CO|LAB

A Building Like a Tree

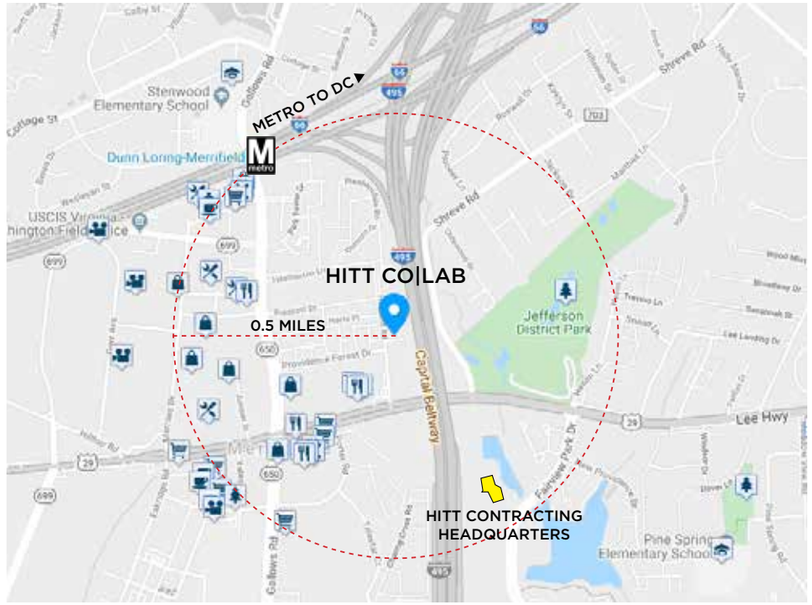
William McDonough + Partners
for HITT Contracting, Falls Church, Virginia

Co|Lab's **building like a tree** concept enlivens the urban environment

When starting from the initial aspiration of designing a building like a tree, wood naturally becomes an important architectural element. At WM+P, wood as a building element has long been the ideal.

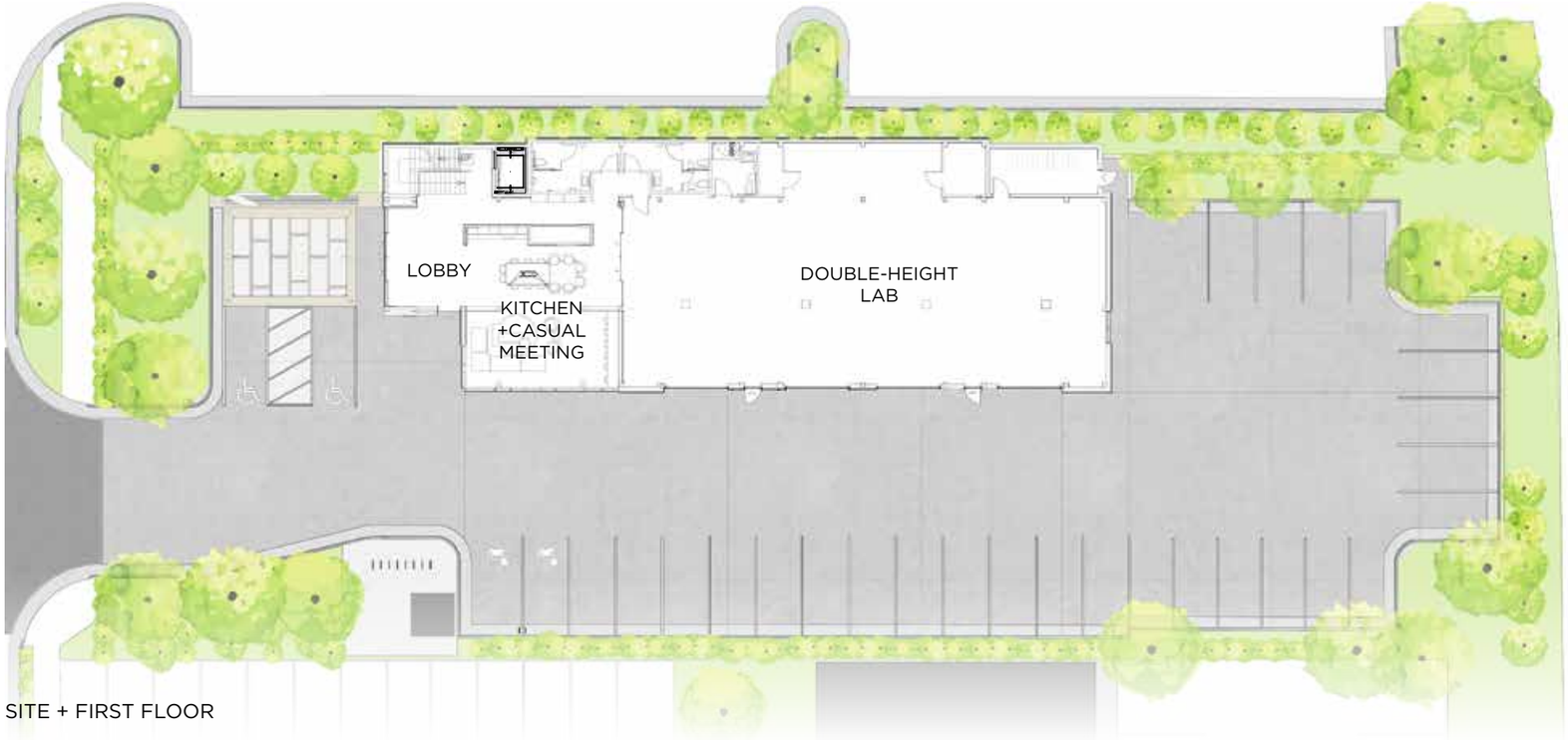
To design buildings like trees, we use three main principles of Cradle to Cradle Design™: waste equals food, use current solar income and celebrate diversity. The HITT Co|Lab is a perfect case study for these principles. The Co|Lab is envisioned as a showcase for building innovation in the 21st century that is net-positive energy, utilizes as many healthy materials as possible and exhibits smart emerging design and construction technologies at every phase of the project. With these innovation paths mapped out, Mass Timber (MT) was quickly identified as a perfect foundation for the project.

