



PLANNING & DEVELOPMENT
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Self-Certification 2018 International Building Code Architectural Provisions



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- Complete construction documents – Required
- Coordination of consultants' documents – Required
- Accurate, detailed project scope – Required
- List of all deferred submittals – Required
 - Architectural cover sheet, or
 - Cover sheet of each discipline
- Special Inspection and Observation Certificates – Required

Points of discussion

1. Occupancy classification
2. Construction type
3. Allowable height & area
4. Passive fire protection
5. Active fire protection
6. Means of Egress



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1. Occupancy Classification



- Classify structures and portions of structures into one or more of the 10 occupancy groups

- Occupancy groups establish the level of RISK

•A: Assembly

•B: Business

•E: Educational

•F: Factory Industrial

•H: High-Hazard

•I: Institutional

•M: Mercantile

•R: Residential

•S: Storage

•U: Utility and Miscellaneous

1. Occupancy Classification



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- What distinguishes occupancy groups:
 - Fuel load
 - Occupant Load
 - Type of activity
 - Occupants' level of situational awareness
 - Occupants' capability of self-preservation

1. Occupancy Classification



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MIXED OCCUPANCY

- Classify the occupancy group for each portion of the building or structure
- It is possible to have more than one occupancy group for a space
- Clearly identify the method(s) used to deal with mixed occupancy
 - Accessory occupancy (Section 508.2)
 - Non-separated occupancy (Section 508.3)
 - Separated occupancy (Section 508.4)

2. Construction type

FIVE BASIC TYPES:

I: non-combustible

II: non-combustible

III: non-combustible exterior walls with combustible roof & floor

IV: non-combustible exterior walls with heavy timber for everything else

V: combustible (any approved material)



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2. Construction type



- Each building can only have one construction type (I, II, III, IV, or V)
- Construction type determines the building's ability to *resist* destruction by fire
- Construction type accounts for 'building element' participation in a fire
- Construction type determines the fire-resistance rating for the 'building elements'

2. Construction type

Two types of fire-resistance rating:



Maintain structural function (Section 704)

for the sake of simplicity in this presentation, I will refer to this as ‘structural’

Contain a fire (provisions found throughout the Code)

for the sake of simplicity in this presentation, I will refer to this as ‘containment’

2. Construction type



**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A	B	A	B	HT	A	B
Primary structural frame ^f (see Section 202)	3 ^{a, b}	2 ^{a, b}	1 ^b	0	1 ^b	0	HT	1 ^b	0
Bearing walls									
Exterior ^{e, f}	3	2	1	0	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions							See Section 2304.11.2		
Interior ^d	0	0	0	0	0	0		0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	1½ ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	HT	1 ^{b, c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed where a 1-hour or less fire-resistance rating is required.
- d. Not less than the fire-resistance rating required by other sections of this code.
- e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- f. Not less than the fire-resistance rating as referenced in Section 704.10.

2. Construction type



TABLE 602
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, d, g}

<u>FIRE SEPARATION DISTANCE =</u> X (feet)	<u>TYPE OF CONSTRUCTION</u>	<u>OCCUPANCY GROUP H^e</u>	<u>OCCUPANCY GROUP F-1, M, S-1^f</u>	<u>OCCUPANCY GROUP A, B, E, F-2, I, Rⁱ, S-2, U^h</u>
$X < 5^b$	All	3	2	1
$5 \leq X < 10$	IA	3	2	1
	Others	2	1	1
$10 \leq X < 30$	IA, IB	2	1	1 ^c
	IIB, VB	1	0	0
	Others	1	1	1 ^c
$X \geq 30$	All	0	0	0

For SI: 1 foot = 304.8 mm.

- a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
- b. See Section 706.1.1 for party walls.
- c. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
- d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
- e. For special requirements for Group H occupancies, see Section 415.6.
- f. For special requirements for Group S aircraft hangars, see Section 412.3.1.
- g. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
- h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.
- i. For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.

2. Construction type



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Roof construction and associated secondary members (see Section 202)	1 1/2 ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	HT	1 ^{b, c}	0

Type VB
Office Building
8ft F.S.D.
wood stud wall

For SI: 1 foot = 304.8 mm.

