ADAPTIVE VALUE

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ABSTRACT

The traditional notion of architecture as a mostly static condition is being increasingly challenged by the ever-accelerating pace of change in the modern world. Architecture that cannot accommodate change comes to be underused, demolished, and replaced with new construction, thus contributing to an unsustainable cycle of material production. In order to achieve a more responsible architectural practice, I propose to disrupt this cycle by implementing adaptability into the design of new built environment.

The following essay is the result of my investigation into adaptability of architecture completed over the course of the Master of Science, Advanced Architectural Design program. The text begins with an attempt to define adaptable architecture and outline the extent of my inquiry. It further presents seven different approaches to adaptability. Each one is supported by a case study of either a design studio or an architectural elective. The third part of the essay synthesizes all the work and proposes a new conceptual framework for viewing adaptability in architecture.

ACKNOWLEDGMENTS

For their contributions to this research project I would like to thank

Lily Chi and **Caroline O'Donnell**, members of my Special Committee, for their helpful input on this essay;

Katharina Kral, for a design studio that allowed me to directly address and investigate adaptable architecture on the scale of a building;

Jesse LeCavalier, for a design studio that expanded my thinking about adaptability into the realm of infrastructural systems;

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The **M.S. AAD class of 2021**, for the three semesters we spent together and everything we learned from each other.

CONTENTS

DEFINING ADAPTABILITY

"There is nothing permanent except change." [1]

[1] Heraclitus, 535 BCE.

Change remains the one constant in all spheres of life. Economic, political, ecological, and social conditions continuously evolve and fluctuate. Architecture, on the other hand, has been traditionally conceived as a static condition, as the production of physical space that can be preserved in its original state for decades or even centuries. The current conditions of the globalized world are increasingly accelerating the processes of change.[2] Therefore now, more than ever, the static notion of architecture must be challenged. One potential resolution to this complex project can be found in the adaptability of architecture, approaching design of built environment with the consideration of future change in mind.

[2] Arjun Appadurai, *Modernity at Large* (Minneapolis: University of Minnesota Press, 1996), 27–47.

Adaptability is certainly not a new concept in architectural discourse or architectural practice. Reappropriation and reuse of existing structures has existed for as long as buildings themselves.[3] More recently, adaptive reuse has been framed as an established discipline of architectural practice in the 1970s.[4] Simultaneously, multiple architectural movements and radical proposals emerged that argued for making architecture more transient and impermanent.[5] However, while these

[3] Sherban Cantacuzino, *Re-Architecture. Old Buildings/New Uses* (New York: Abberville Press, 1989), 8.

[4] Bie Plevoets and Koenraad van Cleempoel, *Adaptive Reuse of the Built Heritage* (New York: Routledge, 2019), 16.

[5] Such as the works of Archigram, Cedric Price, Archizoom Associati.

practices addressed adaptability in some way, there has never been a general agreement on what constitutes adaptable architecture. So how could a more precise definition of adaptability in architecture be generated?

Over the course of my investigation I found it helpful to outline some concepts that are related to adaptability, and in fact are often used interchangeably with the term.[6] **Polyvalence** is the ability of a building or a space to be used in multiple ways without requiring any adjustments. The term has been defined by a Dutch architect Herman Hertzberger, who tried to implement polyvalence into his projects by creating ambiguous spaces.[7] **Flexibility** is the ability of a building or a space to undergo certain adjustments to satisfy a new function. Many modernist architects experimented with flexibility by means of movable partitions, and many contemporary projects are likewise designed with flexible elements.

While polyvalent spaces can simultaneously satisfy multiple functions, and flexible spaces can be easily adjusted for multiple programs, an adaptation of a building or a space implies a more extensive and long-term modification in response to the changes in internal requirements or external conditions. **Adaptability** therefore becomes the extent of a building's potential to accommodate a range of adaptations over long periods of time.[8]

6 The following definitions has originally been outlined by me within the context of research for Cornell Design Studio ARCH 7112: Minimax - Polyvalent Housing.

7 For a better understanding of the architect's ideas, read Hertzberger, *Lessons for Students in Architecture* or *Architecture and Structuralism*.

