OSM3604®
Guideline and Code of Practice for Panelised Design of Offsite Manufactured Light Timber Framed Buildings

Version: DRAFT FOR COMMENT 250721

1. Table of Contents

2. About OSM3604®

2.1. Background: What is OSM3604®and why is it needed

Light timber framed construction is the backbone of residential construction in New Zealand.

The local light timber framing standards and construction practices have evolved well before the arrival of off-site manufacture (OSM) and generally modern methods of construction (MMC).

Off-site manufacture of light timber framed panels is being considered as an alternative to traditional site-based construction in New Zealand for certain types of buildings. This method aims to help meet construction demand, enhance construction quality, and lift construction productivity, especially as the country increasingly builds to address climate change.

OSM3604® standardises and streamlines best practice when building with off-site manufactured light timber framed panels for the New Zealand market.

Establishing a Guideline and Code of Practice like OSM3604® streamlines design for panelised light timber framed systems, promoting widespread adoption by offering a framework that balances standardisation with design flexibility in the areas where this construction methodology has most potential.

2.2. Disclaimer

OSM3604® is a guide aiding in the design and optimisation of light timber framed architecture for off-site manufacture. It is NOT a binding standard.

Design professionals need to exercise their professional judgement when using this guide. It is the designer's sole responsibility their design meets all requirements of the building code and other relevant regulation.

While all reasonable efforts have been made to ensure the accuracy of the materials provided the information presented is for guidance only and may be subject to change.

The authors of this guide and the fabricators of OSM3604® panels will not accept any liability resulting from inappropriate design, specification, and use of the OSM3604® guide or panels.

Please visit www.OSM3604.nz to ensure you have the most up to date copy of this guide.

Assistance is available via hello@offsitedesign.co.nz.

2.3. Purpose of this document

This document sets out the OSM3604® Guideline and Code of Practice for design of off-site manufactured light timber framed buildings.

It has been developed to support New Zealand designers, fabricators, and builders in the effective design, specification, and integration of panelised light timber framed systems into residential and light commercial buildings.

The guidance is intended to promote best practice, improve coordination between disciplines, and ensure consistent delivery of high-quality building envelopes using offsite construction methods.

While not a binding New Zealand Standard, this document aligns with the principles and performance objectives of NZS 3604:2011. It is also well aligned with Passivhaus and other green building rating systems or standards promoting sustainable and energy-efficient construction processes.

OSM3604® is intended as a technical resource to improve the design, documentation, and delivery of projects using offsite manufactured light timber framed panels.

A long-term goal of this initiative is to enable mass application by designers and fabricators to take up panelised construction and realise the benefits of off-site manufacture.

2.4. Who/Which projects is OSM3604® for?

OSM3604® is for anyone interested in lifting quality and productivity in light timber frame construction in New Zealand.

OSM3604® does not automatically realise these benefits, but only if applied to building designs, typologies, and settings that have been carefully designed and optimised for OSM3604®.

OSM3604® can be applied to any light timber framed building, however it will have most impact and is most suitable for:

- Low-energy and Passivhaus designs featuring multi-layered building envelopes, including airtightness, vapour control layers and MHRV systems to be integrated.
- Hybrid designs that require coordination: e.g. off-site manufactured timber framed wall panels over mass timber floors.
- Buildings of relatively compact geometry with a favourable form factor.
- Buildings with simple pitched or mono-slope roofs.

Most light timber framed low-energy and Passivhaus designs will benefit from the OSM3604® approach to design and delivery.

NOTE: OSM3604® is NOT for every project. If in doubt, feel free to contact *Offsite Design Ltd* via hello@offsitedesign.co.nz or ask any OSM3604® fabricator for feedback on your project.

2.4.1. OSM3604® for Builders and Fabricators

Please contact Offsite Design for the *OSM3604® Guide for Builders and Fabricators*, which is currently being developed and will be published separately.

