

**New York Apartments:  
Holes for Life**

by

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## **ABSTRACT**

This thesis explores the potential of design concepts to generate new building morphologies. The report outlines a retrospective demonstration of how the concept of porosity has been used to illicit the qualities of openness and interpenetration within a high-density, mixed-use building complex.

The Lower East Side, one of the oldest and most densely populated areas in New York, is compromised by a multitude of urban dilemmas; Where space is understood in terms of efficiency, capital and growth, residents are largely confined to compact, hermetic apartments which are disconnected from the outside world and from each other.

The concept of porosity serves as a tool to invoke architectural devices that contribute to the desired effect of social exchange.

## **ACKNOWLEDGEMENTS**

Talbot, thank you for giving me the benefit of the doubt

Eric, your appreciation has been a life force

To my friends, thank you for dancing with me

To my parents, with everything I have left





## CHAPTER 1: INTRODUCTION

This thesis explores the potential of design concepts to generate new building morphologies. The report outlines a retrospective demonstration of how *the concept of porosity*, has been used to illicit the qualities of openness and interpenetration within a high-density, mixed-use building complex.

The Lower East Side, one of the oldest and most densely populated areas in New York, is compromised by a multitude of urban dilemmas; Where space is understood in terms of efficiency, capital and growth, residents are largely confined to compact, hermetic apartments which are disconnected from the outside world and from each other.

The concept of porosity is incorporated into the wider hypothesis that *permeability* at the urban and building scale can contribute to an open society. This metaphor serves as a tool to invoke architectural devices that contribute to the desired effect of social exchange.

This leads to the implementation of a corroborative compositional device. In this case, the concept of *the field* serves as a structural framework capable of supporting the paradoxical ambitions of a permeable urbanism: the simultaneous demand for heterogeneity and order.

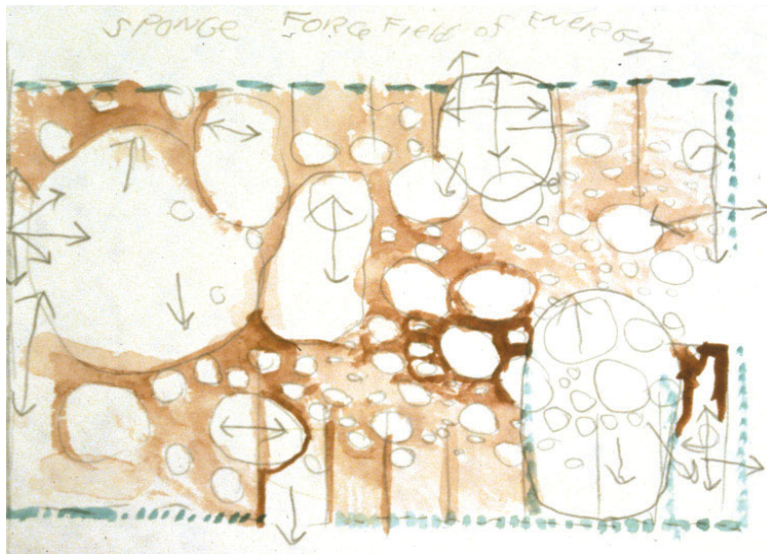
The translation from concept to design evolves through the layering of consecutive actions in a cyclical process of interpretation and evaluation, where porous fields transition from loose constructions to livable ones.

## CHAPTER 2: ON THE CONCEPT OF POROSITY

In “Displacement of Concepts,” the philosopher and urban planner Donald Schön describes the advantage of using analogy and metaphor to comprehend and frame problems; While old concepts can be used as projective models for new situations, they also carry old assumptions and associations and, in the reciprocal nature of this process, new meanings are formed.<sup>1</sup>

In the earth sciences, *porosity* is defined as the attribute of an organic body to have a large number of small openings whose function is associated with circulation and filtration with the external environment. *Permeability* follows as the measure of the ability of a porous material to allow liquid or gas to pass through it; If porosity is an objectively physical description, then permeability is a more complex understanding of surrounding circumstances.

While porosity can be thought of simply as *holes*, its use in architecture implies of a sense of *interpenetration*.



The concept of porosity guided the production of a ‘sponge-like’ architecture in Steven Holl’s Simmons Hall student residence at MIT; *Sponge Force Field of Energy* concept sketch from Holl, *Experiments in Porosity*

<sup>1</sup> Donald Schön, *Displacement of Concepts* (London: Tavistock Publications, 1963), 3

At the scale of a building, openings circulate air and light, provide accessibility, visibility, and communication. Porosity has furthermore been incorporated into the wider hypothesis that *permeability* at the urban scale can contribute to an *open society*.

Permeability is described by an equation which relates the physical properties of a fluid to the pressures applied to a porous material, a dynamic measurement which accounts for many factors: the speed at which a fluid travels, the viscosity of the fluid, the thickness of the porous material, and the applied pressure difference.

On a holistic level, this list is analogous to the system of interrelated components which contribute to the ability of a city to let life pass through. The physical properties of urban components, as well as social pressures relating to program and access, can be evaluated anew to describe a measure of *Urban Permeability*.

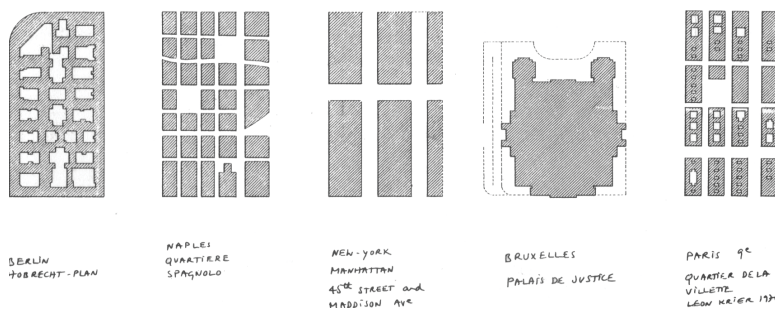


Detail from the 1748 Nolli map, *La Nuova Topografia di Roma*, in which enclosed public space was represented as open

## Access

If we think of the whole city as a singular porous material, then its building blocks represent the plurality of individual, mostly private components, while the sequence of streets and squares constitute the space of flows and exchange. In "Urban Components," Léon Krier describes how the social and cultural complexity of a city has to do with the physical complexity and density of these basic units.

The city block can be identified as the most basic typological element in the composition of urban space and Krier suggests that blocks should be as small as possible, forming many well defined streets and squares. Small blocks, he describes, are the result of the maximum exploitation of urban ground and facilitate the greatest concentration of activity. "If the main cause for small urban blocks is primarily economic," he writes, "it is because such an environment is also the basis of urban culture: of intense social exchange."<sup>2</sup>

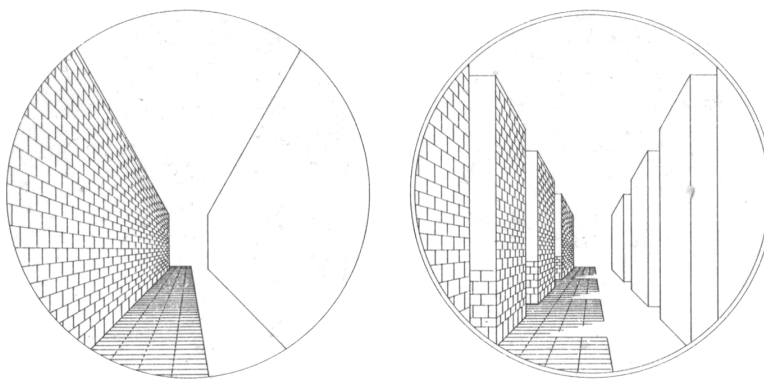


Parallel of Block Sizes; from  
Léon Krier, *Houses, Palaces,  
Cities*

<sup>2</sup> Léon Krier, *Houses, Palaces, Cities* (London: AD, 1984), 43

A permeable urbanism can be understood as the experiential phenomena of spatial sequences, the scale of distances walked and seen, and passages available which offer a freedom of pedestrian movement and allow us to *discover* a place.<sup>3</sup> If something is transparent, it is immediately known. “By simultaneously revealing and concealing, translucency, in contrast, lends interest to what lies beyond the surface.”<sup>4</sup>

In Walter Benjamin’s “Reflections” he describes the porous architecture of the city of Naples in which “building and action interpenetrate in the courtyards, arcades and stairways to become a theater of new unforeseen constellations...”<sup>5</sup> Benjamin attributes this porosity to the juxtaposition of old and new, enduring and fleeting, public and private, sacred and profane, interior and exterior—heterogeneities in scale and access.



The relation between block and street; from Léon Krier, *Houses, Palaces, Cities*

3 Steven Holl, *Urbanisms*, 22

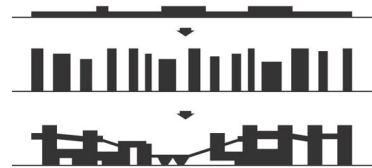
4 Nan Ellin, *Integral Urbanism* (New York: Routledge, 2006), 62

5 Walter Benjamin, *Reflections* (New York: Harcourt Brace Jovanovich, 1978), 285

## Activity

At best, open spaces—streets squares and parks—help knit together diverse surrounding functions by giving them a joint facility. However, in “The Death and Life of Great American Cities,” Jane Jacobs emphasizes that not all open space is good. (“More open space for what? For muggings?”)<sup>6</sup> Jacobs identifies the metropolitan principle that liveliness attracts more liveliness and follows that a mixture of uses of buildings produces a mixture of users who enter and leave adjacent open spaces at different times. This *sequence of use* identifies the temporal dimension of cross-programming as paramount.

‘Mixed-use’ typologies and urban strategies have been prevalent in many cultures throughout history, from the quintessential house over the shop to the large scale hybrid. More recent years have seen numerous architects attempt to address a growing sense of disconnectedness through new forms of cross-programming. Steven Holl has been a leading practitioner of the use of programmatic porosity to explore the capacity of architecture to confront the 21st century challenges of privatization and scale. In Beijing, his Linked Hybrid Building fuses commercial, residential, educational and recreational facilities in a three-dimensional urban space, where pedestrians are free to move through open passages, roof gardens and sky bridges, marking a conceptual departure from the strictly vertical city by carving out new territories for the public sphere.<sup>7</sup>



From a “City of Objects” to a “City of Spaces; concept diagram from Holl, *Urbanisms*

6 Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961), 116

7 Steven Holl, *Urbanisms: Working with Doubt* (New York: Princeton Architectural, 2009), 188

## Threshold

Central to the idea of urban porosity is a challenging of the separation of public and private space, and the belief that the intimacy of private life and the sociability of public life find anchors in each other. In “Houses and Streets make Each Other” Herman Hertzberger describes the codependency of these polarities and architecture’s role as mediator:

Residential units can only function together satisfactorily if the street on which they are situated functions properly as a “living street,” and that in turn depends largely on how all the residential units manifest themselves outwards.<sup>8</sup>

Aldo Van Eyck conceived of the relationship between interior and exterior space as an existential question and used ‘thresholds’ to bridge between different spatial and psychological zones in the city.

Take an example: the world of the house with me inside and you outside, or vice versa. There’s also the world of the street—the city—with you inside and me outside or vice versa. Two worlds clashing, no transition. The individual on one side, the collective on the other. It’s terrifying. Every time we pass through a door we’re split in two—but we don’t take notice anymore, and simply walk on, halved.<sup>9</sup>

To him, the way in which interior and exterior should connect was through meaningful transitions - courtyards, open stairways, balconies, and many other forms of *in-between* space that help soften harsh divisions and provide opportunities for accommodation and observation between adjoining worlds.

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8 Herman Hertzberger, “Houses and Streets Make Each Other,” *Space & Society* 23, no. 1 (1983), 20

9 Aldo Van Eyck, “Otterlo Meeting” in *Team 10 Primer*, ed. Alison Smithson (Cambridge: MIT, 1962), 55



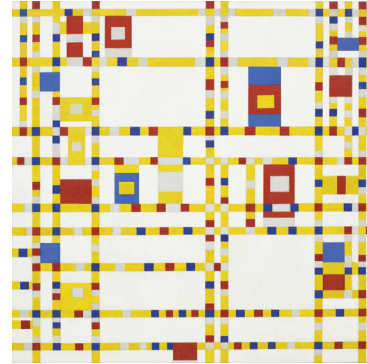
## CHAPTER 3: COMPOSITIONAL STRATEGIES

### The Field: Accommodating Difference

In “Field Conditions,” Stan Allen observes new ways in which *difference* can be accommodated using compositional strategies that depart from traditional concepts of typological form by demonstrating a range of spatial possibilities generated by the systemic logic of the *field*. Here, the term field means “any formal or spatial matrix capable of unifying diverse elements while preserving the identity of each.”<sup>10</sup>

The concept of the field is rooted in mathematical field theory which, in the last years of the 19th century, unequivocally transformed the intellectual conception of the relationship between space and matter. “Space appeared for the first time as an autonomous aesthetic concept and more importantly as a continuum unbroken and indistinct from solid objects.”<sup>11</sup>

“The field describes a space of propagation, of effects. It contains no matter or material points, rather functions, vectors and speeds.”<sup>12</sup> Extracted from its exact meaning, the field can be perceived as a structural framework capable of supporting a heterogeneous agglomeration of elements; The aesthetic application of the field has been appropriated by architectural thinking where it has been used as a method to model and program the space of a permeable urbanism.



Piet Mondrian  
*Broadway Boogie Woogie*  
1942

A structural syntax provides the possibility for endless reconfigurations of difference.

<sup>10</sup> Stan Allen, *Points + Lines: Diagrams and Projects for the City* (New York: Princeton Architectural, 1999), 92

<sup>11</sup> Sanford Kwinter, *Architectures of Time* (Cambridge, MA: MIT, 2001), 60

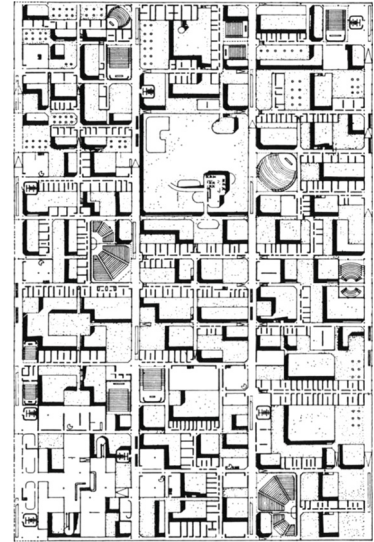
<sup>12</sup> *Ibid.*, 591

Team 10 questioned the failure of early modern architecture to address the public in relation to the private and sought to embrace the built environment as one indivisible whole. To them, it was essential that architecture should take on a formative role in encouraging encounter between social groups.

In the 1974 article “How to Recognize and Read Mat-Building,” Alison Smithson identified a building typology that had emerged from this thinking, which used the concept of the field to dismantle and reframe the conventional conceptions of program and composition.<sup>13</sup>

Mat-buildings tended to be large-scale, high-density structures. Design objectives included the unifying capacity of an accurately modulated grid; a site strategy that let the city flow through; repetition and variation among interchangeable parts; and the activation of void spaces within the fixed fabric—outside architecture’s explicit *envelope of control*.<sup>14</sup>

Within the concept of the field, mat buildings were able to avoid questions of style in favour of organizational principles, suggesting that it is not the overall form that is important but local conditions.



Candilis, Josic, and Woods  
*Berlin Free University Plan*  
1963

The building is conceived not as a thing, but as a set of systems layered to occupy a charged field. The principal function was to provide within one organization the maximum possibility for social exchange; from <http://socks-studio.com>

<sup>13</sup> Alison Smithson, “How to Recognize and Read Mat-Building,” *Architectural Design*, September (1974), 573

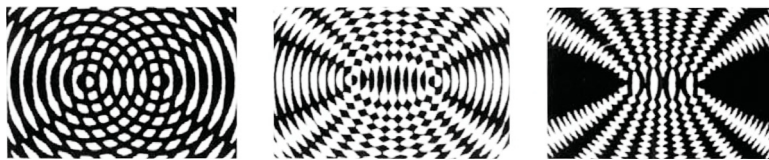
<sup>14</sup> Stan Allen, “Mat Urbanism: The Thick 2-D.” in *Case: Le Corbusier’s Venice Hospital and the Mat Building Revival*, ed. Hashim Sarkis (Munich ; New York: Prestel, 2001), 119

## Moiré: Controlled Chaos

In many ways, urban porosity seeks disorder. Unpredictability and the unknown are the keystones to the sense of discovery that porosity promises. Yet—urban design which seeks porosity is confronted with a fundamental urbanistic paradox: how to give space to the unpredictability of urban life without revoking the architect’s capacity to provide some form of order. “If there is no order,” Alison Smithson wrote, “there is no identity but only the chaos of disparate elements in pointless competition.”<sup>15</sup> In his “Informal” manifesto, Cecil Balmond discusses this paradox:

When we attempt to trap chaos and convert it to our preconceptions, finding order becomes an enormous effort. We try to eliminate fault or error. We try hard but the effort turns to dullness and the heavy formal... One approach is to seek the notion that chaos is a mix of several states of order. What is an improvisation is in fact a kernel of stability, which in turn sets sequences that reach equilibrium.<sup>16</sup>

When two patterns are overlaid, while displaced or rotated from one another, a secondary and visually evident superimposed pattern will produce unexpected effects from those elements that are in themselves repetitive and regular. These effects are not as random as they seem however, since they behave according to mathematical rules. Combining the familiar and unknown, moiré patterns may be used as a tool for simulating porosity since they possess a balance of familiar and unknown elements.

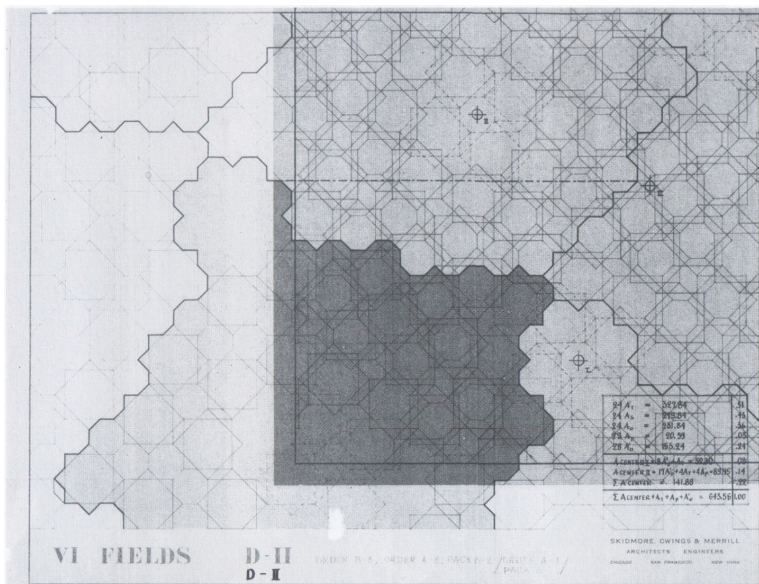


Moiré patterns; from Stan Allen, *Points + Lines*

<sup>15</sup> Alison Smithson, *Architectural Design*, 580

<sup>16</sup> Cecil Balmond, *Informal* (Munich: Prestel, 2002), 219

In the 1950s, Chicago architect Walter Netsch transformed the concept of field theory into a visualization methodology and cultivated a system of design that was idiosyncratic yet non-arbitrary, producing structures that were efficient both programmatically and economically. His process involved manually manipulating sets of two-dimensional geometries and then tracing the resultant moirés to arrive at building plans.<sup>17</sup> The process began without preconceived ideas regarding the design. Rather, its purpose was to search for new field conditions where each building program and structure could be uniquely formed; “In the tracing came discovery.”<sup>18</sup>



Walter Netsch  
*Field study*  
1960

For Netsch, field theory was a formal process which involved manually manipulating sets of two-dimensional geometries to arrive at a plan-based design; from Charles Waldheim, *Chicago Architecture*

17 Charles Waldheim. *Chicago Architecture: Histories, Revisions, Alternatives* (Chicago: University of Chicago, 2005), 20

18 *Ibid.*, 21

## **Superimposition: the Interpretation of Effects**

“The field is a fundamentally horizontal phenomenon—even a graphic one”<sup>19</sup>—yet, as the moiré demonstrates, the combination of fields has the capacity to create intensification at specific moments which may be interpreted as having three dimensional implications. One of the potentials of the field is to generate form through the *interpretation* of these events.

If we think of the figure not as a demarcated object read against a stable field, but as an effect emerging from the field itself—as moments of intensity within a continuous field—than it might be possible to imagine figure and field as more closely allied.<sup>20</sup>

In architecture, superimposition allows us to see the relationships between different layers. Since it is possible to observe overlapped parts as belonging to both layers at the same time, superimposition emphasizes the space “in-between” and creates a dialogue between coexisting systems. For the purposes of generating porosity, superimposition can help to establish whether space is added or subtracted from a field, or whether it belongs to one program or another.

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19 Stan Allen, *Points + Lines*, 98

20 *Ibid.*, 97





René Magritte  
*The Blank Check*  
1965

## CHAPTER 4: HOUSE FULL OF STRANGERS

Why do we have to throw ourselves into the world when we possess the cradle of the house?

The purposes of human life are not found at home; the role of each individual is part of a system of interactions which take place in a common world.<sup>21</sup>

Cities have the potential to make us more enlightened people. They are places where we can enter into the lives of others and learn from their experiences, where diversity stimulates and expands our minds. But this reciprocity is not inevitable; “One of the biggest issues in urban life is *how* to make the complexities that a city contains actually interact.”<sup>22</sup>

A living museum of housing experiments, the Lower East Side has often been an area in decline and public visions of renewal have strongly shaped its evolution. Drastic schemes have been implemented to eradicate poor living conditions and facilitate economic growth, yet, these changes have often resulted in analogous eradications of access and exchange.

As one of the oldest and most densely populated areas in New York, much can be learned from the neighbourhood’s history of residential architecture. Its major historic housing typologies—the tenement, the ‘tower in the park,’ and the small unit apartment—variously demonstrate the effects of scale and organization on urban vitality, and stand as a reminder that apartments are responsible for their neighbourhood and visa versa.

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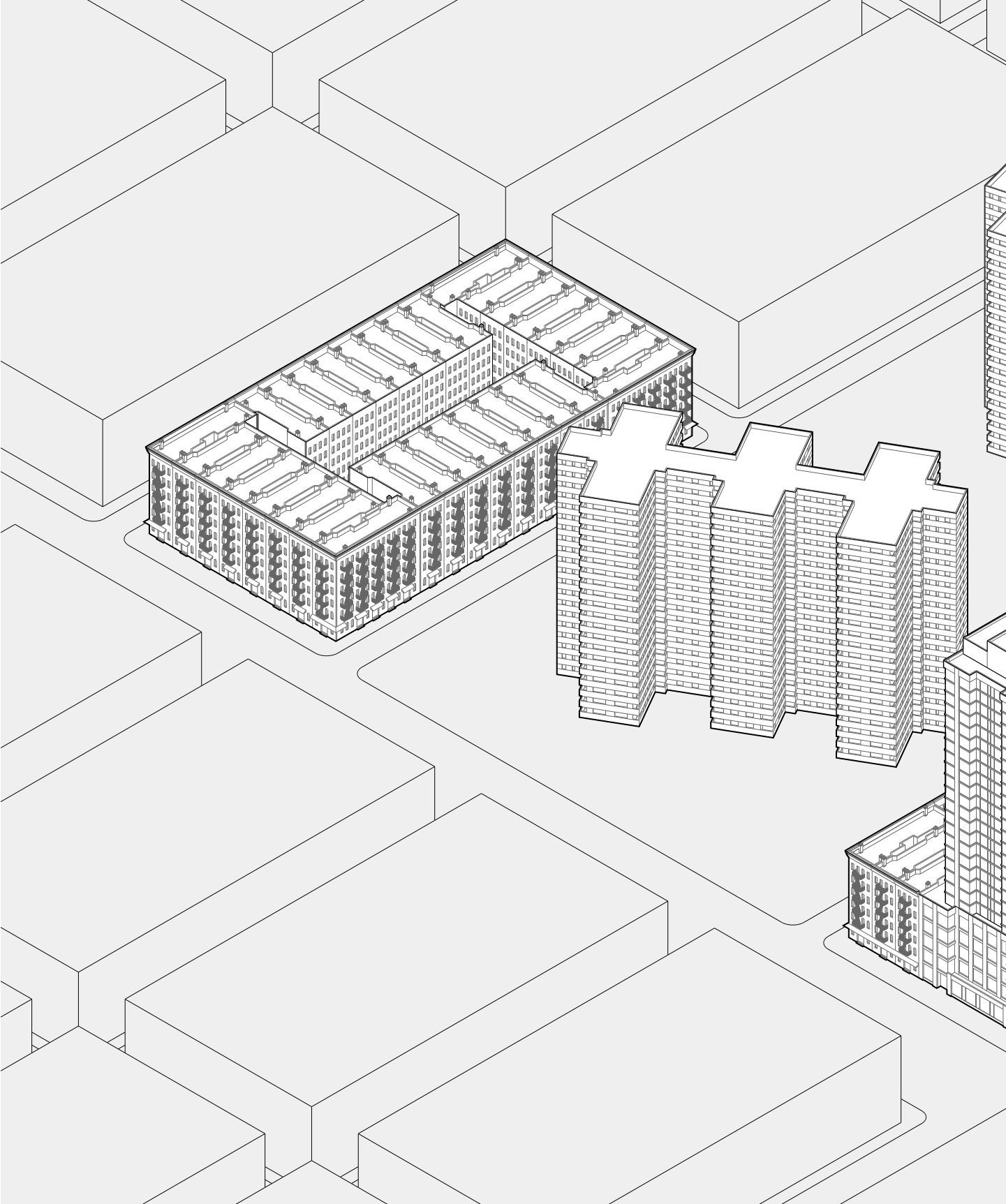
21 Christian Norberg-Schultz, *The Concept of Dwelling* (New York: Rizzoli International Publications, 1985), 31

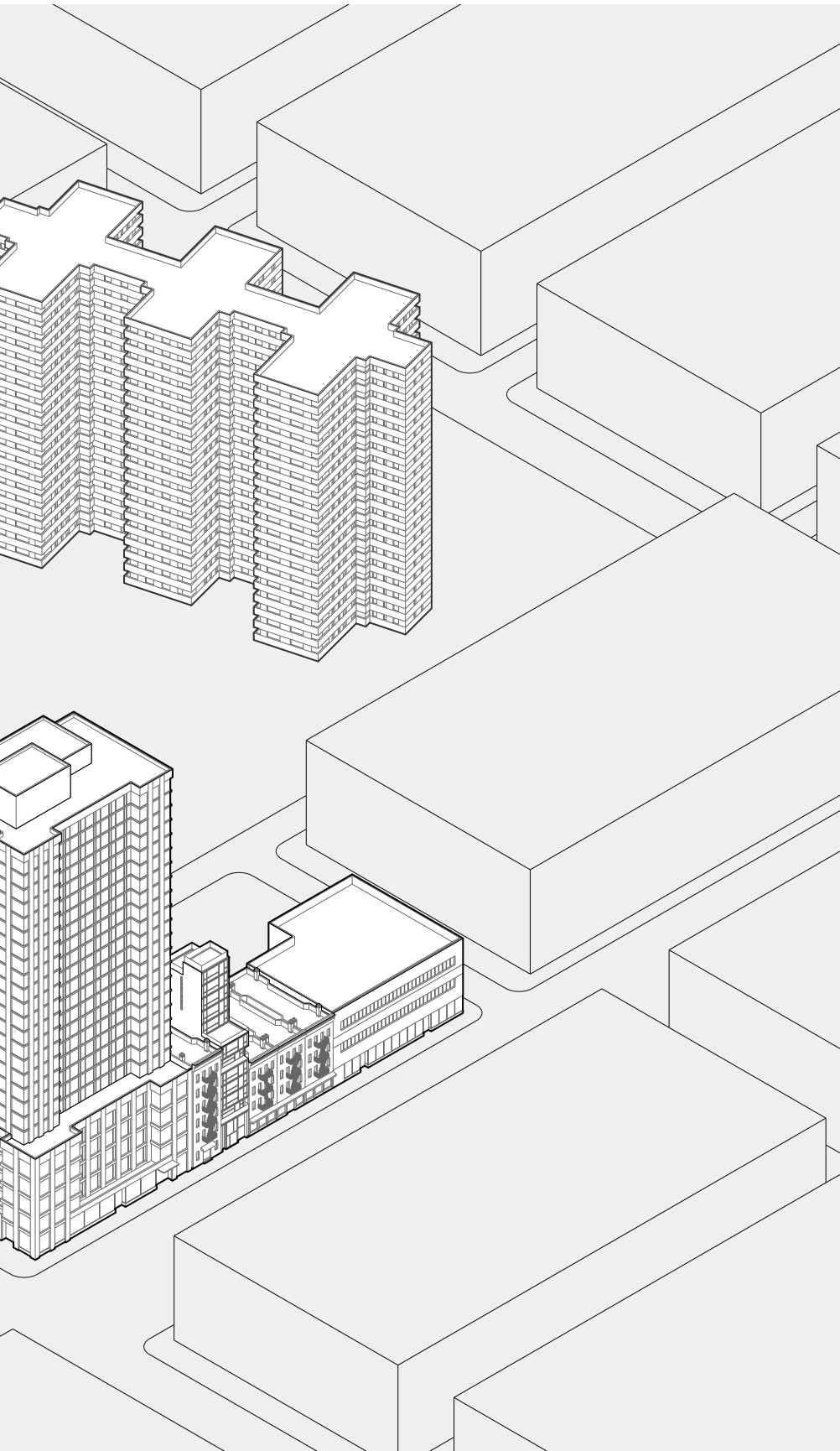
22 Richard Sennett, “New Capitalism, New Isolation,” *Monte Diplomatique Online*, (February 2001) <http://mondediplo.com/2001/02/16cities>



Plan of Manhattan. The Lower East Side is highlighted in red.







From the left: the tenement building, the 'tower in the park,' and the small unit apartment

## Solid

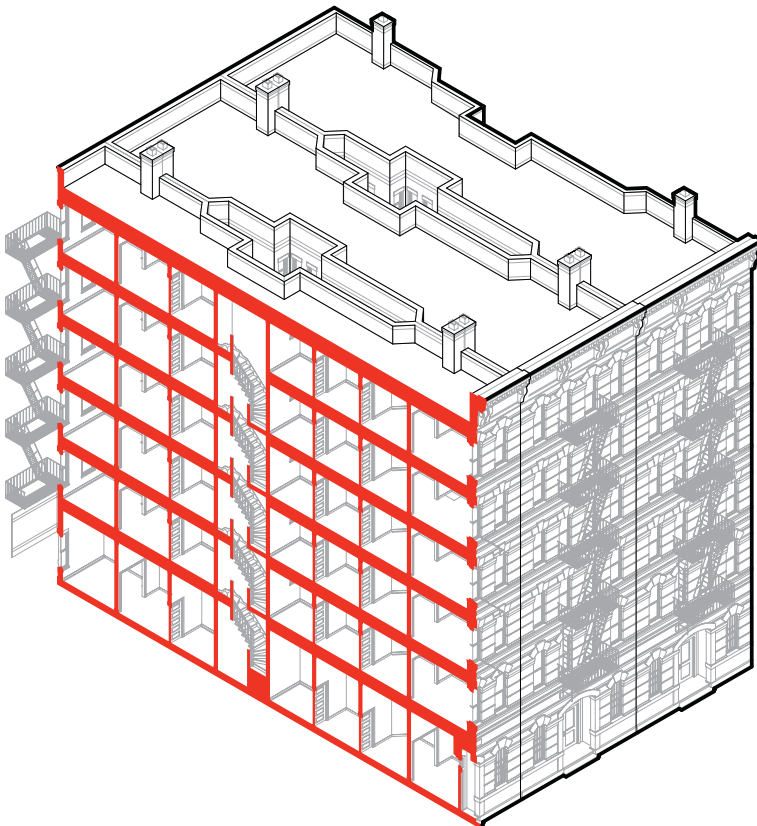
Tenement buildings housed the first major influx of immigrants to New York City. By the end of the eighteenth century, the Lower East Side was the most densely populated neighbourhood in the world, with 500,000 people living in tenements, in horrendously overcrowded and unhealthy conditions.

