



# Magnificence: On the Appearance of the Baths of Caracalla

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# Magnificence

## On the Appearance of the Baths of Caracalla

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Late in his career, architectural historian James Ackerman shifted his attention to the role of magnificence in the work of Michelangelo and Palladio.<sup>1</sup> Ackerman reflected on magnificence in terms of Aristotle's *Nicomachean Ethics*, as speculation on how people might best live, and thus design. This concern for magnificence—the state of splendid appearance—merges aesthetic and ethical concerns. In Aristotle, magnificence was a discourse on the virtue, or possible vulgarity, of resource expenditure and its situational fitness. In his words, magnificence was “a fitting expenditure involving largeness of scale.”<sup>2</sup>

While Ackerman was largely concerned with the outward appearance of Michelangelo's and Palladio's work, today the question of magnificence and how people might best live together with this planet certainly applies to other domains—and scales—of design and building environments. With questions about expenditure and fitness no less significant today, the question of appearance in this century necessarily not only involves the visual characteristics of an object—like Ackerman's interest in Palladio's grand façades—but also invokes fresh architectural questions concerning how buildings come to appear in the most literal energetic and material of terms. These concerns now include planetary modes of production and labor, their planetary energetic and mass flow fields, and how architecture appears to the visual and nonvisual sensory apparatus of our physiology. From

the molecular to the territorial, appearance—and moreover the promise of magnificence—now poses seemingly simple questions for design, especially regarding its environments: how does, *or how should*, architecture appear in this century?

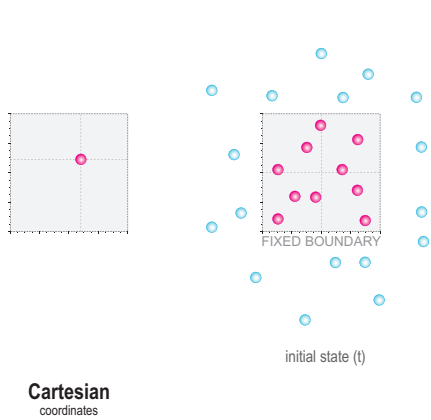
No less critically, the topic of appearance also raises questions about the methods and means we use to describe the appearance of architectural artifacts and phenomena. Architects remain constrained by the *frame of reference* they unwittingly impose to coordinate and project their practices. Cartesian coordination—the basis of mechanical drafting and Rhino models alike—is methodologically only capable of describing static objects within fixed frames of reference (Figure 1). This frame of reference thus systematically occludes the rich dynamics of architecture's environments from immediate consideration and coordination. Accordingly, there is an irreconcilable disjunction between architecture's environmental ambitions—which contend with inherently dynamic systems—and the inherently static means it uses to design those ambitions and systems. So here, too, arise questions about the fitness of our collective frames of reference and methodological expenditures in design.

If only architecture did not move—or matter, energy, or people with and on account of it—then the persistent Cartesianism of architectural design would be an adequate means to discern and describe architecture. “The problem

with buildings,” Bruno Latour and Albena Yaneva note, “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.”<sup>3</sup> The movement of people, matter, and energy are all constitutive to the appearance of architecture. The project of architecture is a moving project. So other frames of reference are methodologically necessary to adequately describe architecture.

To partially address this core disjunction of architecture's frames of reference, some designers now use various types of “simulation” to describe and coordinate discrete aspects of building environments. These isolated climatic, thermal, and fluid dynamic models are examples of Eulerian description (Figure 2). While Eulerian description acknowledges the dynamics of flow, it does so in the context of a fixed frame of reference and thus it does not quite go far enough to accept what Heraclitus long ago observed—“that all things move and nothing remains still.”<sup>4</sup> To not recognize this precept and all the compound movements of architecture takes all of the fun, and a lot of potential function, out of flow and its constitutive role in the dynamics of architecture's environments and appearances.

