

**OEDM In-service – Means of Egress
Presented January 2012**

Means of Egress



Presented by

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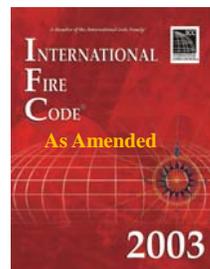
Seminar Overview

This class will examine the fundamental requirements of the Building & Fire Safety Codes governing means of egress from new and existing buildings; common misapplications; and significant changes in newer IBC and NFPA codes

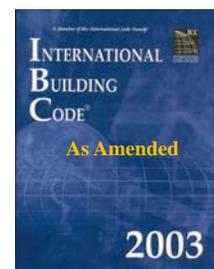
Agenda

- Application
- Fundamentals
- Occupant Loads
- Numbers of & Arrangement
- Common Mistakes
- New Stuff

New Construction and Alterations in Existing Buildings (non CFSC abatement)

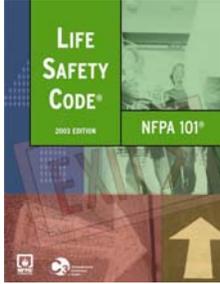


and



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**Part IV – Existing Buildings/
Occupancies**



As Amended

Part IV – Existing Buildings...

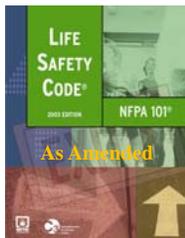
29-292-18e – Application

- Occupancies or uses existing prior to 12/31/05

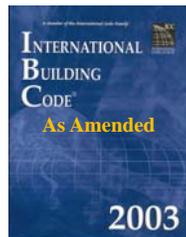
29-292-10e (b) (4)

- Corrective work under abatement orders other than MEP & FP

CFSC – Abatement Work

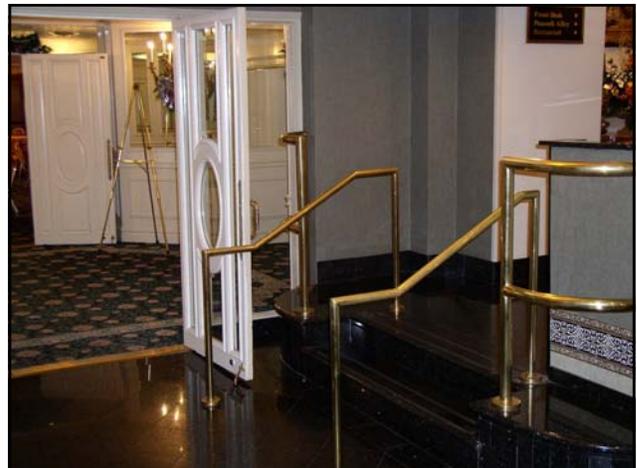


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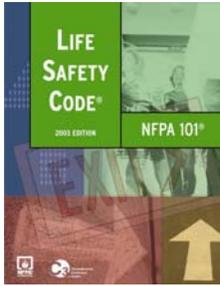
Work to correct cited violations
29-292-10e(4)

Fire Protection
MEP
Structural
105.1.3



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**Part IV – Existing Buildings/
Occupancies**



As Amended

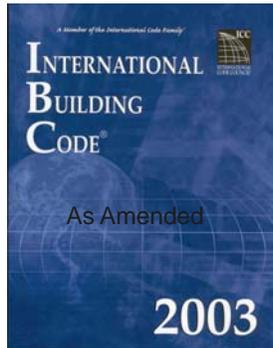
Part IV – Existing Buildings...

Organization

Ch-1 thru 11: Fundamental Chapters

Ch-13 – 42: Existing Occupancies

Annex A: Explanatory Material



**12/31/05: 2005 CT Supplement
08/01/09: 2009 CT Amendment**

As Amended

2003

New Construction

CH – 10 Means of Egress

1002 – Definitions	1014 – Exit & exit access doorways
1003 – General	1015 – Travel distance
1004 – Occupant load	1016 – Corridors
1005 – Egress width	1017 – Exits
1006 – Illumination	1018 – Exits & continuity
1007 – Accessible M of E	1019 – Vertical exit enclosures
1008 – Doors, gates, turnstiles	1020 – Exit passageways
1009 – Stairs & handrails	1021 – Horizontal exits
1010 – Ramps	1022 – Exterior exit ramps & stairways
1011 – Exit signs	1023 – Exit discharge
1012 – Guards	1024 – Assembly uses
1013 – Exit access	1025 – Emergency

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Existing Buildings

No proposed work

- Chapter 34 – Maintenance
- Section 115 – Unsafe structures/equipment
- Section 116 – Emergency measures
- Section 117 – Vacant buildings
- Connecticut Fire Safety Code

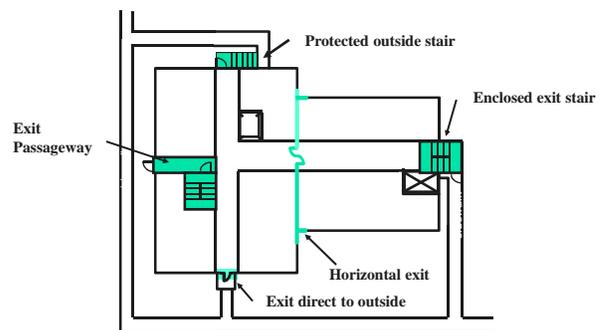
Egress Fundamentals

Definitions

- **Means of egress: A continuous and unobstructed way of travel from any point in a building to a public way**

