



Off-Site Constructed Buildings: Compliance, Standards and Local Authority Roles

**Manitoba Building Officials Association
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FMCC



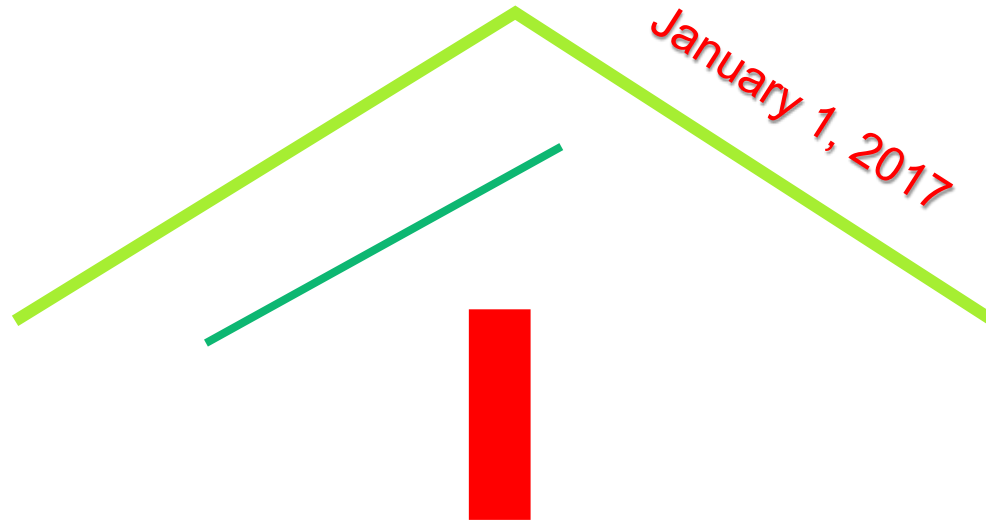
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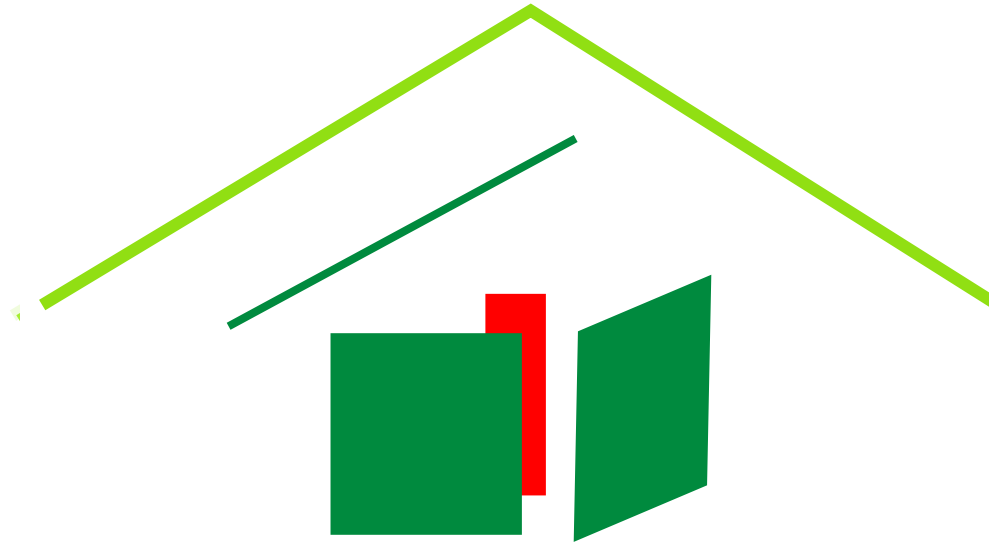
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Factory-Built Modular Construction Council Canadian Home Builders' Association

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Manitoba Act & Regulations

Manitoba Buildings and Mobile Homes Act

Manitoba Building Code

Mobile Homes Standards and Permits Regulation



- **Issues**

- Terminology
 - out of date, not used by the industry
 - does not reflect what is being built
- Referenced standards



- **Implications**

- application of technical and administrative requirements



Outline

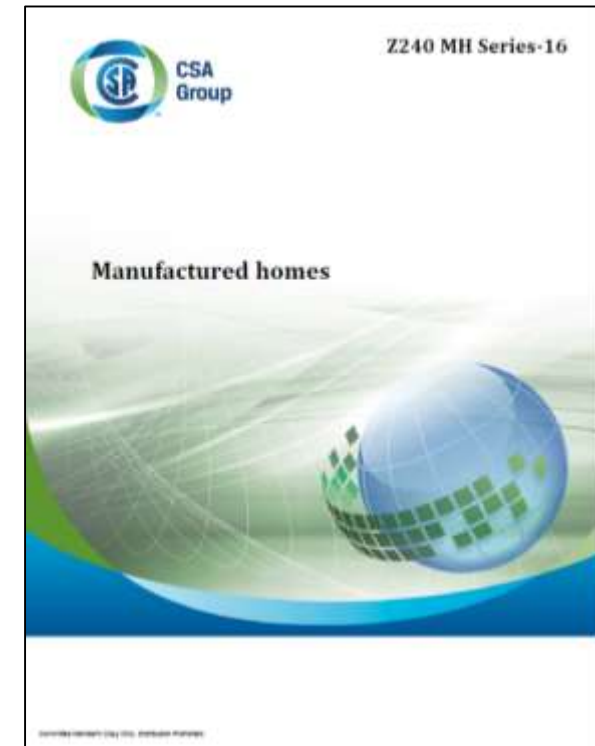
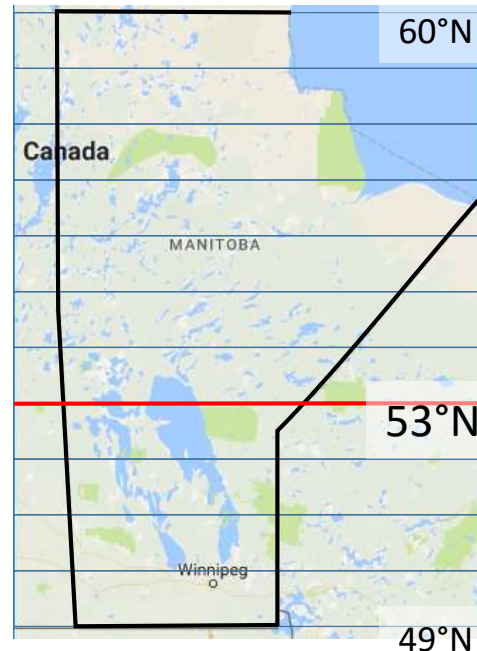
- Compliance
- CSA Standards
- AHJ Roles
- Tiny Houses
- Take-Aways





