

SE 2050

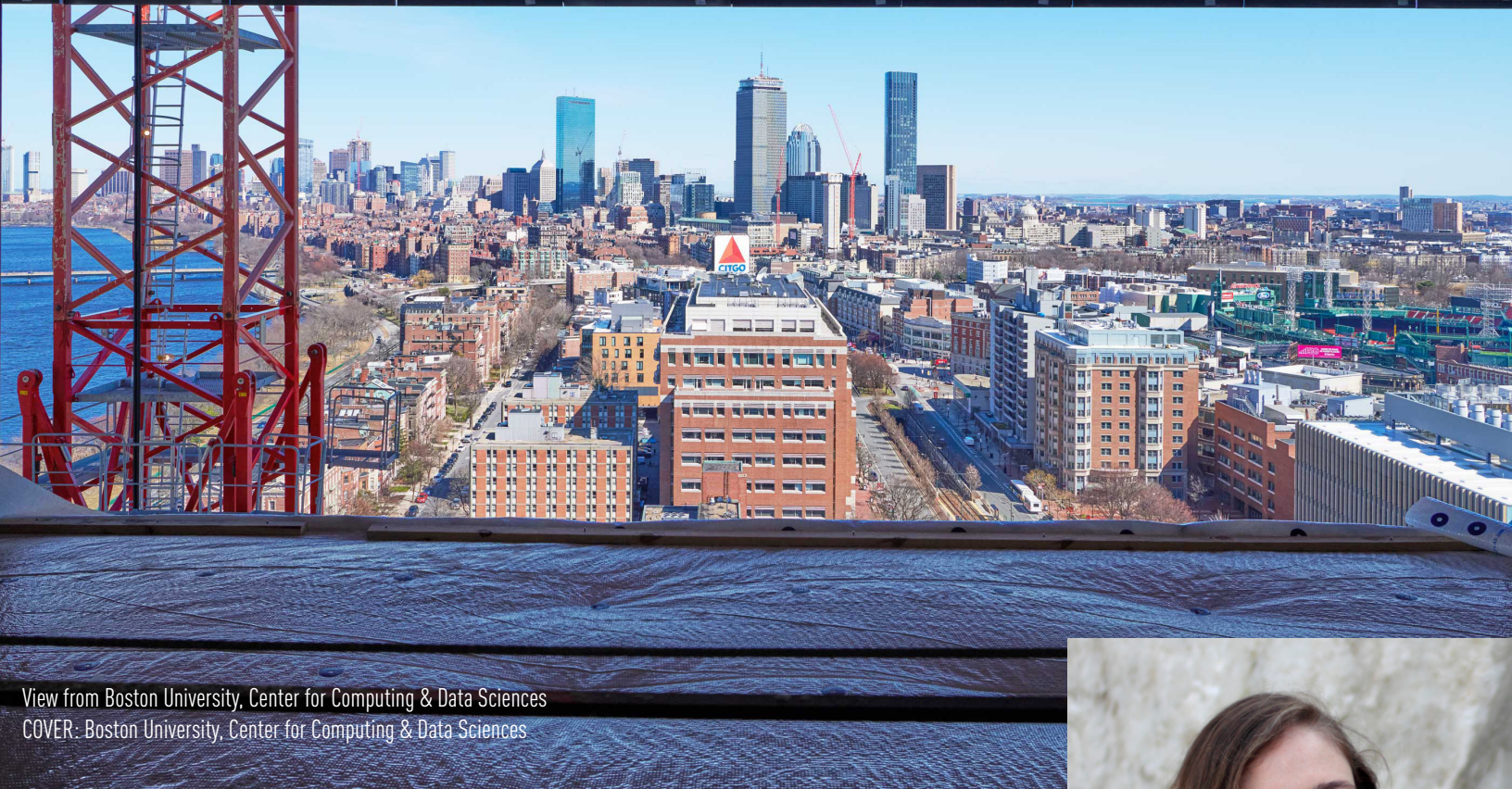
EMBODIED CARBON ACTION PLAN

LeMessurier



2024

INTRODUCTION



View from Boston University, Center for Computing & Data Sciences
COVER: Boston University, Center for Computing & Data Sciences

Every project needs a sustainability champion.
At LeMessurier, we believe every team member should be that sustainability champion.



Suzanne Robinson, P.E., LEED AP
Director of Sustainability

A holistic approach to sustainable construction in today's world will require a new level of participation and expertise from the structural engineer. Our approach to embodied carbon reduction at LeMessurier is to equip all our engineers to be sustainable design leaders. Our Director of Sustainability, Suzanne Robinson, acts as our embodied carbon champion. She works behind the scenes to integrate sustainability into the engineer's daily practice.

