



Evaluation Report CCMC 13628-R Superior Walls Xi Precast Concrete Insulated Wall Panels

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Superior Walls Xi Precast Concrete Insulated Wall Panels”, when used as a prefabricated foundation wall for housing and small buildings in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code 2015:

- Clause 1.2.1.1.(1)(a), Division A, using the following acceptable solutions from Division B:
 - Article 9.3.1.1., General (Concrete)
 - Subsection 9.4.2., Specified Loads
 - Subsection 9.4.3., Deflections
 - Subsection 9.13.2., Dampproofing
 - Subsection 9.13.3., Waterproofing
 - Subsection 9.13.4., Soil Gas Control
 - Subsection 9.14.2., Foundation Drainage
 - Article 9.25.2.1., Required Insulation
 - Article 9.25.2.2., Insulation Materials
- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
 - Subsection 9.4.1., Structural Design Requirements and Application Limitations
 - Subsection 9.4.4., Foundation Conditions
 - Subsection 9.15.3., Footings
 - Subsection 9.15.4., Foundation Walls

This opinion is based on CCMC’s evaluation of the technical evidence in Section 4 provided by the Report Holder.

2. Description

The product is a prefabricated, insulated precast foundation wall. The foundation walls are formed from 34.4 MPa normal weight concrete containing synthetic fibres. The walls consist of a 44.5-mm-thick exterior face shell that is monolithically cast with 260-mm-wide top and bottom bond beams and 57-mm × 190-mm concrete studs at 610 mm on center (o.c.). The shell is bonded to 63.5-mm or 127-mm-thick polystyrene insulation on the inside face. Each stud is wrapped with 25.4-mm-thick expanded polystyrene insulation on three exposed sides and faced with a galvanized steel channel for interior finish fastening. Two chase openings are provided in each stud for plumbing and electrical wiring. Wall panels are available in heights of 1 219 mm, 2 489 mm, 2 743 mm and 3 048 mm, and in various lengths.

