

PRESERVE SHAPE BUILD

Self-Certification 2018 International Building Code Architectural Provisions



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City of Phoenix Planning and Development Department

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602-262-7802



- 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



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 •I: Institutional
 - •B: Business
 - •E: Educational
 - •F: Factory Industrial
 - •H: High-Hazard

- •M: Mercantile
- •R: Residential
- •S: Storage
- •U: Utility and Miscellaneous

1. Occupancy Classification



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

1. Occupancy Classification

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)

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)





- 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'



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'



PLANNING & DEVELOPMENT PRESERVE

BUILD

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
BOILDING ELEMENT	Α	В	Α	В	Α	В	HT	Α	В
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} Interior	3 3ª	2 2ª	1	0 0	2 1	2 0	2 1/HT	1 1	0 0
Nonbearing walls and partitions Exterior	See Table 602								
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	НТ	1	0
Roof construction and associated secondary members (see Section 202)	11/2	1 ^{b,c}	1 ^{b,c}	0°	1 ^{b,c}	0	НТ	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.



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

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF	OCCUPANCY	OCCUPANCY	OCCUPANCY
	CONSTRUCTION	GROUP H ^e	GROUP F-1, M, S-1 ^f	GROUP A, B, E, F-2, I, R ⁱ , S-2, U ^h
X < 5 ^b	All	3	2	1
5 ≤ X < 10	IA	3	2	1
	Others	2	1	1
10 ≤ X < 30	IA, IB	2	1	1°
	IIB, VB	1	0	0
	Others	1	1	1°
X ≥ 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.
- 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.



PLANNING & DEVELOPMENT PRESERVE SHAPE BUILD

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

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V		
BOILDING ELEMENT	Α	В	Α	В	Α	В	HT	Α	В	Type VB
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} Interior	3 3ª	2 2ª	1	0	2 1	2 0	2 1/HT	1 1	0	Office Building 8ft F.S.D. wood stud wall
Nonbearing walls and partitions Exterior				5	See Table	602				
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	See Section 2304.11.2	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)	11/2	1 ^{b,c}	1 ^{b,c}	0°	1 ^{b,c}	0	НТ	1 ^{b,c}	0	

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e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).

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

FIRE SEPARATION DISTANCE =	TYPE OF	OCCUPANCY	OCCUPANCY	OCCUPANCY
X (feet)	CONSTRUCTION	GROUP H°	GROUP F-1, M, S-1 ^f	GROUP A, B, E, F-2, I, R ⁱ , S-2, U ^h
X < 5 ^b	All	3	2	
5 ≤ X < 10	IA	3	2	Type VB
	Others	2	1	Office Building
10 ≤ X < 30	IA, IB	2	1	1 [°] 8ft F.S.D.
	IIB, VB	1	0	0
	Others	1	1	1 [°] wood stud wall
$X \ge 30$	All	0	0	0

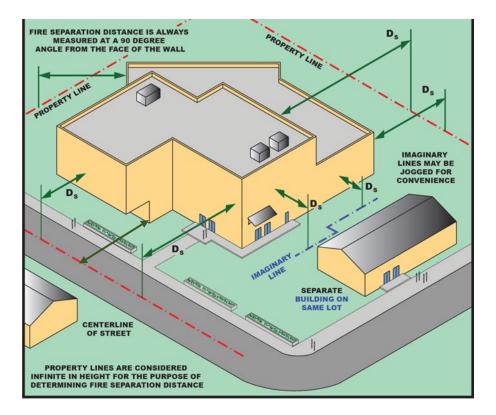
For SI: 1 foot = 304.8 mm.

- 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.
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- 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.
- 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





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



- 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.



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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)



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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



- 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.



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

			TYPE OF CONSTRUCTION										
OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE I		TYF	TYPE II		TYPE III		TYPE V				
		Α	В	Α	В	Α	В	HT	Α	В			
	NS ^d	Ш	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000			
R-1 ^h	S13R	UL	UL	24,000	10,000	24,000	10,000	20,300	12,000	7,000			
K-1	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			
	NS ^d	UL	UL	24.000	16,000	24,000	16,000	20.500	12,000	7,000			
R-2 ^h	S13R	UL	UL	24,000	10,000	24,000	10,000	20,500	12,000	7,000			
K-2	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			



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

					CTION	N L				
OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	ТҮР	EI	TYF	TYPE II		TYPE III		TYF	PE V
	[[Α	В	Α	В	Α	В	HT	Α	В
	NS ^d	UL	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
R-1 ^h	S13R	UL	UL	24,000	10,000	24,000	10,000	20,300	12,000	7,000
K-1	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
	NS ^d	UL	UL	24.000	16,000	24,000	16,000	20,500	12,000	7,000
R-2 ^h	S13R	UL		UL 24,000	10,000	24,000	10,000	20,300	12,000	7,000
IX-2	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



