Conducting a Performance Evaluation using Mr. Ceb

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Presented by

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Class Approval

- Approved for 3 hours of credit in the Technical Category
- Class Number CP-23-00098

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Course Outline

- What are the Compliance Options of the Michigan Rehabilitation Code for Existing Buildings
- Performance Compliance Option
- Applicability
- Fire Safety
- Means of Egress
- General Safety
- Summation Report

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Course Outcomes

The Attendees will learn

- When you can use a Performance Evaluation
- Who can perform a Performance Evaluation
- What are the aspects that are evaluated for Fire Safety
- What are the aspects that are evaluated for means of Egress
- What are the aspects that are evaluated for General Safety
- What constitutes passing using the Performance Compliance Method

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Compliance Alternatives Section 301.1

- The repair, alteration, change of occupancy, addition or relocation of all existing buildings shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant. Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other.

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Compliance Alternatives

- Section 101.2 New Building
- Section 301.1.1 Prescriptive
- Section 301.1.2 Work Area
- Section 301.1.3 Performance

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Performance compliance method Section 301.1.3

- Repairs, alterations, additions, changes in occupancy and relocated buildings complying with Chapter 14 of this code shall be considered in compliance with the provisions of this code.

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PERFORMANCE COMPLIANCE METHODS CHAPTER 14

- The provisions of this chapter shall apply to the alteration, repair, addition and change of occupancy of existing structures, including historic and moved structures, as referenced in Section 301.1.3. The provisions of this chapter are intended to maintain or increase the current degree of public safety, health and general welfare in existing buildings while permitting repair, alteration, addition and change of occupancy without requiring full compliance with Chapters 5 through 13, except where compliance with other provisions of this code is specifically required in this chapter.

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Applicability Section 1401.2 (Michigan)

- Structures existing before November 6, 1974, in which there is work involving additions, alterations, or changes of occupancy shall be made to conform to the requirements of this chapter or the provisions of chapters 5 to13 of the code. The provisions in sections 1401.2.1 to 1401.2.5 shall apply to existing occupancies that will continue to be, or are proposed to be, in groups A, B, E, F, I-2, M, R, and S. This rule shall not apply to buildings with occupancies in group H or I-1, I-3, or I-4.

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Change in occupancy Section 1401.2.1

- Where an existing building is changed to a new occupancy classification and this section is applicable, the provisions of this section for the new occupancy shall be used to determine compliance with this code

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Partial change in occupancy Section 1401.2.2

- Where a portion of the building is changed to a new occupancy classification and that portion is separated from the remainder of the building with fire barrier or horizontal assemblies having a fire-resistance rating as required by Table 508.4 of the International Building Code or Section R317 of the International Residential Code for the separate occupancies, or with approved compliance alternatives, the portion changed shall be made to conform to the provisions of this section.

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Partial change in occupancy Section 1401.2.2

- Where a portion of the building is changed to a new occupancy classification and that portion is not separated from the remainder of the building with fire barriers or horizontal assemblies having a fire-resistance rating as required by Table 508.4 of the International Building Code or Section R317 of the International Residential Code for the separate occupancies, or with approved compliance alternatives, the provisions of this section which apply to each occupancy shall apply to the entire building.

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Partial change in occupancy Section 1401.2.2

- Where there are conflicting provisions, those requirements which secure the greater public safety shall apply to the entire building or structure.

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Additions Section 1401.2.3

- Additions to existing buildings shall comply with the requirements of the International Building Code, International Residential Code, and this code for new construction. The combined height and area of the existing building and the new addition shall not exceed the height and area allowed by Chapter 5 of the International Building Code. Where a fire wall that complies with Section 706 of the International Building Code is provided between the addition and the existing building, the addition shall be considered a separate building.

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Alterations and repairs
Section 1401.2.4

- An existing building or portion thereof that does not comply with the requirements of this code for new construction shall not be altered or repaired in such a manner that results in the building being less safe or sanitary than such building is currently. If, in the alteration or repair, the current level of safety or sanitation is to be reduced, the portion altered or repaired shall conform to the requirements of Chapters 2 through 12 and Chapters 14 through 33 of the International Building Code.

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Accessibility requirements
Section 1401.2.5

- All portions of the buildings proposed for change of occupancy shall conform to the accessibility provisions of section 410.

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Acceptance
Section 1401.3

- For repairs, alterations, additions, and changes of occupancy to existing buildings that are evaluated in accordance with this section, compliance with this section shall be accepted by the code official.

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Hazards
Section 1401.3.1

- Where the code official determines that an unsafe condition exists as provided for in Section 115, such unsafe condition shall be abated in accordance with Section 115.

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Compliance with other codes
Section 1401.3.2

- Buildings that are evaluated in accordance with this section shall comply with the International Fire Code and International Property Maintenance Code.

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Compliance with flood hazard provisions
Section 1401.3.3

- In flood hazard areas, buildings that are evaluated in accordance with this section shall comply with Section 1612 of the International Building Code, or Section R322 of the International Residential Code, as applicable if the work covered by this section constitutes substantial improvement.

