

# Chapter 14



## Building Codes & Construction

### Chapter 14 Goals:

- Understand the various remodeling and renovation jobs that can be built without a contractor's license
- Understand construction safety regulations
- Recognize the numerous architectural styles
- Explain environmental hazards as they relate to housing
- List various construction methods
- Be aware of the different housing and insulation material

## Chapter 14: Building Codes & Construction

### Key Terms

anchor bolts	eave	masonry
asbestos	energy-efficiency ratio (EER)	minimum property requirements
backfill	flashing	modern house
bracing	floor plan	mold
brownfield	fire stop	perc test
building codes	formaldehyde	platform frame
building paper	foundation	post and beam frame
building permit	foundational wall	radon
California Department of Insurance	frame	rafters
California Department of Public Health	French style house	ridge board
California Solar Initiative	girder	R-value
certificate of occupancy	gutter	sheathing
Contractors State License Board	Home Energy Rating System (HERS)	siding
crawl space	Homeowner's Bill of Rights of 2004	sill
Department of Housing and Community Development	insulation	soffit
downspout	International Code Council	solar power
drywall	joist	square foot
Dutch style house	lath and plaster	stucco
	lead-based paint	stud
		uniform codes

### Building Codes



**Building codes** are legal regulations that promote minimum health and safety standards for the design, construction, and alteration of real property.

Beginning in the early 1900s, individual states began creating **minimum property requirements**. Such standards were implemented to promote housing safety, security, and soundness. Among them are standards for roofing, electrical wiring, heating, property access, and hazardous waste.

Nowadays, lenders and government-sponsored financial institutions will not provide loans for properties that do not meet minimum property requirements. An owner of a property that does not meet these requirements may therefore have to make adjustments prior to obtaining a loan or selling the property.

## Federal Regulations

**Uniform codes** refer to industry standard codes to which all licensed contractors must adhere.

The **International Code Council (ICC)** has created a family of “I-codes” to uphold minimum safety standards for buildings. These codes include:

- International Building Code (IBC)
- International Fire Code (IFC)
- International Plumbing Code (IPC)
- International Mechanical Code (IMC)
- International Energy Conservation Code (IECC)

The Public Buildings Amendments of 1988, 40 U.S.C. 3312, requires buildings to be altered if they do not comply with federal building codes.

Details about each code can be found at [www.iccsafe.org](http://www.iccsafe.org).

## State Regulations

Each state has unique building codes that represent its particular interests. In the event that a state building code conflicts with a federal building code, the federal code will be prioritized.

California’s **Department of Housing and Community Development** establishes policies that preserve and expand safe and affordable housing in the state.

The **California Department of Public Health** upholds strict sewer system standards for the drainage of water and waste. These standards ensure that the water entering and leaving a property does not contaminate the local water supply.

## Local Regulations

Each city and county has specific building codes as determined by local legislatures. These codes tend to conform to the customs and traditions of the local area and are changed periodically based on city trajectories.

Local governments regulate land use, square footage allowances, fire safety and sanitation laws, and rules regarding property foundations, retainer walls, stairs, and balconies.

## **Contractors**

Work can be performed without a contractor license under the following circumstances:

- Jobs that cost under \$500 (total includes labor and materials)
- Work performed by a property owner
- Specific agricultural construction
- Oil and gas management

However, the state requires almost all contractors to become licensed prior to performing work. This ensures a certain level of proficiency in the implementation of local, state, and federal building standards.

The **Contractors State License Board** issues contractor licenses.

In order to qualify for a contract license, a contractor must pass a state-administered licensing exam. The exam covers various topics related to building construction, such as framing, windows, and building material. A prospective contractor licensee can enroll in a private test preparation program or prepare independently.

If a prospective contractor licensee passes the state exam, he or she must then obtain a Certificate of Worker's Compensation Insurance and pay a bond or cash deposit. The bond or cash deposit is set aside in case a client is damaged by a contractor's performance.

A contractor's license may be suspended or revoked if he or she:

- Abandons a project
- Fails to adhere to a client-contractor contract
- Does not follow city-approved construction plans
- Does not meet building and safety codes
- Does not follow plans set forth in a client-contractor contract
- Misuses or misdirects client funds

## **California Department of Insurance**

The **California Department of Insurance** enforces the rules and regulations that govern the insurance industry.