2.5. Benefits of OSM3604®

OSM3604® offers wide-ranging benefits to stakeholders across the design and construction value chain by promoting a unified, high-performance approach to panelised light timber frame construction.

BENEFITS TO DESIGNERS

- **Simplified design process** through access to standardised, proven building assemblies and details.
- **Fewer RFIs** and coordination errors.
- **Predictable panel interfaces**—fast resolution of detailing.
- Ability to **optimise projects early** for panelisation, improving coordination of structural and thermal layers, airtightness, and services.
- **Cross-compatibility** between OSM panel suppliers enables greater freedom and less dependency on proprietary systems.

BENEFITS TO CLIENTS/DEVELOPERS

- Projects designed in accordance with OSM3604® can be **tendered competitively** across multiple OSM panel fabricators, maintaining price transparency and supplier flexibility.
- Greater certainty in project timelines through **faster on-site construction**, reducing exposure to weather-related delays.
- Ability to scale and **replicate proven designs** across regions and building types, supporting repeatable development models.

INDUSTRY-WIDE BENEFITS

- Supports the future development of a potential **Quality Mark or certification pathway**, helping assure clients and regulators of consistent quality and performance.
- Encourages **market extension** into high-performance housing, compact multi-unit residential, and regional builds that benefit from rapid and precise construction methods.
- Drives industry alignment toward a **common, scalable, and cost-effective offsite methodology** for light timber frame construction.

By providing a **guiding framework** rather than a rigid standard, OSM3604® balances rigidity with adaptability—allowing the sector to improve productivity, quality, and collaboration across a range of project types, without stifling innovation or architecture.

2.6. Why a registered trademark?

The OSM3604® trademark is intended as a quality mark for buildings designed and delivered in accordance with the OSM3604® Guideline and Code of Practice.

After an initial bedding in period and adoption of OSM3604® practises the expectation is for designers, fabricators, as well as developers to benefit from the rigorous Design for Manufacture and Assembly (DfMA) process prescribed by OSM3604®.

The intention for designers and fabricators is to build superior quality homes by designing and working to a rigorous process enabling quality: OSM3604®.

NOTE: Only projects that have undergone the OSM3604® workflow from design through fabrication to assembly are able to receive the OSM3604® quality mark.

The OSM3604® brand provides credibility for marketing and sales purposes. Certified expertise with a New Zealand wide brand associates your business with technical and professional excellence in Offsite Manufacturing.

3. OSM3604® for Designers

3.1. Overview

OSM3604® is much more than a set of building details— first and foremost it is a process that integrates architectural, structural, building performance, and manufacturing considerations into a coordinated, panel-based design and approach to construction.

It outlines a design workflow, standard details and OSM panel system rules for designers who would like to optimise their project for light timber framed panel construction.

OSM3604® could be described as the process implementation of light timber framing for factory-built, light-weight timber framing optimised for NZ construction, NZ industry, and the NZ regulatory environment.

IMPORTANT: There are few hard system rules and plenty of flexibility in OSM3604®.

However, it is important for designers to understand what makes a panelised timber framed design efficient.

NOTE: OSM3604® and NZS3604:2011

OSM3604® is complementary and outlines an off-site panelised approach to timber framed buildings as per NZS3064:2011. There is no other connection between these two documents.

Maybe in future OSM3604® can and should be an extension to the New Zealand timber framing standard.

3.2. OSM3604® Workflow and process

OSM3604® is both a system and a process that supports architects in designing buildings that are faster to build, more efficient in the offsite factory, more consistent in quality, and better performing—if the design is optimised for OSM3604® from the outset.

Below is the OSM3604® process, from viewpoint of the designer.

STEP 1. GENERAL PROJECT SUITABILITY

- **Assess suitability** of project for OSM3604®:
    - Is the geometry compact?
    - Is the envelope high-performance, low-energy, or Passivhaus?
    - Are airtightness and MVHR coordination part of the brief?
- Identify early if the project goals align with the benefits of a panelised system.
- Talk to *Offsite Design Ltd* or your preferred panelised fabricator in case you're unsure whether OSM3604® is right for your project.

