWING IS FOR THE FOLLOWING PURPOSE ONLY			
PRELIMINARY ☐	DESIGN ☐	CONSTRUCTION ☐	
SKETCH ☐	MEASURED SURVEY ☒	CONTRACT ☐	

Ground Floor Plan

My Happy Place 2 Ltd
Shenton House
3 Oxford Street
Manchester, M2 3WQ

PROJECT NAME:
65 Princess Street
Manchester
M2 3FX

malcolm hollis

The Lexicon
10-12 Mount Street
Manchester M2 5NT

T 0161 832 7031
F 0161 828 0500
W malcolmhollis.com

DATE	NAME
------	------

20.12.2018	DI
------------	----

SCALE	14.00
1.50	0.10

1:50	@A2	PV

PR. PL.	PERIODO	CLASSE	SEDE	VAL. INQ.
100000	1990	100000	100000	100000

74359	MHL	00	GF	M2
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DESCRIPTION	NUMBER	DATE	VALUE
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G	10200		A7	—
---	-------	--	----	---

5/3

JM FOR S.O.
10.07.19

NOT FOR CONSTRUCTION

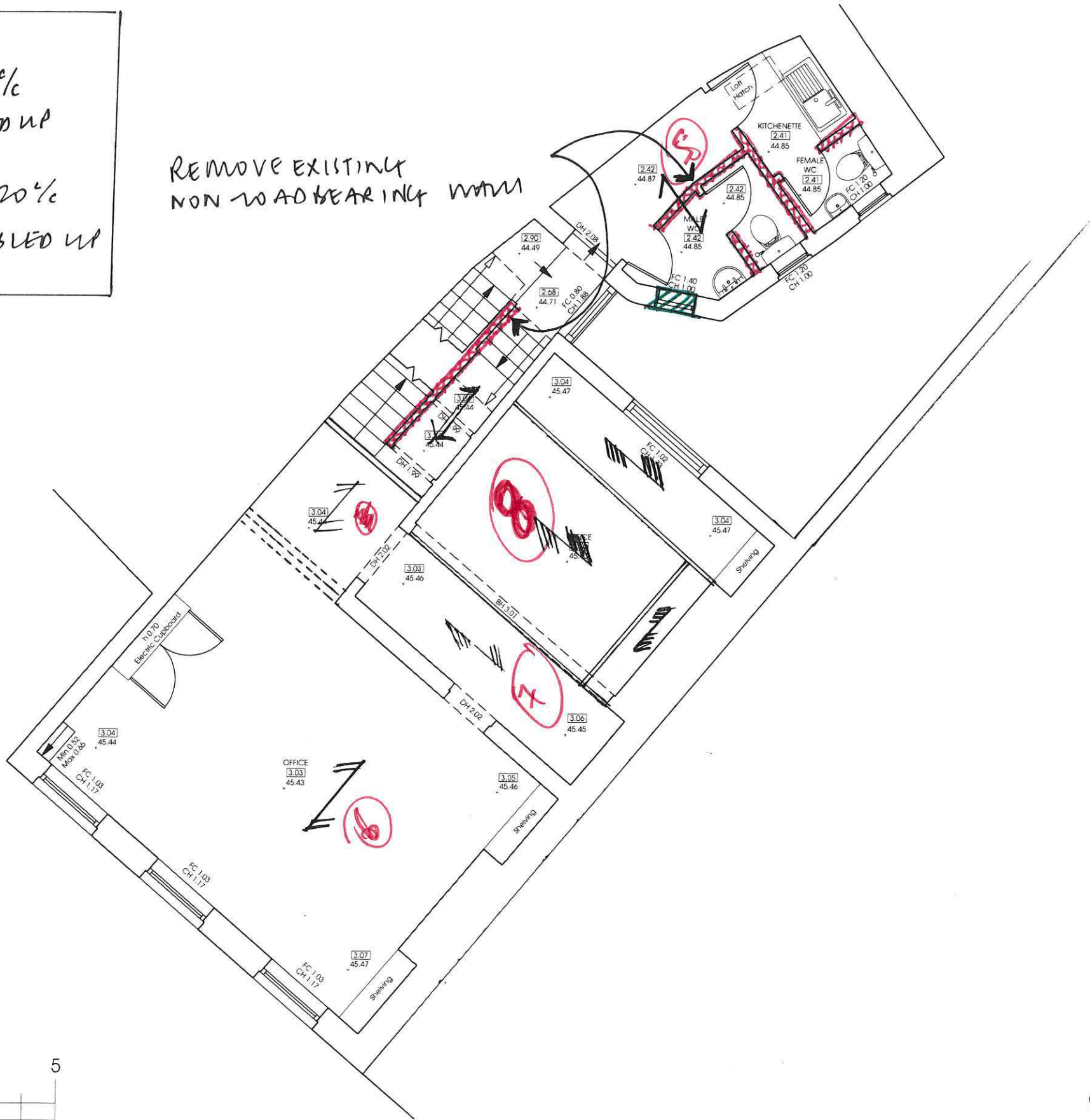
FIRST FLOOR PLAN

NOTES
- AS GROUND FLOOR

FLOOR JOIST KEY

- 160x60 @ 470°
- 170x60 DOUBLED UP @ 370°
- 200x63 @ 420°
- 190x60 DOUBLED UP @ 390°

REMOVE EXISTING NON LOAD BEARING WALL



NOTES

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- 3) ALL DIMENSIONS ARE IN METRES ONLY
- 4) THE ORIGIN AND ORIENTATION OF THE SURVEY DATA RELATE TO A GPS TO THE ORDNANCE SURVEY GRID
- 5) ALL LEVELS ARE BASED ON A GPS TO THE OS LEVEL DATUM