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Investigation and evaluation Section 1401.4

- For proposed work covered by this chapter, the building owner shall cause the existing building to be investigated and evaluated in accordance with the provisions of Sections 1401.4 through 1401.9.

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Structural analysis Section 1401.4.1

- The owner shall have a structural analysis of the existing building made to determine adequacy of structural systems for the proposed alteration, addition or change of occupancy. The analysis shall demonstrate that the building with the work completed is capable of resisting the loads specified in Chapter 16 of the International Building Code.

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Submittal Section 1401.4.2

- The results of the investigation and evaluation as required in Section 1401.4, along with proposed compliance alternatives, shall be submitted to the code official.

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Determination of compliance Section 1401.4.3

- The code official shall determine whether the existing building, with the proposed addition, alteration, or change of occupancy, complies with the provisions of this section in accordance with the evaluation process in Sections 1401.5 through 1401.9.

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Evaluation Section 1401.5

- The evaluation shall be comprised of three categories: fire safety, means of egress, and general safety, as defined in Sections 1401.5.1 through 1401.5.3.

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Evaluation Section 1401.5

- 1401.5.1 Fire safety. Included within the fire safety category are the structural fire resistance, automatic fire detection, fire alarm, automatic sprinkler system and fire suppression system features of the facility.
- 1401.5.2 Means of egress. Included within the means of egress category are the configuration, characteristics, and support features for means of egress in the facility.
- 1401.5.3 General safety. Included within the general safety category are the fire safety parameters and the means-of-egress parameters.

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Evaluation process Section 1401.6

- The evaluation process specified herein shall be followed in its entirety to evaluate existing buildings in Groups A, B, E, F, M, R, S and U. For existing buildings in Group I-2, the evaluation process specified herein shall be followed and applied to each and every individual smoke compartment. Table 1401.7 shall be utilized for tabulating the results of the evaluation. References to other sections of this code indicate that compliance with those sections is required in order to gain credit in the evaluation herein outlined.

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Evaluation process Section 1401.6

- In applying this section to a building with mixed occupancies, where the separation between the mixed occupancies does not qualify for any category indicated in Section 1401.6.16, the score for each occupancy shall be determined, and the lower score determined for each section of the evaluation process shall apply to the entire building, or to each smoke compartment for Group I-2 occupancies.

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Evaluation process Section 1401.6

- Where the separation between the mixed occupancies qualifies for any category indicated in Section 1401.6.16, the score for each occupancy shall apply to each portion, or smoke compartment of the building based on the occupancy of the space.

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Evaluation process Section 1401.6

- 1401.6.1 Building height and number of stories.
- 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 systems.
- 1401.6.10 Smoke control.

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Evaluation process Section 1401.6

- 1401.6.11 Means of egress capacity and number.
- 1401.6.12 Dead ends.
- 1401.6.13 Maximum exit access travel distance to an exit.
- 1401.6.14 Elevator control.
- 1401.6.15 Means-of-egress emergency lighting.
- 1401.6.17 Automatic sprinklers.
- 1401.6.18 Standpipes.

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Evaluation process Section 1401.6

- 1401.6.19 Incidental uses.
- 1401.6.20 Smoke compartmentation.
- 1401.6.21 Patient ability, concentration, smoke compartment location and ratio to attendant.

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Evaluating Height Section 1401.6.1

- **1401.6.1.1 Height formula.** The following formulas shall be used in computing the building height value.
- Height value, feet = [(*AH*) – (*EBH*)]/125 x *CF*
- **(Equation 14-1)**
- Height value, stories = (*AS* – *EBS*) × *CF*
- **(Equation 14-2)**

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Evaluating Height Section 1401.6.1

- *AH* = Allowable height in feet (mm) from Section 504 of the *International Building Code*.
- *EBH* = *Existing building* height in feet (mm).
- *AS* = Allowable height in stories from Section 504 of the *International Building Code*.
- *EBS* = *Existing building* height in stories.
- *CF* = 1 if *(AH) – (EBH)* is positive.
- *CF* = Construction-type factor shown in Table 1401.6.6(2) if *(AH) – (EBH)* is negative.

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Evaluating Height Section 1401.6.1

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

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Evaluating Area Section 1401.6.2

- **1401.6.2 Building area.** The value for building area shall be determined by the formula in Section 1401.6.2.2.
- Section 506 of the *International Building Code* and the formula in Section 1401.6.2.1 shall be used to determine the allowable area of the building. Subtract the actual building area from the allowable area and divide by 1,200 square feet (112 m2). Enter the area value and its sign (positive or negative) in Table 1401.7 under Safety Parameter 1401.6.2, Building Area, for fire safety, means of egress and general safety. In determining the area value, the maximum permitted positive value for area is 50 percent of the fire safety score as listed in Table 1401.8, Mandatory Safety Scores. Group I-2 occupancies shall be scored zero.