Compliance

- Options for off-site constructed buildings
 - Manitoba Building Code
 - CSA Z240 MH Series, “Manufactured Homes”





CSA Standards

- Surface Foundations and Anchorage
= CSA Z240.10.1, “Site Preparation, Foundation and Installation of Buildings”
- Manufactured Homes
= CSA Z240 MH Series, “Manufactured Homes”
- Compliance Assurance
= CSA A277, “Procedure for Certification of Prefabricated Buildings, Modules and Panels”
- 2016 Editions

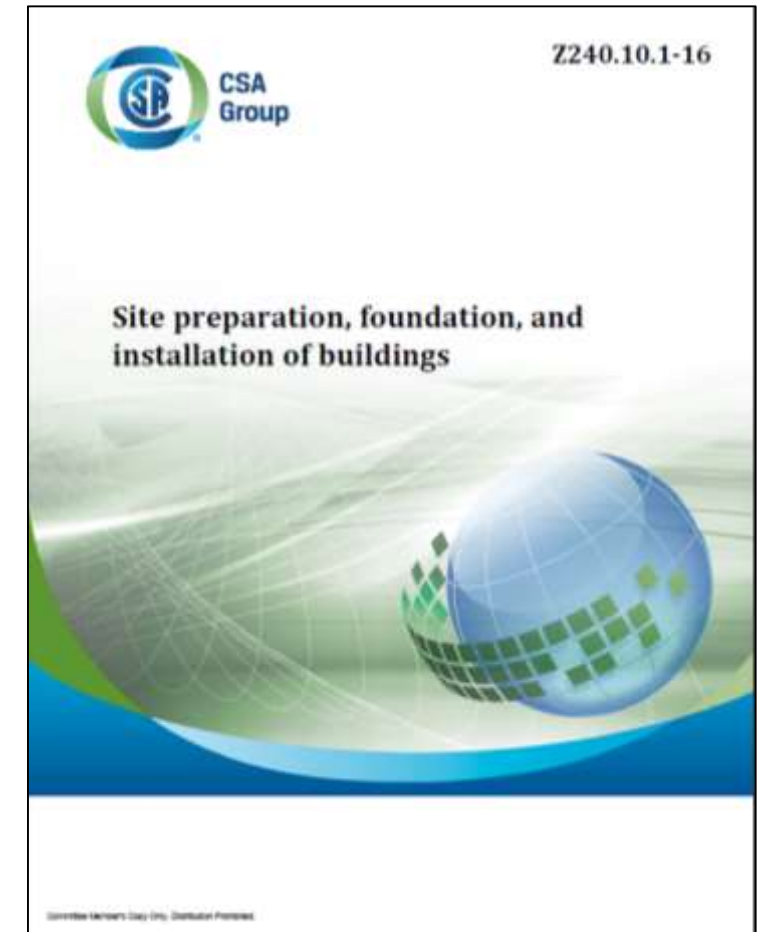


CSA Standards

CSA Z240.10.1 Site Preparation, Foundation and Installation of Buildings

- **Application and Scope**

- For buildings not installed on full-perimeter foundations:
 - site preparation
 - foundations
 - anchorage
 - skirting
- For buildings on full-perimeter foundations:
 - references the NBC
- For any multi-module building:
 - connection of modules



CSA Standards

CSA Z240.10.1 Site Preparation, Foundation and Installation of Buildings

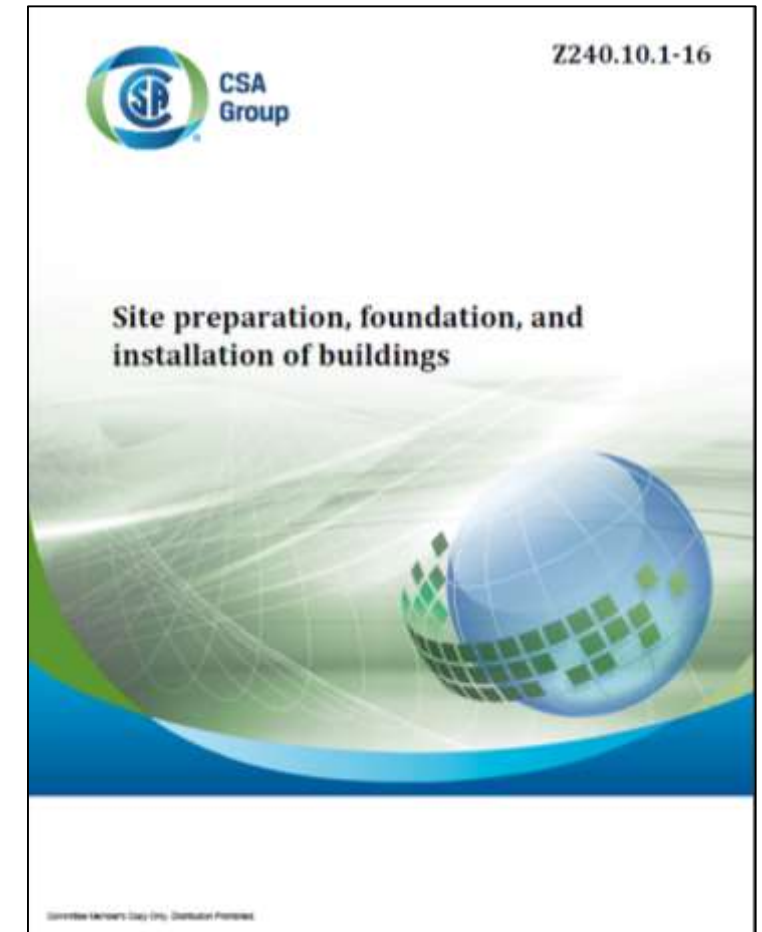
- **Referenced in the NBC/MBC**

- 9.15.1.3. Foundations for Deformation-Resistant Buildings

- no limits on application in the Code

- 9.23.6.3. Anchorage of Smaller Buildings

- max. 4.3 m wide
 - 1 storey in building height



CSA Standards

CSA Z240.10.1 Site Preparation, Foundation and Anchorage ~~Installation~~ of ~~Manufactured Homes~~ Buildings

