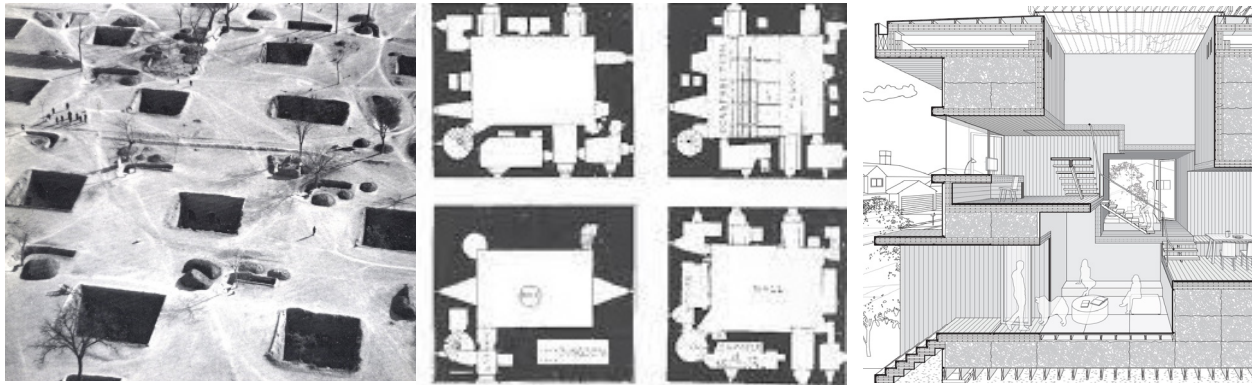


Instructor: Marc Tsurumaki

Meeting Times: Monday and Thursday, 1:30 PM – 6:30 PM, 600 + 700 Avery
(Lectures Wednesday 1:30 PM - 3:30PM, dates TBD))



Mass Effects

Reinhabiting Thickness: Biogenic Materials and Spaces of Refuge in an Age of Radical Uncertainty

Introduction

It could be argued that a dominant trajectory within western architecture has been the impulse toward attenuation: the progressive thinning of our building skins and constructional envelopes. The most obvious evidence of this tendency is the ostensible progression from the massiveness of load bearing masonry to the transparency of the modernist curtain wall. The masonry wall synthesized structure and enclosure into a single monolithic thickness that negotiated between exterior form and interior space, often taking advantage of the inherent expansiveness of the boundary as a programmatically activated depth: witness the varying morphologies of so-called poche with its involutions, interstices and intricate interiorities. As constructional logics shifted to take advantage of the structural capacities of wrought iron and steel, the skins of buildings became both pulled apart and thinned out, while sometimes retaining the solid appearance of an increasingly superficial stone carapace. Thinner and thinner layers of multiple membranes replaced the singular thickness of the mass wall, resulting in complex laminations of monofunctional elements derived from increasingly synthetic sources. With the advent of the modernist curtain wall the line between inside and out was reduced to a single plane of glazing: the apotheosis of steel and glass construction where less was more and visual transparency became equated with intellectual and aesthetic clarity. Moreover, visual lightness was often conflated with actual weight, such that Buckminster Fuller could ask ‘how much does your building weigh?’ with the conviction of moral authority.

Today, it has become clear that there is indeed such a thing as too thin. The attenuation of architecture came at the price of exponential increases in energy consumption, the proliferation of mechanical space, and devastating climatic consequences. An array of technical systems required to compensate for the resulting environmental exposure colonized our buildings, replacing them with a kind of architectural dark matter. Materials like steel and glass, among the most carbon intensive to extract and produce, have had catastrophic impacts on landscapes, natural systems and human populations. The dominance of the curtain wall also ushered in an era of overexposure, where privacy and interiority were sacrificed on the altar of transparency. While a consideration of thermal performance and operational carbon has resulted in increasingly high performance envelopes and contemporary energy codes now mitigate the ubiquity of glass, this studio will examine a more basic question: *how can architectural thickness itself be leveraged to create new spatial, performative, programmatic, social and environmental benefits?*

