1 Building envelope component incremental costing by climate zone

All costing data, except for windows and skylights, were collected from RSMeans (2023). The incremental material and labour costs were accounted for in the analysis. Costing was converted from USD to CAD using the Bank of Canada's exchange rate from August 2023 (i.e., 1.34).

Costing data for windows were obtained from the Local Energy Efficiency Partnerships (LEEP) database (NRCan, 2018). The unit costs of the fenestration systems were adjusted for inflation from 2019 to 2023 using the Bank of Canada's inflation calculator, which increased costs by 15%.

All costing data was then adjusted for inflation from 2023 to 2025 using the Bank of Canada's inflation calculator, which increased costs by 4%.

Table 1. Incremental Cost of Components in Buildings > 300 m^3 to Achieve Tier 2 Compared to Tier 1 in Climate Zone 4

Buildings > 300 m^3	**Climate Zone 4**		
Component	**Tier 1 RSI Value**	**Tier 2 RSI Value**	**Incremental Cost, $/$m^2$**
Ceilings below attics	6.91	6.91	0.00
Cathedral ceilings and flat roofs	4.67	4.67	0.00
Floors over unheated spaces	4.67	4.67	0.00
Walls above grade	2.78	3.08	-4.34
Foundation walls	1.99	2.98	24.76
Unheated floors above frost line	1.96	1.96	0.00
Unheated floors below frost line	0	0	0.00
Heated and unheated floors on permafrost	N/A	N/A	N/A
Heated floors	2.32	2.32	0.00
Slabs-on-grade with an integral footing	1.96	1.96	0.00
Component	**Tier 1 Max. U-Value**	**Tier 2 Max. U-Value**	**Incremental Cost, $/$m^2$**
Windows and sliding glass doors	1.84	1.61	38.49
Skylights	2.92	2.92	0.00

Table 2. Incremental Cost of Components in Buildings > 300 m^3 to Achieve Tier 2 Compared to Tier 1 in Climate Zone 5

Buildings > 300 m^3	**Climate Zone 5**		
Component	**Tier 1 RSI Value**	**Tier 2 RSI Value**	**Incremental Cost, $/$m^2$**
Ceilings below attics	8.67	8.67	0.00
Cathedral ceilings and flat roofs	4.67	4.67	0.00
Floors over unheated spaces	4.67	4.67	0.00
Walls above grade	3.08	3.08	0.00
Foundation walls	2.98	2.98	0.00
Unheated floors above frost line	1.96	1.96	0.00
Unheated floors below frost line	0	0	0.00
Heated and unheated floors on permafrost	N/A	N/A	N/A
Heated floors	2.32	2.32	0.00
Slabs-on-grade with an integral footing	1.96	1.96	0.00
Component	**Tier 1 Max. U-Value**	**Tier 2 Max. U-Value**	**Incremental Cost, $/$m^2$**
Windows and sliding glass doors	1.84	1.22	89.43
Skylights	2.92	2.92	0.00

Table 3. Incremental Cost of Components in Buildings > 300 m^3 to Achieve Tier 2 Compared to Tier 1 in Climate Zone 6

Buildings > 300 m^3	**Climate Zone 6**		
Component	**Tier 1 RSI Value**	**Tier 2 RSI Value**	**Incremental Cost, $/$m^2$**
Ceilings below attics	8.67	10.43	8.41
Cathedral ceilings and flat roofs	4.67	5.02	2.25
Floors over unheated spaces	4.67	4.67	0.00
Walls above grade	3.08	3.08	0.00
Foundation walls	2.98	3.46	0.50
Unheated floors above frost line	1.96	1.96	0.00
Unheated floors below frost line	0	0	0.00
Heated and unheated floors on permafrost	N/A	N/A	N/A
Heated floors	2.32	2.32	0.00
Slabs-on-grade with an integral footing	1.96	2.84	18.46
Component	**Tier 1 Max. U-Value**	**Tier 2 Max. U-Value**	**Incremental Cost, $/$m^2$**
Windows and sliding glass doors	1.61	1.22	50.94
Skylights	2.75	2.75	0.00

