Chapter 5

BRACING SYSTEMS

Chapter Contents

5.1. INTRODUCTION AND SCOPE

Bracing is provided primarily to enable the roof, wall and floor systems to resist the wind and earthquake loads applied to the building. All connections between systems should be adequate to transfer these forces into the building's foundation.

This section covers roof bracing, wall bracing, floor and subfloor bracing.

Figure 5.1 shows bracing examples for roofs, walls and subfloors.

It should be noted that the wind force on unclad frames can be substantial and should be considered in the bracing design.

Horizontal wind (racking) forces on the external surfaces are transferred by horizontal or near horizontal diaphragms and bracing. Diaphragms include roofs, ceilings and floor surfaces including their associated framing.

Each horizontal diaphragm transfers racking forces to lower level diaphragms by connections and vertical bracing. This continues down to the subfloor supports or concrete slab on the ground, where the forces are then resisted by the foundations.

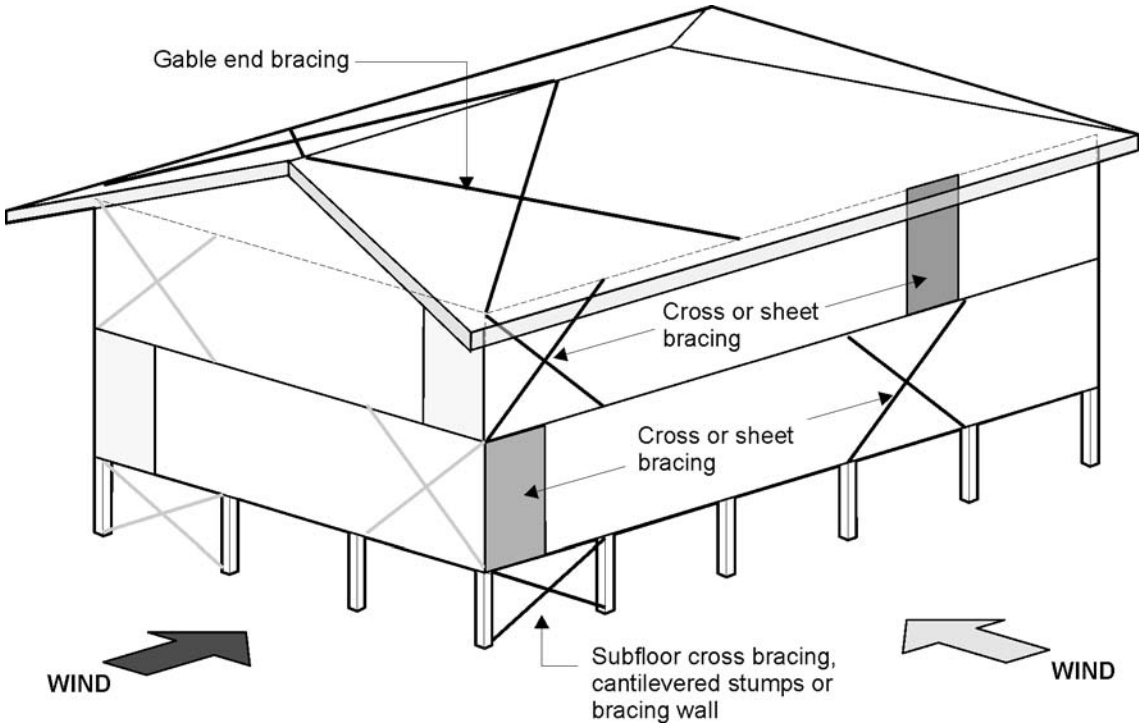

Fig. 5.1 Various bracing systems

5.2. ROOF BRACING

5.2.1. Structural performance

A typical roof bracing configuration is shown in Figure 5.1.

The following points should be considered in the design of a roof bracing system:

- Roof bracing is required to ensure that the roof acts as an integral unit and transfers the imposed loads to the appropriate supports. Bracing should be provided at the top and bottom chords of roof trusses. Some trusses may also require web bracing (refer to roof design section).
- Top chord bracing may be required to:
  - Transfer horizontal wind loads perpendicular to the span of trusses to the supports. Wind and earthquake loads are transferred to the top chords by the roof battens or purlins.
  - Provide restraint to the roof battens or purlins.
- Bottom chord bracing may be required to provide restraint to the bottom chords of trusses when they are in compression due to wind uplift or bending.
- Trusses may need to be temporarily braced during installation. Temporary bracing should not be removed until the permanent bracing has been installed. See also Chapter 9.
- In addition to supporting roof cladding and transferring longitudinal wind loads, roof battens are designed to provide lateral buckling restraint to the top chords of the roof trusses. The lateral buckling action arises from the compressive force in the top chords.
- A hip roof structure will provide significant permanent bracing capacity.
- Continuous ceiling systems with lining, such as correctly fixed plasterboard, can be assumed to act as a rigid diaphragm.