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

			TYPE OF CONSTRUCTION									
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		Α	В	Α	В	Α	В	HT	Α	В		
	NS ^d	Ш	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000		
R-1 ^h	S13R	UL	UL	24,000			10,000	20,300	12,000	7,000		
K-1	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		
	NS ^d	UL	UL	24.000	16,000	24,000	16,000	20,500	12,000	7,000		
R-2 ^h	S13R	UL	UL	24,000	16,000	24,000	10,000	20,300	12,000	7,000		
N-2	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		

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



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

					CTION					
OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	ТҮР	EI	TYF	PE II	ТҮР	EIII	TYPE IV	TYF	PE V
	Į Į	Α	В	Α	В	Α	В	HT	Α	В
	NS ^d	IП	UL	24,000	16,000	24,000	16,000	20,500	12,000	7,000
R-1 ^h	S13R	UL	UL	24,000	10,000		10,000	20,300	12,000	7,000
K-1	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
	NS ^d	UL	тп	24.000	16,000	24,000	16,000	20,500	12,000	7,000
R-2 ^h	S13R	UL	UL	UL 24,000	10,000	24,000	10,000	20,300	12,000	7,000
K-2	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	7 2,000	48,000	61,500	36,000	21,000

 $A_a = [A_t + (I)]$

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





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





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".

Egress plan is required

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



Required quantity of exits is based on:

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



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 Baggage handling Concourse Waiting areas	20 gross 300 gross 100 gross 15 gross						
Assembly Gaming floors (keno, slots, etc.) Exhibit gallery and museum	11 gross 30 net						
Assembly with fixed seats	See Section 1004.6						
Assembly without fixed seats Concentrated (chairs only—not fixed) Standing space Unconcentrated (tables and chairs)	7 net 5 net 15 net						
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net						
Business areas Concentrated business use areas	150 gross See Section 1004.8						

TABLE 1004.5

Required quantity of exits is based on:

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

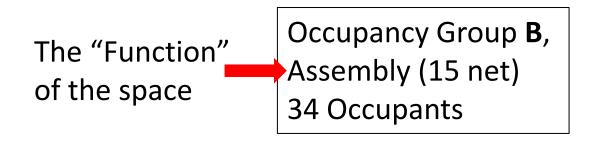


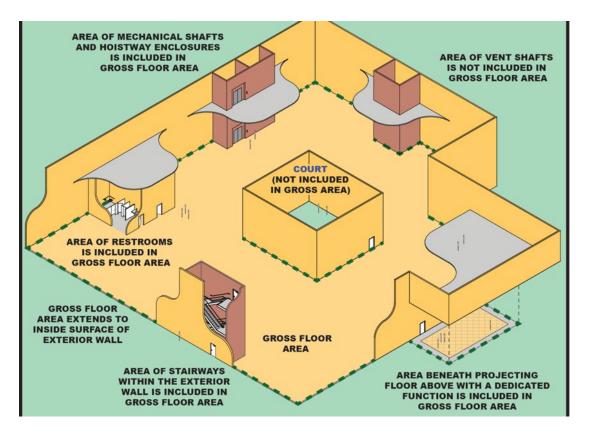


TABLE 1004.5 MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT							
FUNCTION OF SPACE	OCCUPANT LOAD FACTOR						
Accessory storage areas, mechanical equipment room	300 gross						
Agricultural building	300 gross						
Aircraft hangars	500 gross						
Airport terminal Baggage claim Baggage handling Concourse Waiting areas	20 gross 300 gross 100 gross 15 gross						
Assembly Gaming floors (keno, slots, etc.) Exhibit gallery and museum	11 gross 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						

Gross floor area:

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





Occupant Load - Net

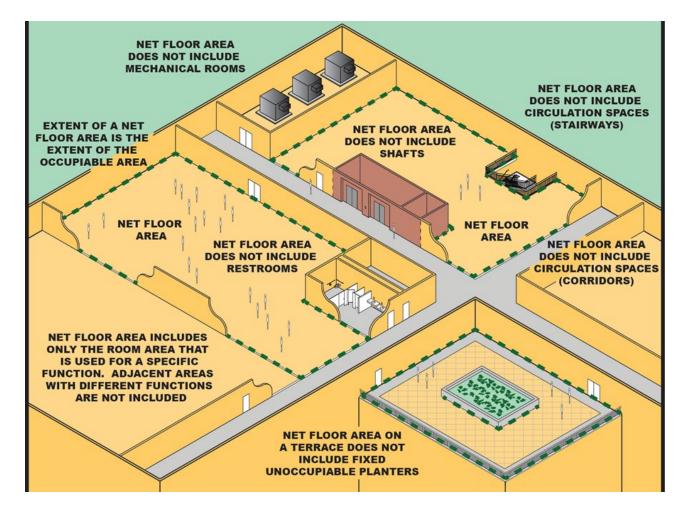
Net floor area:

Actual occupied area

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



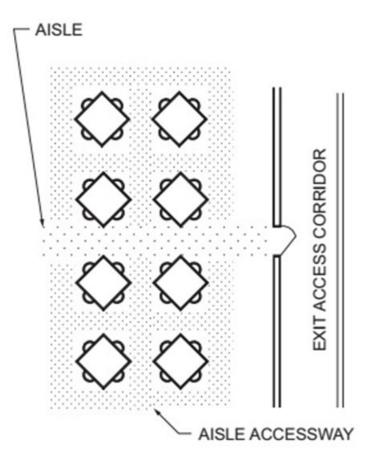
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Occupant Load – Net



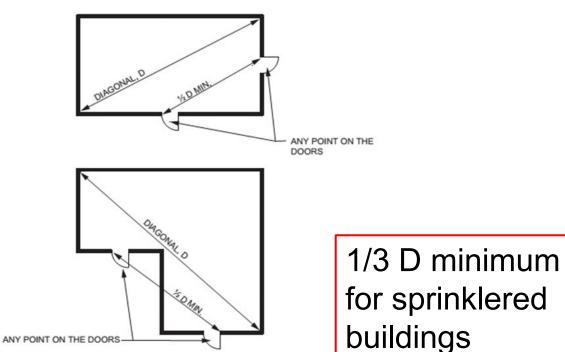
- Deductions for walls and permanent fixtures? Yes
- Deductions for aisles and aisle accessways? No

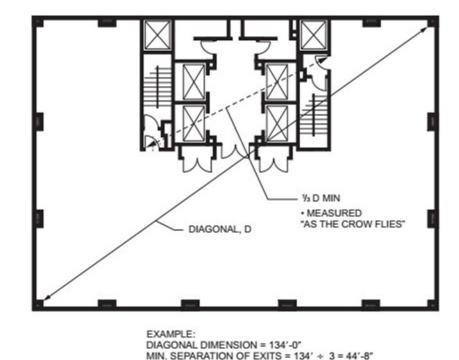


Egress Plan – Separation

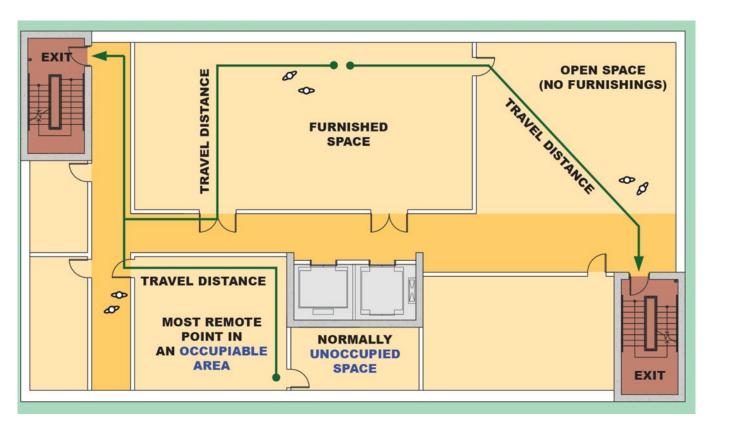


- ANY POINT ON THE DOORS
- Applicable to Exit Access and Exits
- Maximum diagonal dimension of spaces and building



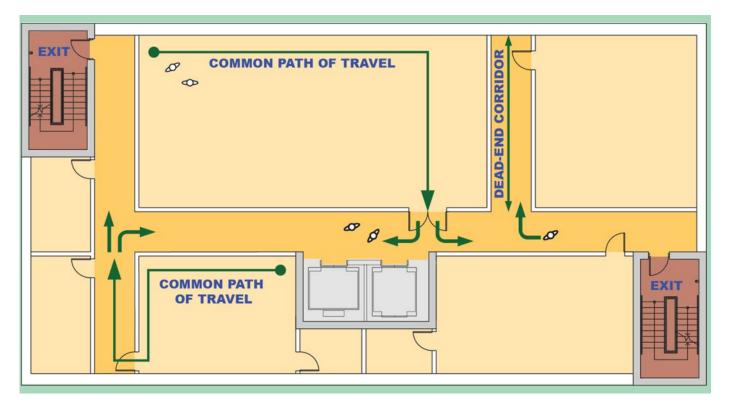


Egress Plan – Exit Access Distance



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

<u>Egress Plan – Common Path</u>





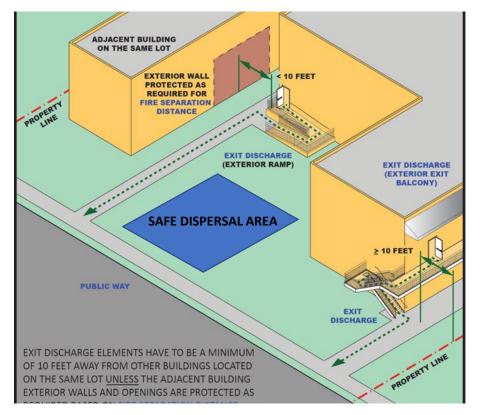
Common Path of Egress Travel:

- Depends on occupancy classification
- <u>Part</u> 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





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.





QUESTIONS?

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