This re-evaluation of architectural thickness will be driven from two interrelated directions:

On the one hand, we will consider the role of plant and earth-based materials, their relation to embodied carbon, thermal and structural performance, constructional logics and spatial invention. A potential implication of these biogenic material systems, one we will seek to exploit, is the return to monolithic mass. In these systems, thickness absorbs and mitigates heat, provides bearing capacity, and generates multivalent environmental effects, providing structure and skin, insulation and enclosure. This same thickness generates underexploited morphological, programmatic and tectonic potentials- providing the possibility for a spectrum of occupations, porosities, liminal spaces and nested interiorities. Eschewing nostalgia in favor of imaginative speculation, we will ask how the material logics of biogenic systems can catalyze a renewed engagement with architectural thickness, challenging normative modes of construction and fundamentally reordering the correlations between mass and spatial form, tectonics and embodied perception.

On the other hand, we will examine the contemporary desire for spaces of refuge; addressing the need for psychological security, physical safety, voluntary seclusion, and collective and individual privacy in a culture of continual overexposure, informational overload, and physical and political precarity. Engaging a range of programs and spatial typologies, the studio will deploy questions of architectural thickness to interrogate notions of shelter, retreat and interiority for an age of anxiety and indeterminacy.

Embodied

As previously noted, the imperative for thinness and transparency resulted in exponential increases in energy use for the cooling and heating of buildings, helping to precipitate our current environmental crisis. Despite recent conservation efforts, the energy consumed by buildings continues to grow, increasing by 20% in just the first two decades of this century. The principle of attenuation also resulted in a secondary phenomenon, the multiplication of the layers that comprise the building skin, resulting in the proliferation of monofunctional membranes for waterproofing, vapor barriers, insulation and visual finish, frequently petroleum derivatives whose extraction, processing, and use compound environmental effects and negatively impact human health.

Given the existential urgency of the current global climate crisis, it has become clear that we must fundamentally alter how we build and what we build with. Whereas the architectural profession has focused primarily on reducing operational carbon: the energy required to heat, cool and maintain buildings, embodied energy, involved in processes of extraction, manufacture, transport, assembly and demolition related to buildings has been largely neglected. And yet, it is precisely embodied energy or carbon that is critical if the planet is to avoid the most catastrophic effects of global warming. Since the majority of embodied carbon is already expended or conserved at the time of construction, it represents the most direct path to achieving these changes in the urgent time spans available. In addition, embodied carbon is not distributed evenly throughout a building. The structure, foundation, and envelope accounts for upwards of 80% of the total carbon, due in part to our current reliance on concrete, steel, and aluminum. These three materials alone are responsible for 23% of global emissions due to both the chemical processes and energy required for their manufacture. Moreover, these processes lead to environmental degradation, which is distributed inequitably in an inverse relationship to economic and political power, reinforcing existing social and racial injustices. Therefore, to address the current ecological crisis, it is imperative that we rethink where our materials come from and where they go, extending our concerns beyond the limits of individual buildings to the larger network of social, environmental and economic relations in which they are enmeshed.

Plant-based materials, like wood, straw, bamboo, hemp and cork as well as minimally processed earth based materials present the most immediate alternative to these more consumptive and destructive ways of building. Biogenic materials that grow through photosynthesis sequester carbon dioxide in their cell structure, ensuring that carbon is captured and stored for the life of the building. Rather than participating in a linear process of extraction, processing, construction and demolition, accelerated by an economic imperative for disposability, plant-based materials can be incorporated into circular logics of organic cycles and material renewal (straw, for example, exploits waste generated through widespread agricultural processes and can contribute to the regrowth of new vegetation). Similarly, earth-based building processes, utilizing soil, loam, cob, or stone require minimal energetic and carbon inputs and degrade harmlessly if additives like concrete are avoided. Moreover, given their complex properties, plant-based biogenic materials often reduce the number of layers in an envelope to create elegant multivalent systems. Cork, straw, and hemp work as thermal-resistant layers: straw has the capacity to be the structure, cork can act as bearing, the water and air resistive barrier, and hemp can provide the suitable substrate for lime and clay plasters. Earthen walls act as structure, exterior sheathing, and water and air barriers. Cross-laminated timber (CLT) is not only the structure but can also be the air barrier; part of the insulation; and the interior surface and cladding. Rather than atomize performance, these material assemblies exhibit a kind of symbiosis, in which the whole is greater than the sum of the parts, implicating multiple functions within a single monolithic material mass, conflating waterproofing, insulation, structural capacity and finished surface in one. However, unlike traditional masonry or concrete, these organically derived masses are often light, relatively speaking, cheap, readily available and integrated into circular economies and organic processes.

