



**TITLE 24, PART 6**

**2025 CODE CYCLE**

# Existing Buildings

Codes and Standards Enhancement (CASE) Proposal  
Exceptions for Commissioning and Mass Walls

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February 24th, 2023

# Agenda

Mandatory Commissioning	9:20
Mass Wall Exceptions	9:50
Discussion	10:10
Break	10:30





# Background - Commissioning

- Proposal Summary
- 2022 Code Requirements
- Context and History

# Proposal Summary – Mandatory Commissioning

This measure would consider removing or revising the exceptions for additions and alterations.



Building Type	Construction Type	Type of Change	Section(s) of Code Updated	Software Updates Required
Nonresidential	Additions and Alterations	Mandatory	Section 141.0(a) ADDITIONS <ul style="list-style-type: none"> <li>• 1. New Section</li> </ul> Section 141.0(b) ALTERATIONS <ul style="list-style-type: none"> <li>• 1.E. (New Section)</li> </ul> Section 120.8 COMMISSIONING <ul style="list-style-type: none"> <li>• (j)(k) (New Sections)</li> </ul>	Minimum

**Note** Enclosed parking garages, grocery, horticulture facilities, healthcare facilities, manufacturing facilities, parking garages, refrigerated warehouses, and vehicle service facilities **are not** included in the existing building CASE report

# Current Code Requirements - Additions

## Existing Requirements in Title 24, Part 6

**Section 141.0(a) Additions.** Additions shall meet either Item 1 or 2 below.

- 1. Prescriptive approach.** The envelope and lighting of the addition; any newly installed space-conditioning system, electrical power distribution system, or water-heating system; any addition to an outdoor lighting system; and any new sign installed in conjunction with an indoor or outdoor addition shall meet the applicable requirements of Sections 110.0 through 120.7, 120.9 through 130.5, and 140.2 through 140.10.  

- 2. Performance approach.** The envelope and indoor lighting in the conditioned space of the addition, and any newly installed space-conditioning system, electrical power distribution system, or water-heating system, shall meet the applicable requirements of Sections 110.0 through 120.7, 120.9 through 130.5 and [either addition alone or existing building plus addition plus alteration].  


*Note: Section 120.8 - NONRESIDENTIAL BUILDING COMMISSIONING is not included*

# Current Code Requirements – Alterations

## Existing Requirements in Title 24, Part 6

**Section 141.0(b) Alterations.** Alterations to components of existing nonresidential (buildings) shall meet Item 1, and either item 2 or 3 below:

**1. Mandatory Requirements.** (not shown; no reference to Section 120.8)

**2. Prescriptive approach.** The altered components of the envelope... shall meet the applicable requirements of Sections 110.0 through 110.9, Sections 120.0 through 120.6, and Sections 120.9 through 130.5.