KEY

AK	Architectural	KL	Kitchenette
AL	Architectural	LD	Loft
AS	Architectural	LE	Loft
AT	Architectural	LF	Loft
AW	Architectural	LG	Loft
AX	Architectural	LH	Loft
AY	Architectural	LI	Loft
AZ	Architectural	LJ	Loft
BA	Bathroom	LK	Loft
BB	Bathroom	LL	Loft
BC	Bathroom	LM	Loft
BD	Bathroom	LN	Loft
BE	Bathroom	LO	Loft
BF	Bathroom	LP	Loft
BG	Bathroom	LQ	Loft
BH	Bathroom	LR	Loft
BI	Bathroom	LS	Loft
BJ	Bathroom	LT	Loft
BK	Bathroom	LU	Loft
BL	Bathroom	LV	Loft
BM	Bathroom	LW	Loft
BN	Bathroom	LX	Loft
BO	Bathroom	LY	Loft
BP	Bathroom	LZ	Loft
BQ	Bathroom	MA	Male
BR	Bathroom	MB	Male
BS	Bathroom	MC	Male
BT	Bathroom	MD	Male
BU	Bathroom	ME	Male
BV	Bathroom	MF	Male
BW	Bathroom	MG	Male
BX	Bathroom	MH	Male
BY	Bathroom	MI	Male
BZ	Bathroom	MJ	Male
CA	Car	MK	Male
CB	Car	ML	Male
CC	Car	MM	Male
CD	Car	MN	Male
CE	Car	MO	Male
CF	Car	MP	Male
CG	Car	MQ	Male
CH	Car	MR	Male
CI	Car	MS	Male
CJ	Car	MT	Male
CK	Car	MU	Male
CL	Car	MV	Male
CM	Car	MW	Male
CN	Car	MX	Male
CO	Car	MY	Male
CP	Car	MZ	Male
CQ	Car	NA	National
CR	Car	NB	National
CS	Car	NC	National
CT	Car	ND	National
CU	Car	NE	National
CV	Car	NF	National
CW	Car	NG	National
CX	Car	NH	National
CY	Car	NI	National
CZ	Car	NJ	National
DA	Car	NK	National
DB	Car	NL	National
DC	Car	NM	National
DD	Car	NO	National
DE	Car	NP	National
DF	Car	NQ	National
DG	Car	NR	National
DH	Car	NS	National
DI	Car	NT	National
DJ	Car	NU	National
DK	Car	NV	National
DL	Car	NW	National
DM	Car	NX	National
DN	Car	NY	National
DO	Car	NZ	National
DP	Car	OA	Other
DQ	Car	OB	Other
DR	Car	OC	Other
DS	Car	OD	Other
DT	Car	OE	Other
DU	Car	OF	Other
DV	Car	OG	Other
DW	Car	OH	Other
DX	Car	OI	Other
DY	Car	OJ	Other
DZ	Car	OK	Other
EA	Car	OL	Other
EB	Car	OM	Other
EC	Car	ON	Other
ED	Car	OO	Other
EE	Car	OP	Other
EF	Car	OQ	Other
EG	Car	OR	Other
EH	Car	OS	Other
EI	Car	OT	Other
EJ	Car	OU	Other
EK	Car	OV	Other
EL	Car	OW	Other
EM	Car	OX	Other
EN	Car	OY	Other
EO	Car	OZ	Other
EP	Car	PA	Other
EQ	Car	PB	Other
ER	Car	PC	Other
ES	Car	PD	Other
ET	Car	PE	Other
EU	Car	PF	Other
EV	Car	PG	Other
EW	Car	PH	Other
EX	Car	PI	Other
EY	Car	PJ	Other
EZ	Car	PK	Other
FA	Car	PL	Other
FB	Car	PM	Other
FC	Car	PN	Other
FD	Car	PO	Other
FE	Car	PP	Other
FF	Car	PQ	Other
FG	Car	PR	Other
FH	Car	PS	Other
FI	Car	PT	Other
FJ	Car	PU	Other
FK	Car	PV	Other
FL	Car	PW	Other
FM	Car	PX	Other
FN	Car	PY	Other
FO	Car	PZ	Other
FP	Car	QA	Other
FQ	Car	QB	Other
FR	Car	QC	Other
FS	Car	QD	Other
FT	Car	QE	Other
FU	Car	QF	Other
FV	Car	QG	Other
FW	Car	QH	Other
FX	Car	QI	Other
FY	Car	QJ	Other
FZ	Car	QK	Other
GA	Car	QL	Other
GB	Car	QM	Other
GC	Car	QN	Other
GD	Car	QO	Other
GE	Car	QP	Other
GF	Car	QQ	Other
GG	Car	QR	Other
GH	Car	QS	Other
GI	Car	QT	Other
GJ	Car	QU	Other
GK	Car	QV	Other
GL	Car	QW	Other
GM	Car	QX	Other
GN	Car	QY	Other
GO	Car	QZ	Other
GP	Car	RA	Other
GQ	Car	RB	Other
GR	Car	RC	Other
GS	Car	RD	Other
GT	Car	RE	Other
GU	Car	RF	Other
GV	Car	RG	Other
GW	Car	RH	Other
GX	Car	RI	Other
GY	Car	RJ	Other
GZ	Car	RK	Other
HA	Car	RL	Other
HB	Car	RM	Other
HC	Car	RN	Other
HD	Car	RO	Other
HE	Car	RP	Other
HF	Car	RQ	Other
HG	Car	RS	Other
HH	Car	RT	Other
HI	Car	RU	Other
HJ	Car	RV	Other
HK	Car	RW	Other
HL	Car	RX	Other
HM	Car	RY	Other
HN	Car	RZ	Other
HO	Car	SA	Other
HP	Car	SB	Other
HQ	Car	SC	Other
HR	Car	SD	Other
HS	Car	SE	Other
HT	Car	SF	Other
HU	Car	SG	Other
HV	Car	SH	Other
HW	Car	SI	Other
HX	Car	SJ	Other
HY	Car	SK	Other
HZ	Car	SL	Other
IA	Car	SM	Other
IB	Car	SN	Other
IC	Car	SO	Other
ID	Car	SP	Other
IE	Car	SQ	Other
IF	Car	SR	Other
IG	Car	SS	Other
IH	Car	ST	Other
II	Car	SU	Other
IJ	Car	SV	Other
IK	Car	SW	Other
IL	Car	SX	Other
IM	Car	SY	Other
IN	Car	SZ	Other
IO	Car	TA	Other
IP	Car	TB	Other
IQ	Car	TC	Other
IR	Car	TD	Other
IS	Car	TE	Other
IT	Car	TF	Other
IU	Car	TG	Other
IV	Car	TH	Other
IW	Car	TI	Other
IX	Car	TJ	Other
IY	Car	TK	Other
IZ	Car	TL	Other
JA	Car	TM	Other
JB	Car	TN	Other
JC	Car	TO	Other
JD	Car	TP	Other
JE	Car	TQ	Other
JF	Car	TR	Other
JG	Car	TS	Other
JH	Car	TT	Other
JI	Car	TU	Other
JJ	Car	TV	Other
JK	Car	TW	Other
JL	Car	TX	Other
JM	Car	TY	Other
JN	Car	TZ	Other
JO	Car	UA	Other
JP	Car	UB	Other
JQ	Car	UC	Other
JR	Car	UD	Other
JS	Car	UE	Other
JT	Car	UF	Other
JU	Car	UG	Other
JV	Car	UH	Other
JW	Car	UI	Other
JX	Car	UJ	Other
JY	Car	UK	Other
JZ	Car	UL	Other
KA	Car	UM	Other
KB	Car	UN	Other
KC	Car	UO	Other
KD	Car	UP	Other
KE	Car	UQ	Other
KF	Car	UR	Other
KG	Car	US	Other
KH	Car	UT	Other
KI	Car	UU	Other
KJ	Car	UV	Other
KL	Car	UW	Other
KM	Car	UX	Other
KN	Car	UY	Other
KO	Car	UZ	Other
LA	Car	VA	Other
LB	Car	VB	Other
LC	Car	VC	Other
LD	Car	VD	Other
LE	Car	VE	Other
LF	Car	VF	Other
LG	Car	VG	Other
LH	Car	VH	Other
LI	Car	VI	Other
LJ	Car	VJ	Other
LK	Car	VK	Other
LM	Car	VL	Other
LN	Car	VM	Other
LO	Car	VN	Other
LP	Car	VO	Other
LQ	Car	VP	Other
LR	Car	VQ	Other
LS	Car	VR	Other
LT	Car	VS	Other
LU	Car	VT	Other
LV	Car	VU	Other
LW	Car	VV	Other
LX	Car	VG	Other
LY	Car	VH	Other
LZ	Car	VI	Other
MA	Car	VJ	Other
MB	Car	VK	Other
MC	Car	VL	Other
MD	Car	VM	Other
ME	Car	VN	Other
MF	Car	VO	Other
MG	Car	VP	Other
MH	Car	VQ	Other
MI	Car	VR	Other
MJ	Car	VS	Other
ML	Car	VT	Other
MM	Car	VU	Other
MN	Car	VV	Other
MO	Car	VG	Other
MP	Car	VH	Other
MQ	Car	VI	Other
MR	Car	VJ	Other
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MU	Car	VM	Other
MV	Car	VN	Other
MW	Car	VO	Other
MX	Car	VP	Other
MY	Car	VQ	Other
MZ	Car	VR	Other
NA	Car	VS	Other
NB	Car	VT	Other
NC	Car	VU	Other
ND	Car	VV	Other
NE	Car	VG	Other
NF	Car	VH	Other
NI	Car	VI	Other
NJ	Car	VJ	Other
NK	Car	VK	Other
NL	Car	VL	Other
NM	Car	VM	Other
NO	Car	VN	Other
NP	Car	VO	Other
NQ	Car	VP	Other
NR	Car	VQ	Other
NS	Car	VR	Other
NT	Car	VS	Other
NU	Car	VT	Other
NV	Car	VU	Other
NW	Car	VV	Other
NX	Car	VG	Other
NY	Car	VH	Other
NZ	Car	VI	Other
OA	Car	VJ	Other
OB	Car	VK	Other
OC	Car	VL	Other
OD	Car	VM	Other
OE	Car	VN	Other
OF	Car	VO	Other
OG	Car	VP	Other
OH	Car	VQ	Other
OI	Car	VR	Other
OJ	Car	VS	Other
OK	Car	VT	Other
OL	Car	VU	Other
OM	Car	VV	Other
ON	Car	VG	Other
OO	Car	VH	Other
OP	Car	VI	Other
OQ	Car	VJ	Other
OR	Car	VK	Other
OS	Car	VL	Other
OT	Car	VM	Other
OU	Car	VN	Other
OV	Car	VO	Other
OW	Car	VP	Other
OX	Car	VQ	Other
OY	Car	VR	Other
OZ	Car	VS	Other
PA	Car	VT	Other
PB	Car	VU	Other
PC	Car	VV	Other
PD	Car	VG	Other
PE	Car	VH	Other
PF	Car	VI	Other
PG	Car	VJ	Other
PH	Car	VK	Other
PI	Car	VL	Other
PJ	Car	VM	Other
PK	Car	VN	Other
PL	Car	VO	Other
PM	Car	VP	Other
PN	Car	VQ	Other
PO	Car	VR	Other
PP	Car	VS	Other
PQ	Car	VT	Other
PR	Car	VU	Other
PS	Car	VV	Other
PT	Car	VG	Other
PU	Car	VH	Other
PV	Car	VI	Other
PW	Car	VJ	Other
PX	Car	VK	Other
PY	Car	VL	Other
PZ	Car	VM	Other
QA	Car	VN	Other
QB	Car	VO	Other
QC	Car	VP	Other
QD	Car	VQ	Other
QE	Car	VR	Other
QF	Car	VS	Other
QG	Car	VT	Other
QH	Car	VU	Other
QI	Car	VV	Other
QJ	Car	VG	Other
QK	Car	VH	Other
QL	Car	VI	Other
QM	Car	VJ	Other
QN	Car	VK	Other
QO	Car	VL	Other
QP	Car	VM	Other
QQ	Car	VN	Other
QR	Car	VO	Other
QS	Car	VP	Other
QT	Car	VQ	Other
QU	Car	VR	Other
QV	Car	VS	Other
QW	Car	VT	Other
QX	Car	VU	Other
QY	Car	VV	Other
QZ	Car	VG	Other
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RB	Car	VI	Other
RC	Car	VJ	Other
RD	Car	VK	Other
RE	Car	VL	Other
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RI	Car	VP	Other
RJ	Car	VQ	Other
RK	Car	VR	Other
RL	Car	VS	Other
RM	Car	VT	Other
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RO	Car	VV	Other
RP	Car	VG	Other
RQ	Car	VH	Other
RS	Car	VI	Other
RT	Car	VJ	Other
RU	Car	VK	Other
RV	Car	VL	Other
RW	Car	VM	Other
RX	Car	VN	Other
RY	Car	VO	Other
RZ	Car	VP	Other
SA	Car	VQ	Other
SB	Car	VR	Other
SC	Car	VS	Other
SD	Car	VT	Other
SE	Car	VU	Other
SF	Car	VV	Other
SG	Car	VG	Other
SH	Car	VH	Other

NOTES

HOON JOISH WEN

↳ - 180 x 65 дюймов и р
с 450°/с.

11 - 200x60 c 345 c/c



NOTES

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- 2) MAIL COLUMN IS SHALL BE INFORMED IN WRITING OF ANY DISCREPANCIES.
- 3) ALL DIMENSIONS ARE IN METRES ONLY.
- 4) THE ORIGIN AND ORIENTATION OF THE SURVEY GRID RELATE TO A GPS TIE TO ORDNANCE SURVEY GRID.
- 5) ALL LEVELS ARE BASED ON A GPS TIE TO US LEVEL DATUM.

