

EMPIRE, STATE & BUILDING.



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**INTRODUCTION:
THE PLOT OF THIS BOOK**

ATLAS & BLACKTOP

A pair of seemingly disparate films by Charles and Ray Eames provides some thematic context for the motivation and scope of this book. The 1976 film, *Atlas*, maps the geographic extents of the Roman Empire's rise and fall in 2 minutes and 30 seconds. The animated map is an index of geographic, political, topographic, material, climatic, and military entanglements that merge into undulating figures enclosed by shifting boundaries. Within these undulations, armies invaded, infrastructure extended into new territories, a Republic conceded to the hubris of emperors, and so on. This morphology is the visual evidence of the collective dynamics and conjugate causes of an empire.

The second film, *Blacktop*, made a quarter-century earlier in 1952, documents the soapy washing of a schoolyard play surface. Paired with the Goldberg Variations, the film delights in how soapy water moves across the micro-topography of an asphalt surface. Again and again, carefully captured frames highlight the liquid figures produced by this play between water and play yard surface. This morphology is the visual evidence of relatively minute dynamics, but no less conjugate causes.

What do these two films have in common? Does the rise and fall of an empire relate to the washing of a schoolyard? In the context of this book, they most certainly do. Both films index the flow of matter and energy across a territory, focused on the formations that result. The films' temporal and spatial scales vary, but the actions and behaviors they ultimately document are quite similar. On a simple but unavoidable level, the two films produce related figures on the screen, despite their disparate territories, durations, and dynamics.

To be more specific, the two films are related because each documents the various bonds and states of their respective systems. Whether your concern is the social and political bonds that yield the plot of an empire, or the ionic-covalent bonds that yield the transparency and rheological behaviors of water, the bonds of each system are fundamental to their figuration and morphology. These bonds and the contingencies of each system are what constitute all the compelling events and forms that we see in each film. They are the impetus for the appearance of these formations.

The formal figures that these systems tend to produce on a screen might be compelling in their own right, but knowledge of the dynamics that produce them enriches

our understanding of the forms and thereby makes them all the more beautiful and meaningful. The more contingent and specific we can be about the causal dynamics of the morphologies presented in each film, the more meaningful each morphology becomes. From the molecular to the territorial, bonds—whether social or covalent, or both—are the units of understanding for each morphology.

This understanding of bonds also provides insight into the various states of the two systems each film documents. Like bonds, states have several, simultaneous meanings that are important for architects to consider. Again, whether it is the relative economic and social well-being of an empire or the relative soapiness of the water as mixed with the roughness and slope of the asphalt surface, the state of the system conveys important knowledge of the system and its formations at any given time.

It is a fundamental premise of this book that architects do not yet fully understand building in terms of the bonds and states that are constitutive of building. They are trained to construe a building only as an isolated object-instance, rather than building as a set of linked, systemic processes of urbanization and civilization. As a result, they do not see that across a range of temporal and spatial scales, building is bonded to a range of factors and forces that extend well beyond any individual building and its plot of land. Furthermore, architects do not fully see the convection of material and energy across the surface of the earth, its assembly in a building for a limited duration, and the dissipation of that material back into the environment as constitutive of building and therefore of design. Neither do they see the magnitudes of energy and meaning inherent in these flows of matter. Architects do not yet see that buildings occupy temporal and spatial scales that span from the molecular to the territorial, from the instantaneous transfer of energy to flows of matter that are millions of years long. Architects do not yet comprehend that within these states and bonds, building has a designed velocity and momentum.

Bruno Latour and Alben Yaneva prod architects in this regard. “[W]e should finally be able to picture,” Latour and Yaneva argue, “a building as a moving modulator regulating different intensities of engagement, redirecting users’ attention, mixing and putting people together, concentrating flows of actors and distributing them so as to compose a productive force in time-space.”¹ Latour and Yaneva are astonished that ar-

chitects do not have the means—or interest—in methods of representing the complex dynamics associated with building, including all the territorial dynamics that presuppose building. “The problem with buildings,” Latour and Yaneva continue, “is that they look desperately static. It seems almost impossible to grasp them as movement, as flight, as a series of transformations. Everybody knows—especially architects, of course—that a building is a not a static object but a moving project.”²² Here they refer to a whole range of dynamic factors that co-determine the appearance of a building in the world, all of which beg for methods and tools of design that better and more completely envision the full engenderment of a building. Even now, architects use pre-Renaissance orthographic and perspectival techniques as a primary mode of representing what constitutes a building. This recidivism is a major epistemological limitation that should be directly challenged today. As Latour and Yanev observe,

“As long as we have not found a way to do for buildings the reverse of what Marey managed to do for the flights of birds and the gaits of horses, architectural theory will be a rather parasitical endeavor that adds historical, philosophical, stylistic, and semiotic ‘dimensions’ to a conception of buildings that has not moved an inch... Only by generating earthly accounts of buildings and design processes, tracing pluralities of concrete entities in the specific spaces and times of their co-existence, instead of referring to abstract theoretical frameworks outside architecture, will architectural theory become a relevant field for architects, for end users, for promoters, and for builders.”²³

The aim of this book is to develop one such earthly account of building, but also to provide some theoretical framework for doing so. The method is seemingly simple: account directly for the material and energetic appearance of buildings—not so much in the conventional “historical, philosophical, stylistic, and semiotic” analysis of their visual disposition, but rather the literal constitution of their becoming. This book aspires to provide an earthly, telluric account of how a succession of buildings appeared in Manhattan. Like the Eames films, it indexes the varied dynamics, bonds and states that are inherent to systems of varied spatial and temporal scales.

