



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

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IBC Technical Lead

Complete Drawings Required



- Provide an accurate project scope
- Review consultants' drawings for coordination
- Submit Special Inspection and Observation Certificates
- List deferred submittals on the architectural drawings
 - Cover sheet or code sheet



Points of discussion

1. Occupancy Group
2. Type of construction
3. Allowable height & area
4. Passive fire protection
5. Active fire protection
6. Means of Egress



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1. Occupancy Group (Chapter 3)



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- Classify a building or structure according to its occupancy group
- Everything starts with the occupancy group!
- Occupancy group establishes the level of RISK
- 10 occupancy groups
 - 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 Continued

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



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1. Mixed Occupancy



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- Individually classify the occupancy for each portion of the building
- 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. Type of Construction (Chapter 6)



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 everything else

V: combustible (any material)

2. Type of Construction



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

2. Type of Construction



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Two types of fire-resistance ratings

Maintain structural function (Section 704)

Contain a fire (provisions throughout the Code)

2. Type of Construction



**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. Type of Construction



**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.

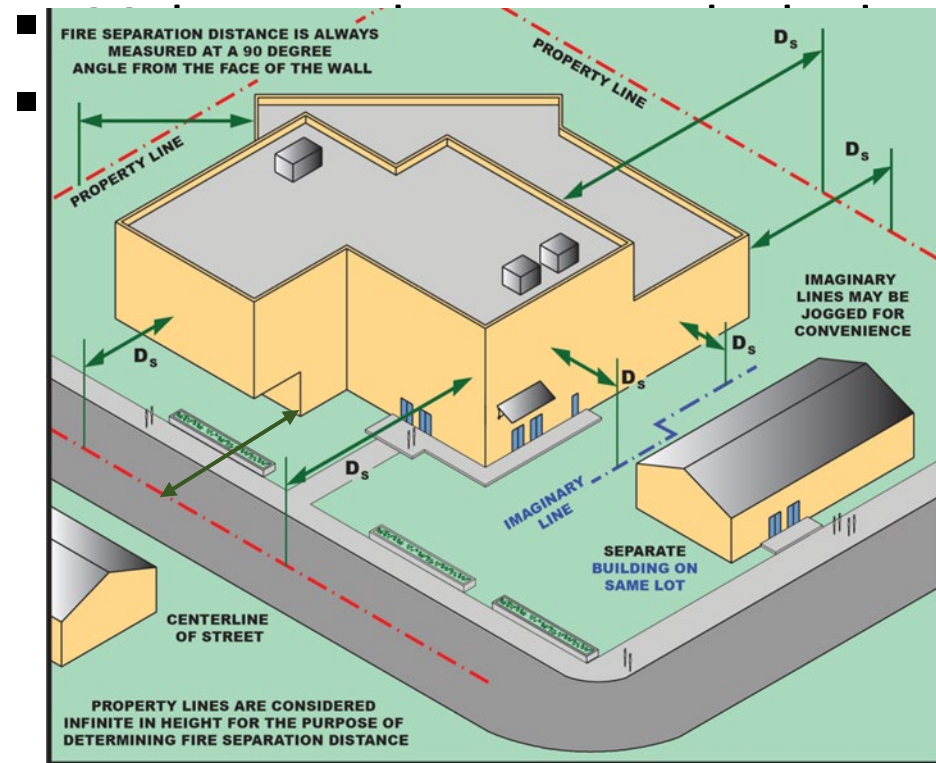
- a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
- b. See Section 706.1.1 for party walls.
- c. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
- d. The fire-resistance rating of an exterior 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.

