State of Connecticut
Department of Administrative Services
Division of Construction Services
Office of Education and Data Management

Office of Education and Data Management
Spring 2017 Career Development Series

2012 International Existing Building Code

Presented by
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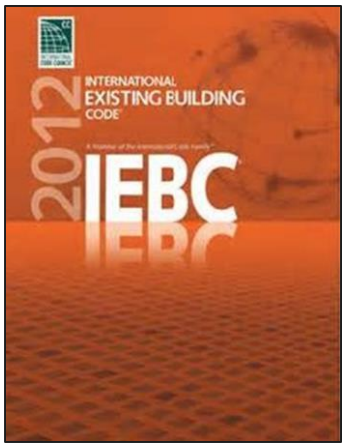
Regulatory Documents



Effective October 1, 2016

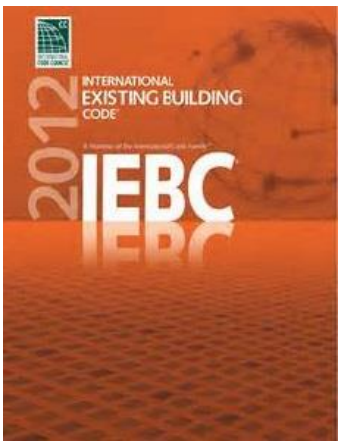
Notations

2012

Indicates a change from prior ICC Code(s)

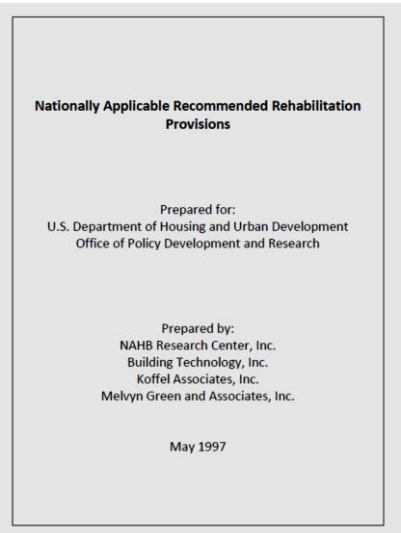
Indicates a 2016 Connecticut change

Overview



This lecture will examine the requirements governing *repairs, alterations, changes of occupancy*, and *additions* to and within existing buildings.

Origins


Nationally Applicable Recommended Rehabilitation Provisions

Prepared for:
U.S. Department of Housing and Urban Development
Office of Policy Development and Research

Prepared by:
NAHB Research Center, Inc.
Building Technology, Inc.
Koffel Associates, Inc.
Melvyn Green and Associates, Inc.

May 1997

Definition

Existing Structure

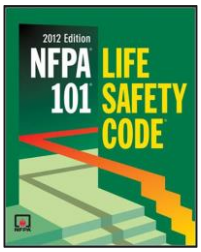
A building or structure, or portion thereof, erected in whole or in part, for which a legal building permit and a certificate of occupancy or approval has been issued. Buildings or structures or portions thereof erected prior to October 1, 1970, shall be deemed existing structures regardless of the existence of a legal permit or a certificate of occupancy or approval.

Application

Existing Buildings

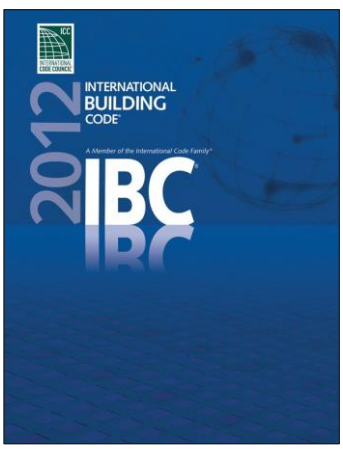
The legal use and occupancy of any building or structure existing on the date of adoption of this code shall be permitted to continue without change, except as specifically covered in this code or the Connecticut State Fire Safety Code.

Regulatory Documents



2012

Baseline



Unsafe structures or equipment

Vacant buildings

Maintenance

Connecticut Fire Safety Code

Application

No Proposed Work

- Chapter 34 – Maintenance
- Section 116 – Unsafe structures/ equipment
- Section 118 – Vacant buildings
- Connecticut Fire Safety Code

Maintenance

- Maintained in a safe and sanitary condition.
- Devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed.
- This chapter shall not provide the basis for removal of fire protection and safety systems and devices in existing structures.

Unsafe Structures

Unsafe, insanitary or deficient because of inadequate egress facilities, inadequate light and ventilation, or which constitute a fire hazard, or are otherwise dangerous to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance

A vacant structure that is not secured against entry shall be deemed unsafe.

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Vacant Buildings

Buildings, structures and/or premises

- Temporarily unoccupied
- Abandoned premises
- Safeguarding - security
- Fire protection
- Fire separation
- Combustibles – Hazardous materials

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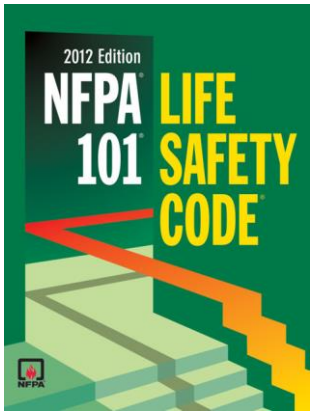
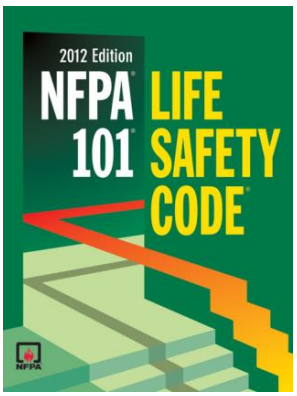
Baseline



