Performing Construction in **Existing Buildings**

Joint Meeting: AIA Detroit BCRC / SEMBOIA / USGBC

Fall Training Event
Venetian Club – Madison Heights, Michigan
September 20, 2017

Presenter and Class Information:
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State Program Approval Number: #18381

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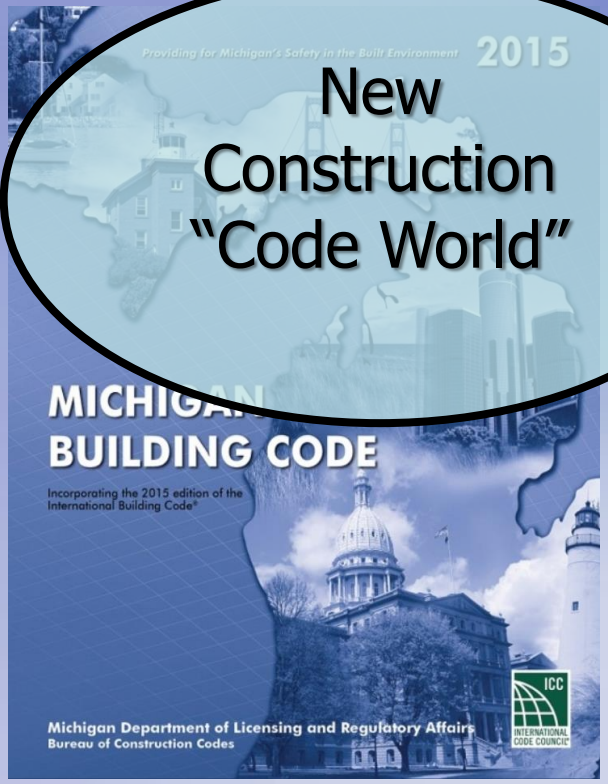
General Information

- Class Objectives
  - Identify applicable code options for new v. existing buildings
  - Discuss the philosophy and summarized history of code provisions for existing buildings and how LEED v4 relates
  - Review the different types of construction activity in the MRCEB (i.e., repairs, alterations, change of occupancy), their code requirements, and examples of how these MRCEB provisions are in alignment with sustainable design
  - Explore lessons learned from practical application of these MRCEB and LEED v4 provisions from various case studies

    For the purpose of this presentation, assume that the term "building" is not subject to the Fire Prevention Code Act 207 of 1941 (e.g., schools governed by NFPA 101 and BFS)

Codes (New v. Existing Buildings)

- Think Differently…



New Construction "Code World"

Existing Building "Code World"

Codes (New v. Existing Buildings)

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Codes (New v. Existing Buildings)

- New Buildings
  - **Total of 2 potential code compliant options**
- Existing Buildings
  - **Total of 6 potential code compliant options**
  - With very few exceptions (i.e., smoke detectors), existing buildings do not have to conform to current or evolving code requirements; they must conform to the *original* requirements they were *originally* built under.
  - Stated another way: *A building that does not conform to the current code is not necessarily dangerous or inadequate.*
  - **Why???**

Codes (New v. Existing Buildings)

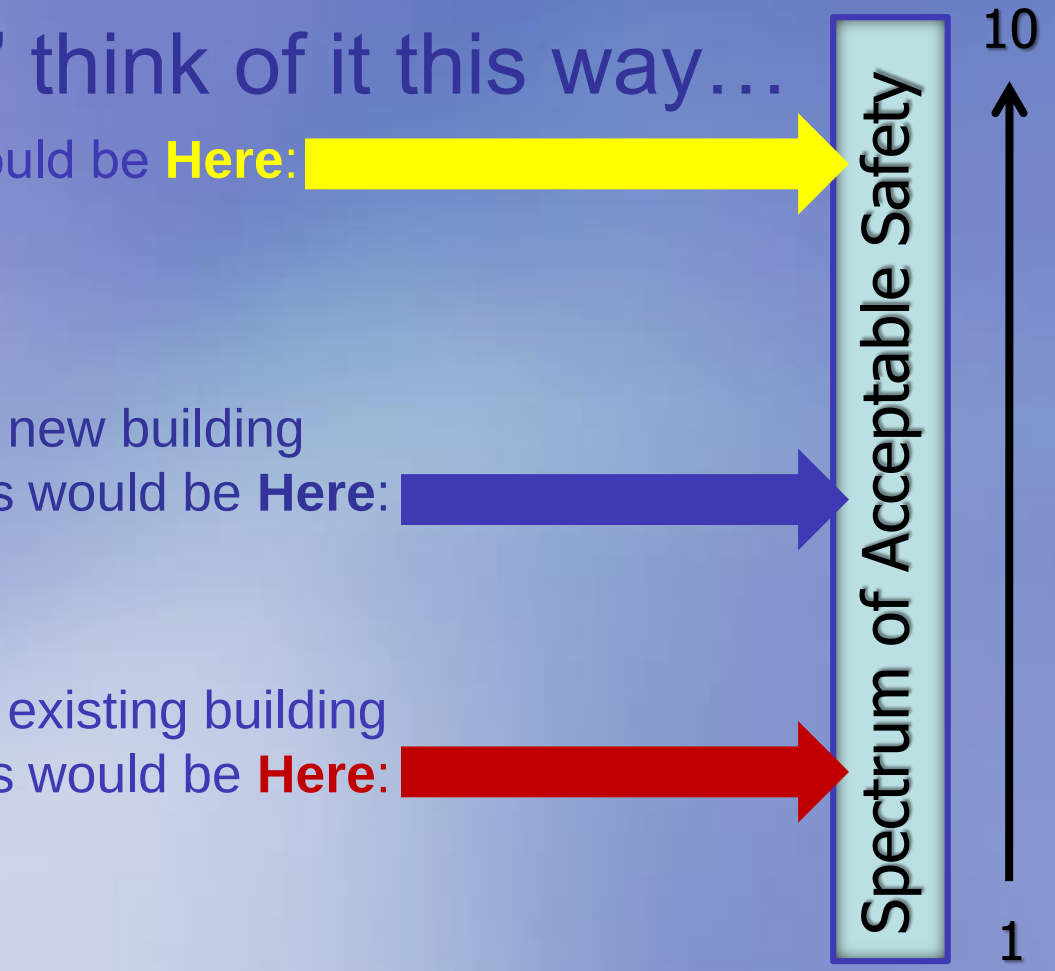
- Why different req's for Existing Buildings?
  - $↑ : In general, it costs more to fully rehab an existing building than to newly construct the same building
  - $$↑: Different obstacles exist for rehab/repair than new work
  - $$$$↑: To upgrade an existing structure to current code requirements has historically proved cost prohibitive
    - During evaluation phase, it would prove more cost effective to build new rather than upgrade old
    - Mid-1960's: President Lyndon Johnson identified building codes as a national study to understand the causes of **urban blight** and to expand available, affordable housing for low-income Americans.
    - 1980 Rehabilitation Guidelines (US Dept of HUD)
      - » Targeted: 25-50% Rule / Change of Occupancy Rule
    - *Result: Codes changed / evolution of Existing Building Code began…*

Codes (New v. Existing Buildings)

- Why different req's for Existing Buildings?
  - **Intent of 2015 MBC**: "…to establish the minimum requirements to provide a reasonable level of safety, public health and general welfare…attributed to the built environment…" (2015 MBC, Section 101.3)
  - **Intent of 2015 MRCEB**: "…to provide **flexibility** to permit the use of **alternative approaches** to achieve compliance with minimum requirements to safeguard the public health, safety and welfare **insofar as they are affected by** the repair, alteration, change of occupancy, addition and relocation of existing buildings." (2015 MRCEB, Section 101.3)

Codes (New v. Existing Buildings)

- In “Code World” think of it this way…
  - “Great Design” would be **Here**:
  - Meeting minimum new building code requirements would be **Here**:
  - Meeting minimum existing building code requirements would be **Here**:



Codes (New v. Existing Buildings)

- New Buildings
  - **Total of 2 potential code compliant options**
  - 2015 Michigan Building Code (MBC)
    - Section 101.2 Scope “The provisions of this code shall apply to the construction…of every building or structure…” [emphasis added]
    - Applies to all building types, including qualifying MRC types if desired…
  - 2015 Michigan Residential Code (MRC)
    - Section R101.2 Scope “The provisions of…[this code]…shall apply to the construction…of detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress and their accessory structures.”

Codes (New v. Existing Buildings)

- Existing Buildings (Construction Activity)
  - **Total of 6 potential code compliant options**
  - 2015 Michigan Building Code (Chapters 3 thru 33)
  - 2015 Michigan Residential Code (Chapters 3 thru 43)
  - 2015 Michigan Residential Code (Appendix J)
    - Section AJ101.1 General “The purpose of these provisions is to encourage the continued use or reuse of legally existing buildings and structures. These provisions are intended to permit work in existing buildings that is consistent with the purpose of the… [MRC]…. Compliance with these provisions shall be deemed to meet the requirements of the…[MRC]….” [info in brackets added]

Codes (New v. Existing Buildings)

- Existing Buildings (Construction Activity)
  - 2015 Michigan Rehabilitation Code for Existing Buildings (MRCEB)
    - Section 101.2 Scope “The provisions of this code shall apply to the repair, alteration, change of occupancy, addition, and relocation of existing buildings…. [Work]…complying with the provisions of the…[MBC and MRC]…shall be considered to be in compliance with this code.”
    - There are **3 different compliance methods** within the MRCEB:
      - » Prescriptive (Chapter 4)
      - » Work Area (Chapters 5 thru 13)
      - » Performance (Chapter 14)

Codes (New v. Existing Buildings)

- Existing Buildings (No Construction)
  - **Only 3 primary codes which apply**
    - Code used to originally construct building (e.g., 1975 BOCA)
    - Fire and Property Maintenance Codes (Local vs. Statewide)
      - » Most local communities have adopted some form of Fire and/or Property Maintenance Code (e.g., 2012 IFC and 2009 IPMC)
      - » Per Public Act 230 of 1972 (Stille-Derossett-Hale Single State Construction Code Act) and its statewide adoption of the MBC dating back to July 31, 2001 (2000 MBC) ***a debate can exist that***, by reference, the IFC and IPMC editions included in MBC Ch. 35 are also adopted statewide. The "prescribed extent" (MBC Section 101.4) of the reference to the listed editions of the IFC and IPMC is so broad and all encompassing, one can believe that the IFC and IPMC are also applicable. ***This is incorrect, they are not, both must be adopted locally to be applicable (*).***
  - *Verify which IFC and IPMC is enforced with Local Authority*

Different Types of ‘Construction Activity’

- MBC and MRCEB recognized activity
  - Repairs
  - Alterations
  - Additions
  - Change of Occupancy
  - Relocation
- Other commonly used terms
  - Reconstruction, re-build, renewal, rehabilitation, renovation, restoration, preservation, re-use, adaptive re-use, stabilization, revival, remodel…
  - *Alphabet soup & bastardizing: “Remodelization” ???*

Different Types of 'Construction Activity'

- Repairs vs. Alterations
  - Different code requirements per type of 'activity'
  - **Can be debatable…**
    - ***When is something a 'repair' and not an 'alteration'?***
  - **"Alterations"** defined the same way in MBC and MRCEB
    - MBC and MRCEB Section 202: "Any construction or renovation to an existing structure other than repair or addition."
  - Therefore, the **definition of "repair"** will determine if something is a repair or an alteration, not the definition of "alteration".