- **Changes to recognize application**
 - site preparation requirements
 - any building on a pile or pier foundation
 - pile and pier foundation requirements
 - any one-storey building with
 - max. 2.4 kPa uniformly distributed live floor load
 - no masonry, concrete or roof tile
 - installation requirements
 - continuity of structure, fire protection, building envelope
 - any multi-module prefabricated building
 - crawl space skirting, access, ventilation
 - any building on a pile or pier foundation

CSA Z240.10.1 Site Preparation, Foundation and Installation of Buildings

- **Updates for consistency with NBC/MBC**

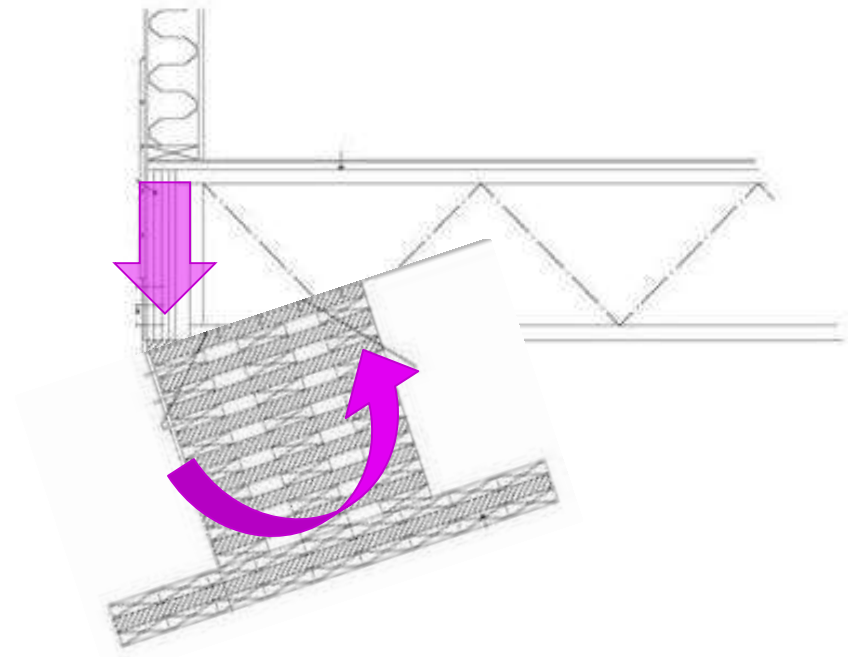
- reference to CAN/CSA-O80 Series preservative treatment of wood
 - requirements specify required level of treatment
- exposure factors for calculating resistance to overturning without anchorage
 - consistent with NBC Part 4
 - look-up tables –
 - required resistance based on -
 - exposure factor
 - building weight
 - building width
 - spacing of supporting beams



CSA Z240.10.1 Site Preparation, Foundation and Installation of Buildings

• Other Updates

- structurally integral footings for piles in frost-susceptible soil
- minimum footing areas
 - calculation and tables – depending on
 - building and occupancy loads
 - pier spacing
 - cantilever beyond supporting beams
 - soil bearing pressure
 - snow load
- pier location and connection where rim joists serve as beams