Table 4. Incremental Cost of Components in Buildings > 300 m^3 to Achieve Tier 2 Compared to Tier 1 in Climate Zone 7A

Buildings > 300 m^3	**Climate Zone 7A**		
Component	**Tier 1 RSI Value**	**Tier 2 RSI Value**	**Incremental Cost, $/$m^2$**
Ceilings below attics	10.43	10.43	0.00
Cathedral ceilings and flat roofs	5.02	5.02	0.00
Floors over unheated spaces	5.02	5.02	0.00
Walls above grade	3.08	3.08	0.00
Foundation walls	3.46	3.97	0.53
Unheated floors above frost line	1.96	1.96	0.00
Unheated floors below frost line	0	0	0.00
Heated and unheated floors on permafrost	N/A	N/A	N/A
Heated floors	2.84	2.84	0.00
Slabs-on-grade with an integral footing	3.72	3.72	0.00
Component	**Tier 1 Max. U-Value**	**Tier 2 Max. U-Value**	**Incremental Cost, $/$m^2$**
Windows and sliding glass doors	1.61	1.22	50.94
Skylights	2.75	2.75	0.00

Table 5. Incremental Cost of Components in Buildings > 300 m^3 to Achieve Tier 2 Compared to Tier 1 in Climate Zone 7B

Buildings > 300 m^3	**Climate Zone 7B**		
Component	**Tier 1 RSI Value**	**Tier 2 RSI Value**	**Incremental Cost, $/$m^2$**
Ceilings below attics	10.43	10.43	0.00
Cathedral ceilings and flat roofs	5.02	5.02	0.00
Floors over unheated spaces	5.02	5.02	0.00
Walls above grade	3.85	3.85	0.00
Foundation walls	3.46	3.97	0.53
Unheated floors above frost line	1.96	1.96	0.00
Unheated floors below frost line	0	0	0.00
Heated and unheated floors on permafrost	4.44	4.44	0.00
Heated floors	2.84	2.84	0.00
Slabs-on-grade with an integral footing	3.72	3.72	0.00
Component	**Tier 1 Max. U-Value**	**Tier 2 Max. U-Value**	**Incremental Cost, $/$m^2$**
Windows and sliding glass doors	1.44	1.05	46.20
Skylights	2.41	2.41	0.00

Table 6. Incremental Cost of Components in Buildings > 300 m^3 to Achieve Tier 2 Compared to Tier 1 in Climate Zone 8

Buildings > 300 m^3	**Climate Zone 8**		
Component	**Tier 1 RSI Value**	**Tier 2 RSI Value**	**Incremental Cost, $/$m^2$**
Ceilings below attics	10.43	10.43	0.00
Cathedral ceilings and flat roofs	5.02	5.02	0.00
Floors over unheated spaces	5.02	5.02	0.00
Walls above grade	3.85	3.85	0.00
Foundation walls	3.97	3.97	0.00
Unheated floors above frost line	1.96	1.96	0.00
Unheated floors below frost line	0	0	0.00
Heated and unheated floors on permafrost	4.44	4.44	0.00
Heated floors	2.84	2.84	0.00
Slabs-on-grade with an integral footing	4.59	4.59	0.00
Component	**Tier 1 Max. U-Value**	**Tier 2 Max. U-Value**	**Incremental Cost, $/$m^2$**
Windows and sliding glass doors	1.44	1.05	46.20
Skylights	2.41	2.41	0.00

2 Building envelope component incremental costing by region

Table 7. Climate Zones by Region

Degree-Days Below 18°C	BC	Alberta	Saskatchewan and Manitoba	Ontario	Quebec	Atlantic Canada	Northern Canada
Zone 4: HDD < 3000	Yes	No	No	No	No	No	No
Zone 5: HDD 3000 to 3999	Yes	No	No	Yes	No	Yes	No
Zone 6: HDD 4000 to 4999	Yes	Yes	Yes	Yes	Yes	Yes	No
Zone 7A: HDD 5000 to 5999	Yes	Yes	Yes	Yes	Yes	Yes	No
Zone 7B: HDD 6000 to 6999	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zone 8: HDD ≥ 7000	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8. Incremental Cost of Components in Buildings > 300 m^3 by Region