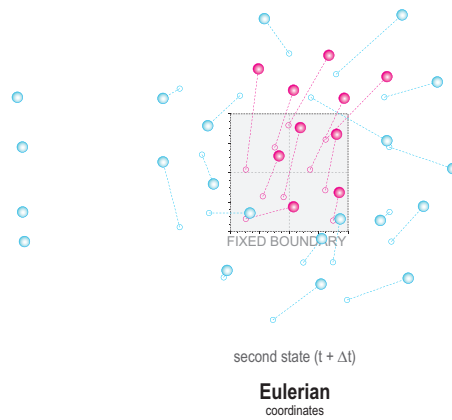
To illustrate these core methodological disjunctions of design and environments, consider the Baths of Caracalla. Rather than conventional Cartesian or Eulerian frames of reference, its design



**Figure 1.** With Cartesian coordinates, a fixed object can only be located with reference to a fixed frame of reference: nothing moves, no change occurs, nothing happens.

is more fully described through Lagrangian description. In field theory, a Lagrangian description of a flow field follows an individual parcel through the time and space of its domain (Figure 3). Lagrangian description makes intrinsic to systemic description what Cartesian and Eulerian coordinates externalize. All environmental quantities and qualities of a flow field are gauged relative to a moving entity, regardless of whether that entity is a body, a brick, or a parcel of air. Rather than an absolute boundary, a Lagrangian account describes a more subjective account of a flow and boundary behavior over time, yet it is no less objective than a quantitative description. The Lagrangian frame of reference thus introduces a far more relative and contingent—and thus exacting—account of a flow field system. If design directs manifold resource expenditures, Lagrangian coordination affords more situational accounting of those flows.

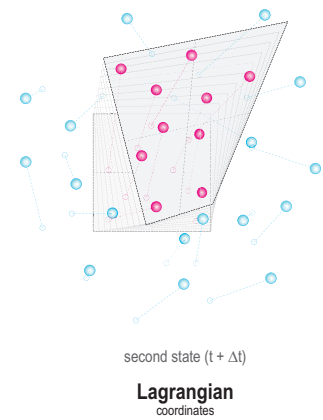
The Lagrangian coordination of the Caracalla masonry architecture—and the modulation of its resulting interior flow fields—was originally motivated by the thermodynamics, delight, and hygiene of rapid physiological modulation in the



**Figure 2.** Eulerian coordination acknowledges events and flow by, here, describing the flow field behavior of a set of pink points in a larger domain as those points transgress a fixed reference boundary (from  $t > t + \Delta t$ ).

bodies of its bathers. In this interior, a bather drifted through a continuously acclimatizing matrix of thermal, spatial, luminous, and moisture sequences. They experienced the Lagrangian pleasures of shifting physio-environmental gradients and displacements in the Caracalla flow field—an idiosyncratic but nonetheless coherent *dérive* through the building (Figure 4).<sup>5</sup> In this context, the Lagrangian description of both quantities and qualities in the *durée* of the flow field were experienced relative to the individual: the rapid rise of temperature mixed with a drop in humidity in the caldarium, a descent into darkness and radiant coolth of the great frigidarium mass, or the orientation of the bathing complex as whole relative to the flux of southwestern afternoon sun (Figure 5).<sup>6</sup>

