A XEROX BUILDERS FIELD GUIDE

Framing & Structural Wood Systems

From Load Paths and Lumber Grading to Shear Walls, Framing Sequence and Quality Control

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INTRODUCTION

The Frame Is the Skeleton of the Home

Once the slab or foundation is in, framing is where a house first takes its actual shape. It is also where the building's structural decisions get made — decisions that are far more difficult and expensive to correct once drywall, siding and finishes are in place.

This guide covers the wood-framed structural system common to residential construction in British Columbia: how loads move through the building, how lumber and engineered wood are selected, how walls, floors and roofs are assembled, and how the frame resists wind and seismic forces — a genuinely important consideration in this province.

For homeowners, understanding the frame makes it possible to ask informed questions and recognize quality work before it disappears behind finishes. For builders and site supervisors, it is a field reference for sequencing, inspection points and common mistakes.

1 Understanding the Structural System

Modern residential wood framing in BC is almost always platform framing: each floor is built as a complete, level platform, and the walls for the next floor are framed on top of it. This differs from older balloon framing, where wall studs ran continuously from foundation to roof.

> **GUIDING PRINCIPLE**
>
> *Every part of the frame exists to do one of two jobs: carry a load, or resist a lateral force. If you cannot explain which job a framing member is doing, that is worth stopping and asking about.*

The Load Path

A load path is the continuous route a load takes from where it originates — typically the roof — down through the structure to the foundation and, ultimately, the soil. Roof loads travel through rafters or trusses into bearing walls, through those walls into floor framing, through the floor framing into the walls below, and finally into the foundation and footings.

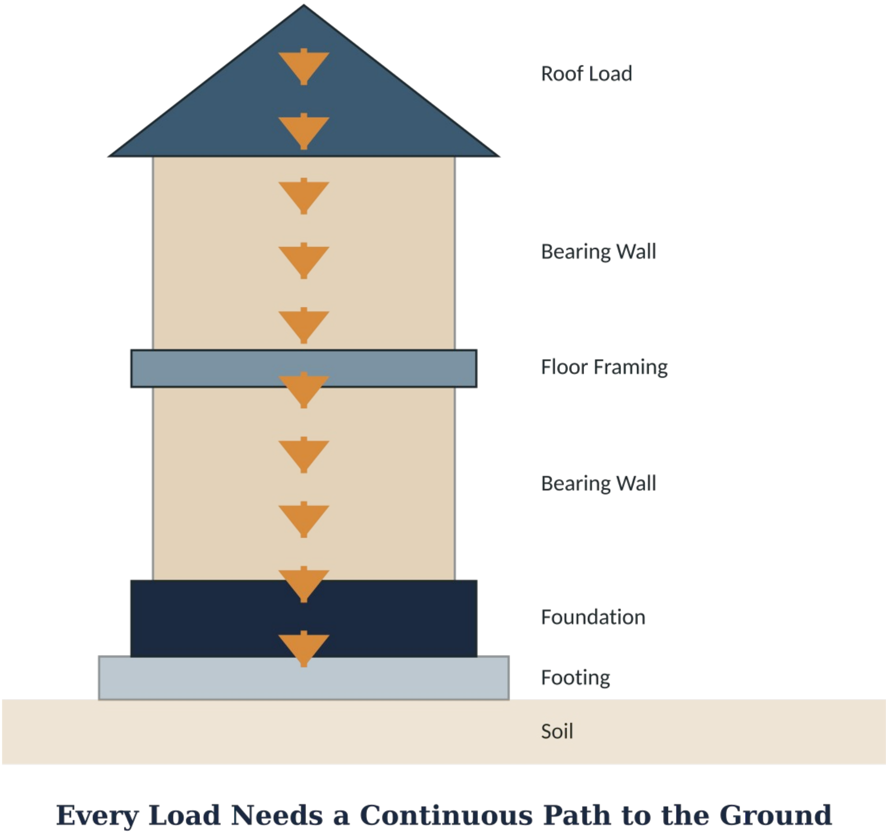

Figure 1 — A continuous load path from roof to soil.

> **GUIDING PRINCIPLE**
> *A load path is only as reliable as its weakest link. A structurally perfect wall sitting on top of an unsupported floor opening is not actually carrying its load anywhere useful.*

2 Lumber Basics: Species, Grades and Span Tables

Structural lumber is graded, not just sized. The grade stamp on a piece of dimensional lumber identifies the species group, grade, moisture content at the time of grading, and the grading agency — all of which affect the allowable span and load for that piece.