The history of the tenement calls into question the relationship between density and housing form. The grid pattern on which streets were laid out and the economic practice of building on individual 25 X 100 foot lots, combined to produce extremely high land coverage. Tenements often covered more than 90 percent of the lot, were five or six stories high, and had 18 rooms per floor of which only two received direct sunlight.<sup>23</sup>

Public concern ultimately led to the passage of a new law, requiring a reduced lot coverage and mandating strict enforcements regarding ventilation, running water and fire safety. These rules are still the basis of New York City law on low-rise buildings, and make single-lot housing developments uneconomical. Despite these upgrades, tenements were still very unpleasant—especially in hot weather.

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23 Richard Plunz "On the Uses and Abuses of Air: Perfecting the New York Tenement, 1850–1901," *Berlin/New York: Like and Unlike: Essays on Architecture and Art from 1870 to the Present*, ed. Josef Paul Kleihues and Christina Rathgeber (New York: Rizzoli, 1993), 159



The tenement building's extremely high land coverage resulted in deep sections and poor ventilation

## Empty

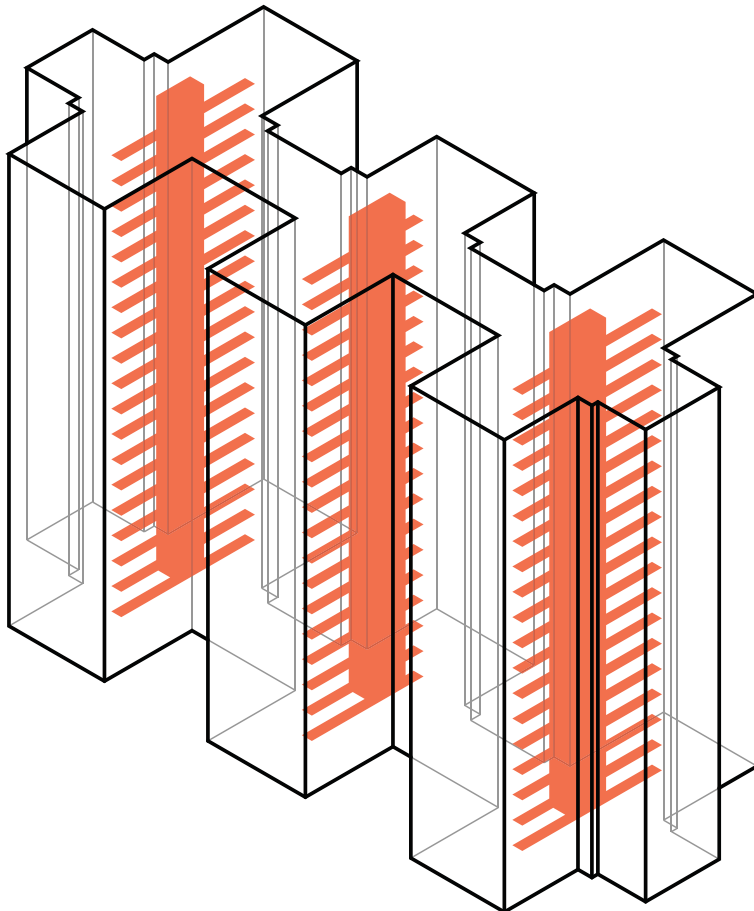
By the mid-nineteenth century, urban critics determined that the grid was disadvantageous for housing and pursued a decades-long program of “slum-clearance” replacing entire neighbourhoods with large-scale public-housing projects. Drawing from Le Corbusier’s “Tower in the Park” style, these schemes were endorsed by modernist housing reform advocates for improving urban living conditions by means of better siting to ensure more sunlight, wider views, and more satisfactory exterior spaces.

As fate would have it, the public housing projects “became worse centers of delinquency, vandalism, and general social hopelessness than the slums they were supposed to replace.”<sup>24</sup> The oversized blocks did not have the grid’s walkable character, and because they were generally reserved for only one building type—residential, and one demographic—low income, vast tracks of land lost the mixed-use quality of the building-lined street; the “parks” became dispirited city vacuums, little used and unloved.

A combination of poverty and redlining led to the deterioration of the neighbourhood’s remaining tenements and by 1990, the local government had demolished over 250 vacant buildings. Community advocates protested that demolition eliminated the possibility of future renovation. Regardless, these demolitions attracted corporate developers looking for vacant sites and thus, prepared the ground for gentrification.<sup>25</sup>

<sup>24</sup> Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961), 129

<sup>25</sup> William Sites, *Remaking New York: Primitive Globalization and the Politics of Urban Community* (Minneapolis: University of Minnesota, 2003), 69



The corridor does not rank high on the list of most-loved spaces. How could such a glaringly unpopular space become so prevalent?

## Private

By the 1980s, increases in housing abandonment and a growing fear of crime lead New York officials to “remake the city.”<sup>26</sup> This redefinition centered on cleaning up public spaces and neighborhoods in order to facilitate the development of tourism, entertainment, and retail-chain commerce, which in turn ruled out legitimate places for the neighbourhood’s own residents.

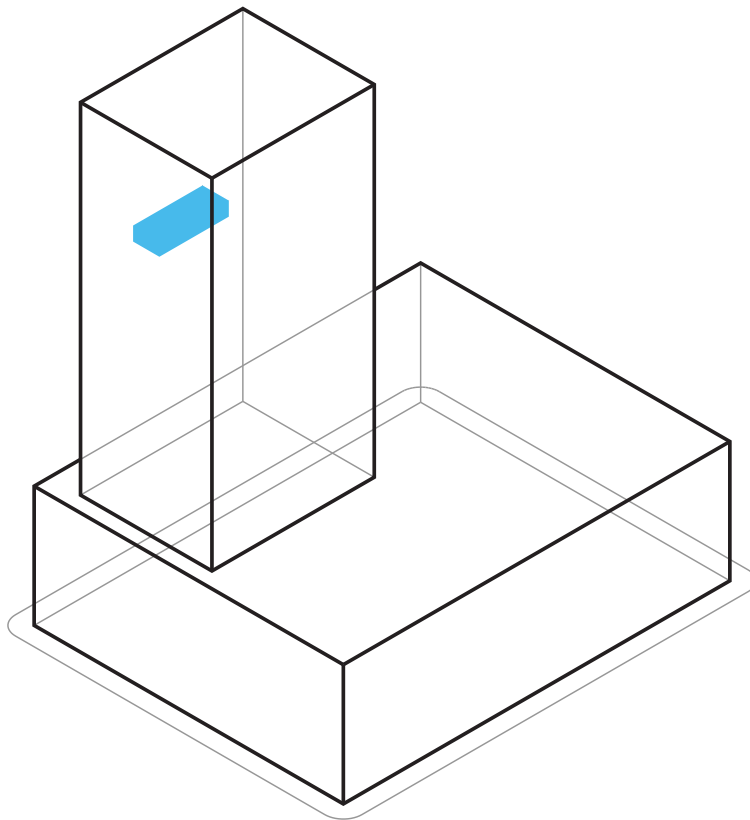
Simultaneously, the construction of new residential buildings showed the same homogenizing forces of redevelopment with the high density small unit apartment becoming the most acceptable form of new housing. As with many historic inner city neighbourhoods, the Lower East Side, a mid-rise neighbourhood since its inception, continues to be disrupted by these apartments; Their systems of internal circulation disconnect units from the street, which in turn is reduced to the function of access rather than *a place to be*. Meanwhile, people arrive home by way of communal elevators and corridors—“spaces that are so anonymous that they discourage informal contacts even between neighbours.”<sup>27</sup>

In “The Open City,” Richard Sennett discusses the conditions of dissociation and indifference that plague urban “civil society.” “Mutual accommodation through dissociation,” he writes, “spells the end of citizenship practices that require understanding of divergent interests, as well as marking a loss of simple human curiosity about other people.”<sup>28</sup>

26 William Sites, *Remaking New York*, 87

27 Herman Hertzberger, *Houses and Streets*, 21

28 Richard Sennett, “The Open City,” *Harvard GSD Lecture Series* (2013)



A thing is a hole  
in a thing it is not







A plan of the Lower East Side shows the stark contrast between the mid-century housing projects and block-based development. Highlighted in red, the thesis site is comprised of three vacant lots along Delancey Street at the mouth of the Williamsburg bridge.

## Site

In 1965, a federal program was designed to tear down several tenements to develop low-income housing along the south side of Delancey Street, the major artery that turns into the Williamsburg bridge, connecting Manhattan to Brooklyn. Due to political controversy, the new apartments were never built. To this day, 20 acres remain vacant, the largest tract of undeveloped city-owned land in Manhattan.<sup>29</sup> Within this acreage, a particularly substantial urban void is created by three adjacent blocks—currently used as parking lots.



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<sup>29</sup> Russ Buettner, "They Kept a Lower East Side Lot Vacant for Decades," *The New York Times* (March 23, 2014)





Photograph of the thesis site;  
from Google Earth

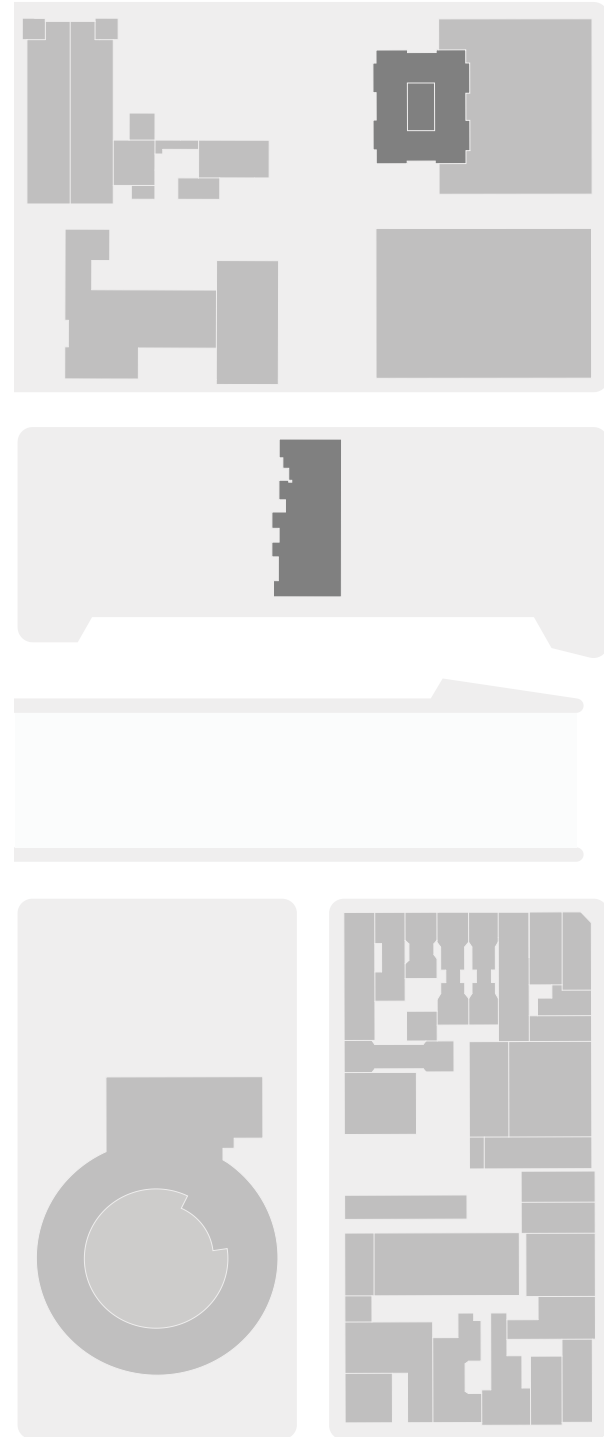
## CHAPTER 5: EVOLVING STARTING POINTS

The following chapter serves as a retrospective account of how the concept of *urban permeability* was used to address the challenge of providing humanistic housing, and access to good public space, through the design of a mixed use building for this site.

The goals were 1) to produce a porous architecture that facilitates spatial interpenetration and elicits a sense of discovery and 2) to devise a structural framework capable of supporting a heterogeneous program, while retaining the identity of individual parts.

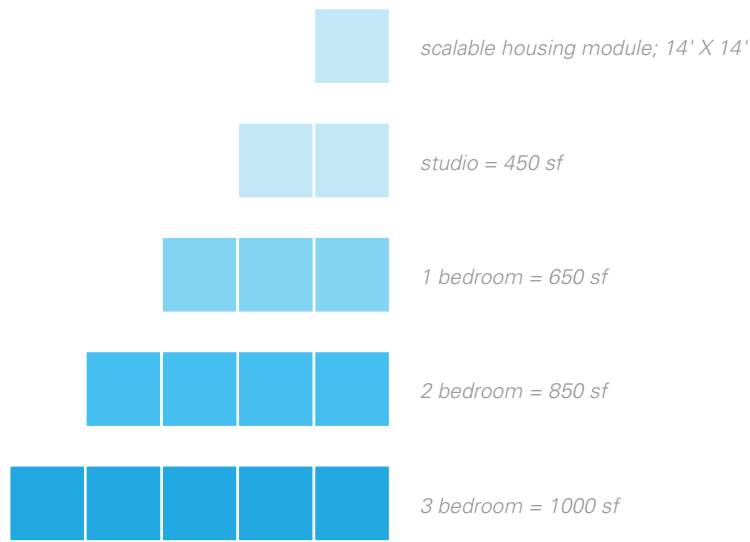
At the onset, it is not known how new concepts generate architectural form. The work of this thesis therefore began with a series of planimetric experiments in which fields of information were layered, augmented and evaluated.

Predicated on the reciprocity between action and evaluation, the following collection of frozen moments describe a methodology that, by emergence, created its own system of orders.



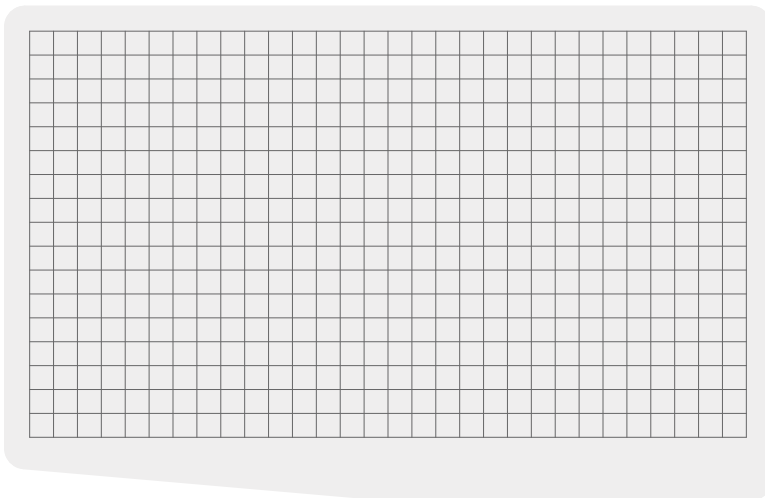


**1**  
To begin, two of the three vacant lots were merged to suggest a pedestrianized superblock



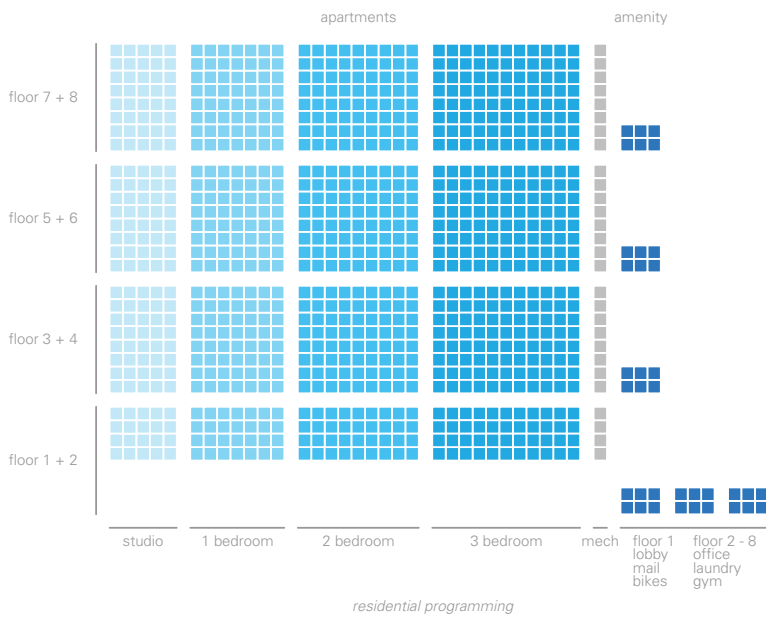
manhattan population density = 25,800 people / square kilometer  
 site area = 0.016 square kilometers  
 site population = 413 people

typical people / unit =  $(1 + 1.5 + 2.5 + 3.5) / 4$   
 = 2.125 people  
 = 194 units (48 of each type)  
 = 141,600 sf

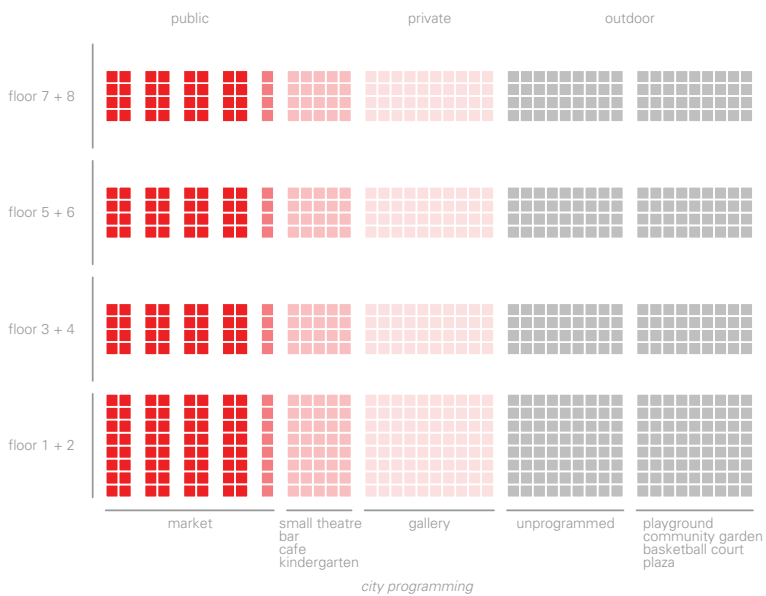


**2**  
 A scalable housing module, accommodating studio to 3 bedroom apartments establishes a rudimentary measure

**3**  
 The module is the basis of a 14' grid, which is transposed onto the site

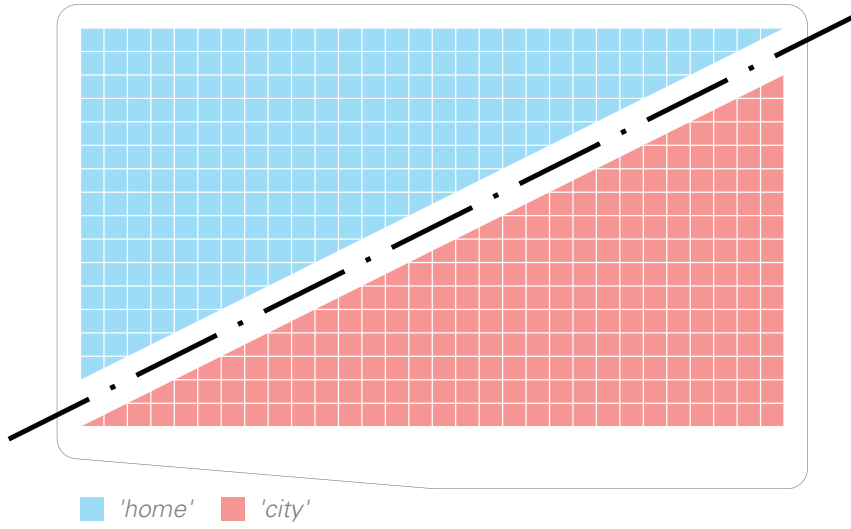


**4**  
A residential program responds to current Manhattan densities

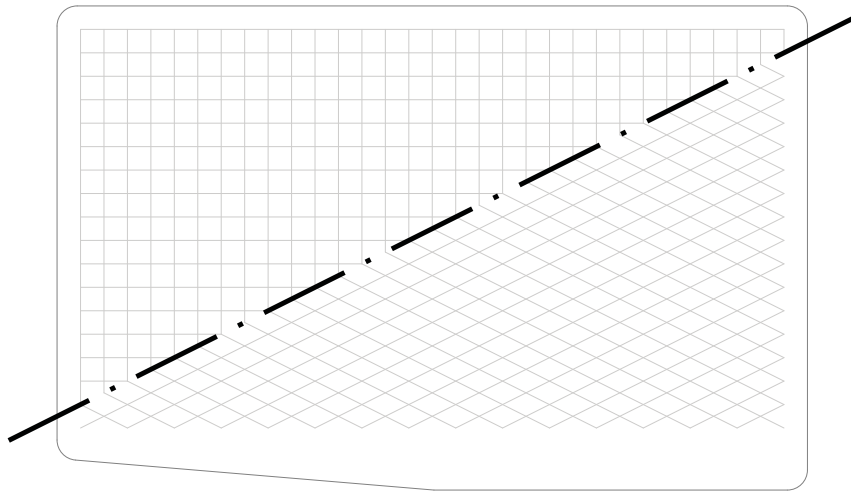


**5**  
An analogous 'city' program begins to establish hybridity

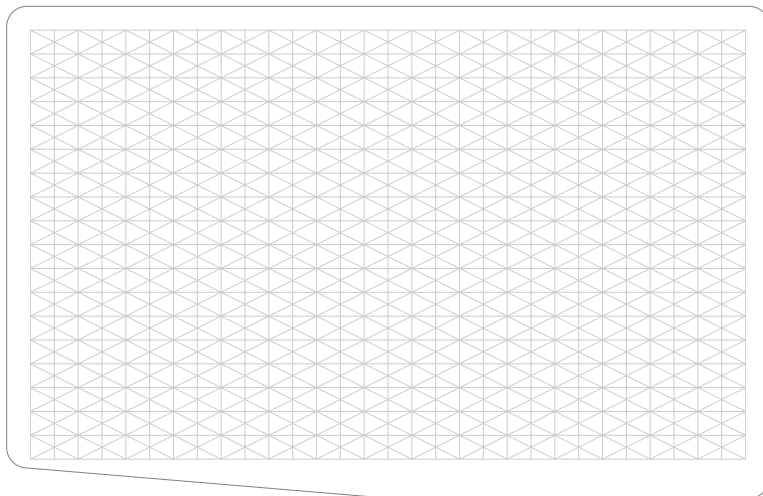




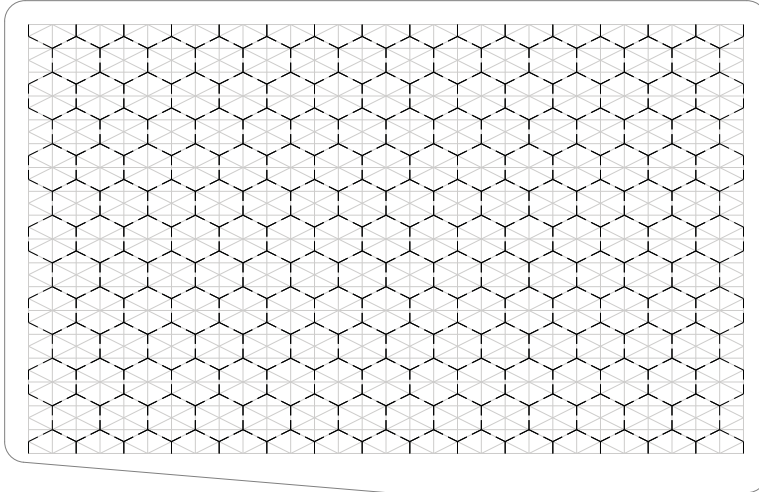
**6**  
A conceptual bifurcation of the site introduces a hybrid program



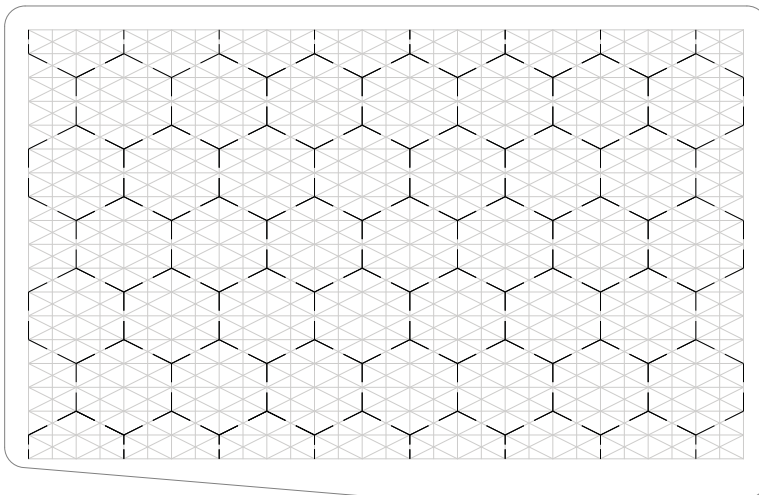
**7**  
A diagonal grid; 2:1 begins to represent the accommodation and experience of *difference*



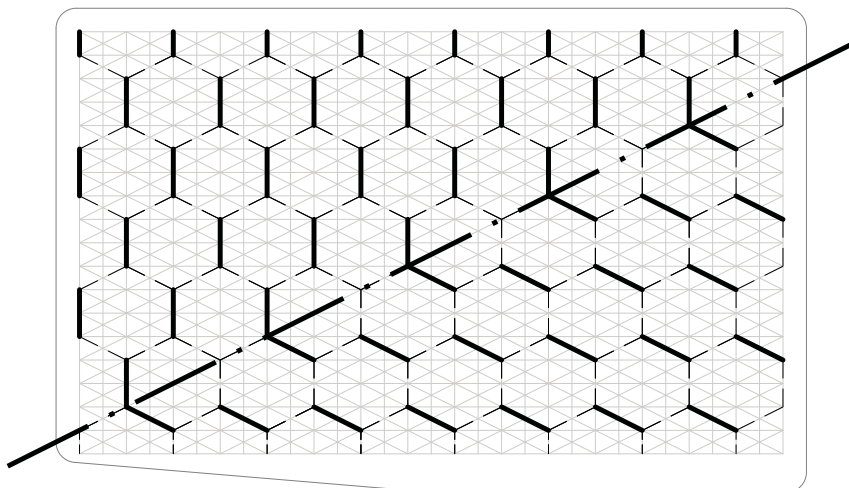
**8**  
The two grids are superimposed



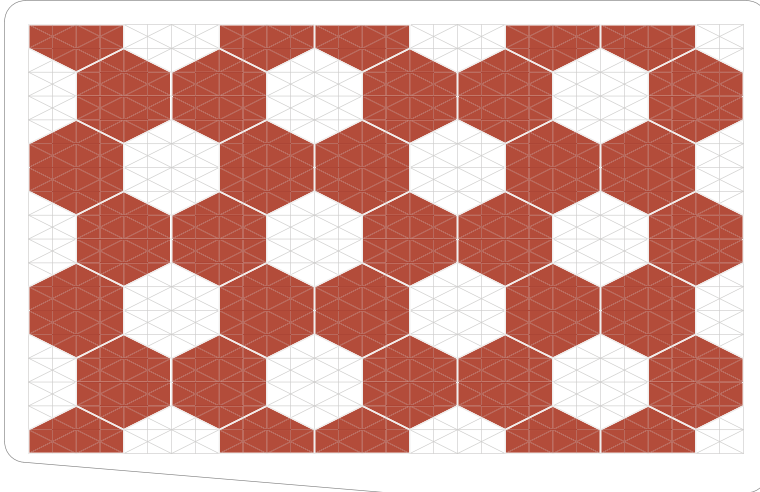
**9**  
Cell structure establishes a non-hierarchical field condition



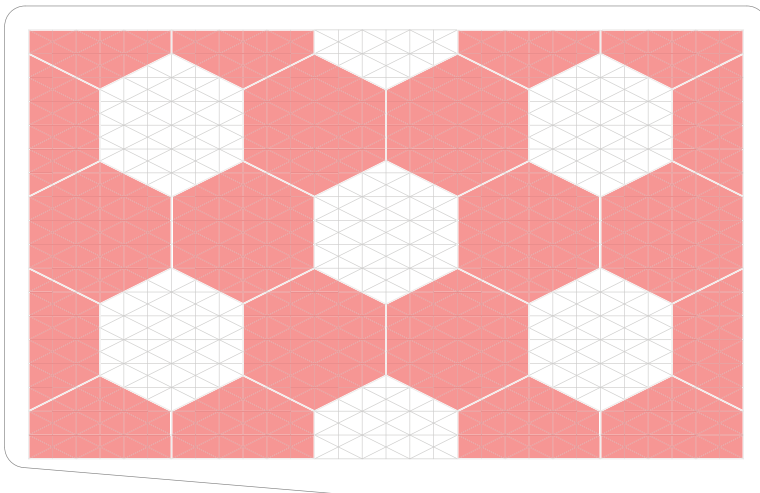
**10**  
Varying cell dimensions establishes a correlation between scale and programmatic use



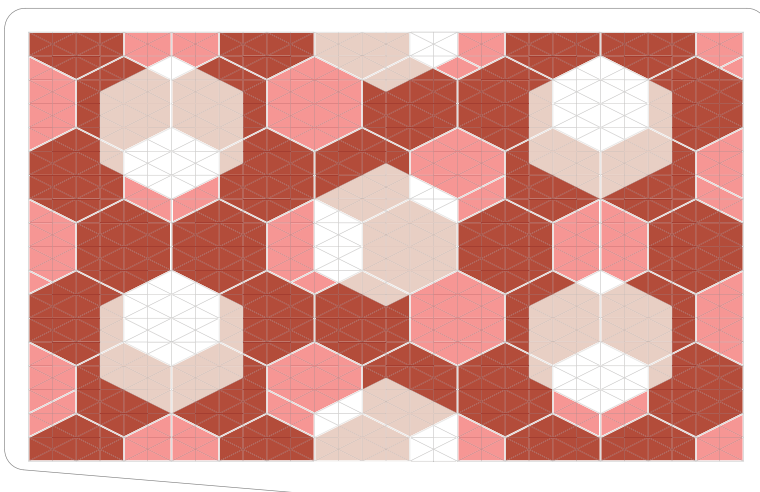
**11**  
Potential for directional hierarchy emerges



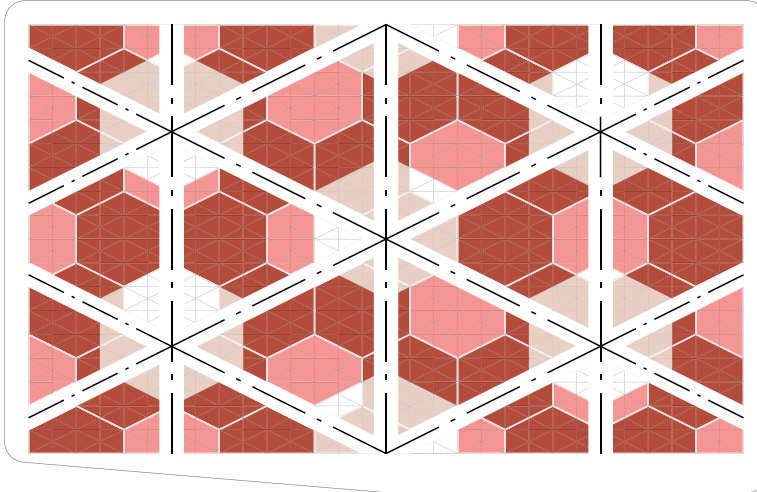
**12**  
Alternating solid and void cells  
introduces the qualities of  
'open' and 'closed'