At LeMessurier, our approach is to find solutions. We go beyond analysis and developing designs with less material. We work with the project design and construction teams, local suppliers, and manufacturers to remove obstacles and change what is considered "business as usual".

EDUCATION

Engineers that speak the language of sustainability.

At LeMessurier, education is a critical step towards our goal of having every engineer speak the language of sustainability. Going beyond answering questions to evaluating design and material options to proposing ideas, engineers are at the forefront of integrating embodied carbon reduction strategies throughout the project. The following are core education approaches carried out throughout the company reaching all engineers.

INTERNAL CONTINUING EDUCATION SESSIONS.

We have integrated sustainability sessions into our weekly continuing education and lunch & learns for the entire company. Building on the six-part embodied carbon series we provided in 2022 for all staff, topics in 2023 included:

- + Early Analysis Tool for Embodied Carbon
- + SE 2050 Reporting Process & Results
- + Updated Concrete and Steel Specs

For 2024, we are expanding our sessions to include subject matter experts in the industry to come speak on cutting-edge sustainability topics.

ANNUAL SUSTAINABILITY STATE OF THE UNION. Starting in 2022, we've provided an internal presentation that takes a look back at what we've accomplished, a look forward at our sustainability goals for the year and how they fit into our SE 2050 Commitment and long term goals to integrate sustainability into our daily practice and projects. We also take a look at new sustainability topics and upcoming policy that is on the horizon.

SUSTAINABILITY WIKI. We have set up a sustainability section in our internal wiki that is continuously added to and curated. It includes resources, presentations/recordings, analysis tools, and posts. Highlights include:

- + Did You Know Series – aims to present the most critical information around embodied carbon in bite size chunks so that engineers can speak confidently with the project team and client.
- + 12 Days of Sustainability – a year-end refresher with a new post each day leading up to Christmas in 2023

ENGAGE WITH SUSTAINABILITY GROUPS. We are active in national and regional organizations that work towards market transformations:

- + Carbon Leadership Forum
- + SE 2050
- + CLF Boston/New England Hub
- + CLF Boston Low-Carbon Concrete Group
- + CLF Boston/New England Reuse Subcommittee
- + Built Environment Plus Carbon & Energy Roundtable
- + Northeast Bio-Based Materials Collective



Norwell Public Library, Norwell MA

Net zero carbon requires a holistic approach to sustainable construction.

As we work towards the SE 2050 Challenge of eliminating embodied carbon on our projects by 2050, we recognize we will not achieve this goal without collaboration with others in the AEC industry and suppliers. Our goal this year is to collaborate with adjacent professions that affect this goal which include: architects, MEP engineers, contractors, sub-contractors, suppliers, manufacturers, and owners.

Reduction strategies from 2023 include:

- + **Updated Specification.** We incorporated embodied carbon performance in our latest version of specifications. Our concrete specifications are performance based.
- + **Updated Revit Modeling Standards.** We have updated our Revit project standards to make performing LCAs using Tally more efficient and accurate.
- + **Decarbonizing Concrete Workshop.** We participated in a year-long stakeholder engagement process, identifying roadblocks and proposing strategies for market transformation. BSA/CLF Boston/Northeast Hub.
- + **Material Reuse.** Last year we had the opportunity to propose reusing salvaged steel members from the building being demolished on the project site. We incorporated the salvaged steel in our design for pricing.

Ongoing reduction strategies include:

- + **Early-Stage Analysis.** We continue to evaluate embodied carbon alongside different design options at the start of a project, exploring different structural framing and material options.
- + **Green Building Certification.** We participate in numerous LEED and ILFI Core project design charrettes and suggest embodied carbon reduction strategies.
- + **Low-Carbon Concrete Tech Review Group.** An internal initiative started in 2023 that researches new to market products that contribute to low-carbon concrete. Looking at strategies that reduce, readjust, reformulate and innovate concrete production that has scalability potential.
- + **Mass Timber.** We consistently use mass timber on projects and are exploring mass timber on more projects each year.
- + **Wood Innovation Grant.** A multi-year project funded by the USFS, "Advancing Mass Timber as a Climate Solution in Three U.S. Cities to Scale up its Use and Encourage Long-Term Investment in New Domestic Manufacturing". Partnering with Olifant, local AIA chapters and structural engineers, SCB Architects, Turner Construction, Woodworks, and Carbon Leadership Forum (CLF).

