Code Requirements for Existing Buildings
R.W. Sullivan Engineering (RWS) was established in 1945 and currently has 90 employees.

RWS is a full service engineering firm offering integrated services in the following disciplines:
R.W. Sullivan Engineering
Code Group

Comprehensive Code Services
– Building, Fire, Life Safety, Accessibility
– Plan Review
– Existing Building Surveys
– Variances and Appeals
– National and International Experience
Beyond the Code

- Revit
- Sustainability and LEED
- Atrium Fire/Smoke and Egress Modeling
- Hazardous Materials
- Structural Fire Resistance
Agenda
Existing Buildings

• New Building Code:
  – Introduction to IEBC
  – Compliance Options
    – Prescriptive
    – Work Area
    – Performance

• Energy Code

• Accessibility Codes:
  – Massachusetts Architectural Access Board Regulations
  – American’s with Disabilities Act
Chapter 1: Applicability to existing buildings (780 CMR 102.6)

- The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code or, as deemed necessary by the building official for the general safety and welfare of the occupants and the public.

- Any existing building or structure shall meet and shall be presumed to meet the provisions of the applicable laws, codes, rules or regulations, bylaws or ordinances in effect at the time such building or structure was constructed or altered...
Definition of an Existing Building:

- Existing buildings which have been legally occupied prior to the adoption of this code (IEBC 202)
International Existing Building Code
(2009 IEBC)

- Adopted with the 8th Edition of 780 CMR as Chapter 34.
- IBC Chapter 34 deleted (it all is repeated in IEBC).
- All IEBC provisions for electrical, plumbing, and accessibility deleted.
- Effective February 2011.
3 Compliance Methods

• Three ways to comply with the code:
  • Prescriptive Compliance Method:
    – Additions, alterations or repairs, unless otherwise noted, follow that of new construction.

  • Work Area Compliance Method:
    – Requirements are based on level of work and generally applies to work area only.

  • Performance Compliance Method:
    – Utilizes a point system to ensure the level of public safety, health & welfare is maintained or exceeded after a renovation.

• Regardless of which option is chosen, IEBC Chapter 1 always applies and contains many unique MA amendments (i.e. structural systems, egress, fire protection, etc).
Means of egress in existing buildings, whether or not undergoing repairs, alterations, or changes of occupancy must comply with the code provisions for new construction in regards to:

1) The minimum number of exits
2) Required egress capacity
Sprinklers in Existing Buildings
IEBC MA Amendment Section 102.2.1.2

• Reference to the amended MGL148 Section 26G
  – All buildings over 7,500 gsf undergoing addition or major renovation
  • Renovations totaling 33% or more of the total gross square footage
  • Renovation costs equal to or greater than 33% of the assessed building value
  – Applies throughout the state
Prescriptive Compliance Method
Chapter 3
Prescriptive Compliance Method
Chapter 3

• Building Materials (IEBC 301.2)
  – Existing materials may remain only if they are safe.
  – New and replacement materials must be that of new construction. Like materials are only permitted if they are safe.
• Repairs (304):
  – Routine maintenance and ordinary repairs, exempt from permit, are not required to comply with the provisions of this section (304.1).
  
  – Nonstructural repair work other than routine maintenance / ordinary repairs requires a permit and can be made with same or like materials (304.1 and 301.2).
  
  – Structural damage that is not substantial can be repaired to restore the building to its original condition (304.4).
  
  – Substantial structural damage must be repaired to meet minimum loads described in 304.2 (lateral loads) & 304.3 (gravity loads).
• Additions (302):
  – Additions to the building or structure must comply with 780 CMR (2009 IBC) for new construction.
Prescriptive Compliance Method
Chapter 3

• Alterations (303):
  – New building systems or portions thereof must comply with new construction.
  – Existing unaltered systems or portions thereof, are no less conforming than prior alterations.
Prescriptive Compliance Method

Section 303.3 – 303.4

• Alterations:
  – Existing structures carrying gravity loads must meet the code for new construction under any of the following circumstances:
    • The design gravity load is increased by 5%.
    • The capacity of the structural member is reduced.
  – Existing structures carrying lateral loads must meet the code for new construction under any of the following circumstances:
    • The design lateral load is increased.
    • The alteration results in a structural irregularity as defined in ASCE 7.
    • The capacity of the structural member is reduced.
    • Exception: Lateral load-carrying members where the demand-capacity ratio with the alteration is increased by less than 10% of the ratio when ignoring the alteration.
• Fire Escapes (305)
  – Existing fire escapes are only allowed to be counted as means of egress on existing buildings if tested and certified.

  – New fire escapes on existing buildings are only permitted if exterior stairs are infeasible.

