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Reimagining Urban Topography

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Abstract Modern metropolises are built on a paradox. As they grow taller, they rely increasingly on the underground for structure, maintenance, delivery, and transportation. Yet, these two worlds are disconnected by a rigid, artificial barrier of asphalt and concrete. This paradox opens a space of opportunity for city development to find its new ground. This article argues that the ground must be reimagined not as a dividing line, but as a habitable volume. By expanding the threshold between the underground and the surface, we can create access to this overlooked world and develop new kinds of public space in an oversaturated city. Through an analysis of Manhattan's infrastructure layers and a design investigation at City Hall Park, this article proposes a "Threshold Membrane" - a porous urban topography that connects the civic realm with the depth of the city.

Keywords: Adaptive Reuse, City Hall Park, Civic Hub, Infrastructuralism, Subterranean Urbanism, Threshold Membrane, Underground Threshold, Urban Topography.

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1. Introduction

This article investigates the critical threshold between the subterranean realm and the city above. Intuitively, we tend to experience the 'ground' as a solid, stable surface. But if we look closer - both geologically and urbanistically - the ground is anything but stable. It is a constructed surface, a negotiated line between the tectonic forces below and the erosion above. Yet, despite massive physical manipulation, we have maintained strict psychological separation. We feel distinctively 'above' or distinctively 'below'.

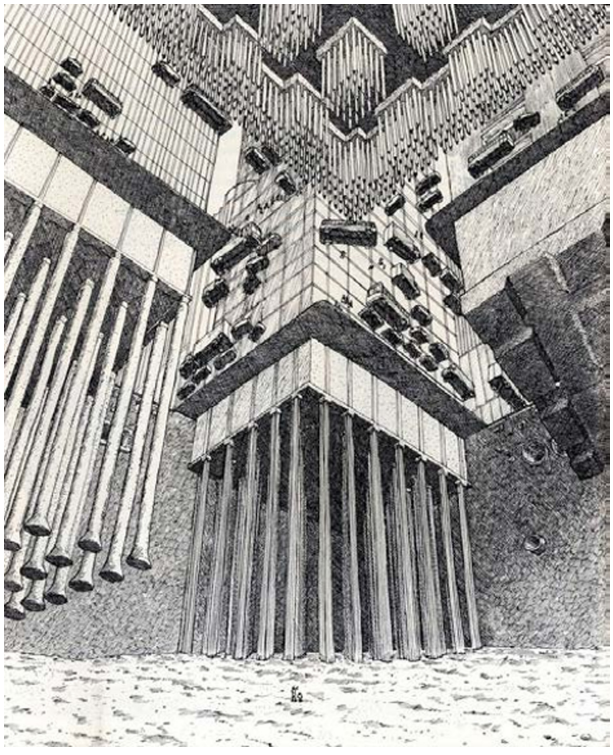


Figure 1. Illustration of urban infrastructure layers from Underground by David Macaulay. (Source: Houghton Mifflin, 1976).

Psychologically, the underground is perceived as the city's utilitarian backroom - neglected, unpleasant, and secondary. It houses the critical infrastructure networks that support the city, yet these systems remain invisible to the regular citizen. This ignorance leads to two critical issues: first, the potential failure of an overlooked system; and second, the creation of vast "leftover cavities" beneath the urban fabric. To unlock the potential that lies beneath our feet, we must first understand the neglected world below.

2. The Mundus Subterraneus

Primordial Shelter Anthropologically, the human perception of the underground is defined by a deep-seated ambivalence. Historically, the surface has been associated with the positive and the rational, while the mundus subterraneus (the world beneath) represents the negative, the invisible, and the unexplored. This duality is rooted in the subconscious identification of the earth as both a "maternal" enclosure and a frightening abyss. As Antonello Boschi notes, the cavern and the lair provide a primordial



Figure 2. Underground villages in China as documented in Architecture Without Architects. (Source: Bernard Rudofsky/ MoMA, 1964).



Figure 3. View of underground dwellings in New Matmata, Tunisia. (Photograph: Maxim Ulitin).

sensation of safety - a return to the womb - yet simultaneously invoke the terror of the tomb and permanent darkness. This psychological stratification mirrors the structure of the human house, where the roof and attic represent rationality and clarity, while the basement embodies the "dark entity" of the home, housing the irrational forces and hidden fears of the unconscious soul.