Different Types of 'Construction Activity'

- Repairs vs. Alterations
  - **MBC and MBC now define "Repair" the same way…**
    - **MBC & MRCEB Section 202** "The **reconstruction or renewal** of any part of an existing building for the purpose of its maintenance **or to correct damage**."
    - *Note that there are no limits on extent or cost of "repairs"; they can be quite **extensive and encompassing***
    - *This is consistent with the specific provisions within the MRCEB since "Substantial Structural Damage", and the work necessary to address it, is contained in Chapter 6 Repairs of the MRCEB*

Different Types of 'Construction Activity'

- Repairs vs. Alterations
  - **Other Source Definitions of "Repair":**
    - **Merriam-Webster Unabridged Dictionary:** "to restore by replacing a part or putting together what is torn or broken…to restore to a sound or healthy state…to make good…to make up for: compensate for…"
  - **Other Source Definitions of "Alteration" or "Alter":**
    - **Merriam-Webster Unabridged Dictionary:** "to cause to become different in some particular characteristic (as measure, dimension… arrangement,…) without changing into something else…"

Different Types of 'Construction Activity'

- Repairs vs. Alterations
  - **Bureau of Construction Codes (BCC) Opinions:**
    - **Mr. Irvin J. Poke, Former Director of BCC (November 2002 BCC Bulletin):** "An alteration is the **physical rearrangement** or addition **of space and building elements**. The repair, removal or replacement of finishes and fixtures are not considered alterations. A building owner may repair finishes or completely remove and replace them and will not be subject to the requirements of accessibility."
      - » (Article Ref: "Accessibility and Existing Structures)
    - **Mr. Todd Y. Cordill, Former Chief; Plan Review Division of BCC (Winter 2014 BCC Bulletin):** "**Repairs and in-kind replacement** of **finishes and fixed equipment** are not considered alterations, unless they involve the **reconfiguration of space** within a building. The **removal and in-kind replacement** of plumbing fixtures and fixed equipment are not deemed alterations."
      - » (Article Ref: "Barrier Free Requirements for Existing Buildings)

Different Types of 'Construction Activity'

- Repairs vs. Alterations
  - 2015 MBC & 2015 MRCEB, **Section 105.2.2 Repairs** states:
    - "Application or notice to the…[building or code]…official is not required for ordinary repairs…Such repairs shall not include…[list of items]"
  - Sometimes folks tend to think this section **solely defines** what a repair is – ***careful, it does not…***
    - **Section 105.2.2** is a subsection of **105.2 Work exempt from permit**.
    - This section provides guidance to define **ordinary repairs** and indicates that a **permit is not required** for ordinary repairs.
    - "Repairs", involving any of the laundry list of items, can be performed **and the work would still be considered a "Repair" per Section 202**; however, a **permit is required**.
      Important Note: *Remember, there are no limits regarding the extent of "Repairs" in the 2015 MRCEB.*

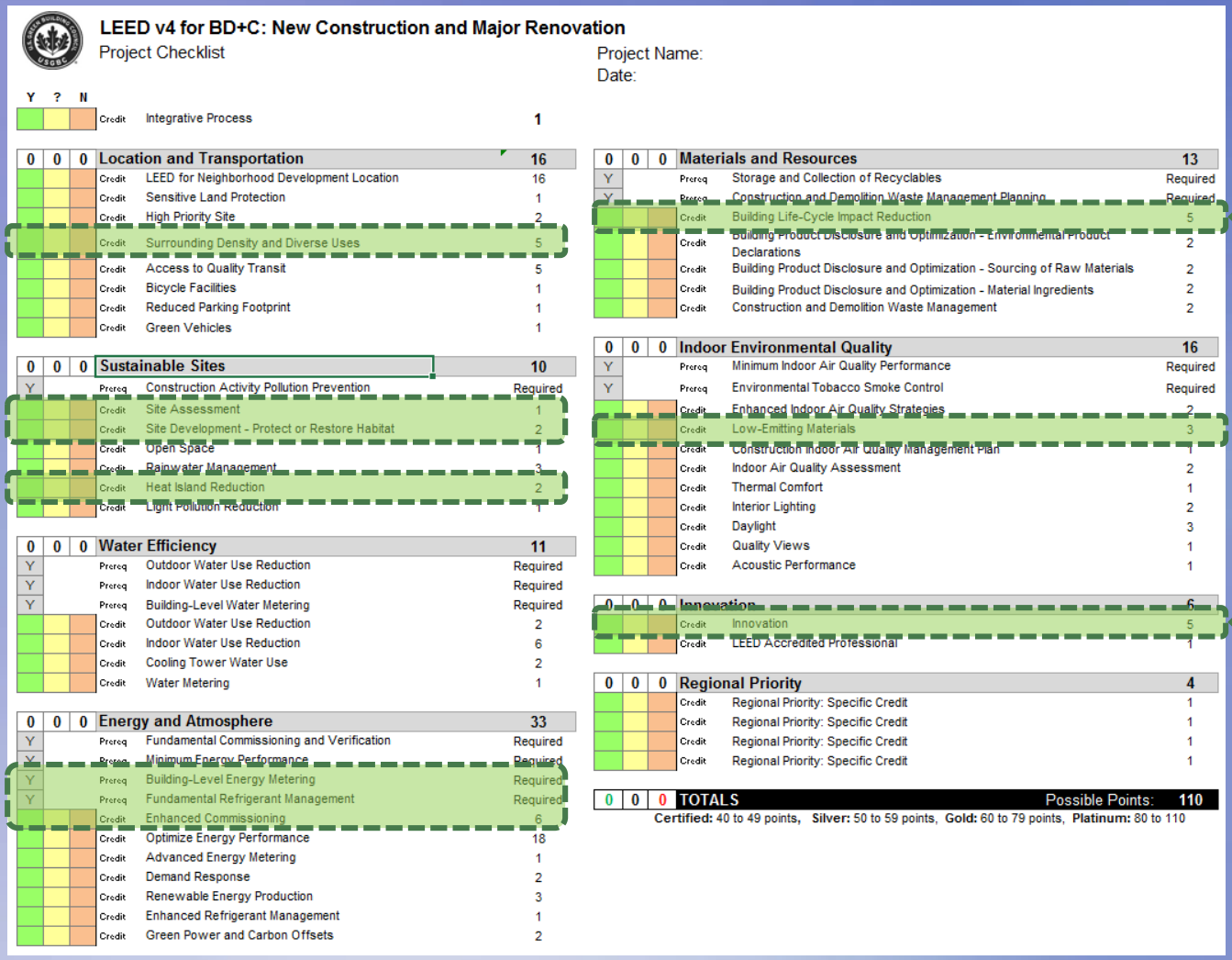
Different Types of 'Construction Activity'

- Repairs vs. Alterations

  Fundamental principles of 'repairs':

  - **Principle No. 1:** Existing buildings are **not** considered **unsafe** or **dangerous** because they do **not** meet current code requirements.
  - **Principle No. 2:** It is **assumed** existing buildings comply with the building code they were **originally** constructed from.
  - **Principle No. 3:** When buildings are damaged, the damaged **parts** can be **reconstructed**, **renewed,** or otherwise **corrected**, to **maintain** the same use, purpose and function which existed prior to the **damage**.

LEED v4 (“existing”, “reuse” or “renovate”)



LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name:

Date:

Y	?	N			
			Credit	Integrative Process	1

Y	?	N	Location and Transportation	16
			Credit	LEED for Neighborhood Development Location	16
			Credit	Sensitive Land Protection	1
			Credit	High Priority Site	2
			Credit	Surrounding Density and Diverse Uses	5
			Credit	Access to Quality Transit	5
			Credit	Bicycle Facilities	1
			Credit	Reduced Parking Footprint	1
			Credit	Green Vehicles	1

Y	?	N	Sustainable Sites	10
Y			Prereq	Construction Activity Pollution Prevention	Required
			Credit	Site Assessment	1
			Credit	Site Development - Protect or Restore Habitat	2
			Credit	Open Space	1
			Credit	Rainwater Management	3
			Credit	Heat Island Reduction	2
			Credit	Light Pollution Reduction	1

Y	?	N	Water Efficiency	11
Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
			Credit	Outdoor Water Use Reduction	2
			Credit	Indoor Water Use Reduction	6
			Credit	Cooling Tower Water Use	2
			Credit	Water Metering	1

Y	?	N	Energy and Atmosphere	33
Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
			Credit	Enhanced Commissioning	6
			Credit	Optimize Energy Performance	18
			Credit	Advanced Energy Metering	1
			Credit	Demand Response	2
			Credit	Renewable Energy Production	3
			Credit	Enhanced Refrigerant Management	1
			Credit	Green Power and Carbon Offsets	2

Y	?	N	Materials and Resources	13
Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
			Credit	Building Life-Cycle Impact Reduction	5
			Credit	Building Product Disclosure and Optimization - Environmental Product Declarations	2
			Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
			Credit	Building Product Disclosure and Optimization - Material Ingredients	2
			Credit	Construction and Demolition Waste Management	2

Y	?	N	Indoor Environmental Quality	16
Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
			Credit	Enhanced Indoor Air Quality Strategies	2
			Credit	Low-Emitting Materials	3
			Credit	Construction Indoor Air Quality Management Plan	1
			Credit	Indoor Air Quality Assessment	2
			Credit	Thermal Comfort	1
			Credit	Interior Lighting	2
			Credit	Daylight	3
			Credit	Quality Views	1
			Credit	Acoustic Performance	1

Y	?	N	Innovation	6
			Credit	Innovation	5
			Credit	LEED Accredited Professional	1

Y	?	N	Regional Priority	4
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1
			Credit	Regional Priority: Specific Credit	1

Y	?	N	TOTALS	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

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LEED v4 (MR Credit: Life-Cycle Impact)

MR Credit: Building Life-Cycle Impact Reduction

BD&C
2–6 points
This credit applies to

- New Construction (2–5 points)
- Core & Shell (2–6 points)
- Schools (2–5 points)
- Retail (2–5 points)
- Data Centers (2–5 points)
- Warehouses & Distribution Centers (2–5 points)
- Hospitality (2–5 points)
- Healthcare (2–5 points)

Intent

To encourage adaptive reuse and optimize the environmental performance of products and materials.

Requirements

NC, CS, Schools, Retail NC, Data Centers, Warehouses & Distribution Centers, Hospitality NC, Healthcare

Demonstrate reduced environmental effects during initial project decision-making by reusing existing building resources or demonstrating a reduction in materials use through life-cycle assessment. Achieve one of the following options.

LEED v4 (MR Credit: Life-Cycle Impact)

Option 1. Historic Building Reuse (5 points BD&C, 6 points Core and Shell)

Maintain the existing building structure, envelope, and interior nonstructural elements of a historic building or contributing building in a historic district. To qualify, the building or historic district must be listed or eligible for listing in the local, state, or national register of historic places. Do not demolish any part of a historic building or contributing building in a historic district unless it is deemed structurally unsound or hazardous. For buildings listed locally, approval of any demolition must be granted by the local historic preservation review board. For buildings listed in a state register or the U.S. National Register of Historic Places (or local equivalent for projects outside the U.S.), approval must appear in a programmatic agreement with the state historic preservation office or National Park Service (or local equivalent for projects outside the U.S.).

Option 2. Renovation of Abandoned or Blighted Building (5 points BD&C, 6 points Core and Shell)

Maintain at least 50%, by surface area, of the existing building structure, enclosure, and interior structural elements for buildings that meet local criteria of abandoned or are considered blight. The building must be renovated to a state of productive occupancy. Up to 25% of the building surface area may be excluded from credit calculation because of deterioration or damage.

LEED v4 (MR Credit: Life-Cycle Impact)

Option 3. Building and Material Reuse (2–4 points BD&C, 2-5 points Core and Shell)

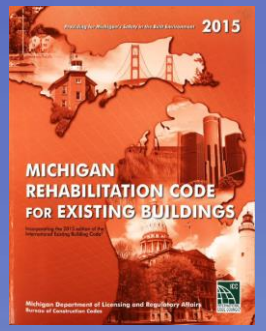
Reuse or salvage building materials from off site or on site as a percentage of the surface area, as listed in Table 1. Include structural elements (e.g., floors, roof decking), enclosure materials (e.g., skin, framing), and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project.

Materials contributing toward this credit may not contribute toward MR Credit Material Disclosure and Optimization.