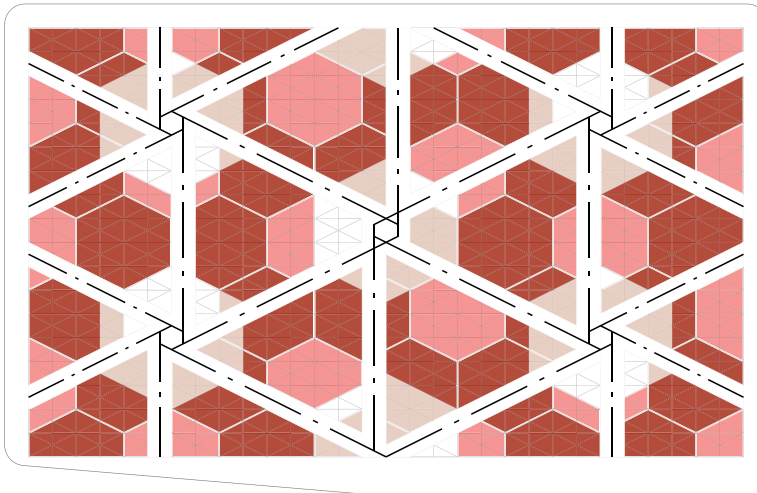
**13**  
Large cell structure suggest  
more pronounced centers



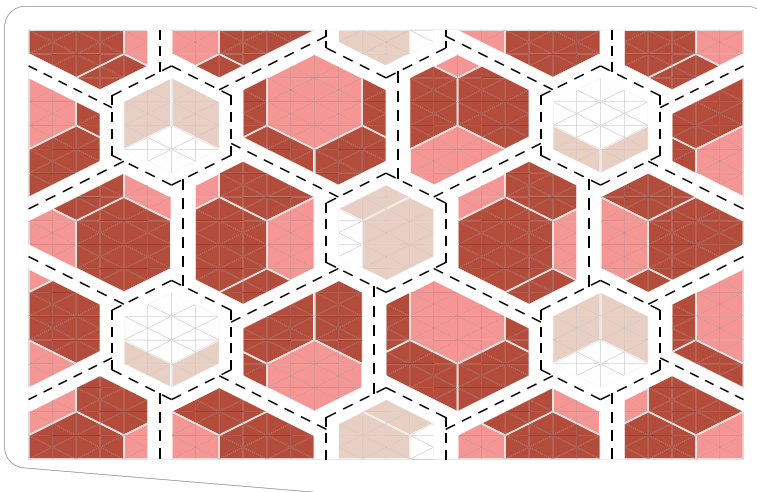
**14**  
When two fields are  
superimposed, the resultant  
moiré effect gives each cell  
a dual character: inside or  
outside & solid or void



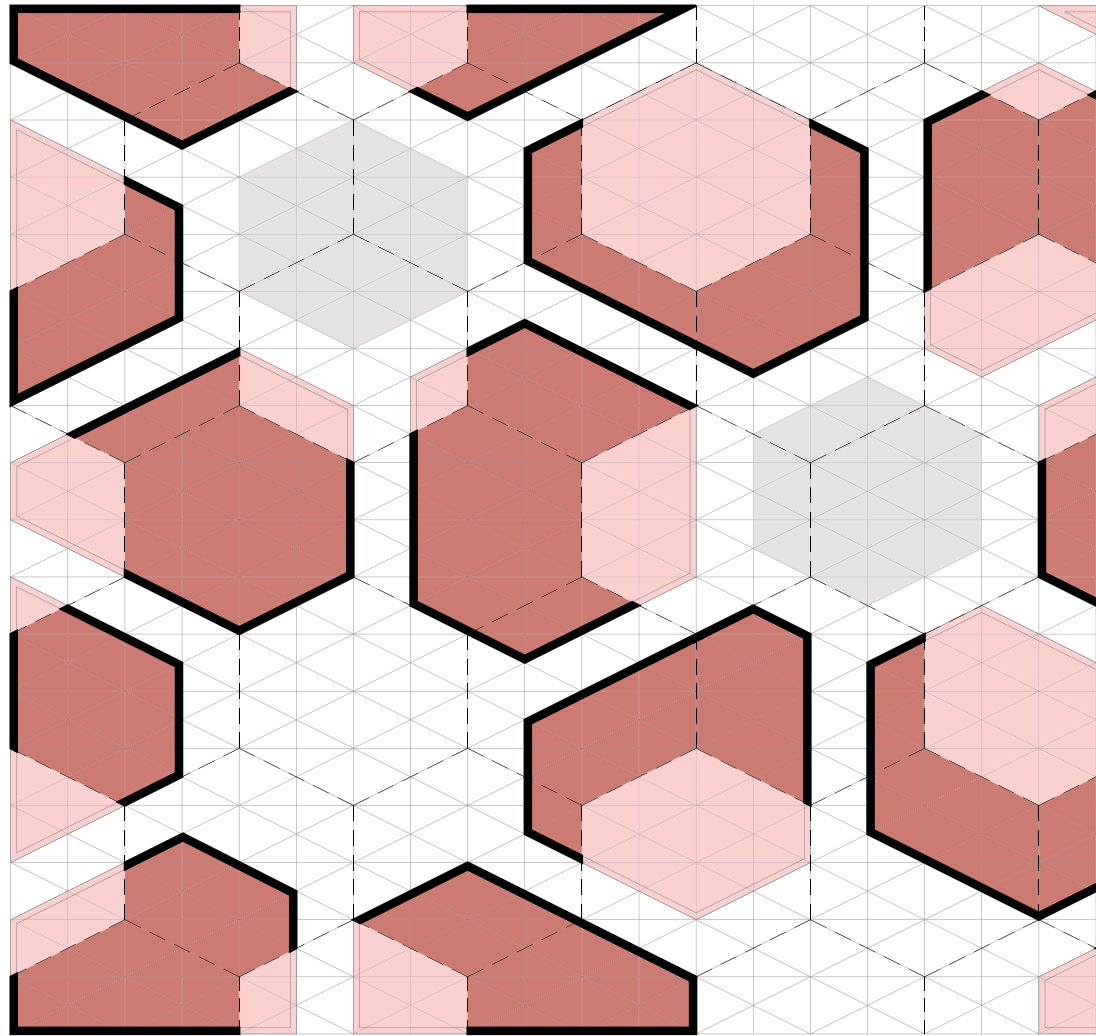
**15**  
Straight paths connect  
centers

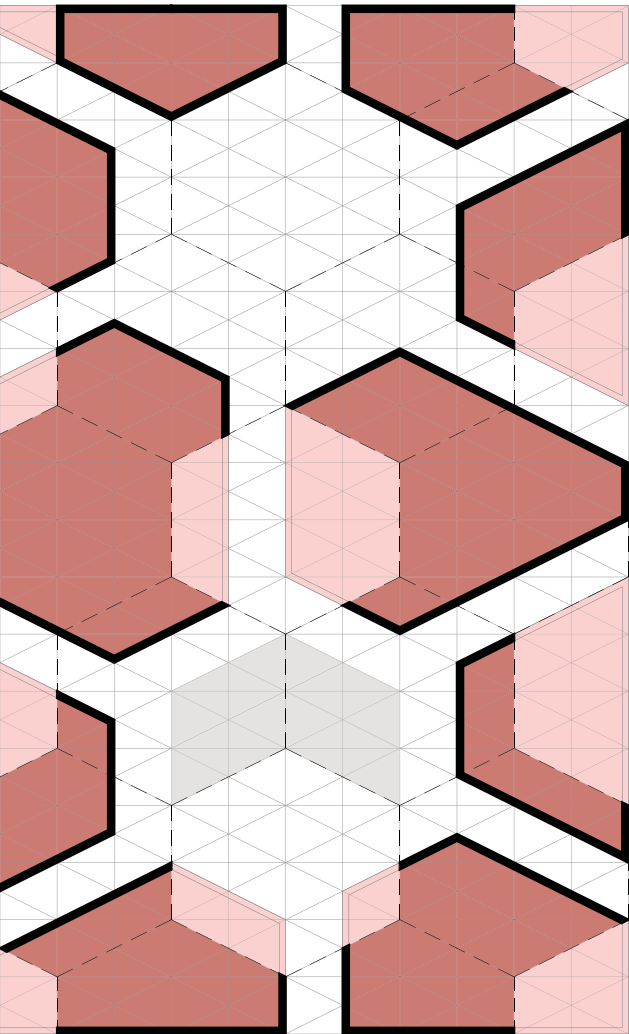


**16**  
Paths shift, breaking view  
corridors to elicit a sense of  
discovery



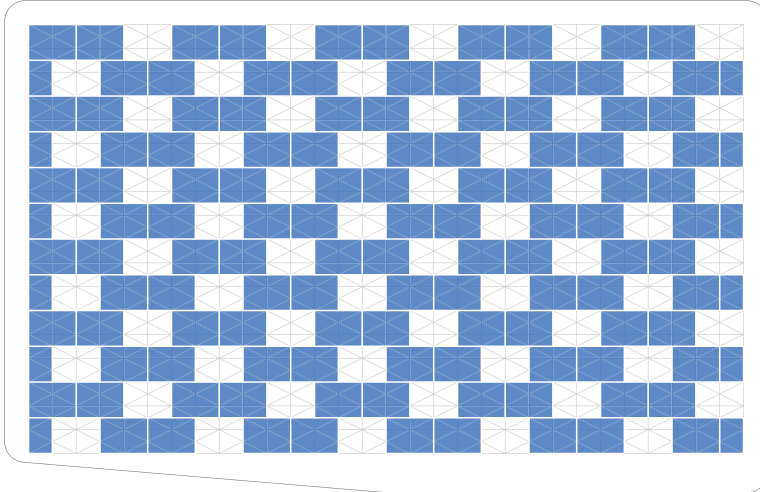
**17**  
Circulation is offset to the  
perimeter of centers



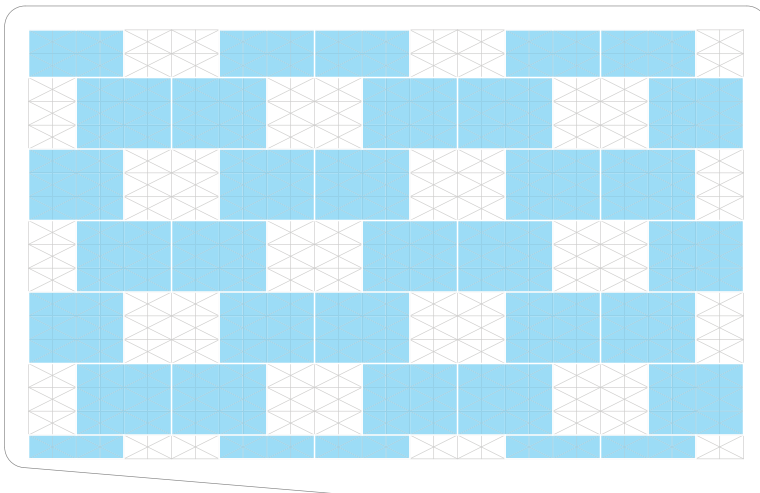


## Porosity Plan Generator

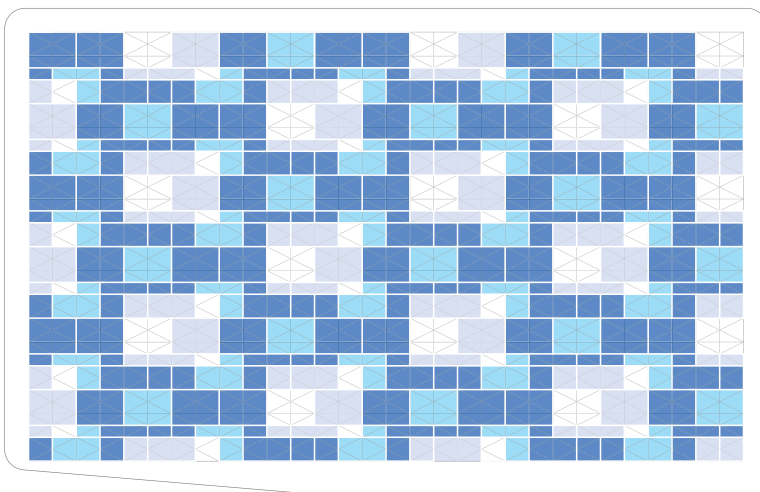
Upon reflection, the generation of a porous field reveals stages of a process that can be repeated with increased specificity. First, the moiré effect is used to establish an inherent quality. In this case, it is a prescribed porosity; Solid, void, inside, and outside spaces are dispersed throughout the plan in a manner that feels random—even though every space can be reduced to a common denominator and shares common dimensions. Then, material is strategically removed to distinguish built from unbuilt space.



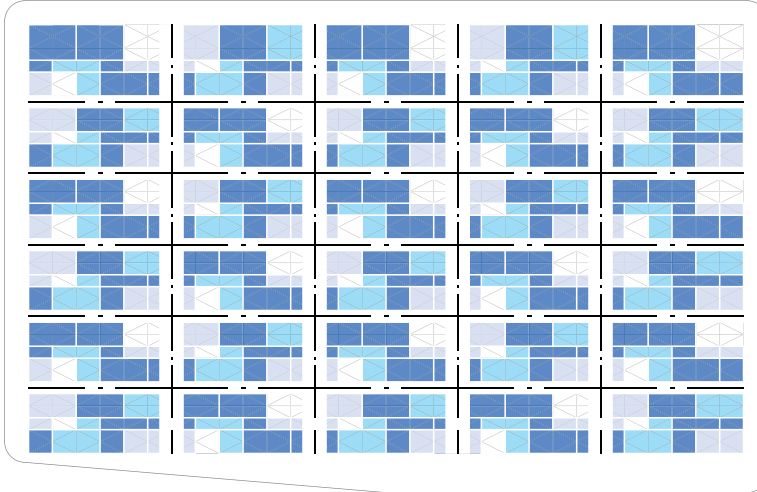
**1**  
A new module establishes  
an orthogonal language for  
housing



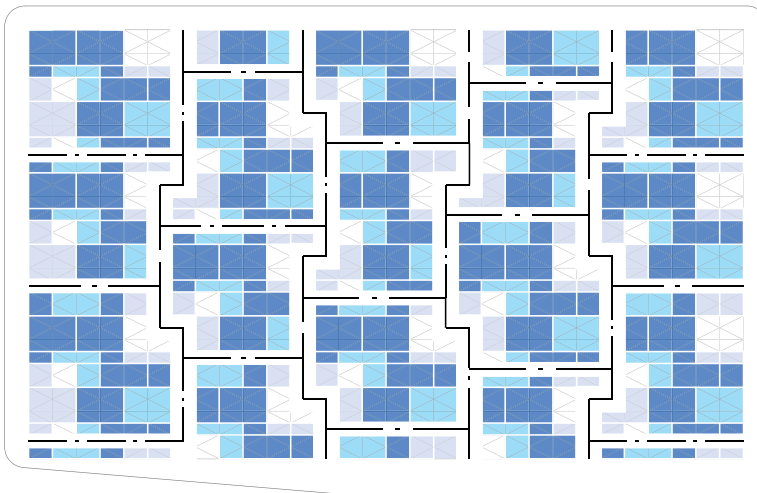
**2**  
Large cell structure with  
pronounced centers



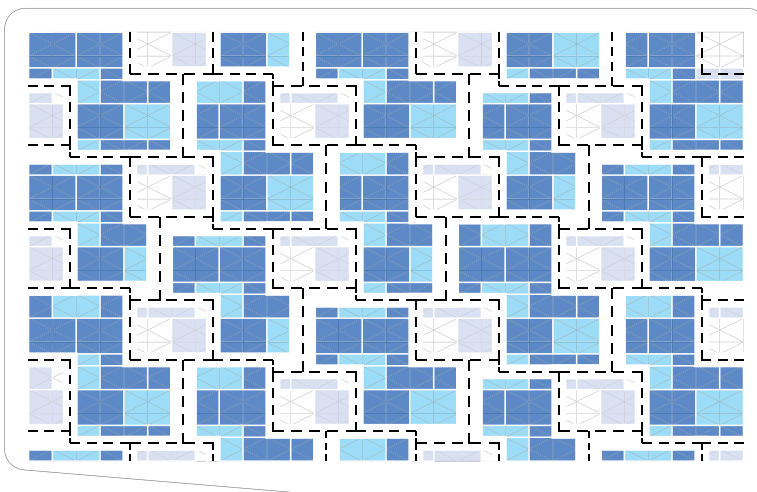
**3**  
Superimposed fields gives  
each cell a dual character;  
inside or outside & solid or  
void



**4**  
Straight paths connect  
centers

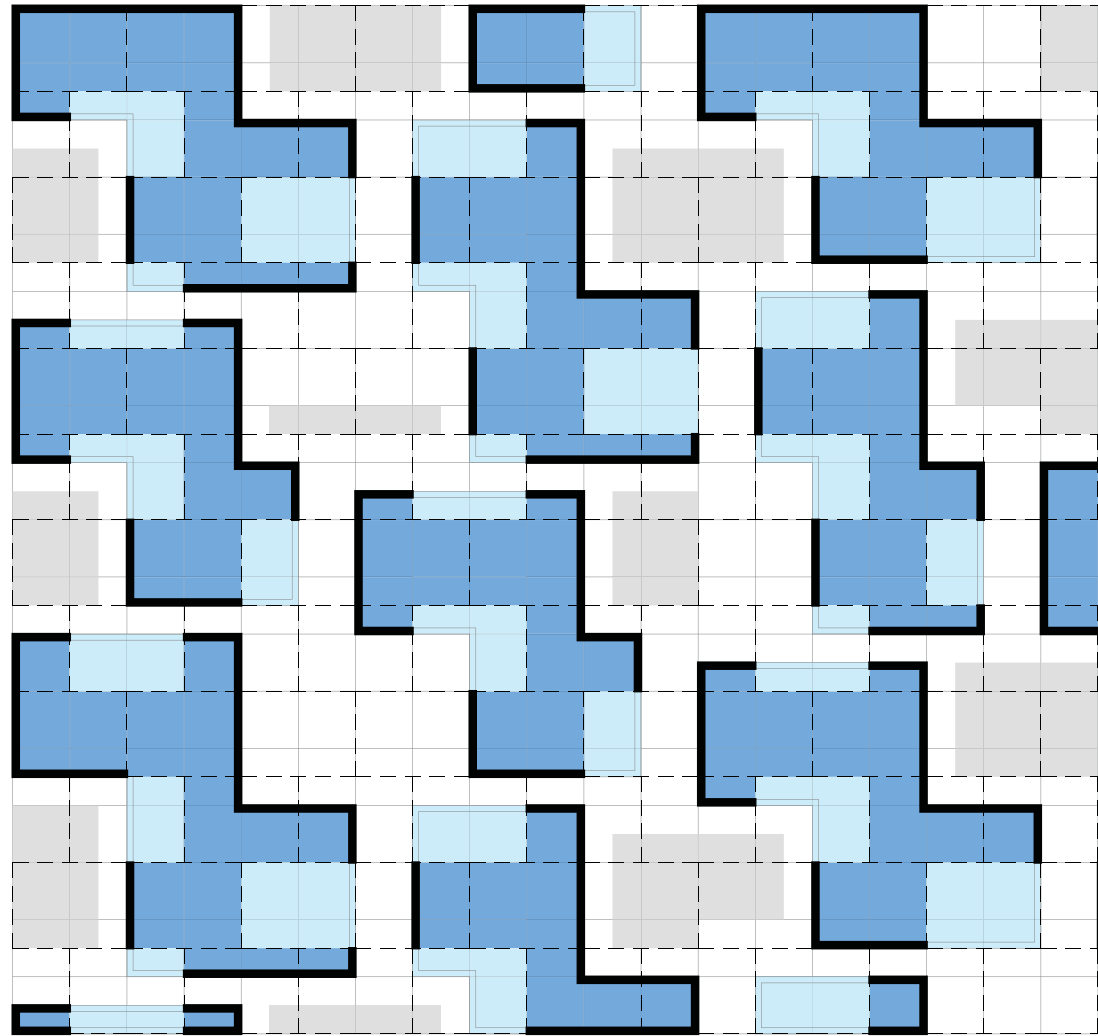


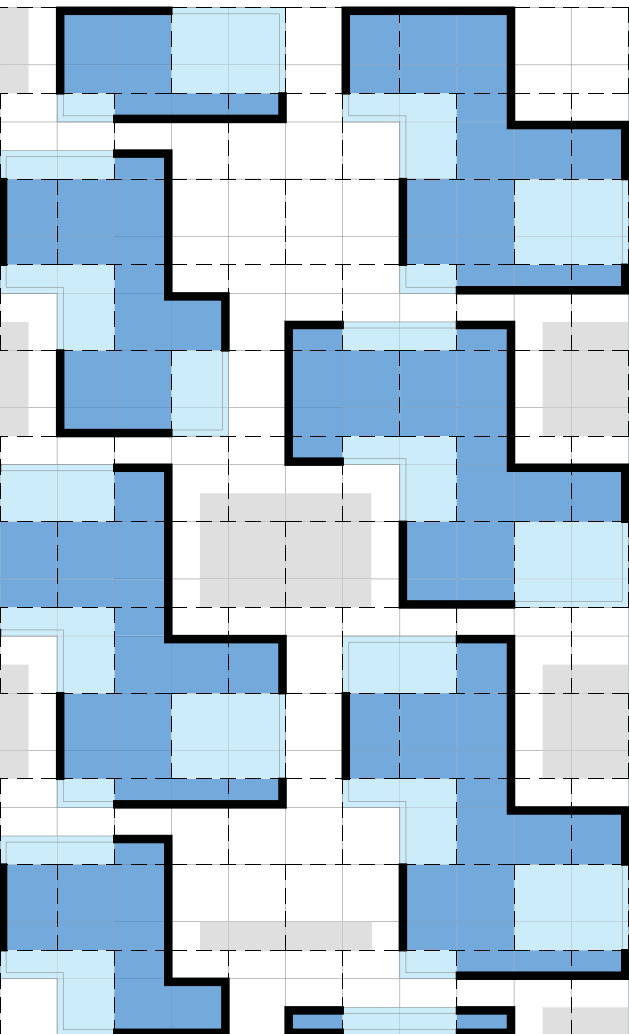
**5**  
Paths shift, breaking view  
corridors to elicit a sense of  
discovery



**6**  
Circulation offset to the  
perimeter of centers





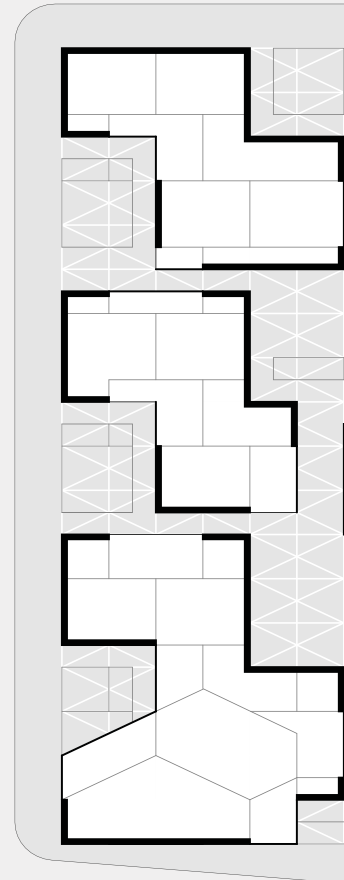
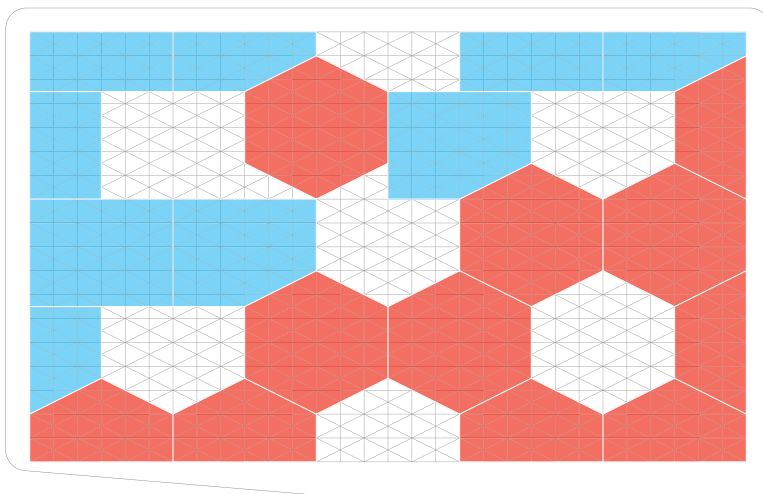
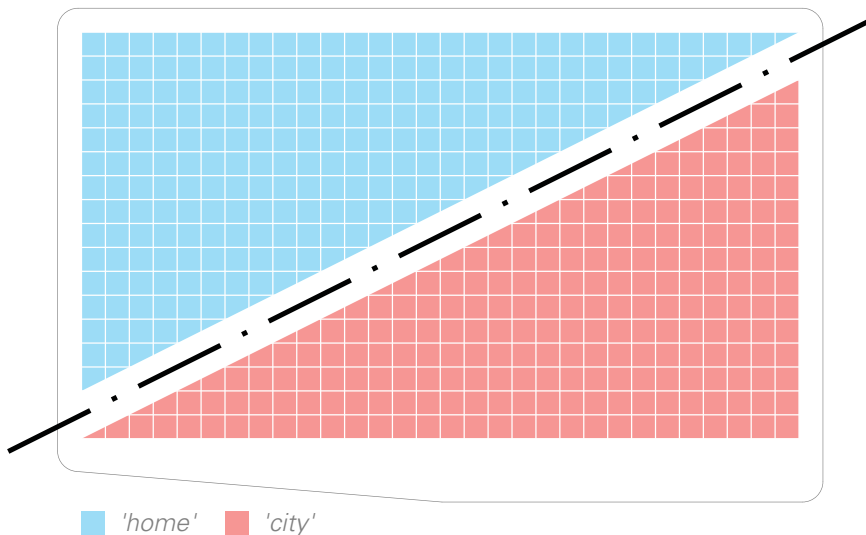


## Residential Porosity Plan

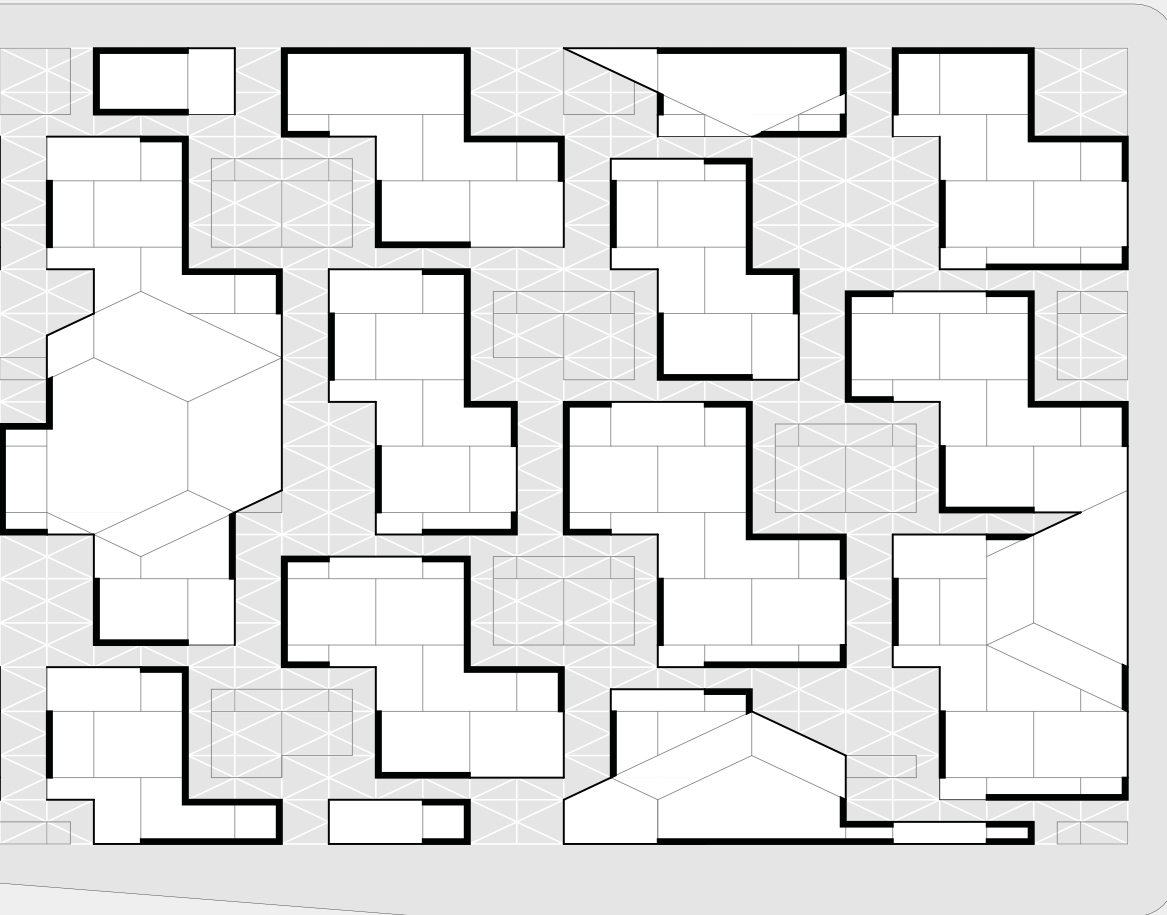
The porosity plan generator proves capable of establishing a spatial heterogeneity within an orthogonal framework, where a residential program can more easily be accommodated

## Erratics

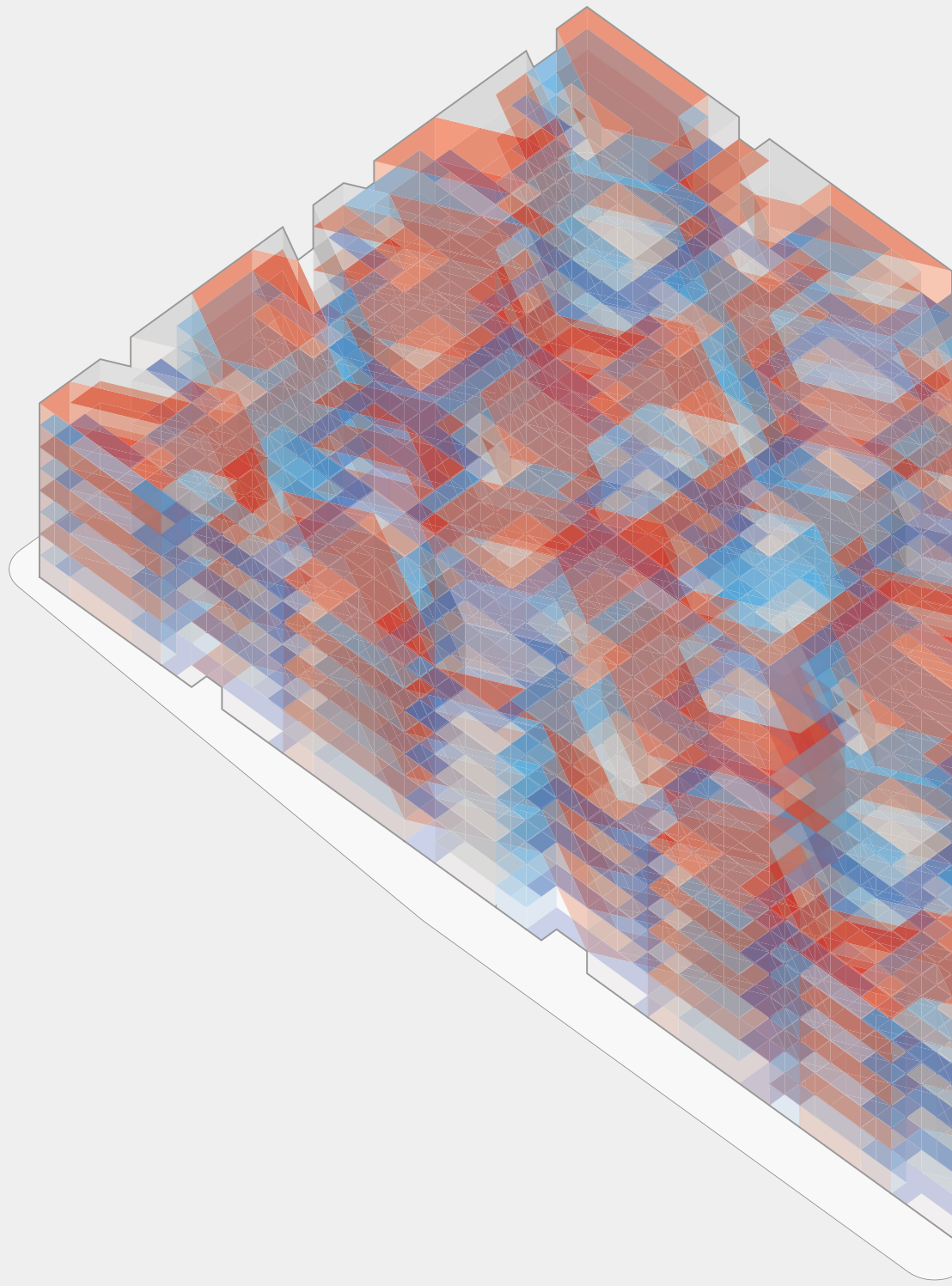
These 'erratic' studies are named after large boulders that have been carried by glacial ice over hundreds of kilometers to appear out of place in the middle of grassy fields. Here, 'erratics' begin to address the desire to make the public sphere visibly and experientially distinct from the housing, while simultaneously representing the capacity of the field to contain difference. Geometry from the 'city' porosity plan begins to infiltrate the 'home' field as isolated incidences that feel both compatible and tense.