I believe this extended consideration of building can enrich our understanding of

the formal and ecological potential of building today. Equally important, however, is the latent magnificence of the bonds, states, and velocities inherent to building. These bonds, states, and velocities provide one non-trivial way to better understand architecture in the twenty-first century and what it might achieve. As but one response to the observations of Latour and Yanev, the movements and momentum of building, rather than its temporary stasis, is the focus of this book.

MATERIALISM OF THE INCORPOREAL

As another philosopher, Brian Massumi, observes, “far from regaining a concreteness, to think the body in movement thus means accepting the paradox that there is an incorporeal dimension *of the body*. Of it, but not it. Real, material, but incorporeal.”²⁴ Architects, again, have traditionally focused on the materialism of the body of the seemingly static building, a corporeal materialism. The materialism of the incorporeal that Massumi invokes has been systemically occluded from the discourse and practice of architecture. In my view, this occlusion also imposes significant epistemological limits on architects and this constrains our understanding of what constitutes the formation of architecture. Without a clear understanding of formation, how we will ever understand anything more about architecture’s perennial preoccupation with form?

To think about building in movement means accepting the “paradox” that there is an incorporeal dimension of building – real, material but incorporeal. This incorporeal dimension only appears paradoxical on account of the parochial manner in which architects have considered and designed building. This incorporeal dimension of building can and should recursively change how architects think about and design building. In nearly all cases, this incorporeal dimension of building reveals as much about the social, economic, ecological, and intellectual state of architecture as do the hardened edges of these incorporeal realms: the individual instances of specific object-buildings. This book focuses on this incorporeal dimension of building and their very real, corporeal effects.

In the process of building, materials and energy converge in one place for a finite duration and then are eventually redistributed back out into the world. Building is movement. But whence the vast quantities of matter and flux of energy that occurs before, during, and after a building’s more familiar and temporary “static” state? In

our collective efforts to build ostensibly static buildings, we continuously move matter and energy in time and space. This constitutes building's most fundamental but least considered incorporeal actualities.

MATERIAL GEOGRAPHY

Methodologically, a central but occluded part of a building's incorporeal materialism includes the material geographies, mass flows, and flow structures that presuppose the construction of a building. In short, materials come from somewhere, are processed somewhere else, and are transported here and there. But architects haven't a clue about this process of formation or its relative ecological significance. This cluelessness leads to gaping metabolic rifts in our conception of building. As such, the literal engenderment of building has become deeply de-politicized and architects are unaware of the political fetters associated with this profound oversight.

MATTER, MATERIAL, MATERIALITY, MATERIALISM

In their under-complex construal of building, architects have yet to acknowledge the incorporeal dimension of buildings: the imperceptibly small or imperceptibly large dynamics of matter. As such, architects have maintained a very limited conception of material in architecture. In place of a *materialist* model of the world, a discourse on *materiality* and, more recently, *smart materials* has focused on cultural and visual qualities of materials in static buildings, such as authenticity, tectonics, ambiance or "phenomenology."

The focus, in short, has been on materiality, not on the dynamics of matter itself on a range of scales. This disposition towards *materiality* rather *materialism* has occluded matters of theoretical and practical significance. Whether on scales that are imperceptibly small or imperceptibly large, architects have neglected multiple operative dynamics central to contemporary life, from the matter and energy dynamics of building, to larger scale patterns of urbanization. An explication of the incorporeal materialism of building is therefore a central focus of this book.

Perhaps more paradoxical than building's incorporeal materialism, ultimately, is its *corporeal energetics*. While architects habitually assume that energy is ephemeral and

freely moves while matter is decidedly fixed, upon even cursory analysis, assuming the inverse advances our understanding of the constitution of architecture. We must begin to grasp that in the process of building, matter moves while forms of energy and its associated practices become fixed and channelized. *Through building, matter moves and energy becomes fixed*. Whether it is the solar economy of the premodern world, the hydrocarbon economy of the modern world, or a more powerful hybrid of the two in coming nonmodern world, each period of building fixes certain energy practices and flows. This paradox of fixing in the energetics of building is another fundamental, yet unconsidered, actuality that remains abstract and unknown to architects.

Without an account of building's corporeal *and* incorporeal materialism, we will understand little about building itself. Without knowing the movements of building's mass flows, we will not know much about buildings as seemingly immovable objects. Without knowing the fixing of energy practices through building, we will not know much about buildings as energetic capture and channel devices.

All of this suggests that architects could radically expand the spatial and temporal definition of what constitutes building. This is the impetus of this book. This expansion would finally permit us to better imagine and reason what building actually is and, more importantly, what building can actually do through design; not just for architecture, but for urbanization as well.