Buildings > 300 m^3	Incremental Cost, $/$m^2$						
Component	**BC**	**Alberta**	**Saskatchewan and Manitoba**	**Ontario**	**Quebec**	**Atlantic Canada**	**Northern Canada**
Ceilings below attics	0.00–8.41	0.00–8.41	0.00–8.41	0.00–8.41	0.00–8.41	0.00–8.41	0.00
Cathedral ceilings and flat roofs	0.00–2.25	0.00–2.25	0.00–2.25	0.00–2.25	0.00–2.25	0.00–2.25	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Walls above grade	−4.70–0.00	0.00	0.00	0.00	0.00	0.00	0.00
Foundation walls	0.00–24.76	0.00–0.53	0.00–0.53	0.00–0.53	0.00–0.53	0.00–0.53	0.00–0.53

Unheated floors above frost line	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unheated floors below frost line	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heated and unheated floors on permafrost	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heated floors	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Slabs-on-grade with an integral footing	0.00–18.46	0.00–18.46	0.00–18.46	0.00–18.46	0.00–18.46	0.00–18.46	0.00–18.46
Windows and sliding glass doors	38.49–89.43	46.20–89.43	46.20–89.43	46.20–89.43	46.20–89.43	46.20–89.43	46.20–89.43
Skylights	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3 Building envelope components

3.1 Ceilings below attics

Typical trusses were assumed to have a spacing of 610 mm on centre (o.c.) and RSI 2.11 (R12) insulation in the cavity between the bottom chords (38 mm × 89 mm). Additional insulation is then layered above to achieve higher thermal insulation performance. Interior finish was assumed to be 12.7 mm gypsum board. Insulation was assumed to be blown fibreglass.

Table 9. Incremental Cost of Ceilings Below Attic Assemblies by Thermal Insulation Performance Level

Nominal Insulation RSI, $(m^2 \times K)/W$	Assembly Effective RSI, $(m^2 \times K)/W$	Incremental Cost, $/m^2
7.04 (R40)	6.91	0.00
8.81 (R50)	8.67	6.87
10.57 (R60)	10.43	15.27
12.33 (R70)	12.19	22.91
14.09 (R80)	13.96	30.55

3.2 Cathedral ceilings and flat roofs

Roof joists were assumed to be 38 mm × 235 mm at 610 mm o.c. It was also assumed that 19 mm strapping was installed between the joists and the 12.7 mm gypsum board interior finish. For flat roofs, both the joists and cavity insulation were assumed to vary with varying effective thermal resistance; as more insulation is added to the cavity, the joist depth may need to increase to maintain a vented air space. Therefore, incremental costing of cathedral and flat roofs considered both nominal cavity insulation and joist framing. All joists were assumed to be spaced at 610 mm o.c., and all assemblies were assumed to have the addition of 19 mm strapping. Cavity insulation was assumed to be batt insulation.

Table 10. Incremental Cost of Cathedral Ceiling and Flat Roof Assemblies by Thermal Insulation Performance Level

Nominal Cavity RSI, $(m^2 \times K)/W$	Joist Lumber Dimensions	Assembly Effective RSI, $(m^2 \times K)/W$	Incremental Cost, $/m^2
4.93 (R28)	38 mm × 235 mm	4.67	0.00
5.46 (R31)	38 mm × 235 mm	5.02	2.24
6.16 (R35)	38 mm × 286 mm	5.80	25.35
7.04 (R40)	38 mm × 286 mm	6.49	27.90

3.3 Floors over unheated spaces

The interior finish was assumed to be linoleum flooring for all exposed floor assemblies, and all assemblies were assumed to have a joist spacing of 610 mm o.c. Sheathing, wood joist depth and cavity were costed for all assemblies. Cavity insulation was assumed to be fibreglass batt.

