LANDRY INDUSTRIES / RESEARCH DESIGN

SCIENTIFIC ENGINEERING CONCEPT • VERSION 0.2

TIPI 2.0

A new standard of living.
Science-led architectural research blueprint.

A permanent, four-season, Indigenous-inspired home intended to outperform conventional housing on comfort, accessibility, indoor health, durability and resident autonomy—subject to independent engineering verification.

Moncton, New Brunswick, Canada
12 November 2026

UNVERIFIED CONCEPT · NOT FOR CONSTRUCTION OR PERMIT

Proposed by Landry Industries
Research prototype • 100 m² class

01 / Scientific design charter

Test an architectural hypothesis, not a marketing slogan.

Research question: Can a permanent, Lakota/Dakota-tipi-inspired dwelling achieve superior subjective living quality while meeting the safety, durability, energy and accessibility demands of Canadian residential construction?

12 × 11 m	100.56 m²	8.3 m	24
Approx. footprint extents	Calculated outer plan area	Concept crown height	Concept rib locations

Purpose and boundaries

The geometry is inspired by the asymmetrical form of historical plains tipis, but the proposed building uses permanent insulated construction, modern mechanical systems and an engineered load path. It is **not** a reconstruction of a traditional dwelling and must not be represented as Indigenous-endorsed without consultation.

RESEARCH DISCIPLINE	QUESTION TO ANSWER	VERIFICATION EVIDENCE
Structure	Does the form resist local snow, wind, uplift and dynamic actions?	Stamped design calculations; independent review; connection tests
Envelope	Can it remain warm, dry, airtight and maintainable?	Heat/moisture simulation; mockups; winter monitoring
Human factors	Do residents experience better comfort, privacy and agency?	Measured indoor conditions; consent-based resident surveys
Economics / ecology	Is lifetime cost and carbon defensible against a reference home?	Life-cycle cost model; audited bill of quantities; comparative LCA

> **Engineering hold point:** No loads, material capacities, foundation design, fire separation, egress plan, HVAC equipment selection or code-compliance determination has been completed. This is not a build instruction set.

Dimension convention: metres except where indicated. Areas and enclosed volume are preliminary; all clearances require verified BIM geometry.

An asymmetrical footprint with a high central volume.