Site Plan



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- Show the fire separation distance
- Provide path of exit discharge all the way to the public way



cane bolted site gates to get to a street
ences shall be readily identifiable



3. Allowable Height & Area (Chapter 5)



- 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 size aims to reduce the risk of injury to an acceptable level for building occupants by limiting fire load and fire hazards
- 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

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

4. Passive Fire Protection (Chapter 7)



- Provided to
 - Maintain structural function
 - Contain a fire
- Provided by
 - Tested & listed assemblies (Section 703)
 - Prescriptive assemblies (Section 721)
 - Calculated assemblies (Section 722)

4. Passive Fire Protection

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

- Design factors:

- Required fire rating (time)
- Continuity
- Openings & penetrations
- Types of materials allowed
- Structural support



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5. Active Fire Protection (Chapter 9)



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



Means of egress

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

Egress plan required

Egress plan shows:

- Egress travel paths.
- Occupancy group, Function, and number of occupants in each space
- Number of occupants using egress features
- Egress width – Both the minimum Code required width and calculated required width
- Exit separation distance
- Entire path of egress travel to the exit discharge
- Travel distances – Both the Common travel distance and Total travel distance

6. Means of Egress



3 Components of a Means of egress

- Exit access
- Exit
- Exit discharge

People that are in the “EXIT” component CANNOT go back into an “EXIT ACCESS” component.

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

6. Egress Tables



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Section 1006 - Number of exits

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

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

**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 (chairs only—not fixed)	7 net
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

