Appendix BL: Hemp-Lime (Hempcrete)

July 15, 2025

GOALS
FOSTER A DIALOGUE
AGREE ON A MINIMUM STANDARD FOR MN

AGENDA

REASONS FOR ADOPTION

SYSTEMS OVERVIEW

PROPOSED AMENDMENTS

RESPONSES TO TAG MTG 1

DISCUSSION

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TUESDAY 15 JULY 2025

PRESENTERS:
Danny Desjarlais
Anna Koosmann, AIA

REASONS FOR CODE ADOPTION

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DISCUSSION

- Hemp-lime buildings are being constructed in MN because it is durable, safe, high performing, and healthy; minimum standards should be enforced
- Adoption of Appendix BL would provide a consistent statewide minimum standard
- Appendix BL is robust, building upon and referencing the body of the residential code
- Proposal includes added Amendments to respond to Minnesota climate conditions
- Bolsters Minnesota’s agricultural hemp industry

SYSTEMS OVERVIEW

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Hemp-lime home constructed by the Lower Sioux Indian Community with brown coat plaster finish

SYSTEMS OVERVIEW

Hemp-lime (hempcrete) is a nonstructural, biocomposite insulation material composed of hemp hurd, lime-based binder, and water.

Raw hemp hurd material

Hemp-lime 3-part mix:
hemp hurd, lime-based binder, and water

Hemp-lime double framed wall,
hand-tamped with slip form

SYSTEMS OVERVIEW

Source: *Designing with HEMP+LIME...* Parsons Healthy Materials Lab 2022 (Kaja Kühl)

Spray-applied hemp-lime in an exterior-stud wall

Hemp-lime home with final coat of plaster finish

SYSTEMS OVERVIEW

Pre-fabricated hemp-lime panels erected on-site

Finished pre-fabricated hemp-lime home with nonplaster exterior

SYSTEMS OVERVIEW

Figure BL103.1 (3) Typical Hemp-Lime with Exterior Stud Framing

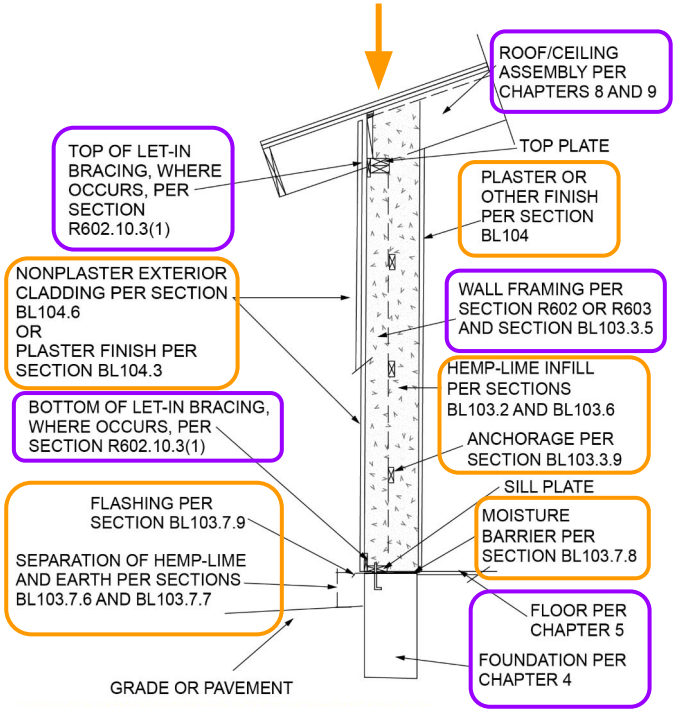
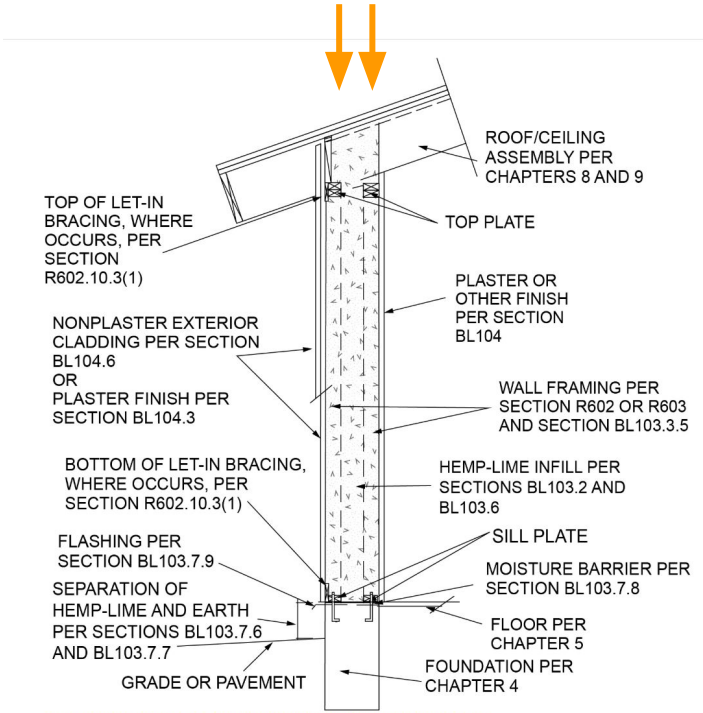