Ref: CSA Z240.10.1 Figure B.8

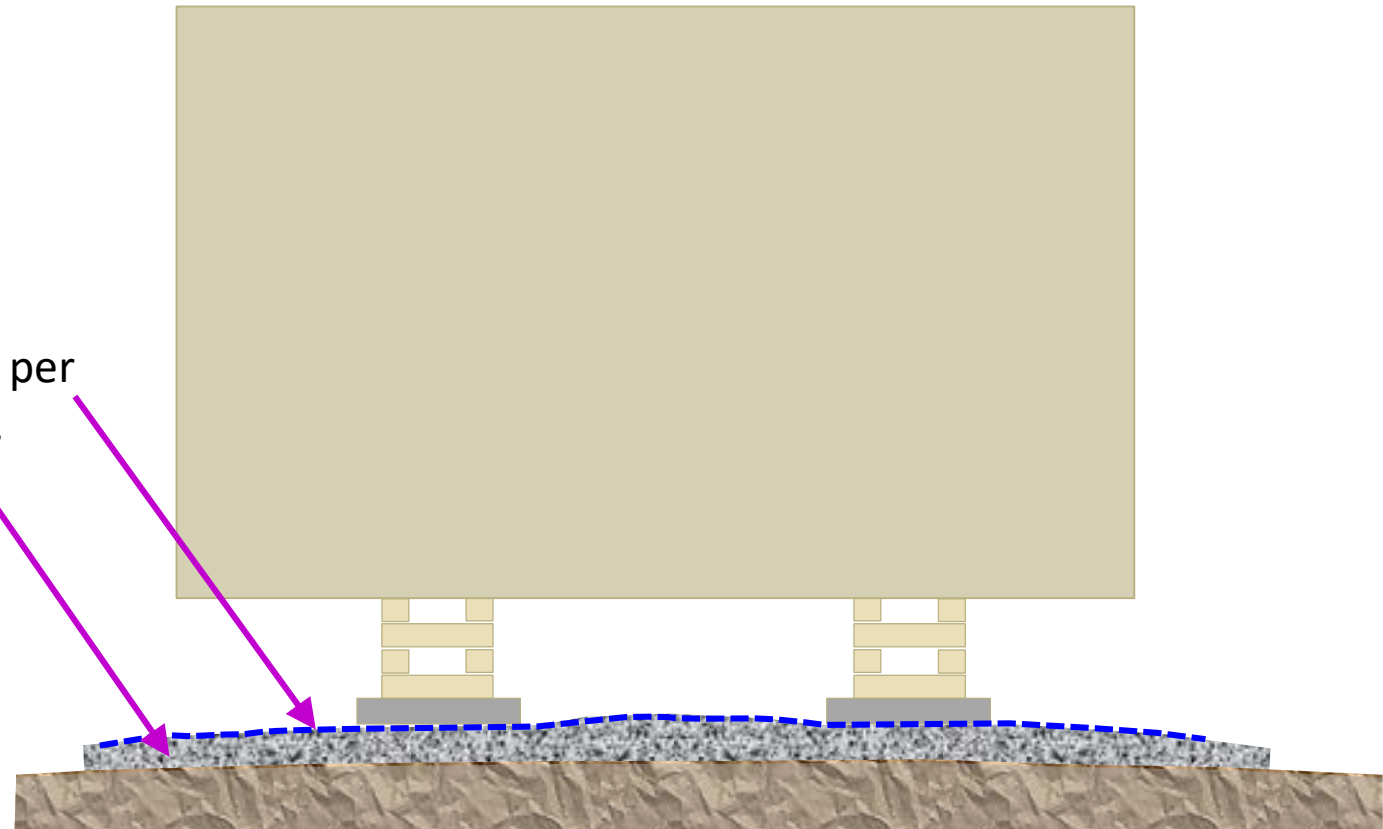
CSA Standards

CSA Z240.10.1 Site Preparation, Foundation and Installation of Buildings

- **Other Updates**

- Protection from moisture in the ground

- ground cover per NBC 9.18.6.1.
- granular fill

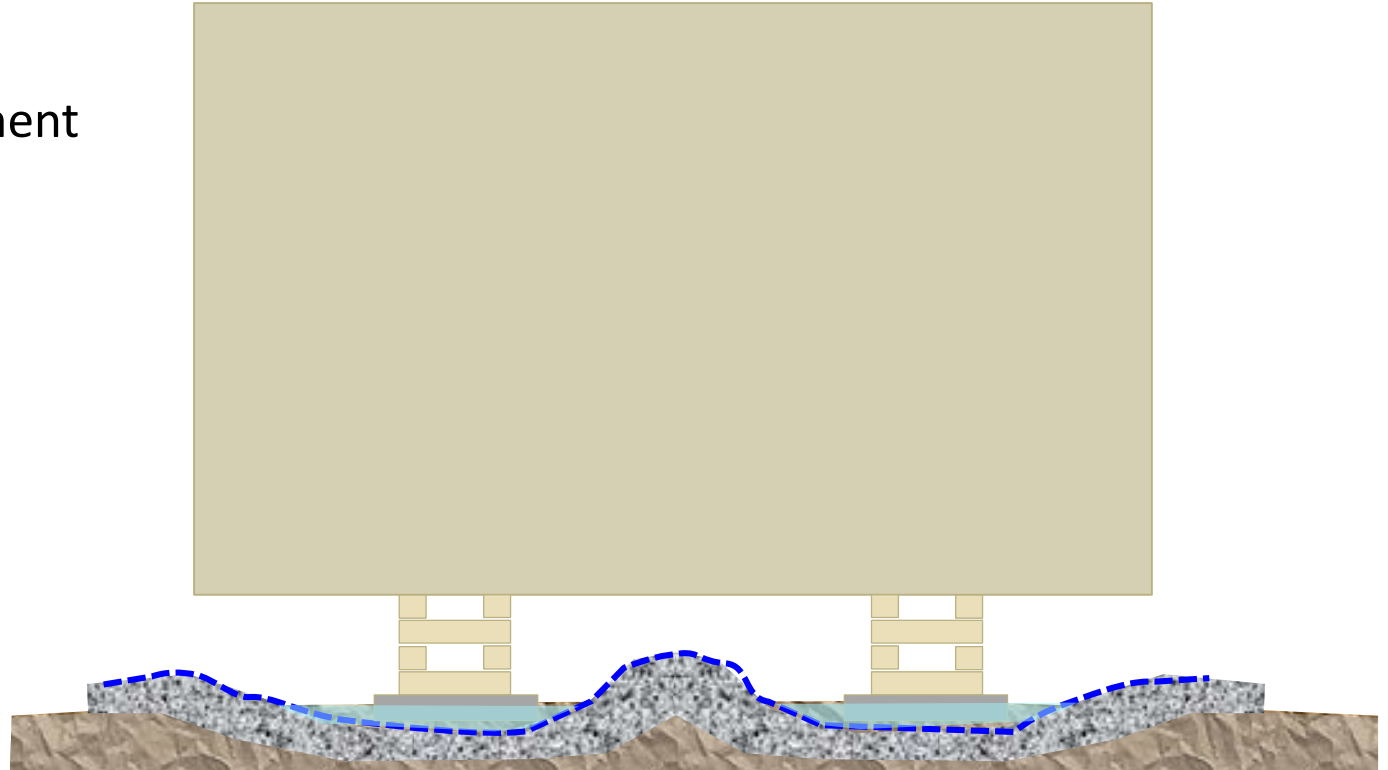


CSA Standards

CSA Z240.10.1 Site Preparation, Foundation and Installation of Buildings

- **Other Updates**

- Protection from moisture in the ground
 - ponding due to footing settlement
 - exception to ground cover requirement deleted
 - options