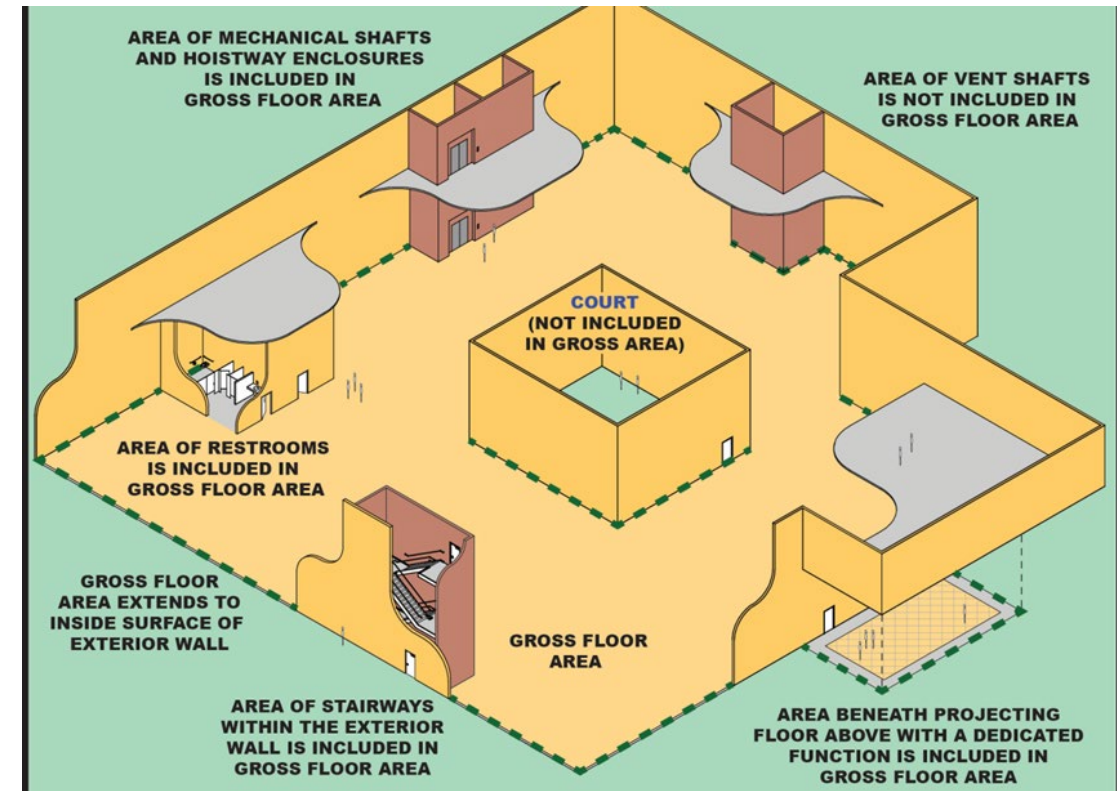
Occupant Load - Gross

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

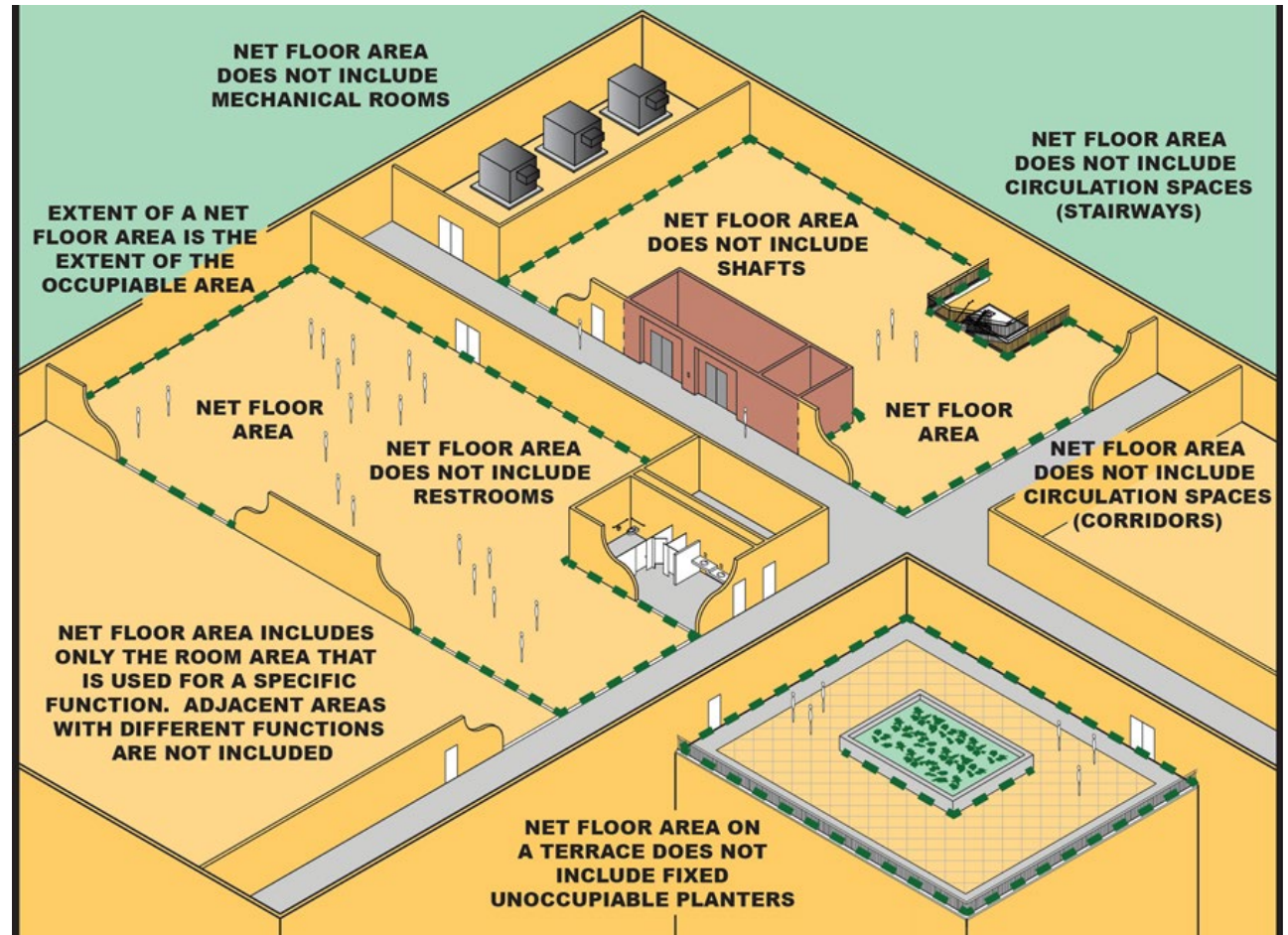
Net floor area

- Actual occupied area

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



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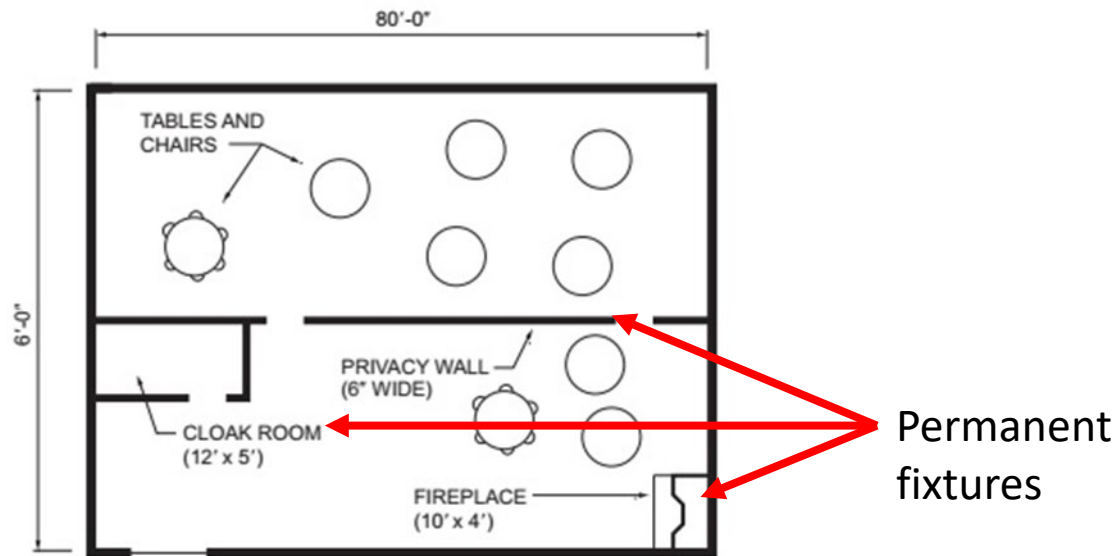