From Organic Shelter to Inorganic Machine For centuries, the threshold between surface and subsurface was porous; humanity utilized the thermal stability of the earth for survival in troglodytic dwellings and "pit houses," such as the yaodong cave dwellings of China and the stepwells of India - typologies extensively documented in Bjarne Mastenbroek's Dig It! Building Bound to the Ground. However, the Industrial Revolution fundamentally severed this organic relationship, transforming the underground from a place of static dwelling into a utilitarian machine. Lewis Mumford argues that the mine became the model for a completely "inorganic environment," a space where the rhythms of nature - day, night, and seasons - were abolished in favor of artificial light and ventilation. Consequently, the underground shifted from a habitat to a network of mobility and extraction, characterized by the dark, dynamic infrastructure of sewers and subways that support the modern metropolis.

In the modern era, the man-made threshold of asphalt



Figure 4. The Chand Baori stepwell in Abhaneri, Rajasthan, India, demonstrating the historical porosity of the ground. (Photo: Doron)

and concrete functions as a barrier that represses this "inorganic" world from view. The ground below the city has become an "archaeosphere", a human-made geological layer composed of ancient foundations, tunnels, and infrastructure that supports the life above. While contemporary urbanism often treats this layer merely as a functional void to be filled with utilities, architectural theorists like Peter Eisenman view the underground as a "palimpsest" - a site of "artificial excavation" where layers of history and memory overwrite one another. Thus, the threshold is not merely a physical separation, but a psychological boundary between the visible, conscious city and its repressed, functional unconscious.

3. Anatomy of The Invisible City

To intervene in the threshold between two worlds, we must first survey the hidden territory beneath our feet. In her book Underground Urbanism, Elizabeth Reynolds presents a precise categorization of these subterranean typologies, revealing a complex stratigraphy that is far more than just "dirt".

The Constraints of the Subsurface Building downwards is inherently more complex than building upwards due to a convergence of physical, psychological, and logistical barriers.

Physically, the underground is often an "incoherent three-dimensional space" congested with an unmapped web of existing utilities, tunnels, and deep foundations that must be navigated with extreme precision to avoid structural collapse. This engineering complexity makes underground construction significantly more expensive and riskier than surface development, often requiring heavy reinforcement against water pressure and geological instability.

The Shallow Subsurface (0–5 m) Directly beneath the pavement lies the city's metabolism. In the first meter below street level, a chaotic, tangled web of pipes and cables - gas, electricity, steam, potable water, wastewater, and optical fiber - forms what Reynolds calls "linear networks". This infrastructure was rarely laid according to a master plan; instead, it was forced underground through centuries of competition, creating a density of utilities that is often only accurately mapped when excavation reveals it.

Encasing these utilities is not necessarily natural soil, but a manufactured stratigraphy known as the "Archaeosphere". This is a hybrid layer where natural ground has mixed with centuries of human artifacts, demolition rubble, and waste. In ancient cities like Rome or York, this artificial ground can be up to 15 meters deep, acting as a "giant carpet" of cultural history and debris covering the natural crust.

The Intermediate Depths (5–50 m) Below the immediate utility layer lies the heavy infrastructure of urban mobility. This zone contains the brick and concrete tunnels of sewer systems and the networks of subways and road tunnels. In cities like Beijing, this depth also houses extensive networks of civil defense bunkers - up to 85 square kilometers - which have been repurposed for housing and commercial use.

Intersecting these horizontal tunnels are the vertical volumes of modern buildings. Referred to as "Icebergs", many modern structures extend deep below the visible surface. This includes multi-level basements used for residential extensions and the massive concrete pile foundations required to stabilize skyscrapers. For example, the Shard in London drives piles through the clay and into the sand 53 meters below ground.