CSA Standards

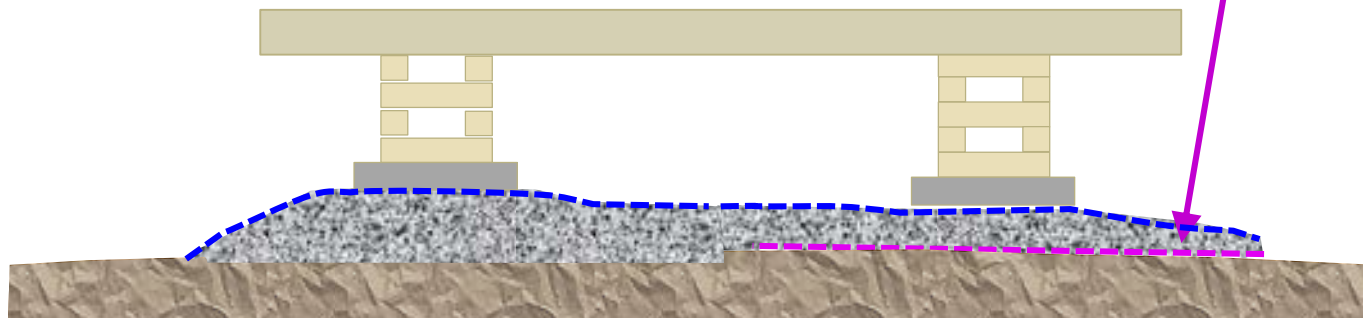
CSA Z240.10.1 Site Preparation, Foundation and Installation of Buildings

• Other Updates

- Protection from moisture in the ground
 - ponding due to footing settlement
 - exception to ground cover requirement deleted
 - options

a) install additional fill

b) install structural geotextile material under granular material (new)





CSA Standards

CSA Z240 MH Series Manufactured Homes

- **Application**

- single-family detached houses
- one-storey
- one or more modules
- constructed to withstand transport and installation loads
 - with inherent strength and stiffness
 - on beams
 - on a chassis
- may be installed on any code-compliant foundation



CSA Standards

CSA Z240 MH Series Manufactured Homes

- **References in the NBC/MBC**

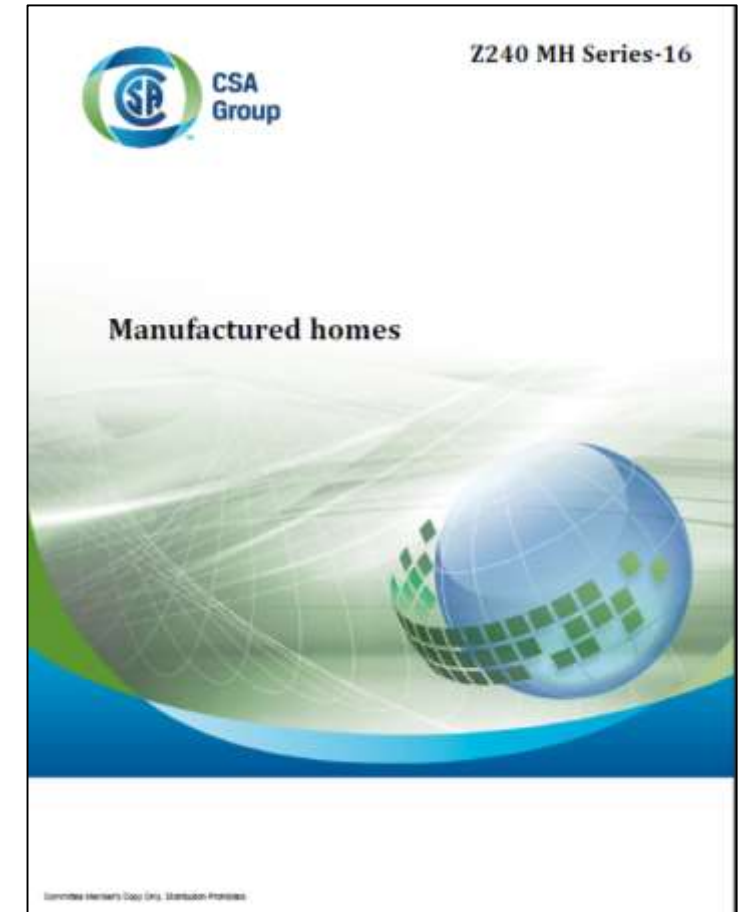
- Not the full standard
 - VERY old editions referenced in the
Manitoba Mobile Homes Standards and Permits Regulation

Article 9.12.2.2. Minimum Depth of Foundations

- Exception for superstructures that pass the deformation-resistance test in CSA Z240.2.1,
“Structural Requirements for Manufactured Homes”

Article 9.15.1.3. Foundations for Deformation-Resistant Buildings

- Option to comply with CSA Z240.10.1 where the building passes the deformation-resistance test in CSA Z240.2.1



CSA Standards

CSA Z240 MH Series Manufactured Homes

- **Updates**

- compliance with NBC except
 - some additional or more stringent requirements to address issues specific to factory constructed buildings (e.g., resistance to loads imposed in-transit and during installation)
 - a few exceptions or less stringent requirements where acceptable performance has been demonstrated or to address affordability issues



CSA Standards

CSA Z240 MH Series Manufactured Homes

- **Only Significant Difference – Energy Efficiency**

- Options:

- NBC 9.36.
- NBC 9.36. with Manitoba amendments
- simplified prescriptive requirements in CSA Z240.2.1 Clause 13

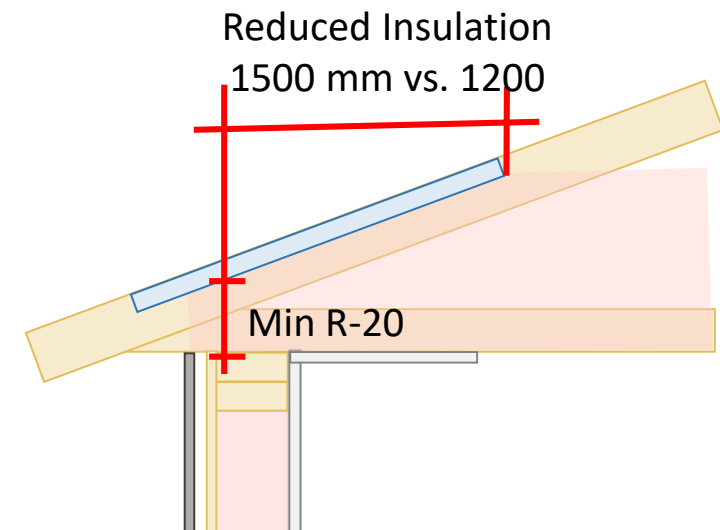


CSA Standards

CSA Z240 MH Series Manufactured Homes

- **Energy Efficiency**

- CSA Z240.2.1 Clause 13
 - Assumes no HRV
 - **Less stringent**
 - attic & floor insulation – Zone 7A
 - ceiling insulation - scissor trusses, coffered ceilings
 - only where roof height is limited by transport regulations
 - not less than required for cathedral ceilings
 - attic insulation at exterior walls
 - permitted to be reduced up to 1500 mm from exterior
 - Zones 7B and 8
 - with roof slope $\leq 4/12$ in





