



FOOTPRINT: CARBON AND DESIGN

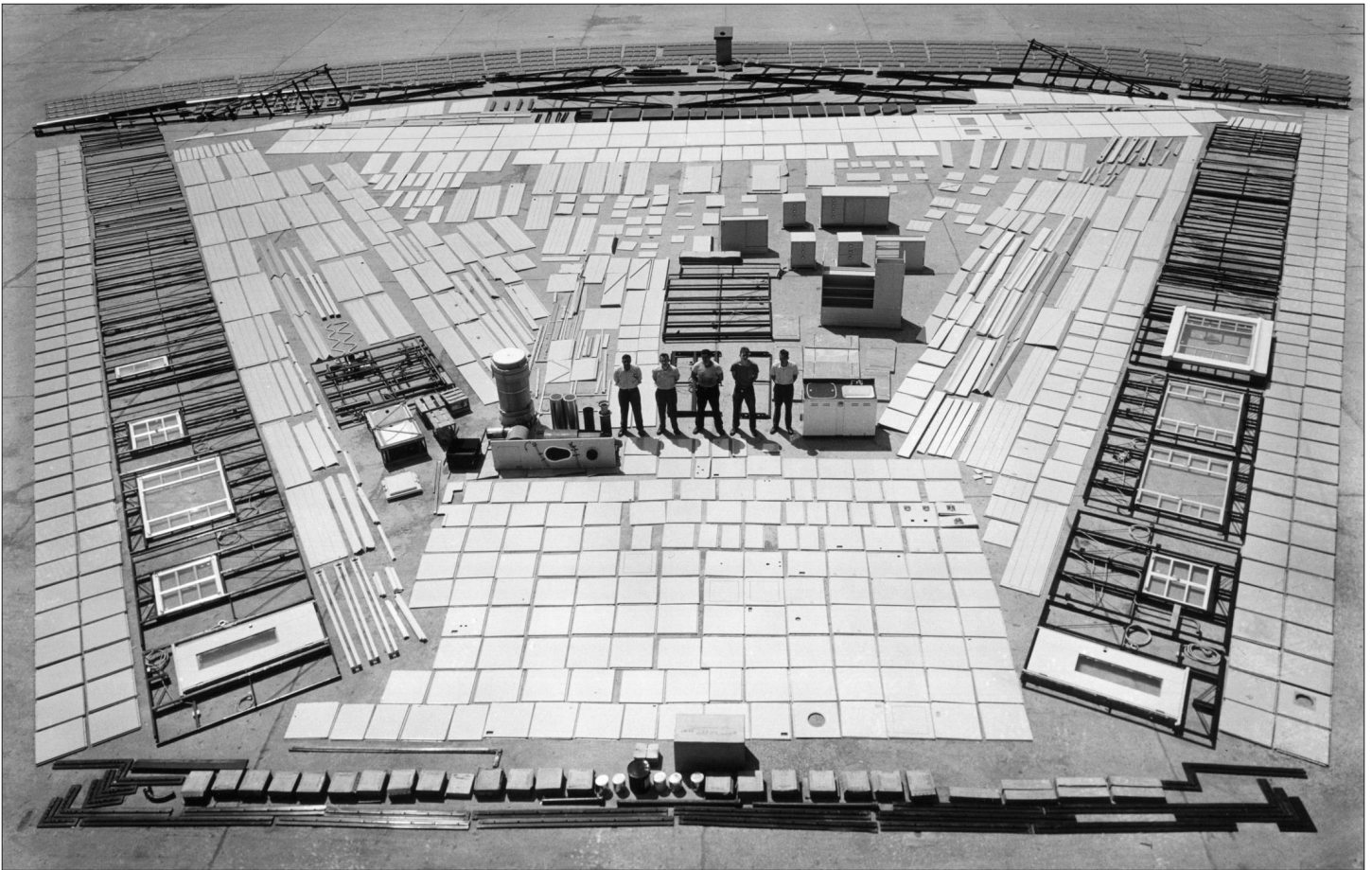
A seminar and workshop in association with **Architecture 2030** and the **Climate Smart Materials Palette**

Instructor: **David Benjamin**

OVERVIEW

In the context of the climate crisis, there has never been a more important moment to think clearly and critically about the footprint of architecture. Carbon footprint is the most famous—and most urgent—impact of buildings, but it is interconnected with other footprints such as energy, water, labor, fairness, and biodiversity. Each footprint links individual design decisions to global consequences. This seminar and workshop will conduct research into carbon accounting, examine the history and relationships between various systems of environmental measurement, invent new forms of visualizing the footprint of architecture, develop strategies for designing low-carbon architecture, and create material for potential inclusion in the Carbon Smart Materials Palette initiative by Architecture 2030.

Image: Timber structure with low carbon footprint at Taiyuan Botanical Garden (DMAA and StructureCraft).