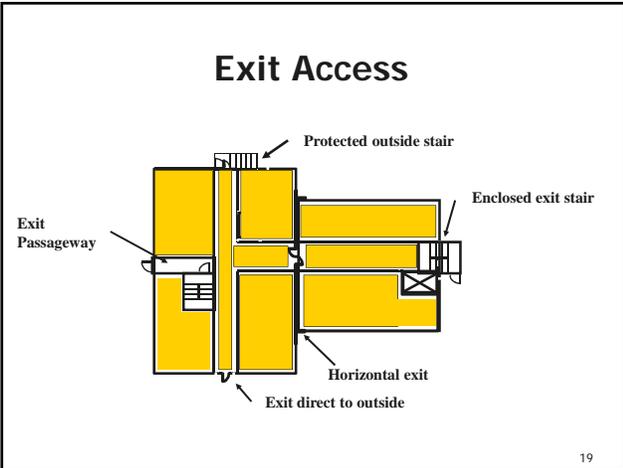
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Exits

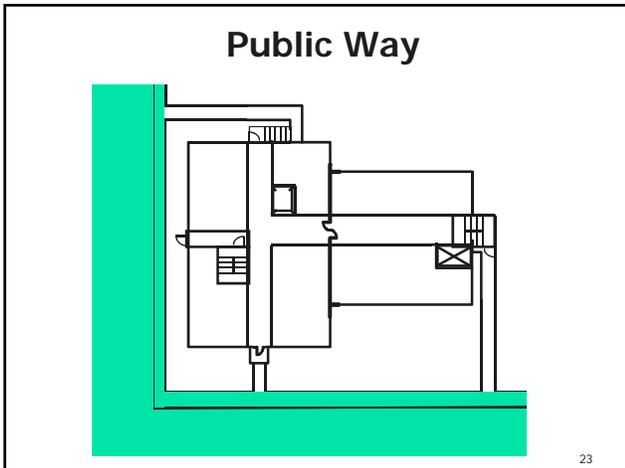
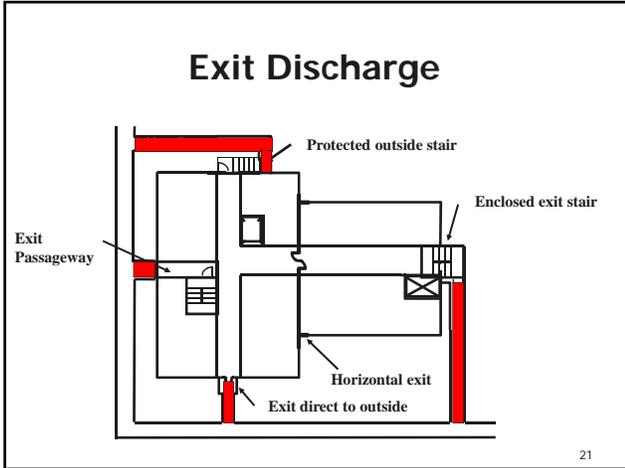


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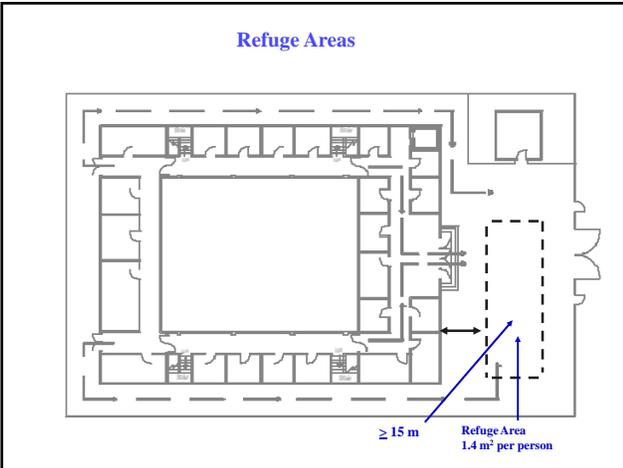
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Occupant Loads
&
Egress Capacity

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Capacity cont'd

Capacity determination based on:

- Occupant load served
- Individual component width
- Individual component capacity
- System capacity

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Capacity cont'd

Capacity determined in 5 steps

1. Determine occupant load
2. Determine component clear width
3. Determine component capacity
4. Determine capacity of each route
5. Determine total capacity \geq OL

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Occupant Load

Step 1: Determine Occupant Load

$$\text{Occupant Load} = \frac{\text{Floor Area}}{\text{Occupant Load Factor}}$$

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Occupant Load cont'd

Occupant Loads

- Based on maximum occupant load anticipated but not less than calculated number
 - *Gross floor area*: Total w/in exterior walls
 - *Net floor area*: Actual occupied area

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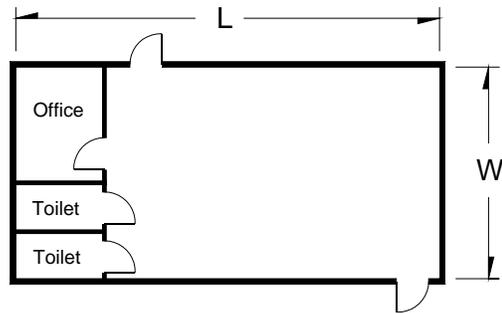
Occupant Load Factors

Table 1004.1.2 Max Floor Area Allowance Per Occupant	
Occupancy	Floor Area in Sq. Ft. per Occupant
Assembly without fixed seats	
Concentrated (chairs only)	7 net
Standing space	3 net
Unconcentrated (tables & chairs)	15 net
Business	100 gross
Mercantile	
Areas on other floors	60 gross
Basement and grade floor areas	30 gross
Storage, stock, shipping areas	300 gross