Key output & hold point: Confirmation that the project is generally suitable for OSM3604®.

STEP 2. EARLY DESIGN COORDINATION

- Begin concept design with **OSM panelisation in mind**—consider the recommended OSM3604® panel formats, including size and set out of openings within panels and relative to junctions (refer Chapter 3.4 to 3.6).
- Engage early with an OSM3604® registered panel fabricator, with *Offsite Design Ltd*, or work from generic OSM3604® constraints (refer Chapter 3).
- Make use of the BIM content available for download from www.osm3604.nz
- Overlay **service zones**, airtightness layers, and MVHR requirements at concept stage.

Key output: A concept that has been informed by efficient panel size and sequence.

STEP 3. DEVELOPED DESIGN & PANEL-BASED SCHEMATIC

- Incorporate OSM3604® **standard assemblies and standard junctions** (refer *OSM3604® Standard Details* available for download separately) into your design.
- Engage with *Offsite Design Ltd* or an OSM3604® registered panel fabricator to validate the panel schematic regarding panelisation, **lifting access, and transport constraints**, for review and input.
- Align panelisation strategy with manufacturing preferences and constraints.

Key output: An agreed panelisation scheme and panel junctions informed by real-world fabrication and delivery limits.

STEP 4. DETAILED DESIGN & COMPLIANCE DOCUMENTATION

- Finalise wall, floor, and roof panel details using *OSM3604® Standard Details* and design rules. Prepare detailed design and compile documentation for consenting purposes.
- **Rough opening sizes**: Window and doors must be selected, modelled, and detailed carefully to clearly show the required dimensions for rough openings.
- **Include panel model** (rough panel volumes and rough openings only) as IFC output.
- NOTE: *Offsite Design Ltd* and your OSM3604® panel fabricator only require rough panel volumes and rough openings. There is no need for you -the designer- to model framing timber, battens, or linings for fabrication or manufacturing purposes.

Key output: Consent-ready documentation and shared rough panel volumes and rough openings.

Congratulations! That's the designer's job in panelisation done.

NEXT STEPS:

Offsite Design Ltd will take over the panel model (rough volumes and rough openings only) and produce a fabrication model and the factory documentation from here.

- *Offsite Design Ltd* will produce a panel fabrication model suitable for off-site manufacture by registered OSM3604® fabricators.
- OSM panel manufacture & in-factory QA by your preferred fabricator, or tender the design.
- On-site assembly & QA by your preferred installer/builder.
- The OSM3604® on-site assembly documentation contains sequencing drawings and standard details.
- Completion, site QA (e.g. blower door) & Feedback Loop.

3.3. When to apply OSM3604®

The earlier the system is implemented on a project, the more likely it is for the system to influence design decisions in favour of an efficient and cost-effective solution. Refer OSM3604® workflow in Chapter 3.2)

The later the system is applied and the more system guidelines are not being met, the more sacrifices in efficiencies are likely to be made by the customer.

OSM3604® can be implemented at several stages during design development:

- Before,
- during or
- after the design process.

It is recommended to develop and implement the OSM3604® as early as possible (i.e. Step 1 above).

3.4. OSM3604® Floor panels

3.4.1. General recommendations

- Avoid split level or stepped floors.
- Avoid cantilevered floors, balconies or decks (these should be stand alone or externally supported).
- Avoid mezzanine, stairwell or 2-storey voids at one end of the building, centralise void against an external wall and support with an abutting internal wall
- Try to contain the stairwell opening within 2 floor panels.

