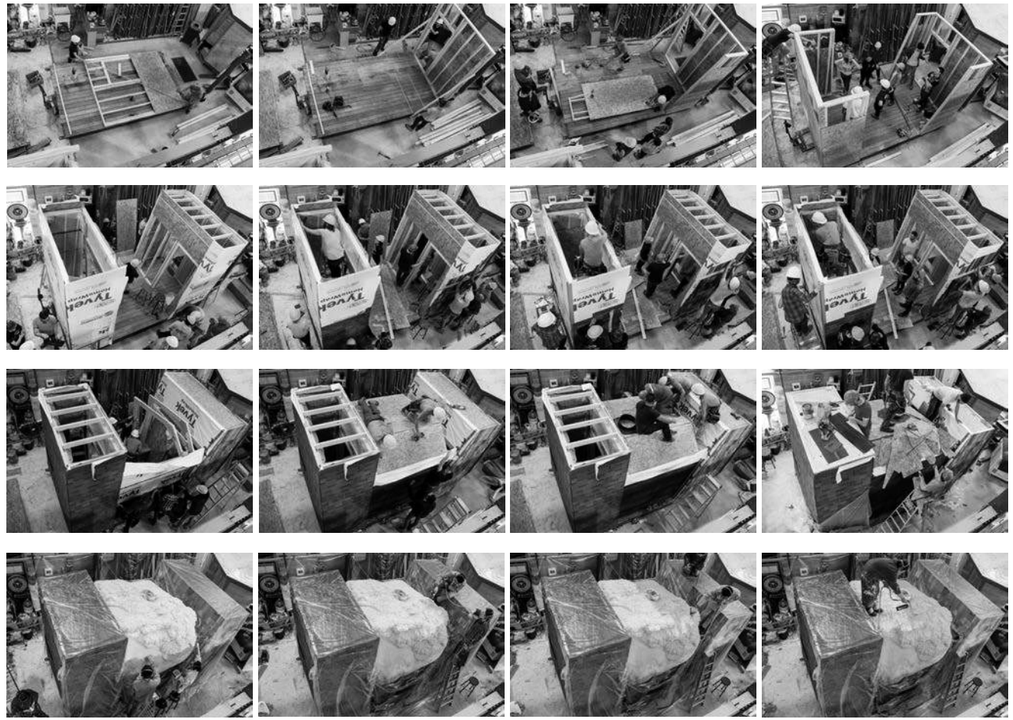
ISBN 9781772840025

carbuncle

c a r b u n c l e
a warming hut



carbuncle a warming hut
Faculty of Architecture
University of Manitoba

Published by DoA Press
201 J.A. Russell Building
University of Manitoba
Winnipeg, Manitoba
R3T 2N2, CANADA
T: +1.204.474.7177
www.umanitoba.ca/faculties/architecture

ISBN 978-1-77284-002-5

Printed in Canada by Friesens

editorial and design

graphic design Lexi Morse
Tia Watson

drawings Meighan Giesbrecht

photography Dylan Hewlett

writing Peter Dueck

editing Eduardo Aquino
Chad Connery
Bianca Dahlman
Jessica Piper

contributors Peter Hargraves
sputnik architecture

Richard Grosshans
PhD IISD

carbuncle design team would like to thank the Faculty of Architecture (the Dean's Office & the Department of Architecture), the Partners Program, C.A.S.T, The Forks, and the International Institute of Sustainable Design for their generous support to the project.

DoAPress

Contents

carbuncle: visually tactile

One has in mind a whole range of complementary sensory perceptions which are registered by the labile body: the intensity of light, darkness, heat and cold; the feeling of humidity; the aroma of material; the almost palpable presence of masonry as the body senses its own confinement; the momentum of an induced gait and the relative inertia of the body as it traverses the floor; the echoing resonance of our own footfall. —Kenneth Frampton in *Toward a Critical Regionalism*

Carbuncle is the project submission from the University of Manitoba, Faculty of Architecture for the 2017 Warming Huts Art & Architecture festival, at The Forks in Winnipeg, Manitoba. Four architecture studios, including 40 students from the Environmental Design and the Architecture Masters Preparation programs, formed a team with instructors Eduardo Aquino, Chad Connery, Terri Fuglem, and Liane Veness. The team's focus was to collectively design and develop a contribution to the international event on the ice.

Previous Warming Hut proposals have explored an infinite array of imaginative possibilities, without necessarily addressing the essence of the event: a warm hut. The team began with a study of Northern saunas, a typology coherent with the Manitoba's Northern climate and culture. Our inquiry engaged the field of technology, as the intention was to explore innovative, feasible, and sustainable technologies in order to advance an effective inhabitation system fitting Winnipeg's cold temperatures and frozen river surface. The International Institute of Sustainable Development (IISD) played a key collaborative role in this process.