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Type VB
Office Building
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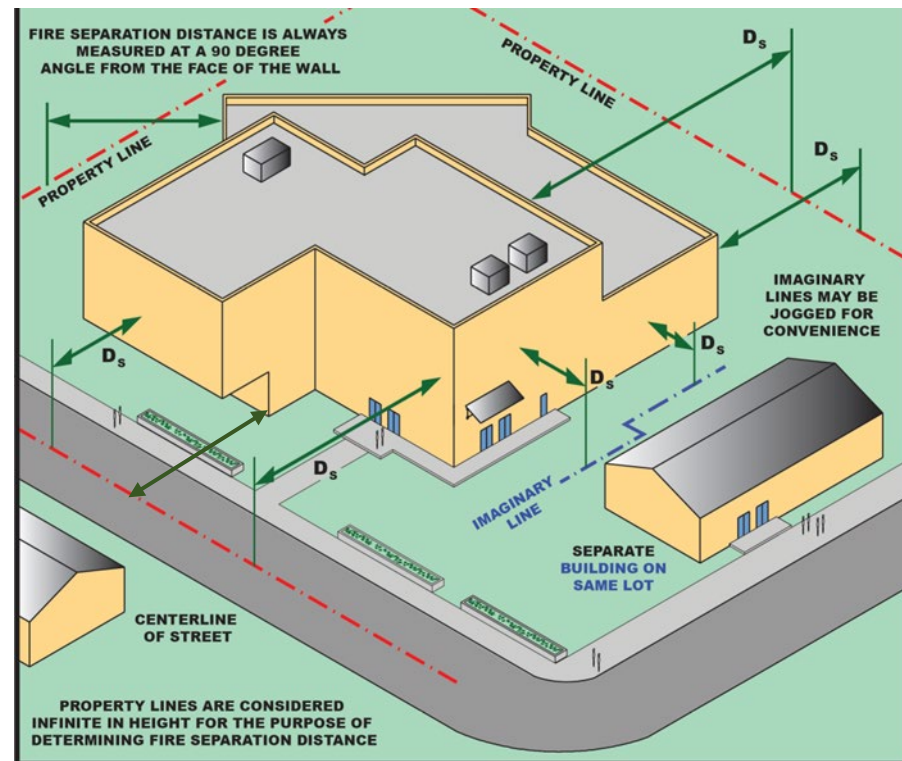
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- i. For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.



Required Site Plan Information:

- Show property lines, lot lines, and imaginary lines
- Show the fire separation distances



3. Allowable Height & Area



- The Code regulates the size of building based on specific hazards associated with the occupancy group, construction type, and the presence of fire sprinklers.

3. Allowable Height & Area



- The Code regulates the size of building based on specific hazards associated with the occupancy group, type of construction, and if the building is sprinklered.
- Regulating the height and size provides for a reasonable time to evacuate.

3. Allowable Height & Area



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- Table 504.3 (height), 504.4 (stories), and 506.2 (area)

3. Allowable Height & Area



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- Regulating the height and size provides for a reasonable evacuation time.
- Table 504.3 (height), 504.4 (stories), and 506.2 (area)
- Allowable tabular area may then be tweaked based on the building's frontage conditions in Section 506.2

3. Allowable Height & Area



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- The Code regulates the size of building based on specific hazards associated with the occupancy group, type of construction, and if the building is sprinklered
- Regulating the height and size provides for a reasonable evacuation time.
- Table 504.3 (height), 504.4 (stories), and 506.2 (area)
- Allowable tabular area may then be tweaked based on the building's frontage conditions in Section 506.2
- Unlimited area buildings are possible in Section 507 for specific primary occupancy groups when surrounded by large open spaces.

3. Allowable Height & Area



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TABLE 506.2—continued
 ALLOWABLE AREA FACTOR ($A_t = NS, S1, S13R, S13D$ or SM , as applicable) IN SQUARE FEET^{a, b}

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
R-1 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
R-2 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000

3. Allowable Height & Area



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TABLE 506.2—continued
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OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
R-1 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
R-2 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000



3. Allowable Height & Area



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		A	B	A	B	A	B	HT	A	B
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	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
R-2 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000

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

3. Allowable Height & Area



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TABLE 506.2—continued
 ALLOWABLE AREA FACTOR ($A_t = NS, S1, S13R, S13D$ or SM , as applicable) IN SQUARE FEET^{a, b}

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		A	B	A	B	A	B	HT	A	B
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	S13R									
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000

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



4. Passive Fire Protection

Does not need to be deployed. Ready to go as-is.

