**Building Codes**

Standards:

* Understand general codes related to floor plans.
* Incorporate aspects of sustainable and universal design.

Building codes

* Required laws that are intended to protect the public by establishing minimum standards of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Minimum \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_for construction and inspection of a structure to prevent:
  + Fire
  + Structural collapse
  + General deterioration
* Building codes dictate minimum requirements, not desirable or practical requirements

Green Buildings

* **Green Building Guidelines:** Incorporation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ considerations and resources into every step of the construction process
* **Green (Environmentally Friendly) Building:** Structure that is designed, built, operated, renovated, and recycled in an ecological and resource-efficient manner
  + Designed to:
    - Blend with its environment
    - Protect the health of occupants
    - Use energy, water, and other resources efficiently
    - Reduce overall impact to the environment

LEED Green Building Guidelines

* **LEED Green Building Rating System:** environmentally friendly design and construction
  + Uses a rating system intended to:
  + Blend the structure with the environment
  + Reduce operating costs
  + Aid in marketing the structure for resale
* LEED certification acknowledges four levels of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
  + Certified: 26 – 32 points
  + Silver: 33 – 38 points
  + Gold: 39 – 51points
  + Platinum: 52 points or more

LEED Green Building Guidelines

* Key areas of the construction process:
  + Sustainable sites
  + Water efficiency
  + Indoor environmental quality
  + Energy and atmosphere
  + Material and resources
  + Innovation
  + Design process

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Efficient design and construction as it relates to the construction site**
* Eight credits are available related to sustainable sites:

1. Site selection
2. Urban redevelopment
3. Brownfield redevelopment
4. Alternative transportation
5. Reduced site disturbance
6. Stormwater management
7. Landscape and exterior design
8. Light pollution reduction

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Use and reduction of the use of water in the structure and at the building site**
* Three credits are available related to water efficiency:

1. Water-efficient landscaping
2. Innovative wastewater technologies
3. Water use reduction

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Interior air quality of the structure**
* Eight credits are available related to indoor environmental quality:

1. Carbon dioxide monitoring
2. Increase ventilation effectiveness
3. Construction interior air quality management plan
4. Low-emitting materials
5. Indoor chemical and pollutant source control
6. Controllability of systems
7. Thermal comforts
8. Daylight and views

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Use of energy to control the atmosphere within a residence**
* Six credits are available related to energy and atmosphere:

1. Optimize energy performance
2. Renewable energy
3. Additional commissioning
4. Elimination of hydro chloroflurocarbons (HCFCs) and halons
5. Measurement and verification
6. Green power

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Materials and products used to build and sustain a structure**
* Seven credits are available related to material and resources:

1. Building reuse
2. Construction waste management
3. Resource reuse
4. Recycle content
5. Local and regional materials
6. Rapidly renewable materials
7. Certified wood

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Design phase of a residence**
* Two credits are available related to innovation and design process:

1. Innovation in design
2. About LEED

National Building Codes

* Regulation of buildings can be traced through history for more than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_years
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ encouraged building regulations as minimum standards for health and safety
* Currently used throughout most of U.S. to regulate issues related to:
  + Fire
  + Structural ability
  + Health
  + Security
  + Energy conservation
  + Use of new materials and technology

National Building Codes

* Each city, county or state has the authority to adopt building codes in accordance with their state \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Regulation at the state and local level is very important

National Building Options

* Most states have adopted the building codes published by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(ICC)**
* The ICC codes consist of:
  + Building Officials and Code Administrators International (**BOCA**)
  + Southern Building Code Congress International (**SBCCI**)
  + International Conference of Building Officials (**ICBO**)
* Each local and/or state \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has the right to adopt all, or a portion, of the indicated code

International Code Family

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: BOCA, SBCCI, and ICBO joined forces to form the Council of American Building Officials (**CABO**) to create a national residential code
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: International Code Council (**ICC**) was formed to attempt another national code
  + **Goal of ICC**: Develop a single set of comprehensive, coordinated national codes that would eliminate disparities among previous three major codes

Model Codes

* The ICC has published:
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(IBC)**
  + Covers all buildings except detached single family, two-family and townhouses three stories or less
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(IRC)**
  + Covers detached single family, two-family and townhouses three stories or less to ensure quality residential construction

In Addition to National Codes

* The following agencies also publish guidelines for minimum property standards for accessibility for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Department of Housing and Urban Development **(HUD)**
  + Federal Housing Authority **(FHA)**
  + Americans with Disabilities Act **(ADA)**

Choosing the right Code

* Architects and engineers have to check with local \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to determine which codes will be used
* Each major codes is divided into similar sections that specify regulations covering:
  + Fire and Life Safety
  + Structural
  + Mechanical
  + Electrical
  + Plumbing

Habitable vs Nonhabitable space

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**space:** used for sleeping, living, cooking or dining purposes
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**space:** closets, pantries, bath/toilet rooms, hallways, utility rooms, storage spaces, garages, and other similar spaces