Table 1. Points for reuse of building materials

Percentage of completed project surface area reused	*Points BD&C*	*Points BD&C (Core and Shell)*
25%	2	2
50%	3	3
75%	4	5

MRCEB



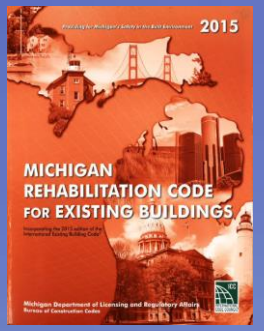
- Section 101.4 Applicability
  - "This code shall apply to…existing buildings, regardless of occupancy,…"

EXCEPT:

- **Section 101.4.1 Buildings not previously occupied.** "A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion…[and its original permit has expired]…shall comply with …[the new code requirements]"

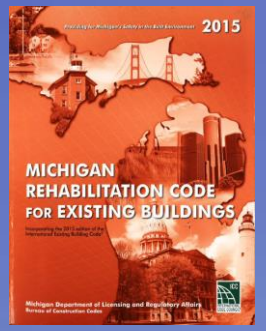
- **Section 101.4.2 Buildings previously occupied.** "The legal occupancy of any building…shall be permitted to continue…except as is…deemed necessary by the code official…

MRCEB



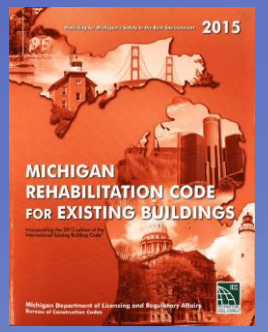
- Chapter 3 – Provisions for All Methods
  - **Section 301.1**:
    - "The repair, alteration, change of occupancy, addition or relocation of all existing buildings shall comply with **one of the methods** listed…as **selected by the applicant**."
    - "[the methods]…**shall not be applied in combination** with each other."
    - Regardless of which method is used, if "…this code requires consideration of the seismic force-resisting system…subject to…[the work you're doing]…also comply with Section 301.1.4.
  - 3 Methods Listed:
    - Prescriptive (301.1.1), Work Area (301.1.2) or Performance (301.1.3)

MRCEB



- Section 301.1.1 Prescriptive Method
  - Comply with **Chapter 4**
  - Essentially same as first 6 ½ pages of old Chapter 34 of MBC

MRCEB



- Section 301.1.2 Work Area Method
  - Comply with **Chapters 5 thru 13**
  - This likely will be the **portion most often used** for various construction activity in existing buildings
  - Each Chapter pertains to a different co
    - Chapter 5: Classification of Work
    - Chapter 6: Repairs
    - Chapters 7, 8 and 9: Alterations (Levels 1, 2 & 3, respectively)
    - Chapter 10: Change of Occupancy
    - Chapter 11: Additions
    - Chapter 12: Historic Buildings
    - Chapter 13: Relocated or Moved Buildings

MR Credit: Building Life Cycle Impact Reduction

MR Credit: Building Life Cycle Impact Reduction

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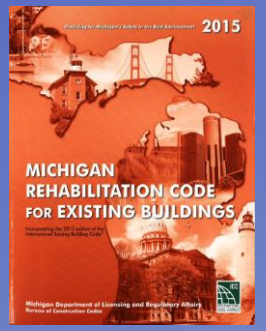

- Section 301.1.3 Performance Method
  - Comply with **Chapter 14**
  - Essentially the last 10 ½ pages of old Chapter 34 of MBC
  - Detailed component or system evaluation for rating the fire safety, means of egress, and general safety aspects of an existing building.
  - Results in a ‘scorecard’ to which the existing level of compliance can be judged as “Pass” or “Fail” for the specific categories reviewed.
  - Interesting concept, rarely used, but likely very useful for certain large rehabilitation projects involving older buildings…

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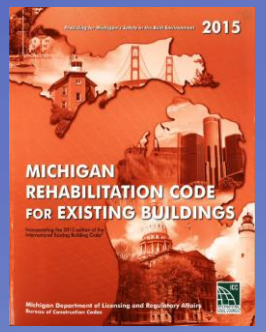


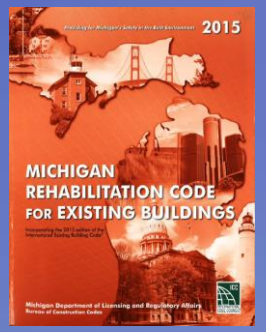
- Cascading Philosophy of MRCEB
  - **Cascading requirements -** the more you change the existing conditions, the more upgrading you'll need to do

↑ – **Repairs:** Typically are performed to maintain the integrity of something, therefore, no substantial risk is created since the previously accepted condition is simply being restored or otherwise maintained.

↑↑ – **Alterations:** Depending on the amount of 'change', anywhere from little to substantial risk can be created by the 'change' due to the new conditions which did not previously exist.

↑↑↑ – **Change of Occupancy:** Substantial risk can be created by changing the level of activity or use of a space – i.e., what may have been safe previously, may not be adequate for the new use.

MRCEB



- Roots of MRCEB Work Area Method

Nationally Applicable Recommended Rehabilitation Provisions

'NARRP'

Prepared for:
U.S. Department of Housing and Urban Development
Office of Policy Development and Research

Prepared by:
NAHB Research Center, Inc.
Building Technology, Inc.
Koffel Associates, Inc.
Melvyn Green and Associates, Inc.

May 1997

Advisory Committee

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- UBC
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- NFPA
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- Insurance Institute
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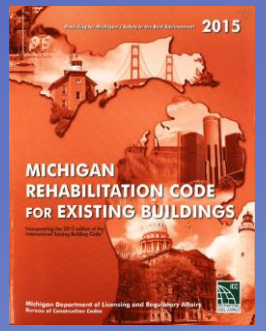
MRCEB – NARRP Quotes:



- "While it is a relatively straightforward procedure to set out requirements for the design and construction of new buildings, the broad spectrum of activities falling under the general heading of "rehabilitation" have proven more difficult to ***regulate in a rational, predictable manner***."
- "Building officials generally have ***wide discretion*** in determining the nature and extent of improvements required when buildings are rehabilitated or converted to new uses."
- "Owners and designers, even after reviewing the applicable codes, are correspondingly ***uncertain*** about what they can and cannot do."
- The NARRP incorporates "…the ***philosophy that improvements required*** when work is being done in existing buildings should be ***proportional*** to the nature and extent of the underlying work."
- "The provisions are written to ensure that public health, safety and welfare are ***maintained or enhanced*** as work is performed, and to ***require more upgrades*** to be included as more work is performed on a ***voluntary basis***."

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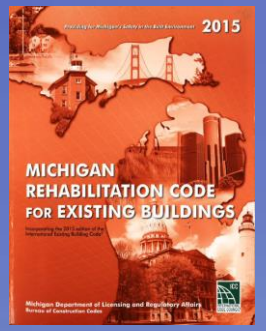
MRCEB

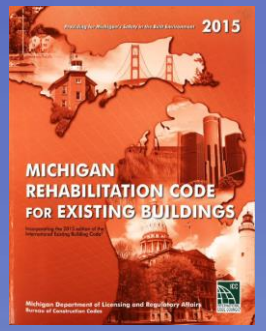


- Chapter 3 – Provisions for All Methods
  - ***Five Key Items Stated…***

#1 – **Section 302.2:** "Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures ***shall comply with the provisions for*** alterations, repairs, additions and changes of occupancy or relocation, respectively, **in this code [MRCEB]** ***and*** **the…[current Michigan codes for new construction]."**

#2 – **Section 302.2:** "***Where*** provisions of the**…[current Michigan codes for new construction]…*conflict*** with provisions of this code [MRCEB], the provisions of **this code [MRCEB]** ***shall take precedence***."

MRCEB



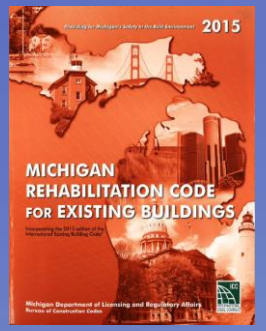
- Chapter 3 – Provisions for All Methods
  - ***Five Key Items Stated…***

#3 – **Section 302.3:** "***Materials already in use*** in a building in compliance with requirements or approvals in effect at the time of their erection or installation ***shall be permitted to remain*** in use…[unless unsafe]."

#4 – **Section 302.4:** "Except as otherwise required or permitted by this code, ***materials permitted by***… **[current Michigan codes for new construction]**…***shall be used***. Like materials shall be permitted for repairs and alterations…[unless unsafe]."

#5 – **Section 302.5:** "…the ***occupancy and use*** of a building shall be determined by…**[the MBC]**."

MRCEB



- Chapter 5 - Classification of Work
  - It all starts **here** if choosing the "Work Area Compliance Method"…
  - *Using the **definitions** for "Repairs", "Alterations", "Change of Occupancy", and "Additions" **in combination with the scoping requirements** for each type of work, will determine which subsequent Chapter(s) you need to comply with.*
  - *Keep in mind that the 'Work Area Compliance Method' includes all applicable provisions in Chapters 5 thru 13, as such, **your project may need to comply with different Chapters in different parts of the building** depending on the amount of **'change'** you are proposing.*

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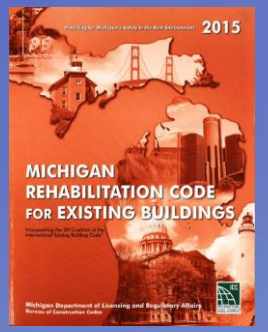
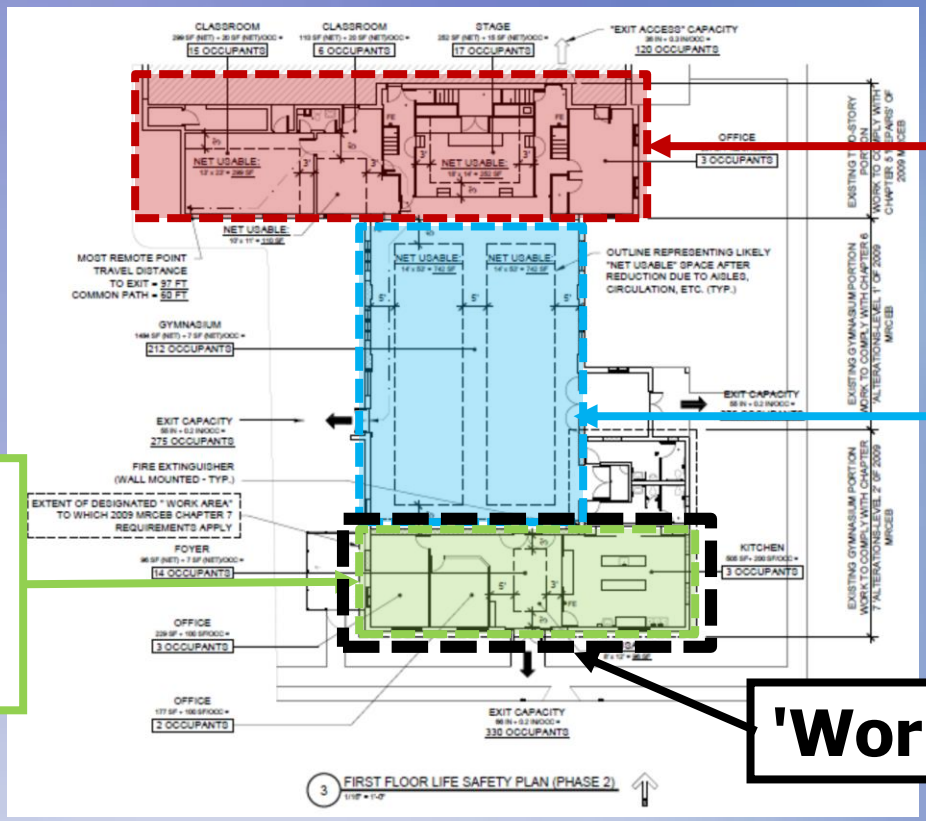


- Chapter 5 - Classification of Work



Chapter 6 Repairs

Chapter 7 Alterations Level 1

Chapter 8 Alterations Level 2

'Work Area'

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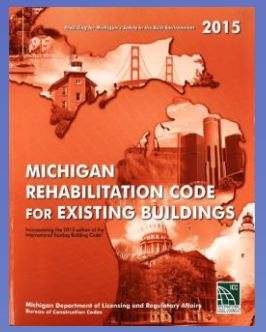

- Section 502 - Repairs
  - **Section 502.1** states, “Repairs…include the patching or restoration **or replacement** of damaged materials, elements, equipment or fixtures for the purpose of maintaining such components in good or sound condition with respect to **existing loads or performance requirements**.”
  - **Section 502.3** states, “Work on nondamaged components that is necessary for the…repair…shall be considered part of the repair and shall not be subject to…[other Chapters].”