CFSC Part IV

2015 CSFPC

CFSC Abatement Work



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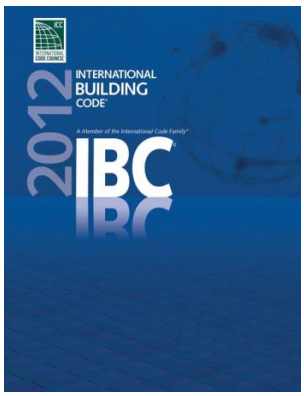
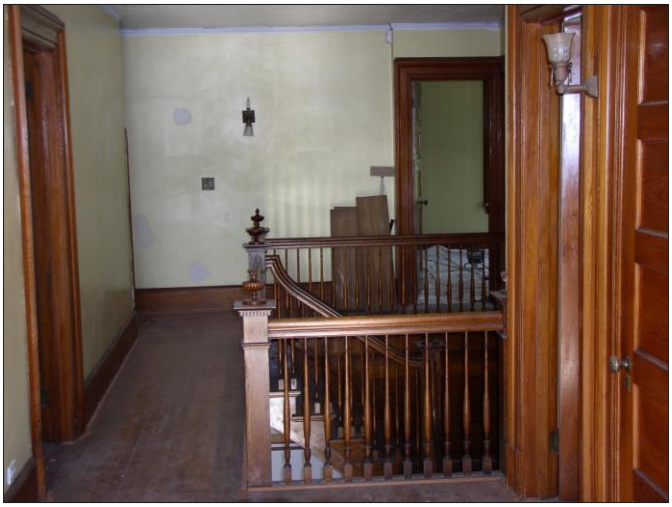
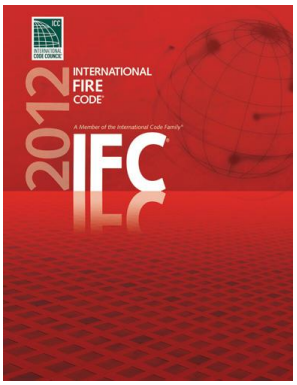


Comply with CFSC except for
MEP, FP, & Structural

CFSC Abatement Work



Non-CFSC Abatement Work



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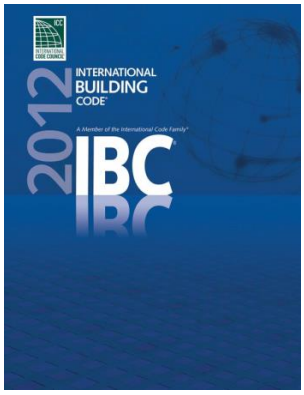


Alterations, Additions, Change of Occupancy, and Repairs

Application

Application

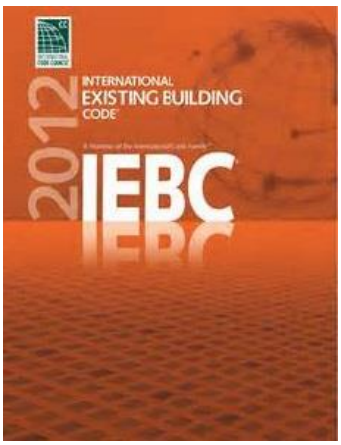
101.2 Scope - Exception 2 (CSFC Part III 101.1.3)

Existing buildings undergoing repair, movement, alterations or additions and change of occupancy may comply with the IEBC portion of the 2016 CSBC.

The choice to comply with this code or the IEBC shall be made by the permit applicant at the time of application for the building permit and shall be indicated on the construction documents in writing.

Contents

2012



- **Prescriptive method**
- **Repairs**
- **Level 1, 2, & 3 alterations**
- **Change of occupancy**
- **Additions**
- **Historic buildings**
- **Moved buildings**
- **Performance method**
- **Construction safeguards**

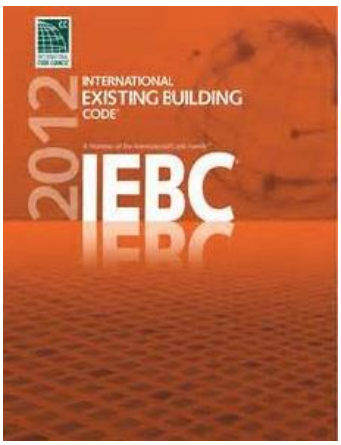
Appendix A-C
Chapters A1-A6 & C1-C2
Resource A

Compliance Methods

Three Options

- Prescriptive (Chapter 4) 2012
- Work Area (Chapters 5 - 13)
- Performance (Chapter 14)

Compliance Methods



Prescriptive

Prescriptive Method

Chapter 4

- General
- Additions
- Alterations
- Repairs
- Glass Replacement
- Fire Escapes
- Occupancy Change
- Historic Buildings
- Moved Structures
- Accessibility

[CSBC Section 3401 – 3409]

Prescriptive Method

General - *Materials & Systems*

- Existing
  - Continue in use unless unsafe
  - Replacement can be like materials

Prescriptive Method

Repairs

Defined. Restoration to good or sound condition – maintenance

- Substantial structural Damage
  - Evaluation
  - Extent of repairs
  - Flood hazard

Prescriptive Method

Alterations

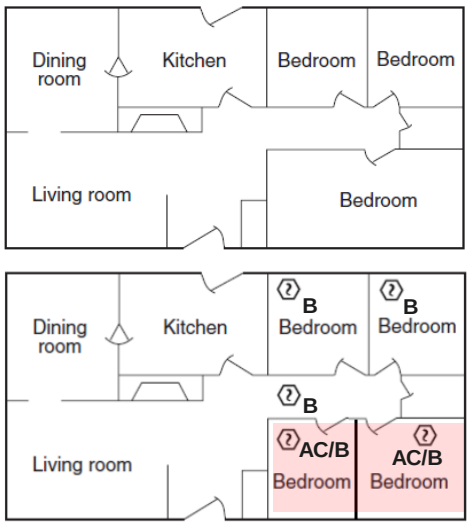
- New work = CSBC
  - Stair R/T exception
  - Handrail extension exception
- Flood hazard areas
- Structural concerns
- Smoke alarms
- CO alarms

Prescriptive Method

Alterations – *Smoke alarms*

- I-4 & E daycare facilities, I-1 or R if permit is required;
- ≥ 1 sleeping rooms are added or created in existing dwelling units,
- Smoke alarms
  - located per new
  - battery operated in existing spaces, unless....