URBANIZATION, TODAY

To this end, it is useful to understand more about some concepts related to urbanization today, especially as they help frame this book. In recent urban theory, the characterization of the urban and urbanization has evolved.⁵ This evolution, in geographer Neil Brenner's view, "cannot be understood adequately with reference to the formation of global cities or large-scale regions, but requires systemic consideration of the tendential, if uneven, operationalization of the entire planet—including terrestrial, subterranean, oceanic and atmospheric space—to serve an accelerating, intensifying process of urban industrial development."⁶ Urbanization in this context is best understood as a process or processes, operating at planetary scales. In other words, according to David Harvey, "the 'thing' we call a 'city' is the outcome of a 'process' that we call 'urbanization'."⁷

For the purposes of this book, it is important to grasp that the “thing” we call a “building” is the outcome of a “process” we call “building.” Therefore, what constitutes building extends far beyond any individual parcel and beyond any individual construction. In every way, building is not so much an autonomous object, but an accumulating center of manifold, contingent processes. We need enough irony as architects to recognize the contingencies inherent in building, and begin to address these incorporeal but real attachments.

The constitutive role of building, like the far-reaching processes and territories of urbanization, needs explicit consideration. We need to grasp the urbanizing process of building, not just in a “city” but in its most far-flung territories of becoming as well. According to Brenner, “a new understanding of urbanization is needed, which explicitly theorizes the evolving, mutually recursive relations between agglomeration processes and their operational landscape, including the forms of land-use intensification, logistical coordination, core-periphery polarization and sociopolitical struggle that accompany the latter at all spatial scales.”⁸

With this book, I aim to provide a very specific, yet emblematic, example of building in the context of urbanization in this sense. This example provides insight on the specific processes, magnitudes, and feedbacks of varied urbanization regimes. It also reveals what is lost when architects envision building as the production of autonomous objects rather than instances of particular, contingent urbanization processes. It is not that these processes should determine architecture but rather that the formation of building is inextricable from them. To consider building outside of these incorporeal but real dimensions of urbanization, again, imposes profound and unwarranted epistemological limitations on the constitution of architecture.

Henri Lefebvre was an urban intellectual who, in 1970, triggered much of this recent reconsideration of urbanization with the following observation: “society has been completely urbanized.”⁹ Lefebvre’s observations on several key processes of urbanization are essential to this book. For example, he noted “the urban phenomenon is made manifest as movement.”¹⁰ This echoes the previous statement that the phenomenon of building is made manifest through movement and *as* movement. The mass movement of material and energy is a central indicator of urbanization and is essential to my analysis.

Lefebvre also observed that the “urban consolidates.”¹¹ One of the most fundamental and persistent tendencies of urbanization, and building, patterns is the consolidation and convergence of matter, energy, information, and people. Whether considered from thermodynamic, ecological, or political perspectives, convergence is constitutive of building. Given its role in urbanization and ecology, I assert that convergence ought to be a central concern for design.¹² The reality is that large patterns of urbanization channel the formation of building and, in turn, building inflects patterns of urbanization. Without grasping this reciprocity, we limit our understanding of both building and urbanization. Given the magnitude of contemporary building collectively, it is preposterous to only grasp building as instances of discrete objects. *Building is, and has always been, a major actor in this process of urbanization.*

In other words, building is more than objects, and must also be understood in terms of its larger, collective processes. Likewise, “the city,” as geographer Christian Schmid understands it, “can no longer be grasped as an object, as a definable unity. It is instead a historical category that is breaking down in the process of urbanization. This shifts the focus of our interest to the analysis of a process of transformation and its inherent potential: the creation of an urban society.”¹³ The definition and constitution of a building must evolve to include the inverse architecture of its becoming and demise. This, in part, would account for a constitution of building suited for this century. Designers can and should consider far more than the appearance of a building in its most reductive, visual sense, especially when the literal appearance of a building is so contingent on incorporeal processes. This consideration is absolutely vital to understanding the constitution of building, architecture, and urbanization today. It is also absolutely essential to any claim about the current ecology of buildings.

URBAN, BOUNDARIES

To consider the urbanization of this century, it is instructive to look back to the etymological root of urbanization: *urbs*, or walled, bounded city. As the aforementioned geographers articulate, the urban is not isomorphic with the political jurisdiction or blurry spatial limits of any particular city. Urbanization processes extend far beyond our traditional notions of the city and its political boundaries, just as building processes

extended far beyond any particular parcel of land. Accordingly, this should alter how we understand the definition of what is urban and it should recursively alter what we understand the constitution of building to be.

In both cases, the Latin etymology of urbanization is central to this book. As with all boundaries, the placement of a boundary is second only to what is exchanged across the boundary. Construing a system boundary—whether thermodynamic, geographic, or disciplinary—is merely a method for discerning what exchanges can or perhaps should occur across the selected boundary. Boundaries allow us to see what is, and what is not, included in the purview of a project, discipline, or civilization. Boundaries are but alibi for discerning the myriad exchanges across that boundary. Boundaries tend to separate, but in doing so they tend only to make any connections more apparent and ready for discernment.