KEY

43	Alc	Alciphron	15	Alciphron	Alciphron
44	Alc	Alciphron	16	Alciphron	Alciphron
45	Alc	Alciphron	17	Alciphron	Alciphron
46	Alc	Alciphron	18	Alciphron	Alciphron
47	Alc	Alciphron	19	Alciphron	Alciphron
48	Alc	Alciphron	20	Alciphron	Alciphron
49	Alc	Alciphron	21	Alciphron	Alciphron
50	Alc	Alciphron	22	Alciphron	Alciphron
51	Alc	Alciphron	23	Alciphron	Alciphron
52	Alc	Alciphron	24	Alciphron	Alciphron
53	Alc	Alciphron	25	Alciphron	Alciphron
54	Alc	Alciphron	26	Alciphron	Alciphron
55	Alc	Alciphron	27	Alciphron	Alciphron
56	Alc	Alciphron	28	Alciphron	Alciphron
57	Alc	Alciphron	29	Alciphron	Alciphron
58	Alc	Alciphron	30	Alciphron	Alciphron
59	Alc	Alciphron	31	Alciphron	Alciphron
60	Alc	Alciphron	32	Alciphron	Alciphron
61	Alc	Alciphron	33	Alciphron	Alciphron
62	Alc	Alciphron	34	Alciphron	Alciphron
63	Alc	Alciphron	35	Alciphron	Alciphron
64	Alc	Alciphron	36	Alciphron	Alciphron
65	Alc	Alciphron	37	Alciphron	Alciphron
66	Alc	Alciphron	38	Alciphron	Alciphron
67	Alc	Alciphron	39	Alciphron	Alciphron
68	Alc	Alciphron	40	Alciphron	Alciphron
69	Alc	Alciphron	41	Alciphron	Alciphron
70	Alc	Alciphron	42	Alciphron	Alciphron
71	Alc	Alciphron	43	Alciphron	Alciphron
72	Alc	Alciphron	44	Alciphron	Alciphron
73	Alc	Alciphron	45	Alciphron	Alciphron
74	Alc	Alciphron	46	Alciphron	Alciphron
75	Alc	Alciphron	47	Alciphron	Alciphron
76	Alc	Alciphron	48	Alciphron	Alciphron
77	Alc	Alciphron	49	Alciphron	Alciphron
78	Alc	Alciphron	50	Alciphron	Alciphron
79	Alc	Alciphron	51	Alciphron	Alciphron
80	Alc	Alciphron	52	Alciphron	Alciphron
81	Alc	Alciphron	53	Alciphron	Alciphron
82	Alc	Alciphron	54	Alciphron	Alciphron
83	Alc	Alciphron	55	Alciphron	Alciphron
84	Alc	Alciphron	56	Alciphron	Alciphron
85	Alc	Alciphron	57	Alciphron	Alciphron
86	Alc	Alciphron	58	Alciphron	Alciphron
87	Alc	Alciphron	59	Alciphron	Alciphron
88	Alc	Alciphron	60	Alciphron	Alciphron
89	Alc	Alciphron	61	Alciphron	Alciphron
90	Alc	Alciphron	62	Alciphron	Alciphron
91	Alc	Alciphron	63	Alciphron	Alciphron
92	Alc	Alciphron	64	Alciphron	Alciphron
93	Alc	Alciphron	65	Alciphron	Alciphron
94	Alc	Alciphron	66	Alciphron	Alciphron
95	Alc	Alciphron	67	Alciphron	Alciphron
96	Alc	Alciphron	68	Alciphron	Alciphron
97	Alc	Alciphron	69	Alciphron	Alciphron
98	Alc	Alciphron	70	Alciphron	Alciphron
99	Alc	Alciphron	71	Alciphron	Alciphron
100	Alc	Alciphron	72	Alciphron	Alciphron

FLOOR PLAN SYMBOLS

- Spot Level
- Floor to Soffit Height
- Floor to Ceiling Height
- Soffit Level
- Fabric Ceiling Level
- Star Arrow (points up)
- Structural Overhead Slope (points up)
- Non-Structural Overhead Slope (points up)
- Slope Slope (points down)
- Structural Ceiling Vault/flat vault
- Non-Structural Ceiling Vault/flat vault

REVISIONS

REV.	DATE	AMENDMENTS	INITIALS
THIS DRAWING IS FOR THE FOLLOWING PURPOSE ONLY			
PRELIMINARY ☐ TENDER ☐ CONSTRUCTION ☐ SKETCH ☐ MEASURED SURVEY ☒ CONTRACT ☐			

Second Floor Plan

My Happy Place 2 Ltd
Shenton House
3 Oxford Street
Manchester, M2 3WQ

PROJECT NAME:
65 Princess Street
Manchester
M2 3FX

malcolm hollis

The Lexicon
10-12 Mount Street
Manchester M2 5NT

T 0161 832 7031
F 0161 828 0500
W malcolmhollis.co.uk



DATE 20.12.2018		DRAWN BY DT	
SCALE 1:50 @A2		PROJECT PV	
PK. NO.	ORGANIZATION	PLANT CODE	PLANT NAME
74359	MHL	00	M2
LOCATION CODE	NAME	STATUS	REVISION
G	10200	A7	—

Scale Bar (m)



- LOCAL STRENGTHENING / RAISING OF FLOOR MAY BE REQUIRED WHERE BUSTLING HAS OCCURRED.

Jm for S.O.
10.07.19

NOT FOR INSTRUCTION

5/5

 Studio One 42 Edge Street Manchester M4 1HN	Project 65 Princess Street		Job no. 031/010	
	Calcs for Joist 1		Start page no./Revision J/ 6	
	Calcs by SG	Calcs date 12-Jul-19	Checked by JM	Checked date 12/07/2019

TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

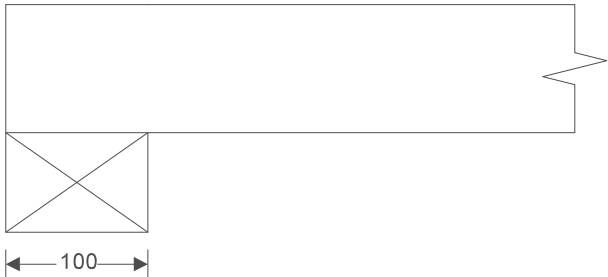
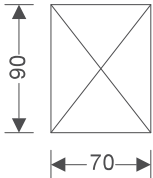
Joist details

Joist breadth	b = 70 mm
Joist depth	h = 90 mm
Joist spacing	s = 400 mm
Timber strength class	C16
Service class of timber	1



Span details

Number of spans	N _{span} = 1
Length of bearing	L _b = 100 mm
Effective length of span	L _{s1} = 1500 mm



Section properties

Second moment of area	I = b × h ³ / 12 = 4252500 mm ⁴
Section modulus	Z = b × h ² / 6 = 94500 mm ³

Loading details

Joist self weight	F _{swt} = b × h × ρ _{char} × g _{acc} = 0.02 kN/m
Dead load	F _{d_udl} = 0.00 kN/m ²
Imposed UDL(Long term)	F _{L_udl} = 2.00 kN/m ²
Imposed point load (Medium term)	F _{L_pt} = 1.80 kN

Modification factors

Service class for bending parallel to grain	K _{2m} = 1.00
Service class for compression	K _{2c} = 1.00
Service class for shear parallel to grain	K _{2s} = 1.00
Service class for modulus of elasticity	K _{2e} = 1.00
Section depth factor	K ₇ = 1.14
Load sharing factor	K ₈ = 1.10

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Consider long term loads

Load duration factor	K ₃ = 1.00
Maximum bending moment	M = 0.230 kNm
Maximum shear force	V = 0.614 kN
Maximum support reaction	R = 0.614 kN
Maximum deflection	δ = 1.523 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 6.656 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 2.438 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.737 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.146 N/mm ²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)	σ _{cp1} = 2.200 N/mm ²
Permissible bearing stress	σ _{c_adm} = σ _{cp1} × K _{2c} × K ₃ × K ₈ = 2.420 N/mm ²
Applied bearing stress	σ _{c_max} = R / (b × L _b) = 0.088 N/mm ²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection	δ _{adm} = min(L _{s1} × 0.003, 14 mm) = 4.500 mm
Bending deflection (based on E _{mean})	δ _{bending} = 1.443 mm
Shear deflection	δ _{shear} = 0.080 mm
Total deflection	δ = δ _{bending} + δ _{shear} = 1.523 mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor	K ₃ = 1.25
Maximum bending moment	M = 0.680 kNm
Maximum shear force	V = 1.814 kN
Maximum support reaction	R = 1.814 kN
Maximum deflection	δ = 3.651 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 8.319 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 7.200 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.921 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.432 N/mm ²

PASS - Applied shear stress within permissible limits

Tekla Tedds Studio One 42 Edge Street Manchester M4 1HN	Project65 Princess Street				Job no.031/010	
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Check bearing stress

Compression perpendicular to grain (no wane)

$\sigma_{cp1} = 2.200 \text{ N/mm}^2$

Permissible bearing stress

$\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 3.025 \text{ N/mm}^2$

Applied bearing stress

$\sigma_{c_max} = R / (b \times L_b) = 0.259 \text{ N/mm}^2$

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 4.500 \text{ mm}$

Bending deflection (based on E_{mean})

$\delta_{bending} = 3.416 \text{ mm}$

Shear deflection

$\delta_{shear} = 0.236 \text{ mm}$

Total deflection

$\delta = \delta_{bending} + \delta_{shear} = 3.651 \text{ mm}$

PASS - Actual deflection within permissible limits

Tekla Tedds Studio One 42 Edge Street Manchester M4 1HN	Project65 Princess Street				Job no.031/010	
	Calcs forJoist 2				Start page no./RevisionJ/ 9	
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TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

Joist details

Joist breadth

$b = 75 \text{ mm}$

Joist depth

$h = 225 \text{ mm}$

Joist spacing

$s = 450 \text{ mm}$

Timber strength class

C16

Service class of timber

1



Span details

Number of spans

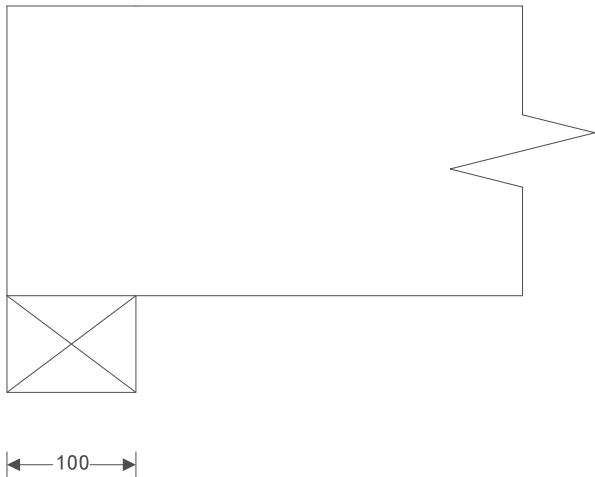
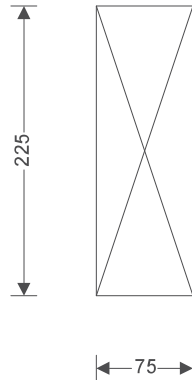
$N_{span} = 1$

Length of bearing

$L_b = 100 \text{ mm}$

Effective length of span

$L_{s1} = 1930 \text{ mm}$



Section properties

Second moment of area

$I = b \times h^3 / 12 = 71191406 \text{ mm}^4$

Section modulus

$Z = b \times h^2 / 6 = 632813 \text{ mm}^3$

Loading details

Joist self weight

$F_{swt} = b \times h \times \rho_{char} \times g_{acc} = 0.05 \text{ kN/m}$

Dead load

$F_{d_udl} = 0.00 \text{ kN/m}^2$

Imposed UDL(Long term)

$F_{l_udl} = 2.00 \text{ kN/m}^2$

Imposed point load (Medium term)

$F_{l_pt} = 1.80 \text{ kN}$

Modification factors

Service class for bending parallel to grain

$K_{2m} = 1.00$

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Service class for compression
Service class for shear parallel to grain
Service class for modulus of elasticity
Section depth factor
Load sharing factor