Prescriptive Method



Prescriptive Method

Alterations – *Carbon monoxide*

- When an alteration is made to a building or structure of I-1, I-2, I-4, R, or E occupancy;
- CO alarms
  - per 915.7
  - throughout building

Prescriptive Method

Additions

- Meet CSBC
- No reduction in existing safety
- Existing & addition = H & A
- Flood hazard areas
- Structural concerns
- Smoke alarms
- CO alarms

Prescriptive Method

Change of Occupancy

- Meet CSBC
  - Stairway R/T exception
- Seismic risk category changes may trigger seismic upgrades

Prescriptive Method

Historic Buildings

Not mandatory

- Repairs
- Alterations
- Additions
- Change of occupancy

If judged not to constitute a distinct life safety hazard

Prescriptive Method

Accessibility

- Change of occupancy
- Additions
- Alterations
- Alterations – primary function area

Prescriptive Method

Accessibility - Additions

Addition only
Existing maybe

Prescriptive Method

Accessibility - Alterations

A *facility* that is altered shall comply w/ CH 11 CSBC, unless *technically infeasible*.

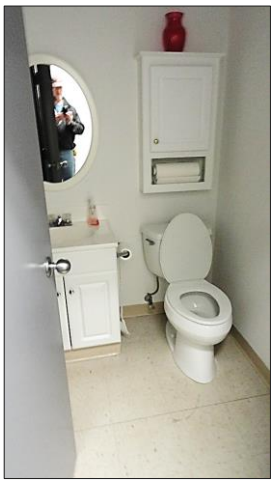
Prescriptive Method

Accessibility - Alterations

Facility - All or any portion of buildings, structures, site improvements, elements and pedestrian or vehicular routes located on a site.

Prescriptive Method

Within the definition of a *facility*



Prescriptive Method

Accessibility – Primary Function Areas

Includes:

- Area altered
- Toilet rooms
- Route thereto

Prescriptive Method

Primary Function - exceptions

- 20% rule
- N/A: windows, hardware, MEP
- N/A: accessibility improvements
- N/A: altered Type B units

N

Prescriptive Method

Accessibility – Change of occupancy

- Complete change
- Partial change

Type B dwelling units and/or sleeping rooms not required if work area ≤ 50% of building area 2012

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Prescriptive Method

Accessibility – Partial occupancy change

Alterations comply with:

- 410.6 Alterations
- 410.7 Alterations – primary function area
- 410.8 Scoping for alterations

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Prescriptive Method

Accessibility – Complete occupancy change

- Meet partial change, *and*
- ≥1 accessible entrance
- ≥1 accessible route to primary function areas
- Accessible parking, *if provided*
- Passenger loading zone, *if provided*
- ≥1 single occupancy toilet or bathing room

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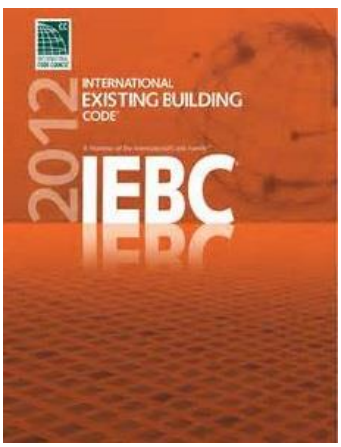
Compliance Methods



Performance

Applicable to:

- Additions
- Alterations
- Changes of occupancy

Not applicable to H & I

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Performance Method

[B] TABLE 1401.7
SUMMARY SHEET-BUILDING CODE

Existing occupancy _____	Proposed occupancy _____
Year building was constructed _____	Number of stories _____ Height in feet _____
Type of construction _____	Area per floor _____
Percentage of open perimeter increase _____ %	
Completely suppressed: Yes _____ No _____	Corridor wall rating _____
Compartmentation: Yes _____ No _____	Required door closers: Yes _____ No _____
Fire-resistance rating of vertical opening enclosures _____	
Type of HVAC system _____	, serving number of floors _____
Automatic fire detection: Yes _____ No _____	Type and location _____
Fire alarm system: Yes _____ No _____	Type _____
Smoke control: Yes _____ No _____	Type _____
Adequate exit routes: Yes _____ No _____	Dead ends: _____ Yes _____ No _____
Maximum exit access travel distance _____	Elevator controls: Yes _____ No _____
Means of egress emergency lighting: Yes _____ No _____	Mixed occupancies: Yes _____ No _____

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Performance Method

SAFETY PARAMETERS	FIRE SAFETY (FS)	MEANS OF EGRESS (ME)	GENERAL SAFETY (GS)
1401.6.1 Building Height 1401.6.2 Building Area 1401.6.3 Compartmentation			
1401.6.4 Tenant and Dwelling Unit Separations 1401.6.5 Corridor Walls 1401.6.6 Vertical Openings			
1401.6.7 HVAC Systems 1401.6.8 Automatic Fire Detection 1401.6.9 Fire Alarm System			
1401.6.10 Smoke control 1401.6.11 Means of Egress 1401.6.12 Dead ends	+ + + + + + + + + + + +		
1401.6.13 Maximum Exit Access Travel Distance 1401.6.14 Elevator Control 1401.6.15 Means of Egress Emergency Lighting	+ + + + + + + +		
1401.6.16 Mixed Occupancies 1401.6.17 Automatic Sprinklers 1401.6.18 Standpipes 1401.6.19 Incidental Use		+ + + + ÷2 =	
Building score—total value			

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Performance Method

[B] TABLE 1401.6.12
DEAD-END VALUES

OCCUPANCY	CATEGORIES[a]		
	a	b	c
A-1, A-3, A-4, B, F, M, R, S	-2	0	2
A-2, E	-2	0	2

a. For dead-end distances between categories, the dead-end value shall be obtained by linear interpolation.