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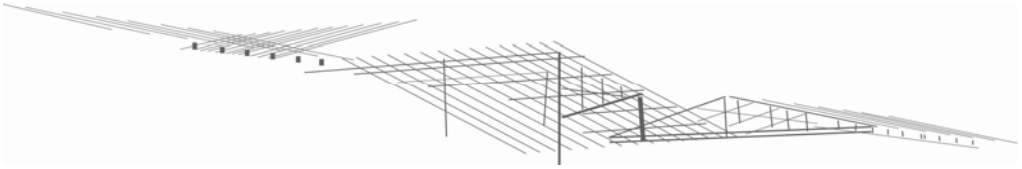
NASH Handbook

Design of Residential and Low-rise Steel Framing



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- Mean that a design, material or building solution complies with the Building Code of Australia (BCA);
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Table of Contents

Preface

Steel framing is commonly chosen for houses and other forms of low-rise construction as it is:

- Cost effective
- Dimensionally stable
- Non combustible
- Termite and borer proof
- Durable
- Strong but lightweight
- 100 percent recyclable
- Consistent in its properties and performance

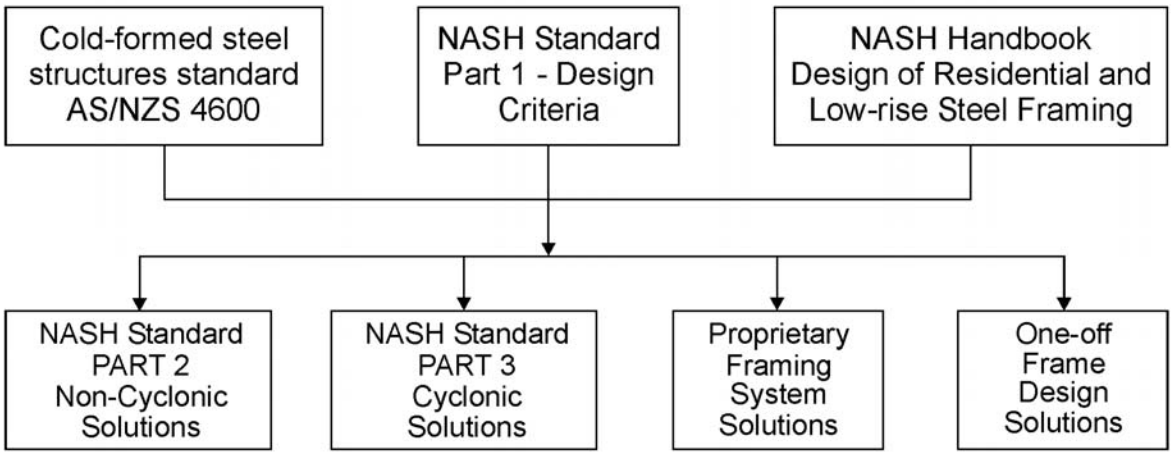
The NASH Standard – Residential and Low-rise Steel Framing Part 1: Design Criteria sets out the design criteria, in terms of structural adequacy and serviceability, for use in the design of low-rise steel framing. This includes houses as well as other low-rise residential and commercial buildings.

This Handbook aims to assist the steel framing designer in the application of the NASH Standard Part 1. However, it does not purport to provide a detailed guide on the use of the Cold-formed steel structures standard AS/NZS 4600 or replace engineering judgement.

The Handbook contains performance data for a number of proprietary components such as screws, rivets, bolts and anchors. This information has been reproduced in Appendices in good faith from information provided by the relevant manufacturers. It has been included to assist the use of the Handbook as a reference for users, but is not exhaustive. Handbook users should contact relevant manufacturers directly for additional performance information.

Two separate Standards (Part 2 & 3) are being developed to provide steel framing span tables and related information and these will be published in due course. The relationship between the Standards and this Handbook is illustrated below.

The NASH web site www.nash.asn.au is regularly updated and provides supplementary information to this Handbook.



National Association of Steel-Framed Housing Inc

NASH is an active industry association centred on light structural framing systems for residential and similar construction. NASH represents the interests of suppliers, fabricators and customers – all those involved in steel framing systems.

NASH's key objectives are to:

- Support the long term growth and sustainability of the steel frame industry.
- Maximise awareness of the steel frame industry in the market place.
- Promote the advantages of steel frames to the building industry and homeowners.

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