Common structural species groups in Western Canada include Spruce-Pine-Fir (SPF), Douglas Fir-Larch, and Hem-Fir. SPF is the most common framing lumber in BC residential construction.

CODE REQUIREMENT

Allowable spans for joists, rafters and beams are governed by span tables in the BC Building Code, based on species, grade, size, spacing and loading conditions. Never assume a span is acceptable because it “looks similar” to another project — confirm against the current code span tables or an engineer’s design for the actual species, grade and load in front of you.

Reading a Grade Stamp

A typical stamp identifies: the grading agency, a mill identification number, the species or species group, the grade (such as No. 1, No. 2, Select Structural, or Stud grade), and the moisture condition (S-DRY, S-GRN, or KD for kiln-dried).

BUILDER'S STANDARD

I sort and check grade stamps as material is unloaded, not after it is already framed into a wall. Catching a mis-delivered grade or species at the pile is a five-minute fix; catching it after the wall is sheathed is not.

3 Engineered Wood Products

Engineered wood products are manufactured to more consistent and often higher structural performance than dimensional lumber, and they make longer spans and larger openings practical.

REF	Product	Common Use
B.01	LVL (Laminated Veneer Lumber)	Beams, headers, long spans
B.02	I-Joists	Floor and roof framing, long clear spans
B.03	Glulam (Glued Laminated Timber)	Large beams, ridge beams, exposed structural members
B.04	PSL / LSL (Parallel / Laminated Strand Lumber)	Beams, headers, columns
B.05	OSB (Oriented Strand Board)	Wall, floor and roof sheathing

DESIGN OPTION

Engineered wood is not automatically the right choice everywhere — it is a design decision that depends on span, load, budget, and whether the member will be exposed or concealed. A qualified designer or the manufacturer's span tables should confirm the right product for each application.

GUIDING PRINCIPLE

Engineered wood products must never be field-modified — no notching, drilling outside manufacturer-permitted zones, or cutting to length without checking the allowable modifications. Doing so can silently remove most of the product's structural capacity.

4 Wall Framing Fundamentals

A standard wall assembly consists of a bottom (sole) plate, vertical studs, and a top plate — usually doubled to tie intersecting walls together and distribute point loads across multiple studs.

Studs are commonly spaced at 16 inches on centre for standard residential loading, though 24-inch spacing may be used with appropriately sized sheathing and framing in some assemblies. Spacing affects insulation fit, drywall fastening, and structural capacity — it is a design decision, not a field preference.

BUILDER'S STANDARD

I check stud spacing with a tape measure at the plates before sheathing goes on, not by eye. A stud that has crept to 18 or 19 inches on centre because of accumulated small errors down the wall can affect sheathing fastening patterns and insulation fit.

Openings: Headers, King Studs, Jack Studs and Cripples

Every window and door opening interrupts the wall's normal load path, so the load that would have gone through the missing studs has to be redirected around the opening.

