Introduction

Living with Infrastructure

On 15 June 1914, a powerful storm in Paris left sinkholes and explosions and fires from broken gas lines in its wake. As often happened during extreme events, photographers walked the battered streets documenting damage. Their photographs became postcards like the one shown in figure I.1, from the Paris printing firm ELD, named for its founder, the photographer Ernest Louis Désiré le Deley (1859–1917), which depicts a large sinkhole with the caption "The piping laid bare on the Rue du Havre." The storm did what scholars call "inverting" or "surfacing" infrastructure, exposing the normally buried and hidden sewer tunnels, as well as water, gas, and electric lines, to air, light, vision, and scrutiny.[1] Inversion also appears here as the contrast between the lamppost standing on the sinkhole's edge at the top left amid the rubble, and the toppled lamppost, trailing its supply line atop the wreckage below. The photograph mimicked the storm in "laying bare" hidden infrastructures, visualizing them for people beyond Paris and for posterity.

By revealing underground infrastructures, the postcard also illustrates two relationships at the heart of this book: the relationship between infrastructure and the environment, which technology studies call "envirotechnical," and the relationship between infrastructure and society, which these studies call "sociotechnical."[2] The environmental aspects of this scene encompass both the extreme weather that opened the sinkhole and the resulting breach of

surface and subterranean environments. The social dimension is conveyed by the people depicted or not depicted. One worker (top right) surveys the scene, while another worker (bottom right) descends below ground. They signal the labor of building, operating, maintaining, and repairing infrastructures. Meanwhile, along the image's top edge, dozens of bystanders press against a makeshift barrier for a better view, illustrating the public concern and curiosity that greeted this inversion of infrastructure and normality. These spectators signal popular reception of infrastructure, their emotional and sensory experience of technology, and infrastructure's roles as part of everyday life, a danger, and a spectacle. The people not depicted here include the engineers and planners who designed the infrastructures and the photographer, perhaps Le Deley himself, although attributing postcard photos is difficult. The branded postcard and its anonymous photographer document a popular culture of representing, remembering, and reflecting on experiences of infrastructure. Thus, both the storm and its documentation "laid bare" the entanglement of infrastructure, environment, and society that characterized Paris in 1914 and drew the attention of workers, engineers, bystanders, photographers, and postcard buyers to this moment of disaster.

The sinkhole depicted was located at the edge of Paris's 8th district (*arrondissement*), among its wealthiest, most modernized, and most infrastructurally equipped. By picturing a collapse here, the card subtly indicated the fragility of Paris's most "Haussmannized" neighborhood, thus politicizing Paris's special brand of urban modernization, which had transformed the city over the preceding sixty years, and is explained in the next section, "Paris, Infrastructure, and Haussmannization." This postcard not only inverted infrastructure but also, more precisely, inverted Haussmannization.

Paris, Infrastructure, and Haussmannization

This book provides a history of Paris, which does not allow me to generalize about France. Paris was in many ways an exceptional place in France and has been exceptionally important in shaping the way we understand urban infrastructure, urban modernity, and infrastructural politics far beyond France's borders. Paris has long been recognized for its infrastructures. From the paved streets and fortifications of King Philippe-Auguste (Philippe II) around 1200 to the Pont Neuf (New Bridge), coach service, postal service, and first streetlamps in the 1600s, Paris entered the modern era after the French Revolution with the nickname "City of Light" (Ville Lumière), which metaphorically cast the capital as a beacon of enlightenment, but literally

invoked its early streetlights. Thereafter, the enormous growth of gas lamps in the nineteenth century cemented the nickname, bolstering Paris's bid to define the modern city by giving infrastructure a leading role.[3]