Boundaries, especially in thermodynamics, are not fixed like walls or the edges of property parcels, but are highly transient. They appear and disappear with the adjacent energy gradients that produce them. This transience underscores the temporal system boundaries for any system in consideration. What is exchanged across the limits of a parcel, city, state, or continent in the process of building is ultimately a more central thermodynamic question of the constitution of building than any concern for the heating, cooling, or illumination of a building would be in isolation.

So, the question of how the urban—and building—is bounded, and how those boundaries are defined, is of crucial importance to this book. At a certain point, initially disparate understandings of property, building enclosure, and the thermodynamic description of building all converge, and in doing so challenge many unquestioned assumptions about building and architecture.

Whether you consider the normative boundaries that separate parcels in a city and thus have traditionally bounded design projects, or those boundaries that have delimited academic and professional design disciplines, each boundary has externalized many important dynamics of urbanization. To this end, a focus on the evolving material and geographic culture of building as an urbanization process is also inherently a history of externalities. The extant historical narratives about building and architecture have few references to the material and energy systems that extend beyond these sites as objects

in a city. Therefore another aim of this book is to make the externalities of architecture, landscape architecture, and urbanism intrinsic to design.

As noted above, one simple and important boundary that is characteristic of this book is the physical, legal boundary of property. But in the most fundamental ways possible, this book openly questions our collective assumptions about the boundaries of parcels as well as projects, disciplines, and urbanization. The parochialism of the old boundaries and disciplinary separations are no longer adequate to understand building and urbanization in this century. Instead, we must devise new boundaries for what we consider urban and what we consider building. Accordingly, we must seek forms of knowledge and insight that are better suited to this century's realities.

To provide but one example: if the parochial system boundaries of "operational energy efficiency" concerns are replaced by more thermodynamically valid and totalizing accounts of the energy associated with building, then the materialism of building would be far more important to architects. The operational energy associated with a contemporary North American building is about 20% of its total energy dissipation while about 80% of the energy associated with building is dissipated through the building processes of extraction, production, manufacture, transportation, construction, maintenance, replacement, and destruction.¹⁴ This single fact should be a central concern of architects. It immediately transforms what architects think the energy associated with building is and what they could do with it. It suggests, on one hand, that the matter in buildings ought to do more. On the other, it also suggests that architects ought to have a much greater role in the supply chains and mass flow related to building, for this is the bulk of building's energy dynamics. Both are essential the maturation of material and energy practices in the current state of architecture.

We ought to consider and design the most significant orders of energy magnitude associated with building. In light of the overwhelming importance of material extraction, production, manufacturing, transportation, construction, maintenance, replacement, and destruction, it is absolutely apparent that it pays to invest in the material culture of building and urbanization in new ways, albeit with more reflexive boundaries. *It is on the basis of this fact that this book looks much more rigorously at a much-expanded consideration of the material flows of building, and their energetic implications.*

COSMOPOLITANISM: ALL URBANIZATION IS ECOLOGICAL

In this evolving discourse about urbanization, it is important to note at the outset that *every pattern of urbanization is inherently ecological* and that *every building is ecological*. All forms of urbanization and building are inherently and absolutely large-scale systems of material-energy exchange, circulation, and organization. To study the interactions of these open systems is to understand their ecological constitution. The rhetorical escalation of “ecological” as modifying adjective for certain types of design in contemporary discourse misleads and denies our understanding of the relative ecological outcomes of every type of building. Every building is ecological. Some forms of urbanization and building are more vital than others, while some are more rapacious. Some forms of urbanization and building are more powerful than others while some are more destructive. Some forms of urbanization and building are more cosmopolitan and just than others, while some are characterized by highly uneven patterns of distribution and accumulation. Regardless, all formations of matter-energy are inherently ecological.

Without grasping both the incorporeal and corporeal movements of building as a process of urbanization, we will know little about the actual ecology of building. This is where conventional claims about the ecology of buildings and cities methodologically fall short. As a central approach to how we might best live together in this century, this book contemplates formations of building that are rarely, if ever, considered. How we direct, modulate, and design the flux of matter and energy will determine the ecological efficacy of the system and the qualities of life it accordingly affords.

The increased awareness of what constitutes the matter of urbanization and a built ecology has further implications. As David Harvey notes, “the qualities of urban living in the twenty-first century will define the qualities of civilization itself.”¹⁵ The qualities of life in a civilization are directly related to its patterns of urbanization, and building plays a central, designed role.¹⁶ As such, there is an urgent need to extend the considerations of building beyond static objects, spaces, and forms, but as fundamental questions of formation and as and through qualities of life that pertain to preferable processes of urbanization and forms of living in this century.

The aim is a more *cosmopolitan* practice of design and building, in the most literal sense. Architects and urban dwellers alike must now recognize that they are constitutively

citizens of planetary-scale urbanization and that our qualities of life extend far beyond the boundaries of our individual buildings or “cities.” Far more is at stake in this century for cosmopolitan architects.