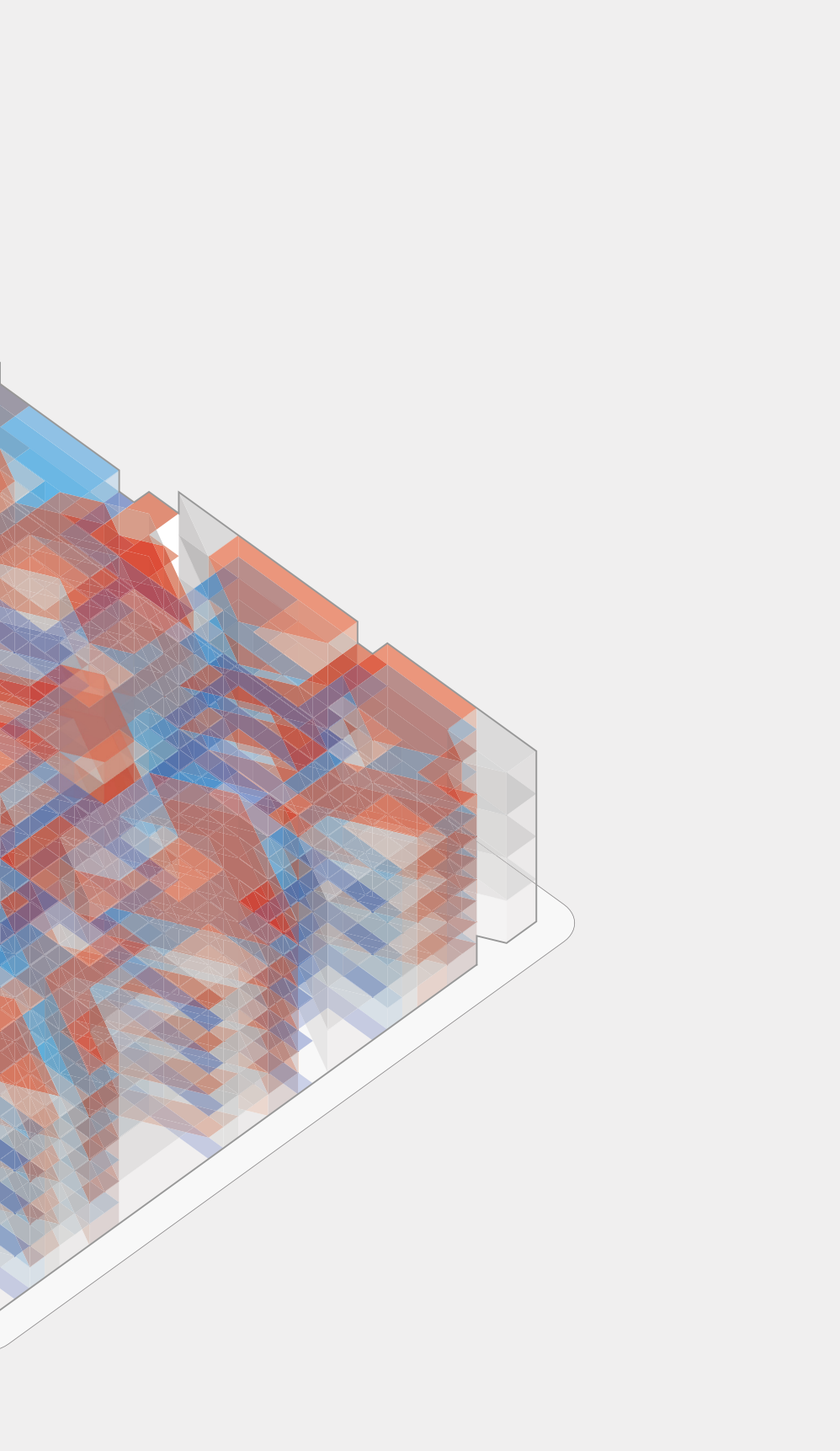


**1**  
A simple 'erratic' study begins to merge disparate geometry



**2**  
A more detailed articulation of  
'erratics' in a field



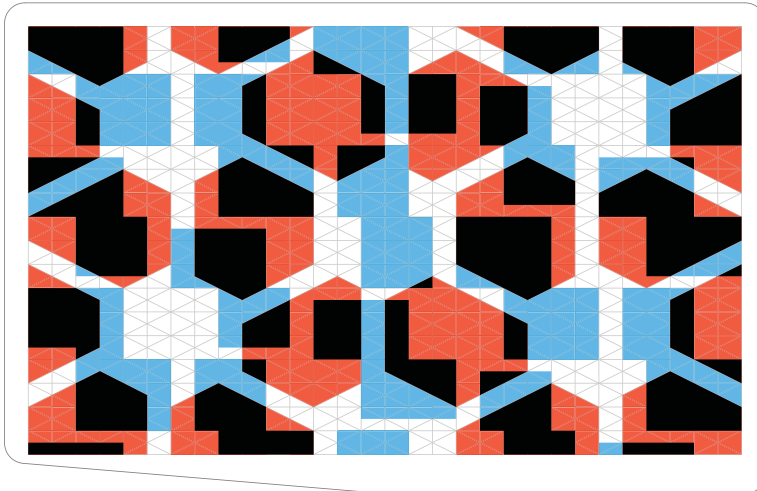


### **Embedded Capacity**

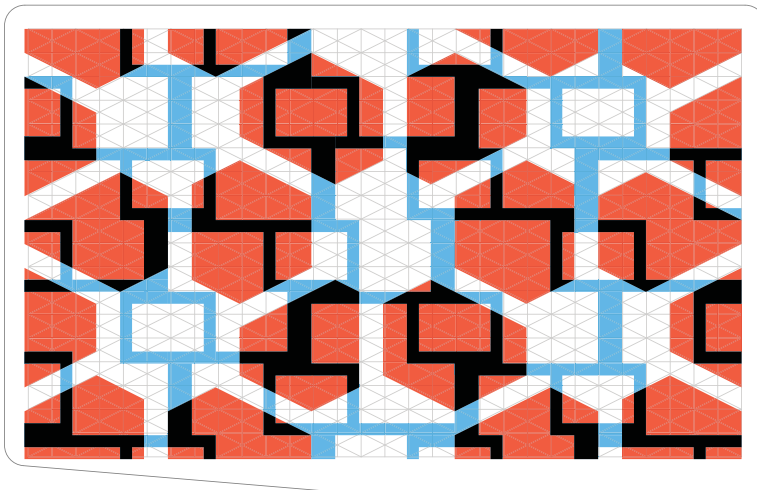
The complete superimposition of both 'city' and 'home' porosity plans sets up a dynamic arena with a multitude of interchangeable orders; At any moment, the information exists to preclude either the house, institution, or void space between.

## Interference

The layering of disparate fields creates a turbulent landscape of possibility; In order to translate its limitless potential into material substance, a formal method will be required. Isolating and overlaying various aspects of both fields begins to allow for the study of relationships between parts. Since it is possible to observe overlapped parts as belonging to both layers at the same time, interference patterns begin to create a dialogue between coexisting systems.

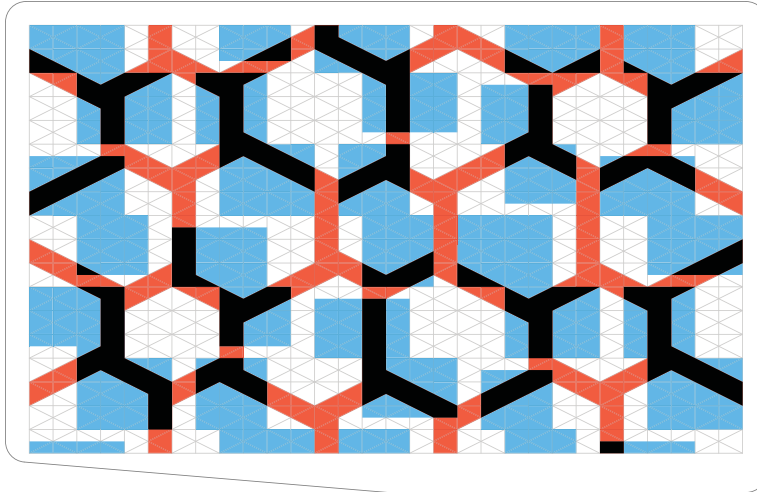


**1**  
Interference study;  
'Home' buildings and  
'City' buildings

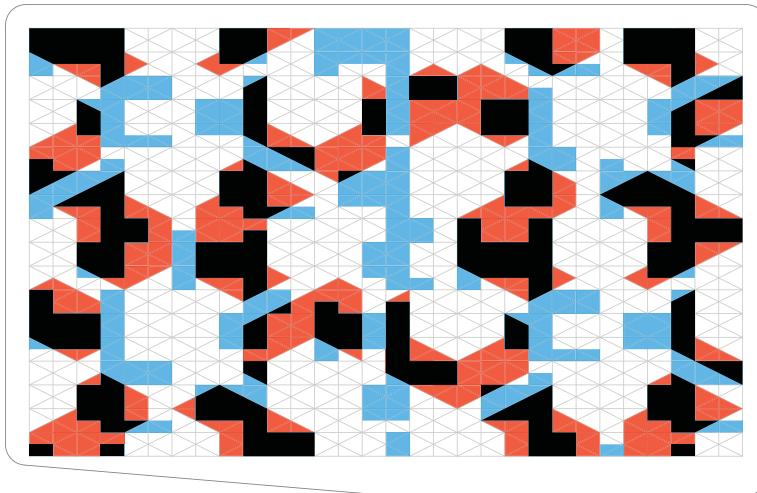


**2**  
Interference study;  
'City' buildings and 'Home'  
paths

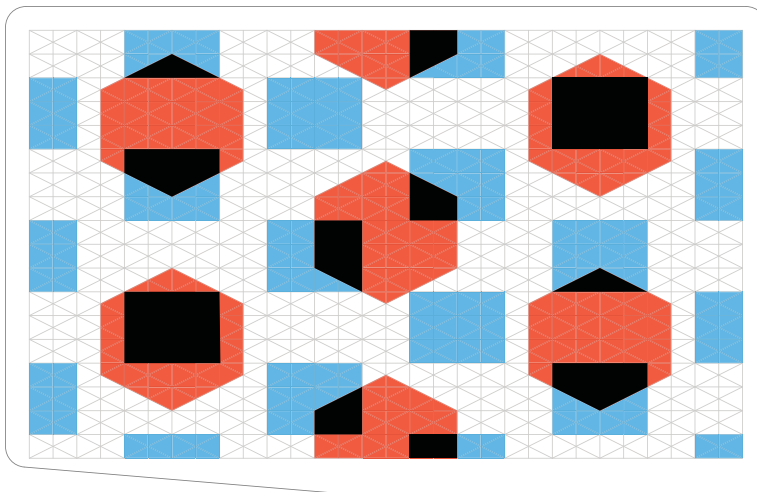




**3**  
Interference study;  
'Home' buildings and 'City'  
paths



**4**  
Interference study;  
Interior, solid space

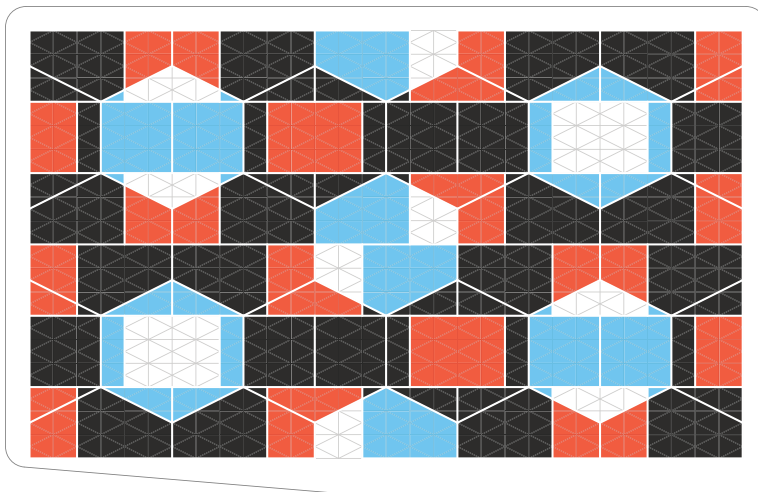


**5**  
Interference study;  
Exterior space

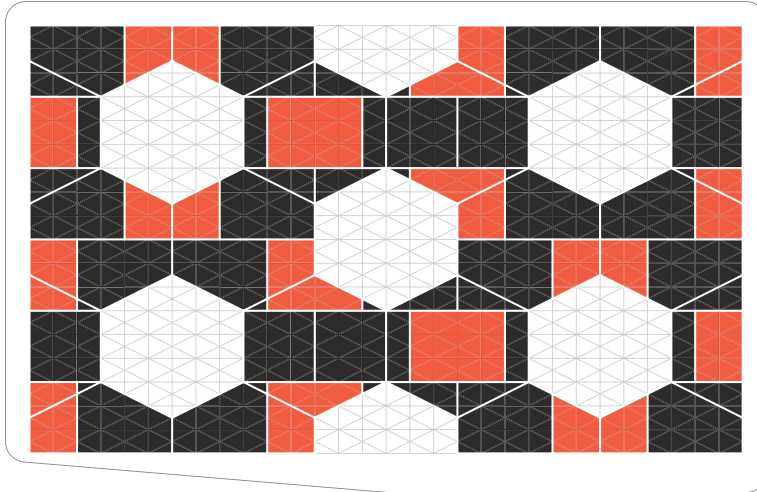
Alternatively, the space of the combined fields can be thought of as an agglomeration of interchangeable building blocks, each having the capacity to represent either coexisting system; By strategically adding or removing information, one form or the other is revealed.

Figure 4 however, depicting blocks that are common to both 'home' and 'city' logics, shows an emaciated footprint. If extruded, there is simply not enough building mass to contain all of the program required. Furthermore, the red or blue material which substantiates either system, simultaneously blocks out light from the opposite system's exterior condition (seen in figure 1).

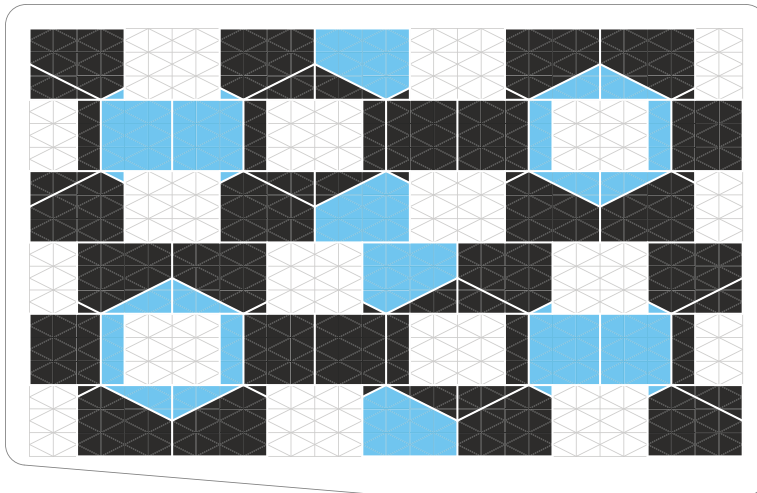
This study therefore reveals that the interference of these divergent geometries is too chaotic for one field to accommodate simultaneously. Rather than struggle with the tension of superimposed systems, how can an interference pattern be reverse-engineered to accommodate difference within a singular logic?



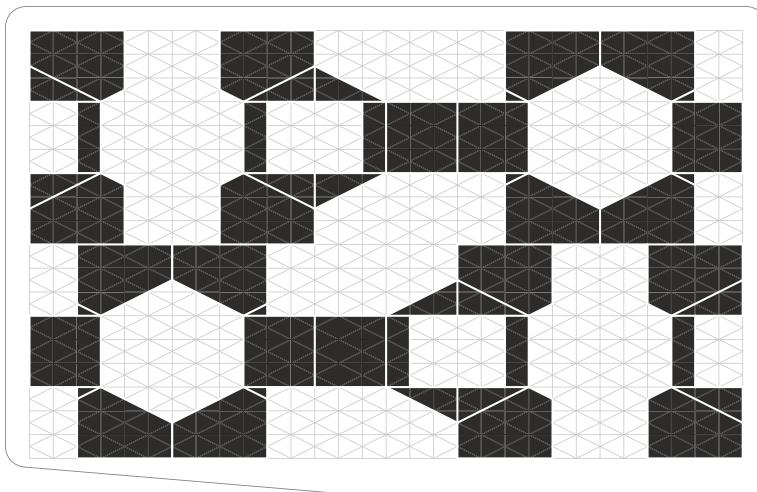
**1**  
Building blocks



**2**  
'City Blocks'



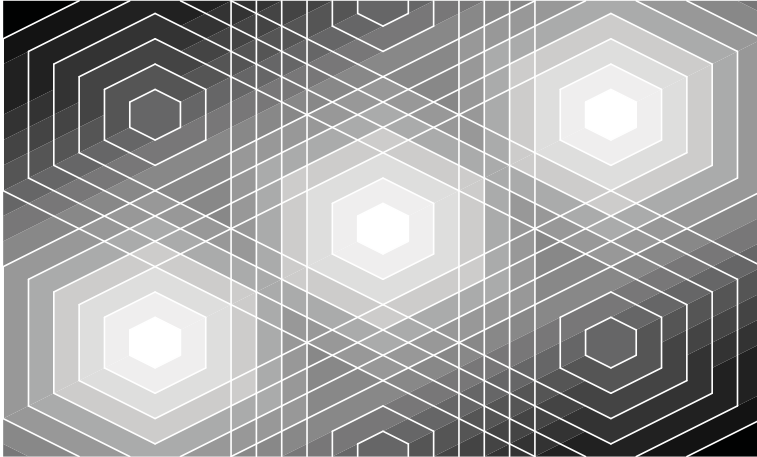
**3**  
'Housing Blocks'



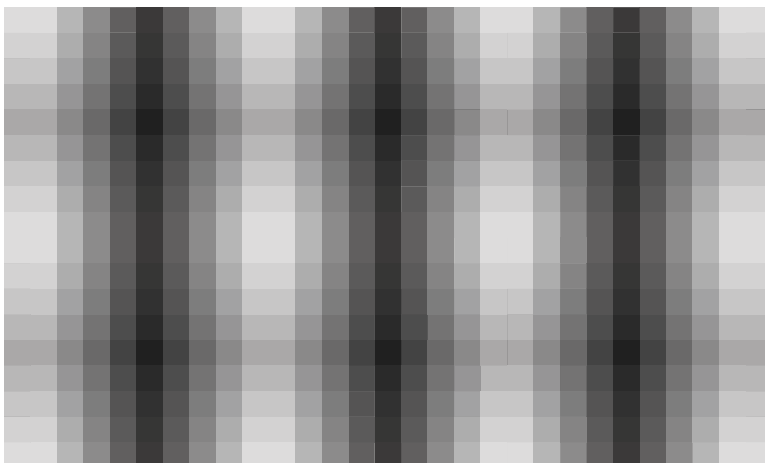
**4**  
Common blocks

Using the basic grid structure from the porosity plans, a series of new moiré patterns are created using rotated fields of lines rather than cells. As the fields are simplified, the manipulation of lines becomes a potential strategy for choreographing emergent figures.

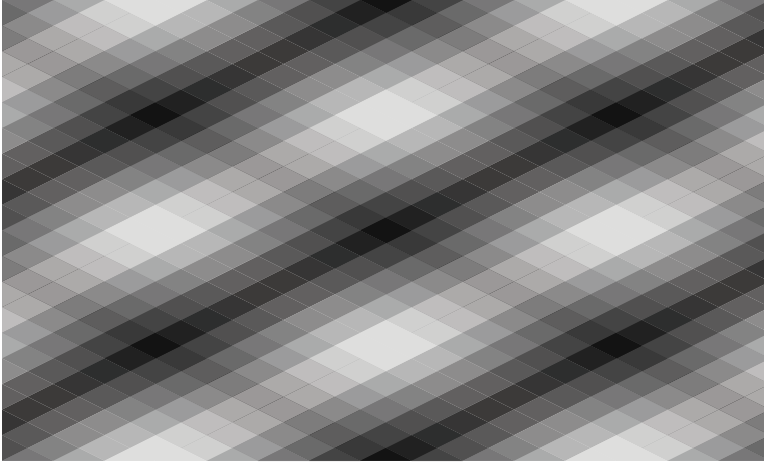
In this study, individual lines evolve to contain their own *embedded capacity*, suggesting that a field can be both simple and, at the same time, comprised of elements that are inherently complex.



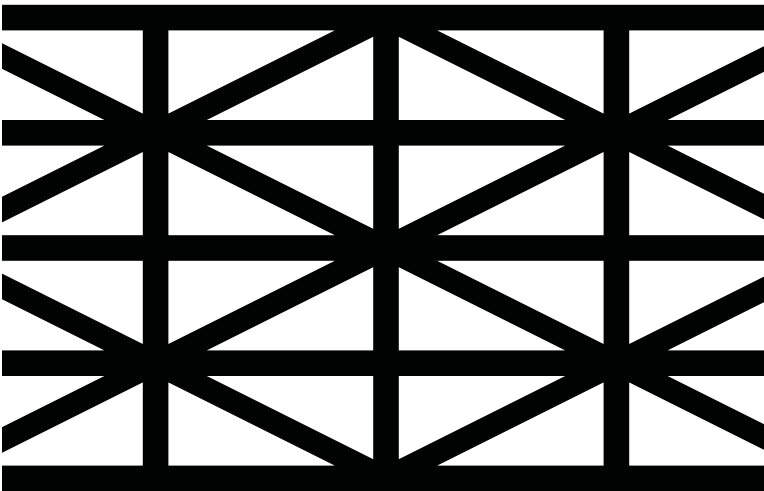
**1**  
Interference patterns  
may have topographical  
implications



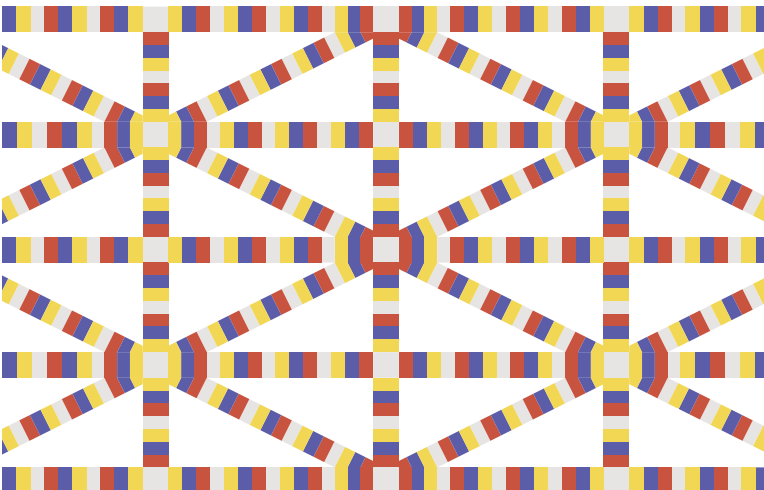
**2**  
Interference study;  
Figures emerge in a field



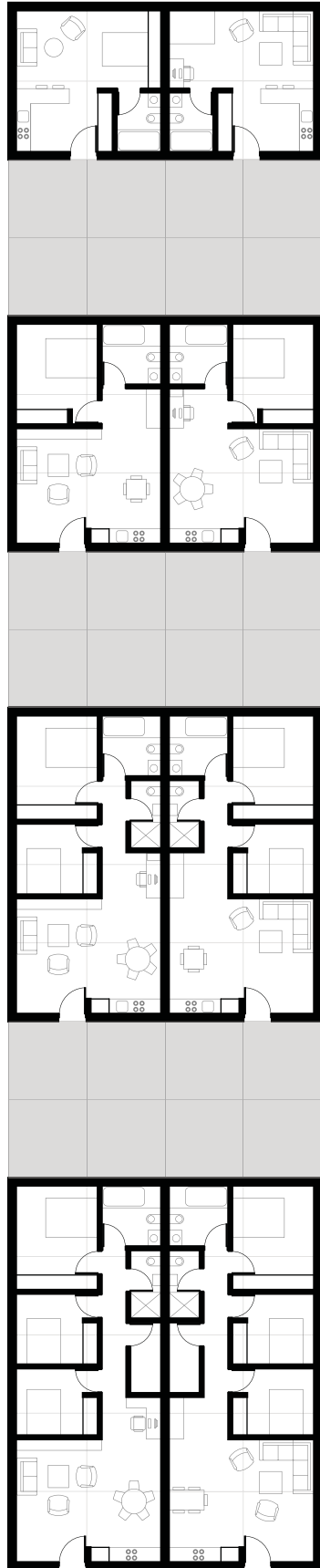
**3**  
Interference study;  
Figures emerge in a field



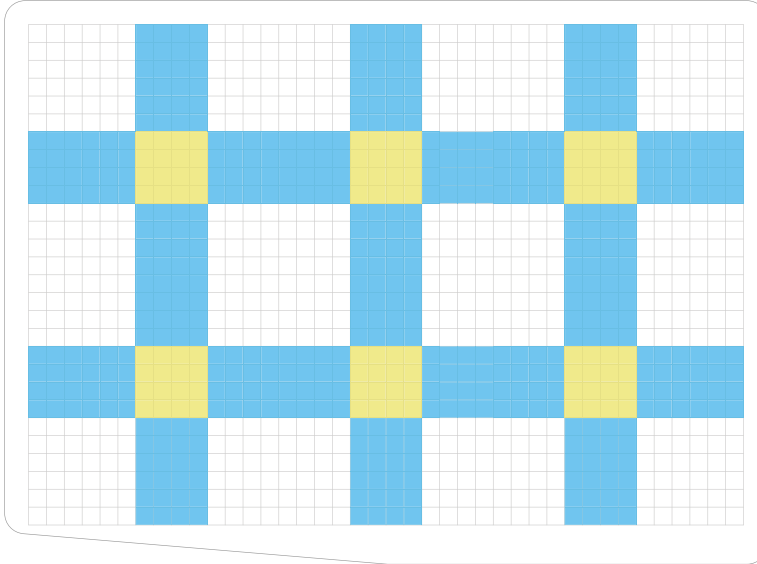
**4**  
Superimposed fields of lines  
suggest a choreographed  
interference pattern



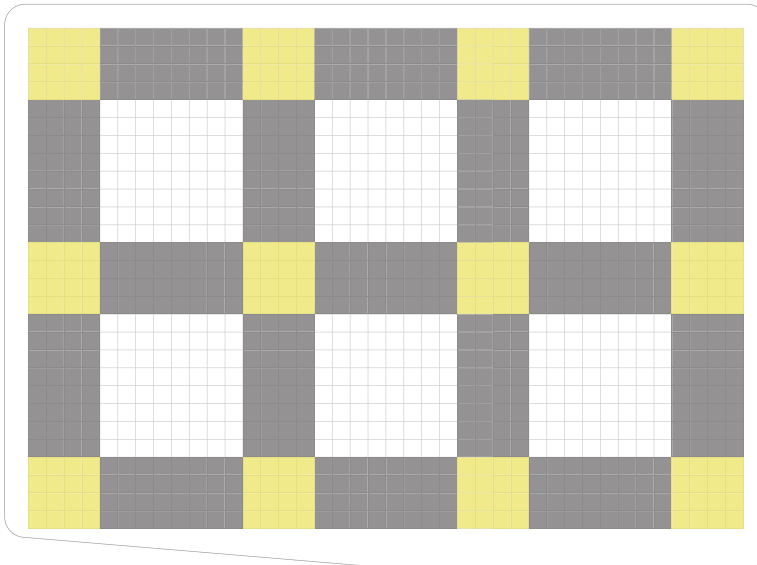
**5**  
The line itself contains an  
embedded capacity



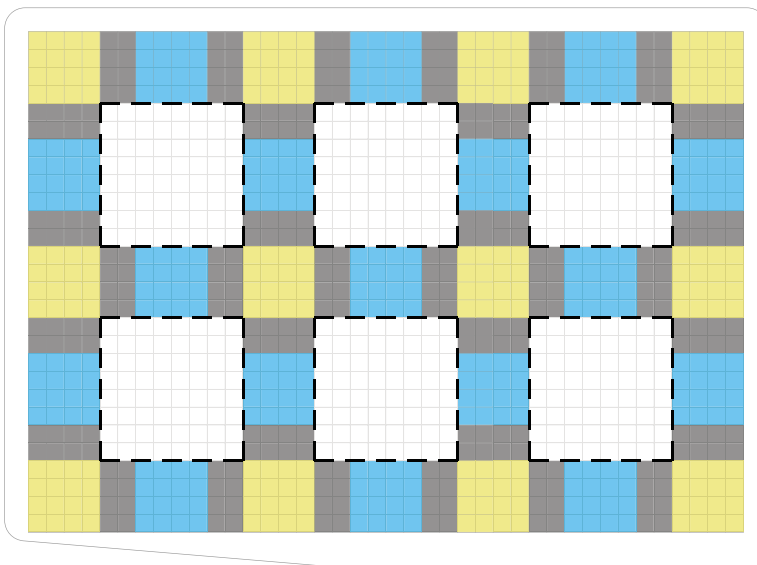
**1**  
40' wide apartment modules  
are conceived of as volumes  
and voids on a line