Co|Lab is one of the country's first true R&D facilities for design and construction professionals to experiment and prove new industry approaches.

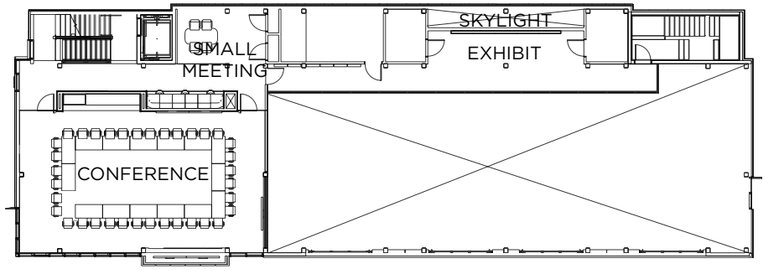


71
WALK SCORE

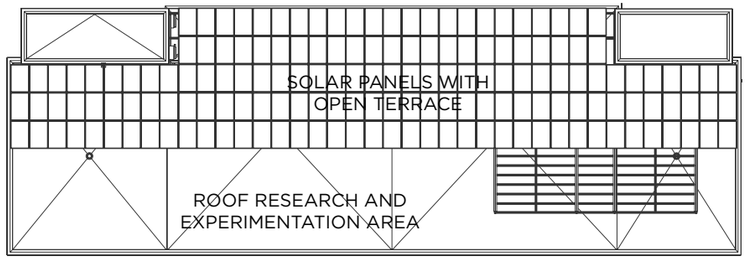
2K+
VISITORS SINCE JUNE 2019 OPENING



SITE + FIRST FLOOR



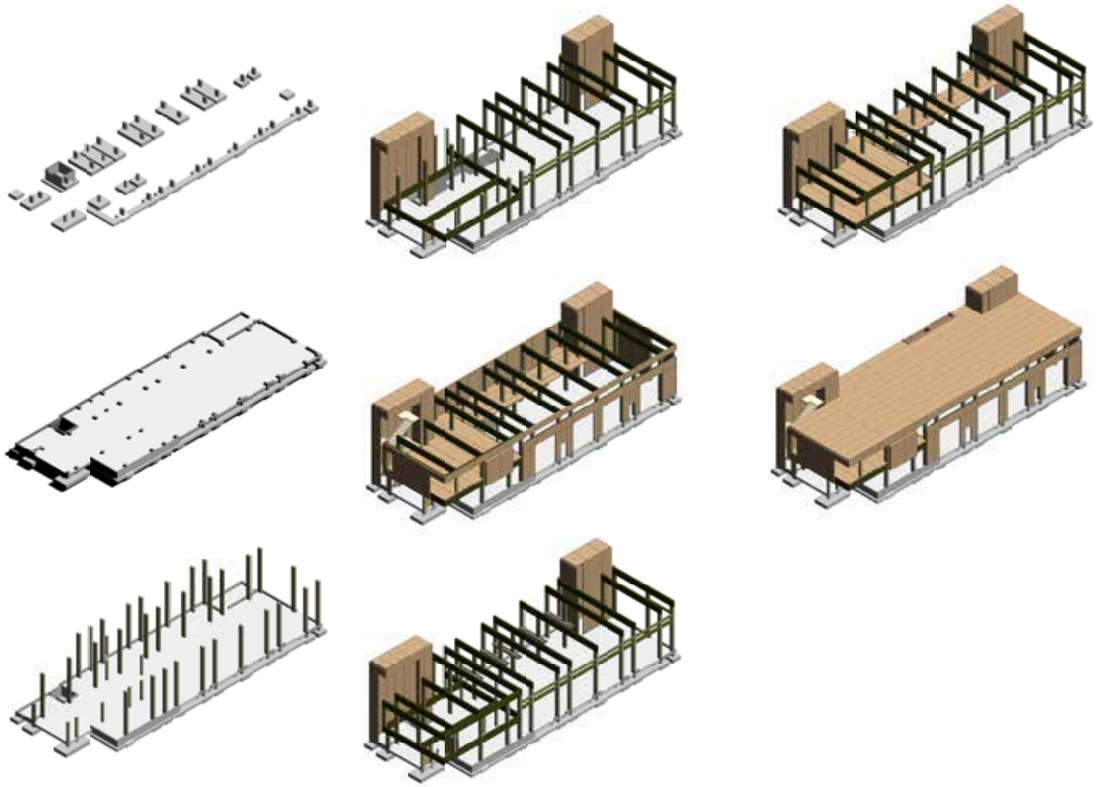
SECOND FLOOR



ROOF PLAN

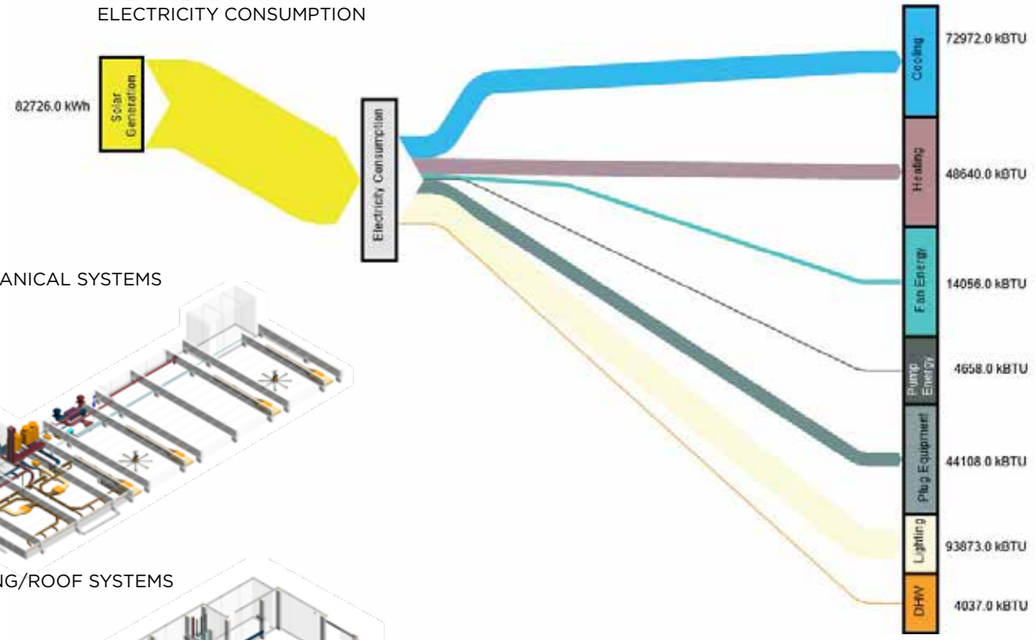
Designed for Disassembly in the Circular Economy

By assembling the building using only mechanical fasteners, the high-value MT elements can be disassembled and then reused or recycled to be endlessly recirculated in a safe, then **circular, economy.** The MT structure provides an interior tactile benefit while also allowing rapid installation of the structural frame and envelope and decreasing the building's carbon footprint.