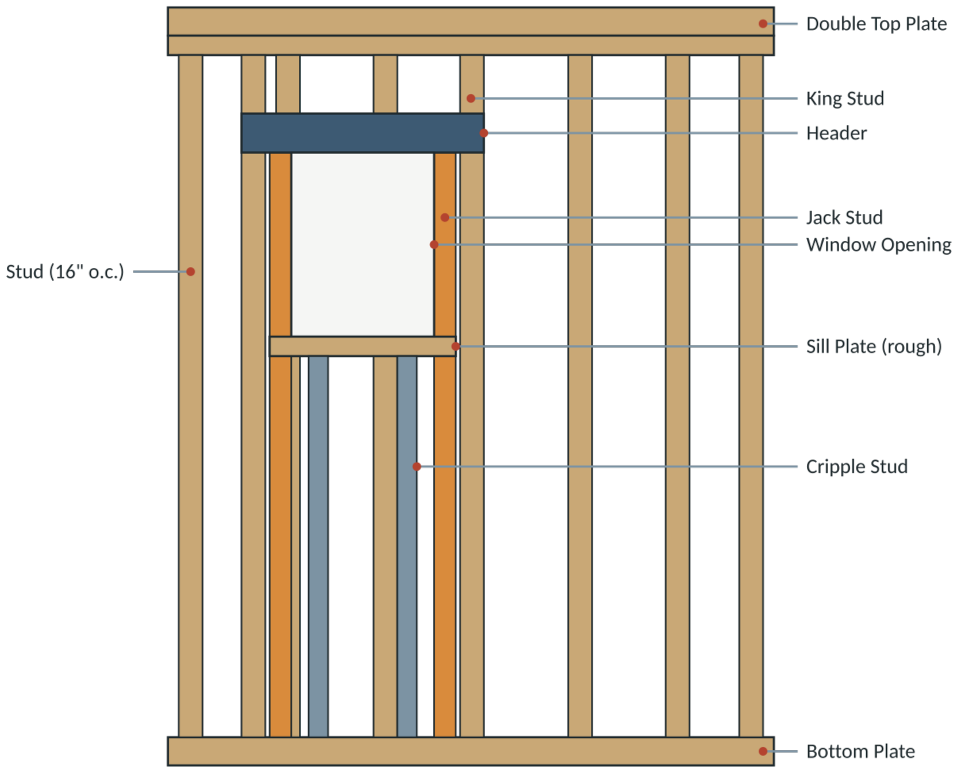

Figure 2 — Standard framing around a window opening.

The header spans the opening and carries the load down to jack studs (also called trimmer studs) on either side. King studs run full height alongside the jacks to tie the header assembly into the top and bottom plates. Cripple studs fill the space above the header (if any) and below a window's rough sill.

> **CODE REQUIREMENT**
> Header size is not a guess — it depends on the opening width, the load above it, and the species and grade of lumber used. Confirm header sizing against the BC Building Code span tables or an engineer's design for anything beyond a small, lightly loaded opening.

5 Bearing Walls vs. Non-Bearing Walls

A bearing wall carries structural load from above down to the framing or foundation below it. A non-bearing (partition) wall only supports itself and is not part of the load path.

GUIDING PRINCIPLE

Never assume a wall is non-bearing because it looks like an interior partition. Confirm against the structural drawings before removing or modifying any wall — this is one of the most common and most costly mistakes in both new construction and renovation work.

Identifying bearing walls generally requires checking the structural drawings, but common indicators include walls that run perpendicular to floor joists and align between floors, walls directly below a beam or a run of trusses, and walls that continue down to the foundation.

6 Shear Walls and Lateral Force Resistance

Gravity loads are not the only forces a frame has to resist. Wind and seismic loads push sideways on the building, and without adequate lateral bracing, a frame can rack — shift out of square — under those forces.

CODE REQUIREMENT

British Columbia is in an active seismic zone, and lateral force resistance is a code requirement, not an optional upgrade. Shear wall locations, sheathing type, nailing schedules and hold-down requirements are specified in the structural design and must be followed exactly — substitutions here are not a minor field decision.

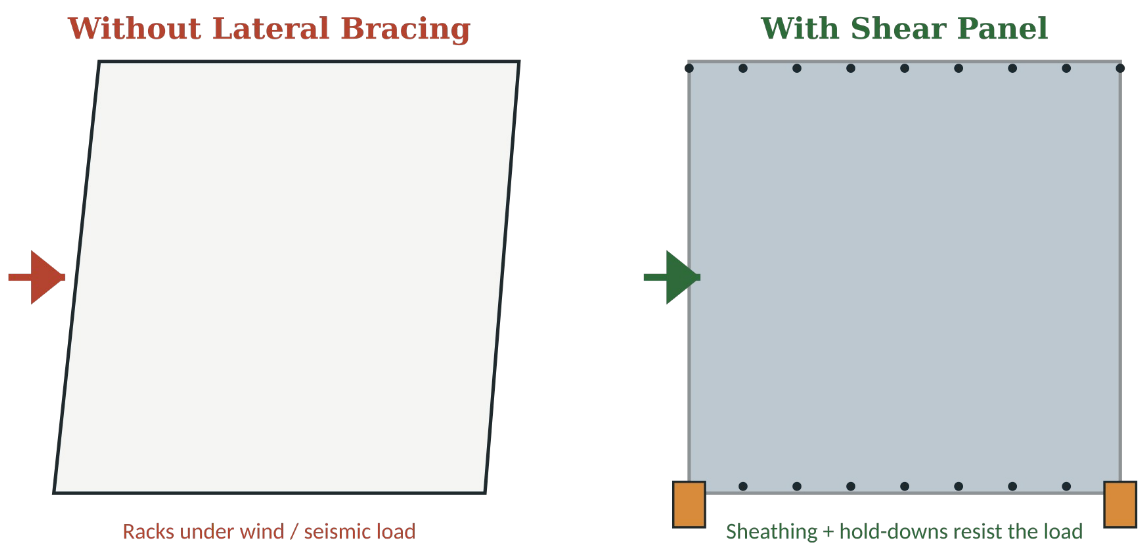

Figure 3 — A shear wall resists lateral (sideways) forces that would otherwise rack the frame.

