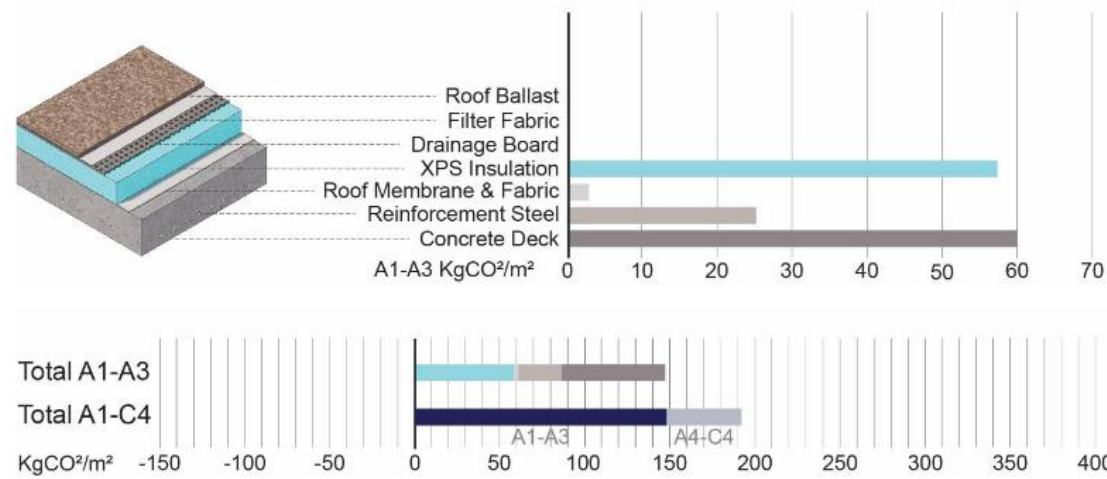


APPENDIX A ROOF ASSEMBLY 02

R02: Results Summary

Metrics	Results
Description	Protected Membrane Roof with XPS on Concrete Deck
Effective R-value	RSI-5.6 m ² /K/W R-31.7 ft ² ·°F·h/BTU
Embodied Carbon per m ² of Enclosure (A1-A3)	148.4 kgCO ₂ /m ²
Biogenic Carbon per m ² of Enclosure	0 kgCO ₂ /m ²



R02: Assembly Effective R-value Calculation

Description	t _{si}	t _{ip}	k	C (USI)	RSI _{effective}	R _{effective}	R _{nominal}
Units	mm	in	W/mK	W/m ² K	m ² K/W	ft ² ·°F·h/BTU	ft ² ·°F·h/BTU
Interior air film					0.11	0.61	
Concrete roof structure	254.00	10.00	1.60	6.30	0.16	0.90	
Hot-applied rubberized asphalt waterproofing membrane	2.30	0.09	-	-	-	-	
Reinforcing fabric	0.26	0.01	-	-	-	-	
Hot-applied rubberized asphalt waterproofing membrane	3.20	0.13	-	-	-	-	
Drainage mat	10.00	0.39	-	-	-	-	
Extruded polystyrene (XPS) rigid board insulation, fully adhered (polyurethane adhesive)	152.40	6.00	0.03	0.19	5.28	29.98	29.98
Filter fabric	-	-	-	-	-	-	
Aggregate ballast	-	-	-	-	-	-	
Exterior air film					0.03	0.17	
TOTALS	422.20	16.60			5.60	31.70	30.00

R02: Embodied Carbon Emissions (A1 to A3 Life Stages) for 9m² Assembly Area

Category	Material	Description (from EPD)	Thickness	Material Volume	Carbon Emissions (A1-A3)	% of total
Units			mm	m ³	kgCO ₂ e	%
Structural Deck	Concrete Deck	Ready-mix concrete, Ontario industry average, 35 MPa concrete with air entrainment GU 50 SL	254 (10")	2.263	540	40.3%
	Reinforcement bar	Reinforcement steel (rebar), generic, 60% recycled content, A615	-	0.02286	240	18.0%
Exterior Membrane	Hot Rubber roof membrane and Reinforcing Fabric	Hot-applied rubberized asphalt membrane, waterproofing, 5.56 mm (219 mils), 6.39 kg/m ² (1.3 lb/ft ²), Monolithic Membrane 6125 (MM6125) (Hydrotech Membrane Corp)	5.5 (0.22")	0.0495	28	2.1%
Exterior Insulation	XPS	XPS insulation (extruded polystyrene)	152.4 (6")	1.3716	520	39%
Drainage	Drainage Board	Drainage mat and moisture barrier, 2.15 kg/m ² , DrainScreen (Sto)	-	*	2.5	0.2%
Drainage	Filter Fabric	Geotextile, generic, 312 g/m ² (1.02 oz/ft ²), Composition: PP net, non-woven PE felt, generic	-	*	2.3	0.2%
Exterior Finish	Roof Ballast	Rock to be used for erosion control, Granite, product specific	-	*	2.7	0.2%
TOTAL					1336	

*Software auto-calculates the impact based on the area provided.

R02: Environmental Emissions (A1 to C4 Life Stages) for 9m² Assembly Area

Lifecycle Stage	A1 to C4	A1-A3	A4-A5	B1-B5	C1-C4	A1-A3 Contribution to total	
Category	Units	Total	Construction Materials	Transport to Site & Construction	Material Replacement & Refurbishment	Deconstruction	
Global Warming	kg CO ₂ e	1729.623	1338.95	135.884	109.49	145.299	77.41%
Acidification	kg SO	0.00093718	0.000838	3.07E-05	5.97E-05	8.78E-06	89.42%
Eutrophication	kg Ne	6.97305	4.5046	0.21699	0.506	1.74546	64.60%
Ozone Depletion	kg CFC11e	2.055435	1.82279	0.094207	0.065	0.073438	88.68%
Formation of Tropospheric Ozone	kg O ₃ e	78.097398	72.903	2.6225	1.3	1.271898	93.35%
Fossil Fuel Primary Energy	MJ	13496.882	6608.37	2025.96	4783.06	79.492	48.96%
Biogenic Carbon Storage	kg CO ₂ e	0	0				