Learn more: <https://www.architects.org/mass-timber-in-3-regions>

KNOWLEDGE SHARING



CSI January 2024 Presentation
DRIVING DOWN CARBON IN CONCRETE

Concrete accounts for approximately 8%-11% of annual global carbon emissions. It is a material too important to ignore. Learn how BU's Center for Computing and Data Science applied low-carbon concrete goals and selected structural elements to reach the highest Portland replacement concrete in Boston to date. See how opportunities in design, construction and supply chain were used to substantially decrease the climate impact of concrete used. Then discover national and local low carbon material initiatives that are underway and growing. Find out how you can participate in moving policy forward to bring low carbon concrete to scale in the Northeast.

Rachelle An, AIA, CIVIC, WELL AP Associate 100k
Chris Humphrey, LEED AP BD+C Designer Payetteff
Nathan Roy, Principal LeMessurier

Wednesday - January 10, 2024
4:30pm - 7:00pm
UMass Club
One Beacon Street - Boston
Hybrid Presentation
5:20 - 7:00PM
Registration is Open!

CSI BOSTON CHAPTER

DRIVING DOWN CARBON IN CONCRETE: FROM ONE PROJECT TO THE MAINSTREAM

The Boston University Center for Computing & Data Science is being touted as the "Climate Change Project of the Year" and is redefining sustainability. We've developed a presentation that shares how we applied low-carbon concrete goals and selected structural elements to reach the highest Portland cement replacement concrete in Boston to date on the project. We share how opportunities in design, construction and supply chain were used to substantially decrease the climate impact of concrete used. We co-present with chairs of CLF Boston/New England hub at industry events including Northeast Sustainable Energy Association (2023) and CSI Boston Chapter (2024). We've also presented the topic to owners, contractors and architectural firms.

"Who are the individuals who will support this effort the most and help maintain the much-needed momentum throughout the entire process? Stick with them."

- Owner



Boston University, Center for Computing & Data Sciences

REPORTING

Engineers that perform the LCA on their project themselves.

Measuring the embodied carbon on projects is the first step to meeting the SE 2050 Commitment goals of embodied carbon reduction. LeMessurier uses the SE 2050 project reporting for two purposes:

EMBODIED CARBON DATABASE. As an industry we have very little project data for structural embodied carbon which is needed to set benchmarks. We are committed to contributing alongside other firms to the SE 2050 database. Each year, LeMessurier is committed to submitting at least five projects to the SE 2050 Database.


LCA TRAINING. Our goal is to have every engineer be proficient in performing LCA on our projects. We believe that the professional performing the design should perform the analysis so they have a direct feedback loop in understanding the impact of design decisions on embodied carbon emissions. As part of the SE 2050 reporting, each cycle of reporting we have a new group of engineers perform a Life Cycle Assessment (LCA) on a current project.

To inform concept/schematic design decisions we use an early-stage analysis tool we developed in-house (A1-A3 scope) and are exploring other tools shared by our peers. For our projects that have a developed Revit model, we use Tally which is a software tool that performs a full building LCA (A-D scope). We have included EPD requests in our specifications.

We target two cycles of SE 2050 reporting and training each year, with a new group of engineers who contribute and build upon our best practices. We have developed the following resources/processes:

- + **INTRO TO TALLY TRAINING.** Following Seneca's observation, "when we teach, we learn", each cycle of reporting, an engineer from the previous cycle provides a demonstration of Tally and the process of performing an LCA, sharing their main takeaways.
- + **TALLY BEST PRACTICES.** We have developed a resource to provide guidance and best practices when using Tally. Each cycle of reporting, we add new information from our lessons learned.
- + **PROJECT STANDARDS.** We have updated our Revit project standards to make performing LCAs using Tally more efficient and accurate.
- + **EXPERIMENTS.** We have had two engineers working on the same project, perform LCAs in parallel and then compare results. We explore the differences and add the discoveries to our best practices.
- + **BUILDING OUR UNDERSTANDING/INTUITION.** After each cycle of LCAs, as a group, we review the results of the projects compared to the current SE 2050 database and discuss what parts of the design contributed to an increase or decrease in embodied carbon. We present our findings to the firm (SE 2050 Reporting Process & Results).





Reaching beyond any single project, making meaningful contributions to our profession and continuing our growth as a team is central to our mission. We build upon the creativity, expertise, and initiative of individual team members past and present.