IISD has developed technologies to transform the locally harvested biofuels, such as cattail (Typha) and native prairie grasses, into pellets to burn in a pellet stove. According to IISD, cattail and grasses absorb large amounts of phosphorus, a nutrient that can cause algal blooms when it enters waterways. Harvesting cattail and prairie grasses captures this phosphorus before it can enter urban waterways and Lake Winnipeg—named the most threatened lake in the world in 2013 by the Global Nature Fund. At the same time, cattail harvesting improves the lake's water quality as it produces a renewable energy source in Carbuncle's winter urban setting through a gravity operated pellet burning stove.

The sauna tradition goes back hundreds of years, especially amongst the culture of Northern peoples. Many sauna typologies have emerged historically, reflecting the culture of the people who used them. Carbuncle works like a sauna, serving as a warming chamber for walkers, skiers and skaters promenading along the Red River/Assiniboine ice trails. The project considers architecture as a social condenser within urban culture, inviting the public to relax within the hotspot of a sauna. The design process involved an intensive design charrette and sessions with the students to identify the very best architectural resolution that would highlight both the character of a Northern Sauna and the biofuel technology. The criteria for the process included an aesthetic referencing Winnipeg's dirty realism and the collision of different vernacular personalities to signify a wide range of positions within the group's diversity. In the end, Carbuncle's triad of asphalt shingles / insulation foam / cedar shingles compressed into a single building, synthesizes the Midwest culture of hybridized domestic architecture.

Aural, aromatic, tactile, and visual senses coalesce with the intimate interactions in the cozy smallscaleness of the "public space" of the sauna, informed here by local popular tectonics. Carbuncle alludes to Frampton's definition of critical regionalism—a piercing resistance to the dissolution of architecture under the guise of globalization.

Peter Hargraves sputnik architecture

warming huts: art and architecture on ice
“a carbuncle loved”

In 1993 the Partners Program ran a number of small student competitions that left a lasting impression on me. As a student in the Environmental Design program at the time, I enjoyed the prospect of competing with my classmates and we all felt a tug of motivation from the fact that our designs may be realized. A few years later a student in the Department of Landscape Architecture spent a term at the University of Oregon and returned with a built project —a bench—that sat for many years in the lobby of the Architecture 2 building. There is meaningfulness in the act of building at real scale, in real life, an idea that is conceived with the boundaries of one’s intellect.

In developing Warming Huts: Art & Architecture on Ice, it was a very natural choice to find a way to include students and faculty in the mix of international artists, architects, landscape architects, and interior designers who were clearly interested in our program of placing art and architecture into the midst of a public place hungry for the infusion of culture. The project scale is ideal for exploration of materials, construction assemblies, conceptual envelopes, ideologies, without necessarily being held to a rigid framework of requirements. The competition is intentionally ambiguous and yet each year themes develop. The 35 huts built to date exhibit a vast array of ideas and each year is a wonder of new thoughts. The irony of the namesake—warming huts—is never lost on the teams that submit winning entries.

Each year since the competition was open to international entries, the faculty and students at the University of Manitoba, Faculty of Architecture have risen to the challenge of designing and building a project that fits with equal degrees of creativity and craftsmanship into the collection of projects that include luminaries such as Frank Gehry and Anish Kapoor. The projects have been realized by groups as small as two or three, to gigantic teams of 100 students. The logistics, scope, scale and complexity of the projects have varied from a weekend of carving giant blocks of insulation, to weeks spent weaving rope nets and hundreds of hours tending the CNC mill. These are all important learning opportunities and studies in how designers realize projects through the sometimes-tangled world of material availability, fabrication techniques, costs of manufacturing, and the unbending dimension of time.

The creation of the Carbuncle this year is a particularly delightful project in a pedigree of projects already robust with excellence. Students learned never to fear an outcome unknown, to embrace experimentation, and to rise to the challenge of all the work that goes into designing and building a dream. The Carbuncle warming hut is evidence of each of these elements. During a visit to the university at the height of the mad rush to complete the project, the degree of collaboration was clear, and the quantity of love and labour were very evident in the faces of the students and faculty alike. This project is the essence of the possibilities that exist in maintaining the Faculty of Architecture involvement on the Warming Huts program. With every moment of hand wringing, head scratching, and sleeplessness, there are equal moments of delight when the public engages the project with glee.

