FA

FOUNDATIONS OF ARCHITECTURE

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.

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

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

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

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

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

COMMON STRUCTURAL ISSUES

Wall of Windows

Large expanses of glass eliminate shear wall capacity. Requires steel moment frames or engineered solutions to resist lateral loads.

Open Floor Plans

Removing interior walls shifts loads to fewer points. Hidden beams, steel columns, or engineered headers must replace the removed support.

Cantilevers

Overhanging floors or balconies require back-span support at least 2x the cantilever distance. Material and connection design is critical.

Rooftop Decks

Additional dead load and live load on the roof structure. Requires waterproofing, drainage, and structural capacity verification.