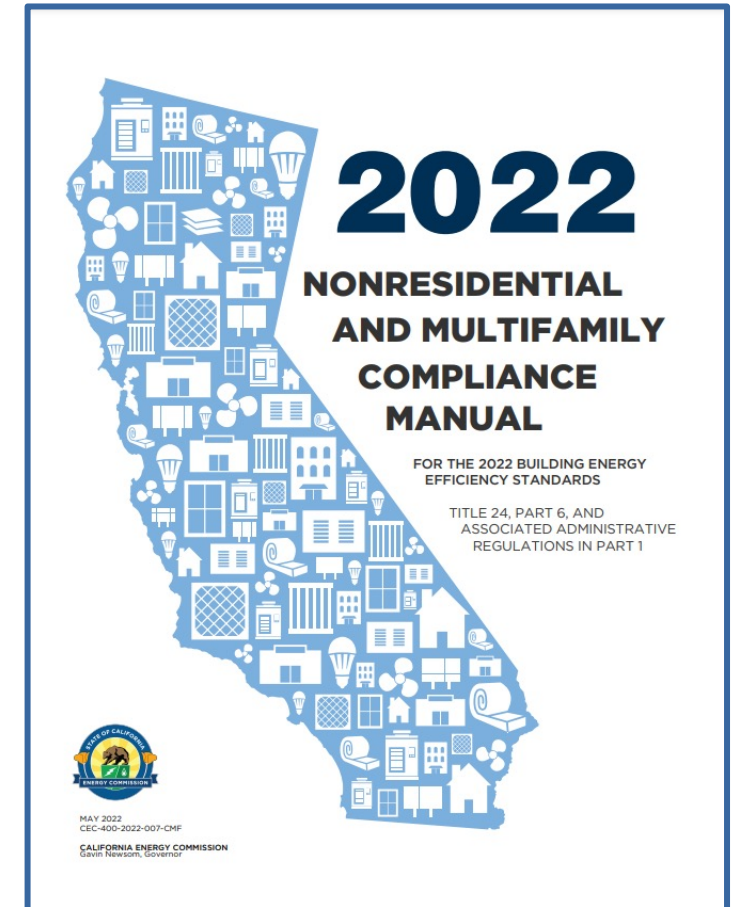
**3. Performance approach.** The altered envelope.....shall meet the applicable requirements of Sections 110.0 through 110.9, Sections 120.0 through 120.6, and Sections 120.9 through 130.5.

*Note: Section 120.8 - NONRESIDENTIAL BUILDING COMMISSIONING is not included*

# Proposed Code Change – Context and History

## Title 24, Part 6:

- For new construction, a mandatory commissioning requirement for design review (Section 120.8) was introduced in 2013 in addition to Title 24 Part 11 commissioning requirements.
- A Building Commissioning Guide Section for new construction was also incorporated in the nonresidential compliance manual.
- However, no commissioning requirements have been proposed for additions and alterations projects since the introduction in 2013.



# Proposed Code Change – Context and History

## Title 24, Part 11 – Green Building Standards:

There is a trigger in Section 301.3 for additions and alterations in existing buildings to meet mandatory measures in Chapter 5. *The CASE team recommends the same trigger for additions and alterations commissioning.*

- **Section 301.3: Nonresidential additions and alterations:** The provisions of individual sections of Chapter 5 apply to newly constructed buildings, building additions of 1,000 square feet or greater, and or building alterations with a permit value of \$200,000 or above. Code sections relevant to additions and alterations only apply to the portions of the building being added or altered within the scope of the permitted work.



# Proposed Code Change – Context and History (Cont.)

**ASHRAE 90.1-2019 introduced a commissioning requirement for alterations and additions**

Section 4.2.5 as below:

- For alterations and additions, verification and testing shall be performed for new systems, and their interface and integration with existing building systems shall be verified or tested.
- Commissioning shall use ASHRAE/IES Standard 202 or other generally accepted engineering standards acceptable to the building official.
- Main Exceptions to 4.2.5.2
  1. Buildings, additions, or alterations with less than 10,000 ft<sup>2</sup> of conditioned space and combined heating, cooling, and service water heating equipment totaling less than 960,000 Btu/h in capacity.
  2. Buildings or portions of buildings that use the simplified approach building compliance path for HVAC systems in Section 6.3., dwelling units, and nonrefrigerated warehouses.