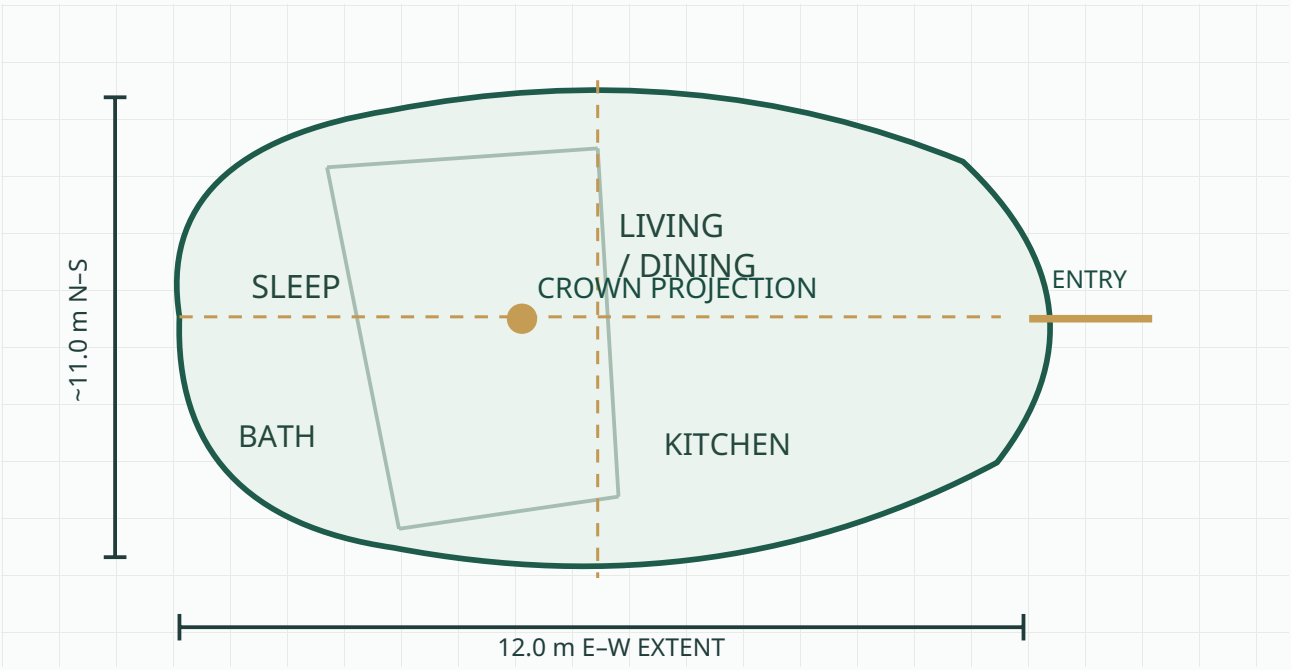


Figure 1. Conceptual zoning only. The true mathematically generated perimeter and partitions are supplied in the existing CAD package; this illustration is not drawn to scale.

Reproducible parametric geometry

> **Floor perimeter:** $x = 6\cos(t)$; $y = 5.5\sin(t)\,[0.97 - 0.11\cos(t)]$, for $0 \le t < 2\pi$. Approx. plan area = **100.56 m²** (1,082.5 ft²). Geometric origin at floor centre. Crown at (−1.0, 0.0, 8.3) m.

Working plan assumption: 1.5 m vertical base/ring zone, then a tapered enclosure to the 8.3 m crown. An accessible entrance vestibule, bedroom, bath, kitchen, living area and service core are **functional zones only**; no exact fixture or clearance layout has been signed off.

> The real usable floor area will be smaller than the mathematical footprint once wall depth, services and minimum headroom are counted. Door locations and steps must be validated against accessibility and egress rules.

03 / Building section

Permanent infrastructure, distinctive vaulted interior.

