ROSS & PARTNERS
Consulting Civil & Structural Engineers
1 Bastwick Street, Clerkenwell,
London, EC1V 3NU
tel. 020 755 360 50
ross-partners.co.uk

Notching of Floor Joists

at

14 Endsleigh Street

London WC1

Document History and Status

Revision	Status	By	Approved	Date
01	Final issue	mor		27 August 2020

1.0 Introduction

Ross and Partners have been appointed to provide professional Civil and Structural Engineering Services in support of the restoration of 14 Endsleigh Street, London WC1.

No 14 Endsleigh Street is a Grade II listed building that lies within a terrace of houses that were built c1825. The building has been unused for many years and the present project aims to restore the property to its original use.

The existing upper floors are formed of timber floor joists. These joists have been notched and altered throughout the history of the building in order to accommodate a variety of mechanical and electrical services.

This report discusses the structural effect and controls that will be employed in the refurbishment of the building.

2.0 Terms of Reference

This report has been prepared by Ross and Partners on the instructions of, and for the sole use and benefit of the client, Overbury. No professional liability or warranty is extended to other parties by Ross and Partners as a result of this report being used by others without the written permission of Ross and Partners.

3.0 Statement of Intent

The client, design team and contractor are committed to the exercise of reasonable skill care and diligence in executing the works with due regard to the protection of historic assets that remain within the building and to working with all interested parties to achieve these goals.

4.0 Site Context

The property is located within a terrace of even houses on the western side of Endsleigh Street, London, W1. The building is arranged over basement, ground and first to third floors inclusive. There is a small garden to the rear.

5.0 Existing Joists

The existing upper floors comprise of timber floor-boards on traditional timber joists. The timber joists each act as individual beams that span between their points of support at the beam ends. The effect of the timber boards is to provide a means of load share across a number of joists. By fixing the boards to the joists, a stiff horizontal diaphragm is formed within each floor plate. This is important in traditional buildings as the floors provide lateral restraint to the walls that support them. Thus. the floors and walls form a complementary structural unit to give vertical and lateral stability.

When loads are applied to the joists flexural (bending) and shear stresses are induced. This is accompanied by consequential deflection.

Where notches are introduced, the depth of the section is locally reduced. A corresponding increase in local stresses is manifest at that point. Ideally any holes should be isolated to the centre of the joist along what is termed the neutral axis. More commonly, notches occur in the tops of joists.

The National Building Specification makes global recommendations for the notching of floor joists in order to limit the position and depth such that the structural performance of the joists is not diminished to an unacceptable level. The extract below gives the recommendations:

435 NOTCHES, HOLES AND JOINTS IN TIMBER
Notches and holes:
- General: Avoid if possible.
- Sizes: Minimum needed to accommodate services.
- Position: Do not locate near knots or other defects.
- In same joist: Minimum 100 mm apart horizontally.
- Notches in joists:
  Position: Locate at top. Form by sawing down to a drilled hole.
  Depth (maximum): 0.15 x joist depth.
  Distance from supports: Between 0.1 and 0.2 x span.
- Holes in joists:
  Position: Locate on neutral axis.
  Diameter (maximum): 0.25 x joist depth.
  Centres (minimum): 3 x diameter of largest hole.
  Distance from supports: Between 0.25 and 0.4 of span.
- Notches in roof rafters, struts and truss members: Not permitted.
- Holes in struts and columns: Locate on neutral axis.
  Diameter (maximum): 0.25 x minimum width of member.
  Centres (minimum): 3 x diameter of largest hole.
  Distance from ends: Between 0.25 and 0.4 of span.
  Scarf joints, finger joints and splice plates: Do not use without approval

These rules will be adhered to on this project.

NOTCHING AND DRILLING

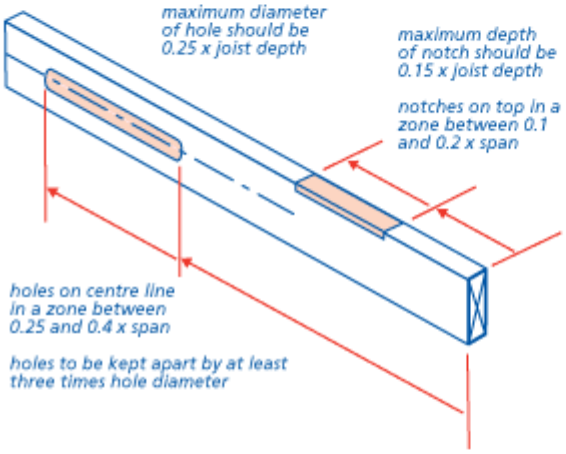
6.4 - S9 Notching and drilling shall be carried out within recognised limits

Items to be taken into account include:

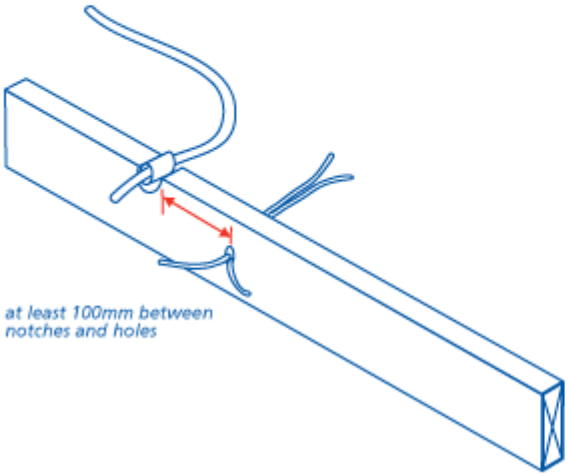
(a) solid timber joists

Solid timber joists and studs should only be notched and drilled within the limits shown in the table below:

Item	Location	Maximum size
Notching joists up to 250mm depth	Top edge 0.1 to 0.2 of span	0.15 x depth of joist
Drilling joists up to 250mm	Centre line 0.25 to 0.4 of span	0.25 x depth of joist



Notches and drillings in the same joist should be at least 100mm apart horizontally.



6.0 Accidental Damage

Aims and Objectives

Whilst every reasonable endeavour will be exercised in the preservation of historic assets, there remains a possibility that some of the timbers may have been notched to an excessive degree.

If such are discovered they shall be repaired using timber wedges that are glued to the original timber.