8 This definition of adaptability has also been first outlined by me for Minimax design studio.

With a more precise definition of adaptable architecture in mind, it is equally important to outline the wide range of this approach, both in its conceptual understanding and its practical implementation. The extent of conceptual discourse on adaptability could address such subjects as material accumulation,[9] ruination,[10] mnemonic connection to the past.[11] Most importantly, thinking about adaptable architecture should allow for the multiplicity of interpretation and an open-ended approach. At the same time, practical considerations can help develop strategies for the implementation of adaptability in the architectural production. Some of those considerations include economic efficiency,[12] reevaluation of the built material,[13] and sustainability of construction.[14]

To properly describe the whole extent of adaptable architecture would require a very extensive and thorough academic work.[15] Over the course of my investigation I was able to more closely address some of the important manifestations of adaptability. The following sections present seven distinct approaches to adaptable architecture and highlight their contributions to the discourse of adaptability.

9 Multiple works of Walter Benjamin address the subject.

10 Plevoets and Cleempoel, *Adaptive Reuse of the Built Heritage*, 42.

11 Sally Stone, *UnDoing Buildings: Adaptive Reuse and Cultural Memory* (New York:Routledge, 2020), 32-35.

12 Cantacuzino, *Re-Architecture*, 11.

13 Andreas and Ilka Ruby, *The Materials Book*, (Berlin: Ruby Press, 2020), 27-52.

14 Muck Petzet, Florian Heilmeyer, eds., *Reduce, Reuse, Recycle: Rethink Architecture* (Ostfildern, Hatie Cantz, 2012), 49.

15 All the subjects mentioned above have been addressed by multiple researchers. The provided sources should be seen as a small excerpt of numerous points of reference.

MATERIAL ADAPTABILITY

A meaningful point of departure for the investigation of adaptable architecture is at the scale of building materials. Architectural industry currently has a massive ecological impact on the planet, namely through excessive material extraction and waste production. These incredible inefficiencies can be attributed to the current architectural paradigm, in which buildings are constructed for limited lifespans, after which they are demolished and their debris transported to the landfills. The current disposability of construction materials needs to be eliminated.

Certain developments in architectural practice could allow for a more sustainable use and reuse of materials. **Urban mining** proposes to take advantage of the already existing built environment for extracting materials.[16] **Modular construction**, if designed intelligently, could allow for building elements to be created more intelligently with higher efficiency and lower waste production.[17] A more focused approach of **design for disassembly** specifically concentrates on developing non-permanent projects with material assemblies that can be easily taken apart for subsequent reuse.[18]

[16] Ruby, *The Materials Book*, 39.

[17] Ruby, *The Materials Book*, 34.

[18] Ruby, *The Materials Book*, 47.

The project to increase the reusability of construction materials however is not merely a technological

challenge — of equal importance is the broader shift in the current way of thinking about materials as infinitely available and disposable. In order to challenge the current highly unsustainable paradigm of architectural production, one needs to start with the technical configuration of the building materials. Only based on the foundation of disassembleable and reusable construction materials can adaptable architecture exist in the first place.

Image credit: Todd Fratzel

PLASTICS IN CIRCULAR ECONOMY

ARCH 6605: The Circular Economy
Spring 2021
Instructors: Felix Heisel, Mark Milstein
Partners: Aishah Alhady, Adriana Contarino,
Joseph McGranahan

The concept of **circular economy** can be defined as a closed-loop system of continuous material reuse with the goal of minimizing the environmental impact of material production.[19] In the architectural sphere this could be achieved through practices of local production, adaptive reuse of buildings, and design for disassembly, among others. This elective addressed circular economy on the local scale of Ithaca region, identifying issues in construction industry and proposing solutions for more sustainable economic and architectural models.