Example: *A column footing requires replacement resulting in the associated column, beam, and floor joists being replaced.*

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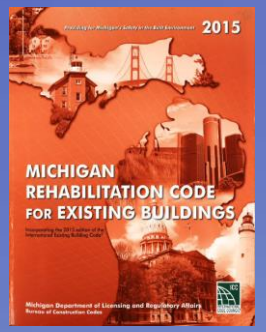

- Chapter 6 - Repairs
  - Fundamental Concept: **“Put it back the way it was”**
  - **Section 601.2 Conformance** “The work shall not make the building **less conforming than it was** before the repair was undertaken.”

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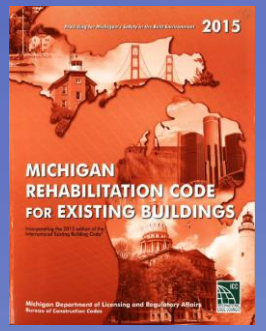

- Chapter 6 - Repairs
  - **Section 602.2 New and replacement materials** "Except as otherwise required…materials permitted…for new construction shall be used. Like materials shall be permitted for repairs and alterations, provided no dangerous or unsafe condition…is created."

MR Credit: Building Life Cycle Impact Reduction

Example: *If siding or other cladding components were blown-off, the siding and components can be replaced, using materials matching that which previously existed, regardless of the current MBC requirements for performance characteristics (i.e., durability) or material standards (i.e., labeling/certifications/thickness requirements).*

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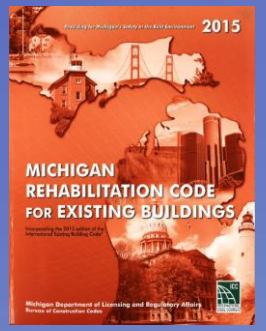

- Chapter 6 - Repairs
  - **Section 603 Fire Protection** "Repairs shall be done in a manner that **maintains** the level of fire protection provided."

    Example: *If a fire-resistance rated partition in a hotel building is damaged from an event (i.e., fire), the partition can be rebuilt to provide the hourly fire-resistance rating and of the extent and configuration that previously existed, regardless of the current MBC requirements.*

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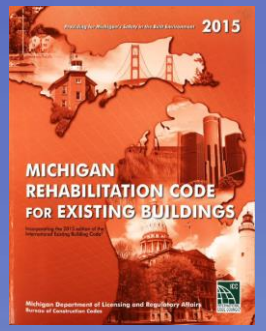

- Chapter 6 - Repairs
  - **Section 604 Means of Egress** "Repairs shall be done in a manner that **maintains** the level of protection provided for the means of egress."

    Example: *If a steel guardrail is damaged from impact, the damaged portion can be replaced in kind, regardless of the current MBC requirements relative to guardrail load-resistance, height or configuration.*

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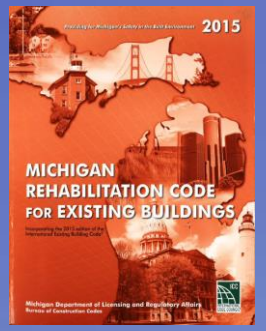

- Chapter 6 - Repairs
  - **Section 605 Accessibility** "Repairs shall be done in a manner that **maintains** the level of accessibility provided."

Example: *If a restaurant's toilet room is water-damaged from a pipe break, the damaged materials and fixtures can be replaced in like kind with no improvement relative to handicap accessibility, regardless of the current MBC requirements.*

Cautionary Note: *ADA regulations,* ***which has different definitions****, can lead to a 'different' result depending on if the work "affects or could affect the usability" of the space..*

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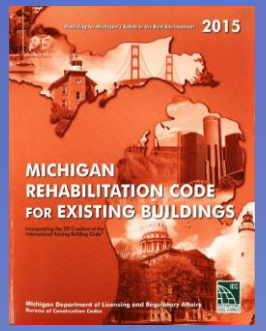

- Chapter 6 - Repairs
  - **Section 606 Structural**
    - Applies only to the “structural repairs” (**Section 606.1 General**) *it is not a general requirement that you now have to perform structural work simply because you’re doing repairs in an existing building…*
    - Also, all **dangerous conditions** shall be eliminated, regardless of structural or nonstructural damage (i.e., or extent of repair being performed)

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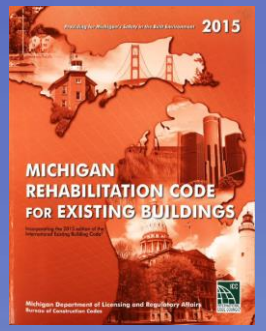

- Chapter 6 - Repairs
  - **Section 202** defines **Dangerous** as “Any building, structure or portion thereof that meets any of the conditions described below…”
    - The building or structure **has** collapsed, **has** partially collapsed, **has** moved off its foundation, **or lacks** the necessary support of the ground.
    - There exists a **significant risk** of collapse, detachment or dislodgment of any portion, member, appurtenance or ornamentation of the building or structure **under service loads**.

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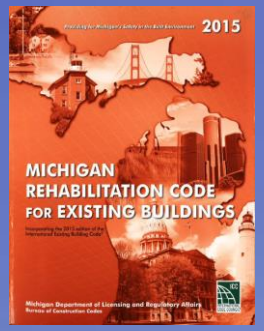

- Chapter 6 - Repairs
  - **Section 606.2 Repairs to damaged buildings**
    - *If the building is damaged in some manner, these are the* ***structural issues*** *you need to assess and/or address…*
      - » Substantial Structural Damage
      - » Less than Substantial Structural Damage

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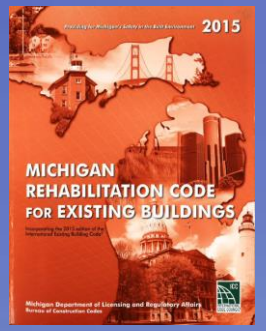

- Chapter 6 - Repairs
  - **Section 202** defines **Substantial Structural Damage** as:
    - "In any story, the **vertical elements** of the lateral-force-resisting system **have suffered damage**…lateral load-carrying **capacity of the structure**…in any horizontal direction **has been reduced by more than 33 percent**…" or
    - "The **capacity** of any **vertical gravity load-carrying component, or any group**…that **supports more than 30 percent** of the…**floor(s) and roof(s)** has been **reduced more than 20 percent**…**and the remaining capacity**…is **less than 75 percent**…required by the [MBC]…"
  - **Sections 606.2.2** and **606.2.3** generally require the repair of "Substantial Structural Damage" to comply with the MBC.
  - **Section 606.2.1** generally allows less than "Substantial Structural Damage" to be of like kind and strength.

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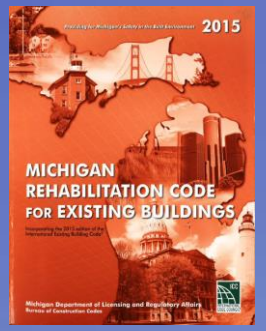

- Chapter 6 - Repairs
  - **Electrical, Mechanical & Plumbing:** Recall that **Section 302.2** requires one to comply with the ***repair provisions*** within the MEP codes, but then also the following is allowed:
    - **Section 607 Electrical:** "Existing electrical…shall be allowed to be repaired or replaced with like material"; however, where receptacles replaced, comply with current NEC and use "hospital-grade" for I-2.
      - » ***Exceptions*** *for 1) use of Edison-base plug fuses, 2) grounding of receptacles/equipment when branch circuit not equipped.*
    - **Section 608 Mechanical:** Don't make it "less conforming" and use of mechanical draft device (with audible/visible alarms) is ok for manually fired appliances and fireplaces with smoke detector provided in room.
    - **Section 609 Plumbing:** Cannot use prohibited materials, and other than blowout water closets, 1.6 gallons/flush cycle max flow rate for replacement water closets.

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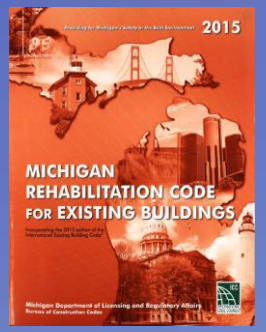

- Case Study – Small Repair
- Detached, one-family dwelling (Group R-3) built in 1960's
- One story plus basement, 900 sqft first floor
- Basement finished at a later date, but prior to 1999 (owner's purchase date)
- Fire occurred in basement in June 2007
- Jurisdiction required, as part of repair work, that an **"emergency escape and rescue opening"** be provided per **R310.1** of MRC (**1029** in MBC)
- Confirmed original egress from basement (stair) complied with **1965 BOCA** and **1996 BOCA**
- In 2001, requirement changed from **"sleeping areas"** to **"habitable space"**
- Performed repair in accordance with Chapter 6 of MRCEB – **no emergency escape and rescue opening required** (maintain level of protection)

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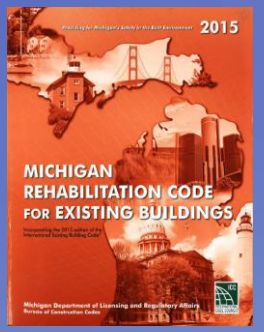
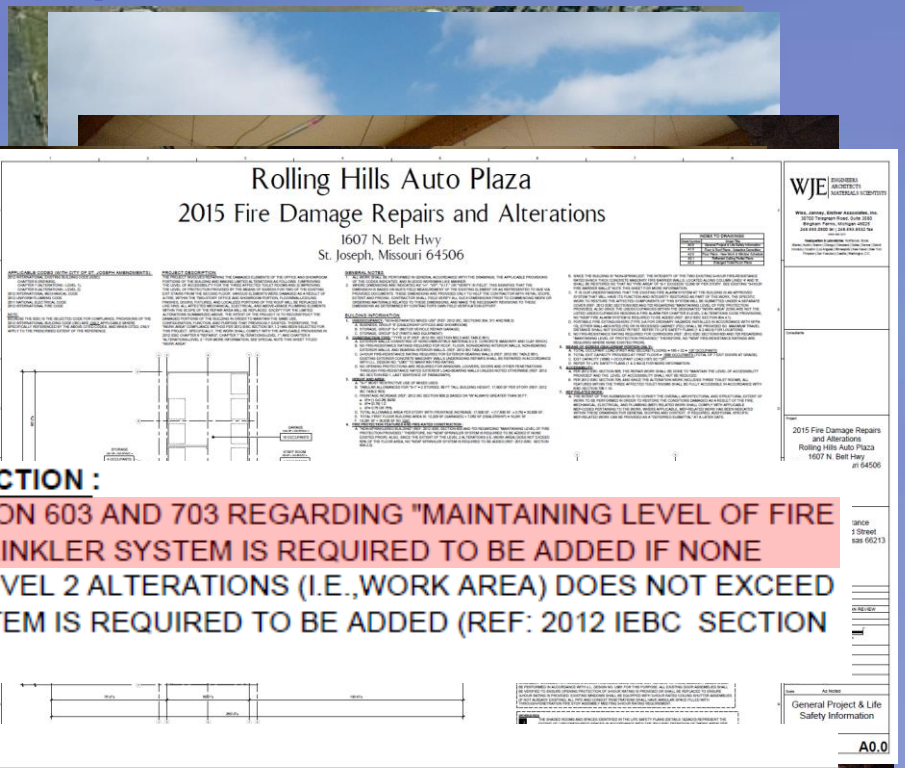


- Case Study – Large Repair
  - Auto-dealership built in 1976
  - Two-stories, 20,000+/- sqft footprint
  - Fire on 2nd floor in July 2014
  - **Fire damage:** 2nd flr, limited 1st flr, roof'g
  - **Soot/smoke damage:** 1st floor areas
  - Developed 'repair' drawings based, in part, on **Ch. 6 "Repairs"**


Rolling Hills Auto Plaza
2015 Fire Damage Repairs and Alterations
1607 N. Belt Hwy
St. Joseph, Missouri 64506

WJE

2015 Fire Damage Repairs and Alterations
Rolling Hills Auto Plaza
1607 N. Belt Hwy

General Project & Life Safety Information

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4. FIRE PROTECTION FEATURES AND FIRE-RATED CONSTRUCTION :

A. "NON-SPRINKLERED BUILDING" (REF: 2012 IEBC SECTION 603 AND 703 REGARDING "MAINTAINING LEVEL OF FIRE PROTECTION PROVIDED," THEREFORE, NO "NEW" SPRINKLER SYSTEM IS REQUIRED TO BE ADDED IF NONE EXISTED PRIOR). ALSO, SINCE THE EXTENT OF THE LEVEL 2 ALTERATIONS (I.E.,WORK AREA) DOES NOT EXCEED 50% OF THE FLOOR AREA, NO "NEW" SPRINKLER SYSTEM IS REQUIRED TO BE ADDED (REF: 2012 IEBC SECTION 804.2.2).