A shear wall works by combining structural sheathing (typically OSB or plywood) fastened to the framing with a specified nailing pattern, together with hold-down hardware anchoring the wall to the structure below it — resisting both the sliding and the overturning forces created by lateral loads.

> **BEST PRACTICE**
> Nailing pattern and edge distance on shear panels matter as much as the panel itself. An under-nailed or over-driven shear panel can fail to deliver its designed capacity even though it looks identical to a correctly installed one.

7 Floor Framing Systems

Floor framing may use solid-sawn joists, engineered I-joists, or open-web floor trusses, depending on span, load, and whether mechanical systems need to run through the floor cavity.

- ☐ Joist size and spacing match the design
- ☐ Engineered joists not field-modified outside permitted zones
- ☐ Species and grade confirmed
- ☐ Subfloor fastening schedule followed
- ☐ Bearing length at supports adequate
- ☐ Floor sheathing panels staggered and gapped correctly
- ☐ Blocking or bridging installed where required
- ☐ Openings for stairs and mechanical properly framed

8 Roof Framing Systems

Most residential roofs use either engineered roof trusses or conventional stick framing (rafters and ceiling joists cut and assembled on site).

> **DESIGN OPTION**
> Trusses are engineered as a complete system and are generally faster to erect and more dimensionally consistent; stick framing offers more flexibility for complex rooflines and can be adjusted on site. Which is appropriate depends on roof complexity, schedule, budget and design — neither is universally “better.”

> **GUIDING PRINCIPLE**
> *Roof trusses are engineered products — the entire truss, not just individual members. Cutting, notching or drilling a truss in the field without engineering approval can compromise the whole system, not just the piece that was cut.*

Whichever system is used, the roof framing must tie back into the wall framing below with a continuous connection capable of resisting both gravity and uplift (wind) loads — typically through specified connectors, not toe-nailing alone.

9 Connections, Fasteners and Structural Hardware

A frame is only as strong as its connections. Nailing schedules — the specified nail size, spacing and pattern for a given connection — are engineered requirements, not general guidelines.

CODE REQUIREMENT

The BC Building Code and the project's structural drawings specify minimum nailing schedules for sheathing, framing connections, and structural hardware. Confirm the applicable schedule for each connection type rather than relying on memory or habit from a different project.

Structural connectors — joist hangers, hurricane ties, hold-downs, post bases and similar hardware — are engineered to specific load capacities, and that capacity depends on using the correct fastener type, size and quantity specified by the manufacturer for that connector.

BUILDER'S STANDARD

Using whatever nails are already in the gun is one of the most common ways a correctly specified connector ends up under-performing. I keep the manufacturer's fastener requirements on hand at the point of installation, not just in the truck.

10 Sheathing

Wall, floor and roof sheathing does more than provide a nailing surface — it is frequently a structural element, particularly where it forms part of the shear wall system.

REF	Application	Common Material
C.01	Wall sheathing	OSB or plywood, per structural design
C.02	Roof sheathing	OSB or plywood, thickness per span
C.03	Subfloor	Tongue-and-groove OSB or plywood
C.04	Shear panels	Structural-rated OSB or plywood, specific nailing schedule

BEST PRACTICE

Panel orientation, edge blocking, gapping for expansion, and nailing pattern all affect sheathing performance — especially where it is doing structural work as part of a shear wall. Follow the structural drawing's panel layout, not just "whatever fits."

11 Protecting the Frame During Construction

A wood frame is exposed to the weather from the moment framing starts until the building is dried in — roofed, sheathed, and wrapped. In coastal BC, that exposure window matters.

GUIDING PRINCIPLE

Framing lumber that sits wet for extended periods before being enclosed can develop elevated moisture content, increased shrinkage after enclosure, and in worst cases mould or decay — problems that are difficult and expensive to address once the building is closed in.

- ☐ Material stored off the ground and covered on site
- ☐ Framing sequenced to minimize weather exposure
- ☐ Roof sheathing and dry-in prioritized in the schedule
- ☐ Standing water removed from deck and floor surfaces
- ☐ Temporary protection used during extended weather delays
- ☐ Moisture content checked before enclosing where practical

12 Squaring, Plumbing and Straightening

A wall that is out of plumb, a floor that is out of level, or a building that is out of square creates problems that compound through every later trade — cabinetry, flooring, trim and finishes all depend on a square, plumb, straight frame.

BEST PRACTICE

Check and correct plumb, level and square at each stage — walls before sheathing, floors before subfloor fastening is complete — while correction is still simple. Waiting until the framing inspection to find a problem means the fix is now happening after the wall is sheathed.