IISD
International Institute for Sustainable Development

Richard E. Grosshans PhD bioeconomy lead

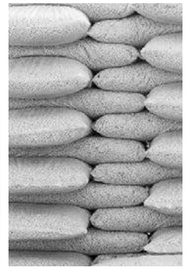
carbuncle's eco-friendly heating source

The fuel pellets heating the Carbuncle warming hut are no ordinary pellets. They are made from "waste" plant materials sourced from within Manitoba. Using these materials leads to benefits such as reduced greenhouse gas emissions and the capture of nutrients that could otherwise contribute to algal blooms in Lake Winnipeg and other water bodies in Manitoba. Continue reading to learn how the Winnipeg-based International Institute for Sustainable Development (IISD) developed this award-winning approach.

the project

For the last decade, IISD and partners have pursued innovative strategies for water, land, and energy management in North America, with a focus in the Lake Winnipeg Watershed. It was proven that harvesting plants, such as cattail (Typha) - that naturally take up nutrients (i.e. phosphorus) and contaminants - from marginal agricultural land, water retention sites, and drainage ditches, reduces phosphorus loading downstream, controls invasive plant species, and improves and restores habitat. Harvesting also produces abundant plant material or biomass that can be utilized for bioenergy products to replace fossil fuels, generate CO2 offsets, and provide revenues from management.

IISD's research at Pelly's Lake, Manitoba has demonstrated harvesting has major environmental and economic benefits when combined with water retention. The Pelly's Lake water retention site is located in a heavily drained agricultural area in southwest Manitoba, and is important for reducing flood impacts. Prior to management, this site had little to no habitat value. Now this restored wetland has a diversity of plant species, waterfowl, and marsh birds. Multi-purpose wetlands such as this are a critical component of a resilient and sustainable agricultural landscape, and are a necessary adaption under current and future climate change impacts.



In 2014-2015, IISD's Cattail Harvesting for Nutrient Capture and Sustainable Energy project reached large-scale harvesting and biomass fuel pellet production. With a growing demand for fuel pellets in Manitoba, over 1000 T of biomass was harvested from the Pelly's Lake site, removing 1.7 T of Phosphorus, and 14 T of Nitrogen. Over 1500 T of blended cattail:grass:wood fuel pellets were produced to generate 5000 tonnes of CO2 equivalent offsets and 50,000 GJ of heat energy - enough to heat 500 Manitoba households. Pellets have excellent burn characteristics with low ash (3%), and high heat energy (19.8 GJ/T).

When a pellet stove such as the one installed in Carbuncle is used to heat a typical Manitoba home, it would burn roughly 2 tonnes of pellets each year. If the pellets were replacing heat from coal, they would offset more than 2 tonnes of carbon – equivalent to removing a car from the road for 6 months.

smart-sourced fuel products

Manitoba is increasingly moving towards environmentally friendly sources of energy. IISD's smart-sourced fuel products support sustainable development by providing an efficient heating source with environmental and economic advantages. These eco-friendly fuel products are blends of under-utilized and waste products, including locally sourced agricultural residues, wetland plants, grassland plants and wood manufacturing residues. These feedstocks do not compete with land for food production but rather create value from what was otherwise a waste product. Fuel pellets can be used for space heating in both larger boiler systems found on Hutterite Colonies and smaller residential-sized pellet stoves such as those found at the City of Winnipeg's Living Prairie Museum, in the "Carbuncle" Warming Hut at the Forks Market, and at the Raw Almond restaurant when on the river.

key benefits

Heating value comparable to compressed wood-based fuel pellets

Low-ash production

Capture of nutrients (phosphorus and nitrogen) and contaminants in plant materials, particularly cattail, resulting in benefits for Lake Winnipeg and other nutrient-stressed waters.

Use of sustainable and locally sourced “waste” materials

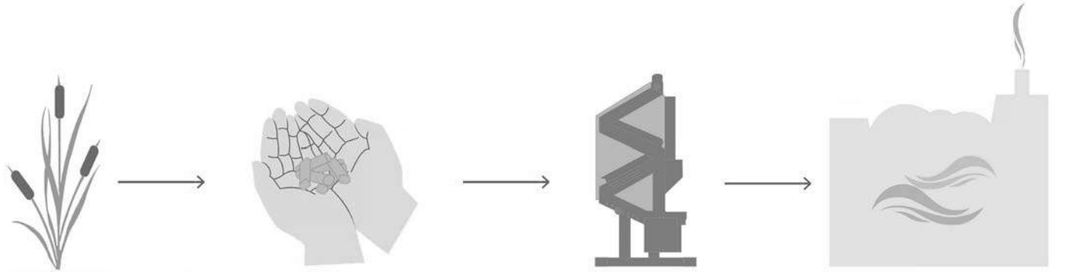
Reductions in GHG emissions when users switch from coal burning systems to biomass

Generate carbon offset credits, and potentially water quality credits where programs exist, to offset costs of production

Use of harvesting as management of invasive species (i.e. hybrid cattail and phragmites)

Source of revenue for landowners from marginal agricultural land

Harvesting plants from ditches and drains and turning these materials into value-added products provides economic benefits to municipalities.