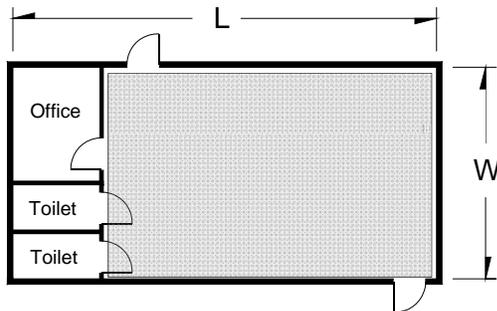
Similar to CFSC Part IV Table 7.3.12

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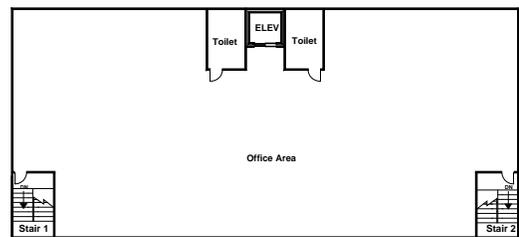
Gross and Net Floor Area



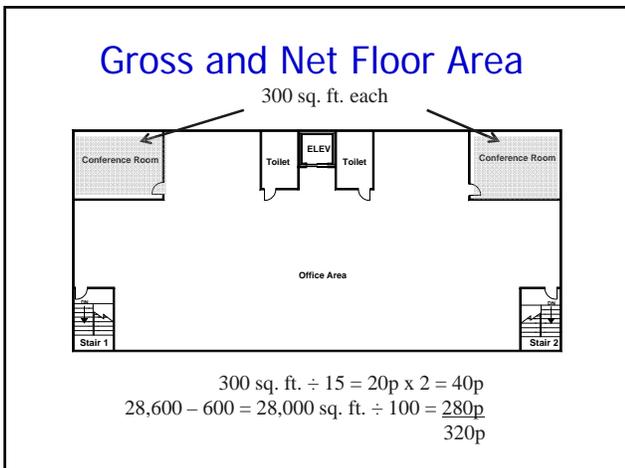
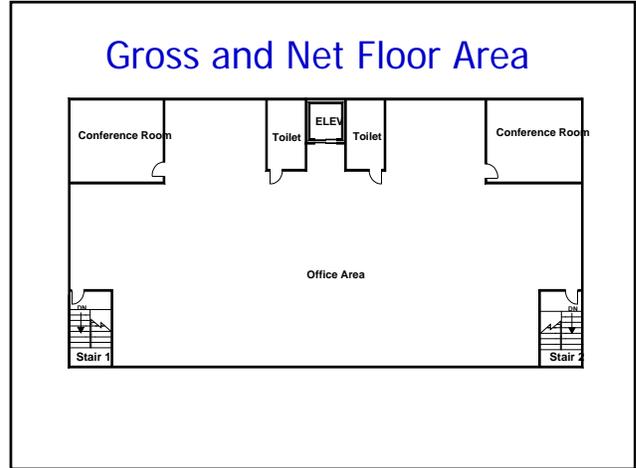
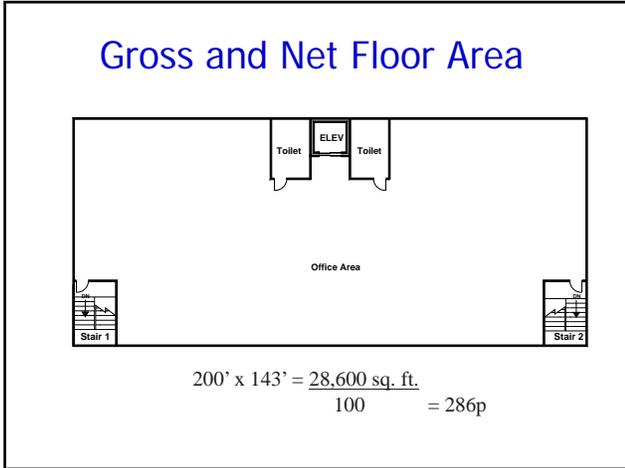
Gross and Net Floor Area



Gross and Net Floor Area



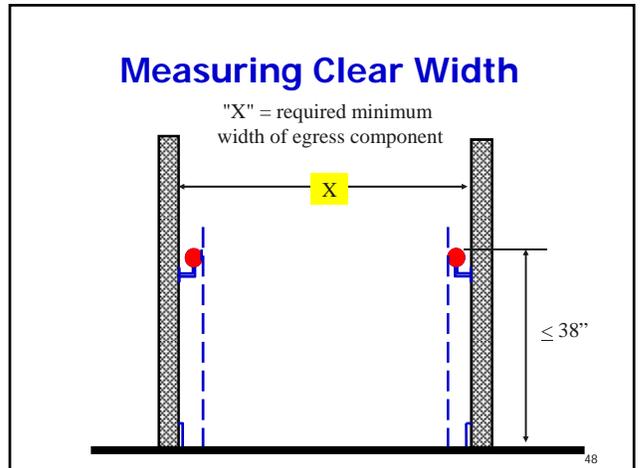
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- ### Occupant Load Increases
- Occupant load may be increased from calculated occupant load if all requirements of the Code are met
 - Occupant load of each story considered individually

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Capacity cont'd

**Step 3: Determine egress capacity
of each component**

$$\text{Capacity} = \frac{\text{Clear width}}{\text{Capacity factor (in./person)}}$$