Common tools for this stage include a laser level, a 4-foot or 6-foot level, string lines for wall straightness, and diagonal measurements to confirm square (equal diagonal measurements across a rectangular layout confirm it is square).

13 Common Framing Mistakes

Many framing problems share a small set of root causes, repeated across different parts of the building:

- ☐ Bearing walls modified without checking the structural design
- ☐ Headers undersized for the actual opening and load
- ☐ Engineered wood field-cut or notched outside permitted zones
- ☐ Incorrect or substituted nailing schedule on shear panels
- ☐ Missing or incorrect hold-down hardware
- ☐ Stud spacing drifting from the specified layout
- ☐ Insufficient bearing length at joist or beam supports
- ☐ Roof-to-wall connections relying on toe-nailing alone
- ☐ Framing left exposed to weather far longer than necessary
- ☐ Truss modified in the field without engineering approval

> **GUIDING PRINCIPLE**
> *Almost every item on this list is cheap to fix while the frame is open, and expensive — sometimes very expensive — to fix once it is covered. The inspection points in the next section exist specifically to catch these before that happens.*

14 Pre-Drywall / Pre-Close-In Inspection

Before insulation and drywall conceal the frame, this is the last practical opportunity to verify the structure without demolition.

- ☐ Structural drawings on site and followed
- ☐ Bearing walls confirmed and unmodified
- ☐ Header sizes match the design
- ☐ Shear wall sheathing and nailing schedule verified
- ☐ Hold-down hardware installed and torqued correctly
- ☐ Joist and beam bearing lengths adequate
- ☐ Engineered wood free of unauthorized cuts or notches
- ☐ Roof-to-wall connectors installed per design
- ☐ Framing square, plumb and level
- ☐ Required inspections completed and documented
- ☐ Photographs taken of all structural connections

15 The Most Important Lessons to Remember

If a homeowner or builder remembers only a few principles from this guide, they should be these:

1. **Every load needs a path to the ground**
   Trace it before you trust it.
2. **Grade stamps are not decoration**
   They tell you what the piece of lumber is actually rated to do.
3. **Engineered wood cannot be freely modified**
   Field cuts and notches can remove most of its capacity.
4. **Bearing walls are not always obvious**
   Confirm against the drawings before removing or altering any wall.
5. **Lateral bracing is not optional in BC**
   Shear walls and hold-downs are seismic code requirements.
6. **Nailing schedules are engineered, not habitual**
   The pattern matters as much as the fastener.
7. **Square and plumb get harder to fix later**
   Check at each stage, not just at the end.
8. **Weather exposure has a cost**
   Get the frame dried in as efficiently as the schedule allows.
9. **Most mistakes are cheap to fix while open**
   And expensive once they are covered.

CLOSING

Conclusion

The frame disappears from view faster than almost any other part of a house. Once it is insulated and drywalled, a homeowner will never see the load path, the header sizing, or the shear wall nailing pattern again — they will simply live with the consequences of whether it was done correctly.

Good framing is not glamorous work. It is careful, sequential, and disciplined: understand where the loads go, use the right material in the right place, connect everything the way it was designed to be connected, and verify it before it is covered.

> **GUIDING PRINCIPLE**
> *A frame does not need to be interesting to look at. It needs to still be doing its job, quietly and correctly, fifty years from now.*

IMPORTANT NOTICE

Please Read Before Using This Guide

This guide is an educational resource. It does not replace, and must not be treated as a substitute for:

- The current British Columbia Building Code, National Building Code of Canada, or any other applicable code in force at the time of construction.
- Municipal or regional-district bylaws, permit conditions, and inspection requirements.
- Site-specific structural design and engineering prepared by a licensed professional.
- Manufacturer installation instructions for any specific engineered wood product or structural connector.
- The professional and legal judgment of the structural engineers and other registered professionals engaged on a specific project.

The technical values, span guidance and examples in this guide are general construction information. Actual requirements vary according to structural design, geographic seismic and wind zone, species and grade of lumber actually supplied, loading conditions, and project-specific engineering.

Where a conflict exists, the applicable building code, engineered drawings, manufacturer's installation instructions and qualified professionals take precedence over this guide.

> **GUIDING PRINCIPLE**
> *This guide reflects the author's own field research, training, and construction experience. It has not yet been reviewed by an independent structural engineer or legal professional. Readers must verify every technical statement against the current, authentic codes, standards, and engineered drawings applicable to their project before relying on it.*

Research and drafting assistance for this guide was provided using AI-based research and writing tools (Claude, by Anthropic), under the direction, technical judgment and final authorship of Mandeep S.

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