Plastics in Circular Economy proposes to mitigate the massive environmental impact of the plastics production. It identifies several major issues within the plastics industry: lack of local production (Fig. 1),[20] highly insufficient recycling system,[21] and current construction practices. The project concentrates on a common to Upstate New York region application of plastics in construction: insulation. The current most wide-spread method — spray-foam insulation — is highly unsustainable, as this product is not only unreusable, it also prevents the potential reuse of any materials it is applied to.[22] The project proposes an alternative product of the insulation panels locally-produced from

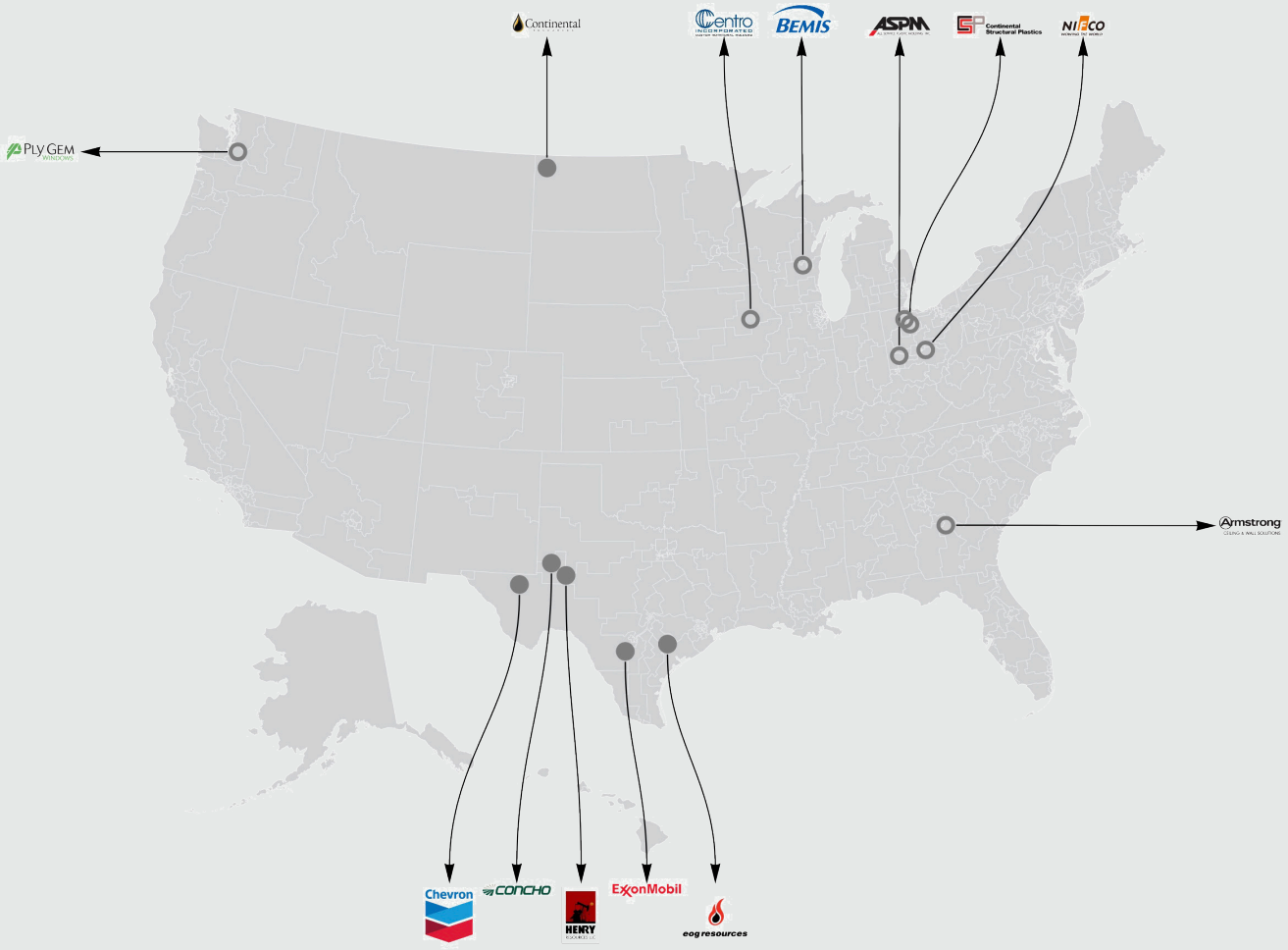
19 For a more extensive overview of circular economy see Walter Stahel, *The Circular Economy: A User's Guide* (New York: Routledge, 2019).

20 Raw materials (crude oil) is primarily extracted in Texas, while the largest manufacturing facilities are located in Ohio.