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Capacity cont'd

OCCUPANCY	WITHOUT SPRINKLER SYSTEM		WITH SPRINKLER SYSTEM*	
	Stairways (inches per occupant)	Other egress components (inches per occupant)	Stairways (inches per occupant)	Other egress components (inches per occupant)
Occupancies other than those listed below	0.3	0.2	0.3	0.2
R-4	NA	NA	0.4	0.2
I-2, R-1*, R-2, R-3	NA	NA	0.3	0.2
Group II	NA	NA	0.7	0.4

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Capacity cont'd

Capacity Factors	Stairs	Level
Board & Care	0.4	0.2
Health Care w/AS	0.3	0.2
Health Care w/o AS	0.6	0.5
High Hazard	0.7	0.4
All other	0.3	0.2

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Exercise

What is egress capacity of:

Door 34" clear in office?

$$34'' \div 0.2''/\text{person} = 170 \text{ persons}$$

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Exercise cont'd

Corridor 48 in. clear in office?

$$48'' \div 0.2'' / \text{person} = 240 \text{ persons}$$

Stair 44 in. clear in office?

$$44'' \div 0.3'' / \text{person} = 147 \text{ persons}$$

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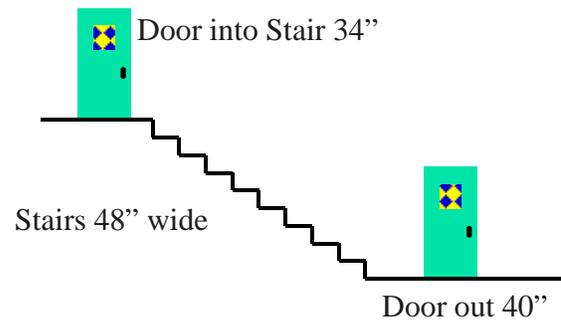
Capacity cont'd

Step 4: Determine Egress Capacity of Each Egress Route

The most restrictive capacity of a component determines capacity of system

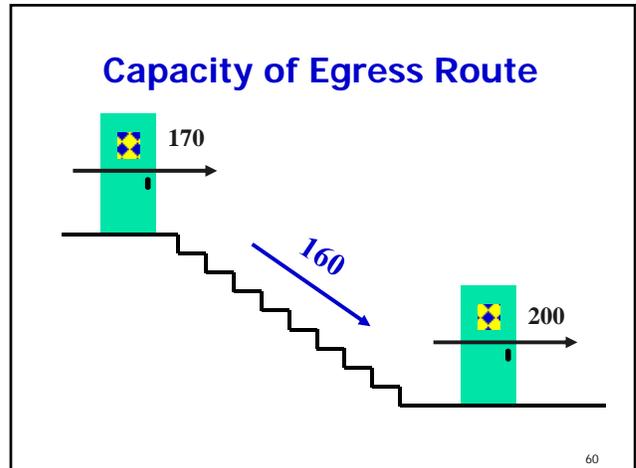
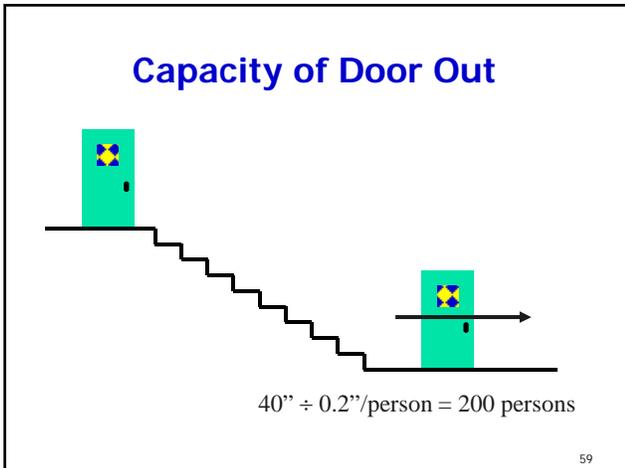
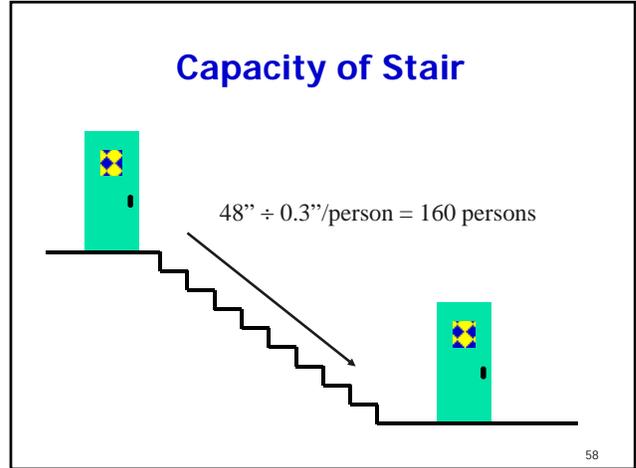
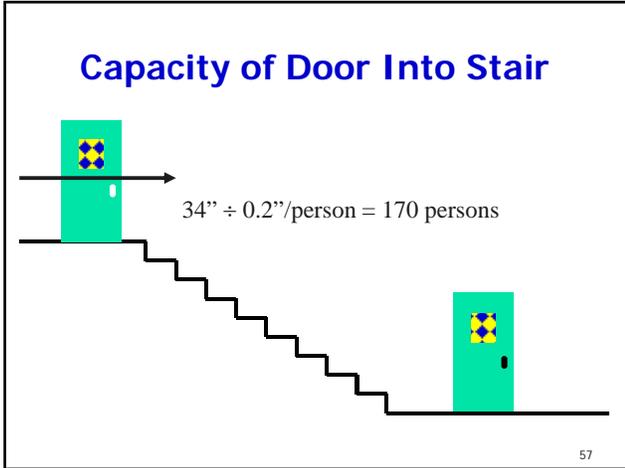
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Exercise