THE MATTER OF BUILDING AND URBANIZATION

To consider building’s corporeal and incorporeal dimensions in the terms described above places questions of building in a context of urbanization. What we think of as urban relies on intense, far-flung networks of matter and energy that presuppose our cities. Without the movement of matter and energy across the earth, our buildings and urban centers would neither persist nor even exist. Buildings, of course, do not simply appear out of nowhere, from nothing. There is far more to their appearance than what we see in a city, for a specific duration. Buildings are inordinately contingent on vast territories of intake, intense processes of transformation, and will exist on sites for a finite period of time. Buildings are not permanent objects but rather temporary accumulations of matter and energy that have a specific velocity.

In the course of the nineteenth and twentieth centuries, the matter of urbanization has become increasingly abstract and unknown. Outside the purview of architects and adjacent designers, the process of building has also become less and less known. We have come to know less and less about what constitutes building as a process of urbanization and its energetic implications.

Building—the act of constructing a building—has always been a fundamental aspect of urbanization and civilization. Building and urbanization are intricately bound, yet architects no longer know what literally constitutes building today, much less what role building plays in urbanization. Designers do not document nor analyze the full material and energy corpus of construction endeavors: the ecology of building and urbanization. Distant, untold environments are transformed and produced through the making of buildings, yet shockingly, these environments are habitually dismissed as externalities. These reciprocal, contingent environments are produced alongside each commissioned project yet remain outside the purview of designers.

This limited consideration of what constitutes building obfuscates matters of theoretical, historical, ecological, and urban significance. It has constrained our view of the

material and energetic relations, and the latent power, of building. A robust understanding of the reach and consequences of building demands a discourse and research methodology that accounts for the expanded geographical and ecological boundaries that constitute building as a process of urbanization.

An historical account of the material and energy flows of building provides insight on the contingencies of building that are as necessary today as they are externalized. Such an account of these contingencies reveals in particular the specific ecological efficacy of different construction paradigms, while simultaneously indexing the shifting geographies and labor conditions of cities. Without such accounting, we parochially continue to imagine an autonomy for architecture that the world never grants. Without such accounting, we continue to construe the question of materials in predominantly scenographic terms and art-historical concerns about the stylistic appearance of buildings. Without such accounting, we are left to cynical, ahistorical industry-driven parameters and neoliberal technocratic metrics that reveal relatively little about the actual energy hierarchies and the ecology of building.

PLOT, PLOT, & PLOT

This book considers the bonds, states, and process of building, for not just one building, but a sequence over time on a single plot of land in Manhattan. To fully understand this plot of land, we must follow the historical sequence of causal events—or *plot*—that describes its successive phases of construction over time. To do so, we must also grasp the full spatial extents inherent in the process of construction. In other words, we must fully *plot* the material and energy geographies that presuppose each phase of construction to begin to understand the matter of urbanization.

Taken together, these three spatial and temporal meanings of plot begin to reveal the motivation, and plot, for this book: to irrevocably expand what is considered to be the constitution of building. Everything about these plots suggests that what we should consider to be a building in fact extends far beyond its most immediately physical appearance. If the ideas of this book are successful, the reader will never again think about a building as an isolated, static entity. Instead, a building will soon appear to us as but the hardened edge of far-reaching processes and potentials.

I treat the Empire State Building plot as an active, evolving site with over two

centuries of successive constructions, as well as ongoing maintenance and operations. The evolution of building on this parcel symbolizes not only the indisputable cultural significance of the icons built on the parcel over time, but represents more general historical paradigms of construction. The cultural importance of the parcel in each of its phases of building has ensured careful, if sometimes uneven, documentation of many aspects of construction over time.

THE PLOT THICKENS

By taking a long view of the contingencies of specific plots of land, we can illuminate much about the geographic and ecological breadth of what constitutes building, both in history and today: a thick description of what constitutes building. For this book, I have identified, quantified, and mapped the materials and energies used on this iconic parcel of land in a sequence of periods over the past 200 years. This renders an account of the energetic and material inputs and outputs involved in each phase of construction. It also explains their geographical relations through the sites of their production: from quarries to factories to construction to dump sites.

The geographic singularity of this plot of land provides a bounded, comparative index of much larger transformations in the urbanization of the world that have occurred in the past two centuries. The dissection of this specific plot over time in turn yields generalized information about the evolving physical composition and built ecology of North American urbanization. This diachronic material inventory and mapping reflects expanding global networks of material flows under changing political and economic contexts: the physical component of urbanization. In short, it helps establish what role building plays in urbanization in history and today.

Spatially, the plot in question legally corresponds with the contemporary extents of the Empire State Building (between 5th Avenue and 425 feet west towards 6th Avenue, and the 197.5 feet between 33rd and 34th Streets). Temporally, the plot of the Empire State Building is studied from its native forest condition to colonial farm (1799–1850), to masonry townhouses (1850–1891), to the bulk of the Waldorf-Astoria Hotel (1891–1929), and to the vertical extension of the Empire State Building construction (1930), as well as its ongoing maintenance, including its recent energy retrofits (2010).