If modernism was driven in part by the structural capacity of steel, glass and concrete, then a new approach to building can derive a similar impetus from these more ecologically beneficial materials. Engaging biogenic materials creates a plenitude of new potentials, shifting the relevance and meaning of terms like efficiency and optimization, structure and skin, reconfiguring constructional processes and eroding the stable logics of the architectural project from one of fixity and duration to one of continual transformation. It demands a radical reassessment of the trajectory of conventional building assemblies that promote lightweight, thin, single-performing, multiple layers to enact strict demarcation of the interior. Building on our forthcoming publication, *Manual of Biogenic House Sections*, this studio will argue for a messier, productive embrace of the sometimes heavy, thick, multi-valent, singular, and entropic.

Overexposed

Whereas questions of architectural thickness might appear to be confined to tectonic, material and performative concerns, they also intersect with the collective and individual desire for refuge in a time of multiple, intersecting crises. Given the confluence of a global pandemic and the threat of emergent diseases, violent political factionalism, border conflicts and forced migration, the erosion of privacies both legal and psychological, and the overarching existential threat of climate change, concepts like shelter, sanctuary, quarantine, and asylum are increasingly at the forefront of public consciousness. The spatial logics of shelter and retreat promise a bulwark against threats both real and perceived, whether from biological, physical, social, or environmental forces that would seem to characterize an increasingly inhospitable present. They also represent a resistance to the pervasive overexposure of our daily lives, voluntarily through social media and covertly through state sponsored surveillance and Big Data, that have rendered notions of interiority, personal privacy and individual political agency precarious. At the same time these architecturally derived concepts of retreat and sequestration have origins often tied to histories of violence and exclusion and therefore require interrogation rather than unconsidered acceptance. Nonetheless, the need for refuge takes many forms and a range of legitima-

cies – from spa to safe house, refugee center to clinic, selective community to school. While taking seriously the need for safety, respite, and interiority, each student will derive a programmatic trajectory informed by and simultaneously critical of these ideas, extrapolating how these terms might inform an architecture at the intersection of mass, material and performance, refuge and care. We will also consider how an engagement with uncertainty can be rendered productive, generating new interrelations between spatial invention and emergent forms of individual and collective subjectivity.

While thick and thin are relative rather than mutually exclusive, they represent useful terms for considering how we approach architecture today. What might it mean to recuperate mass and thickness for architecture when our daily lives are at once increasingly public and exposed and at the same time we retreat more and more into private, communal and institutional interiors as a sanctuary from a biologically, climatically, and socially hostile world? This is not to position thickness as a panacea for contemporary ills, but to argue that there are uses and advantages for an architecture of thickness as well as for thinness. To be thick-skinned is to be resistant to insult and injury, resilient to transformations in the environment. Thickness envelopes and contains, enfolds and secures, insulates and protects, conceals and reveals. Thickness expands thresholds, fosters shadows, facilitates nesting, and renders boundaries inhabitable. It suggests an architecture of subtraction, excavation and erosion rather than of addition though paradoxically based on processes like stacking, corbeling or piling up. Exploiting the benefits of thickness, this studio will seek to catalyze these very material conditions; assuming a range of interiorities and inhabitations and problematizing questions of served and servant, inside and outside, structure and skin, mass and void, exposure and protection. Working through both precise tectonic and material investigations as well as speculative explorations, we will re-imagine the potentials for an architecture of thickness in an age of radical uncertainty.