## Homeowner's Bill of Rights of 2004

After major wildfires swept California in 2003, the state legislature took steps towards strengthening consumer protections in the insurance industry.

The **Homeowner's Bill of Rights of 2004** was created to handle claims and underwrite approvals and denials regarding fire damage.

Section 675.1 (a-c) of the Bill stipulates:

- “*Insurers cannot cancel insurance for a primary residence when it is up for renewal and hasn't been rebuilt yet. Insurers, with input from homeowner/insured, may adjust policy limits, coverage, and premium payment before or at the time of renewal.*”
- “*Insurers cannot cancel insurance while the primary residence is being rebuilt... Insurer cannot use the fact that the primary residence is damaged as a basis for canceling insurance.*”
- “*Insurers must renew the insurance policy at least once if a total loss to the primary residence was caused by a disaster and not by the homeowner/insured's negligence.*”

Section 2051 (a-b) lays out the following rules for the amount of recovery with an “actual cash value” policy:

- “*The amount of recovery for fire insurance that requires payment of actual cash value for the loss is the expense to the homeowner/insured of replacing what was lost as of the time the fire began.*”
- “*For a total loss to the home/structure, the amount recovered is the policy limit or the fair market value of the home/structure, whichever is less.*”
- “*For a partial loss to the home/structure or loss to its contents, the amount recovered is what it costs to repair, rebuild or replace the home/structure or contents minus a fair and reasonable deduction for depreciation, whichever is less. The depreciation only applies to the parts of the home/structure that are subject to repair and replacement during the useful life of the structure.*”

The following rules apply to the amount of recovery with a “replacement cost” policy (Section 2051.5):

- “*Requires payment of the replacement cost for a fire loss based on what it would cost for the homeowner/insured to repair, rebuild or replace the home without a deduction for physical depreciation.*”

- “Allows at least 12 months to rebuild and still receive replacement costs with possibility of a six-month extension. In a declared disaster (Governor's State of Emergency), homeowner/insured has at least 24 months to repair, rebuild or replace the home.”
- “Allows homeowner/insured after a total loss, to rebuild or replace the home at a location other than the original location of the total loss.”

The rules of the Homeowner's Mediation Program is discussed in Section 10089.70 (b):

- “Claims for residential property losses (other than from earthquakes) occurring after 9/30/2003 for which the Governor has declared a state of emergency, may be referred by the Department of Insurance to its mediation program for discussion of possible payments over the policy limits. Sets other conditions for mediation.”

Section 2060 includes provisions for additional living expenses:

- “If a state of emergency has been declared, coverage for additional living expenses shall be for a period of 24 months. Insures must provide homeowner/insured with a list of items that are covered by the “additional living expense” part of the insurance policy.”

Section 791.12 covers “Adverse Underwriting Decisions”. An adverse underwriting decision refers to when an insurance company cancels or fails to renew a property owner’s insurance policy, or increases the property owner’s premium amount.

An insurance company cannot base an adverse underwriting decision – in whole or in part – on the fact that an insured individual inquired into insurance policy limits or coverage (if the inquiry did not result in the filing of a claim, and the information was received from an insurance-support organization whose primary source of information is insurance institutions).

The Homeowner’s Bill of Rights also establishes insurance cancellation requirements. An insurance company must give at least 20 days notice prior to cancelling a property owner’s policy, or 10 days if the reason for the cancellation is a property owner’s non-payment of premiums (Section 677.4).

## **Property Design**

### **Architectural Style**

Architecture refers to the planning, design, and construction of a building or structure.

A property's architectural style varies based on taste and budget. Many modern architects combine multiple styles, taking the best elements of each and conforming it to a client's individual preferences.

Below is a list of the most common architectural styles and their distinct features.

#### **Spanish**



- Stucco exterior
- White or off white-colored exterior
- Brown or orange-colored roof tiles
- Arches, curved edges
- Courtyard
- Balcony

### Victorian



- Large features
- Steep roof
- High ceilings
- Porch
- Two or more stories
- Brick base

### Ranch



- One story
- Long squared building
- Attached garage perpendicular to building, creating an “L” shape
- Large backyard

**Mediterranean**

- Stucco exterior
- Brown and red-colored roof tiles
- Large, open rooms that focus on airspace
- Columned halls
- Archways

**Modern**

- Large windows
- Flat surfaces
- Minimal curvature
- Steel and concrete emphasis

### French



- Stone frame
- Brick features
- Stucco exterior
- Steep, brick roof
- Many windows

### Dutch



- 1-½ to two stories
- Gambrel roof (symmetrical, two-sided roof with two slopes on each side)
- Porch below roof overhang
- Side chimney

### On a Slope

Such properties are built into a slope, hill, or mountain. The characteristics of an “on a slope” property vary as each property is altered to match the shape of the landscape into which it is built.