6. ACCESSIBILITY:

A. PER 2012 IEBC SECTION 605, THE REPAIR WORK SHALL BE DONE TO "MAINTAIN THE LEVEL OF ACCESSIBILITY PROVIDED" AND THE LEVEL OF ACCESSIBILITY SHALL NOT BE REDUCED.

- Short Break -

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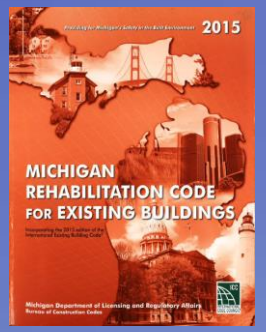

- Chapters 7, 8 and 9 Alterations
  - Work Area Classification Philosophy
    - Used to delineate between Alterations Levels 1, 2 or 3
    - **Section 202** defines **"Work Area"** as "That portion or portions of a building consisting of **all reconfigured spaces**…"

Note: *It does* ***not include*** *incidental work or work not initially intended by the owner but required by the code to be done…*

- **Section 501.2 Work area** states, "The work area…shall be identified on the construction documents."

Cascading requirements - *the more you* ***change*** *the existing conditions, the more upgrading you'll need to do*

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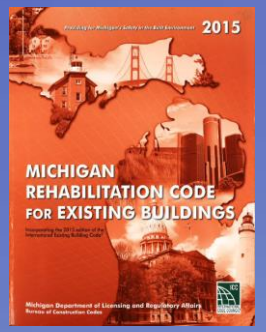

- Chapter 7 Alterations – Level 1
  - **Section 503.1** states, "Level 1 alterations include the **removal and replacement** or **the covering of** existing materials, elements, equipment, or fixtures using new materials, elements, equipment, or fixtures that **serve the same purpose**."
  - Very similar to 'Repairs'; however, the language implies more than a "reconstruction or renewal" is taking place and does not tie the work back to load or performance requirements or the correction of damage.

One way to look at it is that "Alteration" work is voluntary but "Repair" work is necessary as a result of failure or distress.

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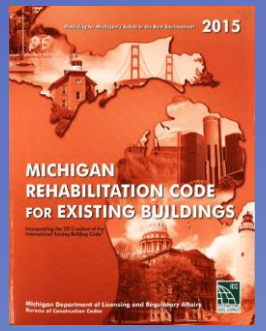

- Chapter 7 Alterations – Level 1
  - **Section 701.2 Conformance.** "An existing building or portion thereof shall not be altered such that the building becomes less safe that its existing condition."
  - At a minimum, don't change it to a condition worse than it is, or stated another way: Make it equal to or better than it was.

Exception: *If level of safety or sanitation will be reduced, altered work must comply with current MBC, at minimum.*

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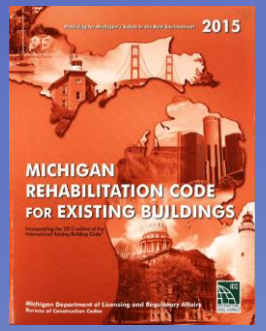

- Chapter 7 Alterations – Level 1
  - **Section 702 Building Elements and Materials**
    - **Sections 702.1, 702.2 & 702.3:** New wall, trim, ceiling, and floor finishes: Must meet flame spread (and radiant flux as applicable) req's of current MBC
    - **Section 702.4 Window opening control devices** – Will need to provide if:
      - » R-2 or R-3 and replacing operable windows
      - » Sill is less than 36 (R-2) or 24 (R-3) inches AFF
      - » 4 inch sphere can fit when window is opened
      - » Can fall more than 72 inches thru opening

      Exceptions for high-rise or other openings equipped with 'fall prevention devices'

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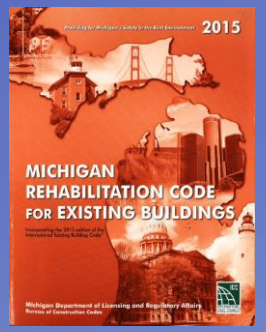

- Chapter 7 Alterations – Level 1
  - **Section 702 Building Elements and Materials**
    - **Section 702.5 Emergency escape and rescue openings** – Will need to provide if R-2 or R-3 and replacing windows, with ‘exceptions’…
      - » No minimum size or sill height, just fit in existing rough opening with manufacturer’s largest size
      - » No minimum size for window well or ladder/step criteria
      - » Window opening control devices ‘are allowed’ to be used on these windows.

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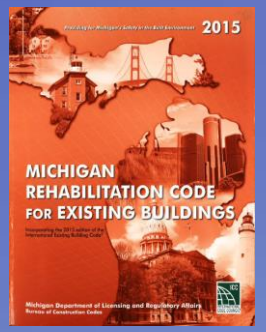

- Chapter 7 Alterations – Level 1
  - **Section 702.6 Materials and Methods** states, "All new work shall comply with the **materials and methods** requirements in…[new construction codes]…that **specify** material standards, detail of installation and connection, joints, penetrations, and continuity of any element, component, or system in the building."

Example: *Replacement sheet metal ductwork needs to meet the gauge, joinery and airtightness requirements of the MMC, but the existing (or replacement) RTUs do not need to be resized to comply with the* ***design requirements*** *(i.e., CFM or ventilation) in the MBC/MMC.*

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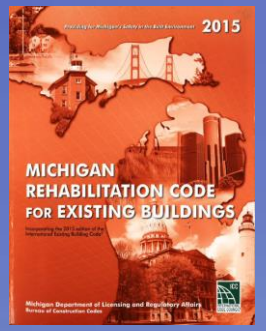

- Chapter 7 Alterations – Level 1
  - **Section 703 Fire Protection** and **Section 704 Means of Egress** – same requirements as "Repairs", just maintain the level of safety previously provided.

  - **Section 705 Accessibility** states, "A building, facility, or element that **is** accessible **shall remain** accessible in accordance with…[req's for new construction]."

    Example: *If a toilet and stall meet the ANSI A117.1-1990 requirements, and only the toilet is replaced, the new toilet needs to comply with ANSI's 2009 req's. No other stall or room upgrades are required unless you do something to it. In other words:* ***Upgrade only what you touch…***

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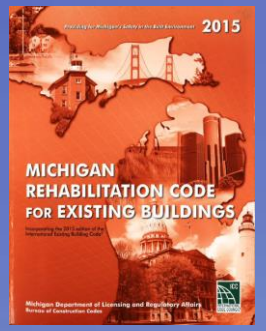

- Chapter 7 Alterations – Level 1
  - **Section 706 Reroofing** – Sim to Section 1511 of MBC:
    - **Section 706.1:** Materials & methods shall comply with Chapter 15 of current MBC *(slope exception if have positive roof drainage)*
    - **Section 706.2:** Structurally, roof system must support loads imposed during reroofing
    - **Sections 706.5 & 706.6:** OK to re-use slate, clay or cement (concrete) tiles, as well as, metal flashings, edgings and drain components if in good condition. Prime existing metal flashings if bituminous bonding to occur.
    - **Section 706.4:** If recovering over wood shingles or shakes, first cover with non-combustible materials (gypsum board, glass fiber, mineral fiber, etc.).

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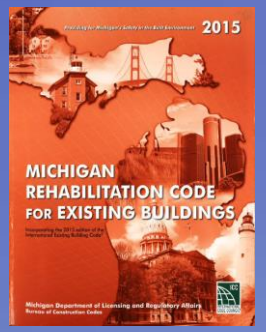

- Chapter 7 Alterations – Level 1
  - **Section 706 Reroofing** – Sim to Section 1510 of MBC:
    - **Section 706.3: Recover v Replacement:** Recovers are allowed for all types of conditions, except:
      - » If existing is 'water soaked' or deteriorated and unsuitable
      - » If existing slate, clay, cement (concrete) or asbestos-cement tile
      - » Where two or more roof coverings (systems) are already present

Exceptions: *1) Separately supported systems, 2) metal/concrete/clay tile over existing wood shakes if non-comb used, 3) SPF, and 4) can keep existing bonded ice barrier in-place on sheathing if cover with new ice barrier.*

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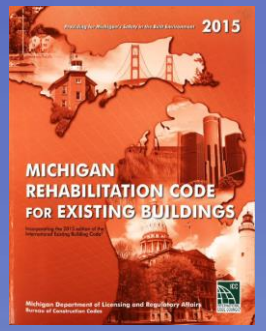

- Chapter 7 Alterations – Level 1
  - **Section 707 Structural**
    - Specific only to replacement of equipment supported by building or where a reroofing permit is required
      - » If additional loads imposed, ensure structure can handle it or alter as required to handle it. ***Exceptions:*** *New dead load not more than 5% or second roof weighing less than 3 PSF.*
      - » If SDC D/E/F, unreinforced masonry parapets, and more than 25% of roof area reroofed, evaluation & bracing may be required.
      - » In high-wind regions (> 115 MPH or special zones) and if more than 50% roof area in reroofing project, evaluation & strengthening may be required at connections (roof-to-roof and roof-to-wall).

Important Note: *The 25% and 50% thresholds only require that an evaluation be performed – it* ***does not*** *require that the remaining 75% or 50% of roofing be reroofed.*

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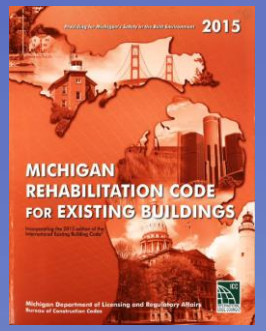

- Chapter 7 Alterations – Level 1
  - **Section 708 Energy Conservation**
    - Requires only the altered portions to comply with new construction energy requirements. Rest of building can remain as is.

Example: *If the windows were replaced, the new windows would need to meet the fenestration related thermal performance required per the current MBC (i.e., U-value, SHGC), but if not altering the exterior wall, no further requirement for wall.*

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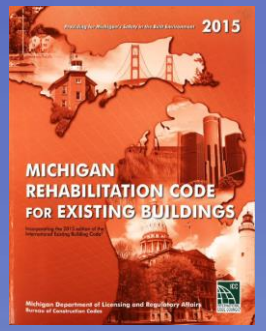

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - More encompassing requirements, additional upgrades due to more extensive 'changes'.
    - Building Elements and Materials
    - Fire Protection
    - Means of Egress
    - Accessibility
    - Structural
    - MEP
    - Energy Conservation

    Example: *If same existing toilet room is within the "Work Area" extent, it now has to be reconstructed to meet all applicable new code requirements relative to accessibility, or if technically infeasible, a new accessible family or assisted-use toilet room must be provided (MRCEB Section 410.8.10).*

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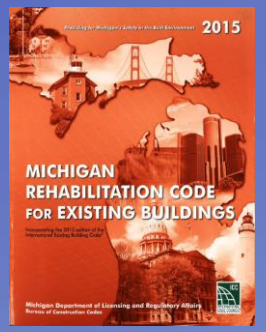
MRCEB-defined 'Work Area' does not exist until Alt Level 2



- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **Section 504.1 Scope** indicates that **Alterations Level 2** "…include the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment."