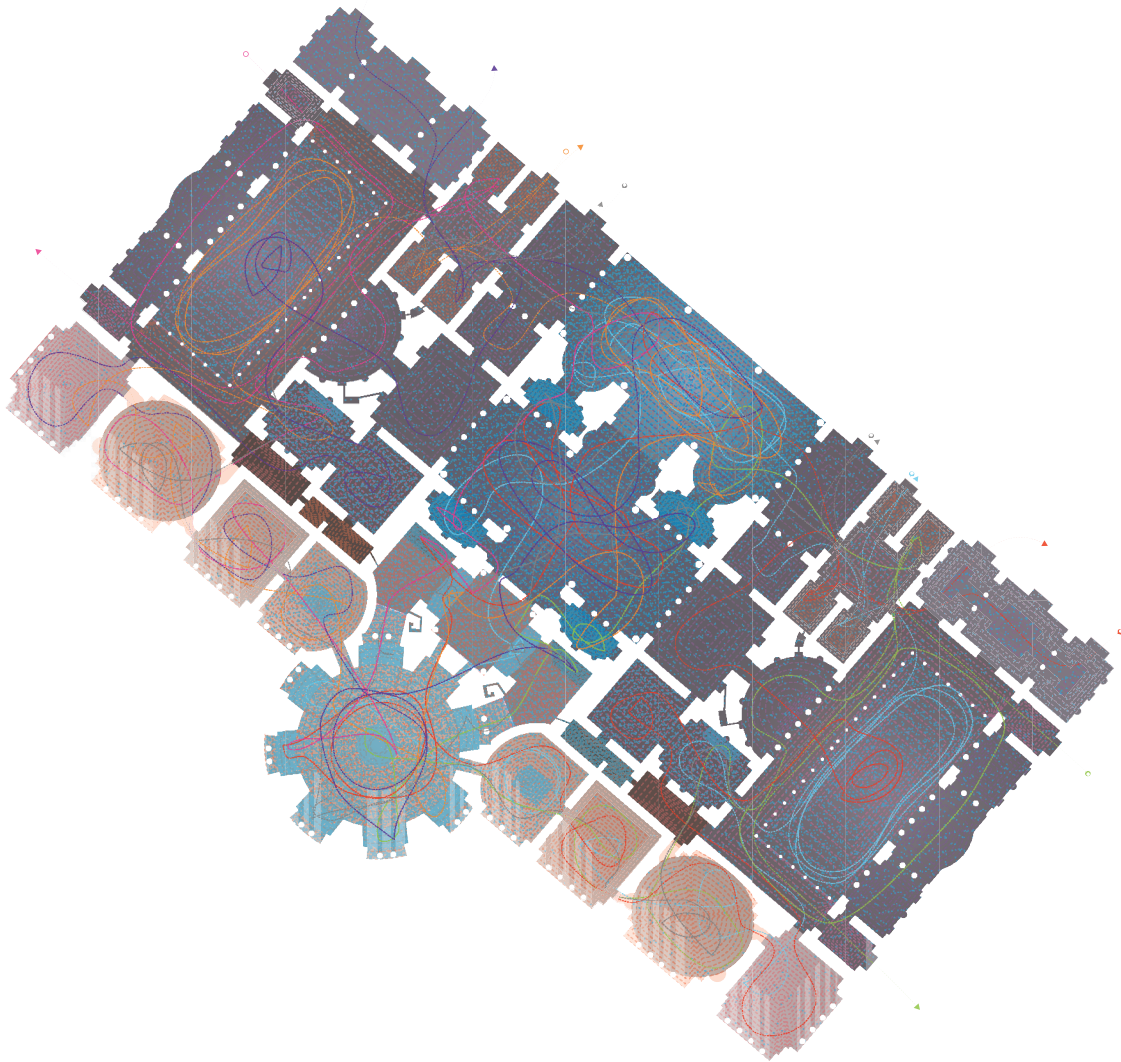
A proliferation of minor passages for both people and air embedded in the Caracalla *poché* contradict, and even undermine, the major axes of the plan. This confirms that models of coordination other than absolute Cartesian geometry alone are at stake in the planning and experience of this building: its appearances. To march an individual through a deterministic Beaux Arts sequence of Euclidian, axially-determined spaces raises



**Figure 3.** In Lagrangian coordination, flow field behavior over time (from  $t > t + \Delta t$ ) is described by following the same set of pink material points, but now the system boundary morphs with the parcel of points. This type of morphological description has very important, but totally unconsidered, spatial and temporal implications for how we could design environments.

critical questions about the many deviations and aberrations evident throughout the plan that enable the flow fields and lines of movement that enliven the architecture for the bathers (Figure 6). A Cartesian explication of the plan deprives us of the situational coordination of dynamic thermal, luminous, and relative humidity variation of the architecture. While the plan has general spatial and structural organizational axes, these do not align with the primary thermodynamic circuits available to bathers nor to the overall thermodynamic and fluid dynamic domain of the building.

In short, Cartesian axes and geometries simply do not describe the primary coherence of this architecture's design and appearances, nor that of any building. Other modalities of description, coordination, and appearance are at stake. A Lagrangian description of the techniques of an interior flow field, as well the flow field of architecture's broader environments, better accounts for the organization and formation of any building. The design and assembly of any building is ultimately more a task of Lagrangian coordination than it is a Cartesian control. Indeed, the



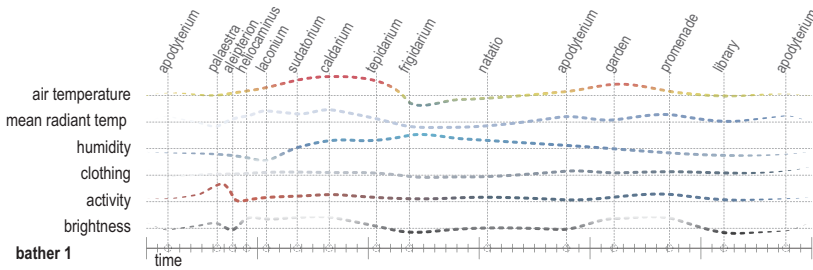
**Figure 4.** The Thermodynamic Dérive: Baths of Caracalla Flow Field Plan I, with the trajectory of bathers mapped. Scale 1 : 1,500. (Image by Kiel Moe.)

calibration of these intensive and extensive properties of architecture pose entirely new questions about architecture's appearance.