Wetlands remove the phosphorus and nitrogen that would pollute Manitoba’s fresh water. Cattails are just one of many plants harvested that can improve watershed health.

Once harvested, plants are broken down and combined with wood residue to produce a low carbon pellet fuel.

Pellets are gravity fed into the pellet stove.

A 40-pound bag of plant based pellets can keep the stove in the sauna burning for up to 36 hours on low, and 12 hours on high.

manitoba’s sustainable biomass supply

With its substantial supply of under-used plant materials, Manitoba is well positioned to develop a robust and leading-edge biomass industry. The Province of Manitoba estimates 3 to 5 million tonnes of biomass is available each year that is not currently used for soil management and livestock. In addition, IISD estimates 3 million tonnes of unconventional (i.e. cattail and ditch grasses) grows in the province; a portion of this could be sustainably harvested for bioenergy. A significant amount of this plant material is within 100 km of Winnipeg and Brandon, optimizing costs and logistics.

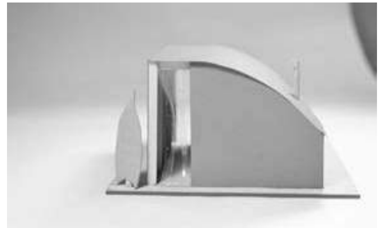
meeting market demand

With Manitoba phasing out coal and users switching to other forms of energy, including biomass, there is an opportunity to integrate new and innovative forms of energy. At the same time, all of Canada is moving towards a price on carbon, which adds extra incentive to create cleaner energy. Commercial biomass systems and residential pellets stoves are readily available in Manitoba. By 2017, it is estimated there will be a need for at least 48,000 tonnes of biomass fuel annually.

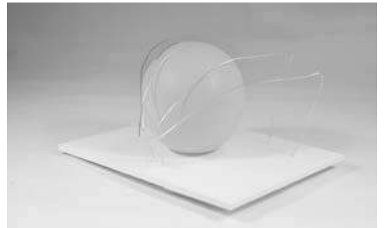
design charette

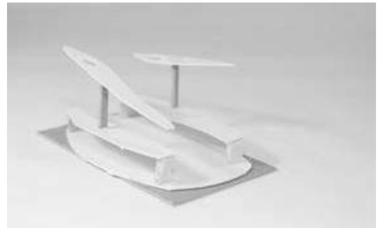
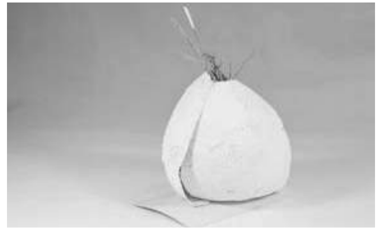
A month prior to the Warming Huts Art & Architecture on Ice, students gathered to receive a briefing on biofuel technology from IISD, and an introduction on the festival from The Forks. Students then paired up and had 3 hours to design and model a *truly warm* warming hut. The four professors then adjudicated the diverse range of ideas and chose the four models that best addressed the hut's sauna program. This tasked students with the challenge of making quick design decisions that were evaluated on merit of their craft and legibility of their intent.