### Square Footage

A property’s square footage is used as the basis for calculating its value.

Square footage only includes a property’s finished areas. A garage is not considered finished. Generally, finished areas are considered any portion of the home that someone can physically live in. Porches, attics, and even garages converted into home offices do not count.

The following steps are used to calculate a property’s square footage:

- Measure from the exterior walls
- Use the nearest inch and round to the nearest square foot
- Calculate every portion of the property that can be lived in or used by guests, minus garages, porches, and attics

A property owner is advised to hire a land surveyor and/or appraiser to perform the necessary measurements and calculations.

### Floor Plan

A property’s floor plan should create symmetry and attempt to make the property appear as large as possible without wasting space. Good architects make use of every square foot while considering a property owner’s specifications and preferences.

When constructing a new property, an architect must consider natural lighting, ease of access to rooms, and air circulation.

In the past, homes were built in a “room after room” style. This layout featured distinct rooms separated or closed off by walls. However, this rigid, computer-like layout is no longer desirable.

Today’s most popular floor plans have combined rooms and open-air layouts that make the inside of a property appear larger than it is.

For example, a modern home may knock down a wall that separates an adjacent kitchen and family room to create the appearance of an expansive eating area.

## Property Features

### Kitchen

Aside from a property’s square footage, the aspect of a home that can increase its value the most is the kitchen.

A kitchen is one of the most important indicators of a home’s value because it can be filled with many potentially expensive items. For example: granite or marble countertops, ceramic tiles, islands, and appliances.

The most distinct feature in a kitchen apart from its size is the cabinetry. Cabinets can be custom or premade. Kitchen appliances can also be directly built in to the cabinetry.

### Bathroom

According to many contractors, the bathroom is the most significant room in the house besides the kitchen.

A bathroom is the only room in a house where a person can be completely alone. Consequently, it can create a lasting impression for a guest or a potential buyer.

Popular bathroom features include wood floors, tile floors, whirlpool bath, and glass showers.

### High Ceilings

High ceilings invite more natural lighting. They also create the illusion of more space without expanding a property’s actual square footage. This can lend a property a grandiose appearance.

## **Construction Process**

### **Building Permits**

Prior to performing construction on a property, a property owner must obtain a building permit. A **building permit** allows a property owner to construct an approved project on his or her property.

Local governments approve building permits. To obtain a permit, a property owner – along with a contractor and/or architect – must fill out an application at a local building office. The application must include a proposed set of plans, project details, and the projected new dimensions.

The local building office will review a property owner's application.

If the city does not approve a submitted plan, a property owner must make revisions according to the standards set by the city.

If the city approves a submitted plan, it will issue a building permit and schedule an appointment to visit the actual location of the property.

A project manager will assess a proposed plan's compatibility with local, state, and federal building codes; zoning laws; and local and state general plans. This assessment occurs in the early stages of construction to prevent a property owner from incorrectly developing his or her property.

The local building office holds regular meetings during a project's various phases of construction. An inspection agent also performs inspections throughout the construction process to ensure that a property adheres to minimum property requirements.

Upon the completion of construction, a certificate of occupancy will be issued. A **certificate of occupancy** states that a building meets minimum property requirements and is therefore safe for occupancy.

A city may issue a temporary certificate of occupancy if a property is still under minor construction, but has portions that are habitable. A temporary certificate is typically valid for 90 days. A property owner must complete construction before or on the stipulated end date. If construction has not been completed before then, a property owner must apply for an extension.

## Site Preparation

A property owner must prepare a property site before he or she can build on it.

Site preparation differs based on local building codes, construction type, and a site's existing condition. For example, a site may need to be leveled with a bulldozer prior to building, whereas another may not.

A site's previous use may also dictate what a property owner can or cannot build.