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Evaluating Area Section 1401.6.2

- **1401.6.2.1 Allowable area formula.** The following formula shall be used in computing allowable area:
- $Aa = At + (NS \times If)$ **(Equation 14-3)**
- *Aa* = Allowable building area per story (square feet).
- *At* = Tabular allowable area factor (NS, S1, S13R, or SM value, as applicable) in accordance with Table 506.2 of the *International Building Code*.
- *NS* = Tabular allowable area factor in accordance with Table 506.2 of the *International Building Code* for a nonsprinklered building (regardless of whether the building is sprinklered).
- *If* = Area factor increase due to frontage as calculated in accordance with Section 506.3 of the *International Building Code*

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Evaluating Area Section 1401.6.2

- **1401.6.2.2 Area formula.** The following formula shall be used in computing the area value. Determine the area value for each occupancy floor area on a floor-by floor basis. For each occupancy, choose the minimum area value of the set of values obtained for the particular occupancy.

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Evaluating Area Section 1401.6.2

$$\text{Area value}_i = \frac{\text{Allowable area}_i}{1200 \text{ square feet}}\left[1 - \left(\frac{\text{Actual area}_i}{\text{Allowable area}_i} + \ldots + \frac{\text{Actual area}_n}{\text{Allowable area}_n}\right)\right]$$

(Equation 14-4)

where:

i = Value for an individual separated occupancy on a floor.

n = Number of separated occupancies on a floor.

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Evaluating Compartmentation Section 1401.6.3

- Evaluate the compartments created by fire barriers or horizontal assemblies which comply with Sections 1401.6.3.1 and 1401.6.3.2 and which are exclusive of the wall elements considered under Sections 1401.6.4 and 1401.6.5. Conforming compartments shall be figured as the net area and do not include shafts, chases, stairways, walls, or columns. Using Table 1401.6.3, determine the appropriate compartmentation value (CV) and enter that value into Table 1401.7 under Safety Parameter 1401.6.3, Compartmentation, for fire safety, means of egress, and general safety.

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Evaluating Compartmentation Walls Section 1401.6.3.1

- A wall used to create separate compartments shall be a fire barrier conforming to Section 707 of the *International Building Code* with a fire-resistance rating of not less than 2 hours.

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Evaluating Compartmentation Walls Section 1401.6.3.1

- Where the building is not divided into more than one compartment, the compartment size shall be taken as the total floor area on all floors. Where there is more than one compartment within a story, each compartmented area on such story shall be provided with a horizontal exit conforming to Section 1026 of the *International Building Code*. The fire door serving as the horizontal exit between compartments shall be so installed, fitted, and gasketed that such fire door will provide a substantial barrier to the passage of smoke.

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Evaluating Compartmentation Floors Section 1401.6.3.2

- A floor/ceiling assembly used to create compartments shall conform to Section 711 of the *International Building Code* and shall have a fire-resistance rating of not less than 2 hours.

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Evaluating Tenant and Dwelling Separations Section 1401.6.4

- Evaluate the fire-resistance rating of floors and walls separating tenants, including dwelling units, and not evaluated under Sections 1401.6.3 and 1401.6.5. Group I-2 occupancies shall evaluate the rating of the separations between patient sleeping rooms.

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Evaluating Tenant and Dwelling Separations Section 1401.6.4

- Under the categories and occupancies in Table 1401.6.4, determine the appropriate value and enter that value in Table 1401.7 under Safety Parameter 1401.6.4, Tenant and Dwelling Unit Separation, for fire safety, means of egress, and general safety.

TABLE 1401.6.4
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
I-2	0	1	2	3	4
S-2	-5	-2	0	2	4

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Evaluating Tenant and Dwelling Separations Section 1401.6.4

- 1. Category a—No fire partitions; incomplete fire partitions; no doors; doors not self-closing or automatic-closing.
- 2. Category b—Fire partitions or floor assemblies with less than 1-hour fire-resistance ratings.
- Category c—Fire partitions with 1-hour or greater fire-resistance ratings and floor assemblies with 1-hour but less than 2-hour fire-resistance ratings or with only one tenant within the floor area.
- 4. Category d—Fire barriers with 1-hour but less than 2-hour fire-resistance ratings and floor assemblies with 2-hour or greater fire-resistance ratings.
- 5. Category e—Fire barriers and floor assemblies with 2-hour or greater fire-resistance ratings.

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Evaluating Corridor Walls Section 1401.6.5

- Evaluate the fire-resistance rating and degree of completeness of walls which create corridors serving the floor and that are constructed in accordance with Section 1020 of the *International Building Code*. This evaluation shall not include the wall elements considered under Sections 1401.6.3 and 1401.6.4. Under the categories and groups in Table 1401.6.5, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.5, Corridor Walls, for fire safety, means of egress, and general safety.

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Evaluating Corridor Walls Section 1401.6.5

TABLE 1401.6.5
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
I-2	-10	0	1	2

a Corridors not providing at least one-half the exit access travel distance for all occupants on a floor shall use Category b.

