Building Codes for Basement Finish

Presenter: Glenn Mathewson
Glenn@GlennMathewson.com
www.BuildingCodeCollege.com

- **Design**
  - Room Dimensions
    - Habitable rooms (living, sleeping, eating, cooking)
      - Minimum 7 ft. length in either direction
      - Minimum 70 square feet
        - Kitchens excluded
    - Hallways
      - Minimum 36-inch width
  - Clearances
    - Toilet
      - 21 inches in front
      - 15 inches on each side (min. 30-inch width)
    - Sink: 21 inches in front
    - Shower: 24 inches in front of door
  - Ceiling height
    - Habitable rooms, hallways, bathrooms, toilet rooms and laundry rooms: 7 ft.
    - Other spaces in basements: 6' 8"
    - Under beams, girders, ducts and other obstructions: 6' 4"
    - Stairways: 6' 8"
  - Fuel-gas burning appliances
    - Cannot be located in sleeping rooms, bathrooms, toilet rooms or storage closets or spaces that open only into those rooms.
    - 30 inch minimum clearance in front of equipment
    - Must be able to remove appliance without removing any permanent construction
      - Gas pipe drop is often an issue
  - Light and Ventilation
    - Habitable rooms must be illuminated
      - Windows 8% of floor area
        - Glazed area to be a minimum 8% of floor area
      - Artificial illumination
    - Artificial Ventilation (habitable rooms)
      - 4% of floor area must be provided in openable area
      - Local mechanical ventilation
      - Whole house ventilation systems
    - Adjoining rooms
      - One half of the area of common wall is open
      - Not less than 10% of interior room
      - Not less than 25 square feet

        - Bathrooms
            - 3 square feet of glazing
                - ½ openable
            - Artificial light &
            - Mechanical exhaust
                - 50 CFM intermittent OR
                - 25 CFM continuous

        - Stairways
            - A light source is required over each landing or over each set of stairs
            - Must be switched at top and bottom if six or more risers

- **<u>Fuel-burning appliances</u>**
    - <u>Combustion air</u>
        - Based on total btu's of appliances
        - Indoor air method
            - 50 ft^3 of interior volume per 1,000 btu/hr
                - Unless house has less than .40 AHC
            - Can use transfer air grills to adjacent rooms, low and high
        - Outdoor air method
            - Vertical ducts or direct openings
                - 1 square inch per 4,000 btu/hr
                - 2 openings, each within 12 inches of ceiling and floor
            - Horizontal ducts
                - 1 square inch per 2,000 btu/hr
                - 2 openings, each within 12 inches of ceiling and floor
            - One opening method
                - 1 square inch per 3,000 btu/hr
                - 1 opening within 12 inches of ceiling
                - Additional clearances around equipment
        - Combination indoor/outdoor air
            - Allows both indoor and outdoor air to be used
            - Google Play: Combustion Air Calculator
                - Codecalculators.com
    - <u>Vent connectors</u>
        - Usually single wall metal
        - 6-inch clearance to combustibles
            - Drywall is considered combustible
        - Cannot leave room of origin
        - Minimum slope of ¼" per 12"
        - Limitations on horizontal lengths
    - <u>B vents</u>
        - 1-inch clearance to combustibles
        - Must be 45° to vertical
            - One 60 ° offset allowed
        - Insulation shield required when insulated adjacent

- Plastic vents
  - High-efficiency appliance that produce condensation inside the vent
  - Can be below vertical
    - Usually a minimum ¼" per 12"
  - Installation is per manufacturer requirements

- **Heating and ductwork**
  - Design
    - Must be capable of maintaining a minimum 68° F at a point 2 ft. from the walls and 3 ft. from the floor.
    - Must have a return air path from habitable rooms for forced air system
    - Return air cannot be taken from a closet, bathroom, toilet room, kitchen, garage, or mechanical room.
      - 10-ft. clearance to open draft hoods
  - Ductwork
    - Minimum of three fasteners in each joint
    - Sealed "substantially airtight"
    - Check the existing ducts
  - Clothes dryer exhaust
    - Maximum length 35 ft.
      - Reductions for elbows based on radius of bend
        - 90° = 5 ft to 1 .5 ft.
        - 45° = 2.5 ft. to 9 inches
    - Length identification labeled within 6 ft. of connection point
    - No fasteners that penetrate more than 1/8" into duct
    - Nail protection required similar to plumbing