# Why Commissioning?

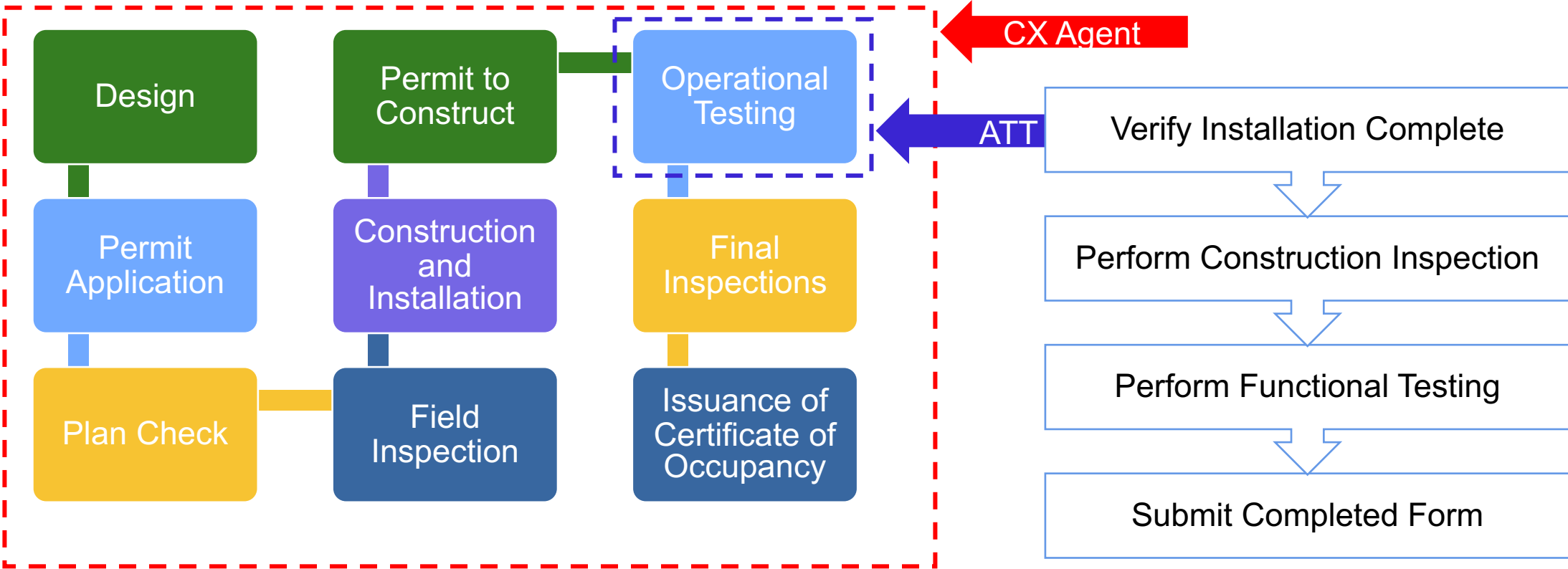
What is the need for commissioning when there is acceptance testing?

- There are mandatory accepting testing requirements (as many as 52 NRCA forms) for alterations and additions. Many of these tests are performed by Accepting Test Technicians (ATTs)
- The boundary of acceptance testing is limited, and it does not start until **the construction is complete and the relevant system is installed**; the scope of commissioning encompasses many systems both isolated and integrated, and the process spans from the design phase to verification after occupancy.
- Acceptance testing does not cover training for the facility personnel whereas the commissioning process does.

	Commissioning Authority (CxA)	Acceptance Testing Technician
Responsibilities	<ul style="list-style-type: none"><li>• Design Review</li><li>• Develop Basis of Design, Owner's Project Requirements, and Commissioning Plan</li><li>• Prepare and submit certificates of acceptance</li></ul>	<ul style="list-style-type: none"><li>• Perform acceptance testing</li><li>• Document certificates of acceptance</li></ul>

# Proposed Code Change – Context and History (cont.)

## Permitting Process and Role of Cx Agents and ATTs



Source: California Energy Commission Staff (2022 Nonresidential Compliance Manual Figure 14-1:1 idealized International Code Council Permitting Process for Building Permit Applications)