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Evaluating Corridor Walls Section 1401.6.5

- 1. Category a—No fire partitions; incomplete fire partitions; no doors; or doors not self-closing.
- 2. Category b—Less than 1-hour fire-resistance rating or not constructed in accordance with Section 708.4 of the *International Building Code*.
- 3. Category c—1-hour to less than 2-hour fire-resistance rating, with doors conforming to Section 716 of the *International Building Code* or without corridors as permitted by Section 1020 of the *International Building Code*.
- 4. Category d—2-hour or greater fire-resistance rating, with doors conforming to Section 716 of the *International Building Code*.

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Evaluating Vertical Openings Section 1401.6.6

- Evaluate the fire-resistance rating of interior exit stairways or ramps, hoistways, escalator openings, and other shaft enclosures within the building, and openings between two or more floors. Table 1401.6.6(1) contains the appropriate protection values. Multiply that value by the construction-type factor found in Table 1401.6.6(2). Enter the vertical opening value and its sign (positive or negative) in Table 1401.7 under Safety Parameter 1401.6.6, Vertical Openings, for fire safety, means of egress, and general safety. If the structure is a one-story building or if all the unenclosed vertical openings within the building conform to the requirements of Section 713 of the *International Building Code*, enter a value of 2. The maximum positive value for this requirement shall be 2.

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Evaluating Vertical Openings Section 1401.6.6

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

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

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Evaluating Vertical Openings Section 1401.6.6

- **1401.6.6.1 Vertical opening formula.** The following formula shall be used in computing vertical opening value.
- $VO = PV \times CF$ **(Equation 14-5)**
- where:
- *VO* = Vertical opening value.
- *PV* = Protection value from Table 1401.6.6.(1).
- *CF* = Construction-type factor from Table 1401.6.6.(2).

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Evaluating HVAC Systems Section 1401.6.7

- Evaluate the ability of the HVAC system to resist the movement of smoke and fire beyond the point of origin. Under the categories in Section 1401.6.7.1, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.7, HVAC Systems, for fire safety, means of egress, and general safety. Facilities in Group I-2 occupancies meeting Categories a, b or c shall be considered to fail the evaluation.

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Evaluating HVAC Systems Section 1401.6.7

- 1. Category a—Plenums not in accordance with Section 602 of the *International Mechanical Code*. -10 points.
- 2. Category b—Air movement in egress elements not in accordance with Section 1018.5 of the *International Building Code*. -5 points.
- 3. Category c—Both Categories a and b are applicable. -15 points.
- 4. Category d—Compliance of the HVAC system with Section 1020.5 of the *International Building Code* and Section 602 of the *International Mechanical Code*. 0 points.
- 5. Category e—Systems serving one story; or a central boiler/chiller system without ductwork connecting two or more stories. +5 points.

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Evaluating Fire Detection Section 1401.6.8

- Evaluate the smoke detection capability based on the location and operation of automatic fire detectors in accordance with Section 907 of the *International Building Code* and the *International Mechanical Code*. Under the categories and occupancies in Table 1401.6.8, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.8, Automatic Fire Detection, for fire safety, means of egress, and general safety. Facilities in Group I-2 occupancies meeting Category a, b or c shall be considered to fail the evaluation.

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Evaluating Fire Detection Section 1401.6.8

TABLE 1401.6.8
AUTOMATIC FIRE DETECTION VALUES

OCCUPANCY	CATEGORIES					
	a	b	c	d	e	f
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	—
I-2	NP	NP	NP	4	5	2

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Evaluating Fire Detection Section 1401.6.8

- 1. Category a—None.
- 2. Category b—Existing smoke detectors in HVAC systems and maintained in accordance with the *International Fire Code*.
- 3. Category c—Smoke detectors in HVAC systems. The detectors are installed in accordance with the requirements for new buildings in the *International Mechanical Code*.
- 4. Category d—Smoke detectors throughout all floor areas other than individual sleeping units, tenant spaces and dwelling units.
- 5. Category e—Smoke detectors installed throughout the floor area.
- 6. Category f—Smoke detectors in corridors only.

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Evaluating Fire Alarm System Section 1401.6.9

- Evaluate the capability of the fire alarm system in accordance with Section 907 of the *International Building Code*. Under the categories and occupancies in Table 1401.6.9, determine the appropriate value and enter that value into Table 1401.7 under safety Parameter 1401.6.9, Fire Alarm System, for fire safety, means of egress, and general safety.

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Evaluating Fire Alarm System Section 1401.6.9

TABLE 1401.6.9
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
F, M, S	0	5	10	15
I-2	-4	1	2	5

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

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Evaluating Fire Alarm System Section 1401.6.9

- 1. Category a—None.
- 2. Category b—Fire alarm system with manual fire alarm boxes in accordance with Section 907.4 of the *International Building Code* and alarm notification appliances in accordance with Section 907.5.2 of the *International Building Code*.
- 3. Category c—Fire alarm system in accordance with Section 907 of the *International Building Code*.
- 4. Category d—Category c plus a required emergency voice/alarm communications system and a fire command station that conforms to Section 911 of the *International Building Code* and contains the emergency voice/alarm communications system controls, fire department communication system controls, and any other controls specified in Section 911 of the *International Building Code* where those systems are provided.