CSA Standards

CSA Z240 MH Series Manufactured Homes

- **Energy Efficiency**

- CSA Z240.2.1 Clause 13

- Less stringent (cont'd)

- wall insulation – all zones
 - windows – Zones 7B & 8
 - space heating

- ~~EE Regulations~~ – ~~“mobile homes” exempt~~

- Clause 13.3.7 – no exemption except -
 - min. AFUE = 82% for gas-fired forced-air furnaces

- More stringent

- insulation for cathedral ceilings and flat roofs



CSA Standards

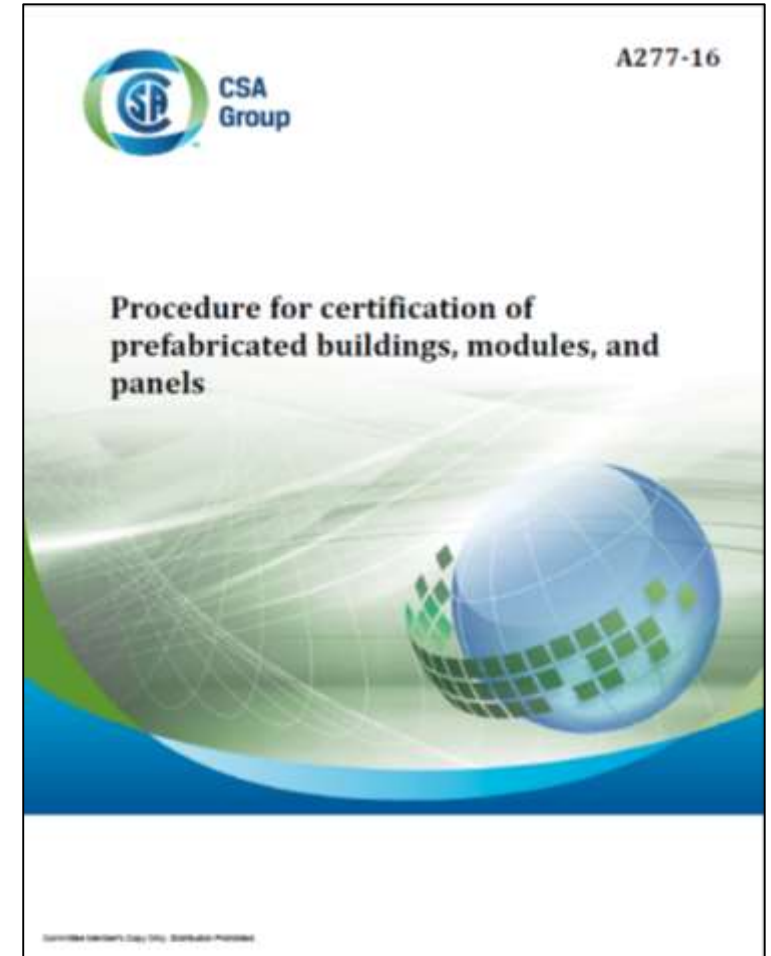
CSA A277 Procedure for ~~Factory~~ Certification of Prefabricated Buildings, Modules and Panels

- **Application**

- factory-constructed buildings, modules and panels

- **Scope**

- in-factory inspection of the built product
- factory quality program
- auditing of the factory quality program
- certification marking