- Provided to
 - Maintain structural function, and/or
 - Contain a fire
- Fire-resistance rating is determined by
 - Tested & listed assemblies (Section 703)
 - Prescriptive assemblies (Section 721)
 - Calculated assemblies (Section 722)



4. Passive Fire Protection

Design factors:

- Required fire-resistance rating (time)
- Continuity
- Openings, penetrations, and joints
- Type of materials allowed
- Structural support

5. Active Fire Protection



Deploys during a fire.

- Fire sprinklers

NFPA 13 - Save the building, put fire out (903.3.1.1)

NFPA 13R – Save the occupants, slow down fire to allow evacuation (903.3.1.2)

- Fire alarm
- Smoke detection
- Carbon monoxide gas detection
- Smoke control system

5. Active Fire Protection



Deploys during a fire.

- Fire sprinklers

NFPA 13 - Save the building, put fire out (903.3.1.1)

NFPA 13R – Save the occupants, slow down fire to allow evacuation (903.3.1.2)

- Fire alarm
- Smoke detection
- Carbon monoxide gas detection
- Smoke control system
- **Intumescent materials**

6. Means of Egress



A continuous & unobstructed path of travel from any occupied portion of a building or structure to the public way

6. Means of Egress



Three parts of a Means of Egress:

Exit Access → Exit → Exit Discharge

These are separate and distinct for each person based on where travel starts.

A person can only proceed one-way through these parts. Once you are in “Exit” you cannot go into “Exit Access”.

With horizontal exits, and atriums, you can have a mix of people. Some can be in the “exit” part while others are still in the “exit access” part. One person’s “exit” can be another person’s “exit access”.

6. Means of Egress

Egress plan is required



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Egress plan shall show:

- Occupancy group, function, and quantity of occupants in each space

Occupancy Group **B**,
Assembly (15 net)
34 Occupants

- Entire egress travel paths to the exit discharge
- Quantity of occupants using egress features
- Required egress width and provided egress width
- Exit separation distance
- Common travel distance and Total travel distance

6. Means of Egress



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Required quantity of exits is based on:

1. Occupant load
2. Maximum common path of egress travel
3. Occupancy group of the space

**TABLE 1004.5
 MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT**

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR*
Accessory storage areas, mechanical equipment room	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal	
Baggage claim	20 gross
Baggage handling	300 gross
Concourse	100 gross
Waiting areas	15 gross
Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Exhibit gallery and museum	30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats	
Concentrated	7 net
(chairs only—not fixed)	
Standing space	5 net
Unconcentrated (tables and chairs)	15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	150 gross
Concentrated business use areas	See Section 1004.8

6. Means of Egress



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Required quantity of exits is based on:

1. Occupant load
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The “Function”
of the space



Occupancy Group **B**,
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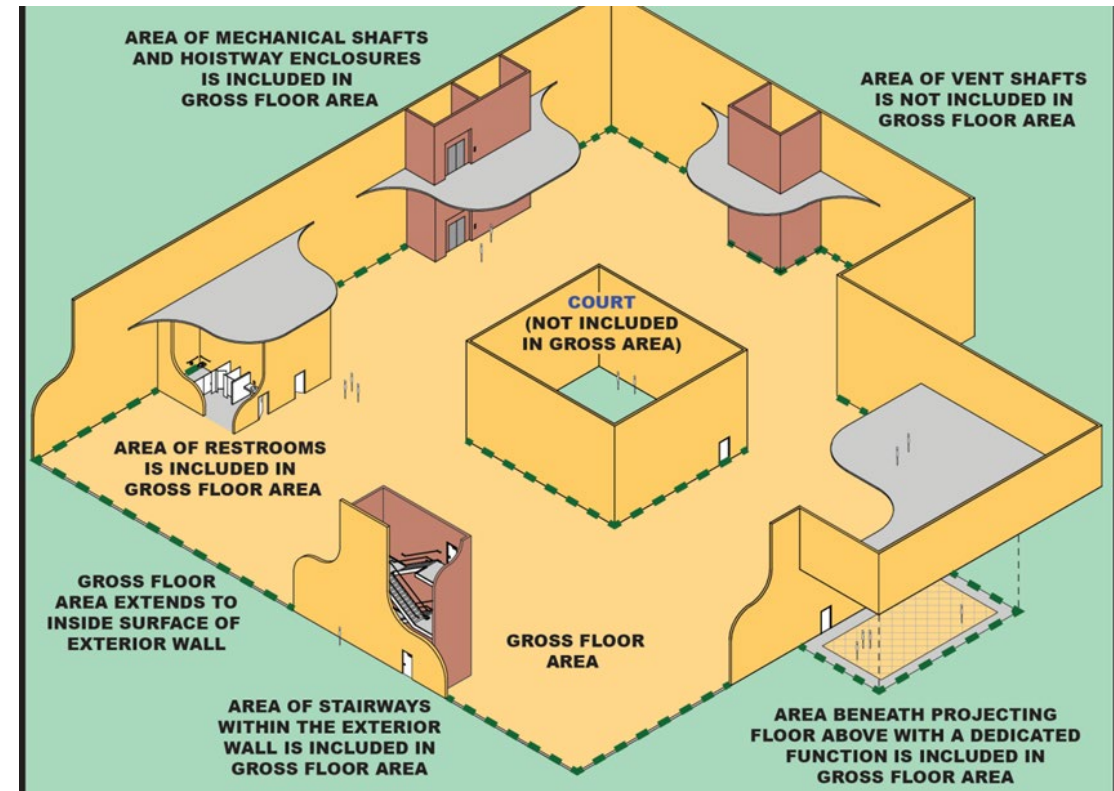
6. Means of Egress