**2**  
A new field is comprised of 40' wide, purpose-built lines; a simple interference pattern emerges



**3**  
The field is shifted



**4**  
Both fields are superimposed, their centers consolidated; A more complex interference pattern provides a greater potential for interpretation

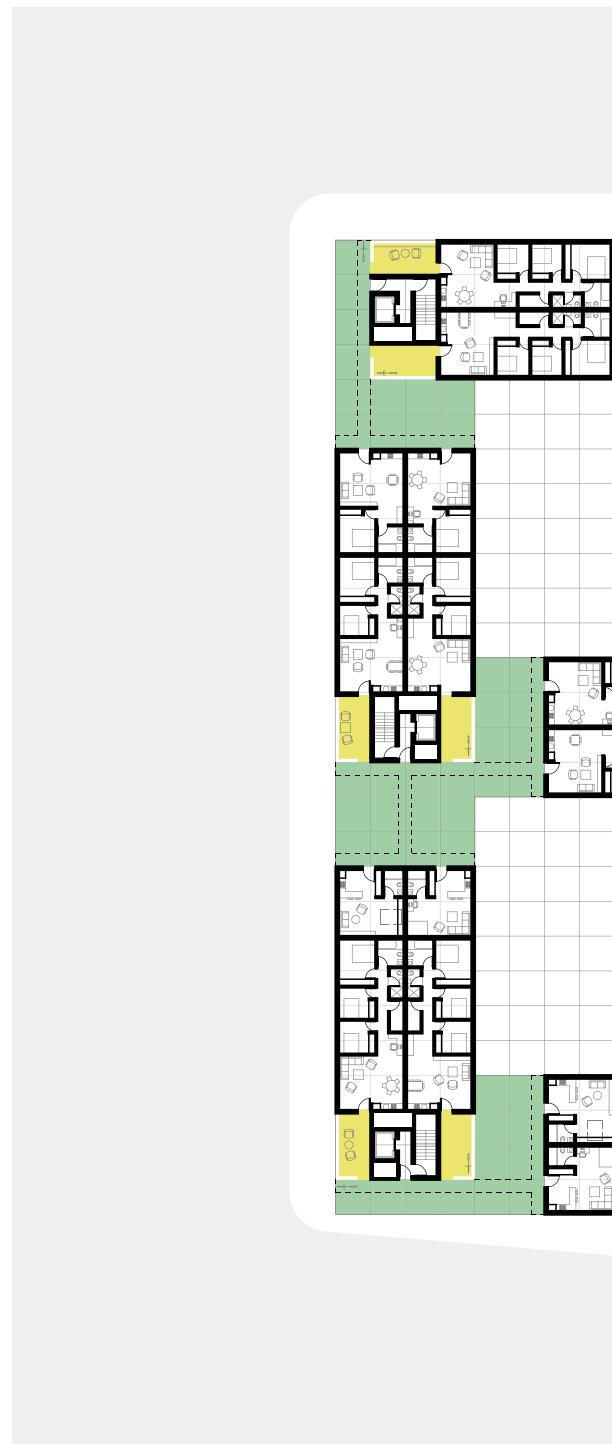
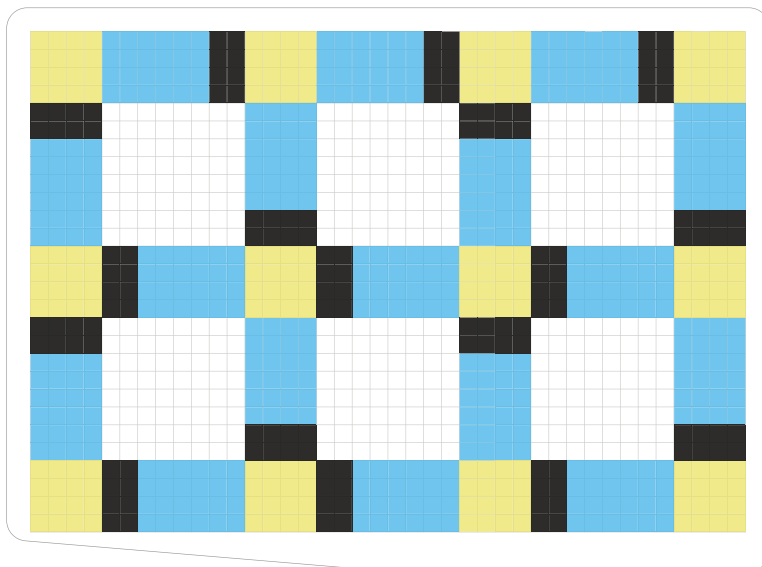


## Interpretation

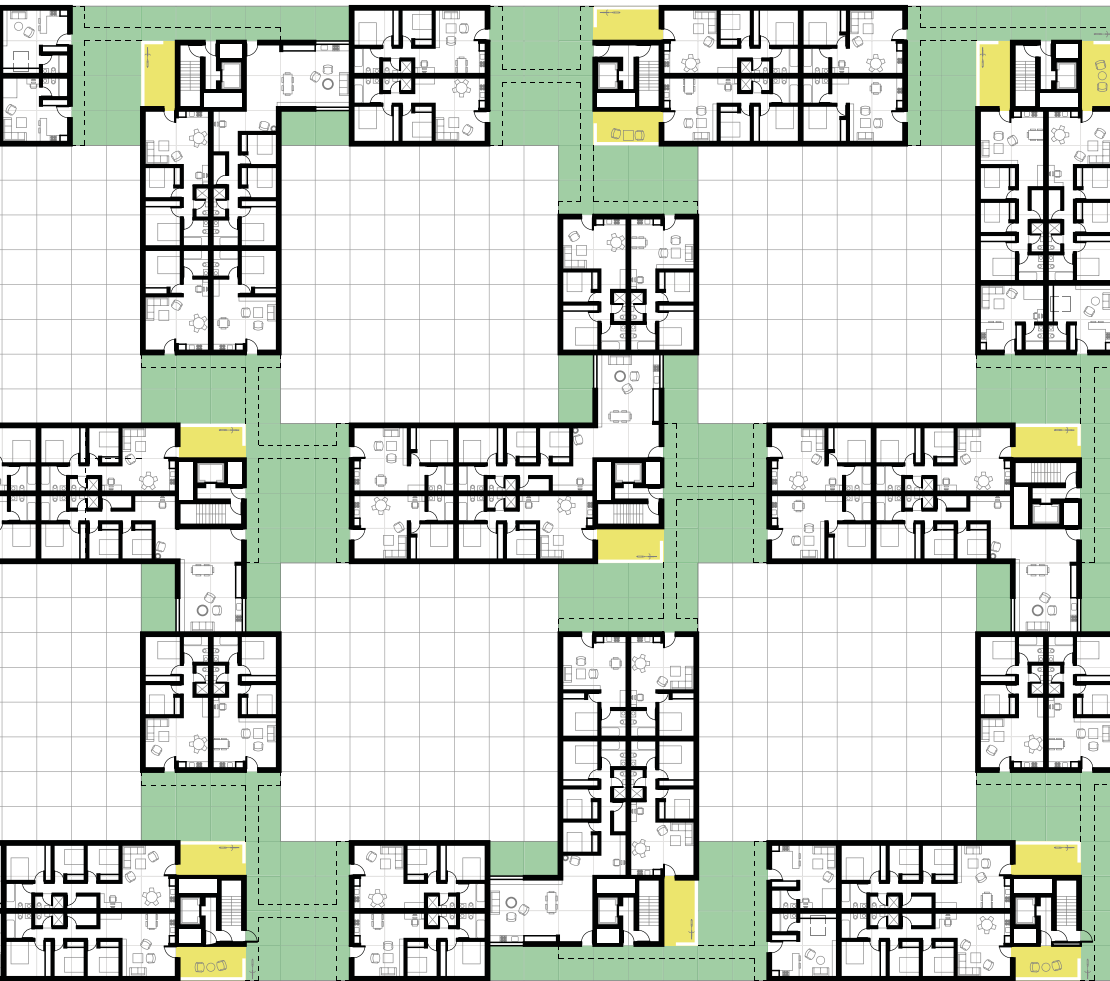
In a decidedly top-down approach, a new field is comprised of increasingly specific elements that are superimposed in a highly controlled manner to assure their capacity to accommodate modular housing units, while providing ample light and uncompromised outdoor space.

Once again, the layers of overlaid information have created a heterogeneous patchwork—a graphic representation of the desired effect of porosity. As the various zones are designated the alternating properties of *built* and *unbuilt*, the *mode* of designing, within the context of the field, emerges as a *process of interpretation*.

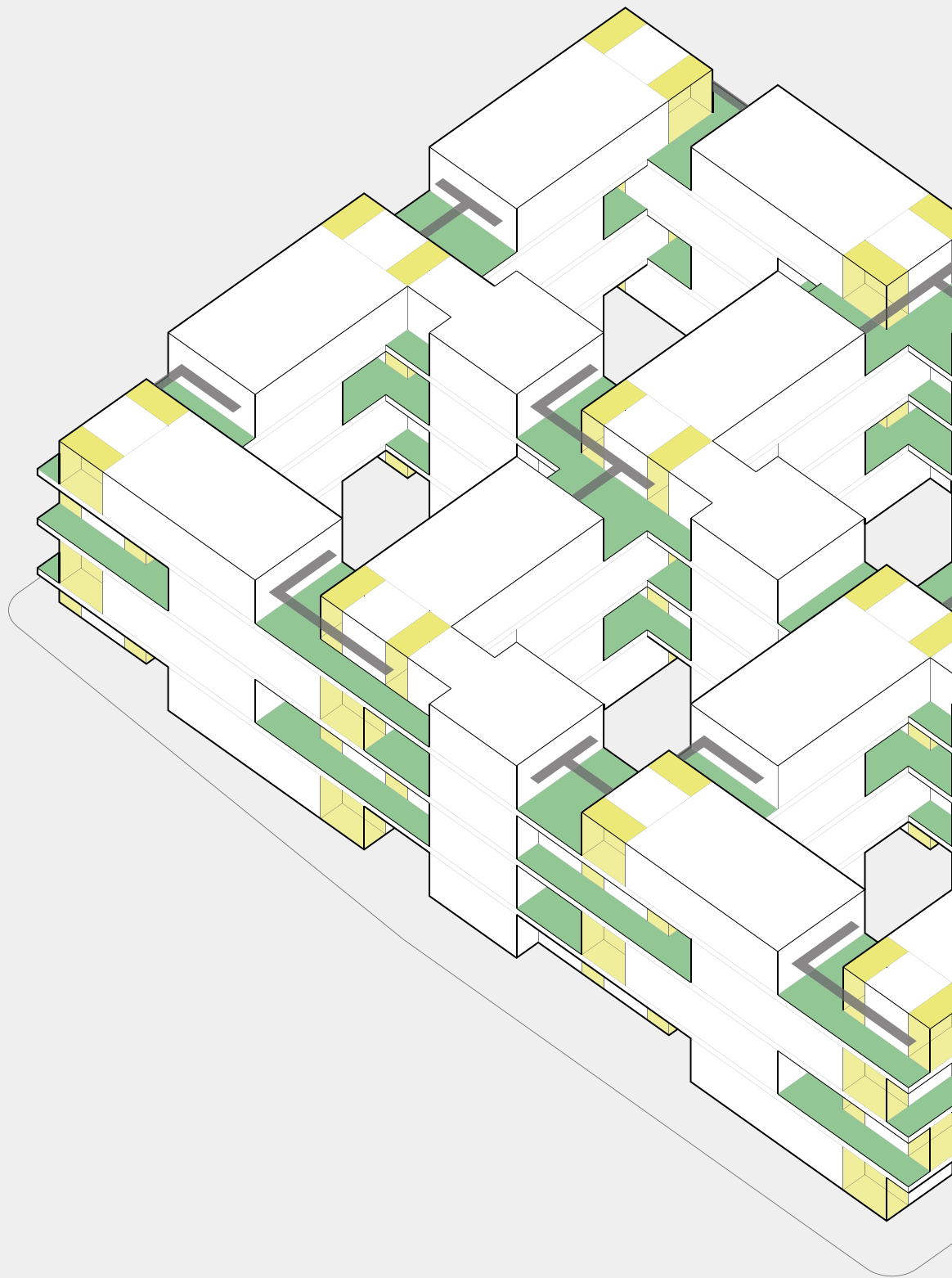
The field evolves from pure abstraction to occupiable space through the subsequent translation of graphic to architectural notation, with a heightened level of spatial articulation.

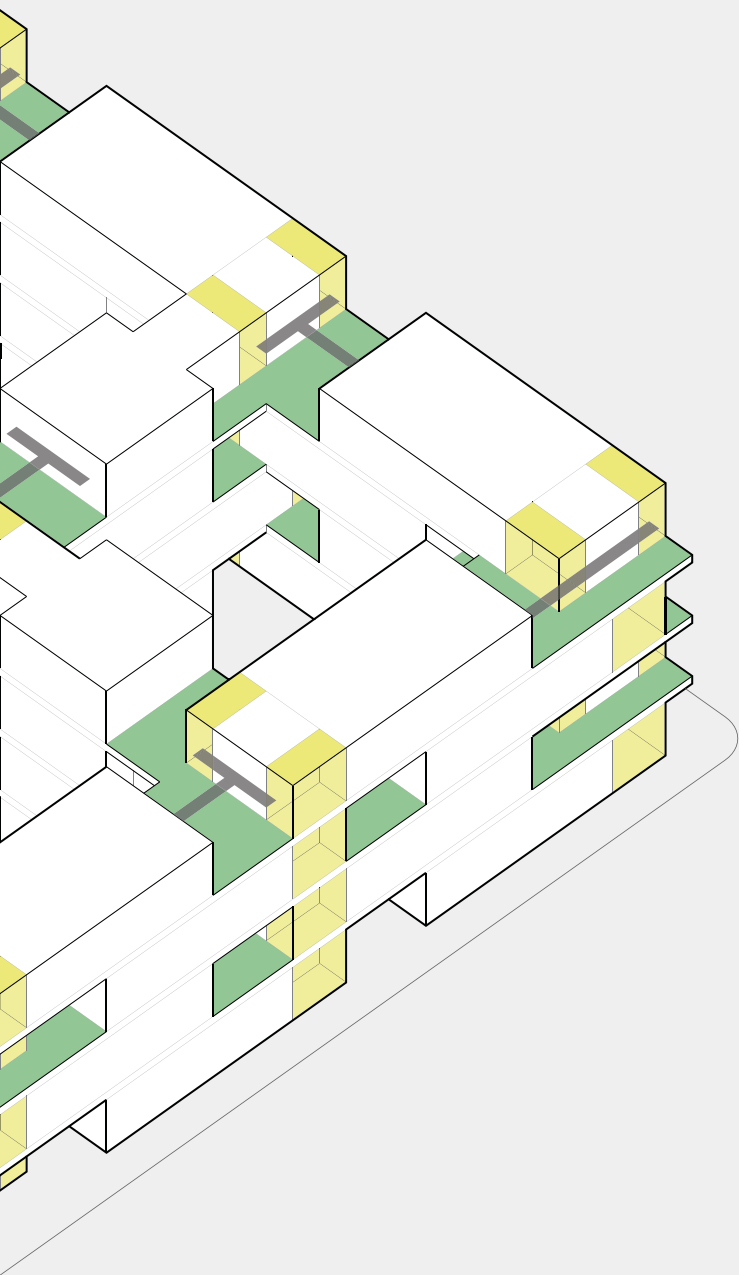


**5** Figures emerge from the field as space is occupied or removed; the resultant graphic notation describes the desired effect of porosity



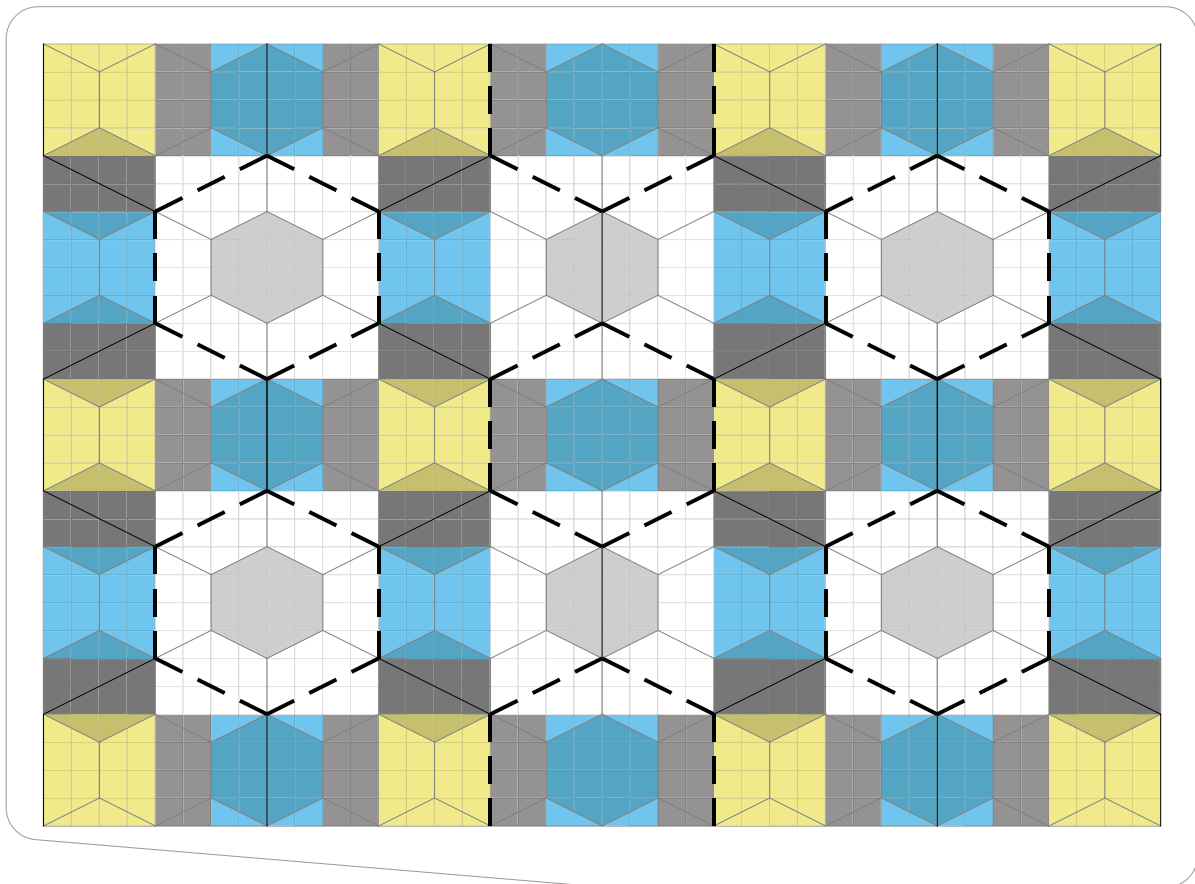
**6**  
Architectural interpretation  
of graphic notation begins to  
imagine occupancy



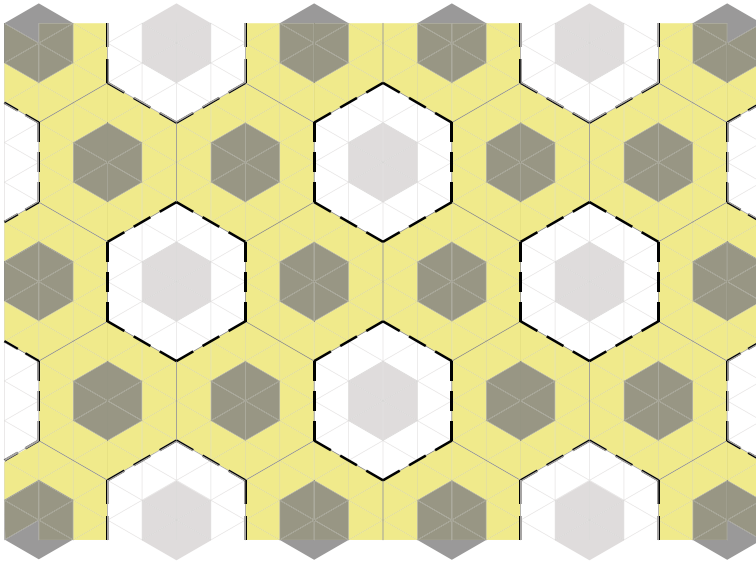


## Residential Porosity Block

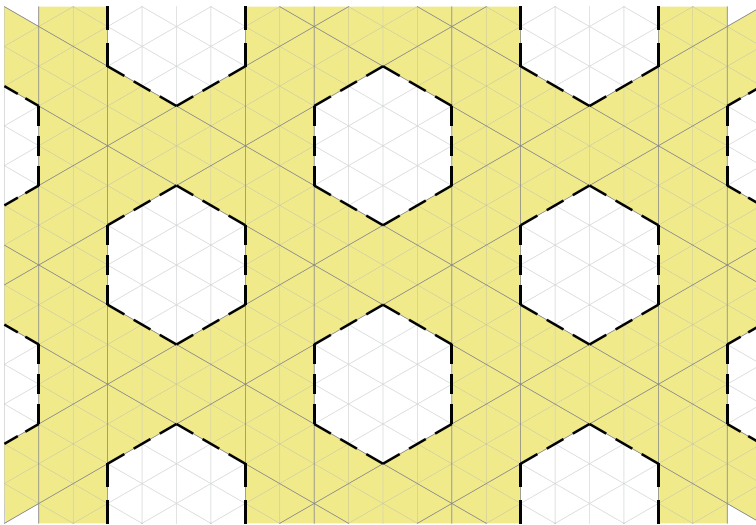
Section is not the product of stacking, as in a conventional building, but of alternating double-height volumes, which brings light into the resultant voids and facilitates an experience of moving up through alternating gardens. However, while this block is porous, it isn't *permeable* and its singular architectural language suggests a singular program.



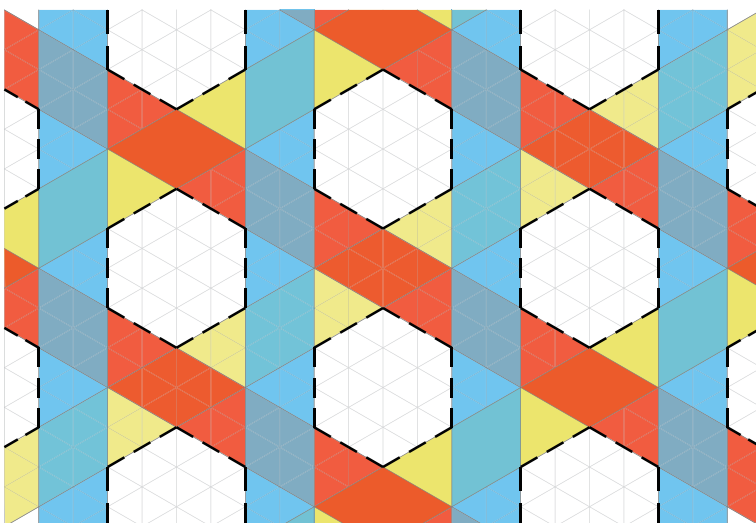
**1**  
The expression of difference is reintroduced; orthogonal and hexagonal fields are superimposed in search of a clue that may unite both 'home' and 'city' logics

**2**

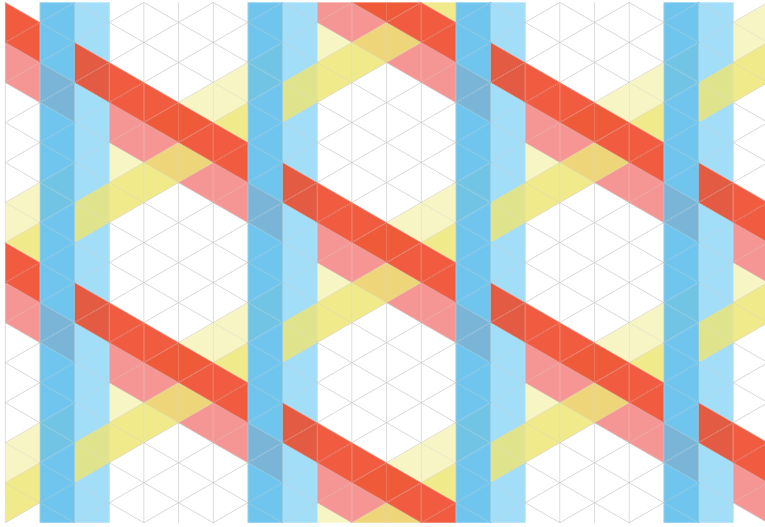
As with the housing block, the hexagonal moire is isolated and studied. The fractal geometry is simplified and the underlying structure is reduced to a triangular grid.

**3**

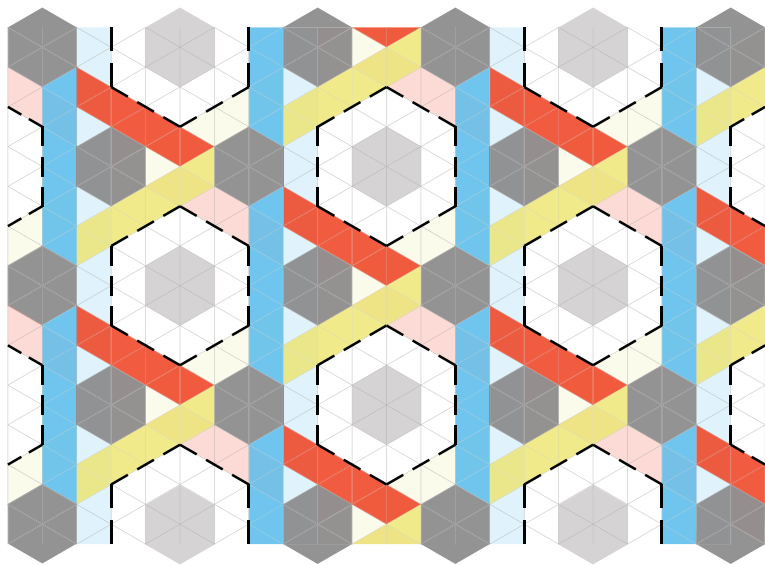
In search of a simplified interference pattern, the hexagonal cell structure is reorganized as regular fields of superimposed lines

**4**

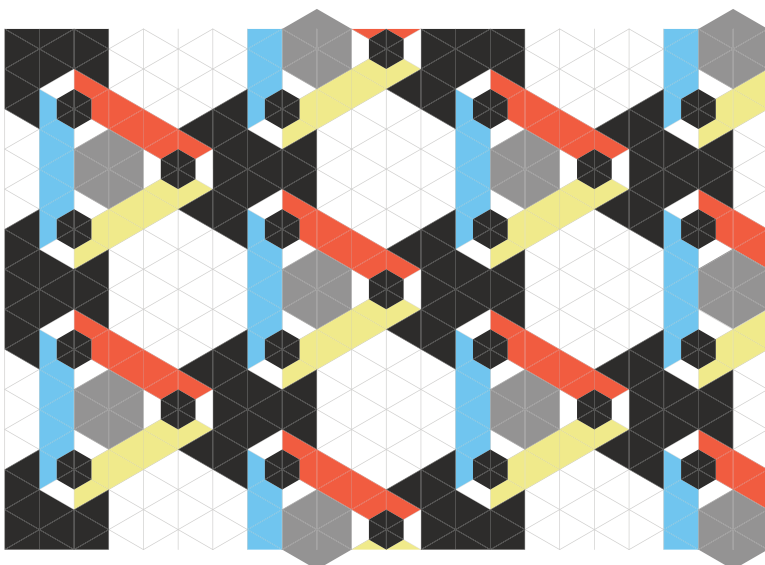
Lines take on divergent characters; suggesting an alternative reading of the structural and programmatic organization of the field and its parts



**5**  
The lines take on complexity and depth

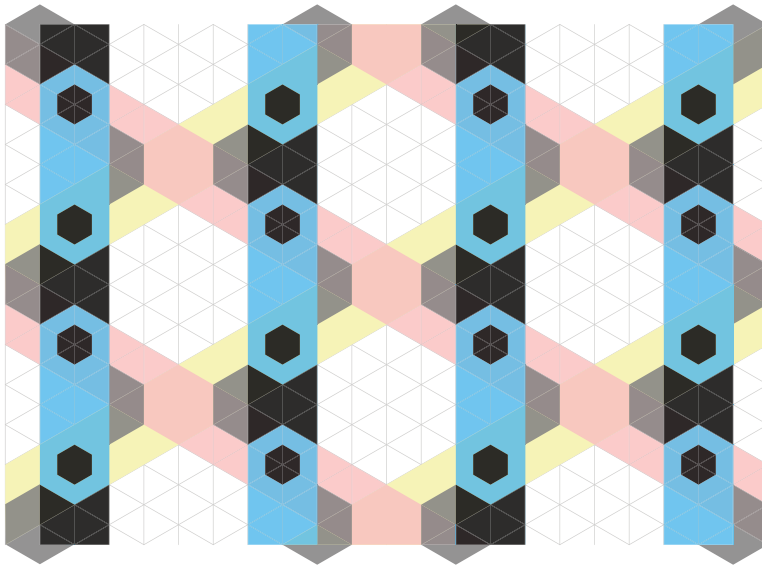


**6**  
Fractal geometry reintroduces multiple readings of space; inside or outside and solid or void provides a greater potential for interpretation