We recognize that meeting the climate goals of different institutions, companies, and professional organizations, including SE 2050, requires dialogue, collaboration and information sharing. We continually educate the owners, AEC community, and students about what the SE 2050 Commitment is and the significance of structural engineering in finding solutions for climate change. We pridefully share we are a member of the SE 2050 Commitment on our website.

“All structural engineers shall understand, reduce and ultimately eliminate embodied carbon in their projects by 2050.”

- SE 2050 CHALLENGE



Brookline High School Expansion, Brookline MA

PARTNERING FOR CHANGE

We welcome the opportunity to collaborate with colleagues beyond the work of a single project. Last year many of our engineers participated in presentations on the topic of embodied carbon at industry conferences and workshops along side colleagues from other firms. The following is a sampling from 2023:

- + Carbon in the Built Environment Microcredential
Suzanne Robinson (LeM), Elaine Hoffman (Goody Clancy), Patrick Murphy (Vanderweil)
- + Driving Down Carbon in Concrete
Nate Roy (LeM), Olivia Humphrey (Payette), Rachele Ain (Utile)
- + The Climate Science of Resiliency & Sustainability for the Built Environment
Emma Sauerwein (LeM), Torey Brooks (EPA), Nathalie Beauvais (HDR)
- + Whole Project Decarbonization, Exploring the Role of Designers & Builders in the Decarbonization of the Built Environment
Suzanne Robinson (LeM), Patrick Murphy (Vanderweil)

The Boston Society of Architects interviewed Suzanne Robinson to learn how some of these workshops help architects stay on top of the latest industry advancements. Visit: www.architects.org/news/bsa-summer-ce-workshops-return

Sustainability in University Curriculum Initiative

INCORPORATE EMBODIED CARBON INTO REQUIRED COURSES, NOT JUST ELECTIVES

We started an initiative in 2022 with the young engineers at LeMessurier, to advocate the acceleration of teaching embodied carbon in the core curriculum for structural engineering at their alma maters.

The engineers recognize the gap they had in their education when it came to the subject of sustainability and structural engineering. Over the years, sustainability in the built environment has moved from optional to mandatory by local, state and federal regulations to address climate change. And yet recent grads of structural engineering are behind compared to their peers in other fields of the AEC industry.

We have had some amazing conversations with universities and are working with them to help update their curriculum and syllabuses to introduce the topic of embodied carbon throughout their core curriculum and capstones.

One take away from this initiative is how powerful the voice of recent graduates are. Many of the professors and department chairs we have reached out to are particularly interested to hear from their recent graduates and are very receptive about ways they can improve their classes and programs.

The engineers have presented on embodied carbon to raise awareness in various formats from guest lecturer, conference speaker, to career day guest at the following institutions in 2023 and early 2024:

- + Northeastern University
- + University of Vermont
- + University of New Hampshire
- + Penn State University
- + Beverly High School + Middle School

We look forward to our 2024 hires joining this initiative and expanding our work to more universities and colleges.

“Sustainability is talked about but never taught fully. Why are we still only learning the old way to do things and not pushing towards future solutions?”