## Poll

- **Measure Name: Commissioning**
- **Type of Poll:** Multiple Choice (One answer)
- **Question:** The Cx should review, record, and flag the completed Certificate of Acceptance forms when the efficiency feature does not pass acceptance testing and flag it. This may help the technician or ATT identify the issues or errors that the efficiency feature is having that prevent it from passing. Do you agree?
- **Answers:** Yes, no, Add it to the issue log so that all issues will be addressed at a later stage.
- **Placement:** after Permitting Process and role of ATT....
- **Broadcast results to attendees as they respond:** (Y)
- **Make poll public during presentation:** (Y)



# Market Overview - Commissioning

- Current Market Conditions
- Market Trends
- Potential Market Barriers and Solutions

# Market Overview and Analysis

## Current Market

- Commissioning has grown to a normal practice since its introduction for new construction in 2013.
- Commissioning agents are well positioned to provide Cx services for additions/alterations.

## Market Barriers

- There may be technical challenges in interfacing with existing legacy systems in existing buildings. This can be addressed by early design review to understand whether the condition/function of existing systems warrants their continued use or replacement.



## Poll

**Do you agree with this description?  
What else should be known?**



# Technical Considerations - Commissioning

- Technical Considerations
- Potential Barriers and Solutions



# Technical Barriers – Commissioning

## Technical Barriers and Potential Solutions

- **New vs Existing Buildings.** There is a clear distinction between new construction Cx and different forms of existing building Cx. This may cause some ambiguities in Cx process and deliverables.
- **Lack of data.** Lack of building and system information is perceived as a big barrier. Energy Auditing and data collection may be also considered a cost-intensive process.
- **Added cost.** Even though there is some cost involved in carrying out the commissioning process, the CASE team identifies a number of ways that could be reduced significantly.



# Energy and Cost Impacts Per Sq. Ft.

## *Methodology and Assumptions*

- Energy Savings Methodology
- Cost Impacts Methodology
  - Incremental costs
  - Energy cost savings

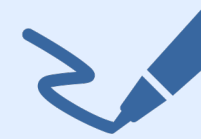


# Assumptions for Standard and Proposed Designs



## Standard Design

T24 2022 compliant standard design with selected non-compliant measures in existing buildings



## Proposed Design

Commissioning measure: T24 2022 compliant standard design

# Modifications to Prototype Buildings: HVAC System

*This slide explains how the prototype will be modified for chiller non-compliant measures.*

- ACM Standard Design: If the change in plant cooling capacity exceeds 50 percent of the existing total cooling capacity of all cooling systems, the system map is based on the entire building's characteristics.
- Per the mapping, System 6-VAV is the HVAC type for buildings > 5 Floors or 150,000 sq. ft which is applicable for all climate zones and cooling capacities
- Proposal Baseline building: A non-compliant chiller measure
- Proposal Design Building: ACM Standard Design



# Modifications to Prototype Buildings: Lighting

*This slide explains how the prototype will be modified for an indoor lighting non-compliant measure.*

- Compliance Requirement: The alteration shall comply with the indoor lighting power requirements specified in Section 140.6 and the lighting control requirements specified in Table 141.0-F
- Proposal Baseline building: Altered lighting system meets LPD requirements but does not have lighting controls
- Proposal Design Building: Meets LPD and controls requirement



# Modifications to Prototype Buildings: SWH

*This slide explains how the prototype will be modified for a service water heating system non-compliant measure.*

- Compliance Requirement: Gas service water-heating systems with a total installed gas water-heating input capacity of 1 MMBtu/h or greater shall have gas service water-heating equipment with a minimum thermal efficiency of 90 percent. Multiple units can meet this requirement if the water-heating input provided by equipment with thermal efficiencies above and below 90 percent averages out to an input capacity-weighted average of at least 90 percent.
  - Exception: Exception 3 to Section 140.5(c): Individual gas water heaters with input capacity at or below 100,000 Btu/h shall not be included in the calculations of the total system input or total system efficiency.
- Proposal Baseline building: Altered gas service water-heating systems of capacity > 1 MMBtu/h are installed with 85% efficiency by ignoring the exception.
- Proposal Design Building: Altered gas service water-heating systems with 90% efficiency