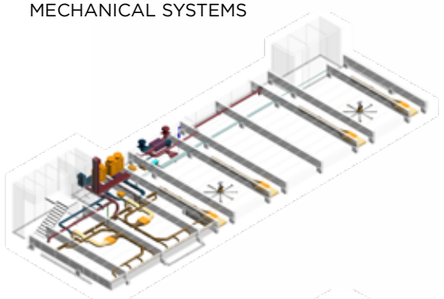


Cost reduction and beauty in using **Cross-Laminated Timber** as a finished product

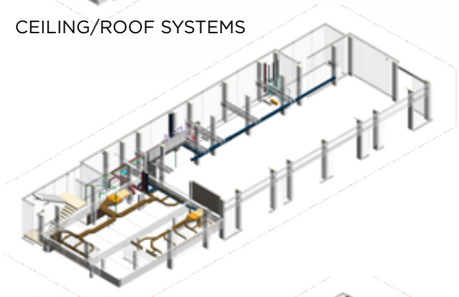
SOLAR GENERATION TO
ELECTRICITY CONSUMPTION



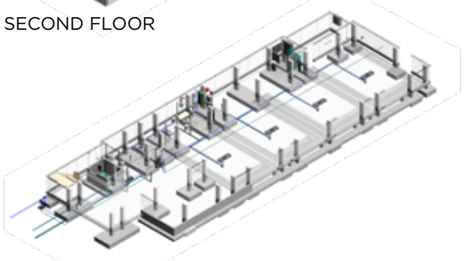
MECHANICAL SYSTEMS



CEILING/ROOF SYSTEMS



SECOND FLOOR



GROUND FLOOR

Solar canopy also acts as a rooftop shelter for informal meetings and reviewing of building innovations being monitored on the roof.

Net-Positive Energy, a model high-performance building

In keeping with WM+P founder William McDonough's vision for Carbon Positive behaviors and buildings contributing to a Circular Carbon Economy, Co|Lab was designed to generate more energy than it consumes and is anticipated to earn Zero Energy Certification once one year of performance data is collected and analyzed.

Intelligent tracking of consumption and on-site power generation is displayed on lobby dashboard

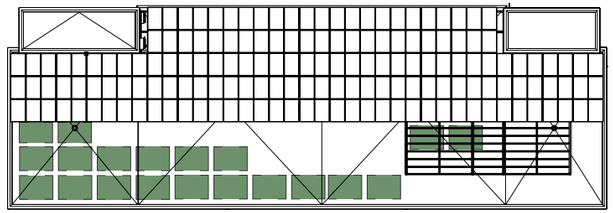
Safe and healthy materials in a collaborative, flexible workplace

By prioritizing material and human health through the specification of Cradle to Cradle Certified™, Health Product Declaration, Forest Stewardship Council and Declare products, Co|Lab aims to bring HITT clients and collaborators together in abundantly daylit, flexible meeting and conference spaces which overlook the double-height lab workspace.