Figure BL103.1 (4) Typical Hemp-lime Double Stud Framing



PROPOSED AMENDMENTS

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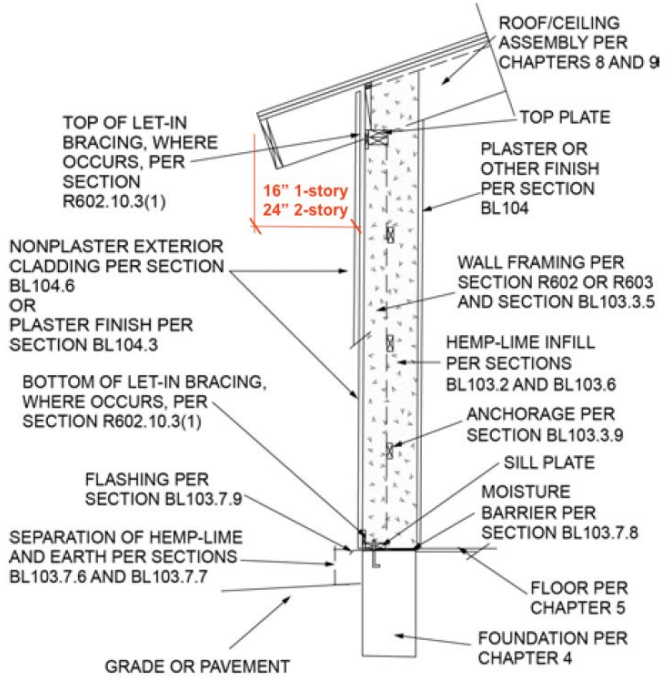
BL103.5. Mechanical, electrical and plumbing in hemp-lime infill. Electrical and telecommunication wiring, panels, and boxes, mechanical ducts, plumbing pipes and other mechanical, electrical and plumbing components made of metal ~~in or in contact with hemp-lime infill~~ shall be isolated from hemp-lime infill with ~~in~~ sleeves, pipes, conduits or tubing made of plastic, or ~~of metal in accordance~~ shall comply with Section BL103.4, or be separated from hemp-lime with approved alkaline-resistant materials.

PROPOSED AMENDMENTS

FIGURE BL103.1(3)—TYPICAL HEMP-LIME WITH EXTERIOR STUD FRAMING



BL103.7.10 Roof overhangs. Hemp-lime walls with direct-applied exterior plaster shall be provided with roof overhangs as follows:

1. 16” (406 mm) horizontal projection for one-story buildings
2. 24” (610 mm) horizontal projection for two-story buildings

Exception: Exterior hemp-lime walls with a ventilated cladding system.

RESPONSES TO TAG MTG 1

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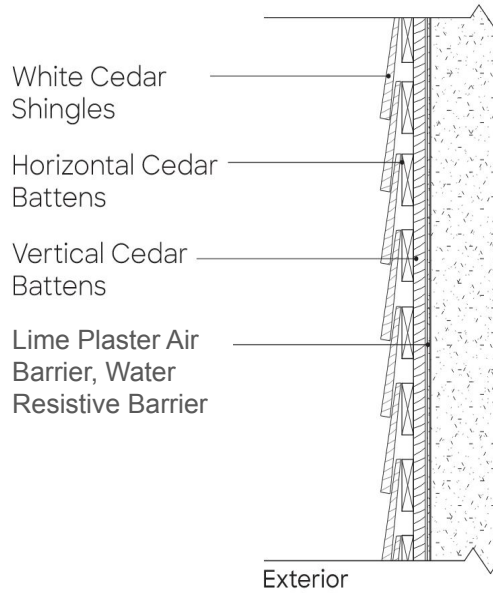
The following items were addressed in the code change proposal:

- **Issue of WRB behind plaster or nonplaster cladding**
- **Flashing and wall penetrations**
- **Moisture and height above grade**
- **Thermal performance and compliance with MN Energy Code**

RESPONSES TO TAG MTG 1

Nonplaster Cladding w/ WRB



Source: *Designing with HEMP+LIME...*
Parsons Healthy Materials Lab 2022

TAG Concern: Use of WRB with plaster or nonplaster cladding

How does Appendix BL address the issue of a WRB behind plaster or non-plaster exterior cladding?