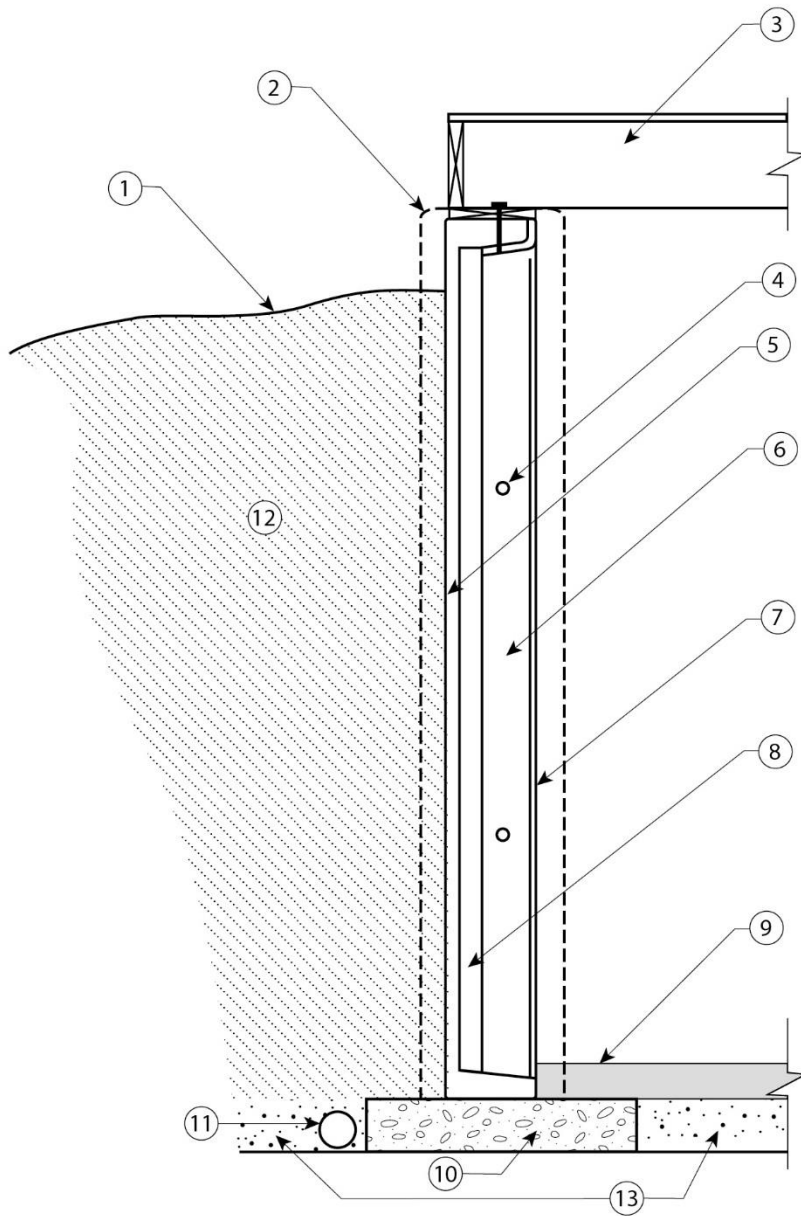


Figure 1. Typical vertical section detail

1. finished grade
2. “Superior Walls Xi Precast Concrete Insulated Wall Panel”
3. lateral support by joists and/or blocking as specified by construction documents
4. chase opening (typical)
5. 44.5-mm-thick face shell
6. 57-mm × 190-mm concrete stud, 610 mm o.c.
7. galvanized stud facing
8. 63.5-mm or 127-mm-thick foam plastic insulation
9. lateral support to be installed before backfilling as specified by construction documents
10. concrete footing
11. foundation drainage system as specified by construction documents
12. backfill area
13. crushed stone

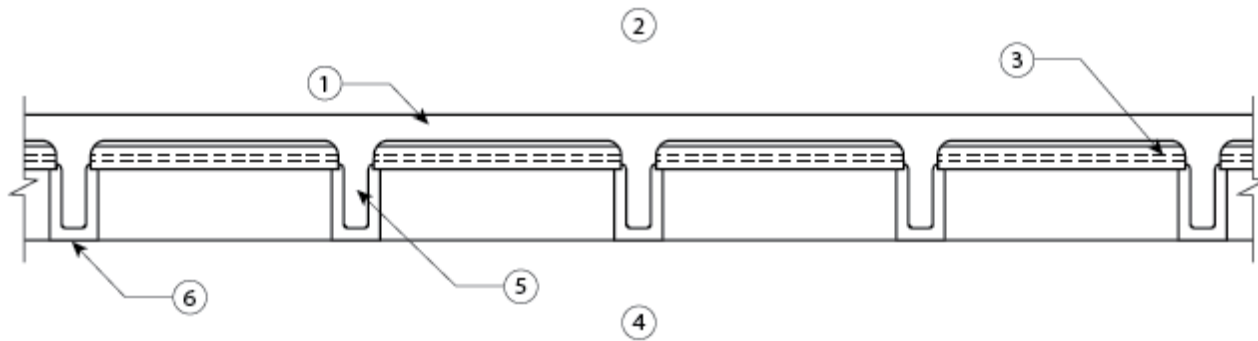


Figure 2. Typical horizontal section detail

1. 44.5-mm-thick concrete face shell
2. exterior
3. 63.5-mm or 127-mm-thick foam plastic insulation
4. interior
5. 57-mm × 190-mm concrete stud, 610 mm o.c.
6. galvanized stud facing

3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the "Superior Walls Xi Precast Concrete Insulated Wall Panels" being used in accordance with the conditions and limitations set out below:

- The precast foundation walls are for housing and small buildings as directed by Part 9 of Division B of the NBC 2015.
- Soil type, drainage characteristics of the soil, frost depth and loadbearing capacity must be determined prior to using the precast foundation walls.
- The precast foundation walls are to be used only in buildings of light-frame construction that are no more than three storeys in building height, with a maximum floor-to-floor height of 3 m, and containing only a single dwelling unit.
- The axial compressive load applied is limited to 109.453 kN/m.
- The design is applicable for seismic zones with $S_a(0.2) \leq 1.2$.
- Exterior surfaces of foundation walls below ground level must be dampproofed in accordance with Subsection 9.13.1., General (Dampproofing, Waterproofing and Soil Gas Control), of Division B of the NBC 2015.
- The builder must prepare site conditions in accordance with Superior Walls Builder Guideline Booklet, MAN42-9027.
- Foundation walls and footings must be installed on stable soils with an allowable bearing pressure of 75 kPa or greater.
- Minimum footing widths must comply with Table 4.2.2.1 of this Report or comply with Subsection 9.15.3. of Division B of the NBC 2015.
- The maximum load applied to a brick ledge is restricted to 42.320 kN/m.
- The foundation must be well drained in accordance with Subsections 9.14.3., Drainage Tile and Pipe, or 9.14.4., Granular Drainage Layer, of Division B of the NBC 2015.
- The proposed wall system must be used with floor systems not exceeding loads and spans as directed by the Subsection 9.4.2. of Division B of the NBC 2015.
- Backfill must be placed in such a way as to avoid damage to the wall and the waterproofing protection.
- The backfill material with surcharge must not exceed 1 602 kg/m²/m.
- The on-site concrete basement floor must be poured prior to backfilling.
- The top of the foundation wall must be supported by the first floor prior to backfilling.
- Where hydrostatic pressure exists, waterproofing must be provided in accordance with Subsection 9.13.3. of Division B of the NBC 2015.
- Installation of the product must be completed by a person certified by Superior Walls of America, Ltd.