A local building office may request a soils report, environmental report, or a perc test as part of a site's preparation. A **perc test** assesses the absorption rate of water into a property's soil. This test may be necessary if a property owner is building a septic system.

## Foundation

The start of any real estate structure is a foundation. A **foundation** is the base of a property. The purpose of a foundation is to provide a sturdy base upon which the other components of a building will be built.

**Backfill** refers to soil that replaces removed soil from construction activity to strengthen and support a new foundation. Backfill is typically made up of soil and rocks.



**A foundational wall** is a wall below ground level that serves as the main support system for a building. The two most common materials for a foundation wall are concrete and masonry.

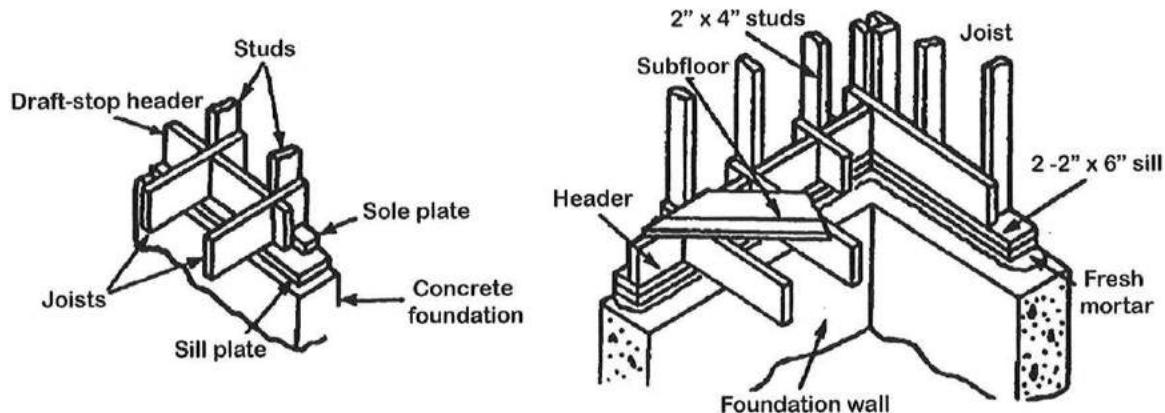
It is common for structures to be built a few feet above ground level. The gap between the first floor and the ground level is called the **crawl space**. A crawl space promotes air circulation below and within a structure. A crawl space also allows contractors to make certain repairs or adjustments to a property from below.

A **sill** is the bottom horizontal beam of a wall to which vertical beams will be attached. **Anchor bolts** secure a sill directly to a foundation or foundational wall.

A **girder** is a property's main horizontal support beam that supports smaller beams. **Bracing** provides stability to a structure by supporting the girders during construction and distributing lateral loads. This increases a structure's ability to withstand the effects of an earthquake.

A **joist** is a horizontal structure beam used to span an open space, often between girders. A joist is often used on a wood-based structure.

## Foundational Apponents



## Frame

Once a property's foundation has been created, the next step is to build a frame.

A **frame** is where the interior and exterior walls attach to one another. A frame holds a structure up and gives it the necessary support to withstand earthquakes. Essentially, it allows all pieces in a construction "puzzle" to fit together.

The most common frames are wood or structured steel.

A wood frame is versatile and provides increased safety during an earthquake. Consequently, it is the most common and reliable frame type in California.

Wood frames attract termites. It is recommended that property owners chemically treat a wood frame every so often to avoid a large-scale infestation. Preventing a wood frame from directly touching the earth can also reduce termite levels.

**Studs** are vertical support beams in a building's frame. City codes require studs to be placed 16 or fewer inches apart. A **fire stop** is a short piece of wood placed between studs that blocks air drafts.

A **soffit** is the underside of a construction element. Soffits often go under an archway, a flight of stairs, or eaves. **Eaves** refer to the part of a roof that extends beyond the exterior vertical wall of a property.

A **platform frame** involves using a first floor of a structure as the foundation to build the next floor. With this method, each story of a structure supports the next story. This method requires less labor and material, and is ultimately cheaper compared to other building methods.

A **post and beam frame** gives architects and contractors the flexibility to make many different property styles. However, such frames cost more and take longer to build than a platform frame. Consequently, they are typically used in larger properties with bigger budgets.

Traditionally, a post and beam frame uses timber framing. Pegs, iron straps, and wedges are used to hold a structure in place.

