Disappear Retreat: dissolving our living footprint to zero energy, zero waste, zero water.

COULSON is dedicated to the highest level of sustainability and design excellence. We push and explore the range of aesthetic creativity while meeting rigorous performance targets. We engage in extensive research and development to advance our groundbreaking ideas. Our passion for the environment is not just technical, but extends to the experience of nature, which is an essential inspiration in our design work and life. We want to insinuate into the landscape and live seamlessly and lightly with its mysterious beauty. This is the starting objective for this project.

What does triple-zero living look like? How far can we drive a conservation-first approach so systems are tiny and integrated? Can we achieve lightness and transparency in extreme cold climates? Can we eliminate the heating and cooling systems using passive design? Can we create a minimal architecture, yet still achieve super-insulation and thermal bridge-free details? How far can we advance a certified Passive House and Living Building to prioritize architectural experience and aesthetics? How small can it be, designing a minimalist lifestyle that is functional with less stuff and more freedom? Can it be affordable, transportable, and adaptable? Can design excite the public about sustainable building showing it is simple, sexy, and feasible? These are questions that began the process.

Imagine it is -25°F on a winter morning, yet no heating is required.

Disappear Retreat integrates the components for triple-zero performance into an almost invisible, ethereal state. The design is light, transparent, and seamlessly connected to the surroundings, dissolving into the landscape where the building form is compact and the glass takes on the identity of the site in its reflections (transparent ultraviolet color prevents animal collision). A spotted pattern of thin-film PV in the south glass wall generates all the energy needs from the sun and camouflages the building amongst the trees like a quiet forest animal. Weathered wood softens the design and blends with the landscape. As evening approaches the clear glass roof emits a warm, welcoming glow.
The spark for the project came under the night sky viewing a psychedelic show of northern lights and imagining a small, self-sufficient retreat with a glass roof where the universe overhead and surrounding ecosystems press close, where one feels connected to the planet and can sleep under the dazzling stars and dream with eyes open.

We wanted to share this experience in a design that nurtures creative minds: those who can harness these natural wonders and reveal it to others through their work and words.

“Press close bare-bosom’d night – press close magnetic nourishing night! Smile O voluptuous cool-breath’d earth! Smile, for your lover comes.” -Walt Whitman, Song of Myself

The project is designed for and inspired by creative work.

Art, literature, music, and poetry influence the sense of place we are striving to achieve. Exploring surreal, transcendental, nouveau, abstract, bauhaus, minimalist, classical, and experimental universes.

The dwelling provides an immersion in nature to recharge the mind and creativity, allowing occupants to disappear into their work and the landscape.

“I seek the power of the rock, the magic of the water, the religion of the tree, the color of the wind, and the enigma of the horizon.” -George Morrison

The result of these objectives, questions, and influences is a transparent, stargazing, triple-zero building, dissolving the impact on the environment physically and aesthetically.

The living essentials are integrated into a prefab, off-grid dwelling providing a minimalist lifestyle in resources, cost, and aesthetics. The high-performance enclosure meets the Passive House Standard and will pursue Living Building Challenge certification, the two most rigorous environmental targets in the world. The 83 ft² building requires no active heating or cooling systems and has a peak heating load of just 100 watts (1 light bulb) in the extreme cold of northern Minnesota. It performs similarly well in cold climates from Seattle to Buffalo and Chicago to Calgary (with minor adjustments to glass specifications).
Retreat has three models with identical exterior enclosures and alternative interior layouts:

The **Bed+Bath** model has built-in sofa/bed with storage underneath, toilet, sink, shower, refrigerator, and induction cooktop.

The **Basic** model is flexible open plan for art, music, meditation, office, and living space adaptable to future needs.

The **Sauna** model has built-in wood benches and sauna heater.

The transportable design fits on a standard trailer, has minimal impact on the land, and is resilient to changes in climate, ownership, function, and economics.

**Disappear Retreat** integrates low-tech components widely available today into a factory-assembled enclosure that uses the passive design approach of super-insulation, air tightness, thermal bridge-free details, compact form, winter passive solar, and summer shading to achieve deep energy reductions.

R-values range from 32 at the glass walls and roof to 87 at the floor. The materials have very high insulation value with minimum thickness: Triple-pane insulated glass units; Aerogel Thermal Wrap at shades; VIPs (vacuum insulated panels) at floor and walls.

Striving for lightness in weight and aesthetics, the minimalist details keep the focus on the beautiful surroundings, offering a meditative experience and the feeling of living outdoors.

“You lose consciousness of your own separate existence. You bend with the landscape, and become part and parcel with nature.” -John Muir

Melting into the landscape with every breath, the **Basic** model open plan provides a contemplative, adaptable space for exercise, meditation, and yoga.

Healthy indoor air quality is achieved with a pair of thru-wall ERV (energy recovery ventilator) discreetly positioned above the north door, providing continuous, balanced, and filtered fresh air and exhaust with minimal impact on sound, energy, or heat loss (heat recovery efficiency 90%). The door can be open to expand the interior space and utilize natural ventilation. An integrated retractable insect screen keeps bugs out without effecting the view.
“Simplicity is the ultimate sophistication.”
-Léonard da Vinci

Disappear Retreat has a neutral palette of only three finish materials, creating a zen atmosphere that emphasizes the exterior views and increases the perceived sense of space as the materials flow seamlessly from interior to exterior and from floor to wall to roof.