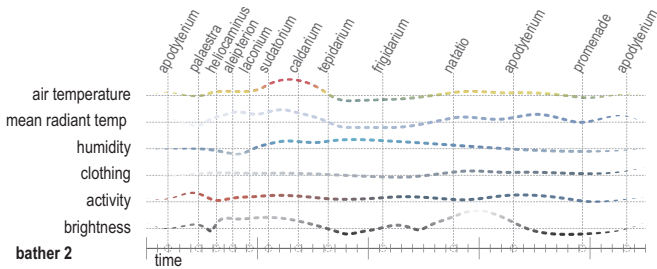
Moreover, when the Lagrangian characterization of a bather and her physiological modulation is coupled with the Caracalla mass—not just in terms of sensations and physiological responses to the resulting heated, cooled, and humidified milieu, but more specifically in terms of the material geography and

assembly of the building's physical engenderment—then a more complete and vital characterization of architecture's appearances is methodologically possible. The construction of the Baths of Caracalla was a wholly geological endeavor, requiring the coordination, movement, and assembly of a million pounds of material every six hours for six years (Figure 7).<sup>7</sup> Its appearance was absolutely inextricable from this flow field of materials from the environments surrounding Rome. The reciprocities between movements in molecular,

physiological, and territorial flow fields opens building design to more ambitious and complete questions about the ecology, geography, political economy, and formation of architecture: its appearance, expenditure, and fitness in the world. Today, the coupled intensive and extensive flows of both bathers and bricks, the coupled convection of air and geology, and the coupled movements of matter and energy are all of relevance to the appearance of architecture. Without this coupled understanding across spatial and temporal scales,



**Figure 5.** *Left, above:* Follow the flow of bather; gauge quantities and qualities relative to their trajectories within the flow field domain of the interior.

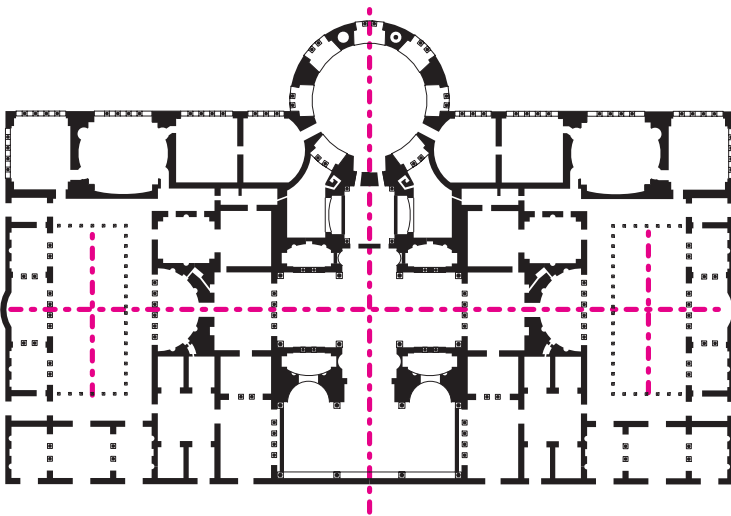


**Figure 6.** *Left, below:* The Baths of Caracalla reduced to Euclidian axes and poché: “No one, of course, lives in Euclidian space; it would be impossible, and adding the ‘fourth dimension,’ as people say—that is, time—does not make this system of coordinates a better cradle for ‘housing,’ so to speak, our complex movements” (see Latour and Yaneva, “Give Me a Gun” [note 3]).

and putting people together, concentrating flows of actors and distributing them so as to compose a productive force in time-space.”<sup>8</sup> That starts to put much of the fun—to say nothing of the politics, geographies, ecologies, and formal novelty—back into the flow fields of architecture and all of its contingent building environments.