**- Student at Penn State University,
Carbon in the Built Environment Microcredential**



Linh Nguyen, EIT
Designer
University of Vermont



Emma Sauerwein
Designer
University of New Hampshire



Nathan Nickerson
Designer
University of Rochester
Northeastern University



Jiarong Chen
Designer
Chongqing University, China
Northeastern University



Hugh Calice
Designer
University of Massachusetts
Lowell



Gabriel Cutrone
Designer
Northeastern University



Natasha Mundis, EIT
Consultant
Northeastern University

LESSONS LEARNED



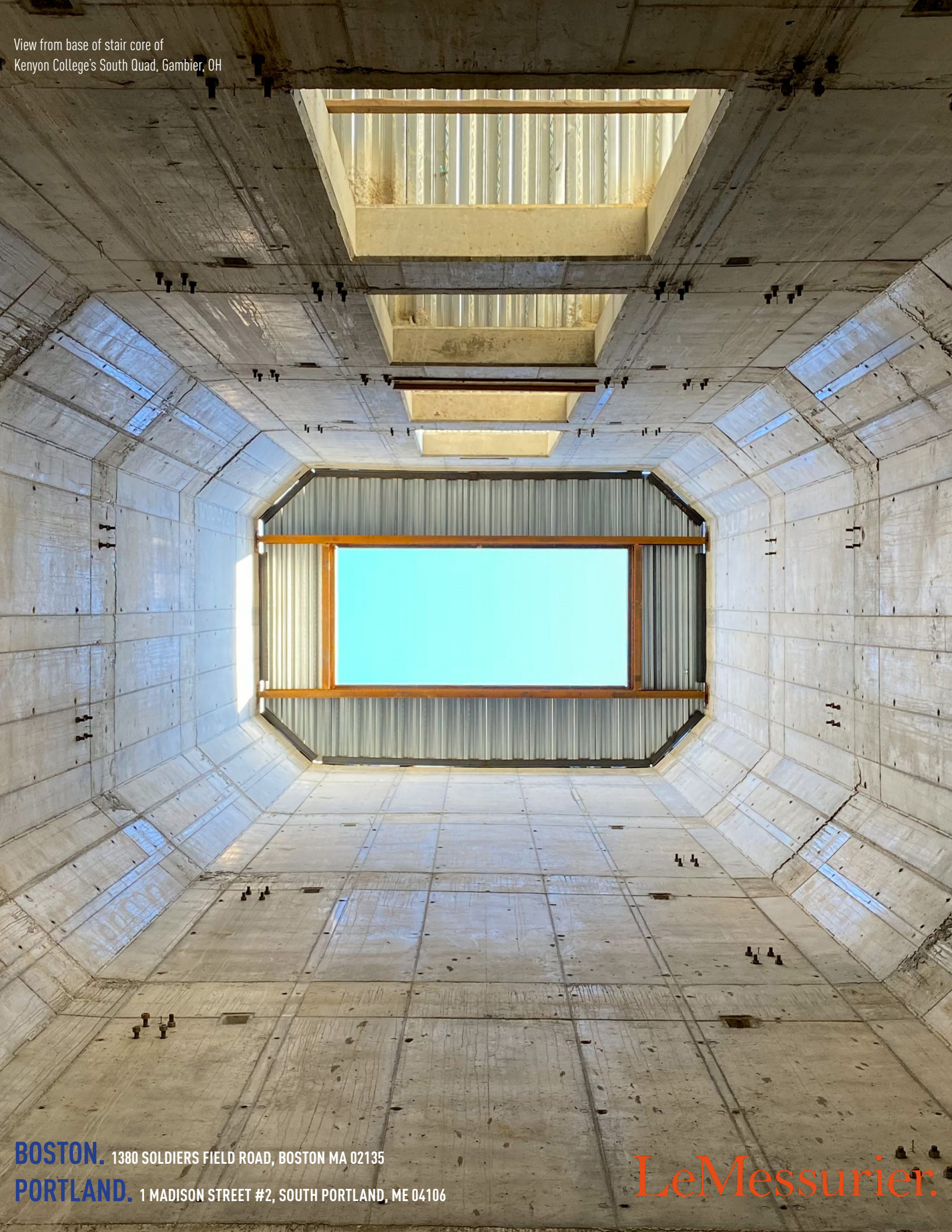
Historic preservation of the Gropius building at
8 Story Street, Cambridge MA

Complex problems inspire ingenious solutions.

As engineers we appreciate a good challenge. At LeMessurier, we foster a culture of collaboration and as a result have a long legacy of innovation. As we work towards meeting the SE 2050 Challenge, it is even more vital to expand collaboration to all players of the AEC industry.

- + **Learning a New Language.** As structural engineers learn the language of sustainability, there are new concepts, terminology and products. We've found the most effective approach is repetition of information in different formats and finding active ways to apply the new knowledge.
- + **Early EPD Requests.** Due to the nature of project schedules, specifying EPDs is not enough. For example, suppliers don't always have the EPDs for the low-carbon concrete mixes on file and there isn't enough time prior to concrete placement for the proper testing. Reaching out to the regional suppliers early (before they are on the team) helps the success rate of building with low-carbon concrete and provides a signal boost to the industry. Early engagement is critical.
- + **Maximizing BIM Workflows.** There is a gap in conventional modeling practices and what is needed for LCAs. Spending time up front on better Revit modeling best practices improves efficiency and in turn allows more time for further analysis on projects to inform design.
- + **Functional Equivalency Beyond Borders.** When we evaluate different material options, we need to recognize functional equivalency may go beyond our scope of the structure. For example, with mass timber, the acoustic performance of the floor needs to be taken into account when making comparisons with a concrete or steel structure.
- + **Support Organizations Accelerating Transformation.** We recognize that achieving the SE 2050 Challenge relies on the work that goes beyond individual companies. We financially support our local sustainability organization, Built Environment Plus (BE+) and nationally, Carbon Leadership Forum (CLF).

View from base of stair core of
Kenyon College's South Quad, Gambier, OH



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LeMessurier.