Gross floor area:

- The area within the exterior walls
- No deductions for any interior space
- Includes non-occupiable spaces



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Occupant Load - Net

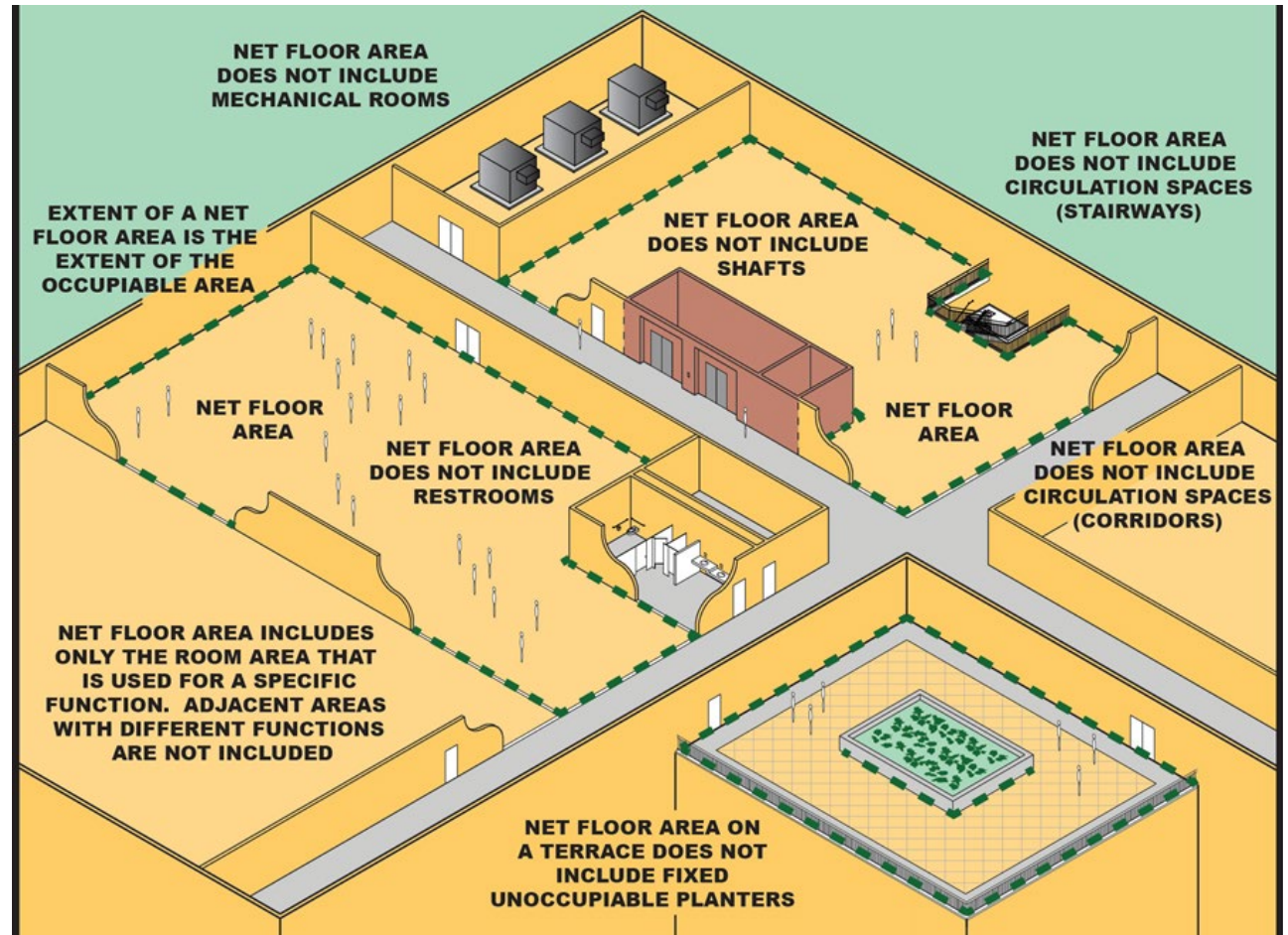
Net floor area:

Actual occupied area

Does not include corridors, mechanical rooms, stairways, restrooms, closets



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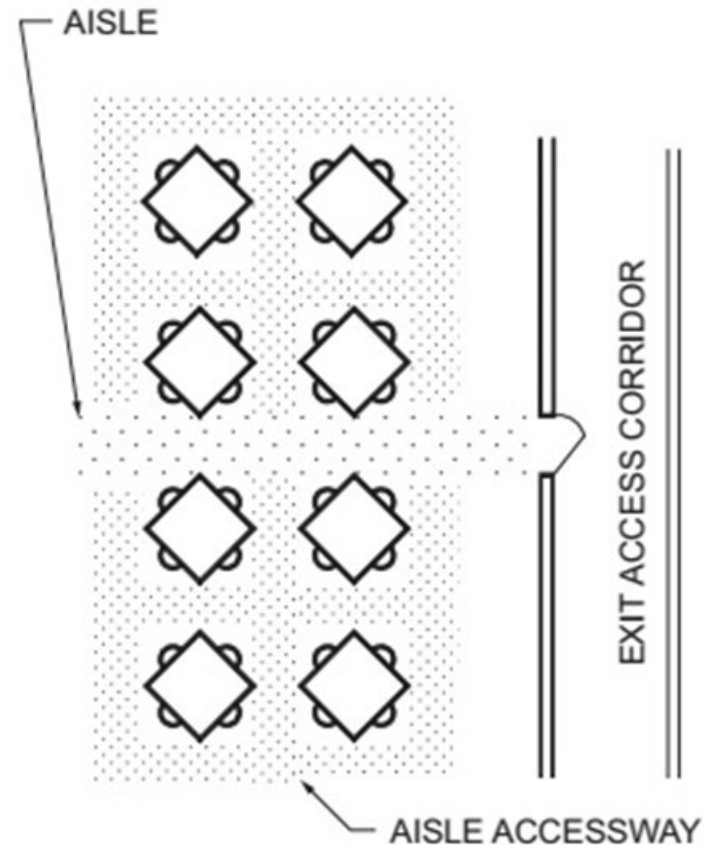


Occupant Load – Net

- Deductions for walls and permanent fixtures? **Yes**
- Deductions for aisles and aisle accessways? **No**



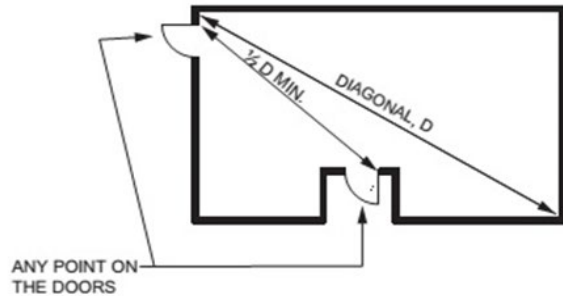
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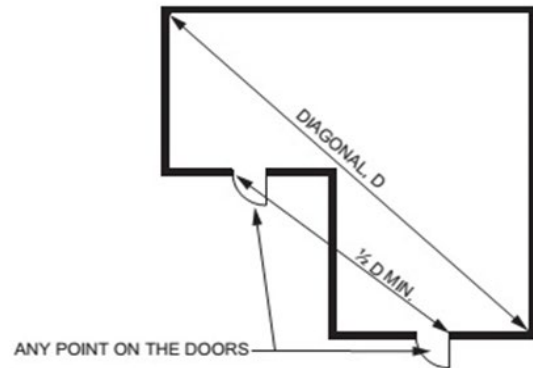
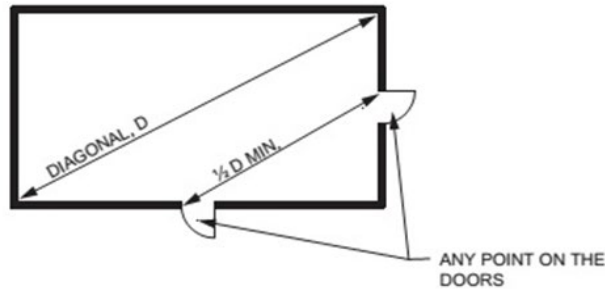
Egress Plan – Separation