## Exterior Walls

The goal of an exterior wall is to keep natural elements out of a property.

An exterior wall is created through a protective casing known as **sheathing**.

Drywall is the most commonly used material for exterior walls. **Drywall** – also known as wallboard or plasterboard – is made of plaster that is hard-pressed within two industrial built sheets of specialized paper. Contractors cut drywall to the specific dimensions of a property's walls and install it with nails and special adhesive glues.

Many builders also use stucco. **Stucco** is comprised of grainy, particulate material, a binding agent, and water. It is often used as a decorative coating to cover undesirable construction materials, such as concrete or metal.

**Masonry** involves constructing an exterior wall with bricks, stone, and/or concrete blocks. Masonry can either be weight bearing or veneer. Typically, masonry structures are tied to a building's structure to add stability and prevent movement in the case of an earthquake. Masonry lasts longer than wood or metal.

**Siding** is a finishing product applied to a property's exterior walls to protect and insulate the property.

## Roof

A roof protects a property from natural elements and helps promote air ventilation. It can serve both functional and aesthetic purposes.

A roof's support system is its rafters. **Rafters** refer to the internal beams extending from a roof's eaves to its peak. A roof's peak – or its highest point – is known as a **ridge board**.

A roof's lifespan depends on the material being used, the quality of its construction, and the type of weather to which a property is exposed.

### **Roof Covering**

A roof covering may be constructed out of shingles, slate, or wooden material.

Shingles refer to individual roof tiles that are layered on top of one another and nailed directly to a structure. When one layer of shingles becomes old and worn, another layer can be added to increase a roof's lifespan. Shingles can be made of wood, slate, or asphalt. Asphalt shingles are among the most common roof covering materials used in the United States.

Slate is another popular roof covering material. As slate is made out of natural stone, it is extremely strong and has a long lifespan. It also provides a beautiful aesthetic appeal. However, slate is also heavy, hard to replace, and very expensive.

Wooden roof coverings are no longer common in the United States due to their susceptibility to catching fire.

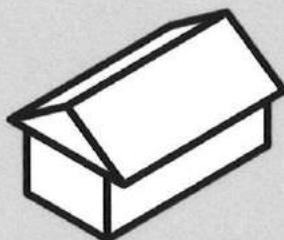
**Building paper** – also known as roofing felt paper or roll roofing – can be added underneath a roof covering to create a protective, waterproofing layer.

### **Roof Style**

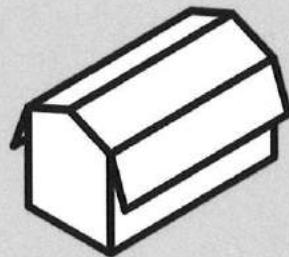
Roofing styles are chosen based on the goals of a property owner and a local area's traditions. The type of roof used also depends on a property's location.

For example, sloped or pitched roofs are used in areas with heavy rain to allow for proper drainage; in drier areas, a flatter roof may be used.

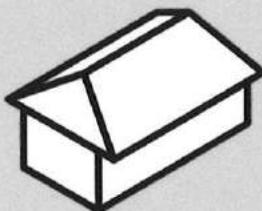
## Roof Types



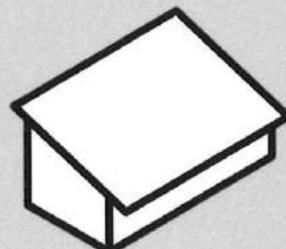
Gable Roof



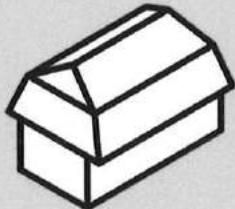
Gambrel Roof



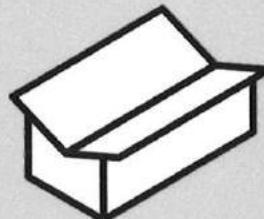
Hip Roof



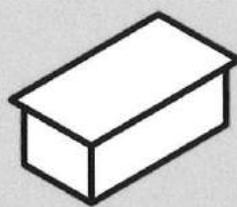
Skillion Roof



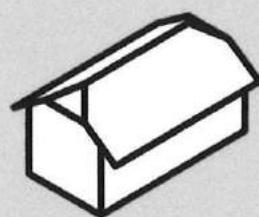
Mansard Roof



Butterfly Roof



Flat Roof



Jerkinhead Roof

Many houses may install a gutter to divert excess water. A **gutter** is a narrow trough at the end of a roof that collects rain runoff. A **downspout** is a pipe that channels water from a gutter away from the property.