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Evaluating Smoke Control System Section 1401.6.10

- Evaluate the ability of a natural or mechanical venting, exhaust, or pressurization system to control the movement of smoke from a fire. Under the categories and occupancies in Table 1401.6.10, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.10, Smoke Control, for means of egress and general safety.

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Evaluating Smoke Control System Section 1401.6.10

TABLE 1401.6.10
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]
I-2	-4	0	0	0	3	0

a. This value shall be 0 if compliance with Category d or e in Section 1401.6.8.1 has not been obtained.

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Evaluating Smoke Control System Section 1401.6.10

- 1. Category a—None.
- 2. Category b—The building is equipped throughout with an automatic sprinkler system. Openings are provided in exterior walls at the rate of 20 square feet (1.86 m2) per 50 linear feet (15 240 mm) of exterior wall in each story and distributed around the building perimeter at intervals not exceeding 50 feet (15 240 mm). Such openings shall be readily openable from the inside without a key or separate tool and shall be provided with ready access thereto. In lieu of operable openings, clearly and permanently marked tempered glass panels shall be used.
- 3. Category c—One enclosed exit stairway, with ready access thereto, from each occupied floor of the building. The stairway has operable exterior windows, and the building has openings in accordance with Category b.
- 4. Category d—One smokeproof enclosure and the building has openings in accordance with Category b.
- 5. Category e—The building is equipped throughout with an automatic sprinkler system. Each floor area is provided with a mechanical air-handling system designed to accomplish smoke containment. Return and exhaust air shall be moved directly to the outside without recirculation to other floor areas of the building under fire conditions. The system shall exhaust not less than six air changes per hour from the floor area. Supply air by mechanical means to the floor area is not required. Containment of smoke shall be considered as confining smoke to the floor area involved without migration to other floor areas. Any other tested and approved design that will adequately accomplish smoke containment is permitted.
- 6. Category f—Each stairway shall be one of the following: a smokeproof enclosure in accordance with Section 1023.11 of the *International Building Code*; pressurized in accordance with Section 909.20.5 of the *International Building Code*; or shall have operable exterior windows.

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Evaluating Means of Egress Section 1401.6.11

- Evaluate the means of egress capacity and the number of exits available to the building occupants. In applying this section, the means of egress are required to conform to the following sections of the *International Building Code:* 1003.7, 1004, 1005, 1006, 1007, 1016.2, 1026.1, 1028.2, 1028.5, 1029.2, 1029.3, 1029.4 and 1030. The number of exits credited is the number that is available to each occupant of the area being evaluated. Existing fire escapes shall be accepted as a component in the means of egress when conforming to Section 405. Under the categories and occupancies in Table 1401.6.11, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.11, Means of Egress Capacity, for means of egress and general safety.

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Evaluating Means of Egress Section 1401.6.11

TABLE 1401.6.11
MEANS OF EGRESS VALUES[a]

OCCUPANCY	CATEGORIES				
	a	b	c	d	e
A-1, A-2, A-3, A-4, E, I-2	-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. The values indicated are for buildings six stories or less in height. For buildings over six stories above grade plane, add an additional -10 points.

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Evaluating Means of Egress Section 1401.6.11

- 1. Category a—Compliance with the minimum required means-of-egress capacity or number of exits is achieved through the use of a fire escape in accordance with Section 405.
- 2. Category b—Capacity of the means of egress complies with Section 1005 of the *International Building Code*, and the number of exits complies with the minimum number required by Sectio 1006 of the *International Building Code*.
- 3. Category c—Capacity of the means of egress is equal to or exceeds 125 percent of the required means-of-egress capacity, the means of egress complies with the minimum required width dimensions specified in the *International Building Code*, and the number of exits complies with the minimum number required by Section 1006 of the *International Building Code*.
- 4. Category d—The number of exits provided exceeds the number of exits required by Section 1006 of the *International Building Code*. Exits shall be located a distance apart from each other equal to not less than that specified in Section 1007 of the *International Building Code*.
- 5. Category e—The area being evaluated meets both Categories c and d.

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Evaluating Dead Ends Section 1401.6.12

- In spaces required to be served by more than one means of egress, evaluate the length of the exit access travel path in which the building occupants are confined to a single path of travel. Under the categories and occupancies in Table 1401.6.12, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.12, Dead Ends, for means of egress and general safety.

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Evaluating Dead Ends Section 1401.6.12

TABLE 1401.6.12
DEAD-END VALUES

OCCUPANCY	CATEGORIES[a]			
	a	b	c	d
A-1, A-3, A-4, B, F, M, R, S	-2	0	2	-4
A-2, E	-2	0	2	-4
I-2	-2	0	2	-6

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

69

Evaluating Dead Ends Section 1401.6.12

- 1. Category a—Dead end of 35 feet (10 670 mm) in nonsprinklered buildings or 70 feet (21 340 mm) in sprinklered buildings.
- 2. Category b—Dead end of 20 feet (6096 mm); or 50 feet (15 240 mm) in Group B in accordance with Section 1020.4, Exception 2, of the International Building Code.
- 3. Category c—No dead ends; or ratio of length to width (l/w) is less than 2.5:1.
- 4. Category d—Dead ends exceeding Category a.