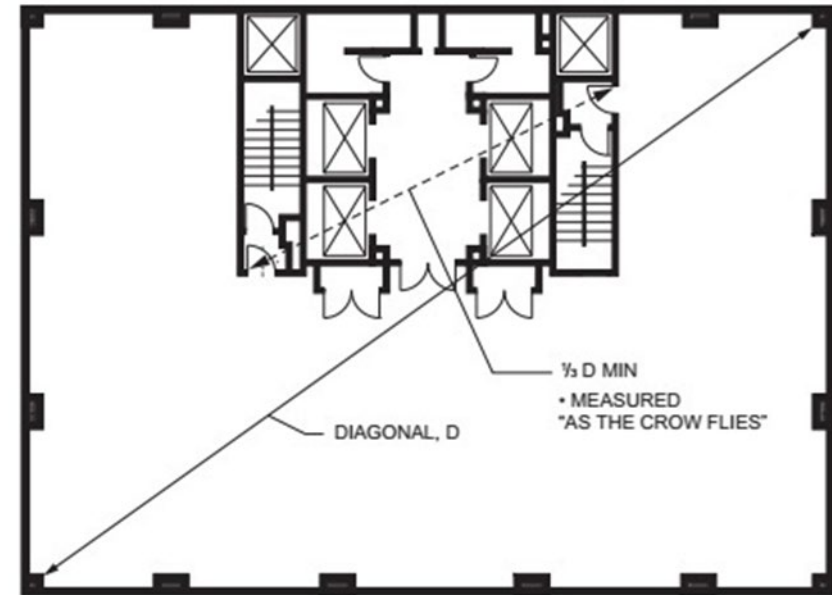
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- Applicable to Exit Access and Exits
- Maximum diagonal dimension of spaces and building