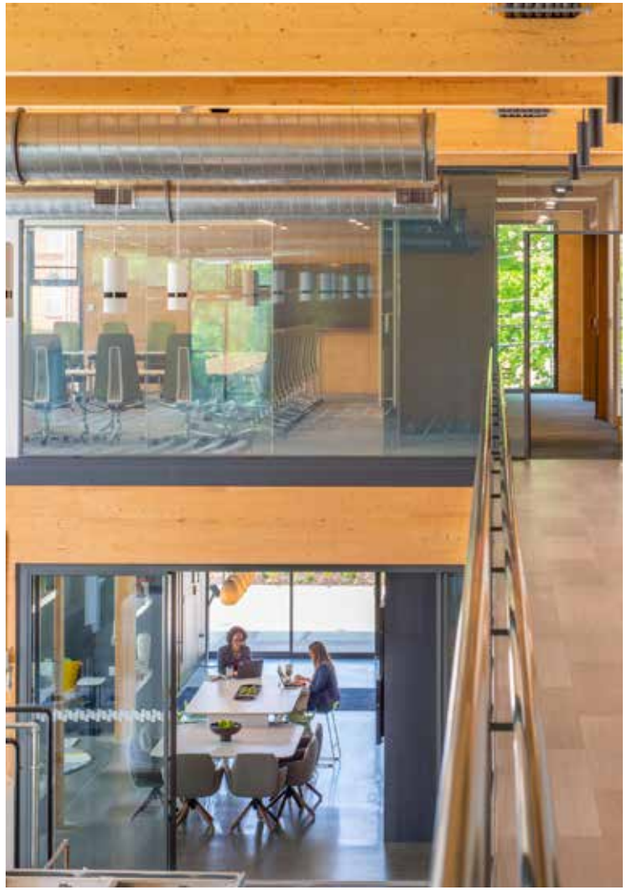
First commercial test installation of Shaw Industries' PET Resilient Flooring

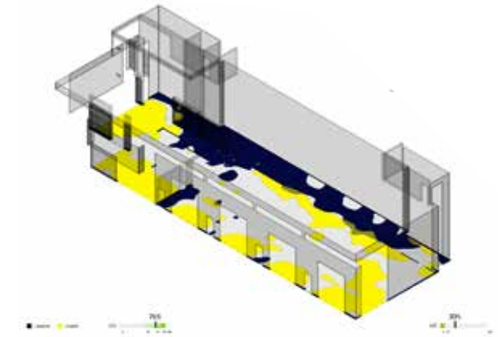
Estimated 13,600 recycled bottles were used to make the product

Building operates as a **Living Lab** where living systems are maximized, monitored and tested.

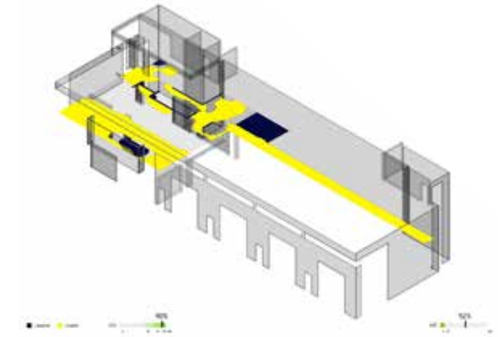


ROOF DESIGNED TO HOLD TEST BEDS FOR GREEN ROOF SYSTEMS





DAYLIGHTING ANALYSIS - GROUND FLOOR



DAYLIGHTING ANALYSIS - SECOND FLOOR

Co|Lab brings clients and collaborators together in **abundantly daylit, flexible meeting and conference spaces** which overlook the double-height lab workspace.

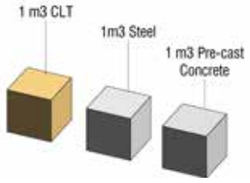
Going beyond zero carbon and toward **carbon positive**

Using Revit and Tally plugin, the team modeled the wood frame and two alternates (one with a steel frame and CLT decks and walls and one with a full steel and concrete structure). **The all wood system was validated as the most environmentally friendly system of the three.**

ALL HOLZ BUILD

'Cradle to Gate' Global Warming potential from Tally®

*Carbon uptake during growth of wood -764.65 kgCO2eq per 1 m^3



Wood Mass = 177 t
Total Mass = 177 t

184.5 mtCO2eq + **275.97 mtCO2eq** = **+91.47 mtCO2eq**

HYBRID HOLZ + STEEL

Wood Mass = 114 t
Steel Mass = 57 t
Total Mass = 171 t

178.7 mtCO2eq + **177.74 mtCO2eq** = **+0.95 mtCO2eq**

STEEL + CONCRETE

Wood Mass = 0 t
Steel Mass = 65.9 t
Conc. Mass = 419.2 t
Total Mass = 488 t

184.5 mtCO2eq + **4.5 mtCO2eq** = **-179.5 mtCO2eq**

Legend

Net value (impacts + credits)