3.4.2. Floor cassette/system build up

- 240-300mm Joists/Rim board (Pine, LVL, I-joist or similar)
- Blocking as per required specifications.
- 19-25mm flooring (OSB, Ply, chip or Fiber cement)
- Rigid Air Barrier (RAB) fitted (min 8mm thickness) and taped to exterior edges or underside
- Exterior building wrap/paper pre-installed to the underside if required
- Insulation pre-installed within Cassette
- Services may be pre-installed if desired (discuss with fabricator)

3.4.3. Floor Panels (Mass Timber)

- CLT (Cross laminated timber) or PLT (Parallel laminated timber) , or NLT (nail laminated timber) Panels: as per structural requirements.

3.4.4. Efficient floor Panel sizes for material use and logistics – General

- Final panel sizes generally should be dictated by logistics to site.
- Floor – ground or mid-floor:
    - Min. size = 1.2m W x 2.4m L
    - Sweet spot = 2.4m W x 6.0m L
    - Max. size = 3.0m W x 12.0m L

3.5. OSM3604® Wall panels

3.5.1. General recommendations

- Avoid large window or door openings in gable wall panels as these wall panels tend to run vertically and are restricted in width.
- Avoid stepping 2nd storey exterior walls in or out of line with ground floor walls.
- Ext. Windows and doors openings should be a min. of 100mm away from an abutting internal wall.
- Ext. window and door openings should be a min of 600mm away from an external wall corner or in-line joint if acting as brace panel.
- Int. doors openings should be a min of 92mm away from an abutting internal wall.
- Aim to keep wall heights consistent.
- Aim to keep all window and door opening heights consistent, with a maximum head height of 2100mm above FL.

3.5.2. Wall panel assembly/system build up

- 90 - 190mm framing (LVL or Pine)
- 9mm bracing (e.g. ply) – No Nogs
- Minimal added blocking to reduce thermal bridging
- Exterior building wrap/paper
- Insulation pre-installed within the wall
- Interior airtightness/vapour barrier pre-installed
- 45mm Service battens pre-installed and temp-fixed where site removal is required.
- Services pre-installed where required (confirm with your fabricator).

3.5.3. Efficient wall Panel sizes for material use and logistics – General

- Final panel sizes generally should be dictated by logistics to site.
- Wall panel - Horizontal
    - Min. size = 2.0m H x 1.2m L
    - Sweet spot = 2.7m H x 6.0m L
    - Max. size = 3.0m H x 12.0m L
- Wall panel – Vertical
    - Min. size = 1.2m W x 2.0m H
    - Sweet spot =3.0m W x 4.8m H
    - Max. size = 3.0m W x 6.0m H

3.6. OSM3604® Roof panels

3.6.1. General recommendations

- Avoid roof pitches below 8° and above 40°
- Gable roofs will generally require ridge support from internal walls or a mix of walls and beams that sit under the panels.
- Avoid roofs with complex geometry e.g. hips, valley, mansards, dormers, hexagonal, etc. as framed panels can be too complex to form and support.
- Avoid skylights, to reduce structural and thermal impacts.
- Aim to keep eave overhangs under 600mm.

3.6.2. Roof Cassette/Assemblies build up

- 240-300mm Rafters (Pine, LVL, I-joist or similar).
- Blocking as per required specifications.
- 19-25mm sarking (OSB, Ply, chip or Fiber cement).
- Rigid Air Barrier (RAB) or wrap fitted and taped to exterior edges
- Interior airtightness/vapour barrier pre-installed
- Insulation pre-installed within Cassette
- 45mm Service battens pre-installed and temp. fixed where site removal is required.
- Services pre-installed where required (confirm with your fabricator)

3.6.3. Roof Panels (Mass Timber)

- CLT (Cross laminated timber) or PLT (Parallel laminated timber) , or NLT (nail laminated timber) Panels: as per structural requirements.