An account of the appearance of the Baths of Caracalla—how it came to appear in Rome, how it appeared to ancient bathers, and how we might best characterize this, or any, building—requires an evolution of our basic models of description and design. On one hand, a Lagrangian relaxation of architecture’s energetics into less technocratic concerns will open designers to actual and more complete—and thus rigorous—accounts of the coupled thermodynamic and ecological systems that presuppose building.<sup>9</sup> On the other hand, the design, description, coordination, and formation of splendid appearances across multiple spatial and temporal scales poses entirely new design questions about what is actually formed and appears through building design.<sup>10</sup> The Baths of Caracalla is but one building that beckons us to construe architecture beyond the fetters of its Cartesian and Eulerian reasoning and toward the latent vitality of Lagrangian imagination.

The environmental aspirations of architecture in this century require means of description and coordination that eclipse, but do not negate, the Cartesian habits of mind and historical expertise that presuppose design today. The appearance of architecture and its

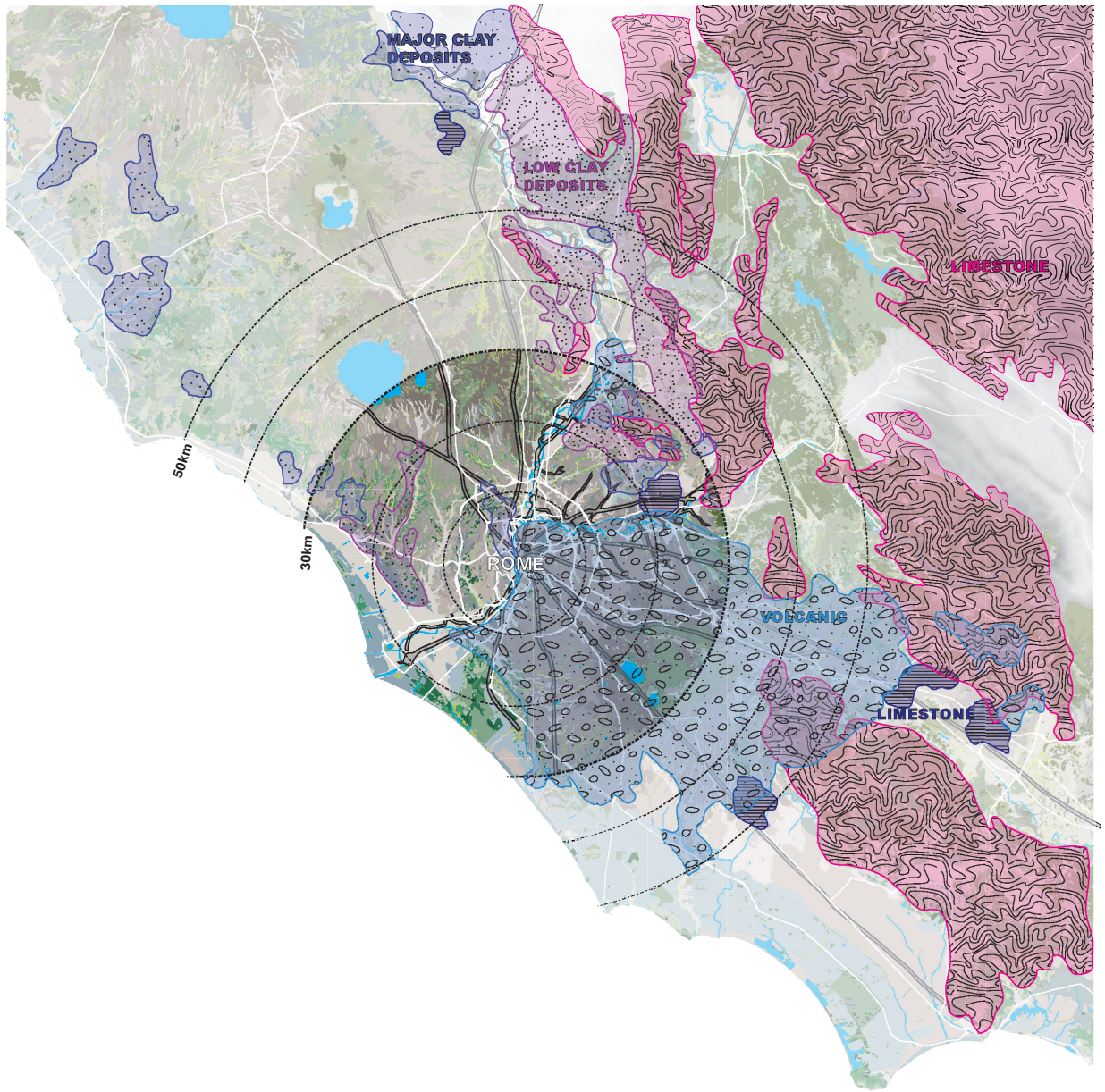


we will never know whether the appearance of architecture—in all of the phenomena, artifacts, and environments it inevitably produces—is ultimately splendid or vulgar.