Occupant Load – Net Continued

Net floor area

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



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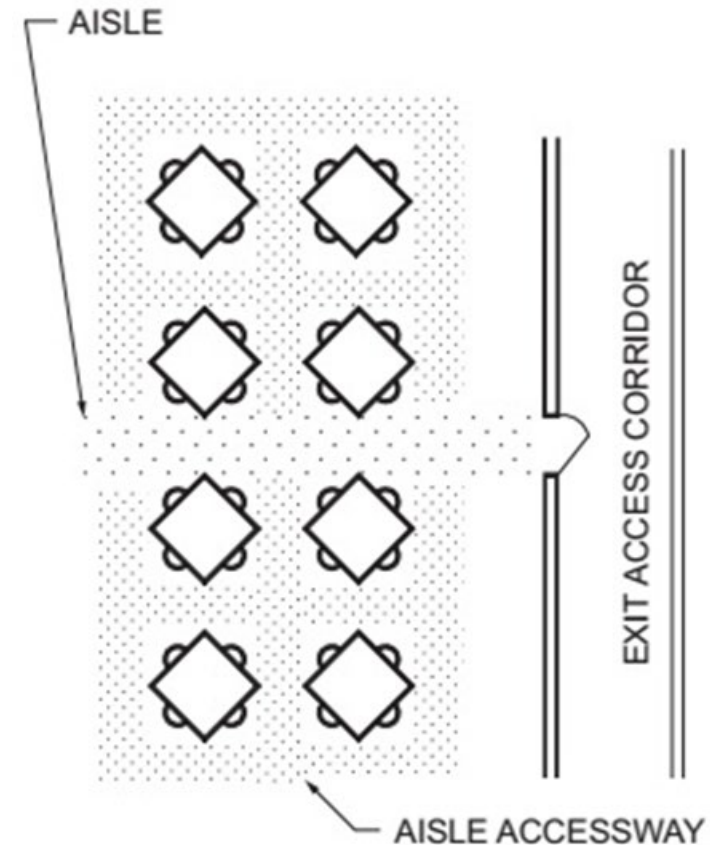


80' x 60' = 4,800 SQ.FT.

PRIVACY WALL:	40 SQ.FT.
FIREPLACE:	40 SQ.FT.
CLOAK ROOM:	60 SQ.FT.
TOTAL:	140 SQ.FT.