    Important Words: *Reconfiguration, addition or elimination, any, extension, additional…*
  - **Section 505.1 Scope** indicates that **Alterations Level 3** "…apply where the work area exceeds 50 percent of the building area."
    - ***Important Words:*** *Work area, exceeds 50 percent, building area*

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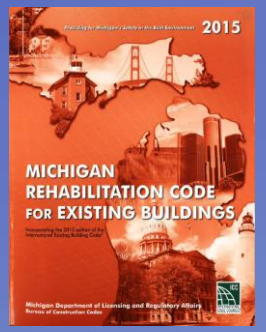

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - ***Therefore, if you:***
    - Reconfigure office layout ……= **Alteration Level 2** (min)
    - Replace office, same layout ……= **Repairs/Alt Level 1**
    - Add one window/door ……= **Alteration Level 2** (min)
    - Eliminate one window/door ……= **Alteration Level 2** (min)
    - Replace windows/doors, same layout ….= **Repairs/Alt Level 1**
    - Move existing door location ……= **???**
    - Extend HVAC system ……= **Alteration Level 2** (min)
    - Install new air conditioning ……= **Alteration Level 2** (min)

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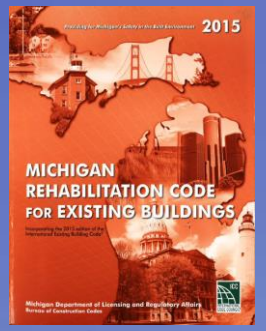

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - The 'overarching' requirement for **Alteration Level 2** and **Alteration Level 3** is found in **Sections 801.3** (Alt Level 2) & **901.2** (Alt Level 3) **Compliance**, which states:

"All new construction elements, components, systems, and spaces shall comply with the requirements of the…[current MBC]"

(exceptions are limited and compliance is expected unless otherwise specifically allowed by the MRCEB)

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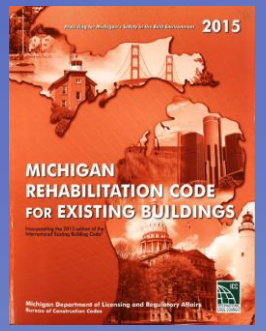

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Building Elements and Materials** requirements apply **within work area (u.n.o.)**
    - All existing interior vertical openings connecting two or more floors must be enclosed **within work area only** by 1 hour walls with opening protectives (**Section 803.2**) – *list of 14 exceptions*
    - Smoke barriers, rated at 30 minute fire-resistance must be provided in I-2 occupancies (**Section 803.3**) – *specific situation (sleeping rooms, # of patients, travel distance)*
    - New **and** existing interior finishes in exits/corridors must comply with new construction req's (**Section 803.4**). Coating over existing can achieve compliance. If more than 50% of floor, beyond work area req'd.
    - Guardrails must be provided if more than 30 inch fall and no guards present or if existing guards are **"…in danger of collapsing…."** New guards to comply with new construction req's (**Section 803.5**)
    - If add sprinklers, fire-resistance ratings can be ***reduced*** to meet [MBC].

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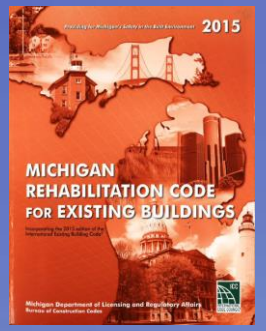

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 3,** then additional **Building Elements and Materials** requirements apply…
    - Stairway enclosures extend from work area all the way to level of exit discharge, and any floors below discharge level (**Section 903.1**)
    - Fire partitions separating Group R-3 dwelling units (attached or townhouse), if not continuous from foundation to roof underside, need to be upgraded (i.e., fireblocked or other means) to provide continuous separation (**Section 903.2**) – *Exception, if concealed behind interior finishes, don't have to do anything.*
    - Interior finishes in exits must comply with new construction req's (or existing finishes coated appropriately) all the way to level of exit discharge (**Section 903.3**).

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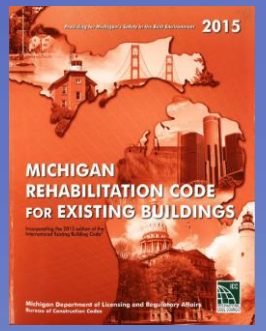

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Fire Protection** requirements apply **within work area (u.n.o.)…**
    - **Section 804.2: Add sprinklers when….**
      - » **High-rise:** If sufficient water supply available + work area has exits/corridors shared by more than one tenant or with occupant load over 30. Where work area exceeds 50% of floor area, do entire floor *(**Exception:** Occupied unrelated tenant spaces)*
      - » **Most other occupancies:** Work area has exits/corridors shared by more than one tenant or with occupant load over 50 + work area exceeds 50% of the floor area *(**Exceptions:** Provide smoke detection if insufficient water supply, also if fire-separation between mixed uses then only sprinkle use that needs it)*
      - » Windowless stories and listed spaces in **MBC Table 903.2.11.6**
      - » **Section 804.2.5 Supervision** required: NFPA 72 central, proprietary, remote station or local alarm service *(limited exceptions)*

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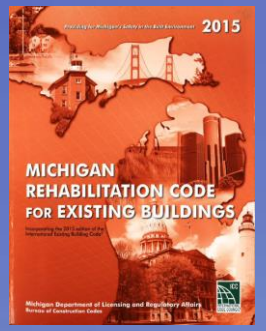

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Fire Protection** requirements apply **within work area…**
    - **Section 804.3 Standpipes:** Add standpipe system per new construction req's if work area includes exits or corridors shared by more than one tenant and is located more than 50 feet away from fire dept access. *Exception for fire pump and interconnection of risers*
    - **Section 804.4 Fire Alarm and Detection:** NFPA 72 automatic fire detection system required for: *Groups E, I-1, I-2, I-3, R-1, R-2 and R-4. Also, if work area exceeds 50% of floor area, install system throughout floor (**804.4.2**). **Exceptions**: 1)Tenant spaces outside of work area and 2) if above listed occupancies already have an "existing, previously approved fire alarm system"*
    - **Section 804.4.3:** Smoke alarms required per new construction req's in sleeping/dwelling units Group R and I-1. *Exception, no interconnection required outside of work area.*

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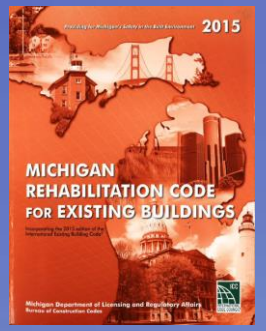

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 3,** then additional **Fire Protection** requirements apply…
    - **Section 904.1.1 High-rise Buildings:** No longer get the criteria limiting sprinkler addition if exits and corridors and occupant load greater than 30….now, if you have supply, you provide. *Limited to work areas.*
    - **Section 904.1.2:** Rubbish and linen chutes require sprinklering per new construction req's. *Limited to work area.*
    - **Section 904.1.3:** Spaces with upholstered furniture or mattresses (F-1 > 2,500 SF / M > 5,000 SF / S-1 > 2,500 SF). *Limited to work area.*
    - **Section 904.2 Fire Alarm and Detection:** Comply with current MBC + manual fire alarm system with notification appliances + fire detection. *Limited to work area.* ***Exception:*** *Visual alarm notification not required unless an existing alarm system is upgraded or replaced or where new alarm system installed.*

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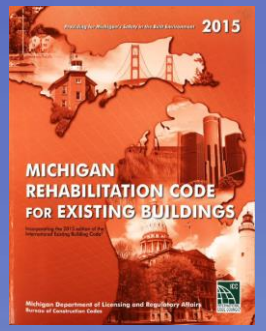

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Means of Egress** requirements apply **within work area (u.n.o.)…**
    - Applies if work areas **include exits/corridors shared by more than one tenant**. ***Exceptions:*** *1) if meets NFPA 101 or 2) if meets original code built under and is acceptable to code official.*
    - **Section 805.3 Number of Exits:** Provide, on every story where work area is present, minimum number of exits per current MBC.
      - » Extensive list of acceptable "Single-exit buildings" (**Section 805.3.1.1**) ***I.e. Exc 9:*** *"Non-sprinklered R-2 of any height with one smokeproof stair and not more than 4 dwelling units/floor"*
      - » **Section 805.3.1.2:** If more than one exit is required, an existing or new fire escape can be used for one of the required exits. *Specific information regarding design and construction of the fire escape.*
      - » Some additional specific req's for mezzanines (**Section 805.3.2**) and main entrances of Group A (**Section 805.3.3**).

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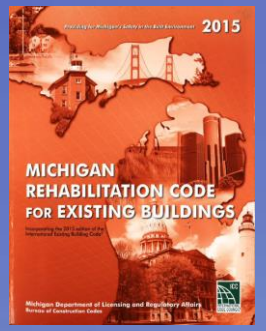

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Means of Egress** requirements apply **within work area (u.n.o.)** only where **exits/corridors shared by more than one tenant:**
    - **Section 805.4 Egress Doorways:**
      - » If over 50 occupants **or** travel distance exceeds 75 feet, minimum two doors required *(Exc: small storage rms / single-exit bldgs)*
      - » I-2 patient sleeping rm or rms greater than 1000 SF, 2 req'd.
      - » Door swing in direction of exit travel if occupant load over 50.
      - » If exit passageway or exit stair, self or automatic closing req'd.
      - » If Group A and over 100 occupants, panic hardware req'd.
      - » Emergency power req'd for I-3 locks *(few exceptions)*
    - **Section 805.5 Openings in Corridor Walls:** Limitations on construction and materials for doors, grilles, transoms and other openings *(i.e., no hollow core wood doors allowed, etc)*

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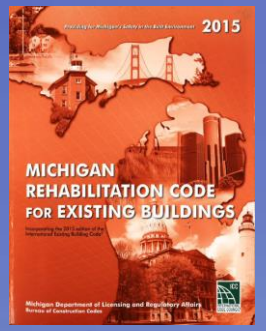

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Means of Egress** requirements apply **within work area (u.n.o.)** only where **exits/corridors shared by more than one tenant:**
    - **Section 805.6 Dead-Ends:** Not more than 35 feet allowed. ***Except:***
      - *1) greater length allowed by MBC*
      - *2) other than A and H, if fire alarm system, then up to 50 feet allowed for **existing** dead-ends,*
      - *3) other than A and H, if sprinkler system, then up to 70 feet allowed for **existing** dead-ends,*
      - *4) other than A and H, if sprinkler system, then up to 50 feet allowed for **newly constructed or extended existing** dead-ends.*
    - Lighting (**Section 805.7**) and Exit Signs (**Section 805.8**) required per current MBC throughout work area.
    - Handrails (**Section 805.9**) and Guards (**Section 805.10**) required per current MBC (mostly) from work area to level of exit discharge.