4. Technical Evidence

The Report Holder has submitted technical documentation for CCMC's evaluation. Testing was conducted at laboratories recognized by CCMC. The corresponding technical evidence for this product is summarized below.

4.1 Material Requirements

4.1.1 Insulation

The polystyrene insulation used in “Superior Walls Xi Precast Concrete Insulated Wall Panels” conforms to CAN/ULC-S701-11, “Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering,” Type 2.

4.1.2 Concrete

The concrete used to produce “Superior Walls Xi Precast Concrete Insulated Wall Panels” conforms to CSA A23.1-14, “Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.”

4.2 Prescriptive Requirements

The following tables demonstrate the compliance data to the NBC 2015 for “Superior Walls Xi Precast Concrete Insulated Wall Panels” on which CCMC based its opinion in Section 1.

4.2.1 Performance Requirements

Table 4.2.1.1 Results of Testing of Performance Requirements of the Product at maximum height

Property	Test	Requirement	Result
Water vapour permeance	ASTM E 96	$\leq 170 \text{ ng/Pa}\cdot\text{s}\cdot\text{m}^2$	20.8ng/Pa·s·m ²
Lateral load	ASTM E 72-05	$\geq 1\,602 \text{ kg/m}^2/\text{m}$	Pass
Axial load	ASTM E 72-05	$\geq 109.453 \text{ kN/m}$	> 669.929 kN/m
Brick ledge	ASTM E 72-05	$\geq 42.320 \text{ kN/m}$	Pass
Interior transverse loading (negative wall pressure)	ASTM E 72-05	Tested to failure	11.6 kPa
Exterior transverse loading (positive wall pressure)	ASTM E 72-05	Tested to failure	22.4 kPa

4.2.2 Design Requirements

Table 4.2.2.1 Footing Design Requirements for the Product²

Construction Type (Assumed Wall Loading)			Minimum Depth and Width of 13-mm Clean Crushed Stone Footing (mm) ³							
			Soil Loadbearing Capacity (kPa)							
			75 kPa		100 kPa		150 kPa		$\geq 200 \text{ kPa}$	
		Depth	Width	Depth	Width	Depth	Width	Depth	Width	
Conventional light-frame construction	1 storey	(16.05 kN/m)	102	378	102	378	102	378	102	378
	2 storeys	(26.29 kN/m)	153	437	102	378	102	378	102	378
	3 storeys	(42.34 kN/m)	331 ¹	642	204 ¹	496	102	378	102	378
Masonry veneer over light-frame construction	1 storey	(21.91 kN/m)	102	378	102	378	102	378	102	378
	2 storeys	(39.41 kN/m)	305 ¹	613	178	466	102	378	102	378
	3 storeys	(58.38 kN/m)	534 ¹	877	331 ¹	642	153	437	102	378

Notes to Table 4.2.2.1:

- ¹ Crushed stone must be compacted in 200-mm lifts with a plate vibrator.
- ² The table allows for 5.27 kN/m for the load due to self-weight of foundation wall.
- ³ Consult project drawings or Table 2 in the Superior Walls, “Builder Guideline Booklet – Canadian Edition” for drawings illustrating the required depth of the crushed stone footing.