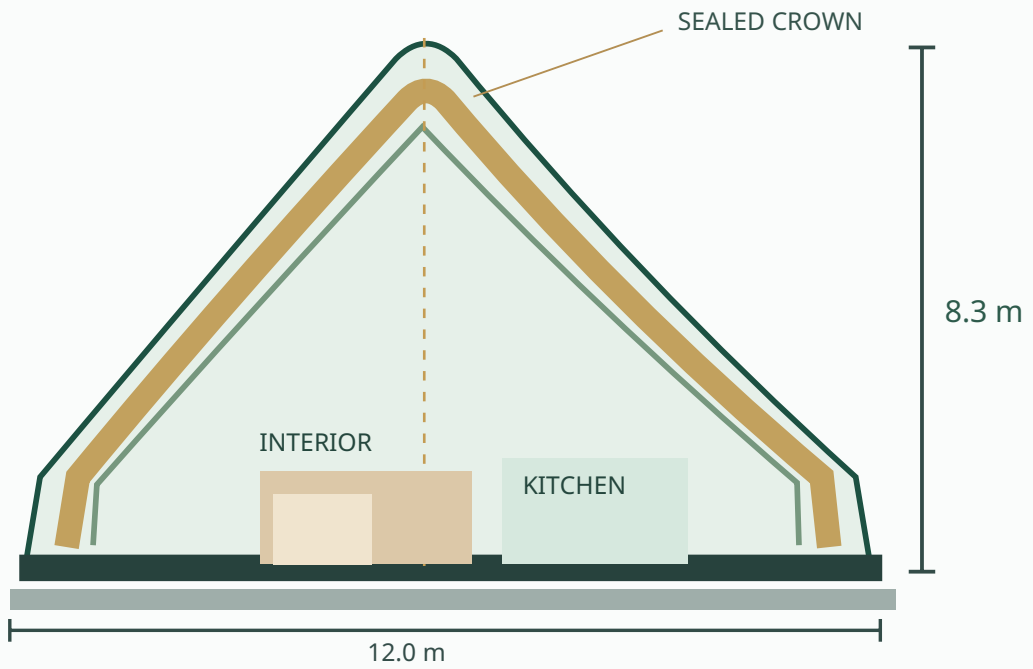


Figure 2. Schematic E–W section. Architectural intent only. Roof curvature and rib shape require 3D engineering.

Load-bearing concept

Candidate assembly: meridional engineered-wood ribs linking an apex crown to a continuous structural perimeter ring, braced with designed sheathing and connections. A **24-rib concept** is proposed for numerical exploration; number, sizes and spacing remain open.

Apex design decision

The iconic smoke-flap silhouette may be preserved externally, but the conditioned home must have a fully weather-sealed crown. Independent balanced ventilation will control indoor air; traditional flaps cannot serve as the sole winter ventilation mechanism.

KEY INTERFACE	REQUIRED ANALYSIS
Ring / footing	Foundation geotechnics, frost, uplift, settlement and drainage
Ribs / crown	Buckling, torsion, deflection, creep, redundancy, moisture movement, fire
Roof and entrance	Snow drift, snow slide/ice fall, waterproofing, protected egress

Verified load paths before prototype procurement.

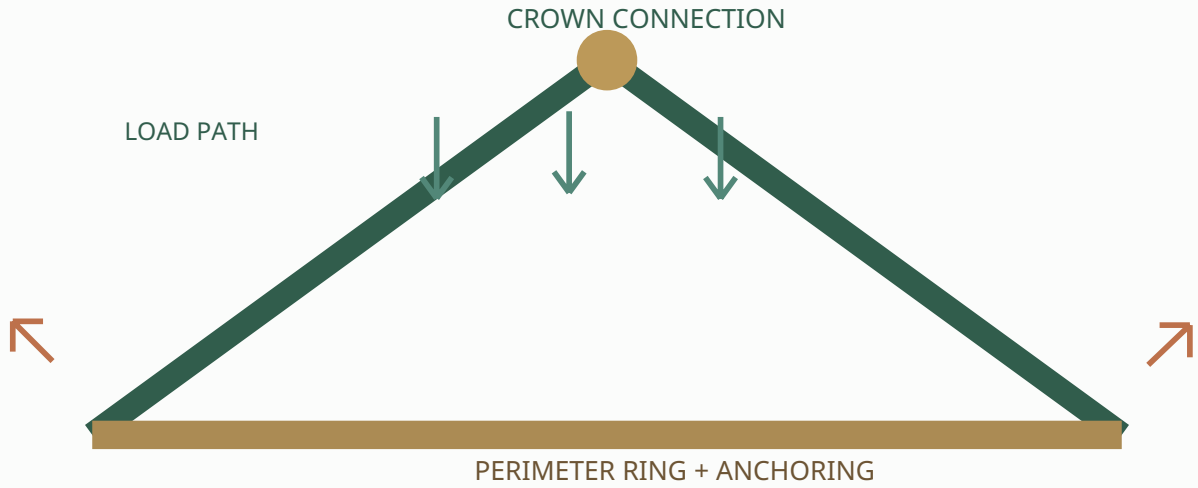


Figure 3. Forces are illustrative, not calculated. This is not a free-body diagram for design.