- **BL104.3.1 Membranes.**
  Prohibits WRB between plaster and hemp-lime, to allow bond with the hemp-lime and free transpiration of moisture from the wall

- **BL104.6 Nonplaster exterior cladding.**
  Requires WRB and air barrier behind nonplaster cladding. (See example drawing)

- **BL104.6.1 Water-resistive and air barriers.**
  Permits vapor permeable WRB and air barrier applied directly to hemp-lime behind nonplaster cladding w/ vent space.

RESPONSES TO TAG MTG 1

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TAG Concern: Flashing and wall penetrations

When using plaster finishes, the moisture barrier should also include a means by which bulk environmental water can be directed to the building exterior via flashings.

- **R703.7.2.1 Weep screeds.**
  Required and covered in the body of the code. Allows any moisture to weep out of the finish.

- **BL103.3.7 Openings in walls, Item 2.**
  Use *approved* WRB at wall openings in accordance with **BL103.7.4 Horizontal surfaces** and **BL104.5.1 Returns on recessed openings**. Elaborated on in the Commentary.

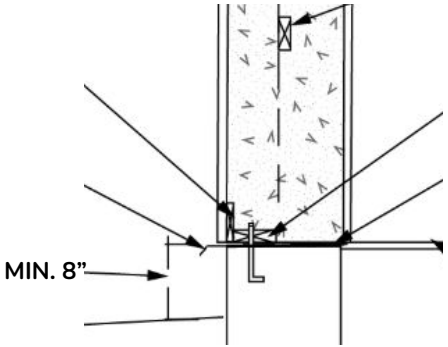
- **BL103.7.3 Penetrations in hemp-lime walls, Item 3.**
  Use *approved* sealant or gasket. Elaborated on in the Commentary.

RESPONSES TO TAG MTG 1

TAG Concern: Moisture and height above grade

Provide sufficient height and flashing of the stem wall of hemp-lime walls to ensure durability of the wall relative to Minnesota snow accumulation and safe discharge of any water that enters the wall system.

Separation of hemp-lime and earth or paved areas



BL103.1 (3) Exterior Stud Framing

- **BL103.7.6 Separation of hemp-lime and earth or paved areas.**
  Minimum 8 inches.
- **BL103.7.7 Separation of exterior plaster and earth or paved areas.**
  Minimum 8 inches.
- **BL103.7.8 Separation of hemp-lime and exterior plaster from foundation.**
  Separate with an *approved* moisture barrier.
- **BL103.7.9 Base of wall flashing.**
  Requires flashing “to prevent water intrusion”

RESPONSES TO TAG MTG 1

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TAG Concern: Thermal performance and compliance with MN Energy Code

Demonstrate how a hemp-lime (hempcrete) wall system achieves the minimum thermal performance required in MN's Energy Code.

- **Table BL106.2 Thermal resistance of hemp-lime.**
  Listed values are based on hemp-lime density.

TABLE BL106.2THERMAL RESISTANCE OF HEMP-LIME[a]

DENSITY (pounds per cubic foot)	R-VALUE (ft^2 ×°F ×h/Btu per inch of thickness)
12.5	R-2.10
15	R-1.86
20	R-1.54
25	R-1.20

For SI: 1 pound per cubic foot = 1.6 kg/m^3.

a. Linear interpolation is permitted. Extrapolation is not permitted.

- **BL104.1 General.**
  The use of exterior continuous insulation needs to meet the minimum vapor permeability requirements.

DISCUSSION

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- Adopting Appendix BL ensures proper use and success of this building system in Minnesota. Amendments consider Minnesota's mixed climate and they are intended to make it robust
- Minnesota should make Appendix BL *with Commentary* accessible to all users
  - Appendix BL provides enforceable language
  - Commentary provides intent and compliance examples
- Bolsters Minnesota's new agricultural hemp industry