The Geological Host (50-100 m) Beneath the "archaeosphere" and the tangle of infrastructure lies the natural

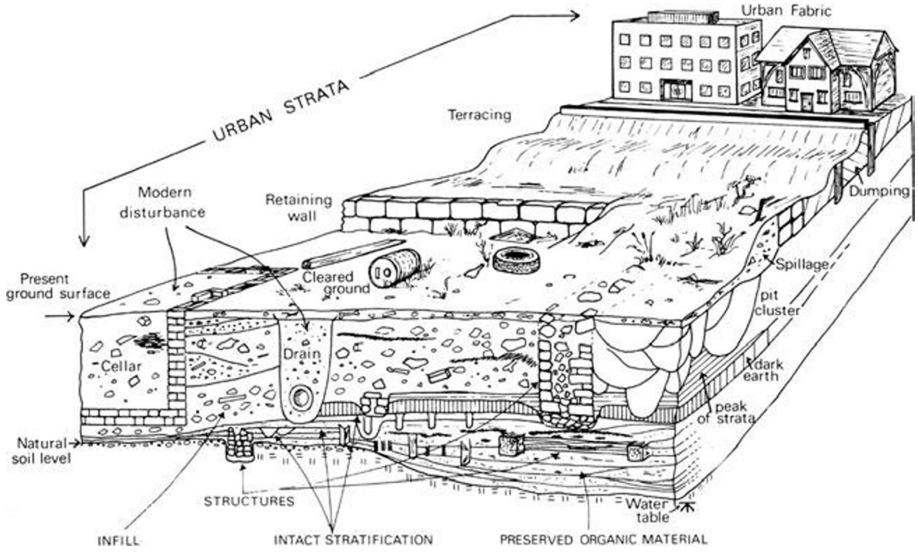


Figure 5. Archaeosphere of the modern urban environment. Illustration by Liz Hooper. From Martin Carver, Underneath English Towns: Interpreting Urban Archaeology (London: B.T. Batsford, 1987).

geology that dictates the city's vertical potential. The specific composition of this layer varies by region. In New York, the Manhattan Schist - a hard bedrock including Inwood Marble and Fordham Gneiss - anchors the skyscrapers, creating a "valley" deep below the surface that historically dictated where tall buildings could be placed. Conversely, in cities like Amsterdam or Mexico City, the ground is soft and unstable, requiring buildings to sit on millions of timber or concrete piles. Deep below this built environment lie natural aquifers, critical reservoirs of fresh water that are increasingly threatened by urbanization.

The Deep Frontier (100–4000m) At these depths, the underground transitions from a space of storage to one of energy and extraction. Cities like Reykjavik utilize this depth for geothermal energy, extracting steam from 1,000 meters below the surface. In the context of the "inorganic environment", this layer is defined by the mine. While urban skyscrapers reach upward, mines like Mponeng in South Africa extend over 4 kilometers downward, utilizing vast vertical elevators to extract resources from the earth's crust in temperatures that require massive refrigeration systems to make human survival possible.

4. Typologies of Disconnection

Having surveyed the physical constraints of the underground, we must examine how contemporary architecture



Figure 6. Design proposal for the Lowline park in New York City. (Image: Diller Scofidio + Renfro, 2015).



Figure 7. Central sunken courtyard at the Bibliothèque nationale de France by Dominique Perrault Architects. (Image: BNF).

has attempted to inhabit this realm. While the utilization of subterranean space has been explored for centuries, modern urban interventions often struggle to integrate the depth of the city with the surface. In examining these modern precedents, distinct typologies emerge, each revealing critical limitations in how the urban threshold is conceived.

The Artificial Cavity The first typology is the "Artificial Cavity", exemplified by the Lowline proposal in New York City designed by DSR. While ambitious in its attempt to reclaim vacant underground space as a park, the project suffers from a fundamental disconnection from the ground plane. Much like the existing subway system, the park interacts with the urban environment only through narrow punctures - staircases and elevators - leaving the street level effectively intact. By treating the ground as a "sealing lid" rather than a connective tissue, the project creates a hermetic container for nature rather than a truly integrated public realm. The focus remains on the technological simulation of the outdoors, rather than the spatial potential of the threshold itself.

The Inverted Fortress A second typology is the "Inverted Fortress", seen in Dominique Perrault's Bibliothèque Nationale de France. Perrault successfully introduces the "sunken courtyard", carving deep voids to bring natural light into subterranean reading rooms. However, despite dignifying the underground workspace, this gesture privatizes the void. The sunken forest becomes an enclosed, visual object for the institution, rather than a permeable extension of the city's public space. It proves that light can penetrate the depths, yet fails to democratize access to that depth.