ACTION / RISK	LIKELY PATH	REQUIRED ENGINEERING DELIVERABLE
Dead + snow	Cladding → sheathing / ribs → ring → footing	Site load combinations including asymmetric drifts and snow shedding
Wind + suction	Cladding fixings → diaphragms → anchors / foundations	External/internal pressure, hold-downs and uplift capacity
Seismic / lateral	Designed brace / diaphragm system → anchorage	3D finite-element analysis, imperfections and torsion
Fire / exposure	Wood/rib performance and required separation	Fire-resistance strategy, egress and compliant material testing
Construction stages	Temporary support before full ring / sheathing action	Erection method and temporary bracing plan

> **HOLD S-1:** No rib sizes, bolt schedules, footing dimensions, steel plate sizes or load ratings are released. Obtain site geotechnical information and the authority having jurisdiction's adopted code requirements first.

Required validation sequence

Develop BIM model → establish climatic and load data → complete 3D analysis → review governing joints → laboratory-test representative apex/ring connections → independently check structural calculations → issue sealed construction documents.

Warm, quiet and dry—with an accountable material assembly.

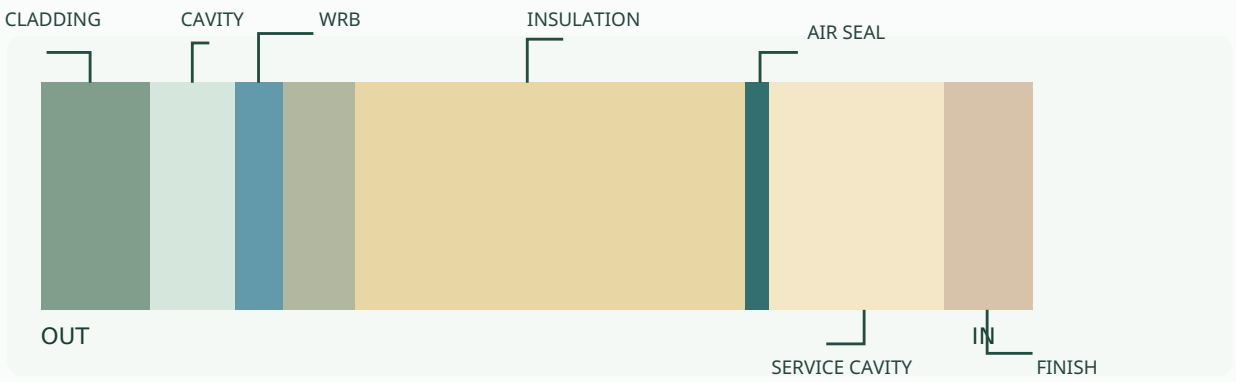


Figure 4. Notional wall/roof layers; widths are illustrative and do not define material thickness or vapor-control placement.

SYSTEM	INITIAL RESEARCH TARGET	PROOF
Roof (effective U)	≤ 0.15 W/(m²·K)	Assemblies, junctions and in-situ measurement
Wall (effective U)	≤ 0.18 W/(m²·K)	Thermal bridge / heat-moisture model
Ground floor (U)	≤ 0.15 W/(m²·K)	Foundation / edge-loss verification
Windows (Uw)	≤ 1.1 W/(m²·K)	Actual rated glazing and installation
Airtightness ambition	n50 ≤ 0.6 h^{-1}	Independent ISO 9972 pressure test

Priorities: continuous air sealing at the crown; moisture-safe roofing; cladding drainage; minimized thermal bridging at exposed rib junctions; high-performance openings; fire and insect controls; sound absorption in the vaulted interior. Final vapor-control design must follow climate-appropriate hygrothermal analysis.

> **Energy equation:** $Q_{trans} = \Sigma(U_i\, A_i\, \Delta T)$. Heat-recovery ventilation term approximately $Q_{vent} = \rho c_p \dot{V} \Delta T(1 - \eta)$. These are calculation frameworks, not completed equipment sizing.

Modern infrastructure, complete personal autonomy.