(TOTAL AREA WITHIN WALLS) - (EXCLUDED ITEMS) = (NET FLOOR AREA)
4,800 SQ.FT. - 140 SQ.FT. = 4,660 SQ.FT.

(NET FLOOR AREA)/(TABLE 1004.5 VALUE) = (OCCUPANT LOAD)
4,660 SQ.FT./15 SQ.FT. PER OCCUPANT = 311 OCCUPANTS



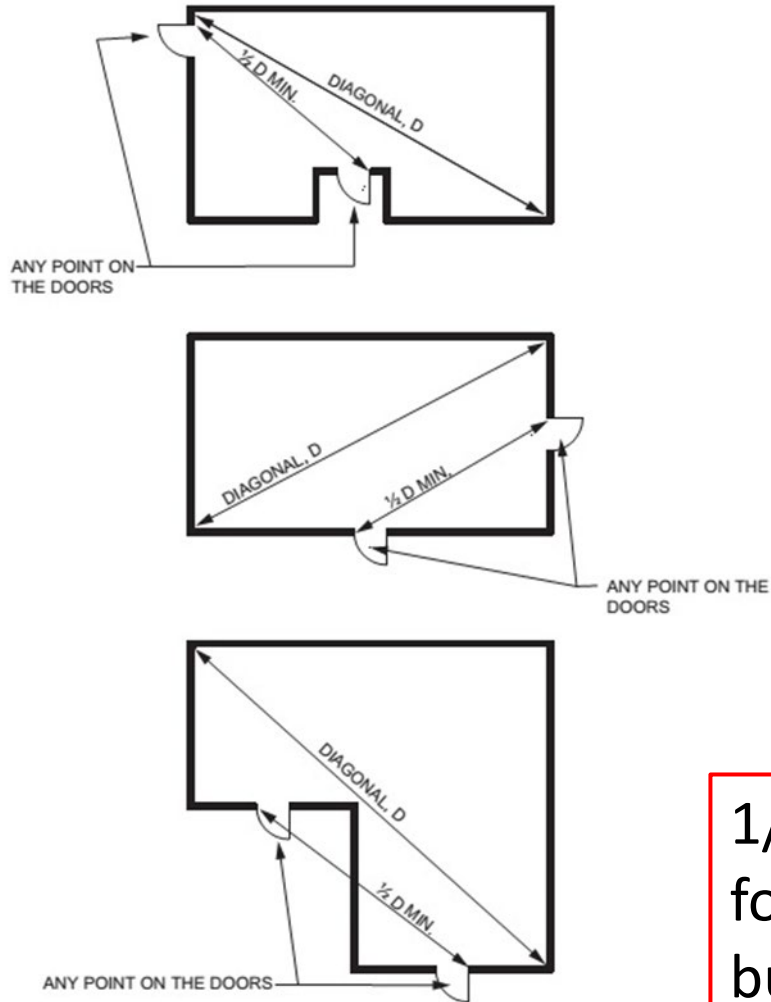
Egress Plan – Exit Remoteness



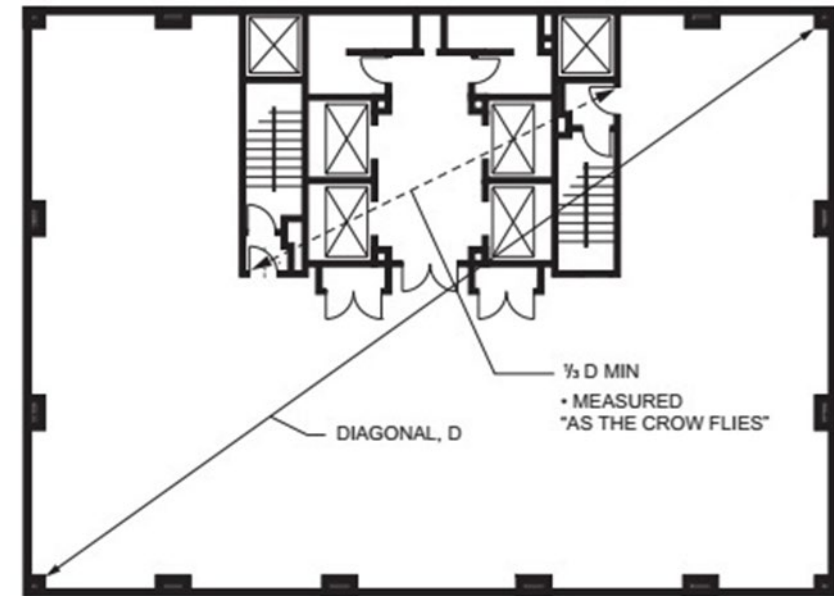
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Egress Component - Remoteness