## Poll

- **Measure Name: Commissioning**
- **Type of Poll:** Word Cloud (word cloud)
- **Question:** What non-compliant measures do you see in alteration projects or what measures do you recommend considering as a non-compliant measure?
- **Answers:** Type your recommendations
- **Placement:** Assumptions
- **Broadcast results to attendees as they respond:** (Y)
- **Make poll public during presentation:** (Y)



# Compliance and Enforcement - Commissioning

- Design
- Permit Application
- Construction
- Inspection



# Compliance and Verification Process



## 1. Design Phase

- Develop Owner's Project Requirements (OPR), Basis of Design (BOD)
- Design Kickoff Meeting
- Develop Commissioning Plan and incorporate measures throughout design process into construction documents
- Design Review in Construction Documents



## 2. Permit Application Phase

- Submit Commissioning Plan
- Submit Certificates of Compliance of Design Kickoff and Construction Document Design Review



## 3. Construction Phase

- Document envelope commissioning construction checklists



## 4. Inspection Phase

- Perform and document Functional Performance Testing and supervision of ATT testing
- Provide Commissioning Report to owner

# Poll Request

- **Measure Name: Commissioning**
- **Type of Poll:** Free Response (Free Response)
- **Question:** If you want to discuss your recommendations with us related to this proposal, please type the topic and your email address. We will contact you in a separate email.  
Examples: Modeling methodology- username@domainname.com, enforcement recommendations-username@domainname.com
- **Answers:** Type your topic for discussion
- **Placement:** after slide 50 (After windows first poll question)
  - Present simultaneously with poll on Slide 51
- **Broadcast results to attendees as they respond:** (Y/N)
- **Make poll public during presentation:** (Y/N)



# Background – Mass Walls Exception

- Proposal Summary
- 2022 Code Requirements
- Context and History

# Proposal Summary – Mass Wall Exception

This measure would consider removing or revising the exceptions for additions and alterations.

Building Type	Construction Type	Type of Change	Section(s) of Code Updated	Software Updates Required
Nonresidential	Alterations	Mandatory	141.0(b)1.B - Wall Insulation  EXCEPTION: Light and heavy mass walls	Minimum

## Note

Enclosed parking garages, grocery, horticulture facilities, healthcare facilities, manufacturing facilities, parking garages, refrigerated warehouses, and vehicle service facilities **are not** included in the existing building CASE report

# Proposed Code Change – Mass Walls Mandatory Requirement

## Description of change

- Remove Exception to Section 141.0(b)1B: Light and heavy mass walls
- Add language as below:
  - B. Wall Insulation. For the altered opaque portion of walls separating conditioned spaces from unconditioned spaces or ambient air shall meet the applicable requirements of Items 1 through 6 below:
  - 5. Light mass walls. A 6-inch or greater hollow core concrete masonry unit or a solid concrete masonry wall with insulation shall have a U-factor not to exceed 0.44
  - 6. Heavy mass walls. An 8-inch or greater hollow core concrete masonry unit or a solid concrete masonry wall with insulation shall have a U-factor not to exceed 0.69