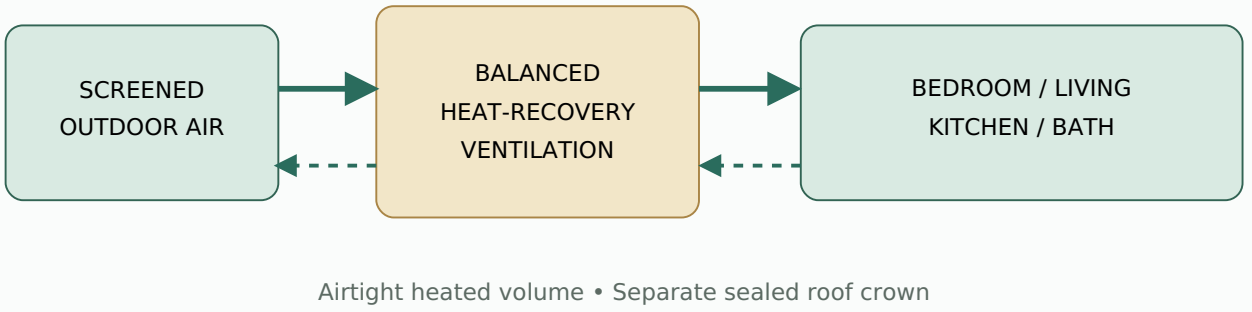


Figure 5. Airflow architecture only: ventilation capacity, duct velocities and controls must be engineered.

SUBSYSTEM	PROPOSED STRATEGY	DECISION STILL REQUIRED
Heating / cooling	Right-sized cold-climate heat pump	Hourly thermal loads, backup strategy and zoning
Fresh air	Balanced HRV with appropriate filtration	Code-required flows, balance, noise and frost protection
Water / wastewater	Normal potable supply, complete bathroom and kitchen	Municipal connection / approved servicing and freeze protection
Power / networking	Code-compliant electrical service and broadband	Demand, outages, maintenance access and grounding
Indoor air quality	CO_2, PM2.5, moisture and radon monitoring	Validated sensor specification and corrective thresholds
Fire/life safety	Compliant alarms, protected exit and emergency lighting where required	Occupancy, fire strategy and authority approval

> **Ventilation illustration only:** 0.4 ACH × ~379 m³ = ~152 m³/h. This is *not* a code-derived required rate and must not be used to specify equipment.

The simplified internal volume (~379 m³) assumes floor area × [1.5 m + (8.3 − 1.5 m)/3]. Replace with true 3D CAD volume and explicit roof shape.

07 / Experimental protocol

Make the proposed superiority falsifiable.

Measure the prototype against a conventional, code-compliant comparison dwelling of similar size, climate, household composition and service levels. Evaluate **both performance and cost**.

INDICATOR	PROTOCOL	DECISION OUTPUT
Temperature / humidity	Multi-height temperature/RH nodes; winter and summer tracking	Comfort profiles and stratification hours
Ventilation / pollutants	CO_2, PM2.5, VOC screens, long-term radon test	Indoor air quality and ventilation response
Envelope water / heat	Moisture probes, thermography, leakage inspections, blower door	Leaks, condensation and n50
Energy	15-minute submetering of HVAC, hot water, ventilation, total power	kWh/m² per year, peak demand, seasonal load
Structures	Displacement, strain, connection response, measured snow/wind events	Engineering serviceability and safety margins
Resident well-being	Optional surveys with informed consent, privacy and accessibility review	Comparative satisfaction and perceived well-being
Environmental/ economic	Audited construction/maintenance costs and life-cycle assessment	Lifetime costs and embodied/ operational emissions

Seven go / no-go research gates

1. **Cultural partnership:** engage appropriate Lakota/Dakota knowledge-holders and local Mi'kmaq partners; define attribution and scope.
2. **Feasibility:** geotechnics, climatic design basis, accessibility, fire and municipal permitting route.
3. **Analysis:** structural FEA, 3D daylight, hygrothermal, energy and ventilation models.
4. **Assembly mockups:** crown/rib and ring joints; envelope, entry and opening test panels.
5. **Permit:** complete and professionally sealed code-compliant design.
6. **Prototype:** supervised construction, inspections and independent commissioning.
7. **Year-long field study:** monitor an entire winter and summer, disclose uncertainties and publish results.