Table 11. Incremental Cost of Floors Over Unheated Spaces by Thermal Insulation Performance Level

Nominal Cavity RSI, (m²×K)/W	Joist Lumber Dimensions	Sheathing	Assembly Effective RSI, (m²×K)/W	Incremental Cost, $/m²
3.52 (R20)	38 mm × 124 mm	0.88 RSI	4.71	0.00
4.93 (R28)	38 mm × 124 mm	None	5.02	−3.62
5.46 (R31)	38 mm × 235 mm	None	5.42	47.44
7.04 (R40)	38 mm × 286 mm	None	6.77	72.98

3.4 Wall assemblies

Reference and higher performance wall assemblies were selected from the Canadian Wood Council's (CWC, 2023) Effective R Calculator. Since material and labour costs for double stud systems were not readily available, only single stud systems were considered. Assemblies were also filtered for those with interior ½ in. gypsum board, exterior vinyl siding, no exterior air space, house wrap sheathing membrane and polyethylene vapour barriers (the latter two wall assembly components do not impact thermal performance).

Table 12. Incremental Cost of Wall Assemblies by Thermal Insulation Performance Level

Assembly Effective RSI, (m²×K)/W	Description	Incremental Cost, $/m²	CWC Wall ID #
2.79	2 × 6 at 16 in. o.c. framing, R19 cavity insulation, 3/8 in. OSB sheathing, vinyl siding	0.00	9733
3.10	2 × 6 at 24 in. o.c. framing, R22 cavity insulation, 3/8 in. OSB sheathing, vinyl siding	−4.70	9740
3.23	2 × 6 at 24 in. o.c. framing, R24 cavity insulation, 3/8 in. OSB sheathing, vinyl siding	−3.15	9745
3.46	2 × 4 at 24 in. o.c. framing, R14 cavity insulation, 3/8 in. OSB sheathing, 1.5 in. XPS, vinyl siding	0.07	10045
3.85	2 × 6 at 24 in. o.c. framing, R19 cavity insulation, 3/8 in. OSB sheathing, 1 in. foil faced polyiso, vinyl siding	5.27	10155
4.07	2 × 6 at 24 in. o.c. framing, R22 cavity insulation, 3/8 in. OSB sheathing, 1 in. foil faced polyiso, vinyl siding	8.57	10160
4.20	2 × 6 at 24 in. o.c. framing, R24 cavity insulation, 3/8 in. OSB sheathing, 1 in. foil faced polyiso, vinyl siding	10.13	10165
4.35	2 × 4 at 24 in. o.c. framing, R14 cavity insulation, 3/8 in. OSB sheathing, 2.5 in. XPS, vinyl siding	13.45	12272

4.80	2 × 4 at 24 in. o.c. framing, R14 cavity insulation, 3/8 in. OSB sheathing, 3 in. XPS, vinyl siding	22.00	12352
4.88	2 × 6 at 24 in. o.c. framing, R22 cavity insulation, 3/8 in. OSB sheathing, 2 in. XPS, vinyl siding	24.85	10005
5.01	2 × 6 at 24 in. o.c. framing, R24 cavity insulation, 3/8 in. OSB sheathing, 2 in. XPS, vinyl siding	26.39	10010
5.32	2 × 6 at 24 in. o.c. framing, R22 cavity insulation, 3/8 in. OSB sheathing, 2.5 in. XPS, vinyl siding	33.39	12512
5.69	2 × 4 at 24 in. o.c. framing, R14 cavity insulation, 3/8 in. OSB sheathing, 4 in. XPS, vinyl siding	39.10	12432
5.77	2 × 6 at 24 in. o.c. framing, R22 cavity insulation, 3/8 in. OSB sheathing, 3 in. XPS, vinyl siding	41.95	12592
6.66	2 × 6 at 24 in. o.c. framing, R22 cavity insulation, 3/8 in. OSB sheathing, 4 in. XPS, vinyl siding	59.05	12672

The RSI 3.10 assembly costs $4.52/m^2 less than the reference RSI 2.79 assembly. This is due to the RSI 2.79 assembly having 16 in. o.c. studs, whereas the RSI 3.10 assembly has 24 in. o.c. studs. There are fewer studs per square metre and, as reported by RSMeans, the material and labour costs are therefore reduced.