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Capacity cont'd

**Step 5: Determine that available
Egress Capacity \geq Calculated
Occupant Load**

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Exercise

Assembly building on sloping lot w/:

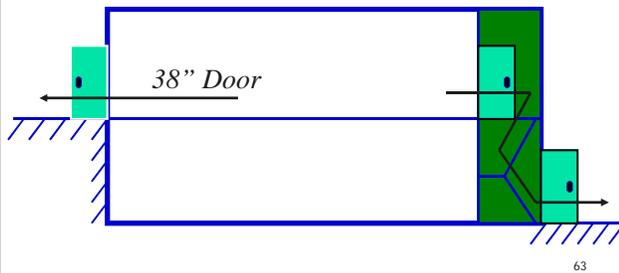
1 door directly to grade 38" clear, &
Stair same as noted in Step 4

What is total exit capacity?

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Exercise

Same stair as
previous exercise



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Exercise cont'd

- Door capacity = $38'' \div 0.2 = 190$ persons
- Stair = 160 persons
- Total exit capacity = $190 + 160 = 350$

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Exercise cont'd

- Area of upper floor is 40,000 sq.ft. used for offices. Is the exit capacity adequate?

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Exercise cont'd

- 40,000 sq.ft. ÷
100 sq.ft./person = 400 persons
- Exit capacity was 350
- Need additional exit capacity

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Balanced Egress



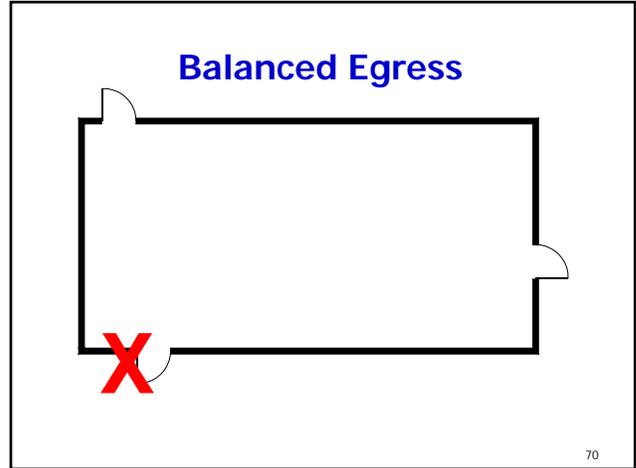
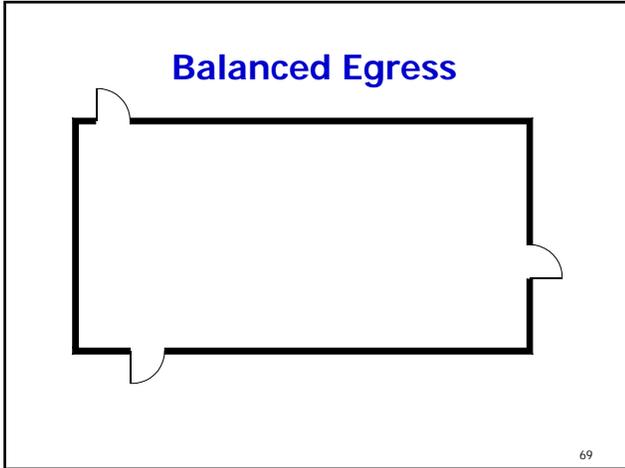
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Balanced Egress



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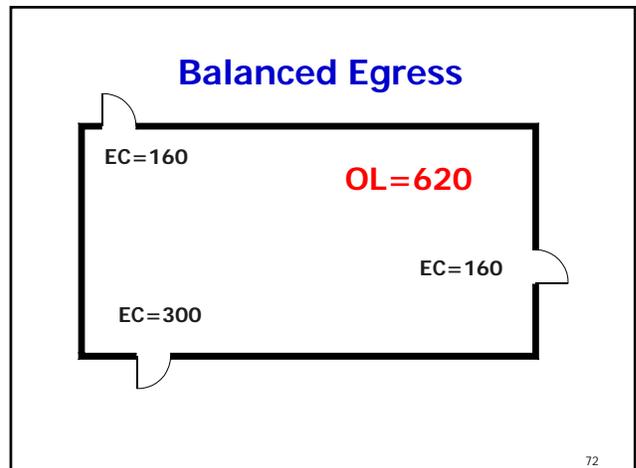
Balanced Egress

$$\frac{R-1}{R} = C$$

R = the number of required means of egress from a room, space or story...

C = the minimum fraction of required egress capacity remaining after the loss of any one means of egress

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**Numbers of...
and
Arrangement**

Number of Means of Egress

Minimum number of exits

1-500	2
501-1,000	3
≥ 1,001	4

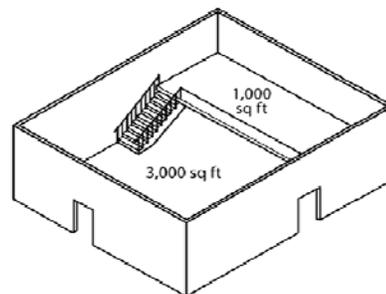
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Number of Means of Egress

Table 1018.2 Buildings with One Exit		
Occupancy	Max Hgt. Of Building above Grade Plane	Max. Occupants (DU) per Floor & TD
A, B, E, F, M, U	1 Story	50-P & 75' TD
H-2, H-3	1 Story	3-P & 25' TD
H-4, H-5, I, R	1 Story	10-P & 75' TD
S	1 Story	30-P & 100' TD
B, F, M, S	2 Stories	30-P & 75' TD
R-2	2 Stories	4-DU & 50' TD