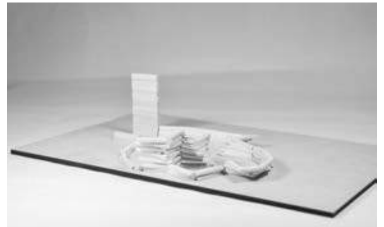




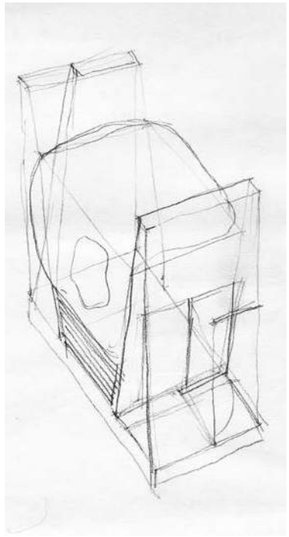


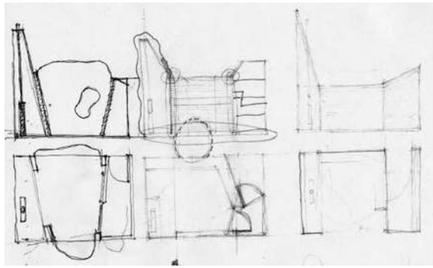


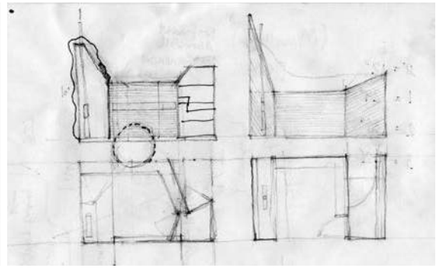


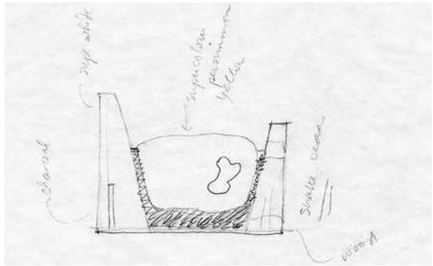
design development

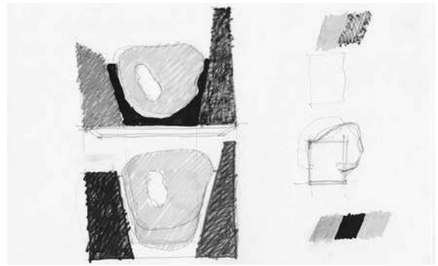
Four designs from the students' charrette were chosen by the professors to integrate into a hybrid entity. The challenge of integrating multiple ideas into a new singularity brought to mind other experimental architectural and artistic assemblages. Seemingly disparate elements overflowed themselves through combinitorial processes and developed into fun and surprising objects. This design process was taken as a model for combining the four student propositions.





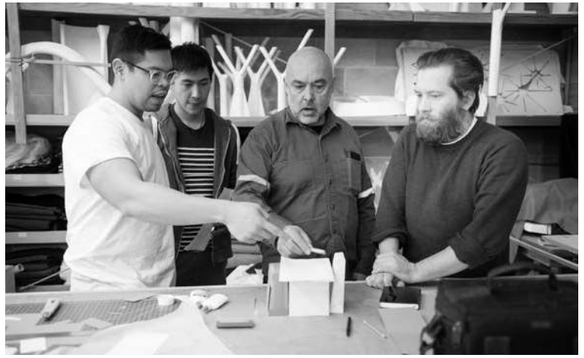






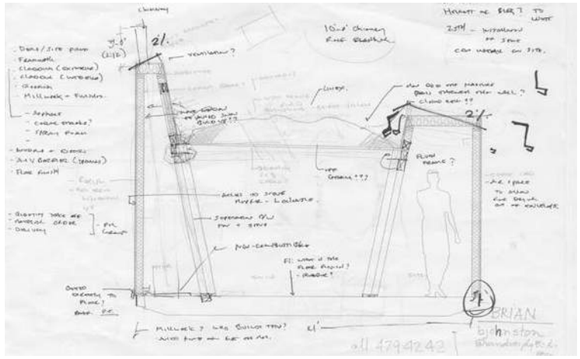
work process

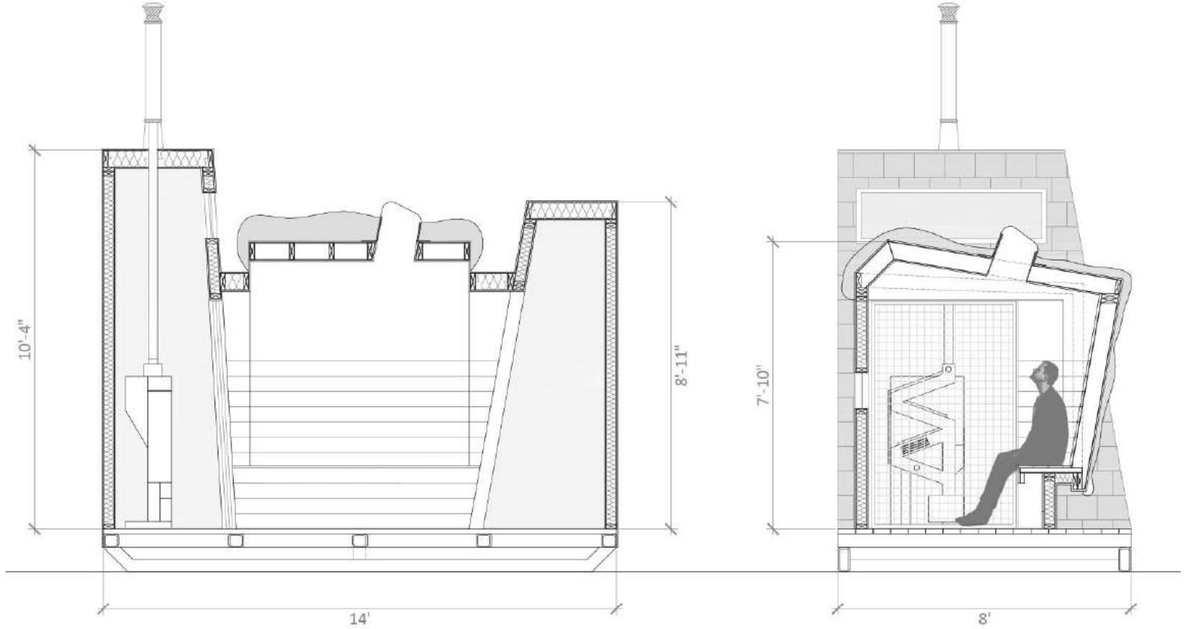
The physical manifestation of the design took on a non-linear and cyclical nature. The design and contruction processes occured simutaneously to the greatly condensed timeline of the project. The expected social hierarchies of design authority governing the construction process were subverted as students and professors worked together as professional colleagues. This created a largely decentralized decision making process allowing creative solutions for design problems that arose from the simultaneous design/ build model.