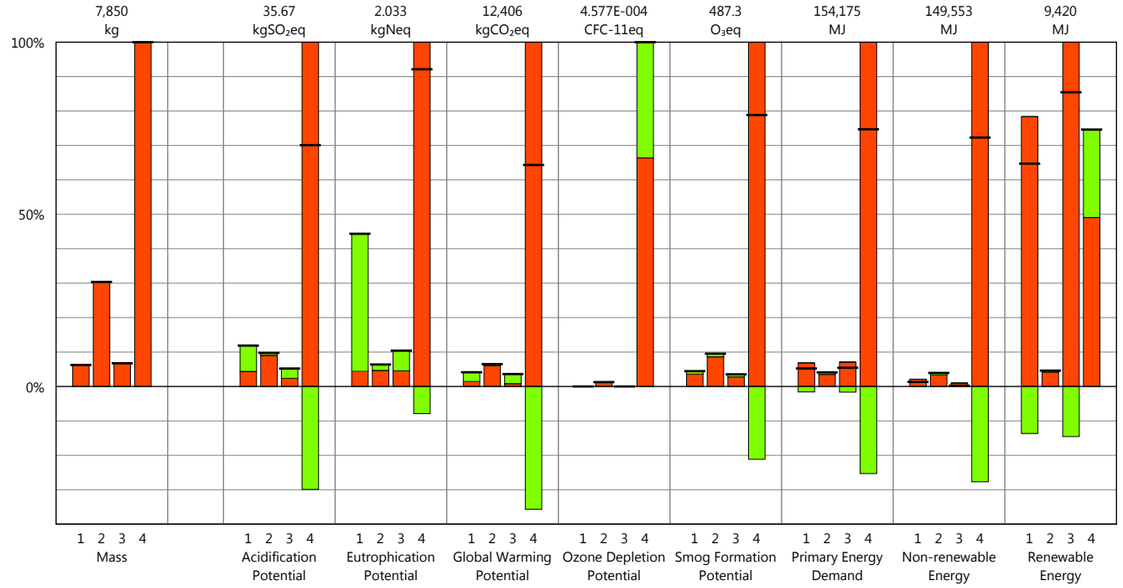
Design Options

Option 1 - CLT (primary)
Option 2 - CONCRETE
Option 3 - SOLID TIMBER
Option 4 - STEEL

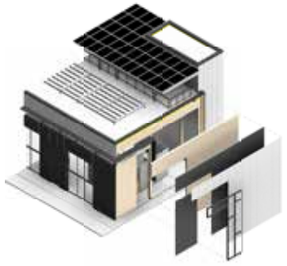
Life Cycle Stages

Manufacturing
Maintenance and Replacement
End of Life

Results per Life Cycle Stage



High-performance concrete rainscreen façade allows exterior areas to be disassembled and repaired without affecting interior spaces



Six seed projects at Co|Lab range widely in topic and include new technology for water intrusion, methods for biocontainment in healthcare, low-voltage lighting and a material study for self-growing brick.

Co|Lab is a collaborative space bringing together the architecture, engineering and construction community to incubate innovative solutions to today's complex building challenges. The building illustrates the true potential for the built environment to embrace new materials, adopt non-traditional approaches, and test cutting-edge technology.

WILLIAM McDONOUGH + PARTNERS

William McDonough + Partners is a design firm that executes a diverse international array of projects from our studio in Charlottesville, Virginia. We are architects, planners and leaders in sustainable design. We practice a positive, principled design approach that draws inspiration from living systems and processes. At its heart, this unique approach celebrates the abundance of nature.

We serve as design team leaders, working on a wide array of projects and building types. We add unique value by integrating rigorous analysis and design synthesis. Our product, building and community designs each embody enduring standards of design quality and economic, ecological and social responsibility.

Fundamental to our approach is an emphasis on the Cradle to Cradle® thinking developed by William McDonough and Michael Braungart in their 2002 book, *Cradle to Cradle: Remaking the Way We Make Things* (North Point Press). It refocuses product development from a process aimed at limiting end-of-pipe liabilities to one geared to creating safe, healthy, high-quality products right from the start.

William McDonough + Partners
Architecture and Community Design

+1 434.979.1111
www.mcdonoughpartners.com