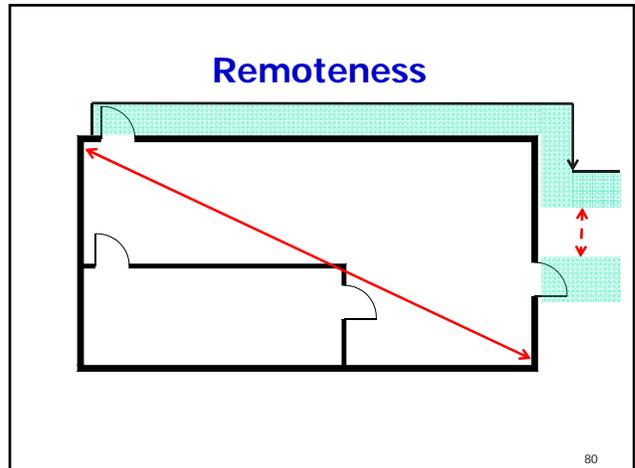
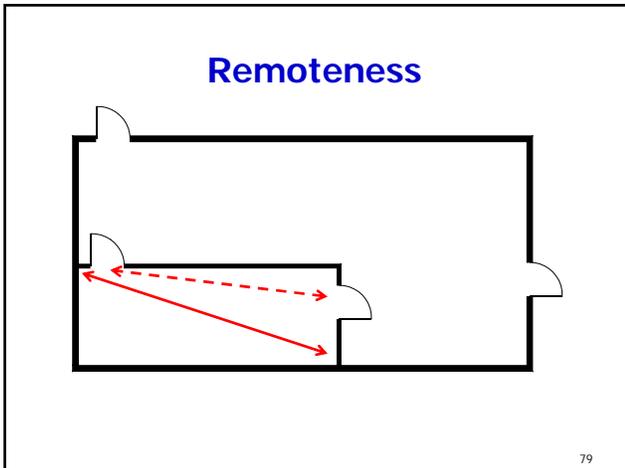
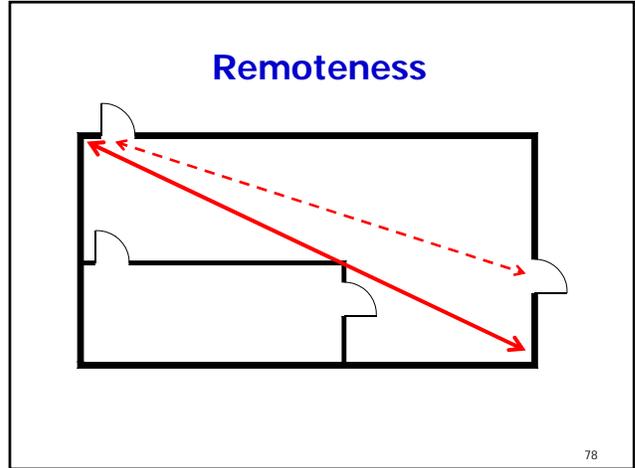
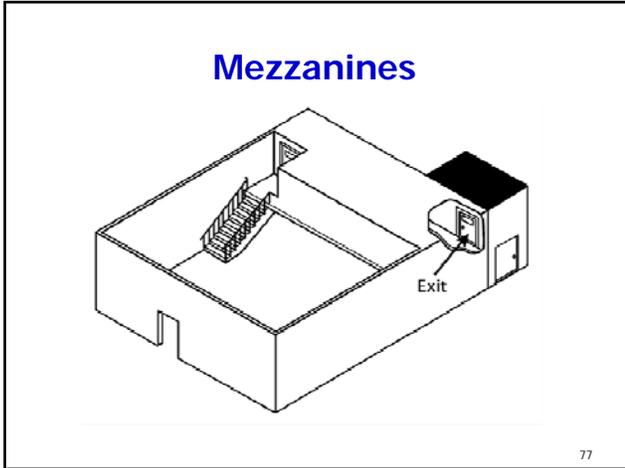
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Mezzanines



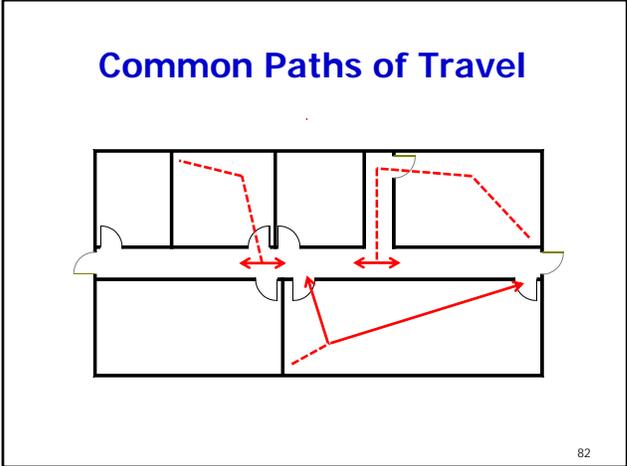
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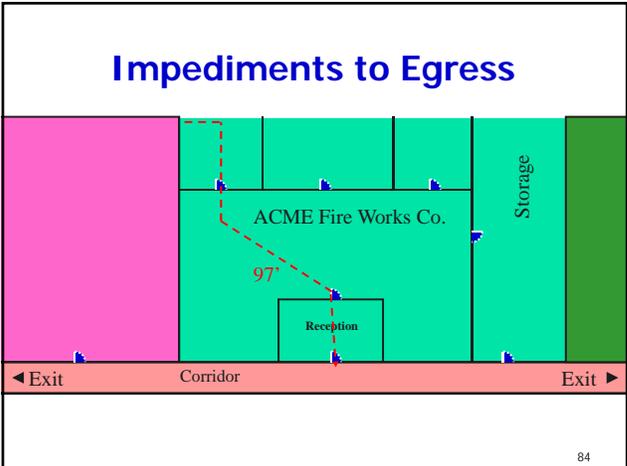
Occupancy	w/o AS	w/ AS
A, E, F-1, I-1, M, R, S-1	200	250
B	200	300
F-2, S-2, U	300	400
H-3	NP	150