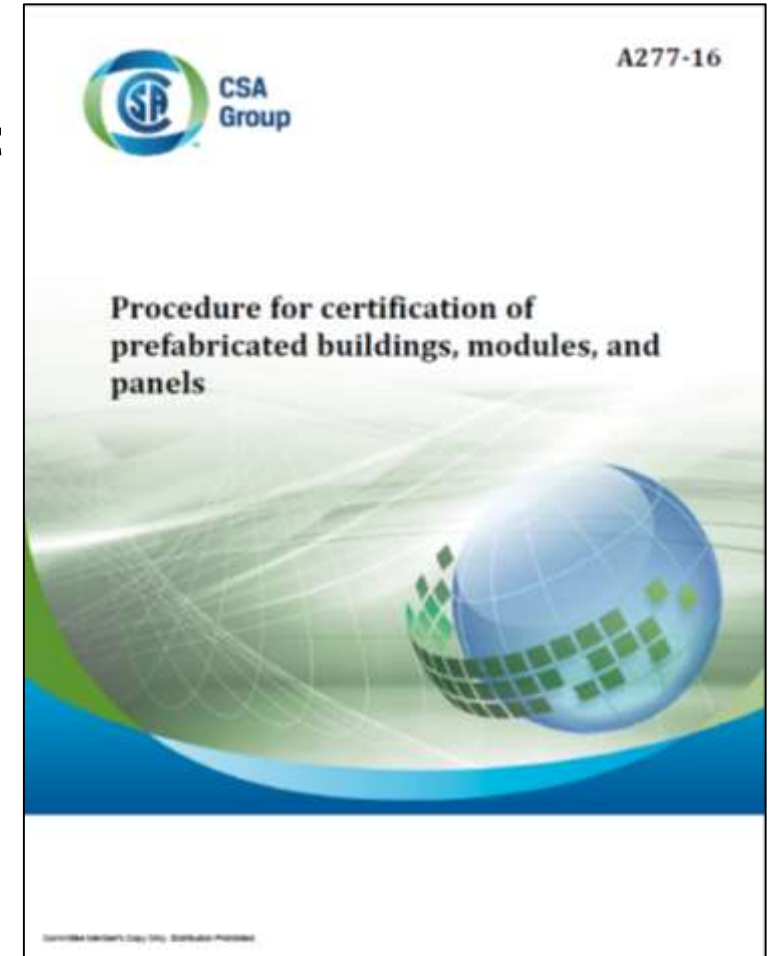


NBC Preface

Relationship of the NBC to Standards Development and Conformity Assessment

- **Acceptance based on:**

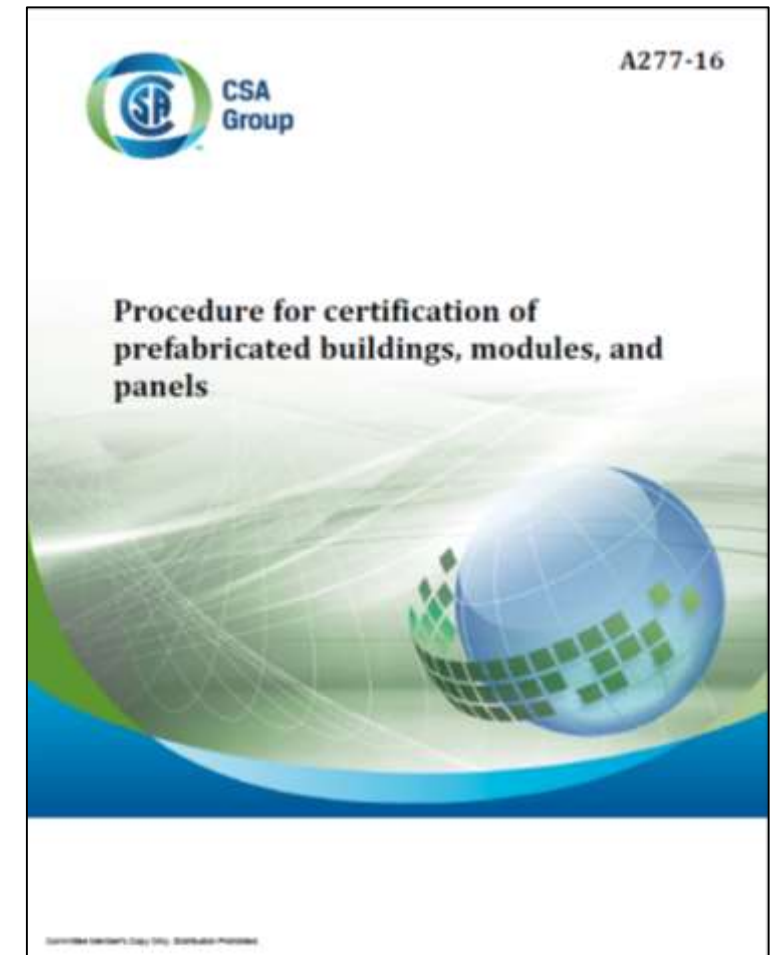
- Inspection
- Testing
- **Certification**
- Registration
- Evaluation
- Qualification



CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

- **Acceptance based on certification**
 - well-established practice where required performance cannot be determined by a simple visual inspection; e.g.
 - lumber
 - electrical fixtures, wiring, fittings
 - plumbing fixtures, piping, fittings
 - fuel-fired appliances, piping, fittings
 - windows, doors, skylights
 - certification procedures typically left to certification bodies accredited by the Standards Council of Canada
 - very few certification standards



CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

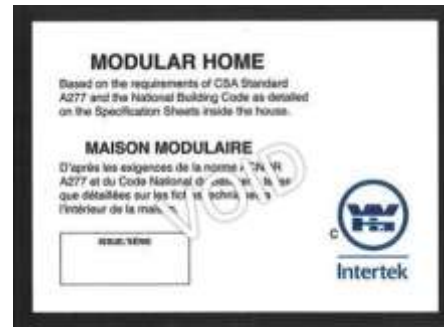
- **CSA A277 developed to promote consistency in certification of prefabricated buildings, modules and panels**
 - same process
 - larger scale
 - more steps
 - more documentation



CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

- Accredited Certification Bodies





CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

- **Accredited Certification Bodies**
 - develop certification procedures
 - in-plant quality process
 - identification of qualified personnel and responsibilities
 - sign-offs
 - record-keeping
 - annual audits
 - random inspections
 - compliance marking



CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

- **Confidence in compliance**

CSA A277 certification may be relied on the same as any other product certification



CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels



CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

Use of A277 is limited only by:

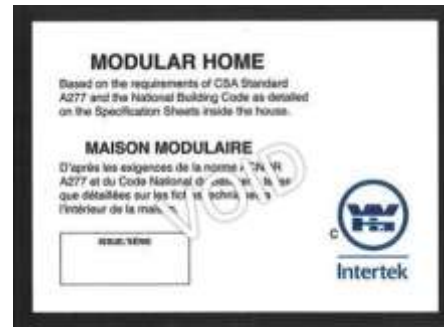
- *certification listing for the manufacturer*
- *the capabilities of the certification body*