framing

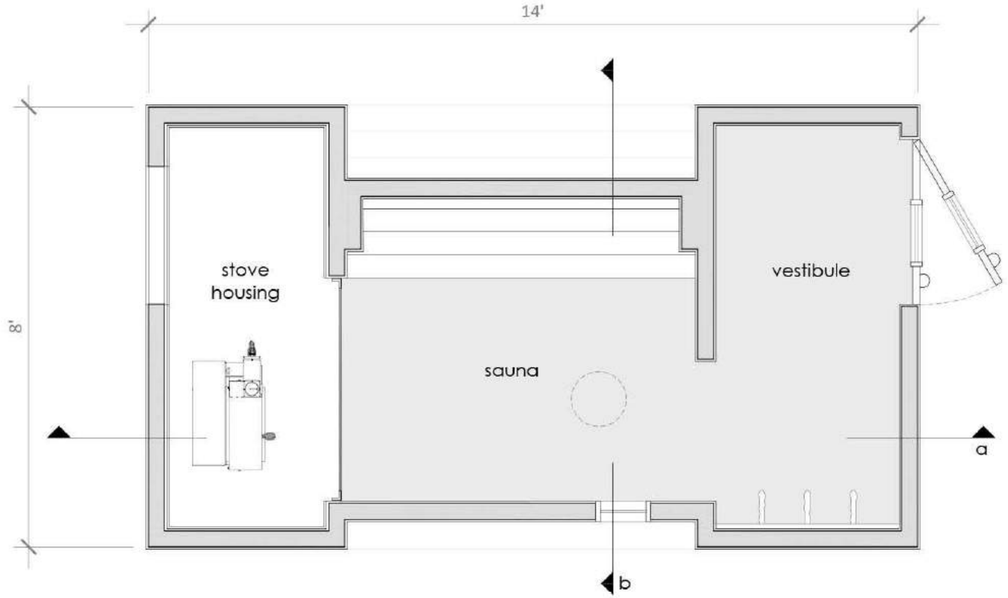
Unifying the separate parts of the building required special attention to the connections. The subtle angles of the vertical walls and the deep reveals of the exterior framing allowed for the careful demarcation of the vestibule from the sauna and the sauna from the stove in both interior and exterior views. In preparation for the spray foam sheathing scraps were layered to create a distorted assemblage on the roof giving the carbuncle its anomalous form. The interior framing of the sauna integrated the back of the bench into the structural wall which flowed up into the roof unifying the disparate structural elements of the sauna.