\(1/4\) inch thick insulated fabric shades at the roof and windows modulate heat gain, glare, acoustics, privacy, and mood. These join with a fabric upholstered wall, adding a softness and sense of comfort to the interior. The crisp glass details are balanced with the tactile warmth of the reclaimed grey weathered wood which blends with the surrounding rocks and trees.

From the exterior the design disappears in the landscape like a chameleon. Photovoltaic spots and reflective glass merge with the surroundings for a quiet and surreal sense of place.

Alone in the landscape, all the rules dissolve. One’s sense of time, order, and sequence are transformed.

“Why sometimes I’ve believed as many as six impossible things before breakfast!” -Lewis Carroll, Alice in Wonderland

Strangeness is essential to creativity. All the limitations that come from familiarity are gone and everything becomes a possibility.

Disappear Retreat explores these new possibilities.

Scattered amongst the boreal forest near Grand Marais, Minnesota like a family of spotted mushrooms, the first prototype buildings will form a Retreat Center offering a non-profit residency program to artistic and scientific professionals and public outreach on sustainable building and climate change.

Visitors will become attune to resource use and the naturally integrated sustenance from the earth and sun and gain creative rejuvenation and inspiration from the landscape.

Prototype construction is underway, Spring/Summer 2018, and will undergo rigorous testing and evaluation at this site before launching into production in 2019.
“Look deep into nature and you will understand everything better.” - Albert Einstein

Stargazing under a dazzling night sky we see beyond ourselves light-years into the future. Hiking in the lush tapestry of the forest we understand the fragility of our ecosystems. We know the impact climate change will have on future generations. A paradigm shift is essential.

Today we have all the elements needed for simple, affordable, self-sufficient building without sacrificing design freedom. Disappear Retreat merges design and performance. Low-tech components and passive strategies dissolve into the architecture. Smart integration and rigorous energy modeling is the innovation.

The design strategies that reduce the energy demand by 86% are woven into the architectural solution and extensively tested with advanced energy modeling. Disappear Retreat meets comfort and performance targets for Passive House and Zero-Energy in cold climate locations like Minneapolis, Duluth, Portland, Vancouver, Seattle, Toronto, Edmonton, Montreal, and Calgary. With minor adjustments to the glass solar heat gain Denver, Provo, Chicago, Madison, Buffalo, and New Haven also perform well.

All Disappear Retreat locations will have a custom site and climate evaluation. An ideal site is at the edge of a tree clearing to maximize solar energy, maximize winter passive solar, and minimize summer heat gain with leafed-out deciduous trees.

The design takes a conservation-first, keep-it-simple approach with passive solutions that drastically cut energy use.

The 8x10x9ft structure is incredibly compact, reducing exterior surface area and, therefore, unwanted heat loss or gain. The air-tight and super-insulated enclosure will never drop below 60°F inside no matter how cold outside and without any sun exposure, so plumbing systems are always safe. Passive solar heating through the glass roof and walls is utilized in the winter, modulated in spring/fall with insulated shades, and blocked in summer by trees and shades. These strategies reduce the peak heating load to just 100 watts (1 light bulb), a 95% reduction. No mechanical heating or cooling is needed.
Rainwater is collected off the Shed roof, filtered, treated, and stored in tank for potable water use on-site. All blackwater waste is treated in a composting system. A pattern of thin-film PV is integrated into the south facing roof and door panels and supplies power to the waste and water systems, electrical vehicle charging, and excess is stored in batteries for Retreat building emergency backup.

Under the accessible floor of the Retreat Bed+Bath is a potable water tank for sink/shower, a greywater tank for sink/shower wastewater, and a blackwater tank for toilet waste. These systems are similar to an RV and keep energy, complexity, cost, land disturbance, and floor height at its lowest. The Shed provides composting and rainwater treatment for multiple Retreat buildings to achieve a Zero-Water Zero-Waste facility.

Filling/emptying of tanks is required every 2 weeks. Tote-along portable tanks with vacuum pump can transfer waste and water, allowing a remote location of Retreat. A portable pump and hose works if Retreat and Shed are within a few hundred feet. At sites with existing septic and well or city services, Bed+Bath can connect to them, but is no longer zero water/waste.

Rainwater is collected off the Shed roof, filtered, treated, and stored in tank for potable water use on-site. All blackwater waste is treated in a composting system. A pattern of thin-film PV is integrated into the south facing roof and door panels and supplies power to the waste and water systems, electrical vehicle charging, and excess is stored in batteries for Retreat building emergency backup. Shed uses passive solar heating through the roof eliminating need for mechanical heating and keeping waste and water systems operational in winter. The 5x7x20ft structure stores bikes, kayak, bins, and maintenance tools. It’s also ideal for winter gardening.

Like Retreat, the Shed dissolves into the landscape with reflective glass, photovoltaic spots, and grey weathered wood.
Disappear Retreat brings lightness in mind, resource use, and design with all essentials and systems seamlessly integrated allowing the surrounding beauty to be the focus, living in balance with nature.

“I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach…”
- Henry David Thoreau

Metrics:

- 7.3 kBtu(ft²yr) 23 kWh(m²yr) pEUI before PV
- -8 kBtu(ft²yr) -25 kWh(m²yr) pEUI after PV
- 4.4 kBtu(ft²yr) 14 kWh(m²yr) space heat demand
- 0.40 ACH₅₀ pressurization test
- R-87 0.065 W(m²k) floor
- R-59 0.096 W(m²k) solid wall
- R-32 0.176 W(m²k) glass + insulated shade

Certifications (pursuing):

- Passive House (PHI-Germany)
- Living Building Challenge
- NZEB
- 2030

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