- **Nail protection**
  - 1 ¼" for electrical cable
  - 1 ¼" for copper & plastic plumbing & dryer vents
    - Must extend 2" below and above top and bottom plates
  - CSST protection required when
    - 6" from nailing surface
    - Concealed
    - Constrained

- **Access**
  - Cleanouts
    - Extend to surface of wall or floor
    - 18-inch clearance for pipes 6" and smaller in diameter
  - Air admittance valves
    - Provide access
    - Provide vents for airflow to valve
  - Junction boxes
  - HVAC dampers
  - Valves
  - Mechanical equipment
  - Ice maker fittings (compression fittings)

- Crawl space
- Gas pipe unions, right/left couplings, bushings, compression couplings & swing joints

- **<u>Framing</u>**
  - Floating walls over slab on grade floors
    - Void height depends on soils report
      - Typically 1.5 to 3 inches
      - Not intended to protect basement finish, rather the structure above.
  - Pressure-preservative-treated or naturally durable lumber
    - Bottom plate of walls on concrete or masonry slabs
    - Wood attached to exterior concrete walls (furring strips)
  - Drilling joists
    - Diameter of hole not more than 1/3 the depth of the member
    - Not less than 2" from top or bottom edge
  - Notching joists
    - Maximum depth of notch at top or bottom at bearing location is ¼ the depth of the joist
    - Maximum depth of notch elsewhere is 1/6 the depth of the joist
      - NO notching allowed in center third of span
    - Maximum length of notch is 1/3 the depth of the joist
    - Not less than 2" from any adjacent notches (or holes)
  - Drilling studs
    - Not less than 5/8" from any edge
    - Bearing studs
      - Maximum diameter of hole is 40% the width of the stud
      - Up to 60% allowed if doubled stud and no more than two in succession
    - Non bearing studs
      - Maximum diameter of hole is 60% the width of the stud
  - Notching studs
    - Bearing studs
      - Maximum 25% deep notch
    - Non bearing studs
      - Maximum 40% deep notch
  - Engineered lumber
    - Regulated by the manufacturer
    - Generally, no notching of I-joist chords is allowed

- **<u>Drywall</u>**
  - Maximum of ¼ recess on device boxes
  - Maximum 1/8 gap adjacent device boxes
  - ½ inch drywall required on walls and ceiling under enclosed, accessible stairs
  - 5/8" or ½" sag-resistant drywall required on ceilings with framing members at 24" OC and when water-based texture is applied

- **Fireblocking**
  - To cut off draft openings in concealed wood-frame construction
  - Materials
    - 2" nominal lumber
    - 2 layers of 1" nominal lumber
    - 23/32" WSP
    - ¾" particle board
    - ½" gypsum board
    - bats or blankets of mineral wool or glass fiber insulation
    - ¼" cement based millboard
    - Cellulose insulation (per mfg. Testing)
  - Locations
    - Horizontally in stud wall cavities at 10" intervals
    - At tops and bottoms of walls at floor levels
    - Interconnections between vertical and horizontal spaces

- **Alarms**
  - Smoke alarms
    - On every floor level and habitable attics
    - In every bedroom or "sleeping room"
    - In "immediate vicinity" of bedrooms or sleeping rooms
    - Hardwired and interconnected
    - Placement from NFPA 72
      - Flat ceiling: no closer than 4" from wall
      - Sloped ceiling: no closer than 4" vertically from ceiling, and no more than 36" horizontally from peak
      - Wall: between 4" and 12" from ceiling
      - More than 36" away from
        - Kitchen door
        - Bathroom (with shower or tub)
        - Supply register of forced air system
        - Tip of ceiling fan blade
      - Alarms required for floor levels cannot be blocked from stairs by doors or other obstructions
  - Carbon monoxide alarms
    - When there is an attached garage or fuel-fired equipment
    - Outside of each bedroom or sleeping room
    - Inside of bedrooms or sleeping rooms that contain a fuel-fired appliance.
    - Do not install (per leading mfg. Instructions)
      - Humid areas: 10 ft. from bath, shower, dishwasher, laundry rooms, etc.
      - Garages, kitchens, furnace rooms, or "dusty, dirty or greasy areas"
      - Near "turbulent air"