CSA Standards

CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

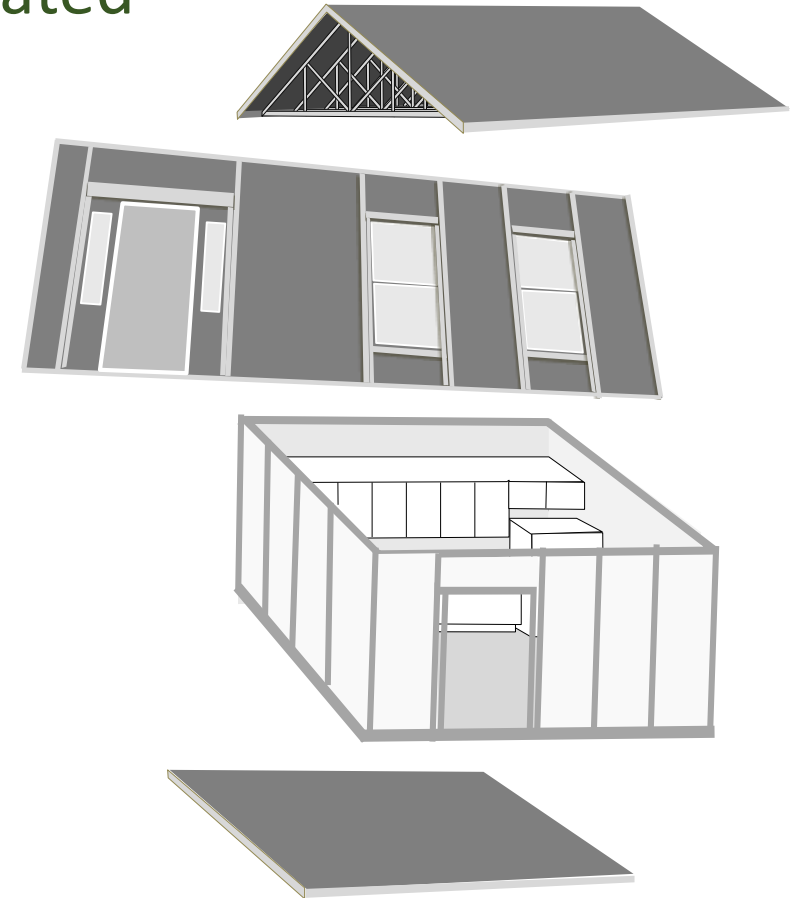
- Accredited Certification Bodies



CSA A277 Procedure for Certification of Prefabricated Buildings, Modules and Panels

- **Updates**

- clarification of application
- building use terminology consistent with building codes
- reference to AHJs for requirements for professional involvement
- Annex information on involvement by qualified persons and building officials
- new specification sheet information to determine compliance at installation site
 - thermal performance of building envelope elements



AHJ Roles

- **Permitting**
- **Inspection**
 - site preparation
 - foundations
 - installation
 - anchorage
 - stitching
 - service connections
 - work not completed in the factory

AHJ Roles

- **Inspection**

- Marking

- labels

- compliance with code or CSA Z240 MH Series

- specification sheet

- manufacturer, date of construction
 - compliance with location-specific requirements at the time of construction
 - wind, snow, earthquake loads
 - heating capacity
 - building envelope energy performance
 - capillary break



Tiny Houses



Arthur Weeden House, Toronto, 1912
2.2 m x 14.3 m (7' x 47')



Tiny Houses

What is a Tiny House?

- typically max. 400 sq.ft.
- may be
 - site-built
 - built off-site
 - with inherent strength and stiffness
 - on beams
 - on a chassis





Tiny Houses

Why Tiny Houses?

- **needed**
 - rising housing prices
 - ~ 1 in 4 Canadians ⁽¹⁾ live where the average home costs are closing in on \$1M ⁽²⁾
 - average after-tax household income ⁽³⁾
 - 2 or more people = \$79,600
 - 1 person = \$31,400
 - households in core housing need ⁽³⁾
 - over 1.5 million households = 12% of all households
- **wanted**
 - average size of new homes
 - condo apartments 800 sq.ft.
 - ...
 - detached house 1900 sq.ft.
 - costs to own and operate



1. Statistics Canada. Estimate for 2016 based on 2011 census
2. CREA. February 2017
3. Statistics Canada. 2011 Census Data



Tiny Houses

Compliance

- could comply with
 - no code or standard
 - CSA Z240 RV Series
Recreational Vehicles
 - CSA Z241
Park Model Trailers
 - CSA Z240 MH Series
Manufactured Homes
 - NBC, provincial-territorial codes/regulations



*Kent Homes –
Z240 RV*

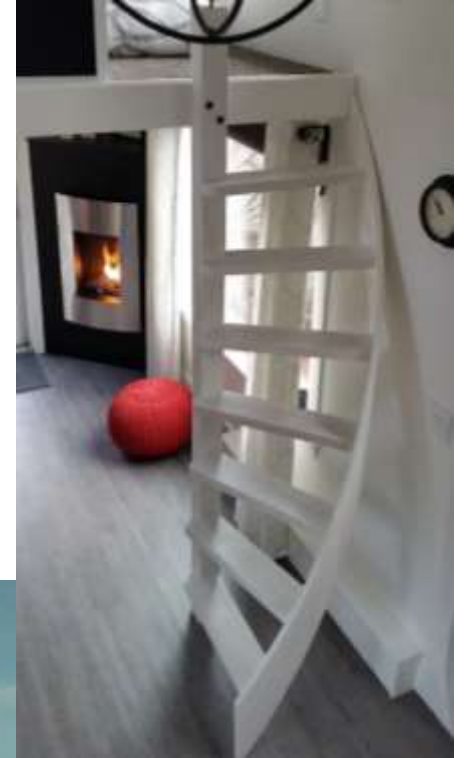
*Guildcrest Homes –
Ontario Building Code*



Tiny Houses

Change requests submitted to the NBC

- **Application of the Code and specific requirements**
 - Definition – *factory-constructed building*
 - Clarifications – Appendix Notes
 - application of the code to factory-constructed buildings
 - mezzanines
 - width of doorways to bathrooms
 - stairs, handrails and guards
 - egress windows
 - number of smoke alarms
- **Lateral Loads – high forces**
 - any building on a chassis



Leaf House

Tiny Houses

Change requests submitted to the NBC

- **Changes to permit some leniency**
 - Combination room criteria
 - where “wall area” < 3 m²
 - Ceiling heights
 - = secondary suite height under sleeping loft
 - Doorway height
 - = secondary suite height under sleeping loft
 - Lavatories not required in very tiny houses



Take-Aways

- CSA Standards – 2016 editions
 - Z240.10.1 – broad application
 - Z240 MH Series – some lenience for energy efficiency
 - A277 – confidence in certification
- Tiny Houses
 - Compliance
 - NBC code change requests
- Manitoba Act and Regulations Update terminology to reflect current usage and products