K_{2c} = **1.00**
K_{2s} = **1.00**
K_{2e} = **1.00**
K₇ = **1.03**
K₈ = **1.10**

Consider long term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

K₃ = **1.00**
M = **0.443** kNm
V = **0.918** kN
R = **0.918** kN
δ = **0.332** mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

σ_m = **5.300** N/mm²
σ_{m_adm} = σ_m × K_{2m} × K₃ × K₇ × K₈ = **6.017** N/mm²
σ_{m_max} = M / Z = **0.700** N/mm²
PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress
Permissible shear stress
Applied shear stress

τ = **0.670** N/mm²
τ_{adm} = τ × K_{2s} × K₃ × K₈ = **0.737** N/mm²
τ_{max} = 3 × V / (2 × b × h) = **0.082** N/mm²
PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

σ_{cp1} = **2.200** N/mm²
σ_{c_adm} = σ_{cp1} × K_{2c} × K₃ × K₈ = **2.420** N/mm²
σ_{c_max} = R / (b × L_b) = **0.122** N/mm²
PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

δ_{adm} = min(L_{s1} × 0.003, 14 mm) = **5.790** mm
δ_{bending} = **0.274** mm
δ_{shear} = **0.057** mm
δ = δ_{bending} + δ_{shear} = **0.332** mm
PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

K₃ = **1.25**
M = **0.892** kNm
V = **1.850** kN
R = **1.850** kN
δ = **0.560** mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

σ_m = **5.300** N/mm²
σ_{m_adm} = σ_m × K_{2m} × K₃ × K₇ × K₈ = **7.522** N/mm²
σ_{m_max} = M / Z = **1.410** N/mm²
PASS - Applied bending stress within permissible limits

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Check shear stress

Shear stress
Permissible shear stress
Applied shear stress

τ = **0.670** N/mm²
τ_{adm} = τ × K_{2s} × K₃ × K₈ = **0.921** N/mm²
τ_{max} = 3 × V / (2 × b × h) = **0.164** N/mm²
PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

σ_{cp1} = **2.200** N/mm²
σ_{c_adm} = σ_{cp1} × K_{2c} × K₃ × K₈ = **3.025** N/mm²
σ_{c_max} = R / (b × L_b) = **0.247** N/mm²
PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

δ_{adm} = min(L_{s1} × 0.003, 14 mm) = **5.790** mm
δ_{bending} = **0.445** mm
δ_{shear} = **0.115** mm
δ = δ_{bending} + δ_{shear} = **0.560** mm
PASS - Actual deflection within permissible limits

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		Approved by	Approved date	

TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

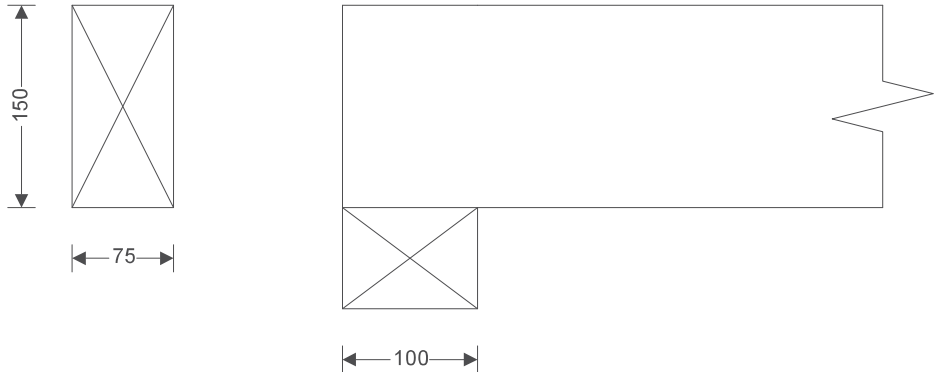
Joist details

Joist breadth	b = 75 mm
Joist depth	h = 150 mm
Joist spacing	s = 420 mm
Timber strength class	C16
Service class of timber	1



Span details

Number of spans	N _{span} = 1
Length of bearing	L _b = 100 mm
Effective length of span	L _{s1} = 2360 mm



Section properties

Second moment of area	I = b × h ³ / 12 = 21093750 mm ⁴
Section modulus	Z = b × h ² / 6 = 281250 mm ³

Loading details

Joist self weight	F _{swt} = b × h × ρ _{char} × g _{acc} = 0.03 kN/m
Dead load	F _{d_udl} = 0.00 kN/m ²
Imposed UDL(Long term)	F _{L_udl} = 2.00 kN/m ²
Imposed point load (Medium term)	F _{L_pt} = 1.80 kN

Modification factors

Service class for bending parallel to grain	K _{2m} = 1.00
Service class for compression	K _{2c} = 1.00
Service class for shear parallel to grain	K _{2s} = 1.00
Service class for modulus of elasticity	K _{2e} = 1.00

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	Calcs for Joist 3		Start page no./Revision J/ 13	
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		Approved by	Approved date	

Section depth factor	K ₇ = 1.08
Load sharing factor	K ₈ = 1.10
Consider long term loads	
Load duration factor	K ₃ = 1.00
Maximum bending moment	M = 0.609 kNm
Maximum shear force	V = 1.032 kN
Maximum support reaction	R = 1.032 kN
Maximum deflection	δ = 2.020 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 6.292 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 2.164 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.737 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.138 N/mm ²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)	σ _{cp1} = 2.200 N/mm ²
Permissible bearing stress	σ _{c_adm} = σ _{cp1} × K _{2c} × K ₃ × K ₈ = 2.420 N/mm ²
Applied bearing stress	σ _{c_max} = R / (b × L _b) = 0.138 N/mm ²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection	δ _{adm} = min(L _{s1} × 0.003, 14 mm) = 7.080 mm
Bending deflection (based on E _{mean})	δ _{bending} = 1.902 mm
Shear deflection	δ _{shear} = 0.118 mm
Total deflection	δ = δ _{bending} + δ _{shear} = 2.020 mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor	K ₃ = 1.25
Maximum bending moment	M = 1.086 kNm
Maximum shear force	V = 1.840 kN
Maximum support reaction	R = 1.840 kN
Maximum deflection	δ = 2.940 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 7.865 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 3.861 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.921 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.245 N/mm ²

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PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)

$\sigma_{cp1} = 2.200 \text{ N/mm}^2$

Permissible bearing stress

$\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 3.025 \text{ N/mm}^2$

Applied bearing stress

$\sigma_{c_max} = R / (b \times L_b) = 0.245 \text{ N/mm}^2$

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 7.080 \text{ mm}$

Bending deflection (based on E_{mean})

$\delta_{bending} = 2.730 \text{ mm}$

Shear deflection

$\delta_{shear} = 0.211 \text{ mm}$

Total deflection

$\delta = \delta_{bending} + \delta_{shear} = 2.940 \text{ mm}$

PASS - Actual deflection within permissible limits

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TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

Joist details

Joist breadth

$b = 50 \text{ mm}$

Joist depth

$h = 175 \text{ mm}$

Joist spacing

$s = 420 \text{ mm}$

Timber strength class

C16

Service class of timber

1



Span details

Number of spans

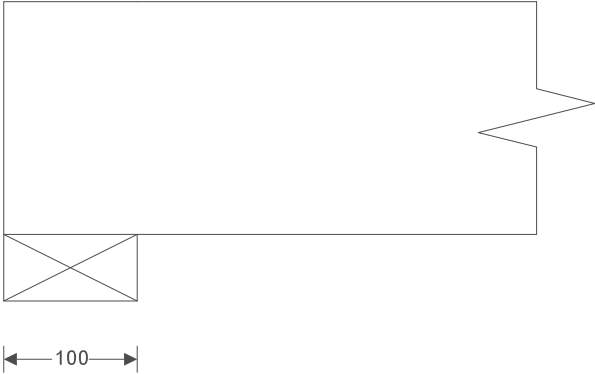
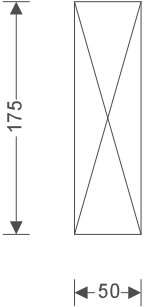
$N_{span} = 1$

Length of bearing

$L_b = 100 \text{ mm}$

Effective length of span

$L_{s1} = 1860 \text{ mm}$



Section properties

Second moment of area

$I = b \times h^3 / 12 = 22330729 \text{ mm}^4$

Section modulus

$Z = b \times h^2 / 6 = 255208 \text{ mm}^3$

Loading details

Joist self weight

$F_{swt} = b \times h \times \rho_{char} \times g_{acc} = 0.03 \text{ kN/m}$

Dead load

$F_{d_udl} = 0.00 \text{ kN/m}^2$

Imposed UDL(Long term)

$F_{l_udl} = 2.00 \text{ kN/m}^2$

Imposed point load (Medium term)

$F_{l_pt} = 1.80 \text{ kN}$

Modification factors

Service class for bending parallel to grain

$K_{2m} = 1.00$

Service class for compression

$K_{2c} = 1.00$

Service class for shear parallel to grain

$K_{2s} = 1.00$

Service class for modulus of elasticity

$K_{2e} = 1.00$

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Section depth factor
Load sharing factor

$K_7 = 1.06$
 $K_8 = 1.10$

Consider long term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

$K_3 = 1.00$
 $M = 0.375$ kNm
 $V = 0.806$ kN
 $R = 0.806$ kN
 $\delta = 0.781$ mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

$\sigma_m = 5.300$ N/mm²
 $\sigma_{m_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8 = 6.186$ N/mm²
 $\sigma_{m_max} = M / Z = 1.468$ N/mm²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress
Permissible shear stress
Applied shear stress

$\tau = 0.670$ N/mm²
 $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = 0.737$ N/mm²
 $\tau_{max} = 3 \times V / (2 \times b \times h) = 0.138$ N/mm²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

$\sigma_{cp1} = 2.200$ N/mm²
 $\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 2.420$ N/mm²
 $\sigma_{c_max} = R / (b \times L_b) = 0.161$ N/mm²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 5.580$ mm
 $\delta_{bending} = 0.687$ mm
 $\delta_{shear} = 0.093$ mm
 $\delta = \delta_{bending} + \delta_{shear} = 0.781$ mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

$K_3 = 1.25$
 $M = 0.849$ kNm
 $V = 1.825$ kN
 $R = 1.825$ kN
 $\delta = 1.461$ mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

$\sigma_m = 5.300$ N/mm²
 $\sigma_{m_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8 = 7.733$ N/mm²
 $\sigma_{m_max} = M / Z = 3.325$ N/mm²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress
Permissible shear stress
Applied shear stress