Category a - Dead end of 35 feet in non-sprinklered buildings or 70 feet in sprinklered buildings.

Category b - Dead end of 20 feet; or 50 feet in Group B in accordance with Section 1018.4, Exception 2, of the *International Building Code*.

Category c - No dead ends; or ratio of length to width (*l*/*w*) is less than 2.5:1.

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Performance Method

Step 1

[B] TABLE 1401.6.6(1)
VERTICAL OPENING PROTECTION VALUE

PROTECTION	VALUE
None (unprotected opening)	-2 times number of floors connected
Less than 1 hour	-1 times number of floors connected
1 to less than 2 hours	1
2 hours or more	2

Step 2

[B] TABLE 1401.6.6(2)
CONSTRUCTION-TYPE FACTOR

FACTOR	TYPE OF CONSTRUCTION								
	IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
	1.2	1.5	2.2	3.5	2.5	3.5	2.3	3.3	7

VO = PV x CF

Step 3

VO = Vertical opening value
PV = Protection value Table 1401.6.6(1)
CF = Construction type factor Table 1401.6.6(2)

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Compliance Methods

Scenario:

1920 private residence to be converted into law offices.

VO = PV x CF

PV = -1 x 2 stories [Table 1401.6.6(1)]
CF = 7 [Table 1401.6.6(2)]

VO = -2 x 7 or -14

Performance Method

[B] TABLE 1401.8
MANDATORY SAFETY SCORES[a]

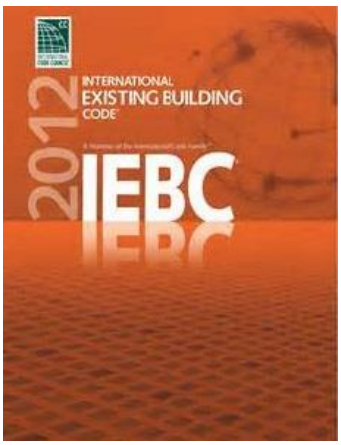
OCCUPANCY	FIRE SAFETY (MFS)	MEANS OF EGRESS (MME)	GENERAL SAFETY (MGS)
A-1	20	31	31
A-2	21	32	32
A-3	22	33	33
A-4, E	29	40	40
B	30	40	40
F	24	34	34
M	23	40	40
R	21	38	38
S-1	19	29	29
S-2	29	39	39

[B] TABLE 1401.9
EVALUATION FORMULAS[a]

FORMULA	T1401.7	T1401.8		SCORE	PASS	FAIL
FS – MFS ≥ 0	_____ (FS) –	_____ (MFS)	=	_____	_____	_____
ME – MME ≥ 0	_____ (ME) –	_____ (MME)	=	_____	_____	_____
GS – MGS ≥ 0	_____ (GS –	_____ (MGS)	=	_____	_____	_____

a. FS = Fire Safety
ME = Means of Egress
GS = General Safety
MFS = Mandatory Fire Safety
MME = Mandatory Means of Egress
MGS = Mandatory Means of Safety

Compliance Methods



Work Area

Work Area Method

Chapter 5

- Repairs (CH-6)
- Alteration – Level 1 (CH-7)
- Alteration – Level 2 (CH-8)
- Alteration – Level 3 (CH-9)
- Change of Occupancy (CH-10)
- Additions (CH-11)
- Historic Buildings (CH-12)
- Relocated/Moved Buildings (CH-13)

Work Areas

Definition

That portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents.

Excludes other portions of the building where incidental work must be performed and where work was not initially intended.

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Repairs

Scope

Patching or restoration or replacement of damaged materials, elements, equipment or fixtures for the purpose of maintaining such components in good or sound condition with respect to existing loads or performance requirements.

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Level 1 Alteration

Scope

Removal, replacement or the covering of existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that serve the same purpose

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Level 2 Alteration

Scope

Reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

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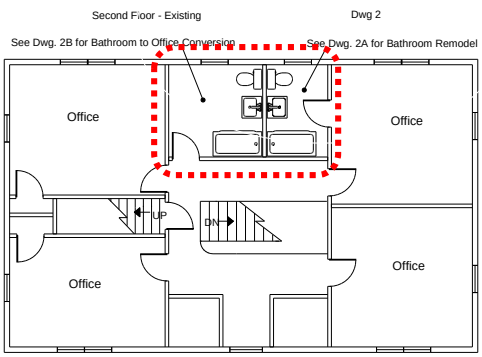
Level 3 Alteration

Scope

Applies where the work area exceeds 50 percent of the aggregate area of the building.

Percentage Calculations



Level 2 Alteration Area/Percentage Calculation			
	Total Floor Area	Total Area Undergoing Alteration	Percentage Undergoing Alteration
Attic	1,120	1120	100%
2nd Floor	1,120	244	22%
1st Floor	1,430	0	0%
Total	3,670	1,364	37.2%

Repairs

Chapter 6

- General
- Building Elements & Materials
- Fire Protection
- Means of Egress
- Accessibility
- Structural
- Electrical
- Mechanical
- Plumbing

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Alterations

Chapter Organization

- General
- Special Use & Occupancy
- Building Elements & Materials
- Fire Protection
- Means of Egress
- Accessibility
- Structural
- Electrical
- Mechanical
- Plumbing
- Energy

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Alterations – Specific Issues

Means of Egress

- Level 1

  Applies to the item touched

Alterations – Specific Issues

Means of Egress

- Level 2

  Applies through out the story containing the work area if work involves a corridor or stair shared by more than one tenant

Alterations – Specific Issues

Means of Egress

- Level 2
  - Number of exits
  - Occupant load
  - Travel distance & dead-ends
  - Door swing
  - Corridors
  - Lighting & signs
  - Handrails & guards

Alterations – Specific Issues

Means of Egress

- Level 3

  Adds lighting and exit signs from the story containing the work area down to grade.