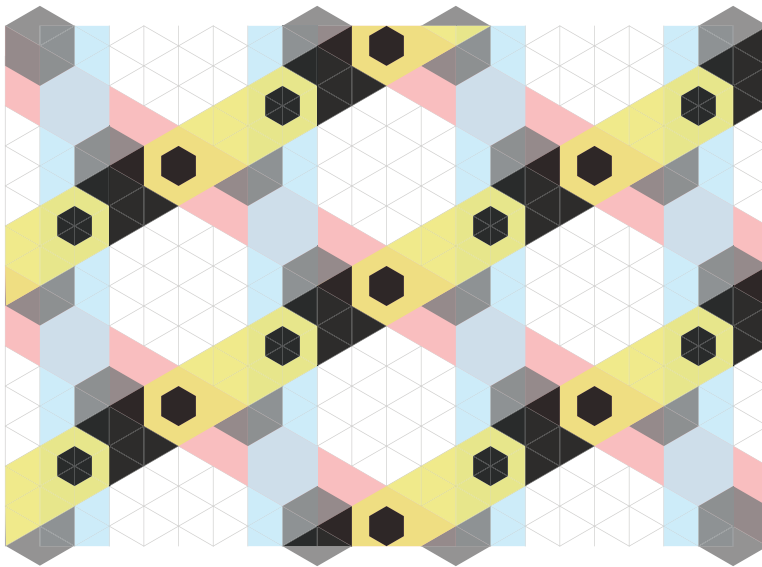


**7**  
As alternating fractals are removed; figures emerge from the field

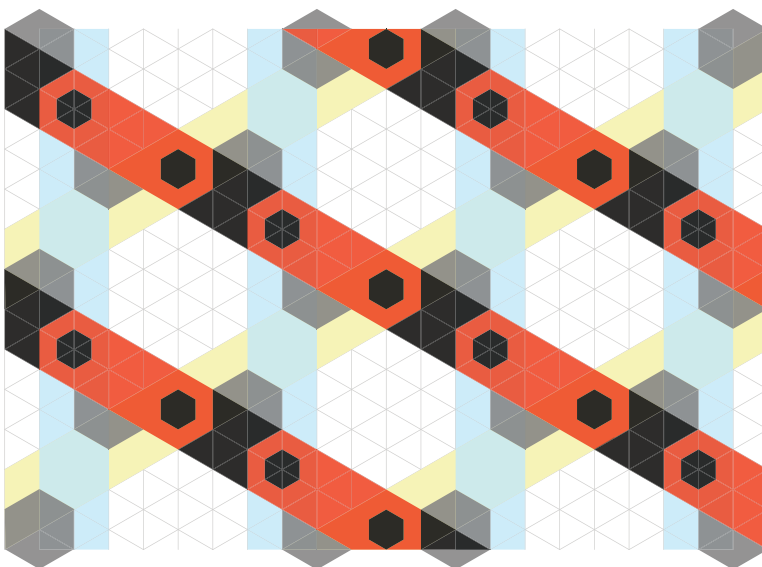




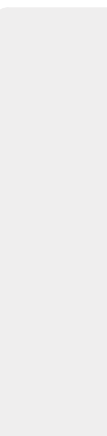
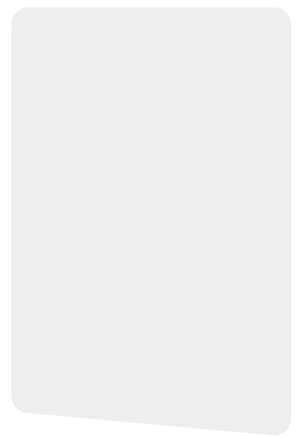
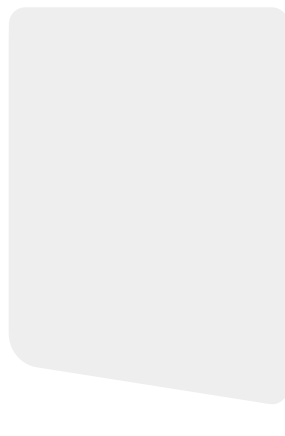
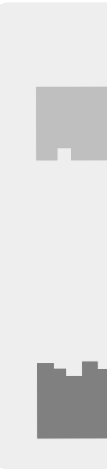
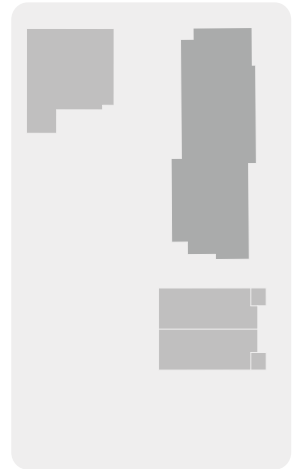
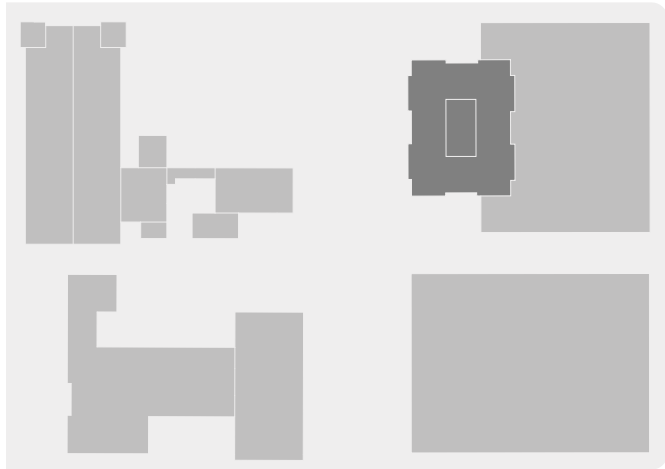
**8**  
Directional hierarchy suggest  
a new mode of expressing  
difference;  
Program 1



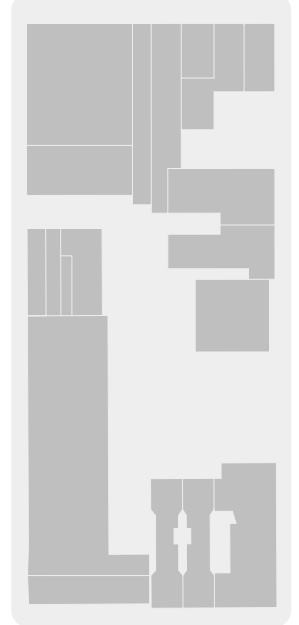
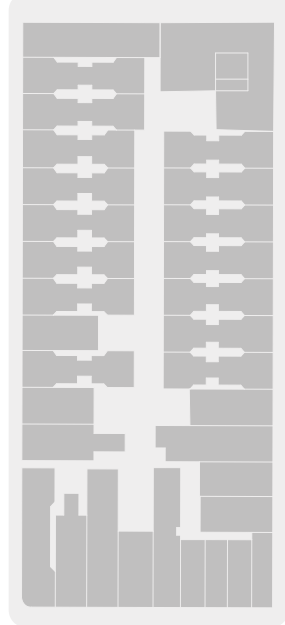
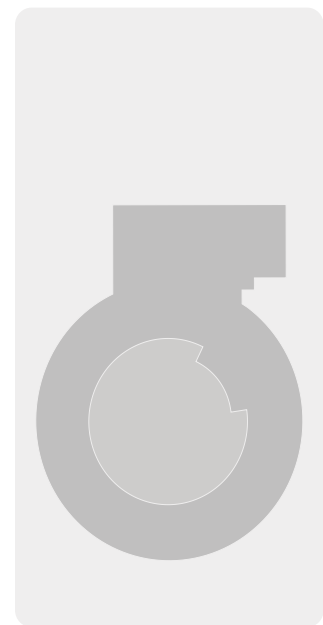
**9**  
Program 2



**10**  
Program 3

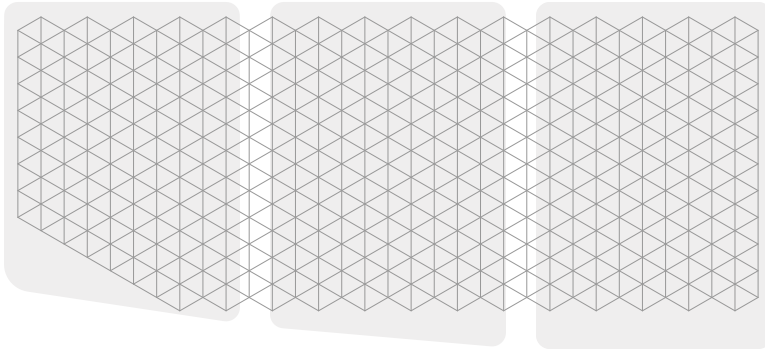


site area = 238,800 sf

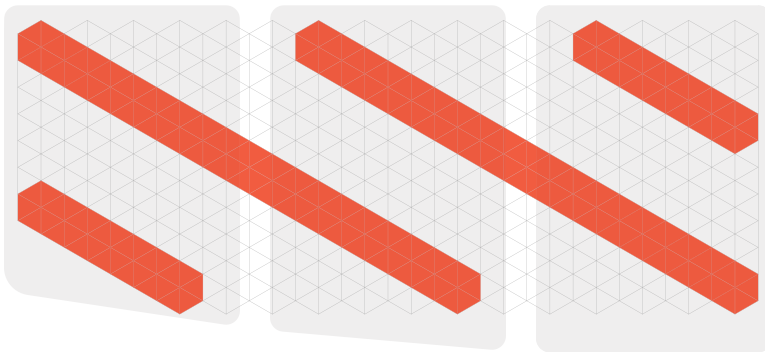




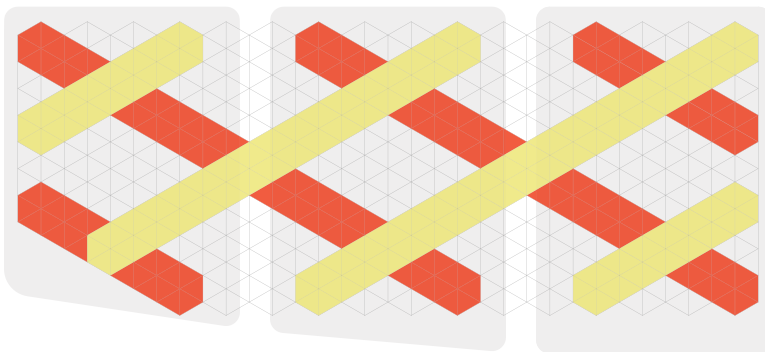
**1**  
A new building morphology returns to the site, this time assuming all three vacancies

**2**

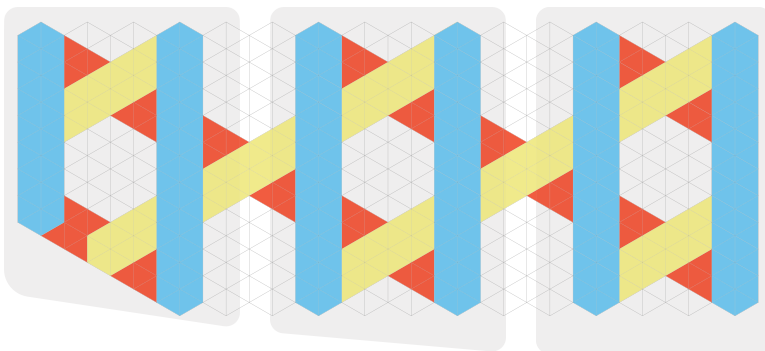
Three sets of lines are rotated and superimposed to form a moiré pattern. Each line can be understood to house a set of specific functions.

**3**

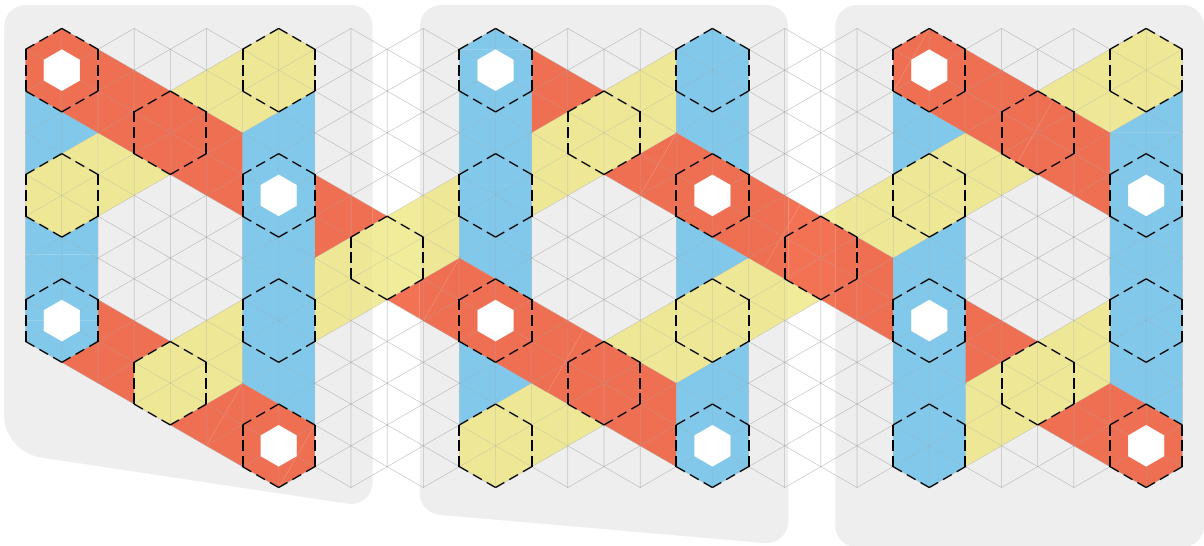
Commercial program

**4**

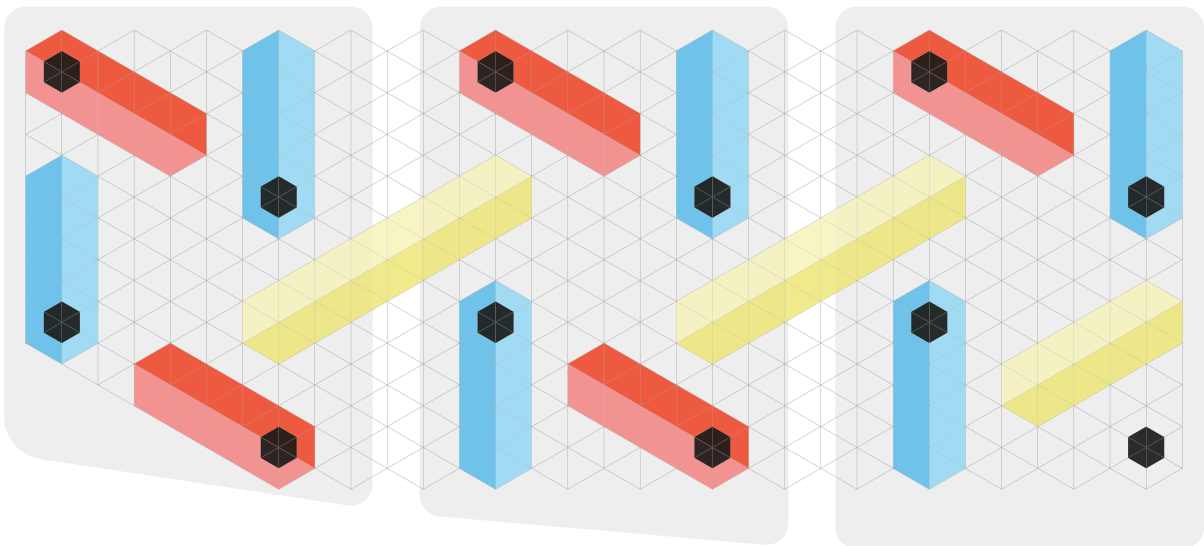
Cultural program

**5**

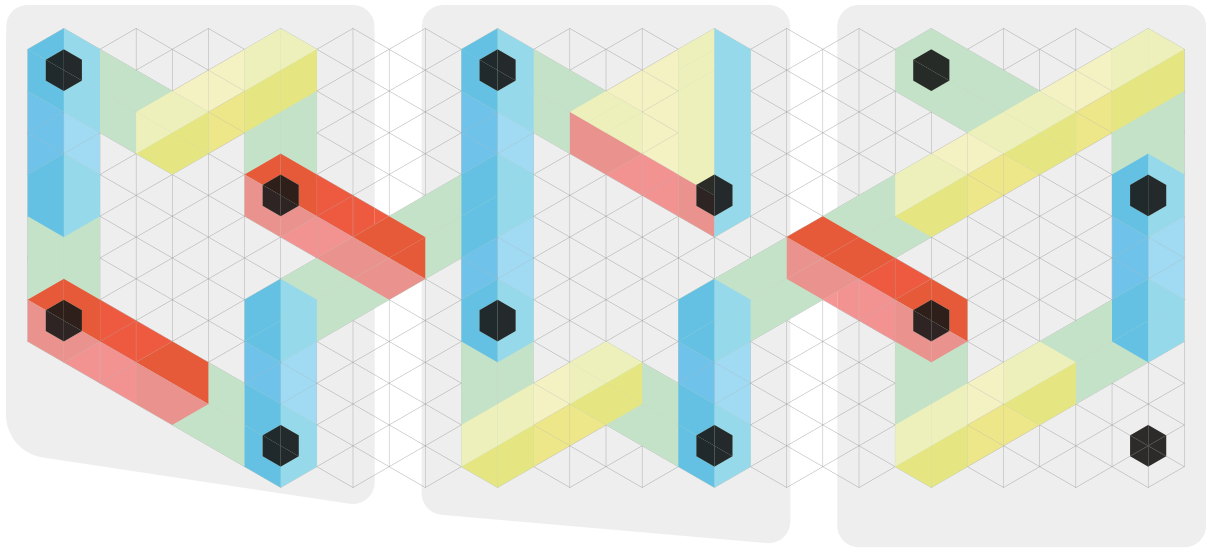
Residential program



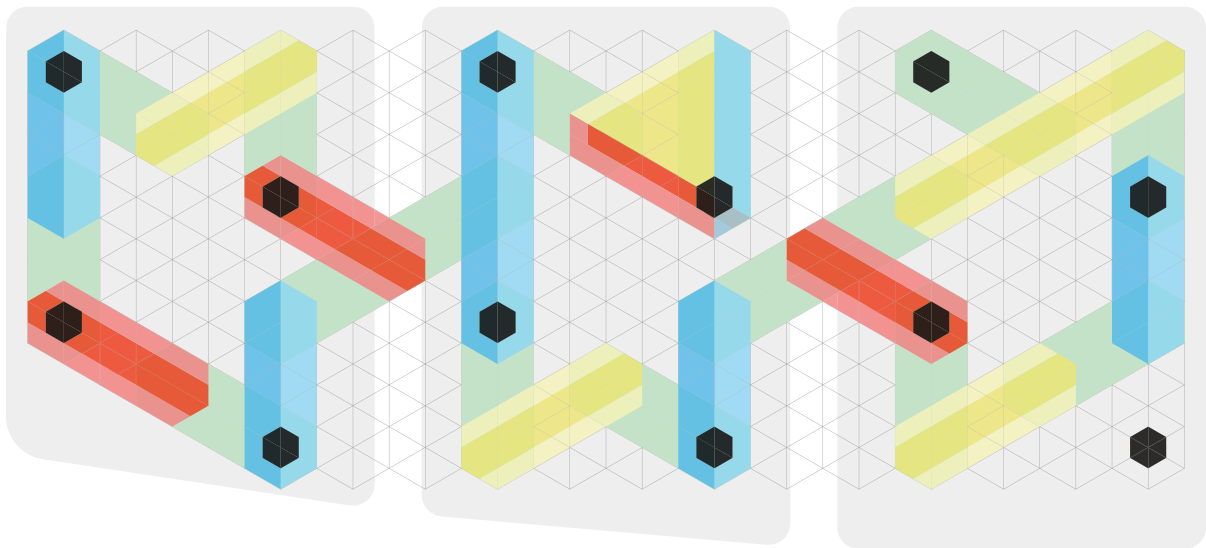
**6**  
 This concept sketch outlines  
 the ambitions of the project;  
 the fusion of various programs  
 within a porous field



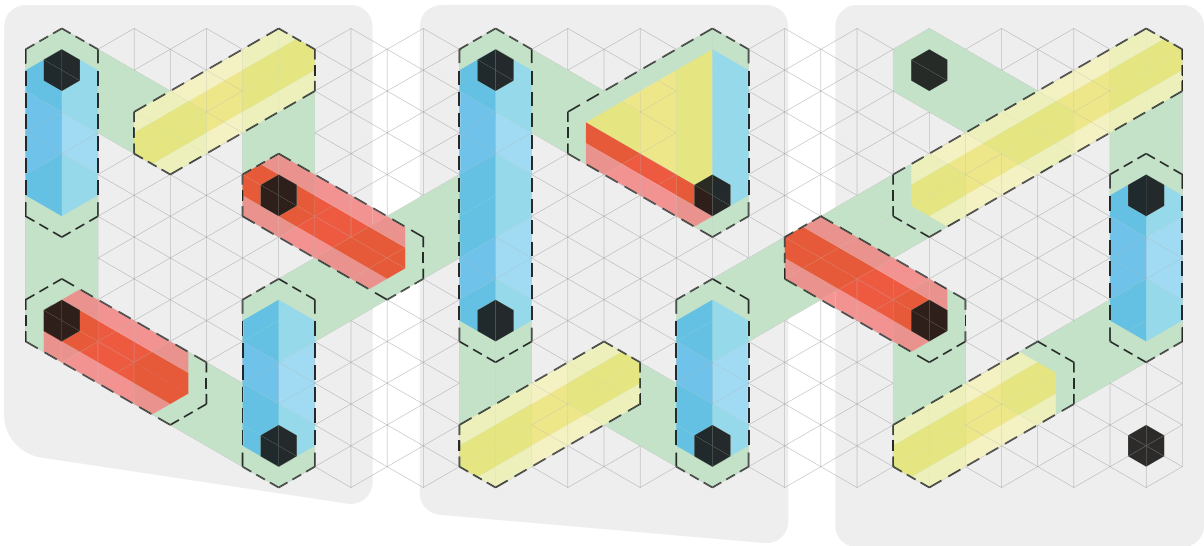
**7**  
 The purpose-built grid is simply  
 a base upon which a volume  
 may or may not be built



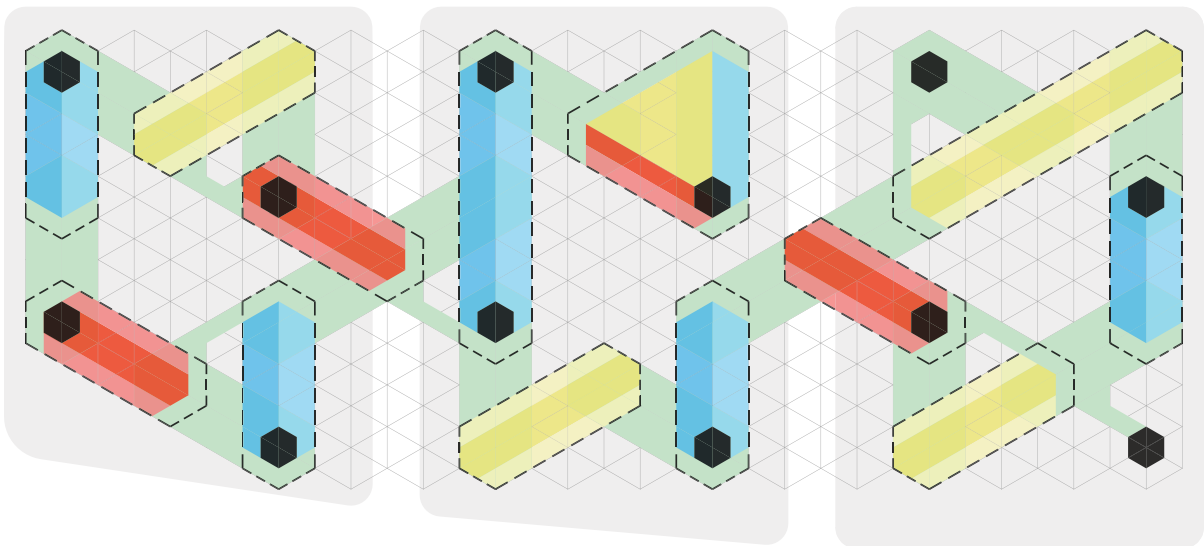
**8**  
 Section is the product of  
 alternating double-height  
 volumes; Roofs become  
 accessible outdoor space



**9**  
 Each block is refigured to  
 contain the potential for  
 passage between outdoor  
 spaces



**10**  
Material is selectively  
removed from blocks to  
permit circulation



**11**  
Small bridges are added to  
increase accessibility

## **Social Aggregator**

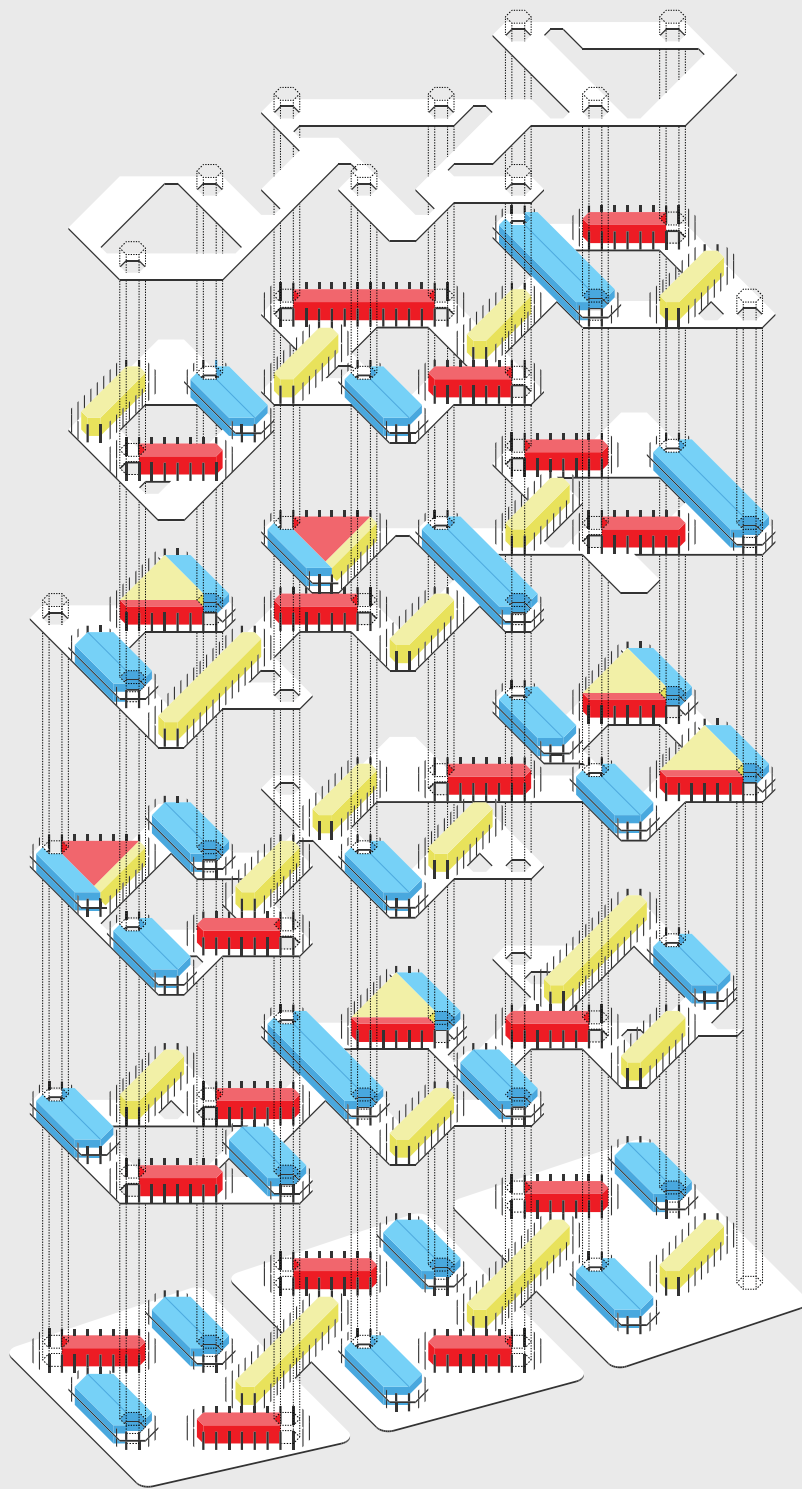
The organizational system is simply a base upon which a volume may or may not be built. This flexibility enables a compositional freedom that produces a perforated building, as well as moments of interest out of individual elements that are regular and repetitive. Aggregates consist of two story residential blocks, containing 4 apartments each, from studio to 3-bedroom units, along with double-height volumes designated for commercial and cultural programming.

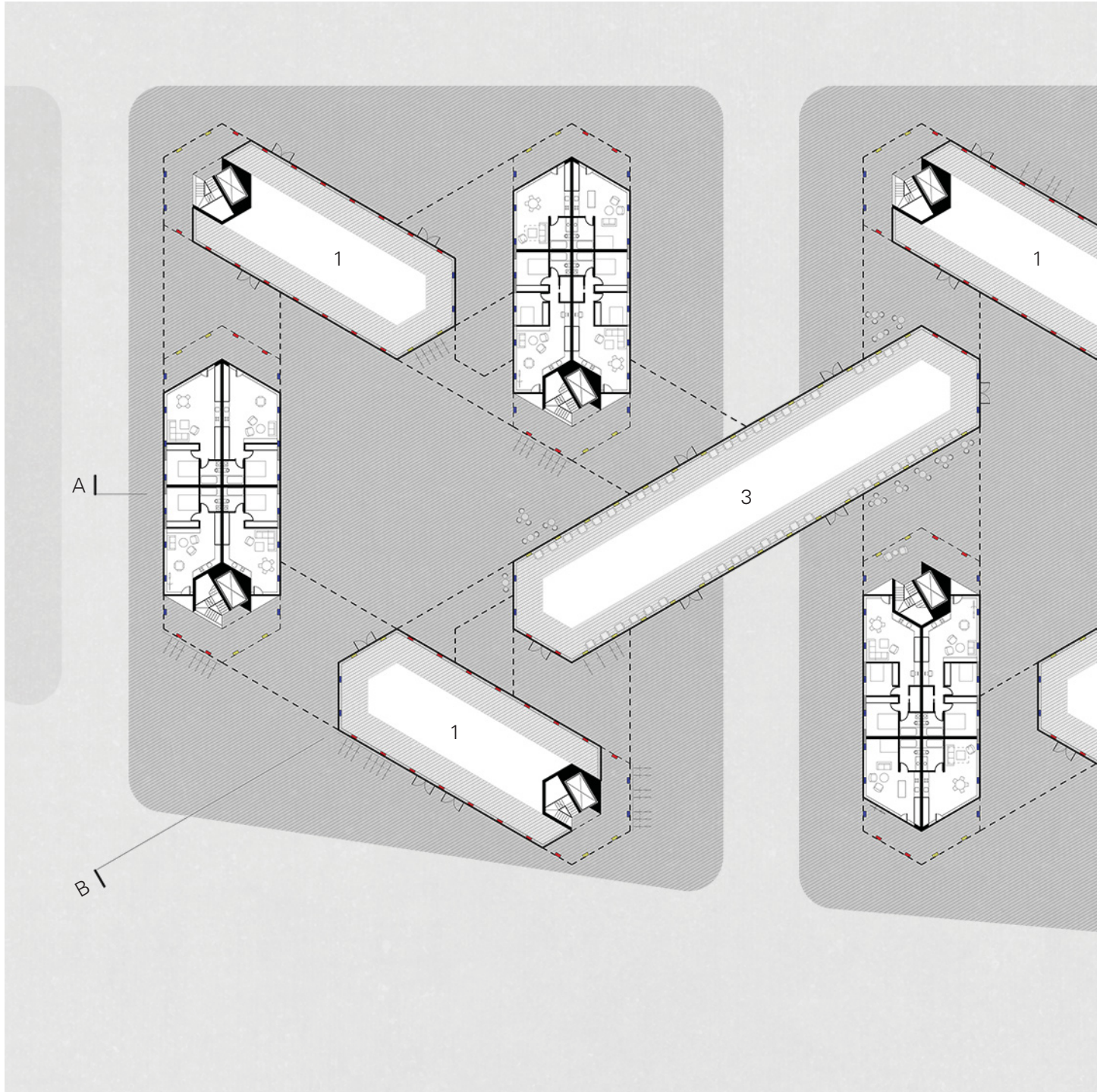
Unlike the typical hierarchical distribution of program, the agglomeration of uses in this scheme produces a mixture of users who can access adjacent open spaces at different times. These voids are connected by indoor and outdoor paths to create a network of common public space throughout.

The perforated form also produces a varied visual experience. Because building blocks are rotated around fixed cores, vertical circulation is enhanced by ascending passed alternating squares, which further increases exposure to places and events and encourages unexpected relationships between neighbours.