$\tau = 0.670$ N/mm²
 $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = 0.921$ N/mm²
 $\tau_{max} = 3 \times V / (2 \times b \times h) = 0.313$ N/mm²

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	Calcs for Joist 4				Start page no./Revision J/ 17	
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PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

$\sigma_{cp1} = 2.200$ N/mm²
 $\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 3.025$ N/mm²
 $\sigma_{c_max} = R / (b \times L_b) = 0.365$ N/mm²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 5.580$ mm
 $\delta_{bending} = 1.249$ mm
 $\delta_{shear} = 0.212$ mm
 $\delta = \delta_{bending} + \delta_{shear} = 1.461$ mm

PASS - Actual deflection within permissible limits

 Studio One 42 Edge Street Manchester M4 1HN	Project 65 Princess Street		Job no. 031/010	
	Calcs for Joist 5		Start page no./Revision J/ 18	
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		Approved by	Approved date	

TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

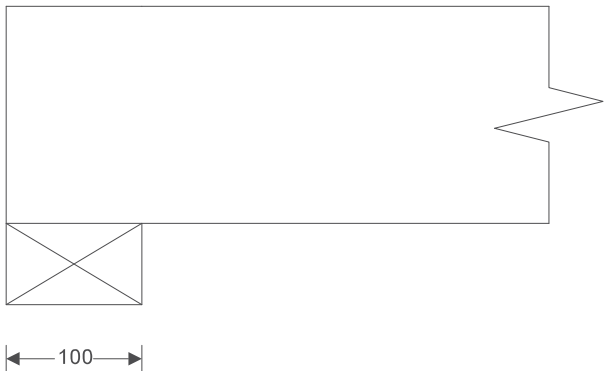
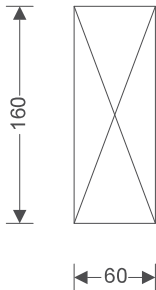
Joist details

Joist breadth	b = 60 mm
Joist depth	h = 160 mm
Joist spacing	s = 470 mm
Timber strength class	C16
Service class of timber	1



Span details

Number of spans	N _{span} = 1
Length of bearing	L _b = 100 mm
Effective length of span	L _{s1} = 2700 mm



Section properties

Second moment of area	I = b × h ³ / 12 = 20480000 mm ⁴
Section modulus	Z = b × h ² / 6 = 256000 mm ³

Loading details

Joist self weight	F _{swt} = b × h × ρ _{char} × g _{acc} = 0.03 kN/m
Dead load	F _{d_udl} = 0.00 kN/m ²
Imposed UDL(Long term)	F _{L_udl} = 2.00 kN/m ²
Imposed point load (Medium term)	F _{L_pt} = 1.80 kN

Modification factors

Service class for bending parallel to grain	K _{2m} = 1.00
Service class for compression	K _{2c} = 1.00
Service class for shear parallel to grain	K _{2s} = 1.00
Service class for modulus of elasticity	K _{2e} = 1.00

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Section depth factor	K ₇ = 1.07
Load sharing factor	K ₈ = 1.10
Consider long term loads	
Load duration factor	K ₃ = 1.00
Maximum bending moment	M = 0.883 kNm
Maximum shear force	V = 1.308 kN
Maximum support reaction	R = 1.308 kN
Maximum deflection	δ = 3.922 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 6.247 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 3.450 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.737 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.204 N/mm ²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)	σ _{cp1} = 2.200 N/mm ²
Permissible bearing stress	σ _{c_adm} = σ _{cp1} × K _{2c} × K ₃ × K ₈ = 2.420 N/mm ²
Applied bearing stress	σ _{c_max} = R / (b × L _b) = 0.218 N/mm ²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection	δ _{adm} = min(L _{s1} × 0.003, 14 mm) = 8.100 mm
Bending deflection (based on E _{mean})	δ _{bending} = 3.721 mm
Shear deflection	δ _{shear} = 0.201 mm
Total deflection	δ = δ _{bending} + δ _{shear} = 3.922 mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor	K ₃ = 1.25
Maximum bending moment	M = 1.242 kNm
Maximum shear force	V = 1.839 kN
Maximum support reaction	R = 1.839 kN
Maximum deflection	δ = 4.490 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 7.809 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 4.850 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.921 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.287 N/mm ²

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PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)

$\sigma_{cp1} = 2.200 \text{ N/mm}^2$

Permissible bearing stress

$\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 3.025 \text{ N/mm}^2$

Applied bearing stress

$\sigma_{c_max} = R / (b \times L_b) = 0.307 \text{ N/mm}^2$

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 8.100 \text{ mm}$

Bending deflection (based on E_{mean})

$\delta_{bending} = 4.208 \text{ mm}$

Shear deflection

$\delta_{shear} = 0.282 \text{ mm}$

Total deflection

$\delta = \delta_{bending} + \delta_{shear} = 4.490 \text{ mm}$

PASS - Actual deflection within permissible limits

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TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

Joist details

Joist breadth

$b = 120 \text{ mm}$

Joist depth

$h = 170 \text{ mm}$

Joist spacing

$s = 370 \text{ mm}$

Timber strength class

C16

Service class of timber

1



Span details

Number of spans

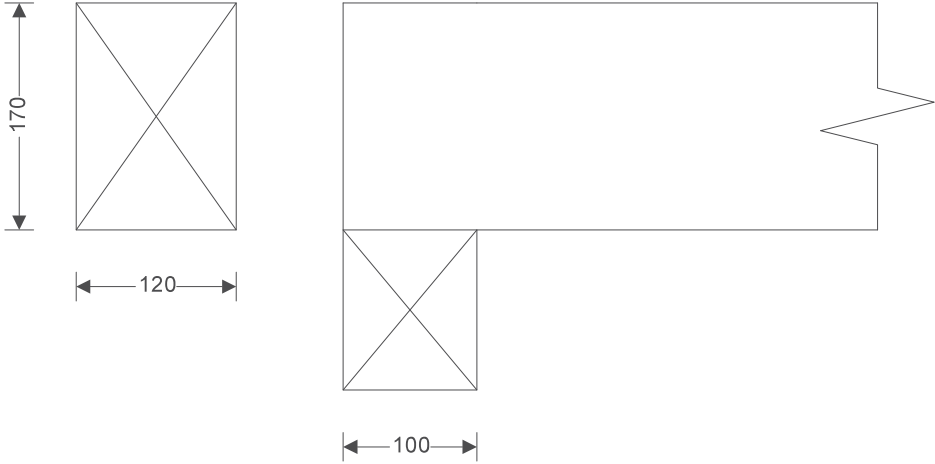
$N_{span} = 1$

Length of bearing

$L_b = 100 \text{ mm}$

Effective length of span

$L_{s1} = 4570 \text{ mm}$



Section properties

Second moment of area

$I = b \times h^3 / 12 = 49130000 \text{ mm}^4$

Section modulus

$Z = b \times h^2 / 6 = 578000 \text{ mm}^3$

Loading details

Joist self weight

$F_{swt} = b \times h \times \rho_{char} \times g_{acc} = 0.06 \text{ kN/m}$

Dead load

$F_{d_udl} = 0.00 \text{ kN/m}^2$

Imposed UDL(Long term)

$F_{l_udl} = 2.00 \text{ kN/m}^2$

Imposed point load (Medium term)

$F_{l_pt} = 1.80 \text{ kN}$

Modification factors

Service class for bending parallel to grain

$K_{2m} = 1.00$

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Service class for compression
Service class for shear parallel to grain
Service class for modulus of elasticity
Section depth factor
Load sharing factor

K_{2c} = **1.00**
K_{2s} = **1.00**
K_{2e} = **1.00**
K₇ = **1.06**
K₈ = **1.10**

Consider long term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

K₃ = **1.00**
M = **2.094** kNm
V = **1.833** kN
R = **1.833** kN
δ = **10.759** mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

σ_m = **5.300** N/mm²
σ_{m_adm} = σ_m × K_{2m} × K₃ × K₇ × K₈ = **6.206** N/mm²
σ_{m_max} = M / Z = **3.622** N/mm²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress
Permissible shear stress
Applied shear stress

τ = **0.670** N/mm²
τ_{adm} = τ × K_{2s} × K₃ × K₈ = **0.737** N/mm²
τ_{max} = 3 × V / (2 × b × h) = **0.135** N/mm²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

σ_{cp1} = **2.200** N/mm²
σ_{c_adm} = σ_{cp1} × K_{2c} × K₃ × K₈ = **2.420** N/mm²
σ_{c_max} = R / (b × L_b) = **0.153** N/mm²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

δ_{adm} = min(L_{s1} × 0.003, 14 mm) = **13.710** mm
δ_{bending} = **10.536** mm
δ_{shear} = **0.224** mm
δ = δ_{bending} + δ_{shear} = **10.759** mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

K₃ = **1.25**
M = **2.218** kNm
V = **1.942** kN
R = **1.942** kN
δ = **9.330** mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

σ_m = **5.300** N/mm²
σ_{m_adm} = σ_m × K_{2m} × K₃ × K₇ × K₈ = **7.757** N/mm²
σ_{m_max} = M / Z = **3.838** N/mm²

PASS - Applied bending stress within permissible limits

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Check shear stress

Shear stress
Permissible shear stress
Applied shear stress

τ = **0.670** N/mm²
τ_{adm} = τ × K_{2s} × K₃ × K₈ = **0.921** N/mm²
τ_{max} = 3 × V / (2 × b × h) = **0.143** N/mm²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

σ_{cp1} = **2.200** N/mm²
σ_{c_adm} = σ_{cp1} × K_{2c} × K₃ × K₈ = **3.025** N/mm²
σ_{c_max} = R / (b × L_b) = **0.162** N/mm²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

δ_{adm} = min(L_{s1} × 0.003, 14 mm) = **13.710** mm
δ_{bending} = **9.093** mm
δ_{shear} = **0.237** mm
δ = δ_{bending} + δ_{shear} = **9.330** mm

PASS - Actual deflection within permissible limits

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	65 Princess Street				031/010	
	Calcs for				Start page no./Revision	
Joist 7				J/ 24		
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date	
SG	12-Jul-19	JM	12/07/2019			

TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

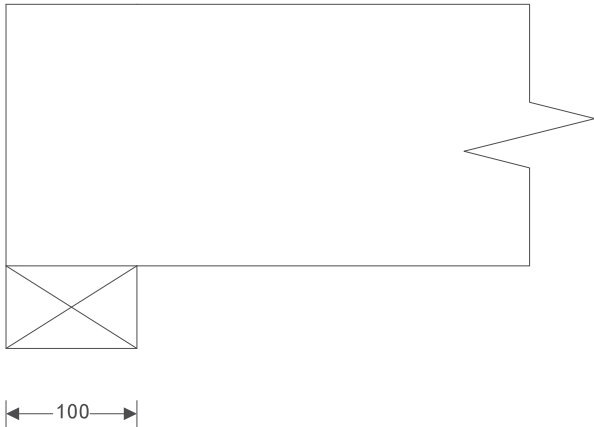
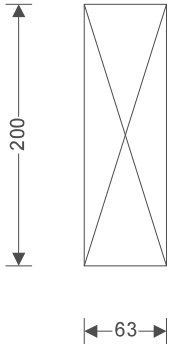
Joist details

Joist breadth	b = 63 mm
Joist depth	h = 200 mm
Joist spacing	s = 420 mm
Timber strength class	C16
Service class of timber	1



Span details

Number of spans	N _{span} = 1
Length of bearing	L _b = 100 mm
Effective length of span	L _{s1} = 4285 mm



Section properties

Second moment of area	I = b × h ³ / 12 = 42000000 mm ⁴
Section modulus	Z = b × h ² / 6 = 420000 mm ³

Loading details

Joist self weight	F _{swt} = b × h × ρ _{char} × g _{acc} = 0.04 kN/m
Dead load	F _{d_udl} = 0.00 kN/m ²
Imposed UDL(Long term)	F _{L_udl} = 2.00 kN/m ²
Imposed point load (Medium term)	F _{L_pt} = 1.80 kN

Modification factors

Service class for bending parallel to grain	K _{2m} = 1.00
Service class for compression	K _{2c} = 1.00

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Joist 7				J/ 25		
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date	
SG	12-Jul-19	JM	12/07/2019			

Service class for shear parallel to grain	K _{2s} = 1.00
Service class for modulus of elasticity	K _{2e} = 1.00
Section depth factor	K ₇ = 1.05
Load sharing factor	K ₈ = 1.10

Consider long term loads

Load duration factor	K ₃ = 1.00
Maximum bending moment	M = 2.016 kNm
Maximum shear force	V = 1.882 kN
Maximum support reaction	R = 1.882 kN
Maximum deflection	δ = 10.781 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 6.096 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 4.800 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.737 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.224 N/mm ²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)	σ _{cp1} = 2.200 N/mm ²
Permissible bearing stress	σ _{c_adm} = σ _{cp1} × K _{2c} × K ₃ × K ₈ = 2.420 N/mm ²
Applied bearing stress	σ _{c_max} = R / (b × L _b) = 0.299 N/mm ²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection	δ _{adm} = min(L _{s1} × 0.003, 14 mm) = 12.855 mm
Bending deflection (based on E _{mean})	δ _{bending} = 10.432 mm
Shear deflection	δ _{shear} = 0.349 mm
Total deflection	δ = δ _{bending} + δ _{shear} = 10.781 mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor	K ₃ = 1.25
Maximum bending moment	M = 2.016 kNm
Maximum shear force	V = 1.882 kN
Maximum support reaction	R = 1.882 kN
Maximum deflection	δ = 8.787 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 7.620 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 4.800 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
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Permissible shear stress	$\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = \mathbf{0.921 \text{ N/mm}^2}$
Applied shear stress	$\tau_{max} = 3 \times V / (2 \times b \times h) = \mathbf{0.224 \text{ N/mm}^2}$ PASS - Applied shear stress within permissible limits
Check bearing stress	
Compression perpendicular to grain (no wane)	$\sigma_{cp1} = \mathbf{2.200 \text{ N/mm}^2}$
Permissible bearing stress	$\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = \mathbf{3.025 \text{ N/mm}^2}$
Applied bearing stress	$\sigma_{c_max} = R / (b \times L_b) = \mathbf{0.299 \text{ N/mm}^2}$ PASS - Applied bearing stress within permissible limits
Check deflection	
Permissible deflection	$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = \mathbf{12.855 \text{ mm}}$
Bending deflection (based on E_{mean})	$\delta_{bending} = \mathbf{8.438 \text{ mm}}$
Shear deflection	$\delta_{shear} = \mathbf{0.349 \text{ mm}}$
Total deflection	$\delta = \delta_{bending} + \delta_{shear} = \mathbf{8.787 \text{ mm}}$ PASS - Actual deflection within permissible limits

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TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

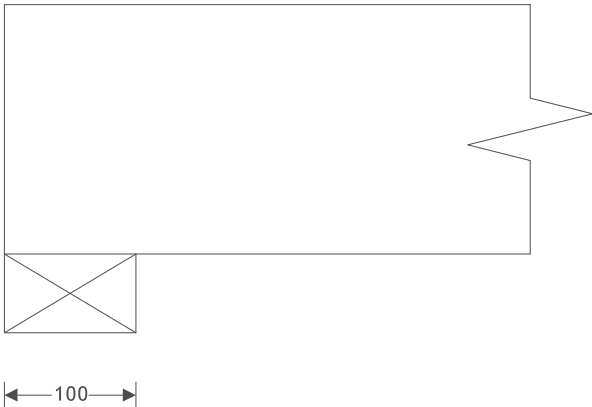
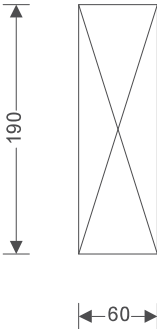
Joist details

Joist breadth	b = 60 mm
Joist depth	h = 190 mm
Joist spacing	s = 390 mm
Timber strength class	C16
Service class of timber	1



Span details

Number of spans	N _{span} = 1
Length of bearing	L _b = 100 mm
Effective length of span	L _{s1} = 3430 mm



Section properties

Second moment of area	I = b × h ³ / 12 = 34295000 mm ⁴
Section modulus	Z = b × h ² / 6 = 361000 mm ³

Loading details

Joist self weight	F _{swt} = b × h × ρ _{char} × g _{acc} = 0.03 kN/m
Dead load	F _{d_udl} = 0.00 kN/m ²
Imposed UDL(Long term)	F _{i_udl} = 2.00 kN/m ²
Imposed point load (Medium term)	F _{i_pt} = 1.80 kN

Modification factors

Service class for bending parallel to grain	K _{2m} = 1.00
Service class for compression	K _{2c} = 1.00
Service class for shear parallel to grain	K _{2s} = 1.00

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Service class for modulus of elasticity $K_{2e} = \mathbf{1.00}$
Section depth factor $K_7 = \mathbf{1.05}$
Load sharing factor $K_8 = \mathbf{1.10}$

Consider long term loads

Load duration factor $K_3 = \mathbf{1.00}$
Maximum bending moment $M = \mathbf{1.198}$ kNm
Maximum shear force $V = \mathbf{1.397}$ kN
Maximum support reaction $R = \mathbf{1.397}$ kN
Maximum deflection $\delta = \mathbf{5.094}$ mm

Check bending stress

Bending stress $\sigma_m = \mathbf{5.300}$ N/mm²
Permissible bending stress $\sigma_{m_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8 = \mathbf{6.130}$ N/mm²
Applied bending stress $\sigma_{m_max} = M / Z = \mathbf{3.319}$ N/mm²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress $\tau = \mathbf{0.670}$ N/mm²
Permissible shear stress $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = \mathbf{0.737}$ N/mm²
Applied shear stress $\tau_{max} = 3 \times V / (2 \times b \times h) = \mathbf{0.184}$ N/mm²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane) $\sigma_{cp1} = \mathbf{2.200}$ N/mm²
Permissible bearing stress $\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = \mathbf{2.420}$ N/mm²
Applied bearing stress $\sigma_{c_max} = R / (b \times L_b) = \mathbf{0.233}$ N/mm²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection $\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = \mathbf{10.290}$ mm
Bending deflection (based on E_{mean}) $\delta_{bending} = \mathbf{4.865}$ mm
Shear deflection $\delta_{shear} = \mathbf{0.229}$ mm
Total deflection $\delta = \delta_{bending} + \delta_{shear} = \mathbf{5.094}$ mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor $K_3 = \mathbf{1.25}$
Maximum bending moment $M = \mathbf{1.594}$ kNm
Maximum shear force $V = \mathbf{1.859}$ kN
Maximum support reaction $R = \mathbf{1.859}$ kN
Maximum deflection $\delta = \mathbf{5.526}$ mm

Check bending stress

Bending stress $\sigma_m = \mathbf{5.300}$ N/mm²
Permissible bending stress $\sigma_{m_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8 = \mathbf{7.663}$ N/mm²
Applied bending stress $\sigma_{m_max} = M / Z = \mathbf{4.417}$ N/mm²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress $\tau = \mathbf{0.670}$ N/mm²
Permissible shear stress $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = \mathbf{0.921}$ N/mm²

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Applied shear stress $\tau_{max} = 3 \times V / (2 \times b \times h) = \mathbf{0.245}$ N/mm²
PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane) $\sigma_{cp1} = \mathbf{2.200}$ N/mm²
Permissible bearing stress $\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = \mathbf{3.025}$ N/mm²
Applied bearing stress $\sigma_{c_max} = R / (b \times L_b) = \mathbf{0.310}$ N/mm²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection $\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = \mathbf{10.290}$ mm
Bending deflection (based on E_{mean}) $\delta_{bending} = \mathbf{5.221}$ mm
Shear deflection $\delta_{shear} = \mathbf{0.305}$ mm
Total deflection $\delta = \delta_{bending} + \delta_{shear} = \mathbf{5.526}$ mm

PASS - Actual deflection within permissible limits

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		Approved by	Approved date	

TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

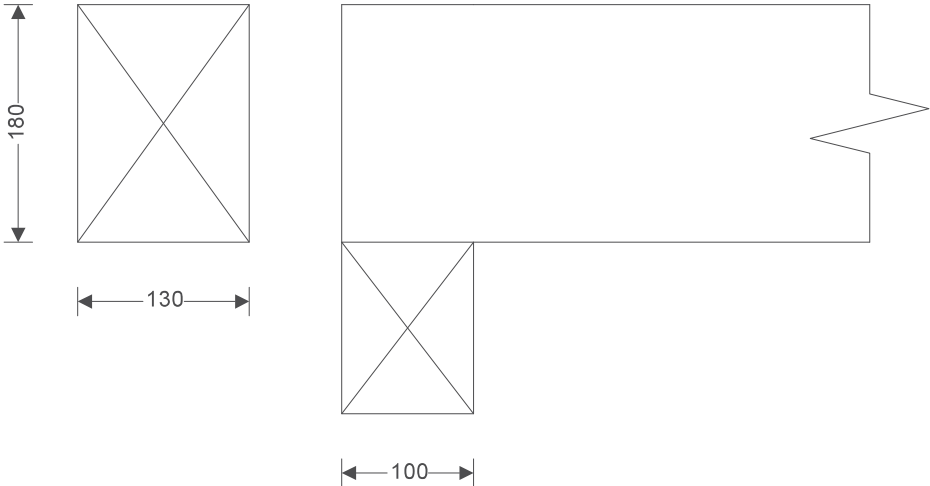
Joist details

Joist breadth	b = 130 mm
Joist depth	h = 180 mm
Joist spacing	s = 450 mm
Timber strength class	C16
Service class of timber	1