A gutter increases a roof's life and provides safety for a property owner.

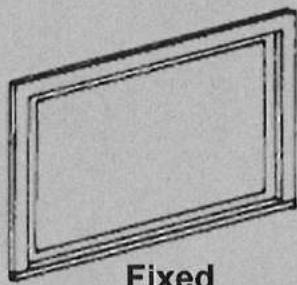


## Windows

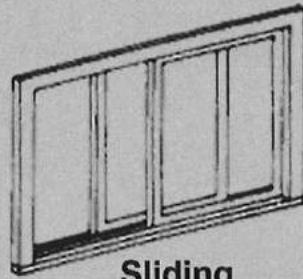
Windows are one of the main components of a property. Their purpose is to increase natural lighting and heat, offer ventilation, and heighten aesthetic beauty.

Windows vary in style and price. The pictures below highlight the different types of windows.

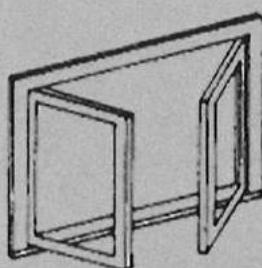
## Window Types



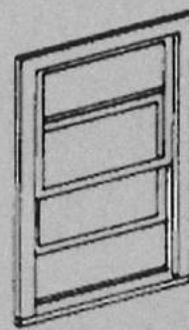
Fixed



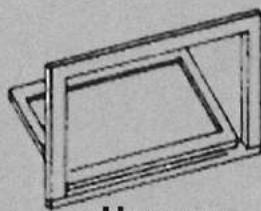
Sliding



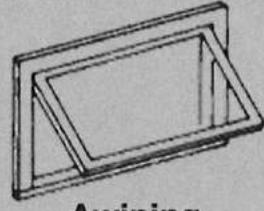
Casement



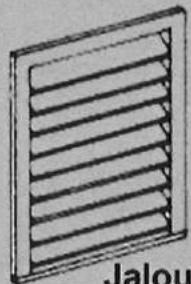
Double or single-hung



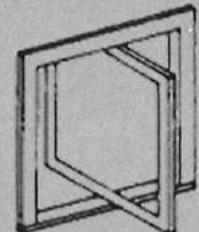
Hopper



Awning



Jalouise



Center pivot

## Exterior Doors

Most homes have three exterior doors:

- Front/main entrance door
- Back/backyard door
- Garage door

Exterior doors protect a property owner's privacy. An exterior door prevents unwanted people, animals, and other elements from entering a home, while allowing multiple access points for a property owner to enter and exit.

An exterior door can also be decorative statement or provide an indication of what lies in the home's interior.

## Flooring

Flooring is a matter of preference, budget, and style.

Carpeting was one the go-to flooring choice for most property owners. However, an influx of laminate flooring choices made hardwood floors more affordable to the masses. New trends have consequently made hardwood floors the most popular choice.

Flooring has the ability to transform a property almost more than any other item. The relative low cost of flooring compared to how much it adds to the value of the property is minuscule and is therefore a reason why almost all real estate investors concentrate on changing the flooring of the property before selling or renting the property.

While carpet overall remains the largest percentage of flooring, wood and laminate flooring is gaining ground. The value added from hardwood and laminate flooring is significantly higher than carpet flooring.

## 5 Main Flooring Types



Laminate



Wood



Tile



Marble



Carpet

## Plumbing

A plumbing system involves the use of pipes, valves, and drain fittings to move water throughout a property. A plumbing system helps distribute water for the purpose of drinking, waste disposal, and heating.

Typical plumbing items include:

- Water heaters
- Water meters
- Water pumps
- Water filters
- Control systems to disperse and calculate the water levels being used

Under California law, all water heating systems must be anchored, braced, and strapped. This law was created to minimize damages resulting from earthquakes, including gas line leaks.

## Wiring

In the past, a 110-volt electrical system was enough to handle the average electricity use of most property owners. However, the increase in technology and products that require wiring (i.e. telephone and Internet lines) has increased the recommended voltage to 240 volts.