*But if we lack the means to describe and coordinate these manifold flow fields, then we lack the means to visualize and evaluate the actual appearance of architecture and its constitutive environments.* To the detriment of architecture and its environments, we recurrently train architects to methodologically and pedagogically segregate these concerns through persistent and unquestioned

Cartesian habits of design that cannot coordinate or couple the salient environmental concerns of this century, even if such concerns are not segregated in reality. So why does our confidence in this parochial Cartesianism persist in our pedagogies and practices?

Other methods of coordination and description—of design—are now necessary. These other methods would help us “finally be able to picture,” as Bruno Latour and Alben Yaneva observe, “a building as a moving modulator regulating different intensities of engagement, redirecting users’ attention, mixing



**Figure 7.** All Roads Lead to Rome's Geology and Forests: Baths of Caracalla Flow Field Plan II. Scale 1 bath : 1,000,000 pounds of material every six hours for six years. (Image by Kiel Moe and Mary Miller.)

environments ultimately requires a range of descriptive models to coordinate the manifold flow fields of architecture's appearances. The dynamic states of architecture's appearances will not emerge from a single, fixed frame of reference alone. An evolutionary epoch of design imagination, description, and coordination is now upon us. It calls for new models and methods of design for how architecture comes to appear, or even better, how it *could* come to appear today. As an art of resource expenditure and its situational fitness, the appearance of architecture today compounds our long-standing enthusiasm for the design of Cartesian, extensive objects with the design of manifold intensive subjects and flow fields.

*The degree to which we can epistemologically and methodologically couple concerns that are seemingly disparate—like the flow of bricks, bathers, and buoyancy—in one deft architectural gesture is the degree to which architecture might achieve its latent magnificence in this century.* This deftness and magnificence could start to put some virtue back into architectural virtuosity, but it will require altogether new methods, frames of reference, and frames of mind for how architects might describe the appearance of architecture in all its representational, spatial, material, energetic, physiological, political, and ecological manifestations.

#### Author Biography

Kiel Moe is Associate Professor of Architecture and Energy at the Harvard University Graduate School of Design.

#### Notes

- 1 James Ackerman, "Michelangelo, Palladio and Public Magnificence," lecture at the American Academy in Rome, October 27, 2009.
- 2 Aristotle, *Nicomachean Ethics* 4.2.
- 3 Bruno Latour and Albena Yaneva, "Give Me a Gun and I will Make All Buildings Move: An ANT's View of Architecture," in *Explorations in Architecture: Teaching, Design, Research*, ed. Reto Geiser (Basel: Birkhäuser, 2008), 80.
- 4 Plato quoted Socrates quoting Heraclitus in *Cratylus*, 402a. Plato, *Plato in Twelve Volumes*, vol. 12, trans. Harold N. Fowler (Cambridge, MA: Harvard University Press; London: William Heinemann, 1921), 66–67.
- 5 I use Guy Debord's term here with his definition in mind: "dérive literally: 'drifting,' a technique of rapid passage through varied ambiances." Guy Debord, "Definitions," in *Internationale Situationniste*, no. 2 (December 1958), trans. Ken Knabb.
- 6 As ancient bath scholar Fikret Yegül observes, "The development of the heating systems of Roman baths provided the basis for the order and organization of spaces and had a direct bearing upon their planning." Yegül, *Baths and Bathing in Classical Antiquity* (Cambridge, MA: MIT Press, 1992), 356. Architects have yet to establish corresponding means to describe order, organization, and planning—design—in equal terms.
- 7 The single best source of the geographic and tectonic engenderment of this building is Janet DeLaine, *The Baths of Caracalla: A Study in the Design, Construction, and Economics of Large-Scale Building Projects in Imperial Rome*. *Journal of Roman Archaeology* Supplementary Series, no. 25 (1997).
- 8 Latour and Yaneva, "Give Me a Gun" (note 3), 87.
- 9 For a more systemic account of the ecology of architecture, see William Braham, *Architecture and Systems Ecology: Thermodynamic Principles of Environmental Building Design, in Three Parts* (London: Routledge, 2015).
- 10 Kiel Moe, *Empire, State and Building* (New York: Actar, 2017).