Span details

Number of spans	N _{span} = 1
Length of bearing	L _b = 100 mm
Effective length of span	L _{s1} = 4570 mm



Section properties

Second moment of area	I = b × h ³ / 12 = 63180000 mm ⁴
Section modulus	Z = b × h ² / 6 = 702000 mm ³

Loading details

Joist self weight	F _{swt} = b × h × ρ _{char} × g _{acc} = 0.07 kN/m
Dead load	F _{d_udl} = 0.00 kN/m ²
Imposed UDL(Long term)	F _{L_udl} = 2.00 kN/m ²
Imposed point load (Medium term)	F _{L_pt} = 1.80 kN

Modification factors

Service class for bending parallel to grain	K _{2m} = 1.00
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 Studio One 42 Edge Street Manchester M4 1HN	Project 65 Princess Street		Job no. 031/010	
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	Calcs by SG	Calcs date 12-Jul-19	Checked by JM	Checked date 12/07/2019
		Approved by	Approved date	

Service class for compression	K _{2c} = 1.00
Service class for shear parallel to grain	K _{2s} = 1.00
Service class for modulus of elasticity	K _{2e} = 1.00
Section depth factor	K ₇ = 1.06
Load sharing factor	K ₈ = 1.10

Consider long term loads

Load duration factor	K ₃ = 1.00
Maximum bending moment	M = 2.535 kNm
Maximum shear force	V = 2.219 kN
Maximum support reaction	R = 2.219 kN
Maximum deflection	δ = 10.157 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 6.167 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 3.611 N/mm ²

PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress	τ = 0.670 N/mm ²
Permissible shear stress	τ _{adm} = τ × K _{2s} × K ₃ × K ₈ = 0.737 N/mm ²
Applied shear stress	τ _{max} = 3 × V / (2 × b × h) = 0.142 N/mm ²

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)	σ _{cp1} = 2.200 N/mm ²
Permissible bearing stress	σ _{c_adm} = σ _{cp1} × K _{2c} × K ₃ × K ₈ = 2.420 N/mm ²
Applied bearing stress	σ _{c_max} = R / (b × L _b) = 0.171 N/mm ²

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection	δ _{adm} = min(L _{s1} × 0.003, 14 mm) = 13.710 mm
Bending deflection (based on E _{mean})	δ _{bending} = 9.920 mm
Shear deflection	δ _{shear} = 0.236 mm
Total deflection	δ = δ _{bending} + δ _{shear} = 10.157 mm

PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor	K ₃ = 1.25
Maximum bending moment	M = 2.242 kNm
Maximum shear force	V = 1.963 kN
Maximum support reaction	R = 1.963 kN
Maximum deflection	δ = 7.373 mm

Check bending stress

Bending stress	σ _m = 5.300 N/mm ²
Permissible bending stress	σ _{m_adm} = σ _m × K _{2m} × K ₃ × K ₇ × K ₈ = 7.709 N/mm ²
Applied bending stress	σ _{m_max} = M / Z = 3.194 N/mm ²

PASS - Applied bending stress within permissible limits

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Check shear stress

Shear stress

$\tau = 0.670 \text{ N/mm}^2$

Permissible shear stress

$\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = 0.921 \text{ N/mm}^2$

Applied shear stress

$\tau_{max} = 3 \times V / (2 \times b \times h) = 0.126 \text{ N/mm}^2$

PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)

$\sigma_{cp1} = 2.200 \text{ N/mm}^2$

Permissible bearing stress

$\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 3.025 \text{ N/mm}^2$

Applied bearing stress

$\sigma_{c_max} = R / (b \times L_b) = 0.151 \text{ N/mm}^2$

PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 13.710 \text{ mm}$

Bending deflection (based on E_{mean})

$\delta_{bending} = 7.164 \text{ mm}$

Shear deflection

$\delta_{shear} = 0.209 \text{ mm}$

Total deflection

$\delta = \delta_{bending} + \delta_{shear} = 7.373 \text{ mm}$

PASS - Actual deflection within permissible limits

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TIMBER JOIST DESIGN (BS5268-2:2002)

Tedds calculation version 1.1.04

Joist details

Joist breadth

$b = 60 \text{ mm}$

Joist depth

$h = 200 \text{ mm}$

Joist spacing

$s = 345 \text{ mm}$

Timber strength class

C16

Service class of timber

1



Span details

Number of spans

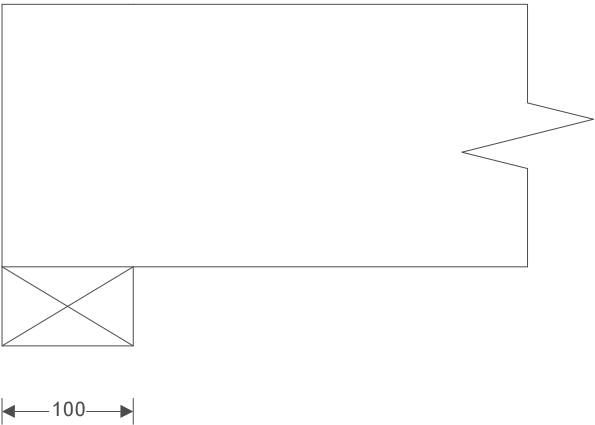
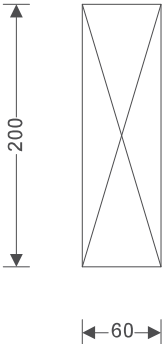
$N_{span} = 1$

Length of bearing

$L_b = 100 \text{ mm}$

Effective length of span

$L_{s1} = 3500 \text{ mm}$



Section properties

Second moment of area

$I = b \times h^3 / 12 = 40000000 \text{ mm}^4$

Section modulus

$Z = b \times h^2 / 6 = 400000 \text{ mm}^3$

Loading details

Joist self weight

$F_{swt} = b \times h \times \rho_{char} \times g_{acc} = 0.04 \text{ kN/m}$

Dead load

$F_{d_udl} = 0.00 \text{ kN/m}^2$

Imposed UDL(Long term)

$F_{l_udl} = 2.00 \text{ kN/m}^2$

Imposed point load (Medium term)

$F_{l_pt} = 1.80 \text{ kN}$

Modification factors

Service class for bending parallel to grain

$K_{2m} = 1.00$

Service class for compression

$K_{2c} = 1.00$

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Service class for shear parallel to grain
Service class for modulus of elasticity
Section depth factor
Load sharing factor

$K_{2s} = 1.00$
 $K_{2e} = 1.00$
 $K_7 = 1.05$
 $K_8 = 1.10$

Consider long term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

$K_3 = 1.00$
 $M = 1.112$ kNm
 $V = 1.271$ kN
 $R = 1.271$ kN
 $\delta = 4.235$ mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

$\sigma_m = 5.300$ N/mm²
 $\sigma_{m_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8 = 6.096$ N/mm²
 $\sigma_{m_max} = M / Z = 2.781$ N/mm²
PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress
Permissible shear stress
Applied shear stress

$\tau = 0.670$ N/mm²
 $\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = 0.737$ N/mm²
 $\tau_{max} = 3 \times V / (2 \times b \times h) = 0.159$ N/mm²
PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

$\sigma_{cp1} = 2.200$ N/mm²
 $\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 2.420$ N/mm²
 $\sigma_{c_max} = R / (b \times L_b) = 0.212$ N/mm²
PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 10.500$ mm
 $\delta_{bending} = 4.033$ mm
 $\delta_{shear} = 0.202$ mm
 $\delta = \delta_{bending} + \delta_{shear} = 4.235$ mm
PASS - Actual deflection within permissible limits

Consider medium term loads

Load duration factor
Maximum bending moment
Maximum shear force
Maximum support reaction
Maximum deflection

$K_3 = 1.25$
 $M = 1.631$ kNm
 $V = 1.864$ kN
 $R = 1.864$ kN
 $\delta = 5.067$ mm

Check bending stress

Bending stress
Permissible bending stress
Applied bending stress

$\sigma_m = 5.300$ N/mm²
 $\sigma_{m_adm} = \sigma_m \times K_{2m} \times K_3 \times K_7 \times K_8 = 7.620$ N/mm²
 $\sigma_{m_max} = M / Z = 4.077$ N/mm²
PASS - Applied bending stress within permissible limits

Check shear stress

Shear stress

$\tau = 0.670$ N/mm²

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Permissible shear stress
Applied shear stress

$\tau_{adm} = \tau \times K_{2s} \times K_3 \times K_8 = 0.921$ N/mm²
 $\tau_{max} = 3 \times V / (2 \times b \times h) = 0.233$ N/mm²
PASS - Applied shear stress within permissible limits

Check bearing stress

Compression perpendicular to grain (no wane)
Permissible bearing stress
Applied bearing stress

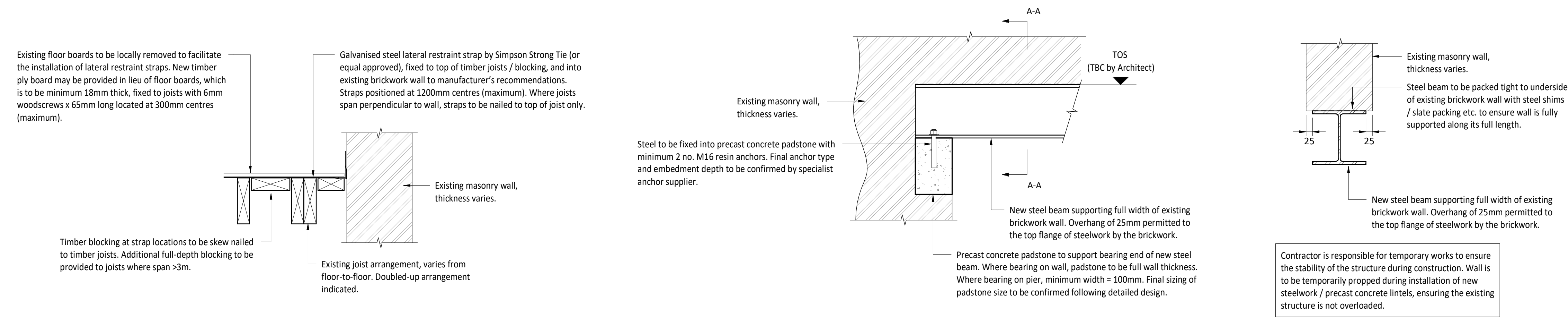
$\sigma_{cp1} = 2.200$ N/mm²
 $\sigma_{c_adm} = \sigma_{cp1} \times K_{2c} \times K_3 \times K_8 = 3.025$ N/mm²
 $\sigma_{c_max} = R / (b \times L_b) = 0.311$ N/mm²
PASS - Applied bearing stress within permissible limits