    • Restrictions on location
    • Cannot access through a window or use ladders.
Prescriptive Compliance Method

Chapter 3

• **Change of Occupancy (307)**
  – Cannot change use/occupancy unless the building meets the requirements of IEBC for the proposed occupancy.
  • Variances allowed if the new use is less hazardous than the existing use based on life and fire risk (subject to approval)
Work Area Method

Chapters 4 – 12
Work Area Compliance
Chapters 4 - 12

• Provisions are based on the type of work as defined in Chapter 4
  – Repairs (402):
    • Patching, restoration, or replacement of damaged elements to good or sound condition for maintenance purposes.
  – Level 1 Alteration (403):
    • Alterations to elements to serve the same purpose. No reconfiguration of spaces.
  – Level 2 Alteration (404):
    • Reconfiguration of spaces
    • Addition or elimination of windows or doors
    • Installation of any additional equipment
    • Renovation area ≤ 50% of the aggregate building area.
  – Level 3 Alteration (405):
    • Renovation area > 50% of the aggregate building area.
  – Change of Occupancy (406)
  – Additions (407)
  – Historic Buildings (408)
  – Relocated Structures (409)
Repairs

Chapter 5

- Nonstructural repair work other than routine maintenance / ordinary repairs requires a permit and can be made with same or like materials.

- Structural damage that is not substantial can be repaired to restore the building to its original condition (506.2.1).

- Substantial structural damage must be repaired to meet minimum loads described in 506.2.2 (lateral loads) & 506.2.3 (gravity loads).
Level 1 Alteration

Chapter 6

• New finishes must comply with the IBC for new construction (602.1 – 602.3).

• New work must comply with the materials and methods of the applicable code (602.4).

• Structural upgrades could include:
  – Gravity members if dead load increased by > 5%
  – Anchoring / bracing of masonry / concrete walls
  – Roof diaphragms and connections to resist wind loads
Level 2 Alteration  
Chapter 7  

• Compliance with Level 1 work required (701.2).

• All new construction and elements must comply with the code for new construction except as noted in Chapter 7 (701.3).
  – For example dead end corridors and ceiling heights have slightly less stringent requirements.
Level 2 Alteration
Floor Openings (703.2)

• All floor openings must be enclosed with 1-hour fire resistance rated construction except:
  – Where permitted by the code for new construction
  – “Mini-Atrium” – 3 story atrium at grade
  – Use Group specific allowances for rating reductions or allowed floor openings
    – Existing open stairs up to 3 stories are permitted in fully sprinklered buildings of Use Group B, E, F, M, R-1, R-2, S
Level 2 Alteration
Floor Openings (703.2)

• Additional Requirements (703.2.2):
  • If work area exceeds 50% of the floor area, then all vertical openings other than stairways must be enclosed (applies outside work area)
  • Does not include vertical openings in tenant spaces completely outside the scope of work.

• Stairway Enclosure Requirements (703.2.3):
  • If work area exceeds 50% of the floor area, then all egress stairways must be enclosed with smoke-tight construction (at a minimum) from the highest work area floor and all floors below.
  • Unless enclosure is not required by the IBC
Level 2 Alteration
Chapter 7

• Existing interior finishes in exits and corridors within work area must comply with IBC requirements (703.4)
  – If the work area is > 50% of the floor area, entire floor must use IBC approved finishes

• Automatic sprinkler systems must be installed in the work area if: (704.2)
  – The work area has exits or corridors shared by more than one tenant or they serve more than 30 occupants
  – The work area exceeds 50% of the floor area
  – The water supply is sufficient
  – The IBC requires it

• Fire alarm systems are required in the work area for Use Group E, I, and R occupancies (704.4)
  – Required throughout the floor if the work area exceeds 50% of that floor
• Fire escapes are permitted to be used as a means of egress as long as they meet the requirements of 705.3.1.2.

• In general, egress requirements for doorways or corridors in work areas follow that of new construction (705.4-6)
  – Existing dead end corridors up to 35 ft are allowed (705.6)
  – In other than A and H occupancies, dead end corridors up to 70 ft are allowed if fully sprinklered
Level 3 Alteration
Chapter 8

• Compliance with Level 1 and 2 work required (801.2)

• Existing shafts and vertical openings must be protected by a 1 hour wall from the floor of the work area to the level of exit discharge (803.1)

• Fire alarm and detection systems must be provided throughout the building where required by Section 704.4 (Level 2).

• Means of egress lighting must be provided from the highest work area floor to the floor of exit discharge (805.2).