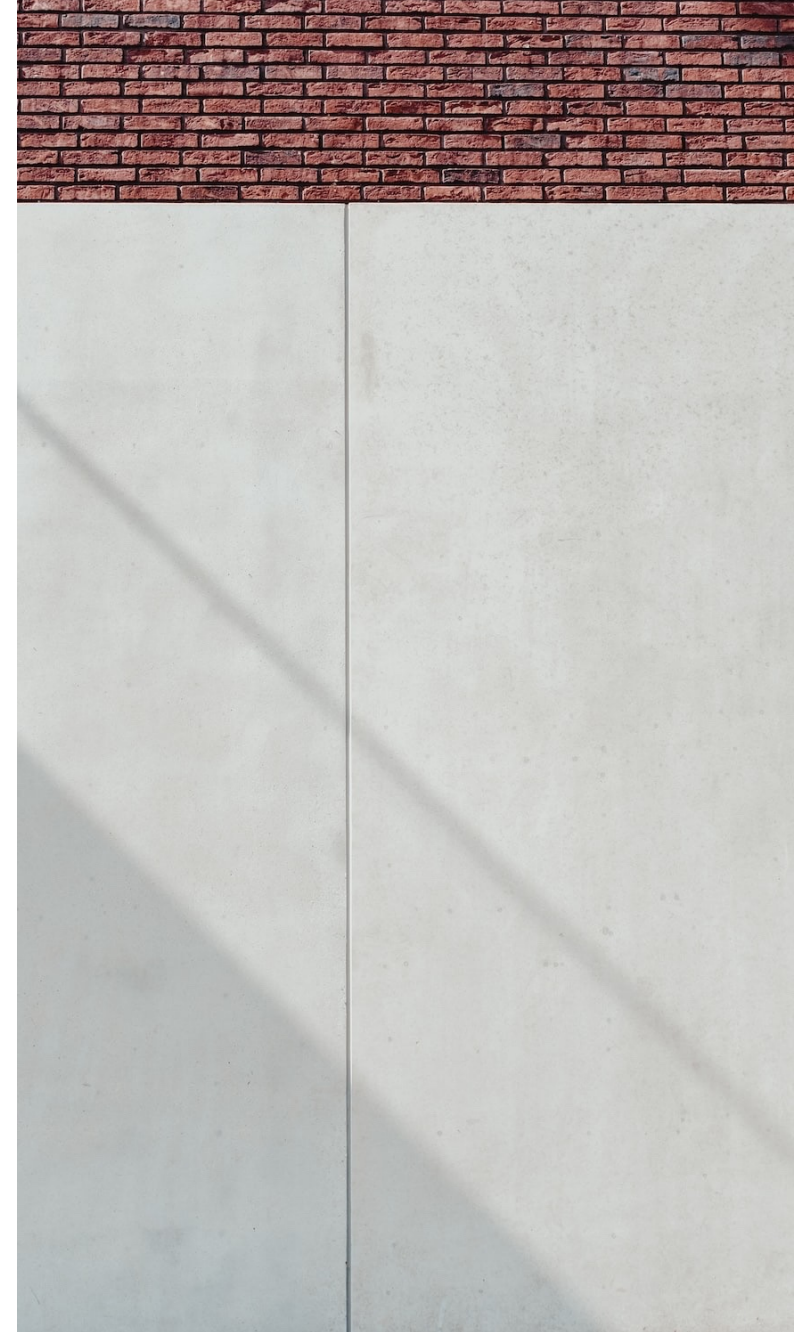
# Context and History

Title 24, Part 6 - 2013 introduced mandatory requirements for mass walls in new construction:

- Light Mass Walls- A 6 inches or greater Hollow Core Concrete Masonry Unit shall have a U-factor not to exceed 0.440.
- Heavy Mass Walls- A 8 inches or greater Hollow Core Concrete Masonry Unit shall have a U-factor not to exceed 0.690.

However, altered mass walls were never addressed in the code.

Neither ASHRAE nor IECC has a Mandatory Requirement for an envelope.





# Market Overview – Mass Walls Exception

- Current Market Conditions
- Market Trends
- Potential Market Barriers and Solutions