1/3 D minimum
for sprinklered
buildings

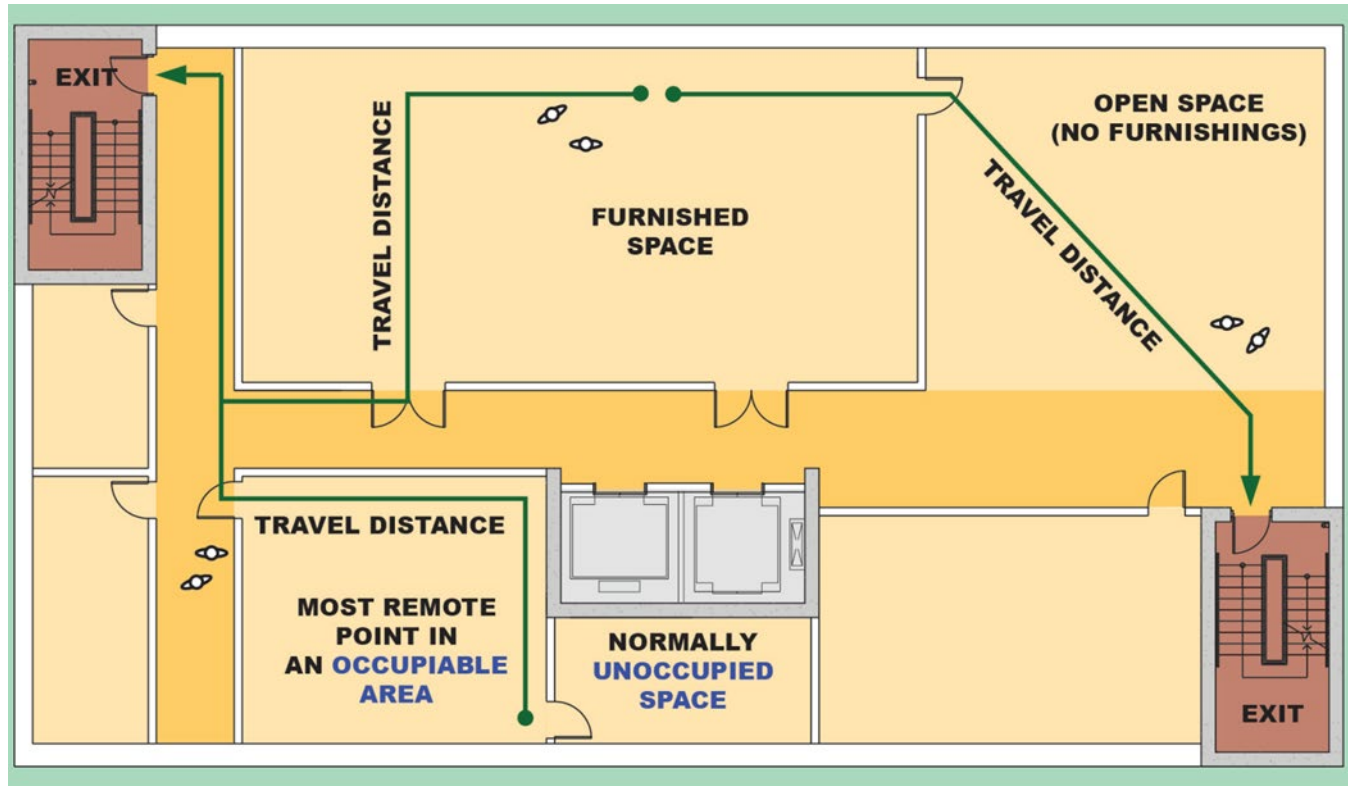


EXAMPLE:
DIAGONAL DIMENSION = 134'-0"
MIN. SEPARATION OF EXITS = 134' ÷ 3 = 44'-8"

Egress Plan – Exit Access Distance



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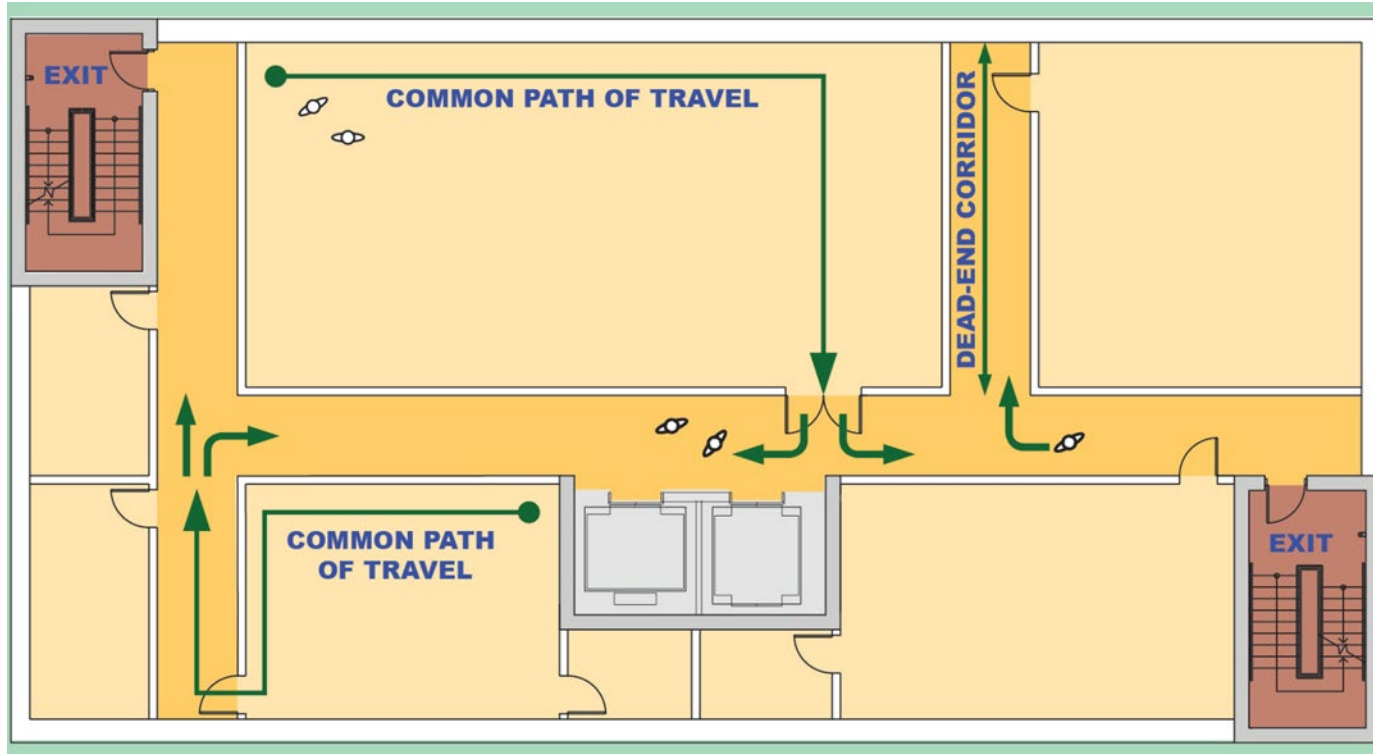