Gaslight rode a wave of infrastructure development that swept Paris in the 1800s, creating the transformed roads, houses, subways, tramways, electric systems, sewers, water supply, and rivers discussed in this book. This wave was linked with Haussmannization, Paris's approach to urban planning and building, named for Prefect of the Seine Georges-Eugène "Baron" Haussmann (1809–1891), who led Paris's departmental government from 1853 to 1870, and founded a new Office of Works (Travaux de Paris) to direct an ambitious plan of "Great Works" (Grands Travaux) or "transformations" to modernize the capital.[4] He envisioned and pursued, but never completed, a city served comprehensively with streets, parks, fresh water, sewerage, gas, telegraphs, compressed air, horse-drawn omnibuses, and improved canals and rivers. Influential urban studies by historians, geographers, social scientists, and urbanists have given Haussmann a commanding role in creating an international "modern infrastructural ideal" that envisioned a "networked city," served by ubiquitous, uniform, and universal networks that would supply resources and remove waste, intended to achieve social progress. Haussmann's Paris became an "archetype" and "icon," defining urban modernity—that is, what makes cities modern—in terms of infrastructure. By 1900, James Scott argues, Haussmannizing Paris was "a widely admired public works miracle and shrine for would-be planners from abroad."[5] Thus, beyond its well-documented reputation as "capital" of France, modernity, progress, the nineteenth century, and even the world, Haussmannizing Paris was certainly a capital of urban infrastructure.[6]

Although the City of Light dazzles, we must remember how many places and people remained in darkness while infrastructure networks expanded, and understand infrastructure's unevenness rather than uniformity, its problems alongside its progress. For example, Paris's sparkling gaslights also raised awareness of technological risk and carried costs for environmental quality: odor, light pollution, and carbon emissions.[7] In sum, Paris helps us see infrastructural ideals and realities, distinguishing enlightenment from streetlights with more clarity, because it has not always lived up to its own infrastructural model or ideal. This book therefore limits its geographic scope to Paris to rethink the city's role as an archetype, capital, icon, and model. By documenting how Parisians pushed back against Haussmannization between 1870 and 1914, it offers a case study that will help scholars today to provincialize

Paris. The book counters Paris's claims to universality with a concrete and contingent account of a specific place, contrasting Paris the myth and model with Paris the real living and working city.[8]

This history of urban technologies, the urban environments they saturate, and their consequences for everyday life grew from my desire to find new ways of studying how infrastructures are lived, or how they are integrated into society, used, and experienced every day. Even after studies of technology and infrastructure turned toward social and cultural history and user studies, research has remained largely focused on Thomas Hughes's "system builders," engineering, institutional analyses, and top-down perspectives.[9] Paris's history from 1870 to 1914 offers a unique opportunity to study how people learned to live with increasingly ubiquitous infrastructure in a networking city. Scholars often claim that Paris, like London, was instrumental in inventing the "networked city," and this book interrogates that claim, heeding the call of recent infrastructure studies to "splinter" urbanism and move "beyond the networked city."[10] While French elites promoted Paris as a model city embodying Haussmannization for the world, and it *was* widely imitated, scholars have mostly overlooked how both Parisians and foreigners contested and politicized Haussmannization by inverting infrastructures.[11]

Not all infrastructures debuted in the 1800s; Paris's carriages and streetlights date to the 1600s. But even for older infrastructures, the nineteenth century brought massive changes in physical scale, symbolic meanings, and sociotechnical integration. Not all infrastructures are alike. Those studied here—systems for housing, transportation, sanitation, and water supply—are specifically *physical* and *urban* infrastructures. Many Americans call them "civil" infrastructures, from the field of civil engineering, or "utilities," signaling their accessibility, instrumentality, and usefulness for the public. In nineteenth-century France, and in French archives today, similar infrastructures are "public works" (*travaux publics*). This book only discusses social, information, and knowledge infrastructures indirectly, when they are relevant to, or part of, civil infrastructure.[12] Excellent social and cultural histories of Paris infrastructures exist for the parks, sewers, gas, and omnibuses developed before 1870, so I emphasize these less.[13] Similarly, while touching on electrification, I defer to research on the years after 1870 that analyzes energy-related infrastructures: artificial lighting, compressed air, and electricity.[14]

All physical infrastructure systems blend social, technological, and environmental parts to deliver resources or services to humans in a socially useful way. Water has been especially important in research literature on