Opposite Page: Exploded isometric showing two-story housing blocks (in blue), and commercial and cultural blocks (in yellow and red)

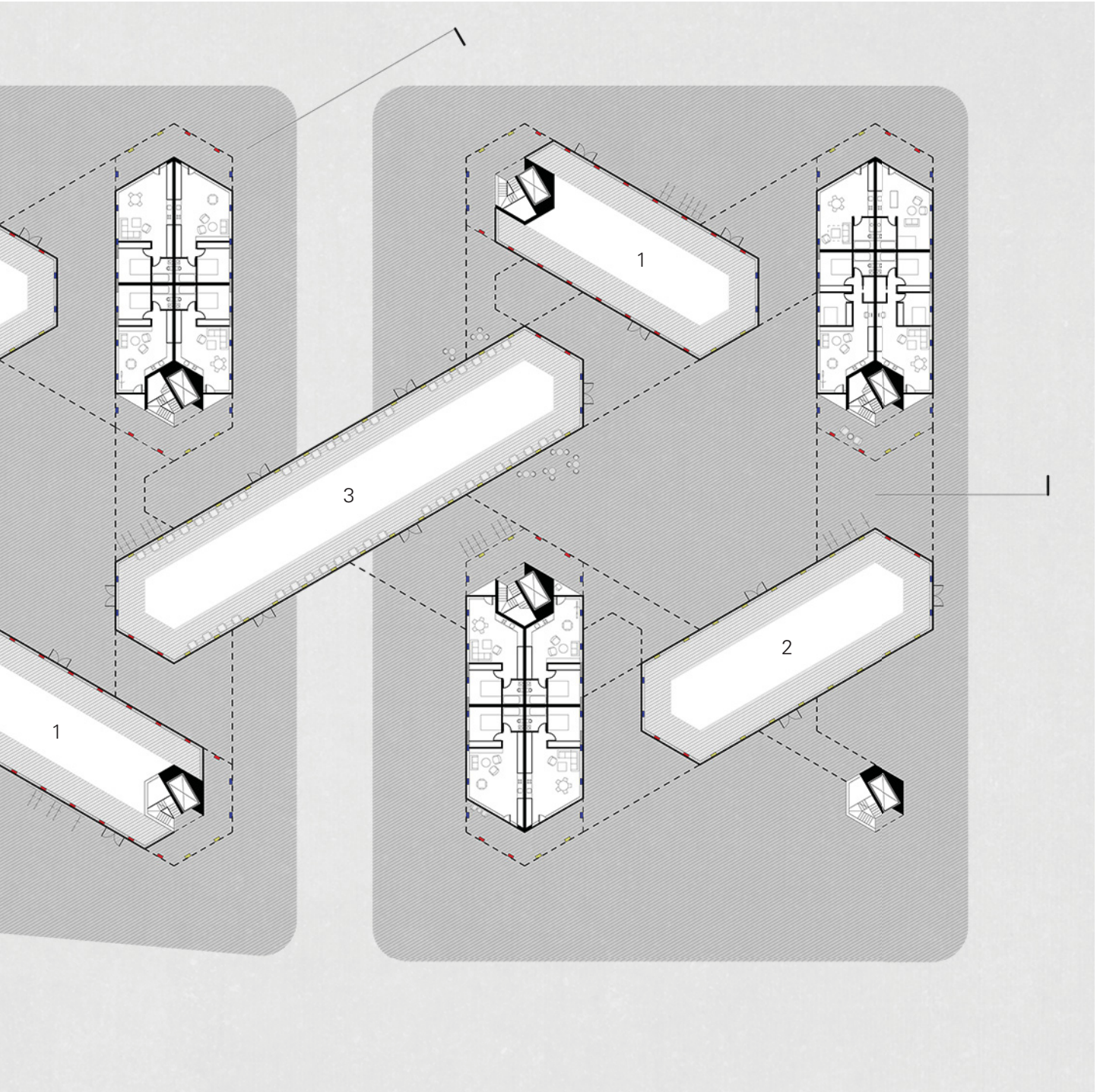




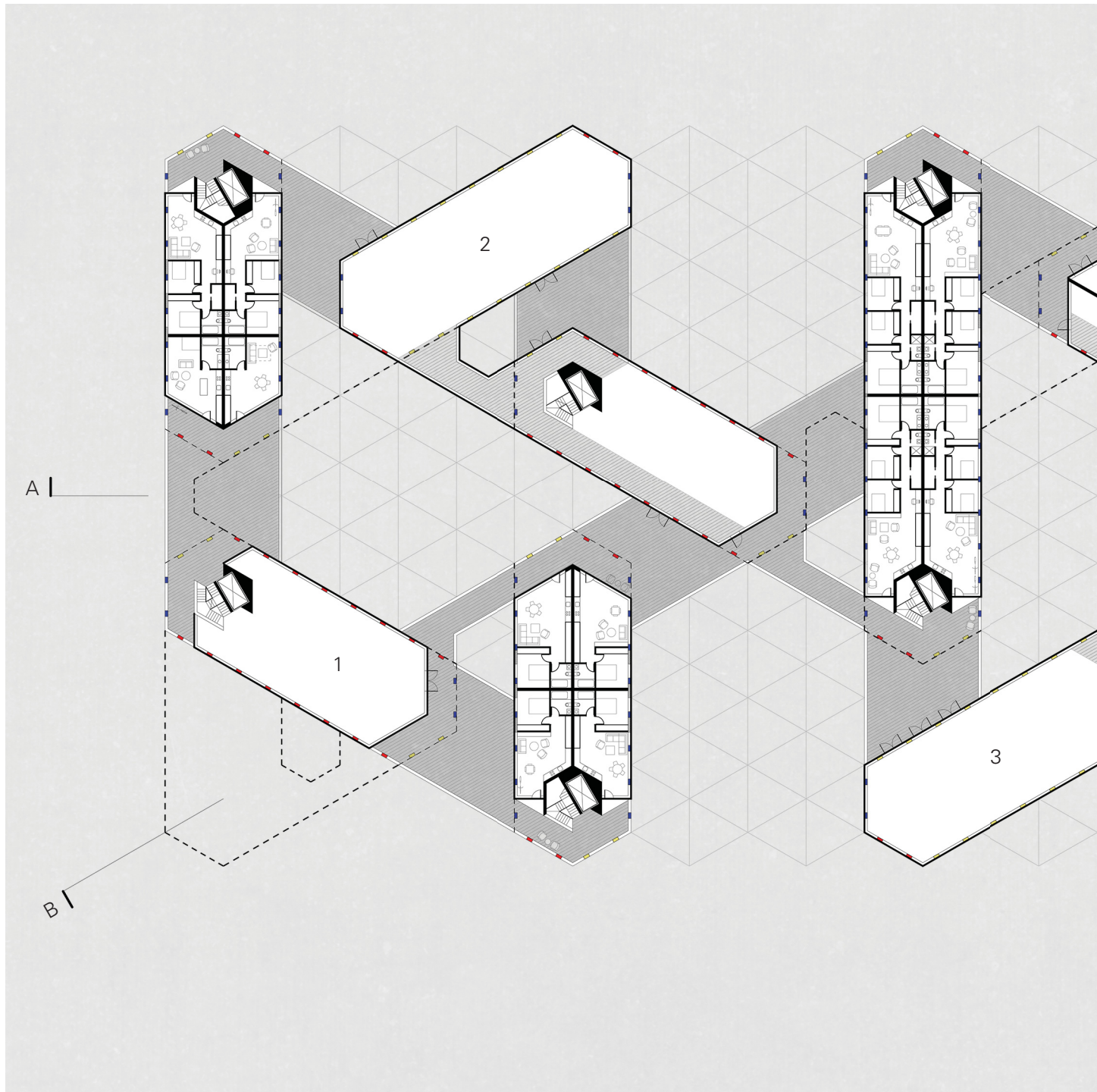


- 1 3,350 sf
- 2 4,150 sf
- 3 6,925 sf



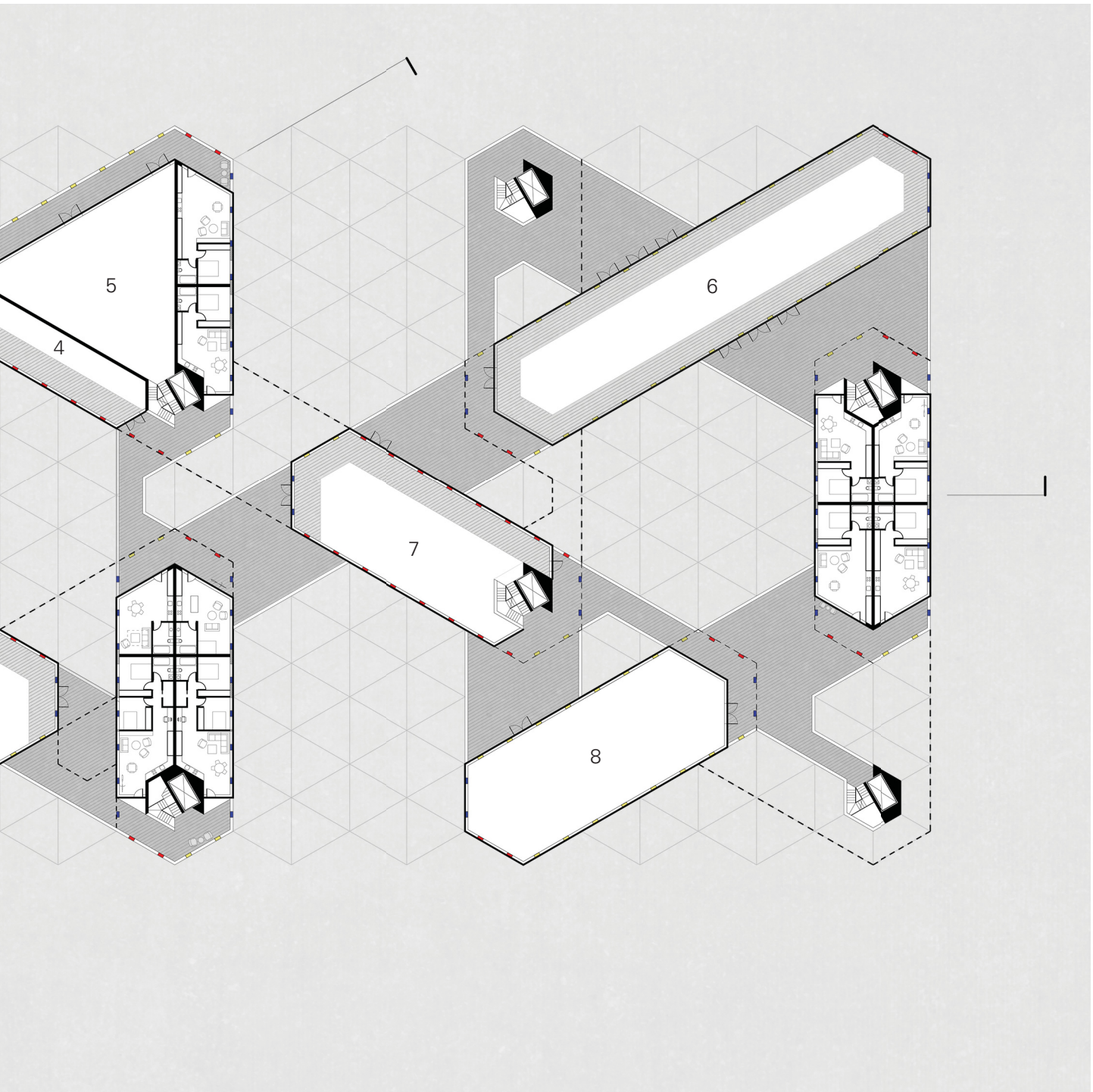


A freedom of pedestrian movement is permitted by an unobstructed ground floor

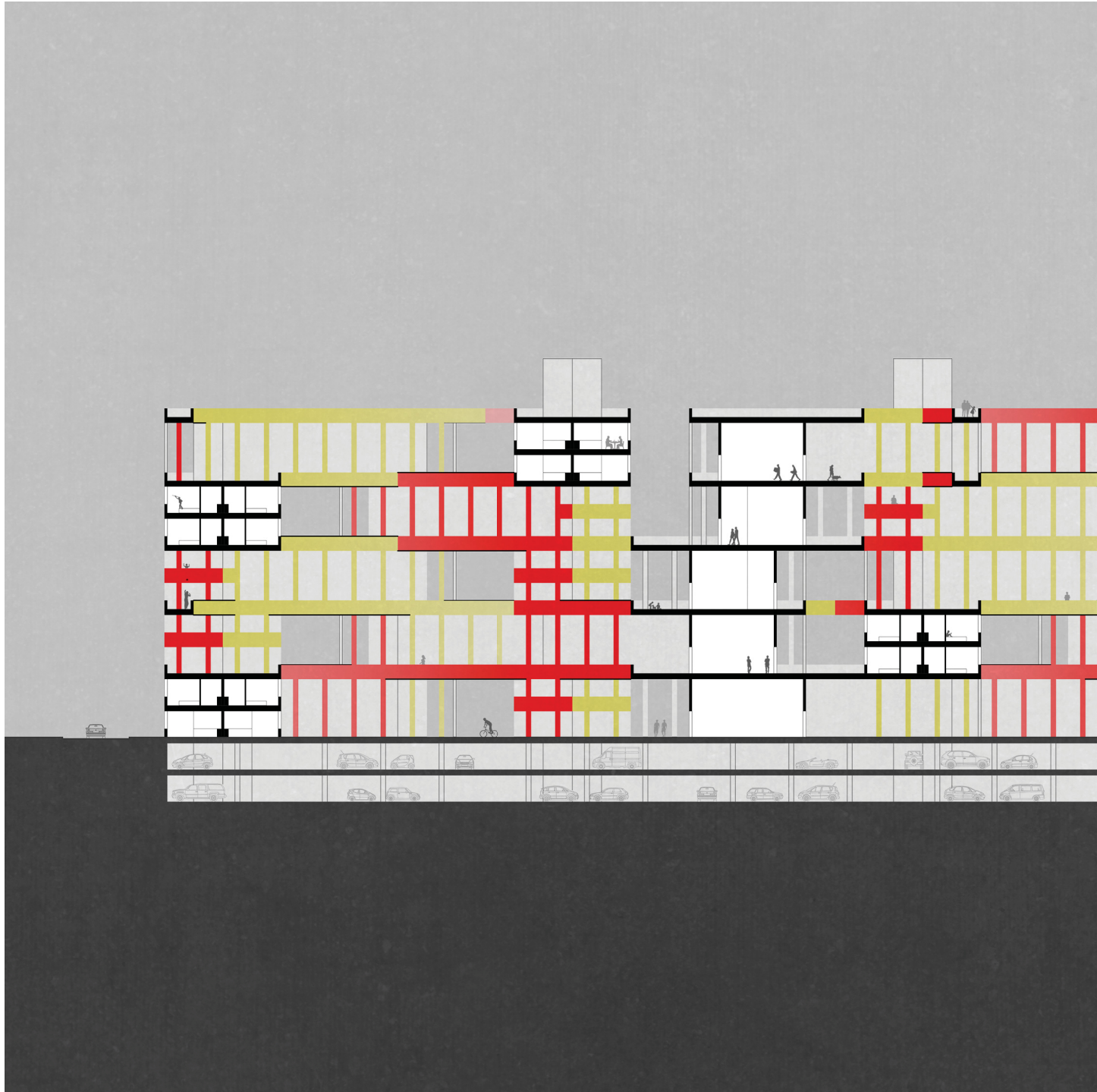


1	2,925 sf	5	2,800 sf
2	8,395 sf	6	6,450 sf
3	4,155 sf	7	3,385 sf
4	1,250 sf	8	3,695 sf



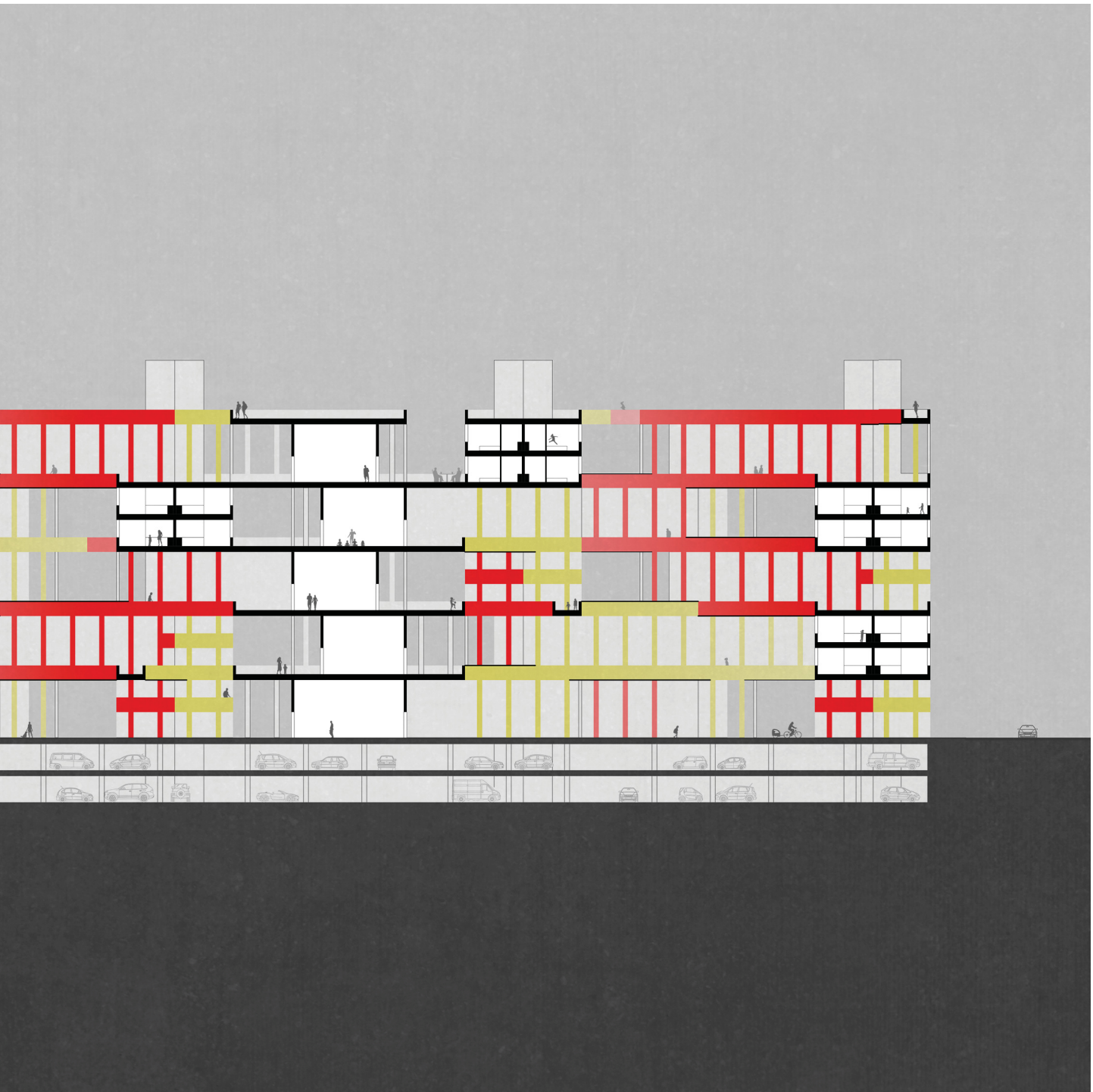


The proliferation of squares and paths form a continuous network of public space on upper levels; A mixture of programs create a mixture of users throughout the day

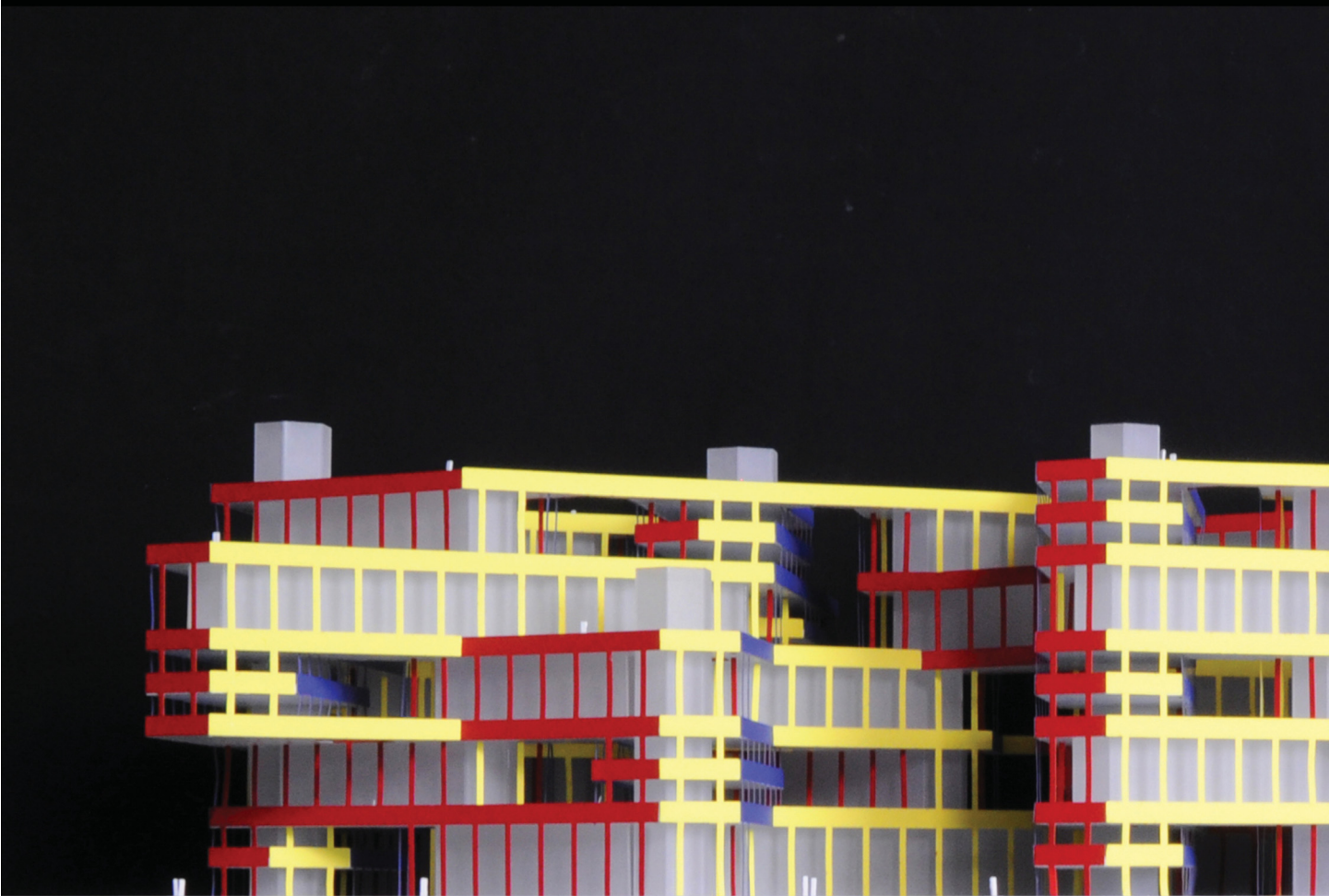


Section A



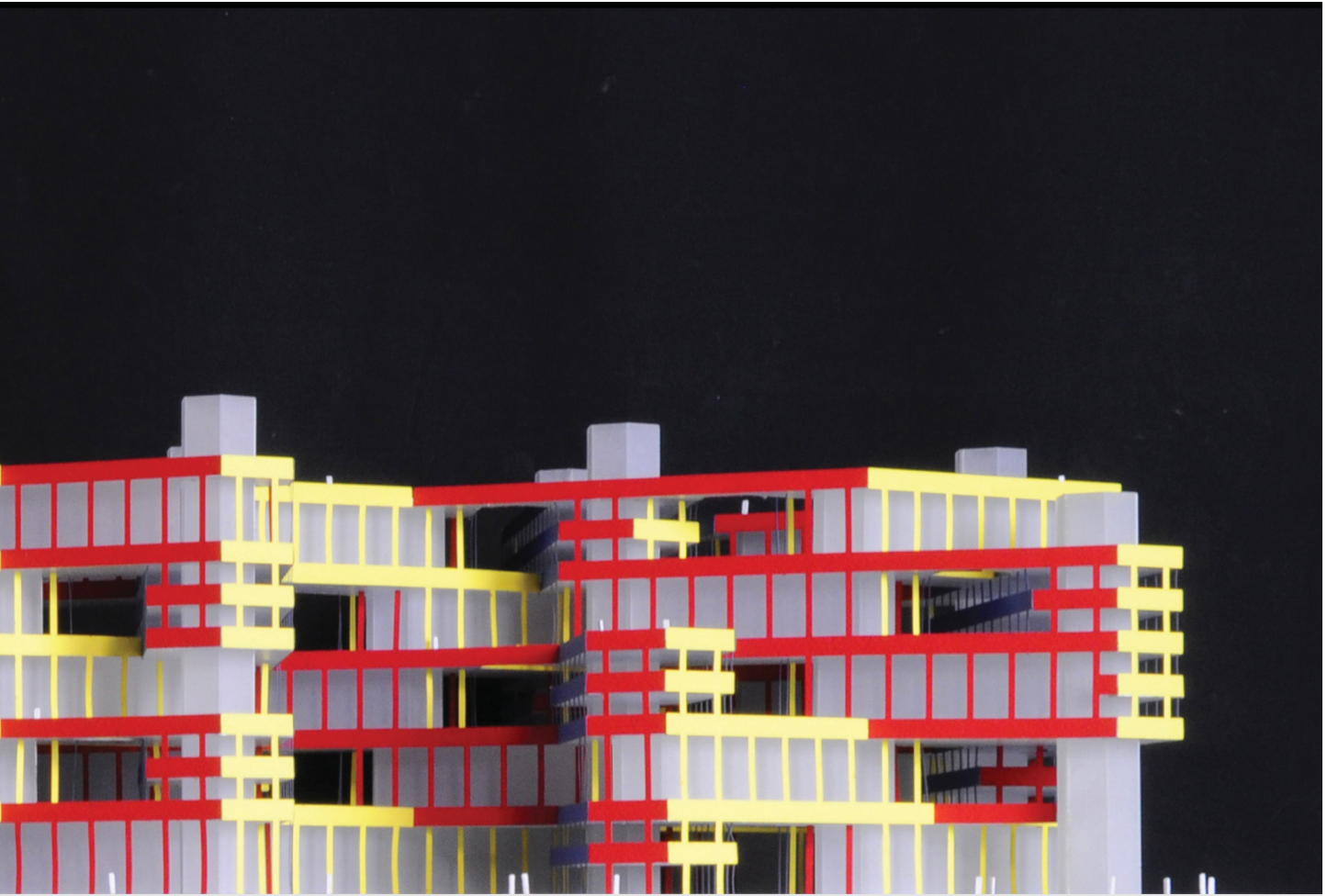


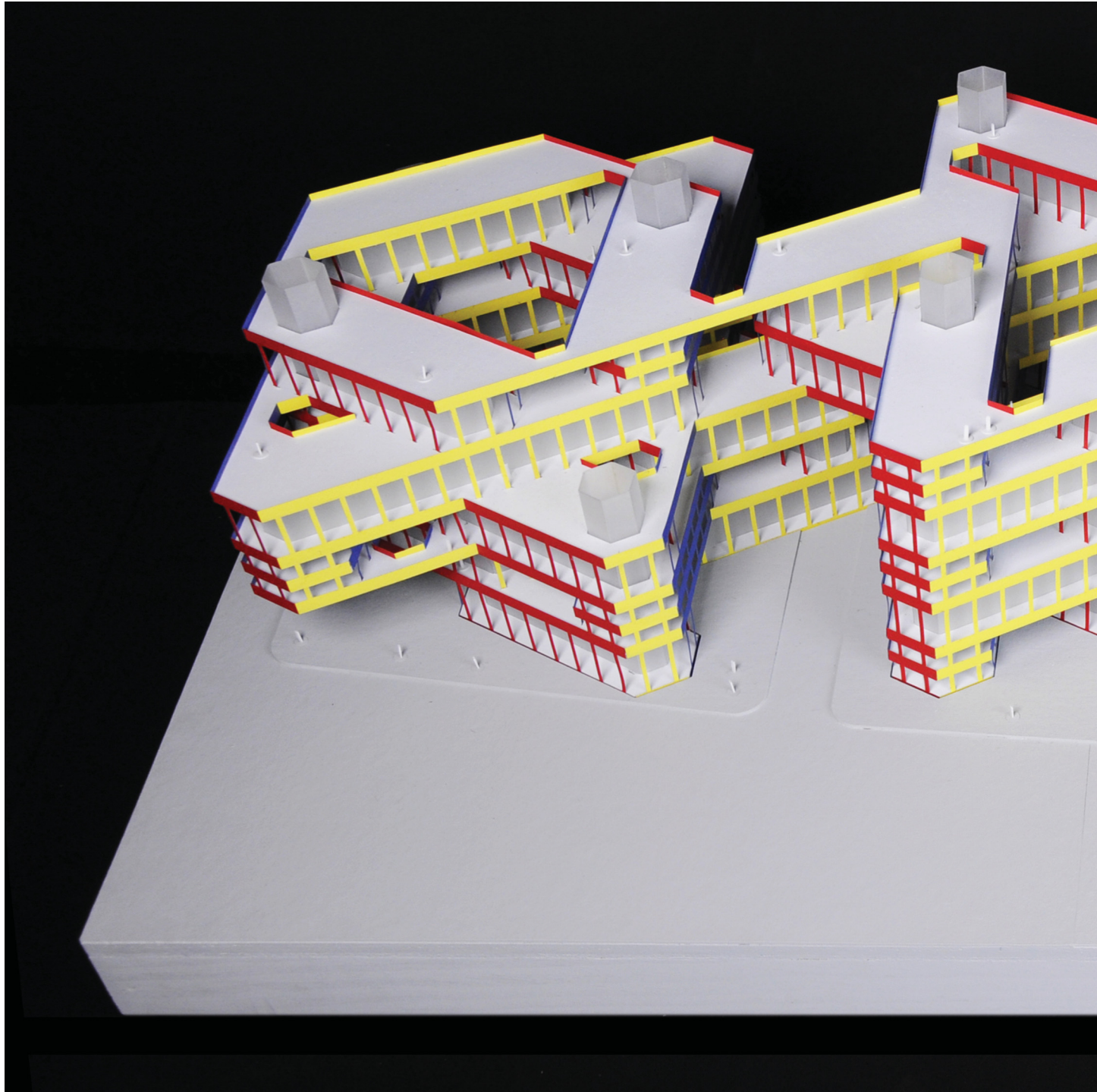
The perforated section produces a varied visual experience which increases exposure and encourages informal contacts between neighbours and visitors alike



View from Delancey St.