3.6.4. Efficient Roof Panel sizes for material use and logistics – General*

- Final panel sizes generally should be dictated by logistics to site.
- Roof – vaulted or mono-pitch and skillion.
    - Min. size = 1.2m W x 2.4m L
    - Sweet spot = 2.4m W x 4.8m L
    - Max. size = 3.0m W x 12.0m L

3.7. OSM3604® Services considerations

- Avoid plumbing fixtures and fittings on external walls, especially in wet areas.
- Aim to keep services together (e.g. kitchen & bathroom/laundry back-to-back).
- Consider a service riser within the building, near kitchen, bathroom or laundry.
- Consider using service voids and access hatches under the midfloor for service routing (raise GF wall heights to 2.7m while maintaining 2.4m ceiling height).
- Consider grouping service penetrations on exterior walls.
- MHRV systems should to be placed close to an external wall so the intake and exhaust are easy to install.

3.8. Optimising for OSM3604®

OSM3604® does not automatically deliver improved outcomes. Its value is only realised when it is thoughtfully applied to projects that are compatible with its principles and logistical realities.

It is not intended for every building, but when used appropriately, it can significantly reduce offsite and onsite time, improve performance outcomes and quality, and deliver greater certainty in project delivery.

Designers are encouraged to assess project suitability early (Step 1 refer OSM3604® Workflow), and to work collaboratively with fabricators and builders to unlock the full benefits of the OSM3604® approach.

IMPORTANT: There are few hard rules in this Guideline and -generally speaking- there are few buildings that can not be panelised and manufactured off-site. If you have a design that clearly lies outside of these guidelines and you're keen on exploring offsite manufacture, then talk to *Offsite Design Ltd* or your preferred fabricator. They will be able to consult on whether and how off-site manufacture still makes sense.

3.8.1. Design for Manufacture and Assembly (DfMA)

At the heart of OSM3604® is rigorous Design for Manufacture and Assembly (DfMA) whose benefits can be unlocked by following the workflow, the standard details (published separately) and the system guidelines outlined in this document.

By rigorously following workflow and process (refer Chapter 3.2) this automatically optimises your project for DfMA.

3.8.2. OSM3604® Building geometry guideline

Consider simple geometry for fast and efficient construction, flexibility can be achieved in certain designs within the general recommendations and limits outlined below:

- Compact geometry
- Minimise tapered walls
- Minimise short (<1.0m) walls
- Think in storeys, wall lengths, and panel breaks—not just spaces.
- Mono slope or simple pitched roof shapes only: Avoid ridges and valleys.
- Avoid overly fragmented geometry or complex intersections.

3.8.3. Panel sizes and flexibility in design

The maximum panel size is determined by manufacturing conditions, logistics and site access, and availability of crane.

Difficult to access sites may require prior investigation to determine the maximum panel size that can be delivered to site.

OSM3604® does not use a standard palette of panels to choose from. Each project is customizable giving the system user flexibility in terms of what can be delivered.

OSM3604® standard details provide an opportunity for faster and more cost-effective design, manufacturing, and installation processes.

Offsite Design Ltd can support to develop standard details with the project design team to suit a developer, prefabricator or contractor preferences.

The system provides a vast flexibility on product and system choices. The compliance of the system lies with the specifier.

OSM3604® can be complemented with mass timber panel systems for e.g. mass timber floor and roof panels like CLT, PLT, SIP or similar.

3.8.4. Designing for Low-Energy, Passivhaus, or High-Performance

Designing for OSM3604® and designing for above-code thermal performance are complementary in that they are best considered from the very beginning and the starting point of a design.

OSM3604® is particularly suited for low-energy, Passivhaus, and generally above code builds.

3.8.5. Windows and Doors

Type

It is recommended to use airtight timber or uPVC or thermally broken composite external windows and doors that can be installed recessed, in the middle of the wall framing.

Improving the thermal performance and airtightness of your specified window and door joinery, combined with the use of OSM3604® Options, may significantly improve the thermal performance and comfort of the completed building.

Size and set out

Size and set out of window and door openings should contained within a wall panel. This is usually not a problem for small and medium size windows.

4. Appendix A

[…]