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



1/3 D minimum
for sprinklered
buildings

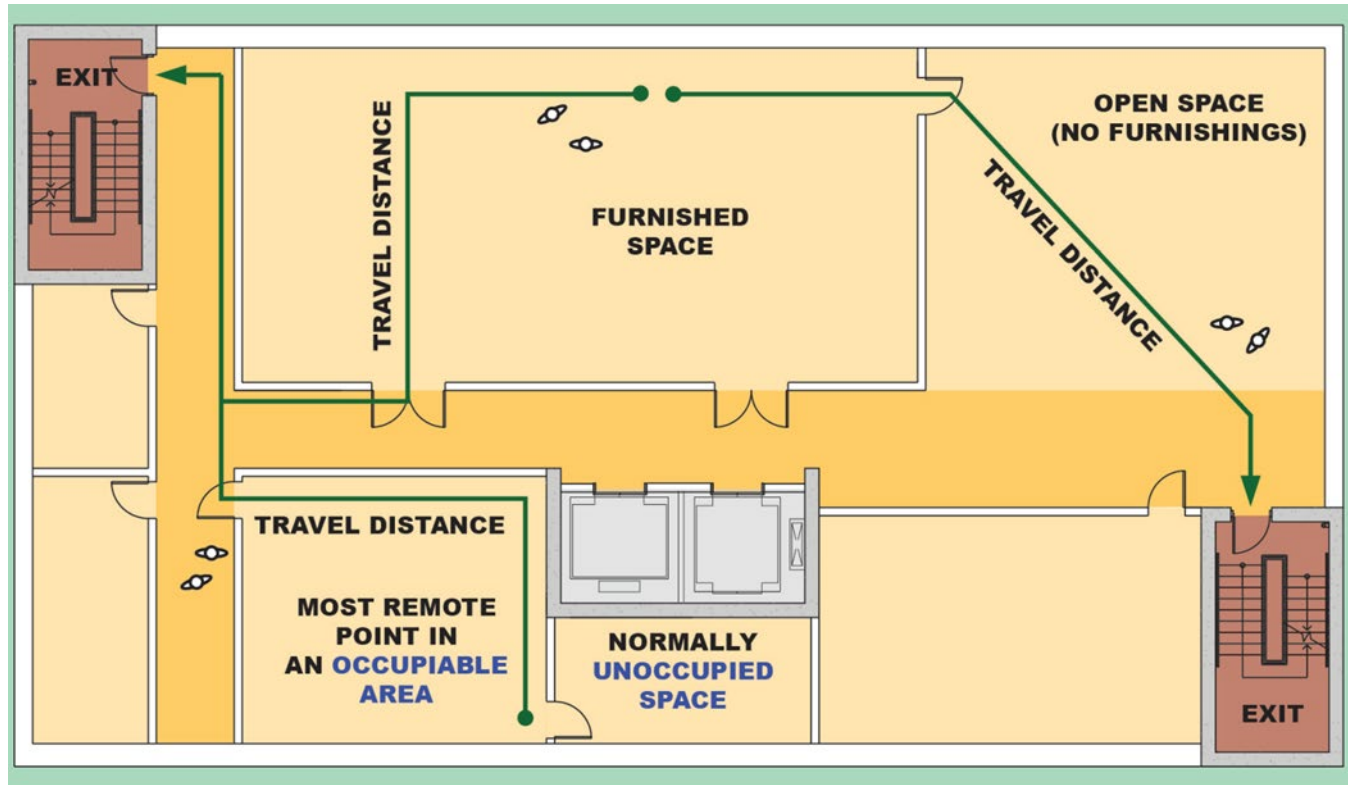


EXAMPLE:
DIAGONAL DIMENSION = 134'-0"
MIN. SEPARATION OF EXITS = 134' ÷ 3 = 44'-8"