Check deflection

Permissible deflection
Bending deflection (based on E_{mean})
Shear deflection
Total deflection

$\delta_{adm} = \min(L_{s1} \times 0.003, 14 \text{ mm}) = 10.500$ mm
 $\delta_{bending} = 4.770$ mm
 $\delta_{shear} = 0.297$ mm
 $\delta = \delta_{bending} + \delta_{shear} = 5.067$ mm
PASS - Actual deflection within permissible limits

Appendix C – Structural Engineering Details



Detail 1 - Lateral Restraint Strap Detail (Joist Span Parallel to Wall)

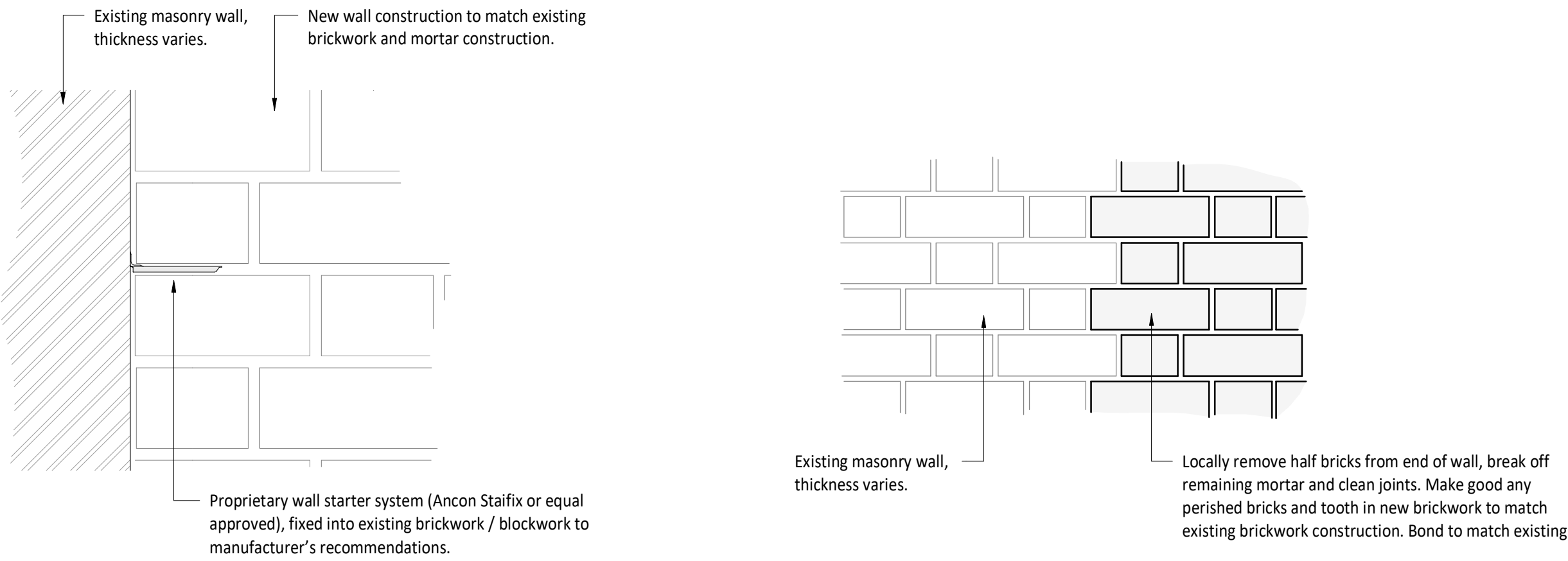
Scale: 1 : 10 @ A1

Detail 2 - Elevation on New Beam Supporting Existing Wall

Scale: 1 : 10 @ A1

Section A-A

Scale: 1 : 10 @ A1

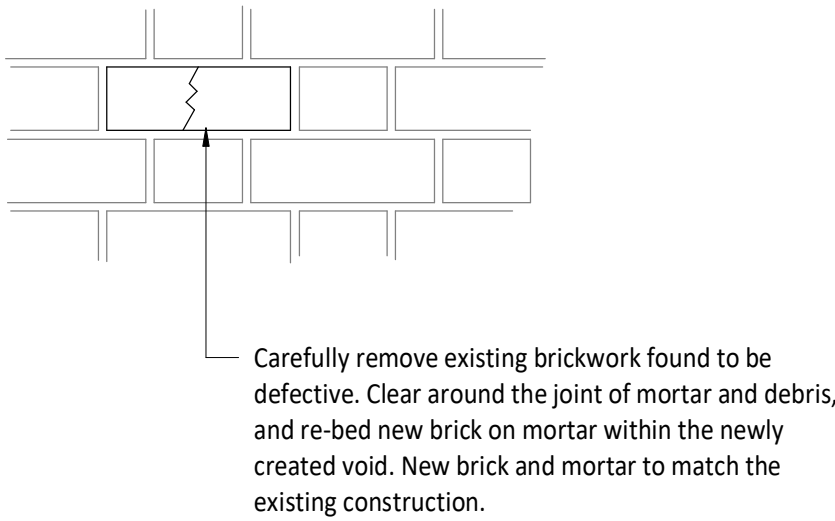


Detail 3 - Blocking Up to Existing Wall with Starter Kit

Scale: 1 : 5 @ A1

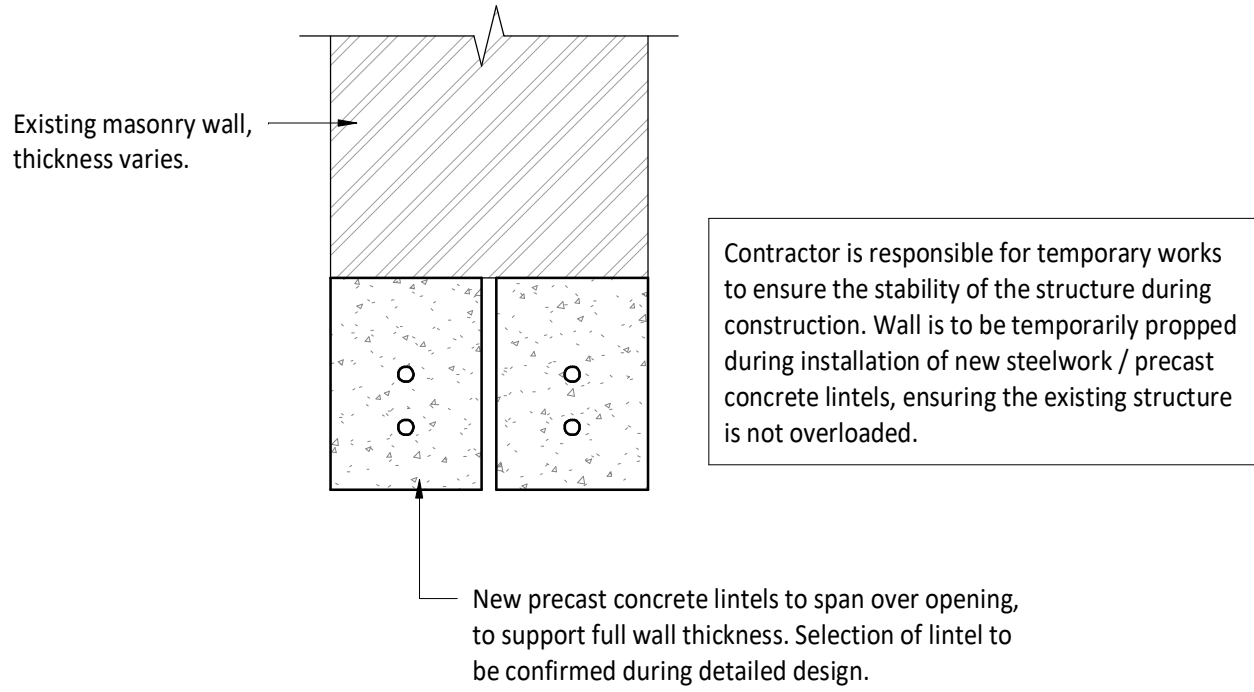
Detail 4 - Blocking Up to Existing Opening Toothing into Existing Construction

Scale: 1 : 10 @ A1



Detail 5 - Typical Brick Repair Detail

Scale: 1 : 10 @ A1



Detail 6 - New Lintels to Proposed Opening

Scale: 1 : 5 @ A1

- General Notes:**
1. This Structural Engineering drawing is to be read in conjunction with all other relevant drawings, specifications and schedules, including all relevant Architect's drawings and other information.
 2. All dimensions are in millimeters unless noted otherwise.
 3. Do not scale from this drawing. Work to stated dimensions only.
 4. All details and dimensions shown relating to the existing structure, existing drainage, ground and site conditions are indicative and are subject to confirmation on site as necessary.
 5. All set out and levels are to be confirmed with reference to Architect's drawings.
 6. The Contractor is responsible for the temporary stability of new and existing structures and the ground during the works.
 7. The Contractor is to ensure that the works are undertaken in a manner so as to ensure that deflections, settlements or movements do not occur that would affect retained (or new) structures and ensure that unacceptable cracking or distress does not occur. The contractor is to allow for making good any such cracking or distress should it occur.
 8. All works are to be in accordance with Building Regulation requirements.
 9. The Builder is to ensure that all works are suitably weathered, and damp proofed so that damp and water ingress do not affect the works whilst in progress or after completion.

P02	08.02.21	Issued for Information	ABH	JM
P01	08.11.19	Issued for Information	PM	JM
Rev	Date	Description	By	Chkd

STUDIO ONE

Client				
My Happy Place 2 Ltd				
Project				
65 Princess Street, Manchester				
Title				
Structural Engineering Details Sheet 1				
Status				
FOR INFORMATION				
Studio One Project Number		Revision	Scale @ A1	
031_10		P02	As Shown	
Drawing Number				
031_10-STU_ONE-XX-ZZ-DR-S-0006				

STUDIO ONE

Prepared by: JM
Reviewed by: JP

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