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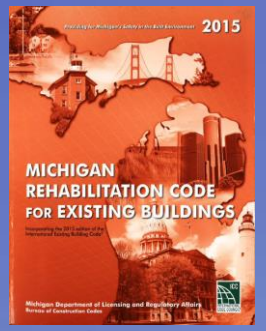

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Means of Egress** requirements apply **within work area (u.n.o.)** only where **exits/corridors shared by more than one tenant:**
    - **Section 805.10 Refuge areas:** In I-2, I-3, Ambulatory care and horizontal exits, the capacity required per current MBC for the areas of refuge shall be maintened.
    - For the following items, **if the work area exceeds 50% of the floor**, then the requirement **extends throughout the floor** *(Exception for tenant spaces entirely outside work area)*:
      - » Door swing **(805.4.2)** and closing **(805.4.3)**
      - » Panic hardware for Group A **(805.4.4)**
      - » Corridor opening limitations **(805.5.5)**
      - » Egress lighting **(805.7)** and exit signs **(805.8)**

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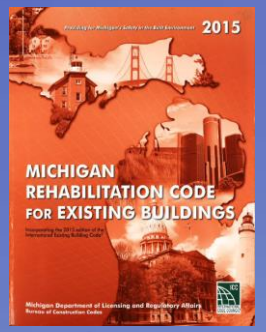

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 3,** then additional **Means of Egress** requirements apply…
    - **Section 905.2 Means-of-Egress Lighting:** Not just within work area…now provide lighting, in accordance with new construction req's from work area to level of exit discharge.
    - **Section 905.3 Exit Signs:** Same as above…

(Alterations Level 2, Means of Egress upgrades hit you pretty hard…not much more required for Alteration Level 3)

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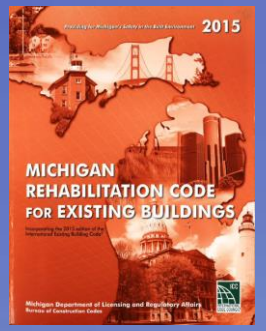

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Accessibility** requirements apply for the altered portions (i.e., **the things 'you touch'**; it is not related to work area)…
    - Must now comply with **Section 410 Accessibility for Existing Buildings** which is a **two-step process**:

#1

    - **Section 410.6:** Comply, to the extent technically feasible, with current MBC Chapter 11 and ICC A117.1 for the things you touch; Exceptions:
      - » Accessible route not req'd (unless primary function association)
      - » No accessible means of egress req'd
      - » R-2 Type A unit alterations need only comply with Type B req's

#2

    - **Section 410.8**: In addition, if you touch any of the following items, comply to the extent stated: *Entrances, elevators, platform lifts, routes to stairs/escalators, ramps, dwelling/sleeping units, jury boxes/witness stands, toilet rooms, dressing/fitting/locker rooms, fuel-dispensers, thresholds, amusement rides*

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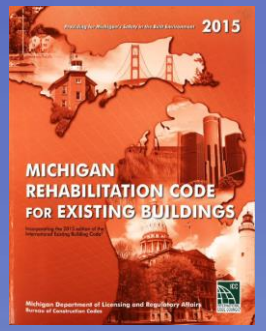

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **Accessibility** requirements apply for the altered portions (i.e., **the things 'you touch'**; it is not related to work area)…
    - After main **two-step process,** back check the following:
    - **Section 410.7 (Primary Function):** If altered work contains one or affects the accessibility to it, then provide an accessible route to it. Route shall include toilet facilities and drinking fountains *(limited exceptions for utility/hardware work, etc.)*
    - **Section 410.9:** If qualifying historic building, you have some limited exceptions/additional flexibility relative to compliance for accessible route (site and inside building), entrances and toilet rooms.
    - **Section 410.1:** Comply with1966 PA 1 *(50% floor area rule)*

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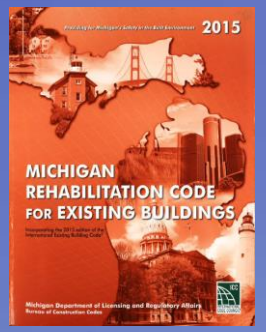

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 3,** same **Accessibility** requirements as **Alteration Level 2** (nothing further)…
  - **Interesting issue relative to 1966 PA 1:**
    - *Keep in mind that if Alteration Level 3, then your **"work area"** must include more than **"50% of the area of the building"***

….but at the same time….

    - *1966 PA 1's 50% rule pertains to **"floor area of the public facility or facility used by the public"***
    - *Therefore, if you are performing an Alteration Level 3 to a multi-story building, by virtue of 1966 PA 1, you may have to comply with the "…barrier free design requirements contained in the state construction code…" (1966 PA 1) for the **"entire"** public facility or facility used by the public (regardless of the defined extent of your work area).*

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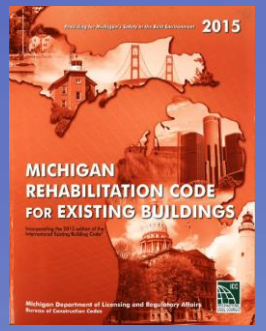

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 2,** then additional **MEP** requirements apply for the altered portions…
    - **Section 808 Electrical:** "All newly installed electrical…relating to work done in any work area shall comply with all applicable requirements of …[current Part 8 Rules]."
      - » ***Additional Provisions*** *for R-2, R-3 & R-4 only, including 1) Exceptions for # of receptacles, 2) use of G[illegible] lighting req's for certain spaces, and 4) equ[illegible]*
      - » ***Additional Provisions*** *for A-1, A-2, A-5, H[illegible] work areas to be "upgraded" to meet Alt 1 n[illegible]*
    - **Section 809 Mechanical:** All reconfigured/converted spaces to comp[illegible] with current MMC but, if using an altered existing mechanical system, need only 5 CFM/person of outdoor and 15 CFM/person ventilation. Also, local exhaust req'd for any new qualifying devices/equip added.
    - **Section 810 Plumbing:** If occ load increased > 20%; update fix counts

MR Credit: Building Life Cycle Impact Reduction
IN Credit: Reduced energy costs and water usage

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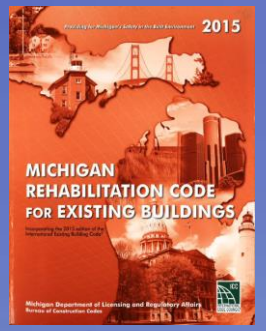

- Chapters 8 & 9 Alterations – Levels 2 & 3
  - **If Alteration Level 3,** same **MEP** requirements as **Alteration Level 2** (nothing further)…
  - **Section 811 Energy:** Regardless if you are performing an **Alteration Level 2** or **Alteration Level 3**, nothing further req'd other than same requirements as **Alteration Level 1** (i.e., altered portions must comply, rest not touched can remain "as-is")…

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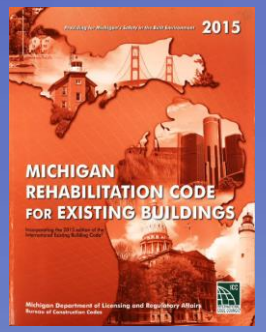

- Case Study – Alterations
- Commercial building, Group A-2, originally built in 1992, partial renovation in 2001
- Two stories above grade with basement level (walk-out design)
- Fire occurred in February 2007, completely destroying construction above basement
- Insurance carrier concerned regarding **extent of proposed changes** in rebuild design documents; **many changes allegedly the result of code upgrades** since its original construction (**1987 BOCA**) and renovation (**1996 BOCA**)
- Performed comprehensive analysis of damage vs. rebuild design and determined majority of **changes not the result of code upgrades.**
- **MRCEB Alterations Level 1** could have been used to put the building back (…**Repairs** too…)
- **Why significant? $3,000,000 question!**

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Building Codes &
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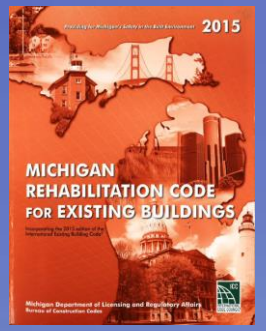
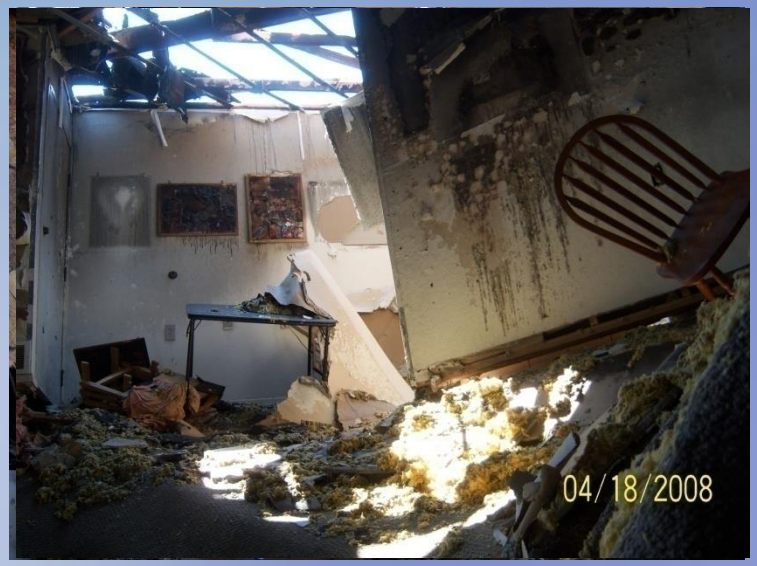


- Case Study – Alterations
  - Commercial apartment building, Group R-2, three-stories, built in 1990's
  - Fire occurred in April 2008 in upper floor mechanical room; extensive fire damage to main entrance open "atrium" space and to all floors, radiating from source area; smoke and extinguishing damage throughout remainder of building.
  - Performed structural and nonstructural **damage assessment** to characterize what can remain vs. what must be repaired/replaced.
  - Recommended **MRCEB Alteration Level 1** for extensively damaged portions and **Repairs** for smoke damaged portions
  - Reportedly, owner intended on making some **changes** to the floor plan that would trigger **Alteration Level 2** requirements
  - Insurance coverage **only** available for minimum requirement of code (Alteration Level 1)…



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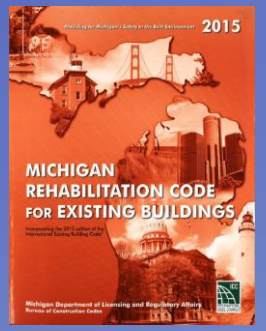

- Chapter 10 Change of Occupancy
  - Different requirements for “Change of Occupancy” vs “Change of Occupancy Classification”…
  - **Section 202** defines **Change of Occupancy** as, “A change in the use of the building or a portion of a building.” *Includes changes between 1) classifications (i.e., E to R-2), 2) groups (i.e., R-1 to R-2) and 3) uses (i.e., A-3 art gallery to A-3 community hall).*
    - If no Classification or Group change, comply with ‘Repair’ or ‘Alteration’ reqs per **Sections 1002 thru 1011**
    - If Classification or Group change, also comply with **Section 1012**
    - **Section 1001.3:** New CofO issued only if new Classification
    - **Section 1002:** If ‘underground bldg’ or changing to one of 11 qualifying ‘special uses’, comply with current MBC.

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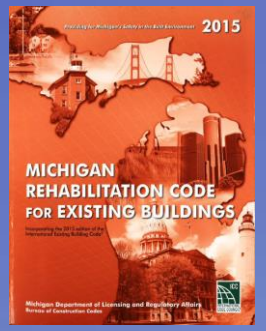

- Chapter 10 Change of Occ. ("No Class/Group")
  - **Building Elements and Materials, Fire Protection, Means of Egress, and Accessibility** – **no further requirements** ***(for the most part)*** than those required per the applicable 'Repair' or 'Alteration' work being done.
    - ***Note:*** *may need fire protection changes if MBC Ch. 9 requires diff. protection for the 'use' change even if the classification/group remains*
  - **Section 1007 Structural**
    - **Gravity:** If higher uniform or concentrated loads, comply with MBC
      - » ***Exception:*** *Stress increase by 5% or less*
    - **Snow/Wind:** If higher risk (Importance Factor), comply with MBC
      - » ***Exception:*** *If change is 10% or less of building floor area*
    - **Seismic:** Same - If higher risk, comply with MBC *(few exceptions)*
  - **Section 1011 Light/Ventilation:** Comply with current MBC

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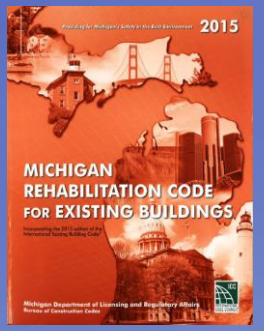

- Chapter 10 Change of Occ. ("No Class/Group")
  - Additional **MEP** requirements apply…
    - **Section 1008 Electrical:** If the new occupancy is one of the special 12 listed, then "…the electrical wiring and equipment of the building or portion thereof that contains the proposed occupancy shall comply with the applicable requirements of …[current Part 8 Rules]."
      - » ***Additional Provisions*** *for 1) Unsafe condition correction required without requiring rest of existing electrical to be changed, 2) service upgrade required, and 3) # of outlets to comply with current Part 8 Rules.*
    - **Section 1009 Mechanical:** If new occupancy is subject to different kitchen exhaust or increased ventilation, those portions of building shall comply with current MMC.
    - **Section 1010 Plumbing:** If new occupancy has increased demand (i.e., fixture count or water supply), comply with current MPC.
      - » ***Additional Provisions*** *for 1) food-handling, 2) chemical waste, 3) interceptor req's, and 3) I-2 use.*