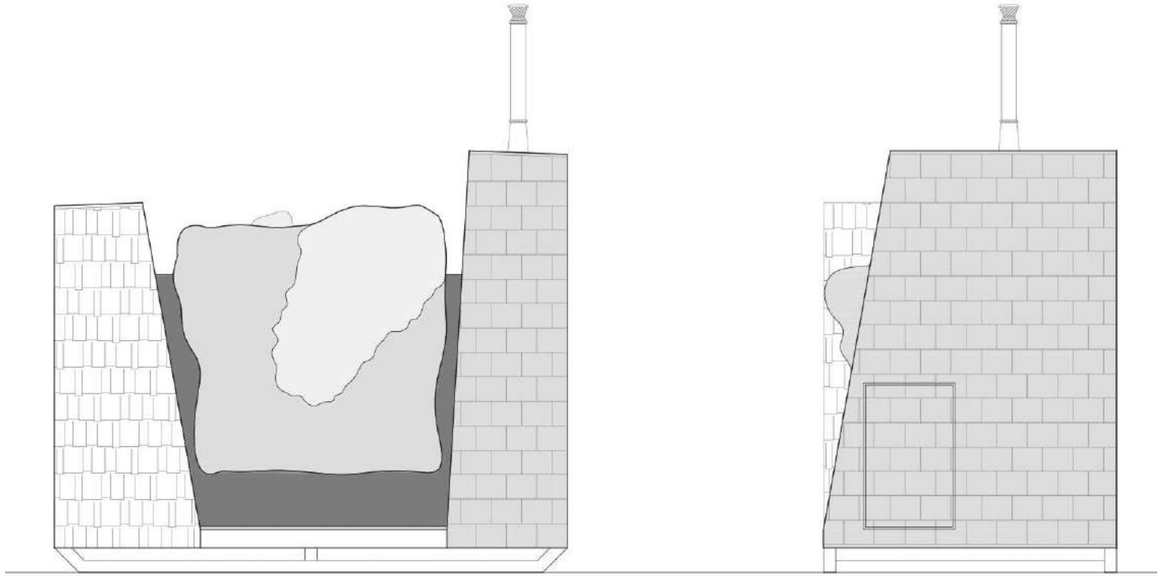


section a

section b

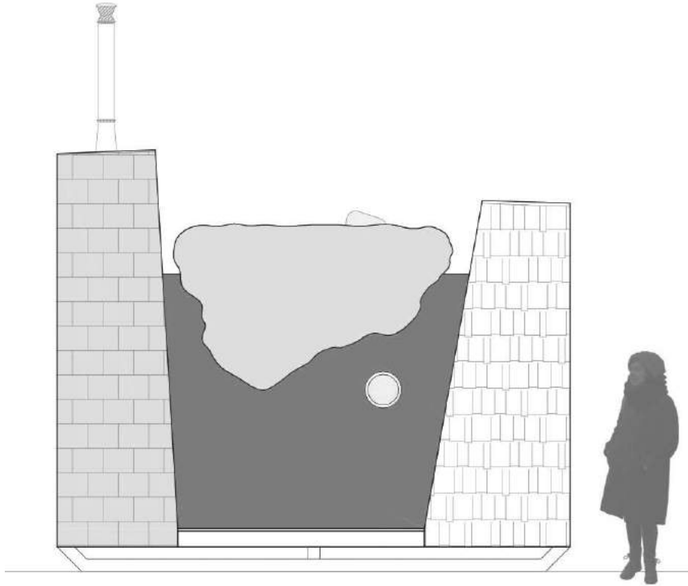


floor plan

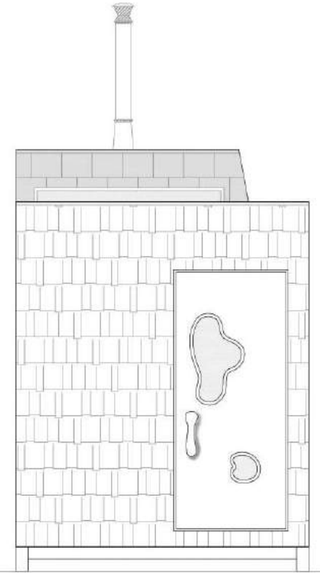


back elevation

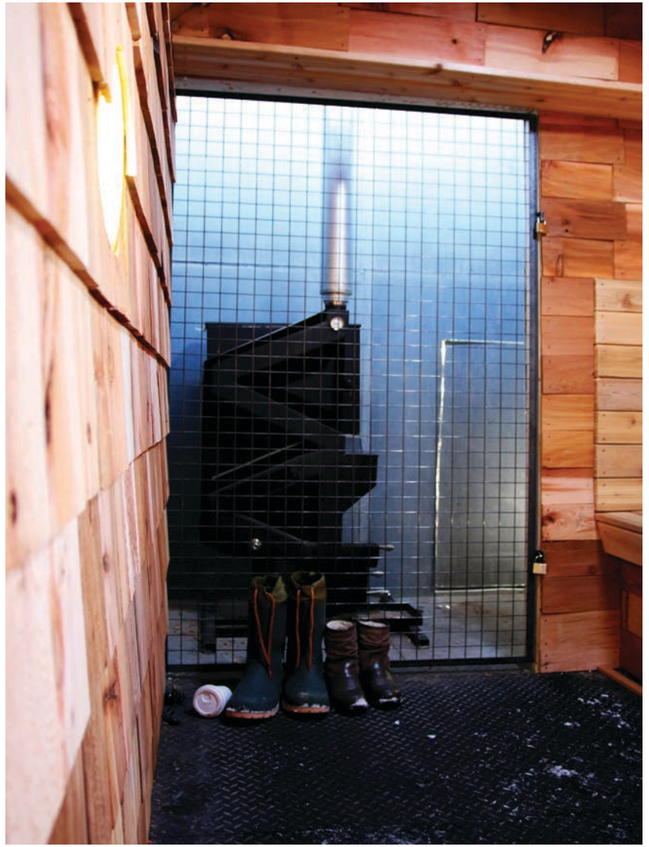
stove chamber elevation



front elevation

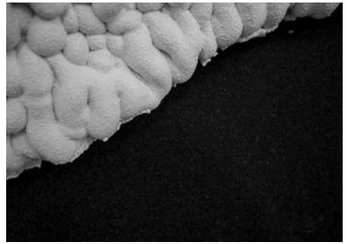


door elevation



spray foam

carbuncle's central mass is clad with a spray applied polyurethane foam insulation processed from vegetable oil and recycled plastics. The insulation was built up over the sculptural framing below until it established a thick hide of cellulite like topographies. This bright yellow artificial skin acts as both insulator and vapor barrier, holding the more traditional language of its cedar interior in a swaddle of anomalous form.