For this plot, a combination of archival construction documents as well as published texts were used to construct detailed three-dimensional digital models of the successive constructions. Within these models, we identified and tallied material assemblies, material components, documented each material's geographic origin, and their most likely routes of transportation and movement. Total material quantities, mass, and volume were derived from these models. Specific construction reports were used to estimate material transportation routes and distances, and where unavailable, estimates were made based on industry standards and historical transportation infrastructure. For each material instance, the total mass, transportation route, and origin, are used to estimate cumulative energy. The aim of this data is to link these disparate constructions in order to better understand what actually constitutes, in both conceptual and physical terms, building and architecture.

EMPIRE. STATE. BUILDING.

Given the motivations and scope of the study discussed above, the Empire State Building proves to be an unusually rich building to consider. There are clear methodological reasons to consider this building, for its construction process was unusually well documented by its builder, as will be discussed in this book. There are iconic reasons, too, that this building was selected: the building is emblematic of many urban and architectural conventions in Manhattan that extend the details of its history beyond its own plot to more general conditions indicative of building in modernity.

But the three words that constitute the name of the building itself—empire, state, and building—provide an unusually apt conceptual framework to understand building as a process of urbanization. These three terms, forever attached to this building, beg us to consider what in fact constitutes the empire, state, and building of this particular plot. Each term therefore is title of a chapter in this book and it is useful to first consider here their individual and collective import to the present study.

EMPIRE.

Empire, an unavoidably ambitious term, immediately conjures images of vast and powerful regimes. The term *empire* refers to some singular executive power that, for

better or worse, directs a vast organization of people, matter, energy, and territory. In its own way, as a significant part of urbanization, any building today implies a silent empire that architects specify but do not at all recognize. Every building organizes and territorializes a vast amount of material, energy, and people, largely through the agency of architects, their designs, and specifications for construction.

The building material industry is an 890 billion dollar industry annually; a tremendous fiscal flow amongst its tremendous material and energetic flows. Since building material costs average slightly less than a dollar per kilogram, these trillion kilos of material movement can well be considered a non-trivial empire of extraction, transportation, processing, construction, demolition, and disposal. The physical stuff of building is an enormous part of our planetary material and energetic culture.

However, a primary claim of this book is that today building—building as a process of urbanization—is largely an *empire without rule*. Building organizes environments in very specific ways that are rarely considered, much less designed, by architects. Yet building continues to determine the vitality and fate of planetary-scale social, material, and energy systems. The externalities of modern and contemporary design are the content of this feral, planetary empire. These empires operate with scant rule, judgment, or consideration; architectural or otherwise. *This empire is wild and it is paradoxical that building—what we typically assume undoes wilderness—is the one dynamic that produces perhaps the sole remaining form of wildness today.* By continuing to ignore this feral empire, architects forfeit opportunities and obligations for design. They externalize more than just these feral environments; they also externalize their latent capacity for desirable qualities of life. Given the magnitude of matter and energy involved, architects could begin to consider building these environments as an important aspect of urbanization and civilization.

What is composed and specified by architects far exceeds the building as an object in a city and implicates these otherwise feral domains of urbanization. A much more cosmopolitan architect and client, for example, could exert considerable agency within the empire that building represents today by designing building, not just buildings. If so, they could influence this empire through the seemingly banal task of producing specifications for construction. They could also consider, if not design, the large-scale

material and energy environment—empires of building's becoming for the benefit of not just buildings but people, territories, and life itself. Thus, for urgent reasons that range from the idiosyncratic concerns of the discipline and profession of architecture to large-scale ecological and urban dynamics, architects and building could start to civilize this empire through study and design.

STATE.

For this book, *state* is perhaps the most important word in the title of the selected building. *State* has multiple meanings that initially may seem disparate but, from an architectural and urban perspective, are deeply convergent. Thus, all its associated meanings are relevant to the present study.

First, one aim of this book is to state something that is seemingly so self-evident and obvious but that contemporary designers either forget or take for granted: that building materials and other forms of energy must come from somewhere, are temporarily organized on a site somewhere else, and then later are dissipated yet somewhere else. Often, however, the most obvious realities evade us individually and collectively. It is difficult to see and see through our epistemological limits, and design accordingly.

One basic aim of this book is to make an unequivocal statement about the literal engenderment, constitution, and formation of building as a basic premise of design. But to state something about the literal engenderment, constitution, and formation of building requires an understanding of the political and thermodynamic definitions of *state*. Indeed, the state of architecture is most manifest and clearly staged through building. So, another aim of this book is to articulate and visualize the simultaneity of states inherent to building that remain externalized in architecture.

To this end, *state* refers to a fundamental political unit, its manner of governance, and the various socially negotiated bonds it collectively represents. What is the fundamental political state of a building? The legal description of the building—the plot of land it occupies—is one operative legal unit. The building codes and zoning codes to which the building must adhere reflect another political unit. The conventions and standards of contemporary construction may incorporate other units of political reach through, for example, unions and regulated safety protocols. This book, however, aims

to demonstrate that the political unit of building—its bonds and contingencies—extends far beyond the scales of a building on a single plot of land. Architects should specifically question, as Michel Foucault wonders, “what the order of a society should be,” and thus “how is one to conceive of both the organization of a city and the construction of a collective infrastructure? And how should houses be built?”¹⁷ Looking back at a specific plot in Manhattan helps structure a new set of questions and practices about the political state of architecture today. It helps us weigh the relationships between urbanization, infrastructure, houses, and other questions of building.