- Depends on occupancy classification
- Natural and unobstructed path (Generally like the furnished space example)
- Diagonal paths are generally not appropriate. There are exceptions.

Egress Plan – Common Path



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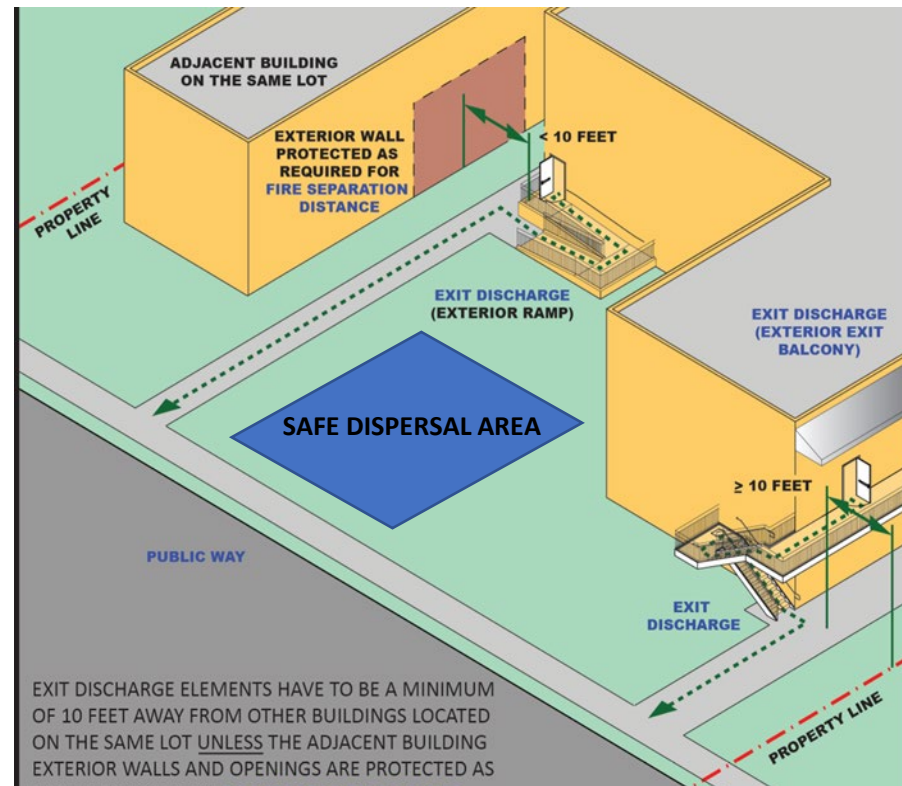
Common Path of Egress Travel:

- Depends on occupancy classification
- Part of exit access travel distance



Required Site Plan Information:

- Provide path of exit discharge all the way to the public way
- Make sure there are no locked or cane bolted site gates to get to a street





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The Code specifies only the minimum requirements !!

Compliance is required to ALL provisions in the Code.

If it is in the Code, it is ALWAYS required!

Plan review comments DO NOT amend the adopted Code.



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QUESTIONS?

Rost Sapon
Structural Plans Engineer
IBC Technical Lead
Accessibility Technical Lead
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