exterior finishings

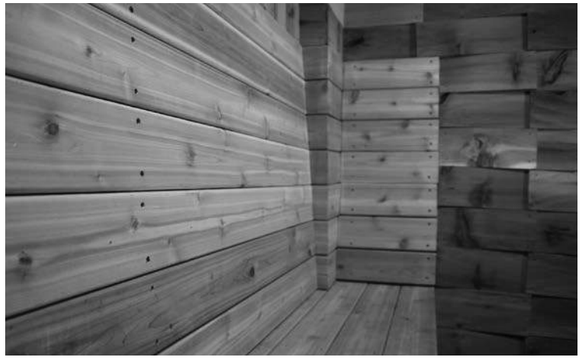
The exterior finishes of carbuncle accentuate the three components of the warming hut. The cedar shakes highlight the entrance of the sauna with an inviting warmth and the stove side bookends the warming hut with its strong verticality and clerestory window. The central portion of the hut is an anomalous yellow mass, seemingly overflowing from its adjacent sections. The three sections are a multiplicity of color and materials. The shingles bring a domestic character, the cedar shakes an organic presence and the carbuncle a bulbous growth.

door

The entrance to the warming hut presents a splash of carbuncle's playful quality with its textured yellow paint, morphing window frames, and sculpted handle. The meandering windows allow the visitors to catch a glimpse of the lush interior cedar finish and prevents collisions between those exiting and entering. The construction of the custom door used digital manufacturing combined with traditional woodcraft. The door's hybridized construction method expressed a combination of a variety of colours, shapes, and materials, presenting a microcosm of carbuncle's personality.

interior

The interior of carbuncle is referential to traditional saunas through the presence of a small space, cedar cladding, and a bench. The vestibule and sauna components are both finished with cedar shakes applied in an unconventional inverted shiplap. The chimney portion of the warming hut is separated from the public portion of the sauna with a custom metal gate that allows full visibility of the stove and a minimal cement-board cladding. The interior is illuminated through small, playful apertures in the doors and walls; a skylight in the sauna; and a translucent clerestory window in the chimney area.



colophon

design team

Eduardo Aquino
Erik Arnason
J.P. Austria
Jonathan Bailes
Dennis Bergen
Tali Budman
Chad Connery
Bianca Dahlman
Sarah Dankochik
Jessica D'Toste
Peter Dueck
Devin Dushanek
Connery Friesen
Terri Fuglem
Meighan Giesbrecht
Dylan Hewlett
Brittany Hince Siwicki
Alyssa Hornick
Weijia Hu
Ke Jiang
Violet Zhiyu Jiang
Jihoon Jo
Manar Khalil
Brendan Klassen
Katie Lee
Lexi Morse
Mark Nowak
Kara Pankiw
Emily Pawluk
Jessica Piper
Stephanie Plouffe
Emily Raymond
Aeron Regalado
Sarabjeet Saka
Alexander Semegen
Andrew Simonson
Justin Squire
Mackenzie Swope
Liane Veness
Kristia Villanueva
Tia Watson
Ruxiao Xue
Shuo Yang
Aldrin Zapata
Jianuo Zhou

collaborators

Paul Jordan, CEO & Dave Panco, Manager, Special Projects, The Forks
Peter Hargraves, Joshua P. Adria, Michael Maksymiuk, Matthew Trendota, David Anderson, Sputnik Architecture Inc.
Karla Zubrycki, Project and Communications Manager, Water Program, IISD
Richard Grosshans, PhD, Bioeconomy Lead, Water Program, IISD
Stéphane Gauthier, Mechanical Engineer, Biovalco

photo credits

All images generously provided by Dylan Hewlett unless otherwise specified below:

11-12 r.	IISD
12 l.	Bianca Dahlman
29 r. & 31 t.	Eduardo Aquino
31 b.l.	Jacqueline Young

Colour Images

4,6,8	Jacqueline Young
1,2,5	Jessica Piper
3,7	Eduardo Aquino

sponsors

University of Manitoba | Faculty of Architecture | Department of Architecture
Partners Program
IISD International Institute for Sustainable Development
The Forks
Sputnik Architecture Inc.
Winnipeg Architecture Foundation
Ye Olde Soot Sweepers Ye Olde Hearth Shoppe
Canada Council for the Arts | Conseil des Arts du Canada
Manitoba
Environment and Climate Change Canada | Environnement et Changement climatique Canada
Manitoba Hydro
RBC Blue Water Project
Manitoba Liquor & Lotteries