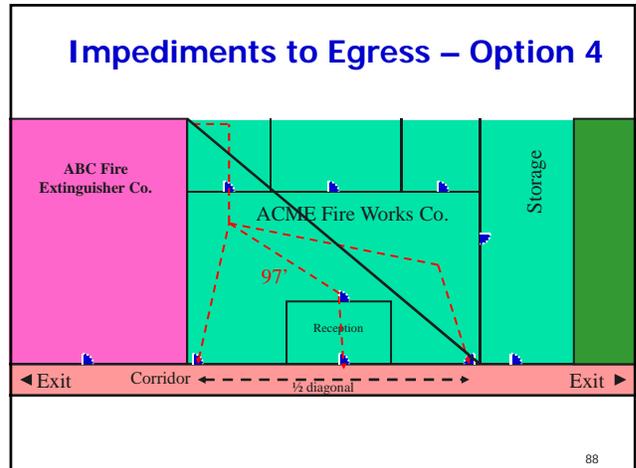
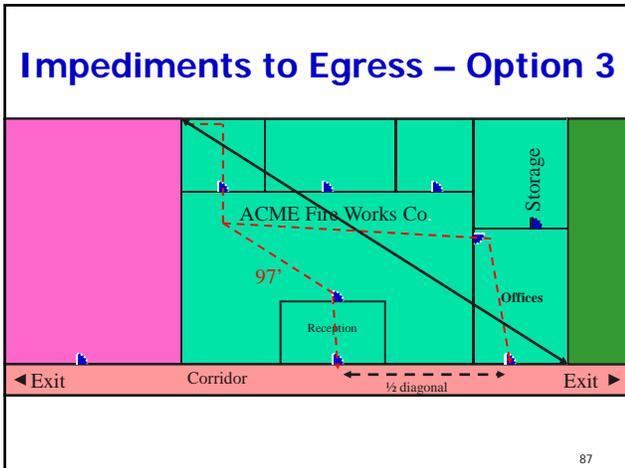
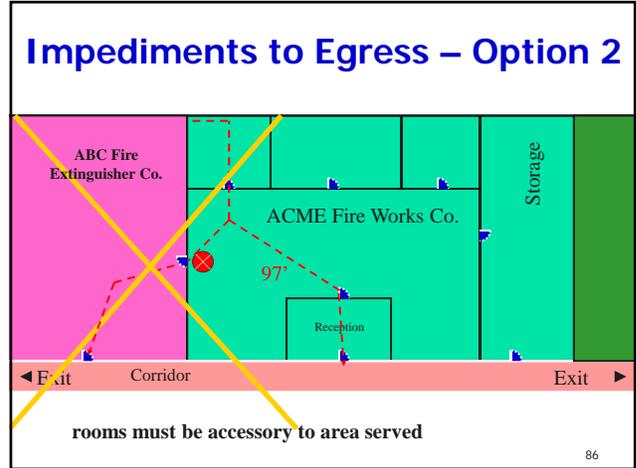
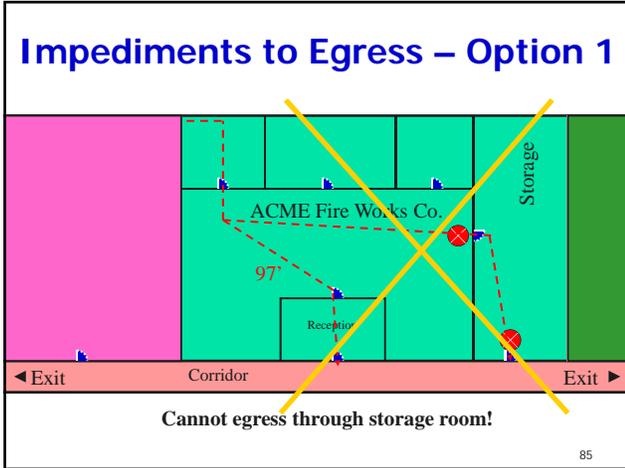
Occupancy	Max Occupant Load
A, B, E, F, M, U	50
H-1, H-2, H-3	3
H-4, H-5, I-1, I-3, I-4, R	10
S	30