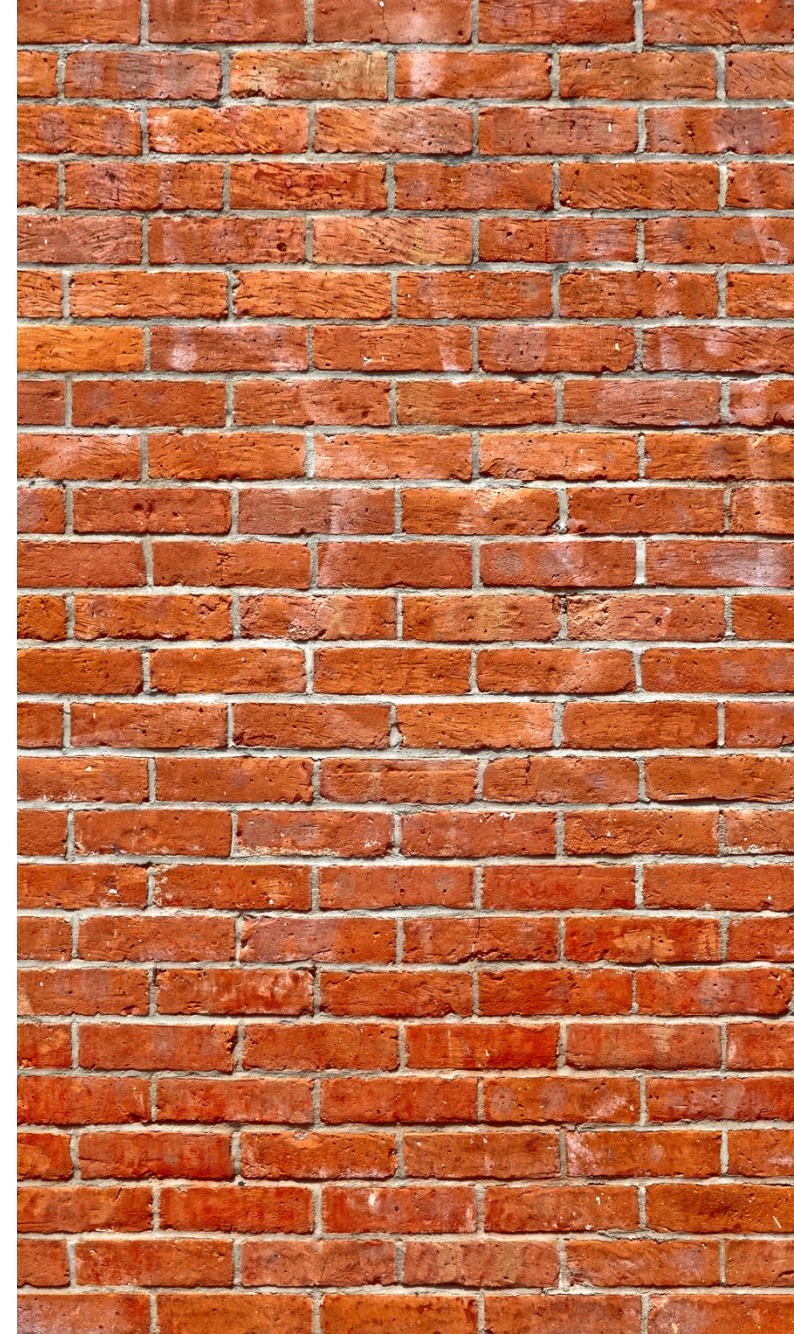
# Market Overview and Analysis

## Current Market

- It is common practice in new construction to provide interior insulation at mass walls. We anticipate that similar interior insulation installation is common where existing mass walls are repurposed as exterior walls at conditioned spaces.

## Market Barriers

- There are no market barriers to increase the thermal performance of existing mass walls.







# Technical Considerations

- Technical Considerations
- Potential Barriers and Solutions

# Technical Considerations – Mass Walls

## Technical Considerations

- Mass walls have an impact on thermal damping and thermal lag. Since mass wall alteration has no insulation requirement, we lose the opportunity of saving energy and demand.
- When the existing solid concrete walls are altered, they can be replaced by hollow concrete walls, or insulation can be added to the existing wall.