70

Evaluating Exit Access Travel Distance Section 1401.6.13

- Evaluate the length of exit access travel to an approved exit. Determine the appropriate points in accordance with the following equation and enter that value into Table 1401.7 under Safety Parameter 1401.6.13, Maximum Exit Access Travel Distance for means of egress and general safety. The maximum allowable exit access travel distance shall be determined in accordance with Section 1016.1 of the *International Building Code*.

71

Evaluating Exit Access Travel Distance Section 1401.6.13

$$\text{Points} = 20 \times \frac{\text{Maximum allowable travel distance} - \text{Maximum actual travel distance}}{\text{Maximum allowable travel distance}}$$

(Equation 14-6)

72

Evaluating Elevator Control Section 1401.6.14

- Evaluate the passenger elevator equipment and controls that are available to the fire department to reach all occupied floors. Elevator recall controls shall be provided in accordance with the Michigan elevator code, R 408.7001 to R 408.8695. Under the categories and occupancies in table 1401.6.14, determine the appropriate value and enter that value into table 1401.7 under safety parameter 1401.6.14, elevator control, for fire safety, means of egress, and general safety. The values shall be zero for a single-story building.

73

Evaluating Elevator Control Section 1401.6.14

TABLE 1401.6.14
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

For SI: 1 foot = 304.8 mm.
NP = Not permitted.

74

Evaluating Elevator Control Section 1401.6.14

- 1. Category a—No elevator.
- 2. Category b—Any elevator without Phase I emergency recall operation and Phase II emergency in-car operation.
- 3. Category c—All elevators with Phase I emergency recall operation and Phase II emergency in-car operation as required by the *International Fire Code*.
- 4. Category d—All meet Category c; or Category b where permitted to be without Phase I emergency recall operation and Phase II emergency in-car operation; and at least one elevator that complies with new construction requirements serves all occupied floors.

75

Evaluating Emergency Lighting Section 1401.6.15

- Evaluate the presence of and reliability of means-of-egress emergency lighting. Under the categories and occupancies in Table 1401.6.15, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.15, Means-of-Egress Emergency Lighting, for means of egress and general safety.

76

Evaluating Means of Egress Emergency Lighting Section 1401.6.15

TABLE 1401.6.15
MEANS-OF-EGRESS EMERGENCY LIGHTING VALUES

NUMBER OF EXITS REQUIRED BY SECTION 1015 OF THE *INTERNATIONAL BUILDING CODE*	CATEGORIES		
	a	b	c
Two or more exits	NP	0	4
Minimum of one exit	0	1	1

NP = Not permitted.

77

Evaluating Means of Egress Emergency Lighting Section 1401.6.16

- 1. Category a—Means-of-egress lighting and exit signs not provided with emergency power in accordance with Section 2702 of the *International Building Code*.
- 2. Category b—Means-of-egress lighting and exit signs provided with emergency power in accordance with Section 2702 of the *International Building Code*.
- 3. Category c—Emergency power provided to means-of-egress lighting and exit signs, which provides protection in the event of power failure to the site or building.

78

Evaluating Mixed Occupancy Section 1401.6.16

- Where a building has two or more occupancies that are not in the same occupancy classification, the separation between the mixed occupancies shall be evaluated in accordance with this section. Where there is no separation between the mixed occupancies or the separation between mixed occupancies does not qualify for any of the categories indicated in Section 1401.6.16.1, the building shall be evaluated as indicated in Section 1401.6, and the value for mixed occupancies shall be zero.

79

Evaluating Mixed Occupancy Section 1401.6.16

- Under the categories and occupancies in Table 1401.6.16, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.16, Mixed Occupancies, for fire safety and general safety. For buildings without mixed occupancies, the value shall be zero. Facilities in Group I-2 occupancies meeting Category a shall be considered to fail the evaluation.

80

Evaluating Mixed Occupancy Section 1401.6.16

TABLE 1401.6.16
MIXED OCCUPANCY 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
I-2	NP	0	5

NP = not permitted.
a. For fire-resistance ratings between categories, the value shall be obtained by linear interpolation.

81

Evaluating Mixed Occupancy Section 1401.6.16

- 1. Category a—Occupancies separated by minimum 1-hour fire barriers or minimum 1-hour horizontal assemblies, or both.
- 2. Category b—Separations between occupancies in accordance with Section 508.4 of the *International Building Code*.
- 3. Category c—Separations between occupancies having a fire-resistance rating of not less than twice that required by Section 508.4 of the *International Building Code*.

82

Evaluating Automatic Sprinklers Section 1401.6.17

- Evaluate the ability to suppress a fire based on the installation of an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*. "Required sprinklers" shall be based on the requirements of this code. Under the categories and occupancies in Table 1401.6.17, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.17, Automatic Sprinklers, for fire safety, means of egress divided by 2, and general safety.