1013.3 Common Path of Travel.

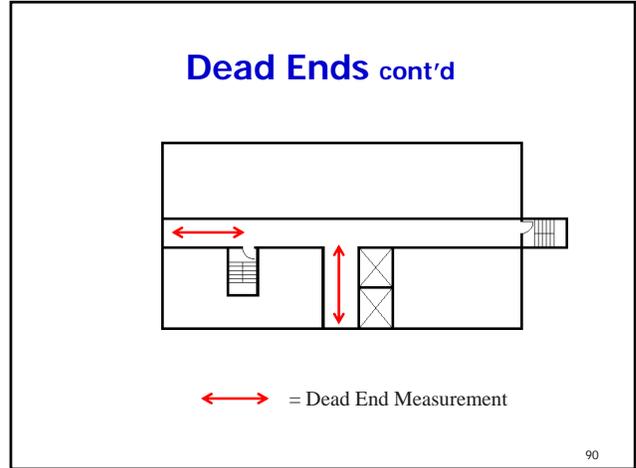
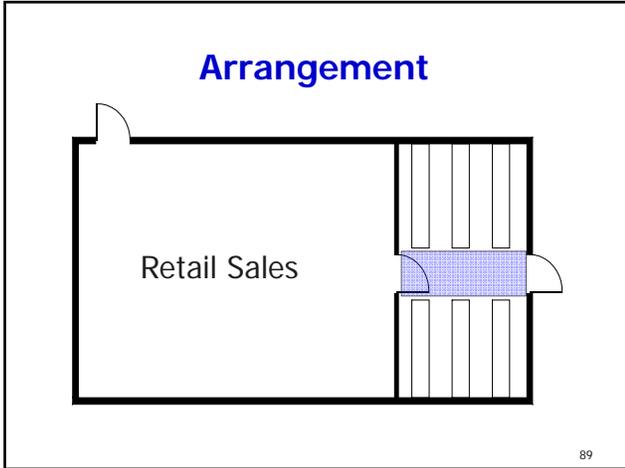
- 75' other than H
- 100' B, F, S w/ AS
- 100' B, S, U if $OL \leq 30$



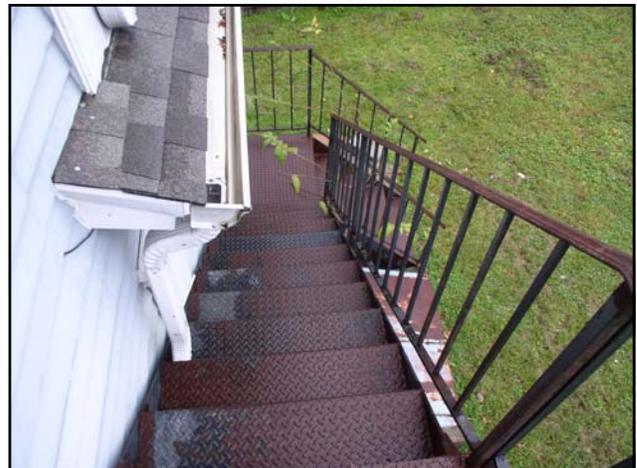
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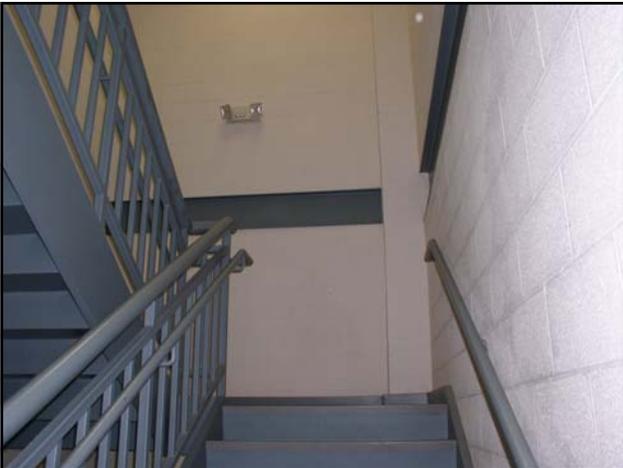
Common Mistakes



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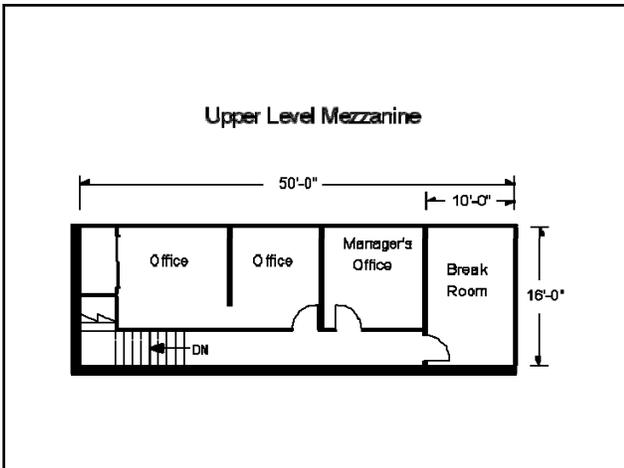
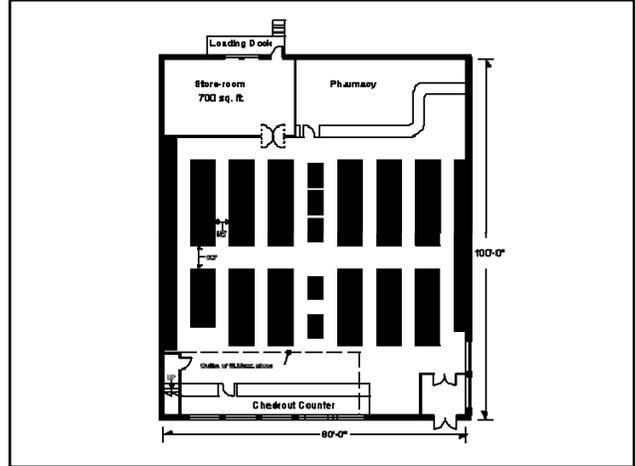
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- Exterior Areas for Assisted Rescue
- Open Stairs for ≤ 10
- Listed Panic Hardware
- Non-separated outside stairs = exits
- ~~Buildings~~ OCCUPANCIES w/ 1 Exit
- Healthcare Corridors

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Questions or Comments



Drive Safe