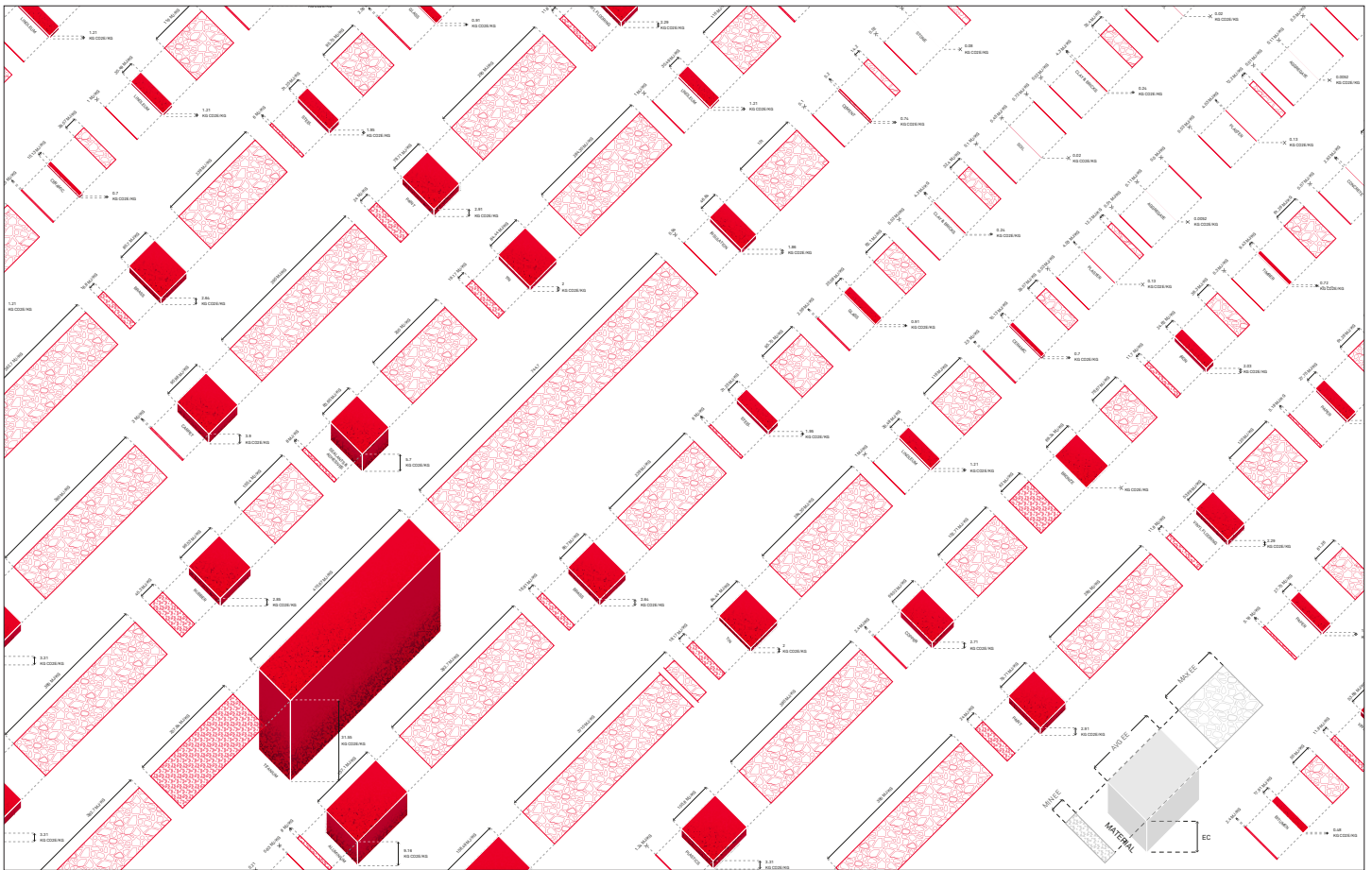


SEMINAR AND WORKSHOP

This course will explore carbon and design through the dual formats of seminar and workshop. The seminar format will involve a close study of the history of environmental measurement, and it will include guest presentations by leading figures on the topic of carbon footprint in architecture. Students will review case studies and engage in critical analysis of concepts and applications. They will gain experience measuring the carbon footprint of architecture, and at the same time they will explore the complexities of designing with this kind of metric. They will engage related issues such as labor, social equity, environmental justice, biodiversity, and species extinction. And they will develop a position about designing the footprint of architecture, rather than merely measuring it. Each student will select an individual topic, make a presentation to the class, and lead a group discussion.

The workshop format will involve hands-on design. Students will develop a project that involves designing in the context of architectural footprints. (Using a project from your design studio is encouraged.) Low-carbon strategies to be investigated may include material selection, lifecycle

Image: All of the parts that make up a prefabricated enameled steel Luston House.