Alterations – Specific Issues

Building Elements & Materials

- Level 1

  Newly installed interior finish = CSBC

  Proposed new work = CSBC

Alterations – Specific Issues

Building Elements & Materials

- Level 2

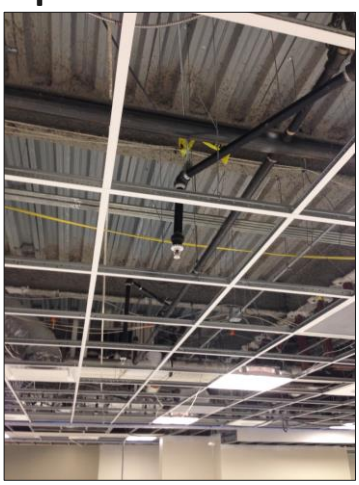
Alterations – Specific Issues

Building Elements & Materials

- Level 3
  - Encloses floor openings from work area to grade
  - Vertical continuity of tenant separation walls

Alterations – Specific Issues

Sprinklers – Level 1



...done in a manner that maintains the level of fire protection.

Alterations – Specific Issues

Sprinklers – Level 2

Throughout the work area in Groups A, E, F-1, H, I, M, R-1, R-2, R-4 & S if work includes exit or corridor shared by > 1 tenant or OL > 30, if

- CBSC requires in new
- Work area > 50% of floor area
- Sufficient municipal water supply w/o fire pump, then SD

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Alterations – Specific Issues

Sprinklers – Level 2

Apply throughout the work area w/ Level 2 Alteration in high-rise if work includes exit or corridor shared by > 1 tenant or OL > 30

- Apply throughout floor if work > 50% floor area
- But only if there is sufficient water from existing standpipe or sprinkler riser

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Alterations – Specific Issues

Sprinklers – Level 3

- Apply throughout the work area in HR if there is sufficient water from existing standpipe or sprinkler riser

Alterations – Specific Issues

Accessibility

- Level 1

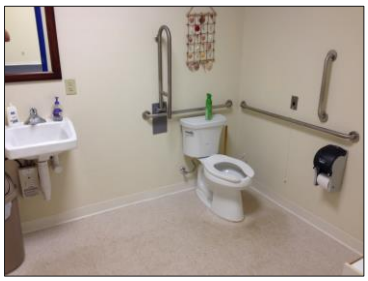
  Applies to the item touched

Alterations – Specific Issues

Accessibility

- Level 2

  Reconfiguration = more requirements



Alterations – Specific Issues

Accessibility

- Level 2
  - Addition of a stair triggers an accessible route between stories
  - Added dwelling units - accessible
  - Visual alarms for the units added
  - Smoke & CO alarms

Alterations – Specific Issues

Accessibility

- Level 3
  - Comply with Level 1 and 2
  - Added dwelling units - accessible 2012
  - Visual alarms for the units added 2012

Change of Occupancy

Defined

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 to:
  - Change of occupancy classification
  - Change of occupancy group
  - No change of classification or group

Change of Occupancy

Application

- Change in occupancy classification
  - 1002 – 1012
- Change of occupancy group
  - 1002 – 1012
- No change of classification or group
  - CSBC

Change of Occupancy

Application

- Partial change w/o separation
- Partial change w/ separation
- Level 3

Change of Occupancy

Chapter 10 Matrix

IEBC CH 10 Base Requirements		Directed Requirements	
1002	Special Use & Occupancy		CSBC
1003	Building Materials & Elements	1012	
1004	Fire Protection	1012	
1005	Means of Egress	1012	
1006	Accessibility	1012.8	
1007	Structural		CSBC
1008	Electrical		NFPA 70
1009	Mechanical		IMC
1010	Plumbing		IPC
1011	Light & Ventilation		CSBC

Change of Occupancy

Change of Occupancy Classification based on Hazard Category

- Hazard Category Tables
  - Means of Egress
  - Height and Area
  - Exterior Wall Exposure
- Apply 1012. 4 – 1012.7

Change of Occupancy

TABLE 1012.4 MEANS OF EGRESS HAZARD CATEGORIES	
Relative Hazard	**Occupancy Classification**
1 (Highest Hazard)	H
2	I-2, I-3, I-4
3	A, E, I-1, M, R-1, R-2, R-4
4	B, F-1, R-3, S-1
5 (Lowest Hazard)	F-2, S-2, U

Life Safety & Exits

- Change to higher hazard (lower number)
  - Egress shall meet CH 10 CSBC
    - 7 minor exceptions
- Change to equal or lower hazard (higher number)
  - Existing egress meet Level 3
  - New egress meet CH 10 CSBC

Change of Occupancy

TABLE 1012.5 HEIGHTS AND AREAS HAZARD CATEGORIES	
Relative Hazard	**Occupancy Classification**
1 (Highest Hazard)	H
2	A-1, A-2, A-3, A-4, I, R-1, R-2, R-4
3	E, F-1, S-1, M
4 (Lowest Hazard)	B, F-2, S-2, A-5, R-3, U

Heights & Areas

- Change to higher hazard (lower number)
  - H & A shall meet CH 5 CSBC
- Change to equal or lower hazard (higher number)
  - H & A deemed acceptable