Egress Plan – Exit Access Distance



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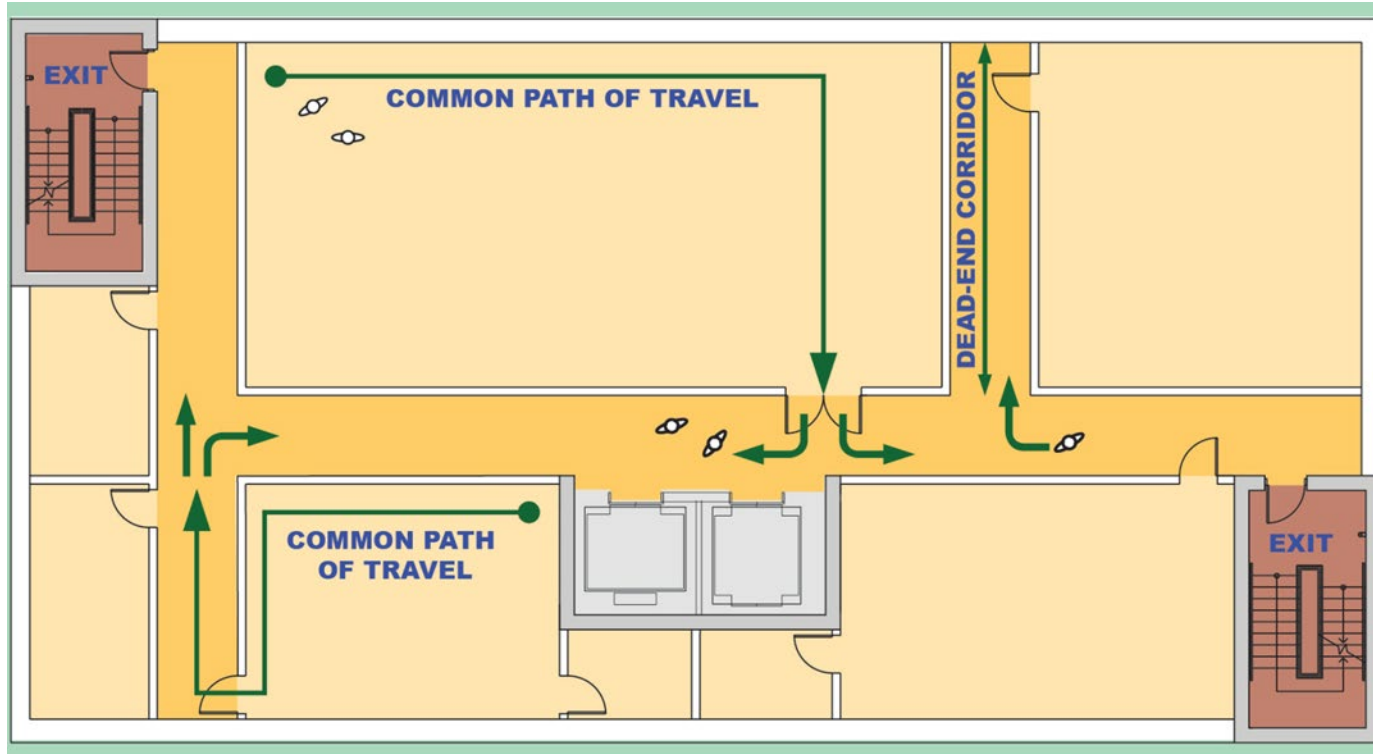
Egress Access Travel Distance:

- 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

The Code specifies only the minimum requirements !!

Compliance is required to ALL provisions in the Code.

Plan reviewers and plan review comments DO NOT amend the adopted Code.

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



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QUESTIONS?

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