Location on the Property

* Exterior walls of residential buildings cannot be located within 5’ of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_lines
* Exterior walls must be made from materials that will resist a fire for 1-hour – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Using 5/8” gypsum board on each side of the wall is a common method in achieving this wall

Egress and accessibility requirements for a residence

* Major subjects to be considered for egress are:
  + Path/means of egress
  + Egress doors
  + Stairs
  + Emergency escape

Means of Egress

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: used in the IRC to specify areas of access or exits (doors, windows, hallways)
* Residential projects are required to provide continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the exterior of the dwelling

Egress Doors

* Each dwelling unit (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_), must have a minimum of one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that is at least 32” wide
  + Common practice is to provide a 36” or large door for an inviting entrance
* Minimum clear height of the door opening must be 78” in height
* Designer can determine all other door sizes
* A floor/landing must be on each side of an exterior door

Emergency Egress Openings

* Emergency egress: required in basements, habitable attics, and every sleeping room
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_may be made through a door or window that opens directly on o a street, alley or yard
* Emergency escape must be operable from inside without use of keys or tools

Emergency Egress Openings - Windows

* Emergency escape \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:
  + Provide occupant method of escape in case of a fire
  + Sill must be within 44” of the floor
  + Minimum clear area of 5.7 sq ft
  + Clear opening area must have a minimum width of 20” and minimum height of 24”
  + Windows with a finished sill height below the surrounding ground elevation must have a window \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Window well must have a clear opening of 9 sq ft
    - Window well must have ladder if depth is more than 44”

Halls

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: minimum of 36” wide
  + Hallways commonly laid out to be 42” wide

Stairs

* Often dictate entire \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of a structure
* Width of stairs: 36” – 42”
* Common tread depth: 10” – 10 ½”
* Common rise: 7 ½”
* Minimum head room: 6’ – 8”
  + Minimum head room spiral stairs: 6’ – 6”

Handrails and Guardrails

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: 1 ½” from the wall, may not extend into the required stair width by more than 4 ½”
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: provided at changes in floor or ground elevation that exceeds 30”
* Guardrails: required to be 36” high

Room Dimensions

* Every dwelling unit is required to have at least one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_with a minimum of 120 sq ft
* Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_rooms, except kitchen, are required to have a minimum of 70 sq ft and shall not be less than 7’ in any horizontal direction

Room Dimensions

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: require a space 30” wide
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: Distance of 21” is required in front
* Bathroom sink: Minimum clearance of 21” is required in front
* Shower: Minimum distance of 24” is required in front

Ceiling Heights

* Habitable rooms, hallways, corridors, bathrooms, toilet rooms, laundry rooms and basements must have a minimum ceiling height of 7’
* Shower or tub equipped with shower head: minimum ceiling height is 6’ – 8”
  + Minimum area of 30” x 30”
* Rooms with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ceilings: minimum ceiling must be maintained in at least half the room

Natural Light and ventilation

* IRC requires all habitable rooms must have natural \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ provided by windows
  + Exception: kitchens
* All habitable rooms must have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_area equal to 8% of the room’s floor area
  + Half of the area used to provide light must be openable to provide ventilation

Alternatives to Natural Light and Ventilation

* Two alternatives can be used in place of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_windows in habitable rooms except bedrooms:
  + Mechanical ventilation
  + Lighting equipment

Heating

* IRC requires heating to be installed in any house where the winter design temperature is below \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ degrees
  + Should be able to maintain heat temperature of 68 degrees

Sanitation

* Each residence is required to have a toilet, sink, shower or tub
* A sink is required in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Each plumbing fixture must be connected to an approved water supply
* Kitchen sinks, lavatories, bath tubs, laundry sinks and washing machines require hot and cold water
* All plumbing fixtures must be connected to a sanitary \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Smoke detectors

* For \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_story houses, smoke detectors must be located:
  + Start of every hall that serves a bedroom
  + Each bedroom
* For \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_houses, smoke detectors must be located:
  + On every floor, including the basement
  + Over the stairs leading to an upper level
  + Start of every hall that serves a bedroom
  + Each bedroom
* Should not be placed:
  + In or near kitchens or fireplaces

Carbon Monoxide

* Required in all new residences that contain:
  + Fuel-fired \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + An attached \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

International Energy Conservation Code

* Published in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_by ICC and updated every 3 years
* Regulate the design and construction of the:
  + Exterior envelope
  + Selection of heating, ventilation, and air conditioning (HVAC)
  + Water heating
  + Electrical distribution and illuminating systems
  + Equipment required for effective use of energy in buildings
* Exterior \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: made of elements of a building that enclosed conditioned (heated and cooled) spaces through which thermal energy transfers to or from the exterior (comprises the exterior walls, ceiling, openings in the walls and ceiling and the floor)

Insulation

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_used to restrict flow of heat, cold, or sound, in the building envelope keeping home warmer in winter and cooler in summer
  + Saves energy cost
  + Maintain uniform temperature
* Reduces amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lost through walls, ceilings, and floors and keep heat from entering
  + Thermal resistance: ability of materials to slow heat transfer
  + R-value: measure of thermal resistance to heat flow (higher the R-value, greater insulation ability)