Third, *state* also ascribes a specific geographic unit to the political unit described above. The social and political bonds of a polis are attached directly to specified territories. It is essential for each polis to observe, survey, and oversee its territory; otherwise the polis enters a state of risk. It is easy to claim that architects do not yet observe, survey, and oversee the territory of building. This book aims to demonstrate that the geographic unit of building—its bonds and contingencies—again extends far beyond the scales of building on a single plot of land. We need methods of observation, reasoning, and imagination to oversee the otherwise feral territory of building.

Fourth, *state* also refers to the condition of a system. In architecture this might refer to the relative well-being—or ideal status—of building, a polis, and its occupants. It can also refer to the relative condition of the ecosystems that float the operations of the building and life itself. This evaluative meaning of *state* remains central to the task and scales of architecture. This is especially valid when the subject of architecture extends, in a gush of goodwill and exactitude, beyond the predominant view of buildings as object in a city. As a function of state in this sense, a fundamental motivation for this book is, *how might we best live together in this century?*

Fifth, and equally influential for this book, *state* in firm thermodynamic terms refers to the overall constitution of a system: its particular mixture of macroscopic state variables at a specific given time. The state of a system is a thermodynamic indicator of the relative magnitudes of energetic flux, transformation, and feedback inherent therein. This would include—in strict physical terms—various extensive measures of the system, but particularly important are the intensive variables of the system. The state of the system puts a degree of measure and magnitude to the nearly infinite sport of molecular and

territorial activity in a system, regardless of its size. Among these state variables and measures, this book argues that the velocity and momentum of building is perhaps the most consequential state variable for building. It also aims to help envision the hierarchy of energy that is associated with building. Thus a central question, no matter how unfamiliar it may seem, for the state of architecture is: *how fast, or slow, should building as an urbanization process move matter and energy through a system?*

Building always involves movement and, as we will see, every building has a velocity and momentum. This velocity reveals a great deal about the cultural, economic, and ecological status of building in any given period of human civilization. In other words, the velocity and momentum of building is a strong indicator of the state of a building and, by extension, a city.

Again, for the present book, these manifold meanings of state are assumed to be conjugate—operating simultaneously and in parallel—in architecture. Ideally, an architect will be able to envision, if not design, the thermodynamic state of a building as overtly connected to the political ideal and condition of a larger collectivity and territory. This will undoubtedly involve excavating multiple assumptions and system boundaries that currently constrain the state of architecture today. In these multiple ways, it is a final assertion of this chapter that architects should be statesmen and stateswomen in every possible sense of the term, fundamentally engaged in questions of statecraft.

BUILDING

Building is perhaps the most obvious term for the present study. But as noted above, building is better understood as a process, not an object alone. While a building is often seen as a relatively static entity, it is anything but. Building—both in individual instances of particular constructions as well as the broad habits of construction in any period—reflects a broad set of processes, places, and people. The dynamics of building in this sense have been grossly under-represented in the discipline of architecture. Even more important than the construction of an individual building is the consideration of building as an active force in urbanization. We must consider building in aggregate, as a central dynamic of civilization. Building ultimately reflects much about the state of our urbanization and civilization.

So, as Michael Cadwell once noted, building is both a good noun and good verb.¹⁸ Architecture, however, privileges the role of buildings as nouns, as static objects. Static massing models are placed on site base models in studios, static photographs of facades line the pages of art history books and magazines, and buildings are often imagined to be rather permanent edifices. These behaviors sacrifice crucial knowledge about building as a verb: as a process embedded in many active worldly systems, especially in active processes of urbanization.

The act of building joins multiple spatial and temporal scales, a telluric transformation of vast material and energy flows. In this way, building is a core function of the urbanization of the planet and civilization. It would be a gross error to underestimate the role of building by externalizing consequential aspects of building.

It would likewise be a mistake, though, to deny the power of buildings as composed objects and all the qualities they afford. But those potentially magnificent qualities are all the more magnificent and potentially powerful when an object is understood more fully and recursively through its constitutive linkages—its bonds—with distant but inextricable, active, and open systems. Thus the aim, architecturally and ecologically, of looking beyond the object to its engenderment in building is to imbue the object of architecture—*buildings*—with even more possibility and capacity by more fully understanding the act of *building* as a process of urbanization. The aim is to finally make even the most remote and minor building cosmopolitan.

EMPIRE-BUILDING/STATE-BUILDING

Though the three individual terms of the book's title are significant independently, it is important to think about the building's name in yet other ways. Every building also reflects an active process of *empire building*. Whether specified by an architect, a builder, or an industry, every building reflects a collective flow of material, energy, and investment that at each step engages with people and environments in benign, positive or negative ways. Individual choices aggregate and accumulate into a much larger pattern of urbanization. These empires are built through choice and design. There are no small plans, no self-sustaining huts. Even with nominal insight into building as an urbanization process, architects today can much better rule—that is, exercise judgment—on how each building builds its own empire of matter and energy.