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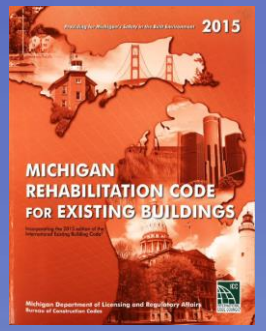

- Chapter 10 Change of Occ. ("Class/Group")
  - If changing occupancy **"classification"** or **"group"**, now required to comply with **Section 1012** (not just applicable "Repair" or "Alteration" provisions), which will include some or all upgrades to:
    - Passive fire-resistive construction and compartmentalization
    - Active fire-protection systems
    - Means of egress
    - Height and area
    - Exterior wall fire-resistance and opening protectives
    - Vertical shaft protection
    - Accessibility

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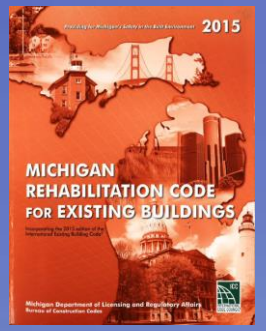

- Chapter 10 Change of Occ. ("Class/Group")
  - **Section 1012 Change of Occupancy Classification**
    - **Section 1012.1.1 Compliance with Chapter 9** (Alterations Level 3). Unless the new occupancy classification/group/MBC Ch. 9 app area is separated from the remainder of the existing building with **fire barriers**, the entire building must comply with Chapter 9.
    - **Section 1012.1.2 Fire Protection and Interior Finish.**
      - » **Fire Sprinklers, Fire Alarm, and Detection Systems:** Based on new occupancy classification, if current MBC require sprinklers, alarms, and detection, then you must provide them **"…throughout the area where the change of occupancy occurs."** Existing alarm notifications shall be automatically activated throughout the building.
      - » **Interior Finishes:** In area of occupancy classification change, **wall and ceiling finishes** shall comply with current MBC.

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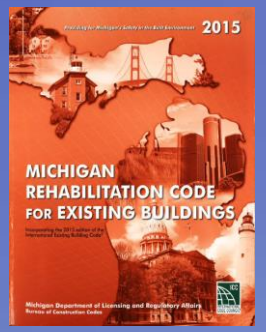

- Chapter 10 Change of Occ. ("Class/Group")
  - **Section 1012.1.3: "Hazard Categories" Analyses**
    - Triggers based on relative degree of hazard between existing occupancy and new occupancy classification.
    - **Cascading requirements: *"The more of a hazard, the more new code compliance required."***
    - **Three primary hazard categories reviewed:**
      - » Means of Egress (**Section 1012.4**)
      - » Heights and Areas (**Section 1012.5**)
      - » Exterior Wall Fire-Resistance (**Section 1012.6**)

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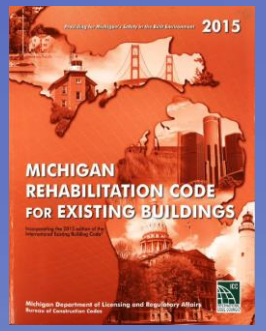

- Chapter 10 Change of Occ. (“Class/Group”)
  - **Section 1012.4 Means of Egress**
    - **Table 1012.4:** Determine change to “higher” or “equal/lower” category.
    - If **Higher** , then means of egress shall comply with current MBC
      - » ***Limited Exceptions for:*** *Existing stairway enclosures, handrails, guards, replacement stairway pitch/slope, existing corridor walls and openings, dead-end corridors, and existing operable windows serving as emergency escape and rescue openings.*
    - If **Equal/Lower** , then existing elements of means of egress shall comply with **Alt Level 3** req’s, and by association, **Alt Level 2** req’s.
    - **Section 1012.4.3 Egress Capacity:** comply with current MBC.
    - **Sections 1012.4.4 Handrails & 1012.4.5 Guards:** comply with **Alt Level 2** req’s.

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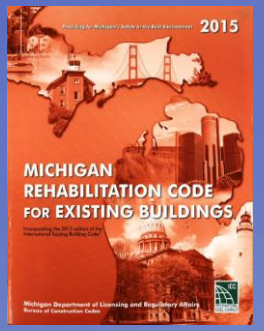

- Chapter 10 Change of Occ. (“Class/Group”)
  - **Section 1012.5 Heights and Areas.**
    - **Table 1012.5:** Determine change to “higher” or “equal/lower” category.
    - If **Higher** , then heights/areas shall comply with current MBC
      - » *Exceptions for 1) fire-resistance reductions for high-rises and 2) qualifying uses if sprinklers provided will allow the use of fire barriers to act as a “fire wall alternatives”.*
      - » ***Section 1012.5.3 Fire Barriers.*** *In* ***separated mixed-use*** *buildings, the fire barriers (new or existing) shall comply with current MBC. Exception for existing wood lath/plaster walls in “good condition” or existing 1/2 inch thick gypsum wall board, provided only a 1-hour rating is required.*
    - If **Equal/Lower** , then no further req’s.

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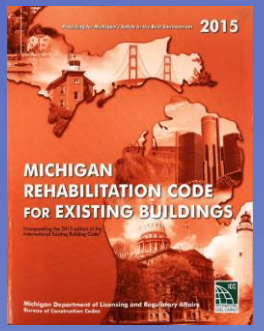

- Chapter 10 Change of Occ. (“Class/Group”)
  - **Section 1012.6 Exterior Wall Fire-Resistance**
    - **Table 1012.6:** Determine change to “higher” or “equal/lower” category.
    - If **Higher** , then **exterior wall fire resistance** and **opening protectives** shall comply with current MBC
      - » ***Exception:*** *If building is three stories or less, is classified as A-2 or A-3 with occupant load less than 300, B, F, M or S, then 2-hour rating allowed.*
      - » ***Section 1012.6.3 Opening Protectives:*** *Comply with current MBC. If protectives required due to fire separation distance, then sum of opening area must be less than 50% of wall area per story. Exceptions for 1) if MBC allows more, 2) Group R less than or equal to three stories and more than 3 feet from property line, and 3) sprinkler system.*
    - If **Equal/Lower** , then no further req’s.

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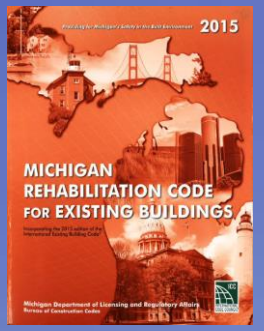

- Chapter 10 Change of Occ. (“Class/Group”)
  - **Section 1012.7 Enclosure of Vertical Shafts**
    - **Section 1012.7.1:** Comply with current MBC for **atriums or Section 1012.7**. *(regardless of hazard category analyses)*
    - **Section 1012.7.2 Stairways:** If **Higher** hazard, comply with current MBC.
      - » ***Exceptions:*** *1) All Groups except I, if connecting only one adjacent floor and not connected with corridors or stairways, 2) if each story separated by 1-hour construction or wired glass in steel frames with sprinklered corridors, and 3) existing penetrations ok as long as protected per current MBC.*
    - **Section 1012.7.3 Other Vertical Shafts:** If **Higher** hazard, comply with current MBC.
      - » ***Exceptions:*** *1) Existing 1-hour shafts are ok and 2) if building sprinklered, no rating for openings connecting less than 6 stories (No Group I).*

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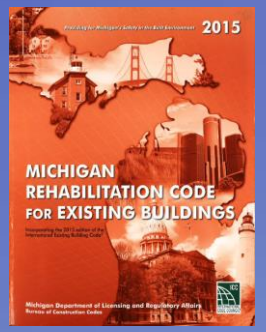

- Chapter 10 Change of Occ. ("Class/Group")
  - **Section 1012.8 Accessibility**
    - **Regardless if Higher hazard value**, must provide the following accessibility work:
    - If change only affects a **portion of the building**, accessibility improvements required in accordance with Level of Alteration (Chapters 7, 8 or 9) being done (**Section 1012.8.1**).
    - If change affects whole building, comply, to the extent technically feasible, with applicable Alteration work ***and*** the following is required (**Section 1012.8.2**):
      - One accessible entrance
      - One accessible route (site features and interior primary function)
      - Accessible signage
      - If loading zones provided, one accessible zone req'd
      - If parking provided, provide accessible parking

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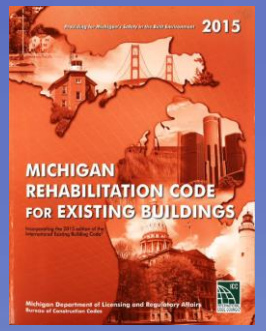

- Case Study, Change of Occupancy
- Commercial building, thee-stories, mixed use constructed in1880's
- Group M on first floor, Groups M and B on second floor, third floor "vacant"
- Owner renovated (with permit) in 2005 third floor to Group R-2 (five dwelling units)
- Building, including R-2 story, was **not sprinklered**
- Fire in July 2007, serious injuries, death, litigation
- Question: **"Was sprinkler system required?"**
- Records indicate permit issued for R-2 renovation per "Alteration Level 2" MRCEB *and* MBC (???)
- **If MBC = required**
- **If MRCEB = not required**
- Why were both codes listed?...different answer in each code – **only one shall apply**
- Most restrictive requirement not only requires sprinklers in R-2 story, but throughout building…

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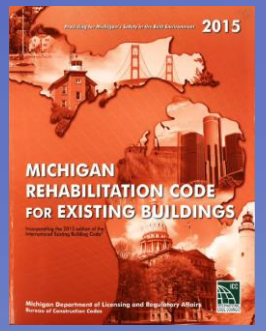

- Chapter 11 Additions
  - **Section 1101.1 Scope:** All work associated with additions must comply with current MBC. Portion of existing building ***"impacted by addition"***, must comply with MRCEB.
    - *Chapter contains various "exceptions" or "relief" to the overarching above requirement, but for the most part, the MBC will be "king"…*
  - **Section 1101.2 Creation or extension of nonconformity:** Cannot extend an existing **"nonconformity".**
    - *Who knows what this term means (not defined in code), but assume it means anything that does not comply with the code it was constructed under or modified to.*
    - *Also has Zoning limitation terminology 'roots'…*

Other Helpful References

- **"Existing Buildings…What Code Applies",** AIA Detroit BC&RC On-line Article, authored by B. Tognetti, April 16, 2007.
- **"Accessibility and Existing Structures",** Michigan Dept. of Consumer & Industry Services, BCC Bulletin Article, authored by I. Poke, November 2002.
- **"Michigan Rehabilitation Code for Existing Buildings",** Michigan Dept. of Consumer & Industry Services, BCC Bulletin Article, authored by L. Lehman, Spring 2007.
- **"Accessibility for Existing Buildings Change of Use",** Michigan Dept. of Consumer & Industry Services, BCC Bulletin Article, authored by I. Poke, May 2004.
- **"Existing Installations vs. Additions, Alterations or Repairs",** Michigan Dept. of Consumer & Industry Services, BCC Bulletin Article, authored by T. Barry, February 2004.
- **"Using the IEBC to Help Safely Revitalize Existing Building Stock",** ICC Building Safety Journal Article, authored by H. Naderi, October 2007
- **"Are the Structural Upgrade Triggers in the IBC and IEBC Morally Defensible?",** Structural Engineer Magazine Article, authored by G. Searer and T. Paret, August 2008.
- **"Breaking the Codes: How State and Local Governments are Reforming Building Codes to Encourage Rehabilitation of Existing Structures",** Online Publication, authored by P. Mattera, January 2006.
- **"Building codes and Historic Buildings",** National Trust for Historic Preservation, Preservation Book Publication, authored by M. Green and A. Watson, 2005.
- **"Navigating Historic to Present US Model Code Provisions for the Repair of Damaged Buildings",** technical paper for the American Society of Civil Engineers (ASCE), specifically ASCE's *Practice Periodical on Structural Design and Construction*, co-authored by B. Tognetti, Z. Martin and H. Hill, September 2015.
- **"Current Code and Repair of Damaged Buildings",** technical article for the National Council of Structural Engineers Association (NCSEA), specifically NCSEA's *Structure Magazine*, co-authored by B. Tognetti, Z. Martin and H. Hill, February 2017.