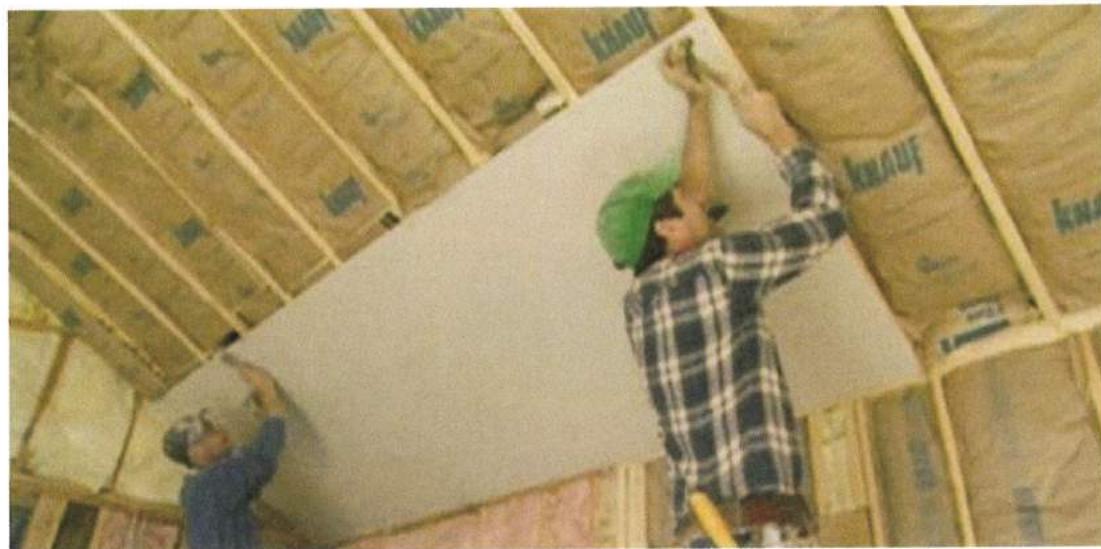
This increased voltage subsequently allows for broadband Internet service and increased Wi-Fi capability.

It is recommended that the average modern household have a minimum of 100 amps of electricity. However, most contractors will recommend 150 amps of electricity.

## Interior Walls

Lath and plaster used to be the primary material used to construct interior walls. The **lath and plaster** process involves using wet plaster and applying it to wood and wire. Once dry, a contractor can make any necessary changes. However, lath and plaster can take up to 10 days to apply/dry.

Drywall is cheaper, more flexible, and quicker to use. Consequently, most interior walls and ceilings are now constructed with drywall.



## Insulation

**Insulation** is used to protect a property from external forces, such as water, wind, hot and cold temperatures, chemicals, noise, and fire. Put simply, it prevents inside air from going out and outside air from getting in.

For example, during the winter months, insulation keeps heat produced by a fireplace from escaping and prevents frigid outside air from entering.

Proper insulation also has the power to lower electricity and gas bills. As oil prices have increased consistently since 2005, this is more important than ever.

Insulation is put into place by wrapping and installing specific material around some or all portions of a wall so that external forces remain where they should, which is outside. Sheathing and interior gypsum boards are examples of insulation methods that are put on the corner of walls and rooms to prevent anything from moving from outside to the inside.

**Flashing** is a weatherproofing, insulating material installed to prevent water from penetrating other building material. It is commonly used around chimneys, windows, door openings, and vents.

Insulation is also used for piping. An insulating blanket can be wrapped around a pipe to stabilize its temperature. This reduces the chances of a pipe bursting or malfunctioning.

An insulation material's quality is expressed through an R-value. An **R-value** represents the thickness of a particular insulation material. An R-1 value is







**Formaldehyde** is a plastic or resin chemical composed of chemicals that are used as an adhesive to strengthen products. Like asbestos, formaldehyde is believed to cause adverse health effects stemming from its ability to emit toxic fumes. Consequently, products with formaldehyde are banned in many states.

**Lead-based paint** contains toxic metal that can affect the health of individuals who reside or work at a property that contains it. Lead-based paint can cause physical damages, particularly to younger, developing individuals and the elderly.

**Mold** is an organism that occurs naturally in damp, wet, and/or humid conditions and can cause adverse health conditions, including difficulty breathing.