83

Evaluating Automatic Sprinklers Section 1401.6.17

- High-rise buildings defined in Chapter 2 of the *International Building Code* that undergo a *change of occupancy* to Group R shall be equipped throughout with an automatic sprinkler system in accordance with Section 403 of the *International Building Code* and Chapter 9 of the *International Building Code*. Facilities in Group I-2 occupancies meeting Category a, b, c or f shall be considered to fail the evaluation.

84

Evaluating Automatic Sprinklers Section 1401.6.17

TABLE 1401.6.17
SPRINKLER SYSTEM VALUES

OCCUPANCY	CATEGORIES					
	a[a]	b[a]	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
I-2	NP	NP	NP	8	10	NP

NP = not permitted.
a. These options cannot be taken if Category a in Section 1401.6.18 is used.

85

Evaluating Automatic Sprinklers Section 1401.6.17

- 1. Category a—Sprinklers are required throughout; sprinkler protection is not provided or the sprinkler system design is not adequate for the hazard protected in accordance with Section 903 of the
- *International Building Code*.
- 2. Category b—Sprinklers are required in a portion of the building; sprinkler protection is not provided or the sprinkler system design is not adequate for the hazard protected in accordance with Section 903 of the *International Building Code*.
- 3. Category c—Sprinklers are not required; none are provided.
- 4. Category d—Sprinklers are required in a portion of the building; sprinklers are provided in such portion; the system is one that complied with the code at the time of installation and is maintained and supervised in accordance with Section 903 of the *International Building Code*.
- 5. Category e—Sprinklers are required throughout; sprinklers are provided throughout in accordance with Chapter 9 of the *International Building Code*.
- 6. Category f—Sprinklers are not required throughout; sprinklers are provided throughout in accordance with Chapter 9 of the *International Building Code*.

86

Evaluating Standpipes Section 1401.6.18

- Evaluate the ability to initiate attack on a fire by a making supply of water available readily through the installation of standpipes in accordance with Section 905 of the International Building Code. "Required Standpipes" shall be based on the requirements of the International Building Code. Under the categories and occupancies in Table 1401.6.18, determine the appropriate value and enter that value into Table 1401.7 under Safety Parameter 1401.6.18, Standpipes, for fire safety, means of egress, and general safety.

87

Evaluating Standpipes Section 1401.6.18

TABLE 1401.6.18
STANDPIPE SYSTEM VALUES

OCCUPANCY	CATEGORIES			
	a[a]	b	c	d
A-1, A-3, F, M, R, S-1	-6	0	4	6
A-2	-4	0	2	4
A-4, B, E, S-2	-12	0	6	12
I-2	-2	0	1	2

a. This option cannot be taken if Category a or Category b in Section 1401.6.17 is used.

88

Evaluating Standpipes Section 1401.6.18

- 1. Category a—Standpipes are required; standpipe is not provided or the standpipe system design is not in compliance with Section 905.3 of the International Building Code.
- 2. Category b—Standpipes are not required; none are provided.
- 3. Category c—Standpipes are required; standpipes are provided in accordance with Section 905 of the International Building Code.
- 4. Category d—Standpipes are not required; standpipes are provided in accordance with Section 905 of the International Building Code.

89

Evaluating Incidental Uses Section 1401.6.19

- Evaluate the protection of incidental uses in accordance with Section 509.4.2 of the International Building Code. Do not include those where this code requires automatic sprinkler systems throughout the building including covered and open mall buildings, high-rise buildings, public garages and unlimited area buildings. Assign the lowest score from Table 1401.6.19 for the building or floor area being evaluated and enter that value into Table 1401.7 under Safety Parameter 1401.6.19, Incidental Uses, for fire safety, means of egress and general safety. If there are no specific occupancy areas in the building or floor area being evaluated, the value shall be zero.

90

Evaluating Incidental Uses Section 1401.6.19

TABLE 1401.6.19
INCIDENTAL USE AREA VALUES

PROTECTION REQUIRED BY TABLE 509 OF THE INTERNATIONAL BUILDING CODE	PROTECTION PROVIDED						
	None	1 hour	AS	AS with CRS	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 CRS	-1	0	-1	-1	0	0	0
AS with CRS	-1	-1	-1	-1	0	-1	0
1 hour or AS	-1	0	0	0	0	0	0

AS = Automatic sprinkler system.
CRS = Construction capable of resisting the passage of smoke (see IBC Section 509.4.2 of the *International Building Code*).
Note: For Table 1401.7, see page 75.

91

Evaluating Smoke Compartmentation Section 1401.6.20

- Evaluate the smoke compartments for compliance with Section 407.5 of the International Building Code. Under the categories and occupancies in Table 1401.6.20, determine the appropriate smoke compartmentation value (SCV) and enter that value into Table 1401.7 under Safety Parameter 1401.6.20, Smoke compartmentation, for fire safety, means of egress and general safety. Facilities in Group I-2 occupancies meeting Category b or c shall be considered to fail the evaluation.

92

Evaluating Smoke Compartmentation Section 1401.6.20

TABLE 1401.6.20
SMOKE COMPARTMENTATION VALUES

OCCUPANCY	CATEGORIES[a]		
	a	b	c
A, B, E, F, M, R and S	0	0	0
I-2	0	NP	NP

For SI: 1 square foot = 0.093 m^2.
NP = Not permitted.
a. For areas between categories, the smoke compartmentation value shall be obtained by linear interpolation.