# Technical Considerations – Mass Walls

## Technical Barriers and Potential Solutions

- There are no major technical barriers to reducing the U-value of existing mass walls by installing additional insulation.
- Exterior insulation would enhance the benefit of thermal mass for a building, though it would alter the appearance of the exterior walls.
- Where increasing the thermal performance of existing mass walls results in a thicker wall assembly, designers will need to accommodate potential decreases in interior floor area.

**POLL QUESTION  
NEXT SLIDE**

## Poll

### Word Cloud:

What other technical considerations and barriers should we examine?

# Energy and Cost Impacts Per Unit

## *Methodology and Assumptions*

- Energy Savings Methodology
- Cost Impacts Methodology
  - Incremental costs
  - Energy cost savings

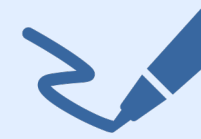


# Assumptions for Standard and Proposed Designs



## Standard Design

T24 compliant standard designs except for light and heavy mass walls U-factors of 0.91 and 0.74 respectively



## Proposed Design

T24 compliant standard designs except for light and heavy mass walls U-factors of 0.44 and 0.69 respectively

## Poll

- **Measure Name: Removing Mass Walls Exemption for Alterations**
- **Type of Poll:** Word Cloud (word cloud)
- **Question:** In what situations would an existing mass wall be modified? Are typical alterations done to existing mass walls amenable to measures required to reduce U-values such as providing exterior or interior insulation?
- **Answers:** Type your recommendations
- **Placement:** after slide 14 (Indoor Agriculture Floral Markets)

Present simultaneously with poll on Slide 15

- **Broadcast results to attendees as they respond:** (Y/N)
- **Make poll public during presentation:** (Y/N)

## Poll

- **Measure Name: Removing Mass Walls Exemption for Alterations**
- **Type of Poll: Multiple Choice** (One Option)
- **Question:** The cost for this mandate proposal is not going to be significant. Do you agree?
- **Answers:** Yes, No, Not sure, Want to Discuss
- **Placement:** after slide 14 (Indoor Agriculture Floral Markets)

Present simultaneously with poll on Slide 15

- **Broadcast results to attendees as they respond:** (Y/N)
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# Compliance and Enforcement – Mass Walls Exception

- Design
- Permit Application
- Construction
- Inspection

# Compliance and Verification Process



## 1. Design Phase

Building designers must be aware of the code changes to the additions/alterations provisions. The qualified design reviewer, per commissioning requirements, as well as energy consultants and compliance documentation authors must verify that plans and specifications match, and therefore meet the requirements of Title 24, Part 6.



## 2. Permit Application Phase

Plans examiners would verify that the project meets new envelope U-factor requirements by ensuring that the NR Compliance Certificate (NRCC) matches the plan and specifications.



## 3. Construction Phase

Envelopes would be built to new U-factor requirements per energy documentations and/or specifications. Installers need to complete the NR Compliance Installation (NRCI) documents.



## 4. Inspection Phase

Building inspectors would verify that the U-factor meets what is listed on energy documentation, plans, and/or specifications

# Poll Request

- **Measure Name:** Mass Walls
- **Type of Poll:** Free Response (Free Response)
- **Question:** If you want to discuss your recommendations with us related to this proposal, please type the topic and your email address. We will contact you in a separate email.  
Examples: Modeling methodology- username@domainname.com, enforcement recommendations-username@domainname.com
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- **Broadcast results to attendees as they respond:** (Y/N)
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# Discussion and Next Steps

# We want to hear from you!

- POLL QUESTION NEXT SLIDE:
- Provide **any last comments or feedback** on this presentation now verbally or over the chat
- More information on pre-rulemaking for the 2025 Energy Code at <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency>

**Comments on this measure are due by March 10, 2023.** Please send comments to [info@title24stakeholders.com](mailto:info@title24stakeholders.com) and copy CASE Authors (see contact info on following slide).

## Poll

**We want to hear from you!  
Any final thoughts or questions?**

# Thank You

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