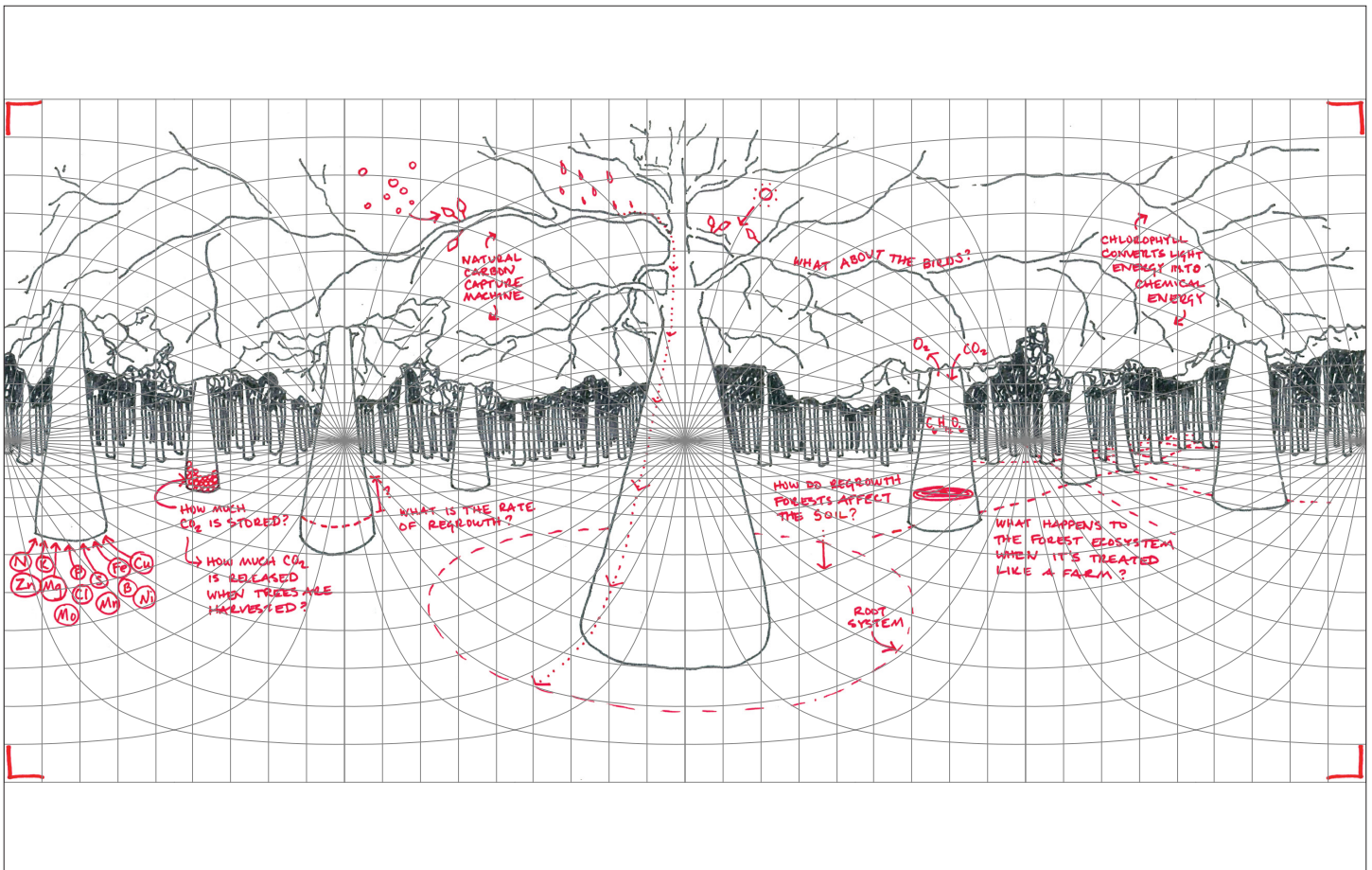
analysis, building codes and government regulation, alternative business models, renovation and adaptive reuse, and design for disassembly. Students may work individually or in small teams and they may use a variety of media, including data analysis, metric drawings, 360 renderings, virtual reality, augmented reality, hand drawings, physical models, and videos. Students will also work collaboratively to develop materials for external exhibition.

EXHIBITION

Students in this class may have the opportunity to create drawings for inclusion in the Carbon Smart Materials Palette. They will build off of and reinvent the work of previous GSAPP students who created footprint-related exhibits for the New Museum, Greenbuild, the Shanghai Biennale, and the Museum of Modern Art.

Architect Ed Mazria and his organization Architecture 2030 first identified the large role that architecture plays in carbon emissions and climate change in the early 2000s. Since then, many in the architecture and construction industries have come to recognize that buildings contribute about

Image: Visualization of embodied energy in building materials (Accurat and Embodied Energy Pilot Project at GSAPP).



40% of global emissions. And while Mazria points out that the United States is starting to see a decoupling of total floor area and total operation carbon (floor area has increased by about 20% in the past 15 years while operational carbon emissions have decreased by about 30%), it is clear that embodied carbon continues to increase. With this in mind, Architecture 2030 has launched the Carbon Smart Materials Palette to help architects navigate a wide range of material choices and decide on the best low-carbon ones. Students in the class will study materials, conduct research on footprints, and create material for potential inclusion in the Materials Palette, which in turn will play a role in influencing a large community of architects and a large number of built projects.

Over the course of the semester, students will experiment with new design strategies and engage in a broader, high-profile discourse about climate change and the footprint of architecture.

Image: Site sketch and x-ray visualization sustainable regrowth forest (Lindsey Wikstrom, Embodied Energy Pilot Project at GSAPP).