Likewise, *State Building* suggests that architects could be far more central thermodynamic and political agents in the systems of building and urbanization production. Architects can, and should, be state builders for each project. What states are ideal? What territories and velocities does this entail? What bonds and contingencies are involved therein? What is the appropriate system boundary of design today? Architects are state builders and could design accordingly, thereby finally and fully addressing an inordinately important question about the constitution of building and architecture today.

SYSTEM BOUNDARY

Another way to understand this book's perspective on constitution of building is as a sustained reflection on the little-considered topic of system boundaries in architecture. For architects, the system boundary of a project is routinely isomorphic with the final construction: its legal site limits, the envelope of a building as an object/artifact, and perhaps how it "performs" in narrowly defined terms. Each of these boundaries—the site limit, the building envelope, and the narrowly bounded concerns of building energy performance—is today an inadequate description of building.

Systems boundaries are not static entities, but better understood as active zones of exchange. System boundaries vary greatly and are absolutely contingent on the phenomena in question. System boundaries are merely a way to understand what is exchanged across the boundary and thus provide insight on system dynamics. Thusly, the legal limit of the site matters, but mostly for what is exchanged across that boundary: matter, energy, people, and information. The building envelope matters, but mostly for what is exchanged across that boundary: dissipations of operational energy, solar insolation, air pressure, and humidity. The narrowly bounded concerns of building energy performance matter most when those concerns are fully situated in the open thermodynamic systems of building's larger energy hierarchies.

To question the system boundaries of building immediately questions what constitutes—and what should constitute—building today. These questions most certainly extend to the territories, intakes, transformations, and velocities of building. To do so allows designers to more readily see how communication and feedback are powerful agents of building in ways that are largely unfamiliar to contemporary practice.

ARCHITECTS ARE THE 3%

A primary reason for architects to consider the broader systems of building is that building design only constitutes a small portion of the ecological opportunity that building represents for ambitious designers. By billing, architects are involved with about 3% of construction in the United States.¹⁹ The territory and agency of the architect should not be restricted to the design of individual building-objects alone if she wishes to have productive, maximal impact on the environment. The ecological and architectural potential to re-design the larger material and energy flows of building is profound, but simply impossible on a building-by-building basis. The system boundary of architecture's organization of material and energy flows might strategically expand in this regard, especially as that expansion can recursively make individual object-systems for building more powerful.

Whether towards ecological or professional ends, architects could expand their system boundary of constitutes a building. This would inevitably involve more convergent building designs that use far more of fewer material systems, such that they can know much more about those systems. This transition from unwarranted complicatedness to meaningful ecological complexity transforms aspects of design practice and opens new design domains. From the molecular to the territorial, this transition affords novel opportunities to design both matter and supply chains, to discern phenomena on manifold spatial and temporal scales, and in so doing place building in a much more complex and vital spectrum of material-energetic dynamics. This transition would position architects to better design and affect a much larger percentage of building. In short, architects and buildings could be vastly more powerful than they are in architectural and ecological senses of the term.

POWER

Power is a term that will appear in multiple ways in this book. Like empire, state, and building, power has several meanings that are related from an architectural point of view. In the most common sense, power reflects a capacity to influence or govern the behavior of a system of social relations through law, knowledge, trade, etc. In a scientific context, power refers to the rate at which available energy is consumed and the rate at which work is done in a system.

Make no mistake: how building specifies the organization of material and energy flows is indeed a powerful component of urbanization. To this end, another triad helps further shape a framework for devising powerful ecological and architectural outcomes.

In the most rudimentary and abstract way, all of these uses of the term refer to the way in which matter and energy are organized and used according to some system organization. Whether in energetic or social ways, this term reflects the capacity of a system to do work. While the implications of these two definitions are as vast as they are contentious, it is important to keep both the general and scientific meaning of *power* in mind when considering what constitutes building today and its associated state of architecture.

THE CONSTITUTION OF BUILDING AND THE STATE OF ARCHITECTURE

The Empire State Building, in its tripartite name, evokes much about the political and thermodynamic status of building. Thus, what is fundamentally at stake in this study is a consideration of what constitutes building today. What is the constitution of building and architecture? Does the practice of architecture align with this actual constitution? What should the constitution of building be and, accordingly, what should constitute the full practice of architecture? What models of pedagogy and practice best address this constitution?

The material and energy flows of building indicate much about the actual political and thermodynamic states of building, which span multiple spatial and temporal scales. How architects can better envision, and perhaps design, these systems and states towards more magnificent architectural, ecological, and urban outcomes—through singular acts of architecture—is the primary provocation of this book. What constitutes building is at once a set of states, bonds, territories, and actions. The practice of architecture in the twenty-first century could more fundamentally reflect this constitution of architecture. This book explicates the historical trajectory of building one plot, in order to help designers envision what constitutes building and better imagine the constitution of architecture today.

This book begins with a chapter that plots the history of building on the stated site. Three chapters—one each on the empire, state, and building of this plot follows. This analysis will then conclude with speculations about other models that might better shape building, and all the latent magnificence of its formations, in this century.

ENDNOTES

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