Change of Occupancy

TABLE 1012.6 EXPOSURE OF EXTERIOR WALLS HAZARD CATEGORIES	
Relative Hazard	**Occupancy Classification**
1 (Highest Hazard)	H
2	F-1, M, S-1
3	A, B, E, I, R
4 (Lowest Hazard)	F-2, S-2, U

Exterior Walls

- Change to higher hazard (lower number)
  - Meet CSBC
- Change to equal or lower hazard (higher number)
  - Walls & openings deemed acceptable

Additions

Chapter 11

- Extended nonconformity
- Height & area[1]
- Increased fire area
- Structural
- Smoke alarms
- CO alarms

[1] *Infilled floor openings not counted*

Historic Buildings

Chapter 12

- Evaluation report
- Special occupancy exceptions
- Repairs
- Fire safety
- Alterations
- Change of occupancy
- Structural

Moved Buildings

Chapter 13

- Location on lot
- Foundation
- Wind, snow, seismic loads
- Flood hazard areas

Case Study

Chapter 14 Performance Methodology

Case Study - Building Score

SAFETY PARAMETERS	FIRE SAFETY (FS)	MEANS OF EGRESS (ME)	GENERAL SAFETY (GS)
3410.6.1 Building Height 3410.6.2 Building Area 3410.6.3 Compartmentation			
3410.6.4 Tenant and Dwelling Unit Separations 3410.6.5 Corridor Walls 3410.6.6 Vertical Openings			
3410.6.7 HVAC Systems 3410.6.8 Automatic Fire Detection 3410.6.9 Fire Alarm System			
3410.6.10 Smoke control 3410.6.11 Means of Egress 3410.6.12 Dead ends	**** **** ****		
3410.6.13 Maximum Exit Access Travel Distance 3410.6.14 Elevator Control 3410.6.15 Means of Egress Emergency Lighting	**** ****		
3410.6.16 Mixed Occupancies 3410.6.17 Automatic Sprinklers 3410.6.18 Incidental Use		**** +2=	
Building score — total value			

**** *No applicable value to be inserted.

Case Study - Building Height

$$\text{Height value in feet} = \frac{(AH) - (EBH)}{12.5} \times CF$$

$$\text{Height value in stories} = (AS) - (EBS) \times CF$$

Where:

AH = Allowable height in feet (Table 503)

EBH = Existing building height in feet

AS = Allowable height in stories (Table 503)

EBS = Existing building height in stories

CF = 1 if (*AH*) – (*EBH*) is positive

CF = Type of construction factor shown in Table 1401.6.6(2) if (*AH*) – (*EBH*) is negative.

Case Study - Building Height

Height value in **feet** = $\frac{(40) - (26)}{12.5} \times 1$

Height value in **feet** = 1.12

Height value in **stories** = (2) – (3) x 1

Height Value in **stories** = -1

Case Study - Formulas

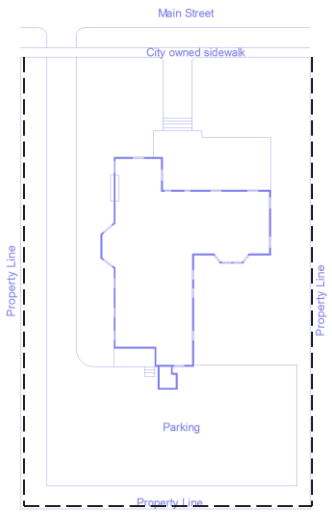
$$A_a = [A_t + (A_t \times I_f) + (A_t \times L_s)]$$

Table 503 — Frontage increase — Sprinkler increase

$$I_f = \left[\frac{F}{P} - 0.25\right] \frac{W}{30}$$

Where:
F = Bldg perimeter with 20' minimum open area
P = Total building perimeter
W= Weighted average of perimeter having a 20' min open area

Case Study - Frontage Increase



Case Study - Frontage Increase

$$I_f = \left[\frac{220}{220 - 0.25}\right]\frac{30}{30}$$

$$I_f = 0.75$$

$$A_a = [A_t + (A_t \times I_f) + (A_t \times L_s)]$$
$$A_a = [9000 + (9000 \times 0.75) + (9000 \times 0)]$$
$$A_a = 24{,}750 \text{ SF}$$

Case Study - Building Area Value

$$\text{Area value } i = \frac{24750}{1200}\left[1 - \left[\frac{1450}{24750}\right]\right]$$

Area value = 19.4

Caution!! Maximum value of 15 due to a limit of ½ the Mandatory Fire Safety Value which is 30

Case Study - Compartmentation

Compartmentation Values

Occupancy	Categories				
	a ≥ 15,000 sq. ft.	b 10,000 sq. ft.	c 7,500 sq. ft.	d 5,000 sq. ft.	e ≤ 2,500 sq. ft.
A-1, A-3	0	6	10	14	18
A-2	0	4	10	14	18
A-4, B, E, S-2	0	5	10	15	20
F, M, R, S-1	0	4	10	16	22

1,450 sq ft per floor
x 4 floors

5,800 sq ft total

7500……..10
7000……..11
6500……..12
6000……..13 ← **13.5**
5500……..14
5000……..15

Case Study - Tenant Separations

Separation Values

Occupancy	Categories				
	a	b	c	d	e
A-1	0	0	0	0	1
A-2	-5	-3	0	1	3
R	-4	-2	0	2	4
A-3, A-4,B, E, F, M, S-1	-4	-3	0	2	4
S-2	-5	-2	0	2	4

a. No partitions or incomplete partitions

b. Fire partitions < 1-hr

c. … or with only one tenant within the fire area

d. Fire barriers ≥ 1-hr < 2-hr

e. Fire barriers ≥ 2-hr

Case Study - Corridor Walls

Corridor Wall Values

Occupancy	Categories			
	a	b	c[a]	d[a]
A-1	-10	-4	0	2
A-2	-30	-12	0	2
A-3, F, M, R, S-1	-7	-3	0	2
A-4, B, E, S-2	-5	-2	0	5