93

Evaluating Smoke Compartmentation Section 1401.6.20

- 1. Category a—Smoke compartment size is equal to or less than 22,500 square feet (2092 m2).
- 2. Category b—Smoke compartment size is greater than 22,500 square feet (2092 m2).
- 3. Category c—Smoke compartments are not provided.

94

Evaluating Patient Ability, Concentration, Attendant Ratio Section 1401.6.21

- In I-2 occupancies, the ability of patients, their concentration and ratio to attendants shall be evaluated and applied in accordance with this section. Evaluate each smoke compartment using the categories in Sections 1401.6.21.1, 1401.6.21.2 and 1401.6.21.3 and enter the value in Table 1401.8. To determine the safety factor, multiply the three values together, if the sum is 9 or greater, compliance has failed.

95

Evaluating Patient Ability Section 1401.6.21.1

- Evaluate the ability of the patients for self-preservation in each smoke compartment in an emergency. Under the categories and occupancies in Table 1401.6.21.1 determine the appropriate value and enter that value in Table 1401.7 under Safety Parameter 1401.6.21.1, Patient Ability for Self-preservation, for means of egress and general safety.

96

Evaluating Patient Ability Section 1401.6.21.1

TABLE 1401.6.21.1
PATIENT ABILITY VALUES

OCCUPANCY	CATEGORIES		
	a	b	c
I-2	1	2	3

1. Category a—(mobile) Patients are capable of self-preservation without assistance.
2. Category c—(not mobile) Patients rely on assistance for evacuation or relocation.
3. Category d—(not movable) Patients cannot be evacuated or relocated.

97

Evaluating Concentration Section 1401.6.21.2

- Evaluate the concentration of patients in each smoke compartment under Section 1401.6.21.2. Under the categories and occupancies in Table 1401.6.21.2 determine the appropriate value and enter that value in Table 1401.7 under Safety Parameter 1401.6.21.2, Patient Concentration, for means of egress and general safety.

98

Evaluating Concentration Section 1401.6.21.2

TABLE 1401.6.21.2
PATIENT CONCENTRATION VALUES

OCCUPANCY	CATEGORIES		
	a	b	c
I-2	1	2	3

1. Category a—attendant-to-patient concentrations is 1:5.
2. Category b—attendant-to-patient concentrations is 1:6 to 1:10.
3. Category c—attendant-to-patient concentrations is greater than 1:10 or no patients.

99

Evaluating Attendant to patient Ratio Section 1401.6.21.3

- Evaluate the attendant-to-patient ratio for each compartment under Section 1401.6.21.3. Under the categories and occupancies in Table 1401.6.21.3 determine the appropriate value and enter that value in Table 1401.7 under Safety Parameter 1401.6.21.3, Attendant-to-patient Ratio, for means of egress and general safety.

100

Evaluating Attendant to patient Ratio Section 1401.6.21.3

TABLE 1401.6.21.3
ATTENDANT-TO-PATIENT RATIO VALUES

OCCUPANCY	CATEGORIES		
	a	b	c
I-2	1	2	3

1. Category a—attendant-to-patient concentrations is 1:5.
2. Category b—attendant-to-patient concentrations is 1:6 to 1:10.
3. Category c—attendant-to-patient concentrations is greater than 1:10 or no patients.

101

Building score Section 1401.7

- After determining the appropriate data from Section 1401.6, enter those data in Table 1401.7 and total the building score.

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SUMMARY SHEET- BUILDING CODE TABLE 1401.7

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Safety scores Section 1401.8

- The values in Table 1401.8 are the required mandatory safety scores for the evaluation process listed in Section 1401.6.

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
I-2	19	34	34
M	23	40	40
R	21	38	38
S-1	19	29	29
S-2	29	39	39

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Evaluation of building safety Section 1401.9

- The mandatory safety score in Table 1401.8 shall be subtracted from the building score in Table 1401.7 for each category. Where the final score for any category equals zero or more, the building is in compliance with the requirements of this section for that category.
- Where the final score for any category is less than zero, the building is not in compliance with the requirements of this section.

105

Mixed occupancies Section 1401.9.1

- For mixed occupancies, the following provisions shall apply:
- 1. Where the separation between mixed occupancies does not qualify for any category indicated in Section 1401.6.16, the mandatory safety scores for the occupancy with the lowest general safety score in Table 1401.8 shall be utilized. (See Section 1401.6.)
- 2. Where the separation between mixed occupancies qualifies for any category indicated in Section 1401.6.16, the mandatory safety scores for each occupancy shall be placed against the evaluation scores for the appropriate occupancy.

106

Summary

- The performance evaluation procedure of Mr.CEB gives us a way to evaluate work proposed to take place in a specific building with specific features to determine that the results will comply with a minimum level of safety for the intended occupancy even though the building will not comply with the requirements for a new building or with the other options of the rehabilitation code.

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