The Commercial Landscape A more successful integration is found in SKP Chengdu (Field Operations and Sybarite), where the "Iceberg" strategy is inverted to prioritize the surface. Here, the ground is enhanced as a vibrant, green public park, while the commercial program occupies the subterranean levels. Crucially, the separation is softened by "slits" and voids that allow the underground life to register on the surface. Yet, a critical limitation remains: the subterranean architecture mimics the flat, stacked logic of a traditional building buried in soil. The potential for the underground to offer a distinct physical condition - defined by compression, mass, and geology - is largely traded for standard commercial floor plates.

Toward a Deep Surface To truly reimagine this relationship, we must look toward a new architectural logic. The vertical movement between levels should not merely be a means of circulation but the defining force of the surface itself. Drawing from the Yokohama International Port Terminal (FOA), where the roof peels up to become the floor, or the Sancaklar Mosque (Emre Arolat), where the topography itself dissolves into the ceiling of the sanctuary, we can envision a "Deep Surface". In this model, the ground is no longer a barrier to be pierced, but a thickened landscape that swells and folds to inhabit the space between the city and its infrastructure.

5. The Thick Threshold: A Proposal for City Hall Park

To demonstrate how the potential of the underground can be broadened beyond mere utility, one particular site serves as a perfect case study. It is a site that embodies the conflict between the sanitized surface image and the chaotic subterranean reality: City Hall Park in New York.



Figure 8. Integration of subterranean retail and surface park at SKP Chengdu. (Image: Field Operations)



Figure 9. The integration of public ground and transit access at the Yokohama International Passenger Terminal. Photograph by Satoru Mishima.



Figure 10. Aerial view of City Hall Park, 1952. Photograph by Angelo Rizzuto.

The Infrastructural Island This site was selected for three critical reasons. First, it sits atop a massive, overlooked infrastructural knot. The park is effectively an “island” surrounded by a convergence of subway lines - the 4, 5, 6, J, and Z to the Northeast; the R and W to the Northwest; and the 2 and 3 to the Southwest. Yet the abandoned City Hall Loop station lies dormant directly beneath the municipal seat. Second, the site holds immense urban significance as the “Heart” of the Financial District and the “City Gate” for pedestrians descending from the Brooklyn Bridge. Currently, however, this arrival is met with a confusion of traffic and fences rather than a welcoming civic space.

The Historical Palimpsest Third, and perhaps most critical, is the site's role as a historical palimpsest. The ground here has been rewritten repeatedly: from the Lenape crossroads to the Dutch “Commons”, to a site for the unwanted (housing almshouses, debtors' prisons, and burial grounds). In the 19th century, this complex history was buried to create a “sanitized image” for the government. Today, the park functions as a “Nominal Monument” - a detached administrative enclave that organizes the city’s files but fails to engage its community.

The New Agora If the current site is a static monument to administrative power, this proposal argues that a thickened, articulated threshold could transform it into a “New Agora” - a true civic hub that acknowledges the porosity of the ground. Rather than maintaining the thin, impermeable layer of asphalt that separates the citizen from the infrastructure, we can envision a "swelling" of the ground plane.

By manipulating the topography, a continuous, entangled landscape could be created. This articulated ground weaves the abandoned City Hall station back into the public realm, creating a space of reciprocity. This intervention constructs an *urban palimpsest*, connecting the deep subway layers, the streetscape, and the adjacent skyscrapers into a single, vertical public territory. It demands that the buried history and the saturated public transport node be connected into a common civic hub that "erupts" from the earth and finds space for expression.

6. Conclusion: An Overlooked Frontier

This strategy of “thickening the threshold” is not unique to Lower Manhattan. Even across the United

States, the volume of subterranean voids that could facilitate the demands of modern metropolises is enormous ranging from the abandoned subway tunnels of Cincinnati and Rochester to the neglected streetcar networks of Los Angeles. These are not merely ruins; they are latent spatial assets.

By reimagining the ground not as a barrier but as a porous interface, we allow the future development of our cities to access this overlooked frontier. Whether reactivating "vacant gems" like the City Hall Loop or constructing new deep-surface developments, we must shift our perspective. The ground we walk upon is not the end of the city, but the beginning of a vast, habitable volume waiting to be claimed.

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