• Exit signs must be provided from the highest work area floor to the floor of exit discharge (805.3).
Level 3 Alteration
Chapter 8

- Structural analysis required
  - More than 30% of total floor and roof areas are structurally altered within a 12-month period
    - Subject to IBC wind loading and reduced seismic forces
    - Less than 30% of total floor and roof areas are structurally altered within a 12-month period
      - Must demonstrate that the altered building complies with the loads applicable at the time of original construction or most recent substantial renovation
Change of Occupancy

Chapter 9
Change of Occupancy

Definition - A change in the purpose or level of activity within a building that involves a change in application of the requirements of this code

Applies
- When the occupancy classification is not changed
- Where there is a change in the occupancy classification or the occupancy group designation changes
Where the change in use is to a special use category, the building must comply with the code for new construction (902.1):

- Covered mall buildings
- Atriums
- Motor vehicle-related occupancies
- Aircraft-related occupancies
- Motion picture-projection rooms
- Stages and platforms
- Special amusement buildings
- Incidental use areas
- Hazardous materials
Change of Occupancy

Change of Occupancy Classification
- Within a group
- From one group to another

Partial Change in Use
- Where not separated from the remainder of the building, the entire building must comply with Level 3 requirements

Fire sprinkler, alarm & detection systems are required based on the new occupancy

Interior finishes of areas that changed occupancies must meet the requirements of new construction (912.3)
Change of Occupancy
Chapter 9

- Hazard Categories determine what needs to be updated to new construction standards when changing occupancies.
Hazard Categories
Chapter 9

- Means of Egress (912.4)
- Height and Area (912.5)
- Exterior Wall Fire-Resistance (912.6)
- Enclosure of Vertical Shafts (912.7)
In general, when changing to a higher hazard category occupancy, must comply with new construction.

When changing to equal or lesser occupancy hazard category:

- **Egress:**
  - Existing egress elements must comply with Level 3 Alteration criteria.
  - New egress elements must meet criteria of new construction.
  - Egress capacity must always meet or exceed the requirements for new construction for the occupancy.

- **Height and Area:**
  - The existing height and area is acceptable.

- **Exterior Walls:**
  - The existing existing exterior walls and openings of the building are acceptable.
• All additions to existing structures, including areas impacted by an addition, must meet the new construction requirements unless otherwise noted (1001.1)

• Additions must meet height and area limitations of the code for new construction (1002.1)

• Existing fire areas increased by the addition must be provided with fire protection systems per the code for new construction (1002.3)
• Existing structure carrying gravity loads must meet the code for new construction under any of the following circumstances:
  – The design gravity load is increased by 5%.
  – The capacity of the structural member is reduced.

• The addition and existing building acting as a single structure must meet the code for new construction for lateral loads where the addition is not structurally independent.
  – Exceptions: Existing lateral load-carrying members where the demand-capacity ratio with the addition is increased by less than 10% of the ratio when ignoring the addition.
Historic Buildings

Chapter 11

- **Defined as:** Buildings that are listed in or eligible for listing in the National or State Register of Historic Places, or designated as historic under an appropriate state or local law.

- There is no obligation for owners of historic buildings to use the provisions of this chapter (1101.1).
  - Can apply base IEBC as if non-historic; or
  - Section 308 which does not require compliance with the provisions relating to construction, repair, alteration, addition, restoration and moved structures, and change in occupancy where the building official deems the building to not constitute a distinct life safety hazard.
Historic Buildings
Chapter 11

• Repairs to any portion of the historic building or structure are permitted to be with original or like materials and original methods of construction (1102.1).

• Replacement of existing or missing features with original materials is permitted.

• Replacement of individual components of a building system can be replaced in kind without requiring the system to comply with the code for new construction (1102.5).

• If a historic building cannot meet IEBC and poses a distinct fire hazard the code official may require the installation of an automatic fire-extinguishing system as an effective substitute for some requirements, however, sprinklers cannot be installed in lieu of providing the required number of exits (1103.2).

• Existing egress components are permitted as long as the code official deems they are safe of egress (1103.3).
In buildings 3 stories or less, exit stairways must be enclosed to limit the spread of smoke; however, they are not required to have a fire-resistance rating (1103.6).

Grand stairways need not comply with the handrail and guard requirements as long as they are not structurally dangerous (1103.9).
Historic Buildings
Chapter 11

• Manual fire extinguishing equipment and manual pull stations are required for house museums in all use groups other than R-3 and R-4 (1103.12).
  • Fire extinguishers aren’t required if the building is equipped with a sprinkler system.
• Fire alarm systems are required in all house museums as specified in Section 1103.12(2)
• Smoke detection equipment is only required in R-1,-2,-3 when equipped with a sprinkler system.
Historic Buildings
Chapter 11

• Change of occupancy in an historic building shall apply with the appropriate provisions of Chapter 9 unless otherwise noted. (1105.1)

Some Notable exceptions:

– Building area limits are allowed to be exceeded by 20% for change of occupancy (1105.2)
– Occupancy separation of 1 hour can be omitted if equipped with an approved automatic sprinkler system (1105.4)
– For buildings less than 3,000 sq ft existing conditions are permitted to remain at all stairs and rails (1105.11)
Relocated or Moved Buildings
Chapter 12