3.5 Foundation walls

All foundation wall assemblies were assumed to have 200 mm concrete walls and interior 12.7 mm gypsum board finishes. The interior framing and cavity insulation and the exterior insulation (assumed to be extruded polystyrene, XPS) were the only elements assumed to vary between the different foundation wall assemblies considered. All interior framing was assumed to be spaced at 610 mm o.c.

Table 13. Incremental Cost of Foundation Walls by Thermal Insulation Performance Level

Framing Studs Lumber Dimensions	Nominal Cavity RSI, (m^2×K)/W	XPS RSI, (m^2×K)/W	Assembly Effective RSI, (m^2×K)/W	Incremental Cost, $/m^2
38 × 89 mm	2.11 (R12)	None	1.98	0.00
38 × 140 mm	3.52 (R20)	None	2.98	24.75
38 × 140 mm	4.23 (R24)	None	3.46	29.25
38 × 140 mm	3.52 (R20)	0.88 (R5)	3.97	52.50
38 × 140 mm	4.23 (R24)	0.88 (R5)	4.34	57.00
38 × 140 mm	4.23 (R24)	1.32 (R7.5)	4.78	62.41
38 × 140 mm	4.23 (R24)	1.76 (R10)	5.22	67.51

3.6 Slabs-on-grade and below-grade assemblies

Only under-slab rigid insulation was assumed to vary between the different effective thermal resistance performance levels.

Table 14. Incremental Cost of Slabs-on-Grade and Below-Grade Assemblies by Thermal Insulation Performance Level

XPS RSI, $(m^2 \times K)/W$	Assembly Effective RSI, $(m^2 \times K)/W$	Incremental Cost, $/m^2
1.76 (R10)	1.96	0.00
2.64 (R15)	2.84	18.45
3.52 (R20)	3.72	35.86
4.42 (R25)	4.62	53.25

3.7 Windows

Table 15. Incremental Cost of Windows by Thermal Transmittance Value

U-Value, $W/(m^2 \times K)$	Solar Heat Gain Coefficient	Incremental Cost, $/m^2	LEEP Database Reference
1.84	0.40	0.00	LEEP-MB-Winnipeg - window:double_glaze:vinyl:glass:double_lof_lowe:insulating_spacers:air_fill:shgc_0.5:u-value_1.82
1.61		38.48	LEEP-MB-Winnipeg - window:shgc_0.51:u-value_1.65
1.44		63.35	Interpolated
1.22		89.40	Interpolated
1.05		109.54	LEEP-MB-Winnipeg - window:shgc_0.44:u-value_1.08
0.94		122.55	Extrapolated
0.82		136.77	Extrapolated

4 Heat/energy recovery ventilator

A heat-recovery ventilator (HRV) or an energy-recovery ventilator (ERV) with a minimum 60% sensible heat-recovery efficiency (SRE) for climate zones 4 and 5 and a minimum 70% SRE for climate zones 6 to 8 is required for compliance under the Tier 2 prescriptive path.

Table 16. Incremental Cost of HRVs/ERVs in Buildings > 300 m^3 to Achieve Tier 2 Compared to Tier 1

Climate Zone	Tier 1 SRE	Tier 2 SRE	Incremental Costs for HRVs/ERVs in Various Regions, $						
			BC	Alberta	SK and MB	ON	QC	Atlantic Canada	Northern Canada
4 and 5	60%	60%	0	0	0	0	0	0	0
6–8	60%	70%	200	200	200	200	200	200	200

Source: buildwithrise.ca; prices include retail markup and Canada-wide free shipping.
Notes to Table 16:
Products: Greentek Premiere Series PRS 0.7H (SRE ~60%); Aldes H95-TRG (SRE ~70%)