Note a: Corridors not providing at least ½ the travel distance for all occupants on a floor shall use Category b.

a. No partitions or incomplete partitions

b. Fire partitions < 1-hr

c. … or without corridors permitted by 1016

d. Fire barriers > 2-hr

Case Study - Vertical Opening Value

$$VO = PV \times CF$$

Table (1) Protection Value

Protection	Value
None (Unprotected opening)	-2 multiplied by number of floors connected
Less than 1-hour	-1 multiplied by number of floors connected
1 to less than 2-hour	1
2-hours or more	2

Table (2) Construction Factor

	Type of Construction									
	1A	1B	2A	2B	2C	3A	3B	4	5A	5B
Factor	1	1.2	1.5	2.2	3.5	2.5	3.5	2.3	3.3	7

-14 = -2 x 7

Case Study - HVAC Systems

a. Plenums not meeting IMC 602: -10 points

b. Air movement in egress elements: -5 points

c. Both categories above: -15 points

d. Compliant HVAC: 0 points

e. **1 story system or central boiler: 5 points**

5 points

Case Study - Fire Detection

Automatic Fire Detection Values

Occupancy	Categories				
	a	b	c	d	e
A-1, A-3, F, M, R, S-1	-10	-5	0	2	6
A-2	-25	-5	0	5	9
A-4, B, E, S-2	-4	-2	0	4	8

a. **None**
b. Existing SD in HVAC
c. New SD in HVAC per IMC
d. Common space detection
e. SD throughout

Case Study - Fire Alarm

Fire Alarm System Values

Occupancy	Categories			
	a	b[a]	c	d
A-1,A-2, A-3, A-4, B, E, R	-10	-5	0	5
M, F, S	0	5	10	15

Note a: For buildings equipped throughout with an automatic sprinkler system, add 2 points for activation by a sprinkler water flow device.

a. **None**
b. Manual fire alarm
c. Manual fire alarm & FD notification
d. FA w/ voice & command center

Case Study - Smoke Control

Smoke Control Values

Occupancy	Categories					
	a	b	c	d	e	F
A-1, A-2, A-3	0	1	2	3	6	6
A-4, E	0	0	0	1	3	5
B, M, R	0	2[a]	3[a]	3[a]	3[a]	4[a]
F, S	0	2[a]	2[a]	3[a]	3[a]	3[a]

a. **None**
b. AS & exterior windows
c. Enclosed exit w/exterior windows
d. Smokeproof enclosures
e. AS & mechanical smoke control
f. All stairs have windows or SP enclosures

Case Study - Means of Egress

Means of Egress Values

Occupancy	Categories				
	a[a]	b	c	d	e
A-1, A-2, A-3, A-4, E	-10	0	2	8	10
M	-3	0	1	2	4
B, F, S	-1	0	0	0	0
R	-3	0	0	0	0

a. Min. number & a fire escape
b. Min. number & compliant capacity
c. Min. number & 125% capacity
d. > min. number
e. Meets both c and d above

Case Study - Dead-end

Dead-end Values

Occupancy	Categories		
	a	b	c
A-1, A-3, A-4, B, E, F, M, R, S	-2	0	2
A-2, E	-2	0	2

a. 35’ w/AS 70’ w/o AS

b. 20’; or 50’ in B w/AS

c. **None or L:W < 2.5:1**

Case Study - Maximum Travel Distance

$$\text{Points} = 20 \times \frac{\text{Max Allowable TD} - \text{Max Actual TD}}{\text{Max Allowable TD}}$$

$$\mathbf{9} = 20 \times \frac{200\text{-}110}{200}$$

Case Study - Elevator

Elevator Control Values

Elevator Travel	Categories a	b	c	d
Less than 25 feet of travel above or below the primary level of elevator access for emergency fire-fighting or rescue personnel	-2	0	0	2
Travel of 25 feet or more above or below the primary level of elevator access for emergency fire-fighting or rescue personnel	-4	NP	0	4

a. **No elevator**
b. Elevator w/o Phase I or II
c. All elevators w/Phase I & II
d. New elevators serve all floors

2012 International Existing Building Code

Case Study - Emergency Lights

Egress Emergency Lighting Values

No. of Exits Required by Section 1010.0	Categories a	b	c
Two or more exits	NP	0	4
Minimum of One	0	1	1

a. **EL and exit signs not provided w/EP**
b. EL and exit signs provided w/EP
c. Generator

2012 International Existing Building Code

Case Study - Mixed Occupancy

Mixed Use Group Values[a]

Occupancy	Categories		
	a	b	c
A-1, A-2, R	-10	0	10
A-3, A-4, B, E, F, M, s	-5	0	5

a. Min. 1-hr separation

b. Separated occupancy requirements

c. 2 x Separated occupancy requirements

No mixed occupancies – Value = 0

2012 International Existing Building Code

Case Study - Sprinklers

Sprinkler System Values

Occupancy	Categories					
	a	b	c	d	e	f
A-1, A-3, F, M, R, S-1	-6	-3	0	2	4	6
A-2	-4	-2	0	1	2	4
A-4, B, E, S-2	-12	-6	0	3	6	12

a. Required throughout & not provided or wrong

b. Required partially & not provided or wrong

c. Not required – Not provided

d. Required partially and provided partially

e. Required throughout and provided throughout

f. Not required and provided

2012 International Existing Building Code

Case Study - Incidental Use Areas

[B] TABLE 1401.6.19
INCIDENTAL USE AREA VALUES[a]

PROTECTION REQUIRED BY TABLE 508.2.5 OF THE *INTERNATIONAL BUILDING CODE*	PROTECTION PROVIDED						
	None	1 hour	AS	AS with SP	1 hour and AS	2 hours	2 hours and AS
2 hours and AS	-4	-3	-2	-2	-1	-2	0
2 hours, or 1 hour and AS	-3	-2	-1	-1	0	0	0
1 hour and AS	-3	-2	-1	-1	0	-1	0
1 hour	-1	0	-1	-1	0	0	0
1 hour, or AS with SP	-1	0	-1	-1	0	0	0
AS with SP	-1	-1	-1	-1	0	-1	0
1 hour or AS	-1	0	0	0	0	0	0

a. AS = Automatic sprinkler system; SP = Smoke partitions (See IBC Section 508.2.2).
Note: For Table 1401.7, see page 14-35.