- The building must be located on the lot in accordance with the IBC or IRC as applicable.
- The foundation and the connection to the foundation must be in accordance with the IBC or IRC as applicable.
Performance Compliance Methods

Chapter 13

• Applies to alterations, repairs, additions and change of occupancies in existing buildings including historic and moved.
Performance Compliance Methods
Chapter 13

• Change in Occupancy
  – Provisions of this chapter must be that of the new occupancy

• Partial Change in Occupancy
  – If separated by a fire barrier then only the section changed needs to comply
  – If not, then the more stringent of the provisions between the two occupancies shall apply to the entire building

• Additions
  – Must meet IBC requirements for new construction.
  – Height and area limitations of IBC can not be exceeded
  – If a fire wall is provided between existing building and addition, then the addition can be considered a separate building.

• Alterations and Repairs
  – If the existing building does not comply with the code for new construction, any alterations or repairs cannot result in the buildings being less safe.
The design evaluation is comprised of three main categories:

– Fire Safety
  • Structural Fire Resistance
  • Automatic Fire Detection
  • Fire Alarm
  • Fire-Suppression System

– Means of Egress
  • Configuration
  • Characteristics
  • Support Features

– General Safety
  • Fire Safety Parameters
  • Means of Egress Parameters
## Evaluation – Building Score

### Section 1301.7

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### Table 1301.7

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Construction Safeguards
Chapter 14
Construction Safeguards
Chapter 14

• Construction sites must be kept safe for workers and pedestrians:
  – Fire protection systems
    • Fire extinguishers (1404)
    • Standpipes (1406)
    • Sprinkler systems (1407)
  – Means of egress
  – Protected walkways
  – Barricades/Barriers
  – Covered walkways (when required)
  – Adequate lighting
  – Accessibility requirements
Energy Code
International Energy Conservation Code
Energy Code

• The 2009 IEBC follows the 2009 IECC for energy provisions

• Massachusetts has front end amendments for IECC
  – The code is not to be used to require the removal, alteration, abandonment, nor prevent the continued use of an existing building or building system
Energy Code

- Additions, renovations, and repairs to an existing building must conform to the code for new construction, without requiring the unaltered portion of the building to comply.
- If the energy use of the building is not increased the following need not comply:
  - Storm windows
  - Glass only replacements in existing sash and frame (unless required elsewhere in IEBC)
  - Existing ceiling, wall, and floor cavities exposed during construction – if filled with insulation
  - Construction where existing roof, wall or floor cavity is not exposed
• Existing Buildings: Renovations (3.3)
  – The level of compliance for existing buildings is based on the following thresholds:
    • Work costs less than $100,000: only the work being performed is required to comply.
    • Work costs $100,000 or more but less than 30% of assessed value of existing building: in addition to work being performed, an accessible public entrance and an accessible toilet room, telephone and drinking fountain must comply with 521 CMR (if public toilets, telephones and drinking fountains are provided).
  – Exempt Work: Curb cuts, MEP without architectural alterations, roof repair or replacement, window repair or replacement, repointing and masonry repair, septic systems, site utilities, and landscaping.
521 CMR: Massachusetts Architectural Access Board

• Existing Buildings: Renovations (3.3), con’t
  - Cost of work is equal to 30% or more of the assessed value of the existing building: entire building is required to comply with 521 CMR.
    - Exempt Work: None

• In determining applicability of 521 CMR, the cost of all work performed within a 3 year period must be added together.
• Existing Buildings: Alterations (36.402, 36.403)
  – Altered portions of a facility are required to comply with the accessibility regulations to the maximum extent feasible.
  – The accessibility of the path of travel and facilities (toilet rooms, drinking fountains, etc.) serving an altered area must also be improved, unless the cost and scope of the overall alteration is disproportionate to the cost of the overall alteration.
    • Disproportionate = cost exceeds 20% of the cost of primary alteration
    • If the cost of alterations to the path of travel or facilities is disproportionate, these areas must still be improved up to 20% of the cost of the primary alteration.
  – Alterations by a tenant in areas that only the tenant occupies do not trigger an obligation for the landlord to improve the accessibility of the path of travel or facilities used by tenant, if those areas are not otherwise being altered.
• Existing Buildings: Removal of Barriers (36.304)
  – Existing Public Accommodation: architectural barriers must be removed where such removal is able to be carried out without much difficulty or expense.
  – Priorities:
    • Accessible route and entrance to facility.
    • Access to areas within the facility where goods and services are made available to the public.
    • Accessible restroom facilities.
    • Take any other measures necessary to provide access to accommodations, privileges, advantages, goods, or services of a place of public accommodation.