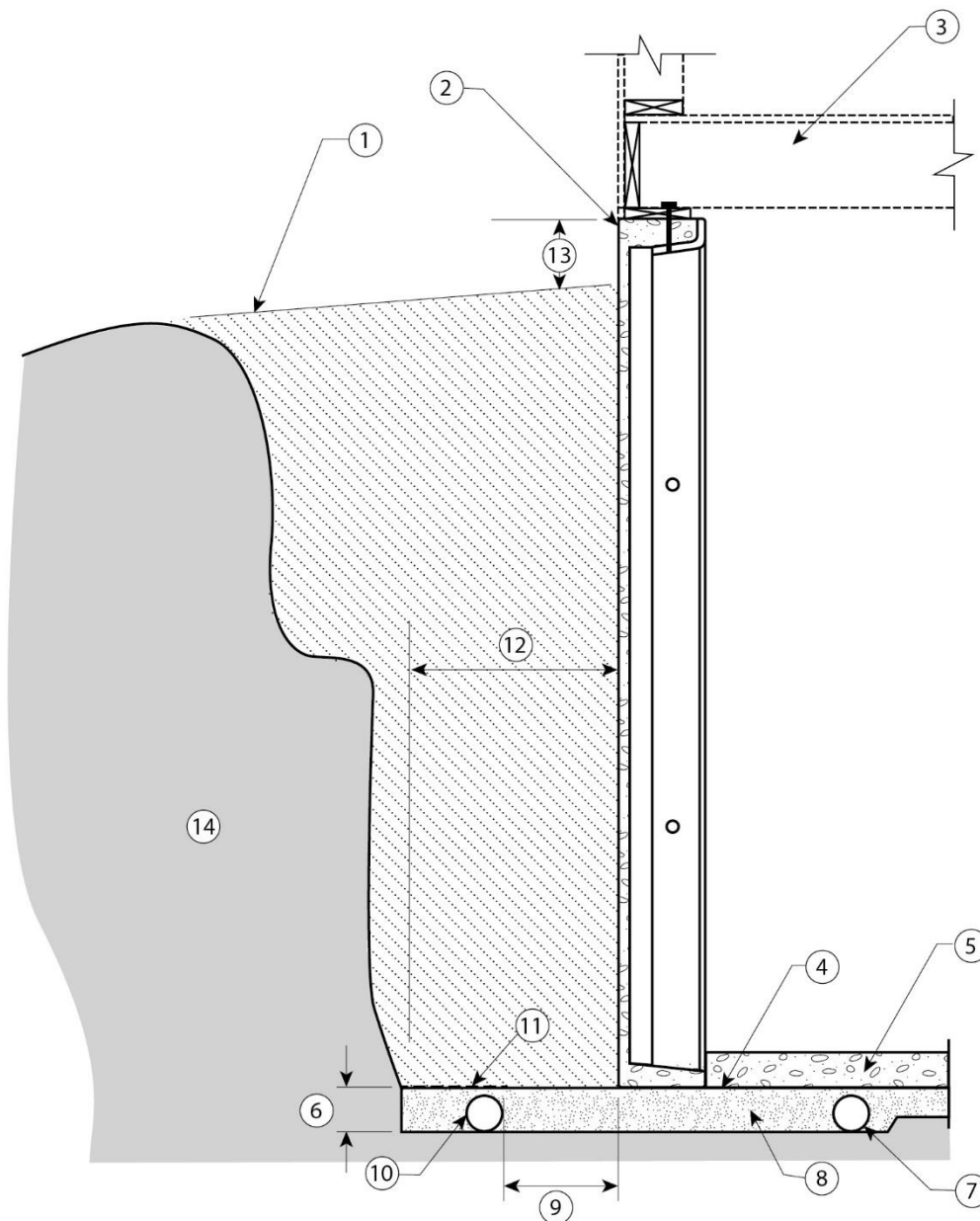


Figure 3. Crushed stone footings

1. slope away from foundation
2. “Superior Walls”
3. lateral support by joists and/or blocking as specified by construction documents
4. vapour barrier
5. concrete floor (lateral support) to be installed before backfilling as specified by construction documents
6. 13-mm clean crushed stone (determine stone depth from Table 4.2.2.1)
7. alternate drain pipe position
8. 13-mm diameter clean crushed stone
9. locate drain pipe at least 300 mm beyond panel/wall
10. drain pipe to sump or daylight
11. filter membrane (provided by builder)
12. minimum 600 mm over dig at base of excavation
13. 150-mm minimum distance between top of slope and top of wall
14. virgin soil

Table 4.2.2.2 Lateral Support and Sill Plate Anchorage of Product to Wood-Frame Floors

Top of Foundation Wall Fastening Schedule					
Backfill Height	Joist Height	Sill Plate Bolting	Brace and Block Spacing	Number of Solid Blocks Required	Minimum Distance of Blocking
2.286 m to 2.896 m	≥ 254 mm	One 12.7-mm bolt at 609.6 mm o.c.	1 220 mm o.c. and 305 mm from the interior of each corner	3	1 524 mm
2.286 m to 2.896 m	< 254 mm	One 12.7-mm bolt at 609.6 mm o.c.		2	1 220 mm
0 m to 2.286 m	Any height	One 12.7-mm bolt at 1 219.2 mm o.c.		1	610 mm

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