Design decisions must survive a rigorous red-team review.

RISK	SEVERITY	MANDATORY MITIGATION
Snow sliding / roof drift	HIGH	Load modeling; protected entry; ice fall and runoff control
Crown/ring joint failure	HIGH	Nonlinear FEA; independent calculations and physical tests
Deep-envelope moisture	HIGH	Hygrothermal simulation; draining/drying layers; mockups
Apex water/air leakage	HIGH	Continuous control layers and watertight crown testing
Life-cycle energy burden	MEDIUM	Optimize exposed surface, high-performing envelope, metering
Vaulted-space acoustics	MEDIUM	Reverberation modeling and acoustic absorption
Cultural appropriation or misstatement	HIGH	Honest provenance, collaboration and appropriate permissions
Untested composite materials	HIGH	Nonstructural coupons only; independent material qualification

Research pathway for hemp-based materials

Hemp-derived biochar, hemp carbon fillers and Hempoxies research may be evaluated for non-load-bearing applications such as replaceable interior finish samples, test panels or detachable cladding coupons. **No experimental Hempoxies component is structurally specified.** Verify fire performance, emissions, moisture durability, creep, bond stability, toxicity and end-of-life before any residential deployment.

> **Phase A: one monitored dwelling**
> Validate comfort, safety, architecture, lifetime cost and emissions.

> **Phase B: independent replication**
> Build or test a second prototype only after documented corrections and peer review.

Potential community expansion

A 1,000-resident Moncton proposal is a **separate master-planning stage**. Do not infer its feasibility from the prototype footprint alone. Assess land use, roads, utilities, density, accessibility, environmental impact, ownership and resident rights at the settlement scale.

> **Go/no-go principle:** The project must be allowed to fail experimentally. If the structure cannot achieve superior measured outcomes at a credible lifetime cost, revise its geometry or reject it.

Primary source register

This edition re-presents the previous 11-sheet CAD research package in a readable HTML/PDF dossier. These links identify standards and research authorities; listed targets and dimensions remain unverified design assumptions.

1. Nomadics Tipi Makers, styles and sizes: https://tipi.com/styles-and-sizes/
2. Nomadics Tipi Makers, measurement PDF: Manufacturer measurements
3. Architectural History of Indigenous Peoples in Canada (Canadian Encyclopedia / FNHPA): Architectural history PDF
4. City of Moncton, building and development permits: moncton.ca/en/building-permits
5. Government of New Brunswick, building code information: Provincial code
6. National Research Council of Canada, National Building Code 2025: NRC code publication
7. Accessibility Standards Canada, CSA/ASC B652: Accessible dwellings
8. Health Canada, radon guideline: Radon guidelines
9. Passive House Institute, building criteria: PHI criteria PDF
10. National Research Council, climate-resilient buildings and infrastructure: NRC research programme

Scientist handoff: first commissioned deliverables

01 Climate and code basis memo, including occupancy class, governing load schedules, energy tier and construction/permit approval path. **02** Verified BIM geometry and room-clearance drawing. **03** Structural analysis and representative connection tests. **04** High-performance envelope model and crown mockup. **05** Probable construction cost and comparative carbon calculation.

> **Final status:** Scientific design concept v0.2, 12 November 2026.
> **Use limitation:** Not certified, not peer-reviewed, not construction-ready and not a permit application. All engineered designs must be reviewed and sealed by suitably licensed professionals in New Brunswick.

Regulatory watch: code adoption and energy-tier dates must be confirmed with the authority having jurisdiction at the time of application. The original DXF/JSON CAD files remain complementary working documents, not fabrication instructions.