If none, use 0

Case Study - Building Score

Safety Parameters	Fire safety (FS)	Means of egress (ME)	General safety (GS)
1401.6.1 Building height	-1	-1	-1
1401.6.2 Building area	15	15	15
1401.6.3 Compartmentation	13.5	13.5	13.5
1401.6.4 Tenant & dwelling unit separations	0	0	0
1401.6.5 Corridor walls	0	0	0
1401.6.6 Vertical openings	-14	-14	-14
1401.6.7 HVAC systems	5	5	5
1401.6.8 Automatic fire detection	-4	-4	-4
1401.6.9 Fire alarm system	-10	-10	-10
1401.6.10 Smoke control	****	0	0
1401.6.11 Means of egress	****	0	0
1401.6.12 Dead ends	****	2	2
1401.6.13 Max. travel distance	****	9	9
1401.6.14 Elevator control	-2	-2	-2
1401.6.15 Means of egress emergency lighting	****	0	0
1401.6.16 Mixed use groups	0	****	0
1401.6.17 Sprinklers	0	0 ÷ 2 = 0	0
1401.6.18 Incidental occupancy area protection	0	0	0
Building score – total value	**2**	**13.5**	**13.5**

Case Study - Mandatory Values

Table 1401.8
MANDATORY SAFETY SCORES[a]

Use Group	Fire Safety (MFS)	Means of Egress (MME)	General Safety (MGS)
A-1	20	31	31
A-2	21	32	32
A-3	22	33	33
A-4, E	29	40	40
B	30	40	40
F	24	34	34
M	23	40	40
R	21	38	38
S-1	19	29	29
S-2	29	39	39

Case Study - Performance Evaluation

Table 1401.9
EVALUATION FORMULAS[a]

Formula	Table 3408.7		Table 3408.8		Score	Pass	Fail
FS - MFS ≥ 0	2	(FS) -	30	(MFS) =	**-28**		**X**
ME - MME ≥ 0	13.5	(ME) -	40	(MME) =	**-26.5**		**X**
GS - MGS ≥ 0	13.5	(GS) -	40	(MGS) =	**-26.5**		**X**

Case Study

Chapter 10 Change of Occupancy

Case Study - Change of Occupancy

TABLE 1012.4
MEANS OF EGRESS HAZARD CATEGORIES

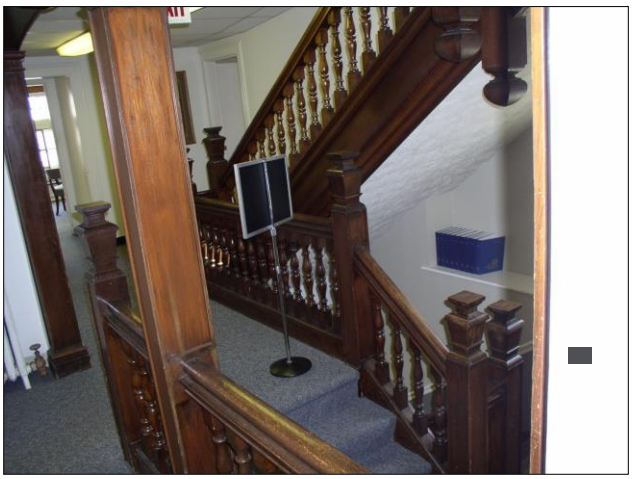
Relative Hazard	Occupancy Classification
1 (Highest Hazard)	H
2	I-2, I-3, I-4
3	**A**, **E**, I-1, M, R-1, R-2, R-4
4	**B**, F-1, R-3, S-1
5 (Lowest Hazard)	F-2, S-2, U

Case Study - Life Safety & Exits

Change to equal or lower hazard (higher number)

- Existing egress meet Level 3
  - Capacity
  - Handrails & Guards
- New egress meet CH 10 CSBC
  - Stairway R/T exception

Case Study - Life Safety & Exits



CFSC Part IV 39.2.4.7

Case Study - Change of Occupancy

TABLE 1012.5 HEIGHTS AND AREAS HAZARD CATEGORIES	
Relative Hazard	**Occupancy Classification**
1 (Highest Hazard)	H
2	A-1, A-2, A-3, A-4, I, R-1, R-2, R-4
3	E, F-1, S-1, M
4 (Lowest Hazard)	**B**, F-2, S-2, A-5, **R-3**, U

Case Study - Heights & Areas

Change to equal or lower hazard (higher number)

- H & A deemed acceptable

CSBC Table 503
B-Occupancy; Type VB Construction
9,000 SF/ 2-Story/40-feet

Case Study - Change of Occupancy

TABLE 1012.6 EXPOSURE OF EXTERIOR WALLS HAZARD CATEGORIES	
Relative Hazard	**Occupancy Classification**
1 (Highest Hazard)	H
2	F-1, M, S-1
3	A, **B**, E, I, **R**
4 (Lowest Hazard)	F-2, S-2, U

Case Study - Exterior Walls

Change to equal or lower hazard (higher number)

- Walls & openings deemed acceptable

Case Study – Exterior Walls

Case Study – Change of Occupancy

Additional Requirements

- Fire protection
- Interior finishes
- Vertical openings – non-egress
- Incidental uses area
- Accessibility
- MEP
- Structural

Questions or Comments

Thank You & Goodbye