

STRUCTURAL BASICS GUIDE

Key structural concepts every homeowner should understand before designing.

KEY VOCABULARY

Load-Bearing Wall

A wall that supports weight from the structure above it - roof, floors, or other walls. Cannot be removed without adding a beam or header.

Header / Lintel

A horizontal structural member that spans an opening (door, window, or pass-through) and transfers the load above to the sides.

Span

The distance a beam, joist, or rafter can cover without intermediate support. Longer spans require deeper or stronger members.

Point Load

A concentrated force applied at a single location, such as where a beam rests on a column. Requires adequate support below.

Foundation

The structural base that transfers the building weight to the ground. Type depends on soil conditions, climate, and building loads.

Shear Wall

A wall designed to resist lateral forces from wind or seismic activity. Typically uses plywood or structural sheathing.

SPAN GUIDELINES

Up to 12 ft Standard wood joists and rafters. No special engineering typically required.

12 - 20 ft Engineered lumber (LVL, TJI), doubled-up members, or steel beams may be needed.

20 - 30 ft Steel beams, engineered trusses, or glulam beams required. Engineer involvement recommended.

30 ft + Steel frame, heavy timber trusses, or specialized structural systems. Engineer required.

FOUNDATION TYPES

Slab-on-Grade

Best for: Warm climates, flat lots, cost-effective builds

Limitations: No crawl space access, harder to modify plumbing later

Crawl Space

Best for: Sloped sites, access to plumbing and HVAC, moisture-prone areas

Limitations: Requires ventilation and moisture control, limited headroom

Full Basement

Best for: Cold climates (frost depth), bonus living or storage space

Limitations: Higher cost, waterproofing critical, not ideal for high water tables

Pier and Post

Best for: Steep terrain, flood zones, decks, and light structures

Limitations: Limited insulation options, exposed underside, pier spacing matters

WHEN TO CONSULT AN ENGINEER

- Spans over 20 feet in any direction
- Removing or modifying a load-bearing wall
- Large window walls or openings over 8 feet wide
- Cantilevered sections (overhangs beyond the foundation)
- Multi-story construction or unusual roof loads
- Uncertain soil conditions or steep building sites
- Rooftop decks, green roofs, or heavy mechanical equipment