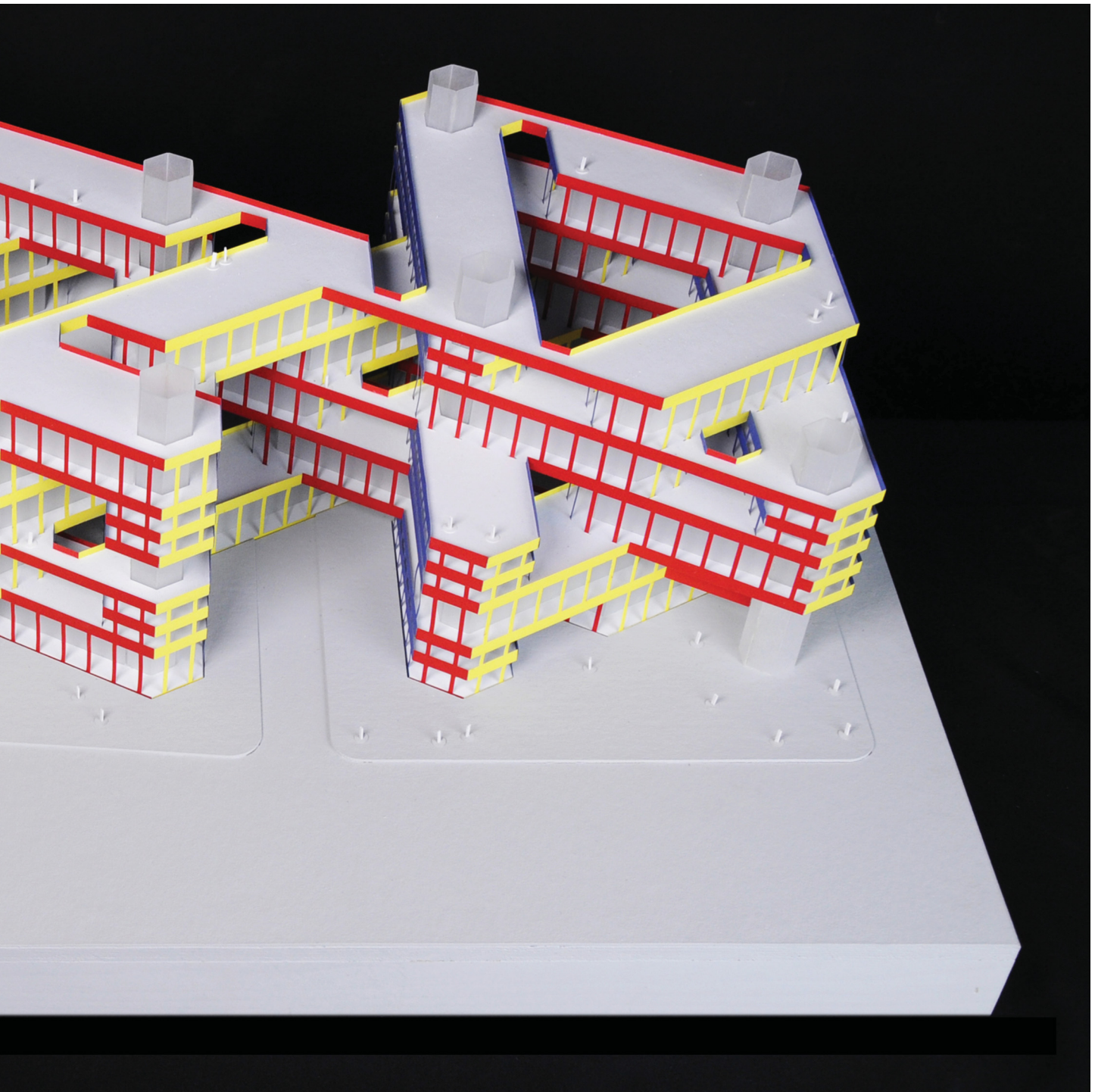


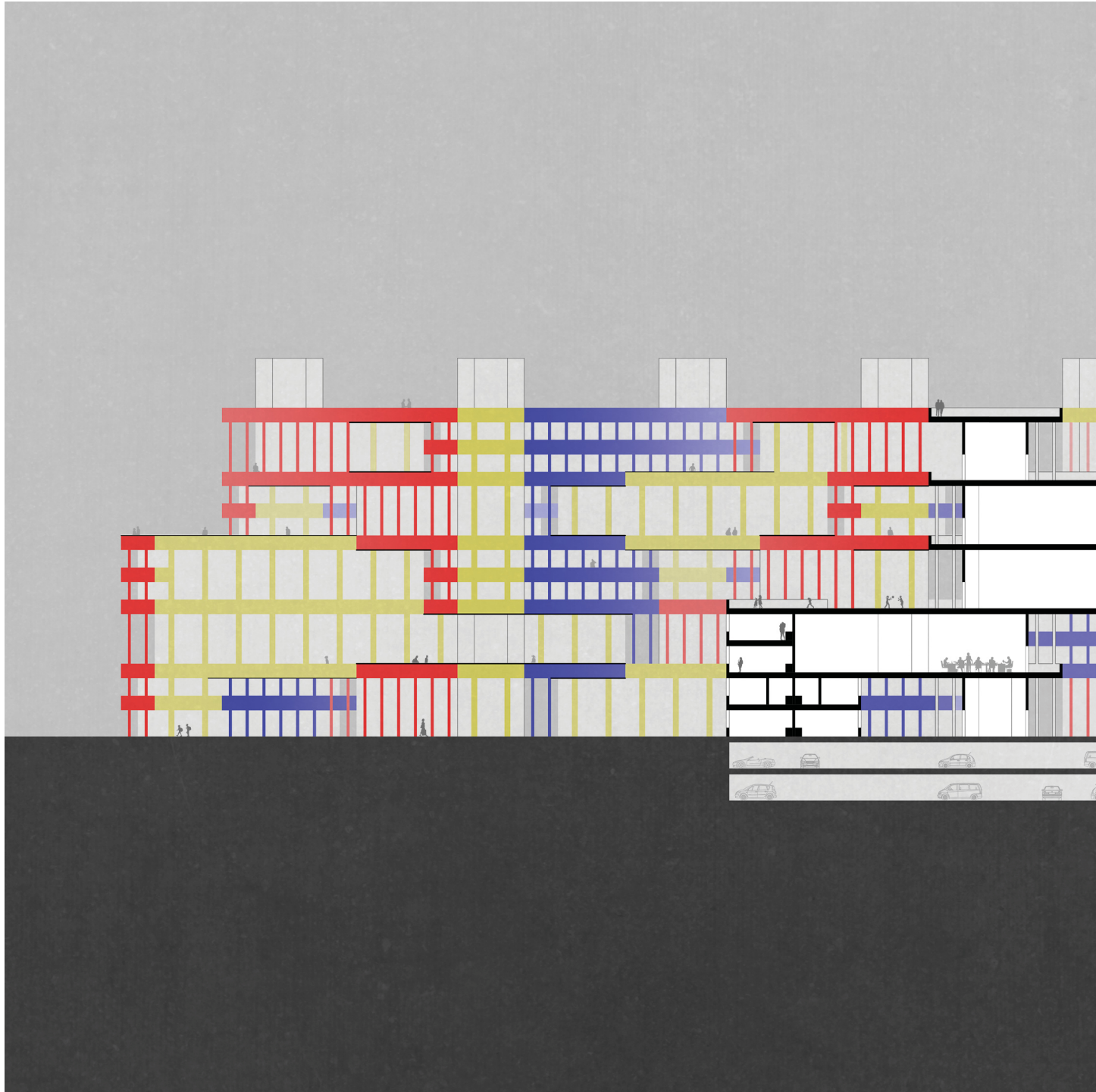




Ariel view from Delancey St.

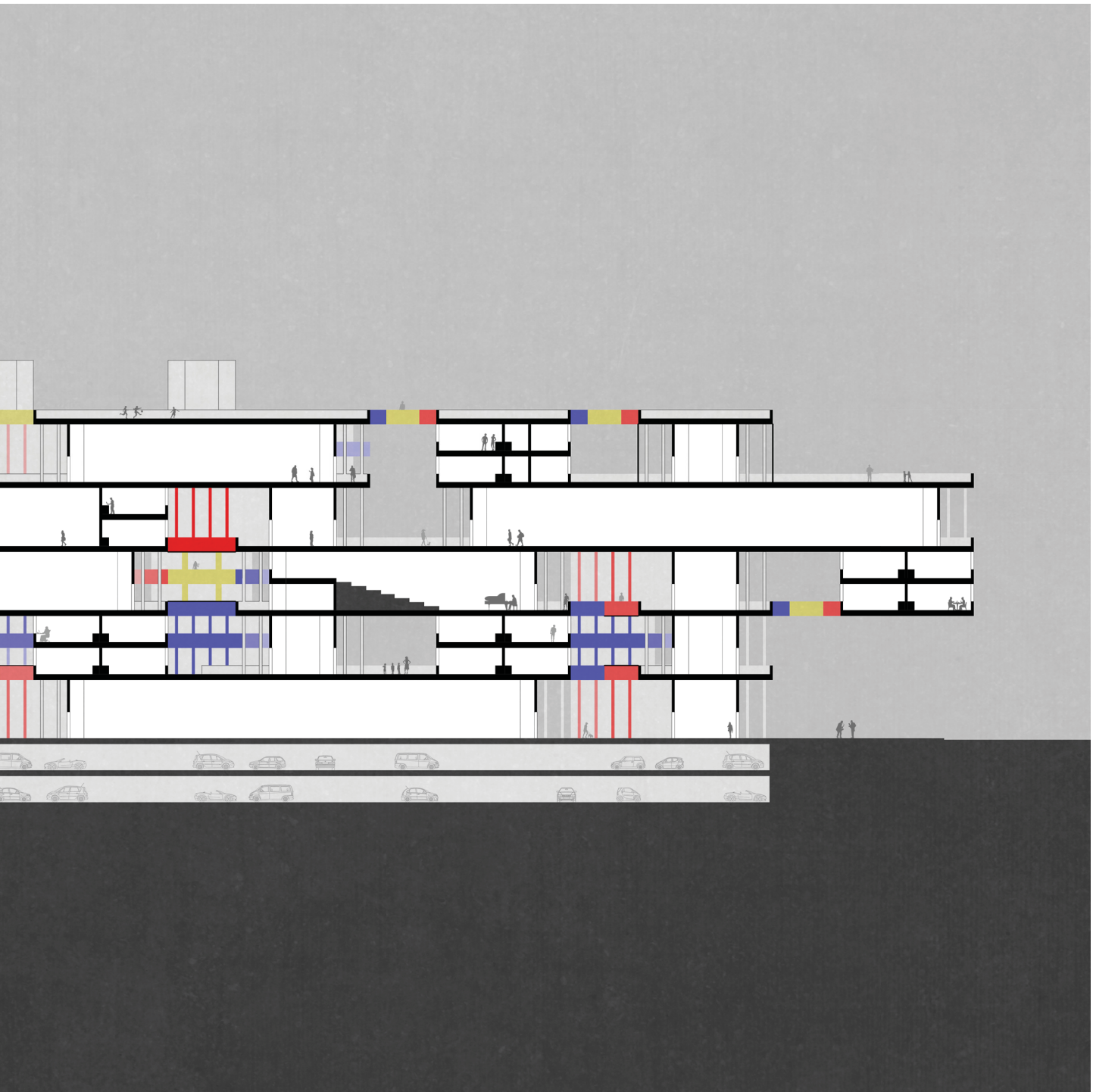




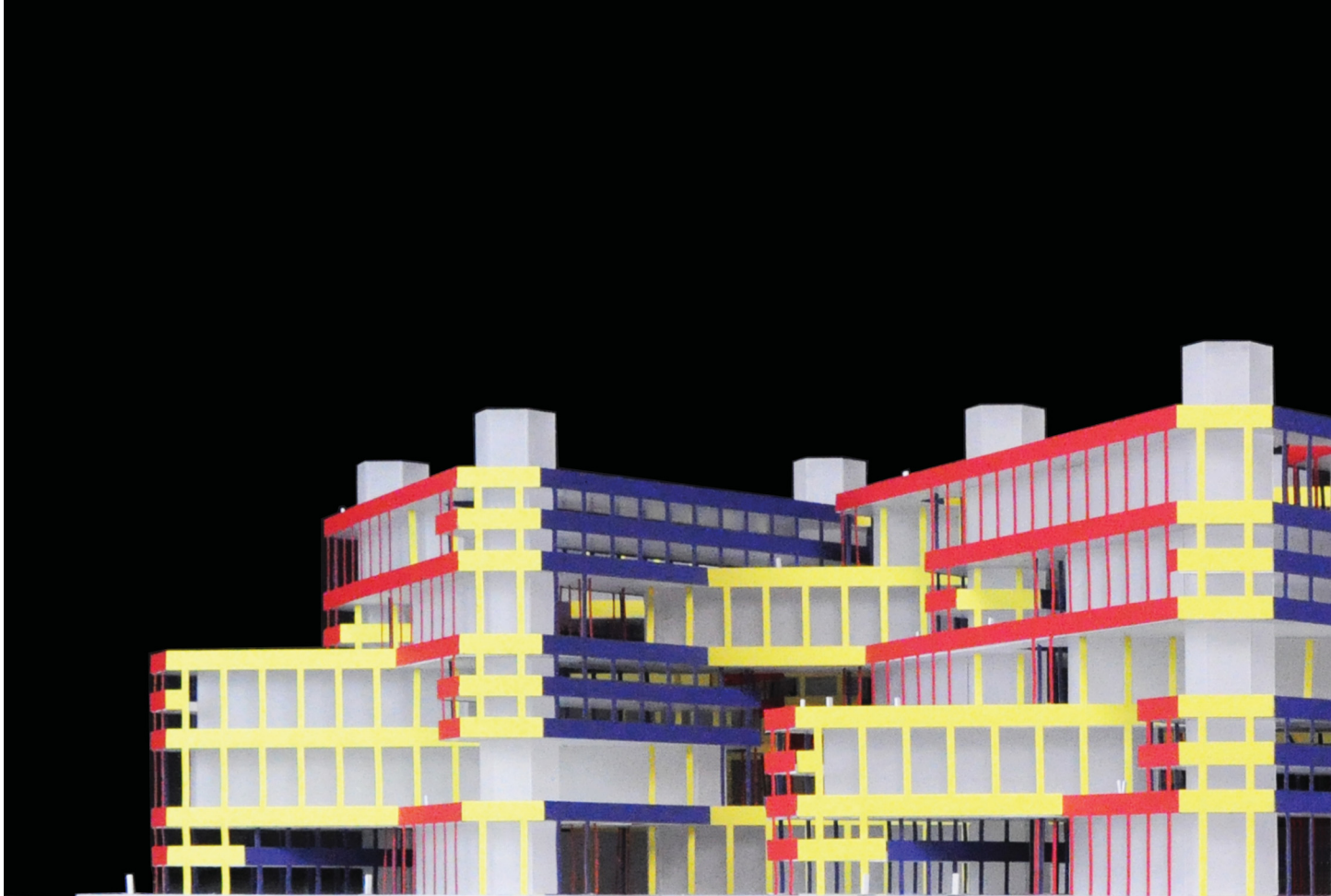


Section B

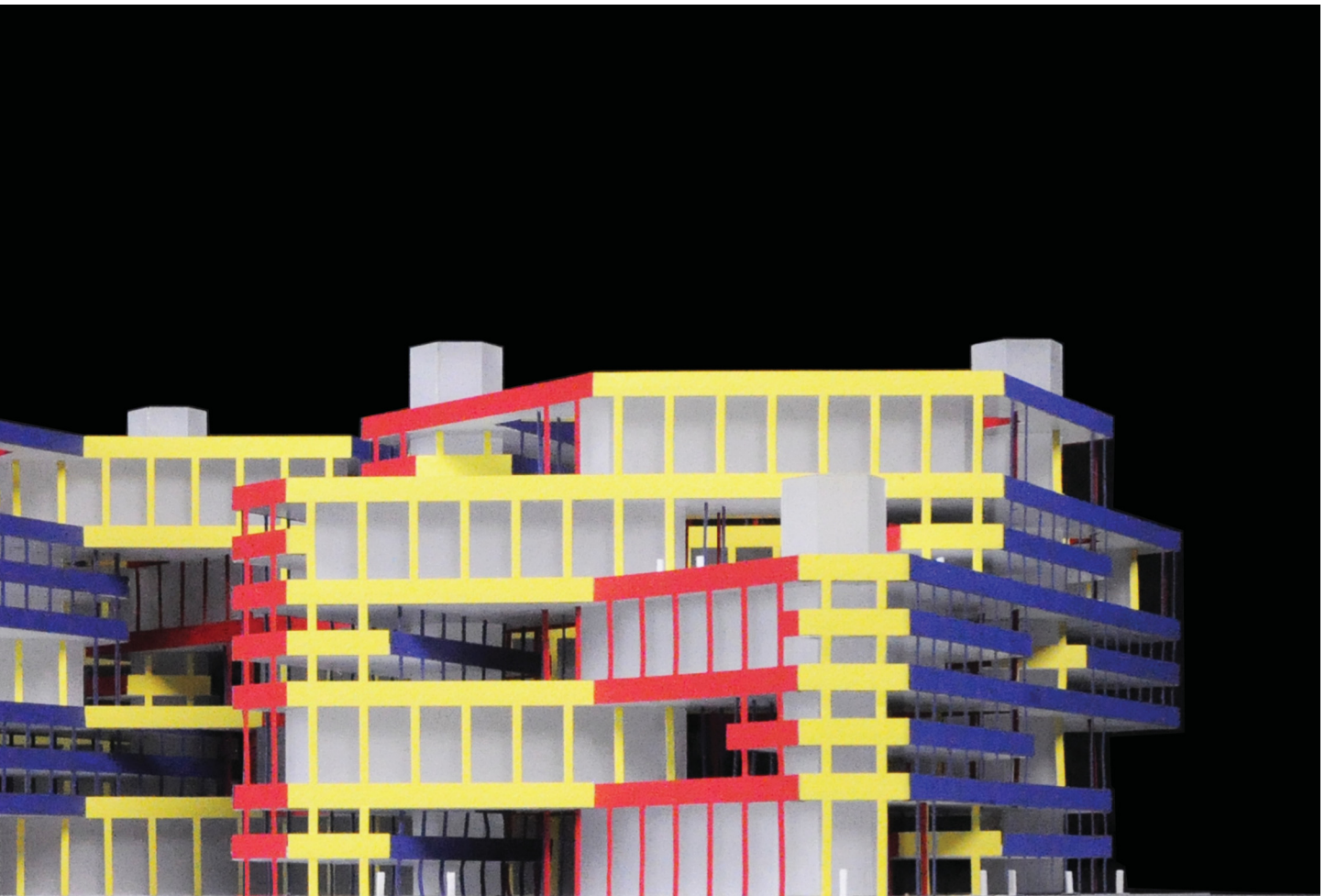




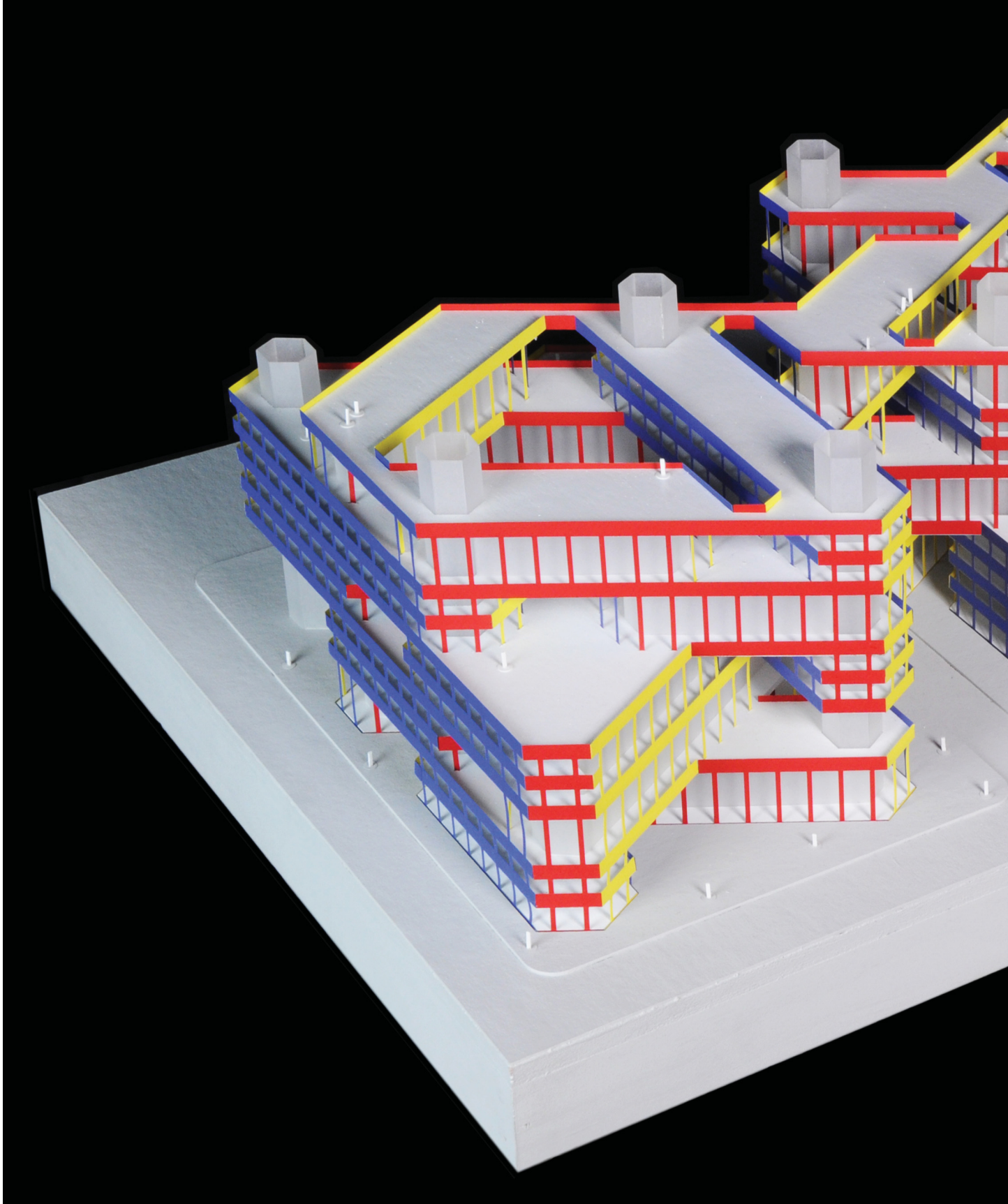
The diverse agglomeration of two story apartments and double-height commercial and cultural space breaks from the typical hierarchical distribution of program



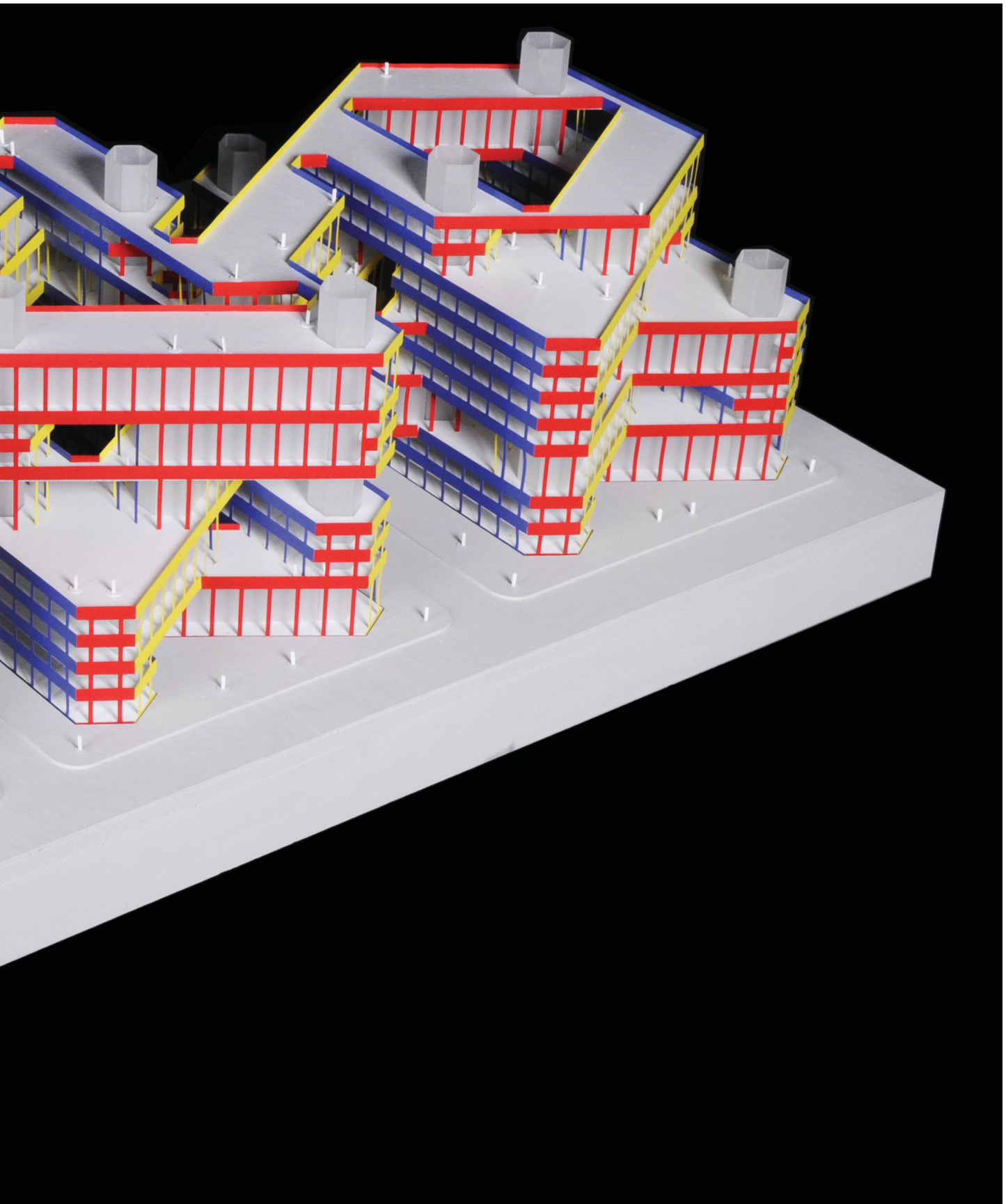
View from the south





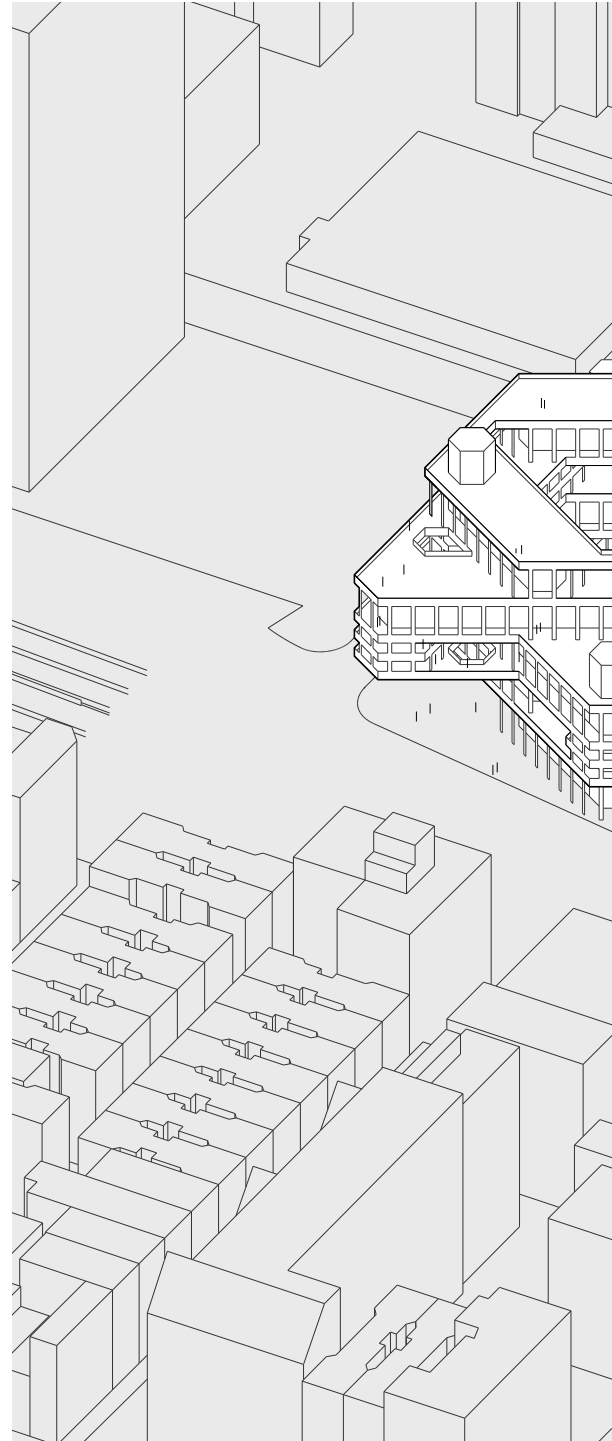


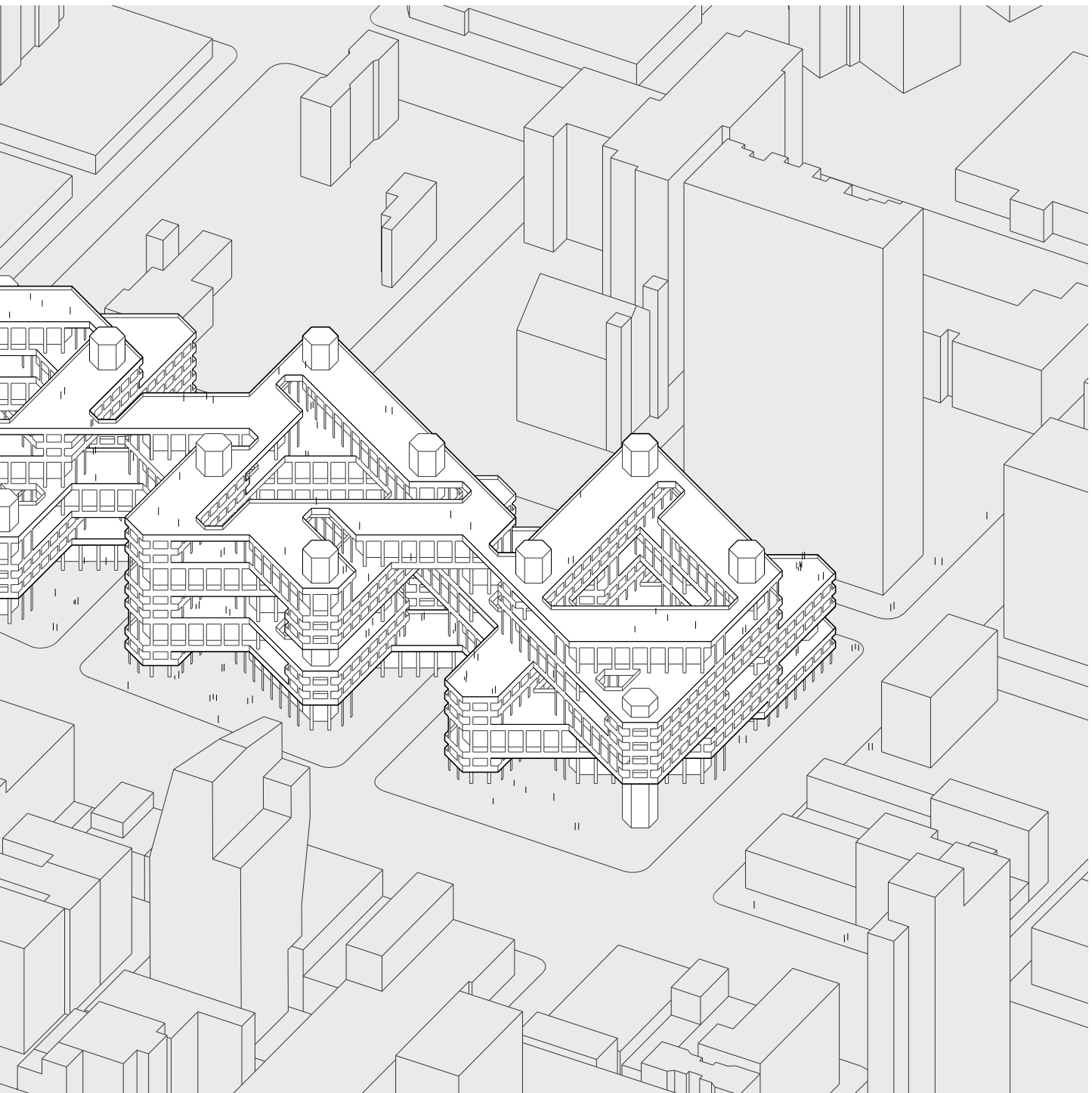




## CHAPTER 6: CONCLUSION

The architecture to describe a new social order is needed to counteract forces of isolation and spatial confinement in the contemporary urban context. By looking for a solution outside of architecture's database of preexisting building types, this thesis took the critical position that the generation of a new form requires a new starting point. Using the concept of urban permeability as a metaphor and creative muse, a methodology and architecture materialized out of a series of experimental field studies. Within the abstract space of these fields, a set of organizational principles were able to redefine the elements of 'home' and 'city,' and suggest a new relationship between them.





The new building in context

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