21 Only 9% of plastics are currently recycled, see Laura Parker's "A Whopping 91 Percent of Plastic Isn't Recycled" in *National Geographic Society*.

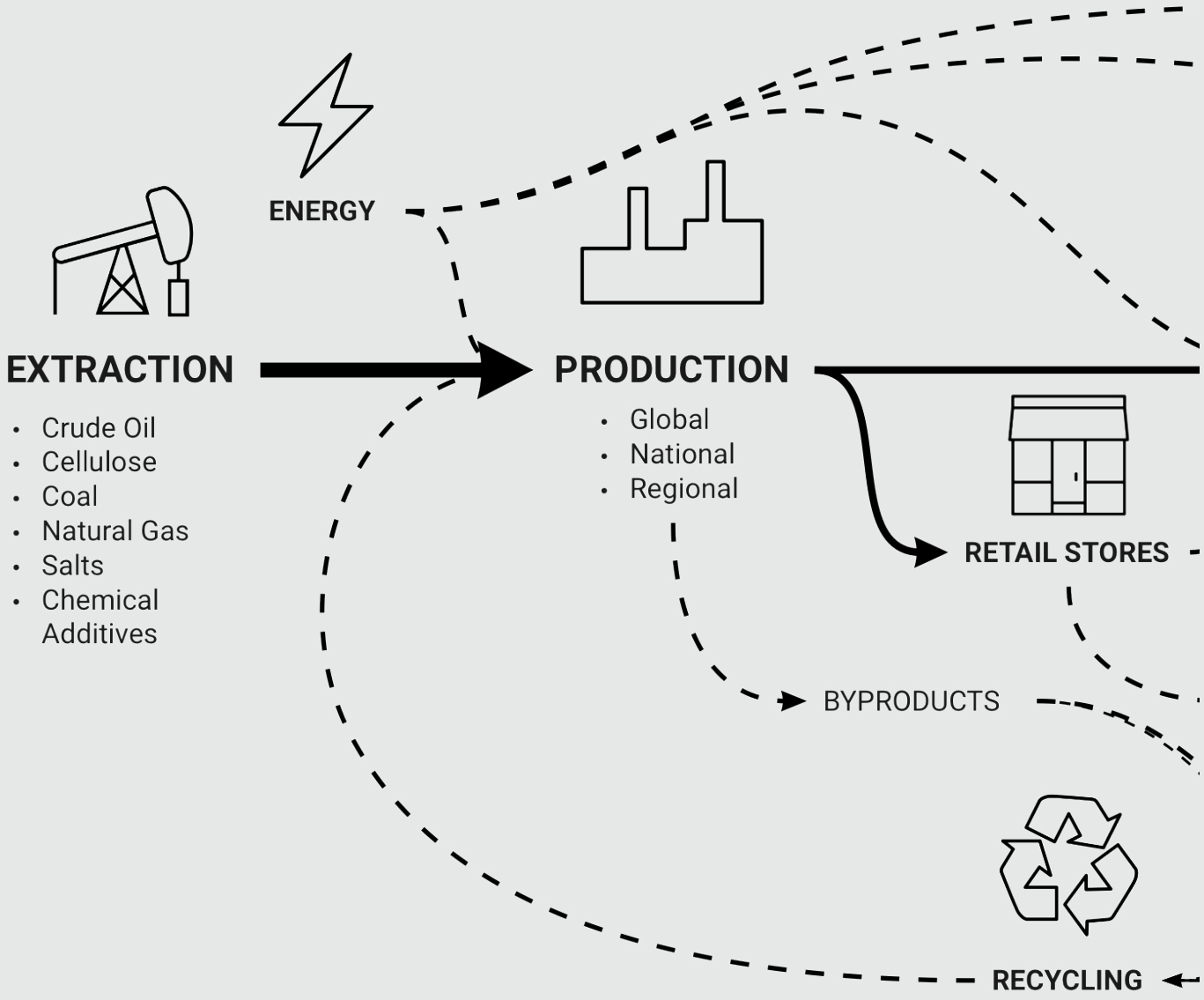
22 For more on spray foam insulation see Erin Shine, "The Great Debate: Pros & Cons Of Spray Foam Insulation" in *Attainable Home*.

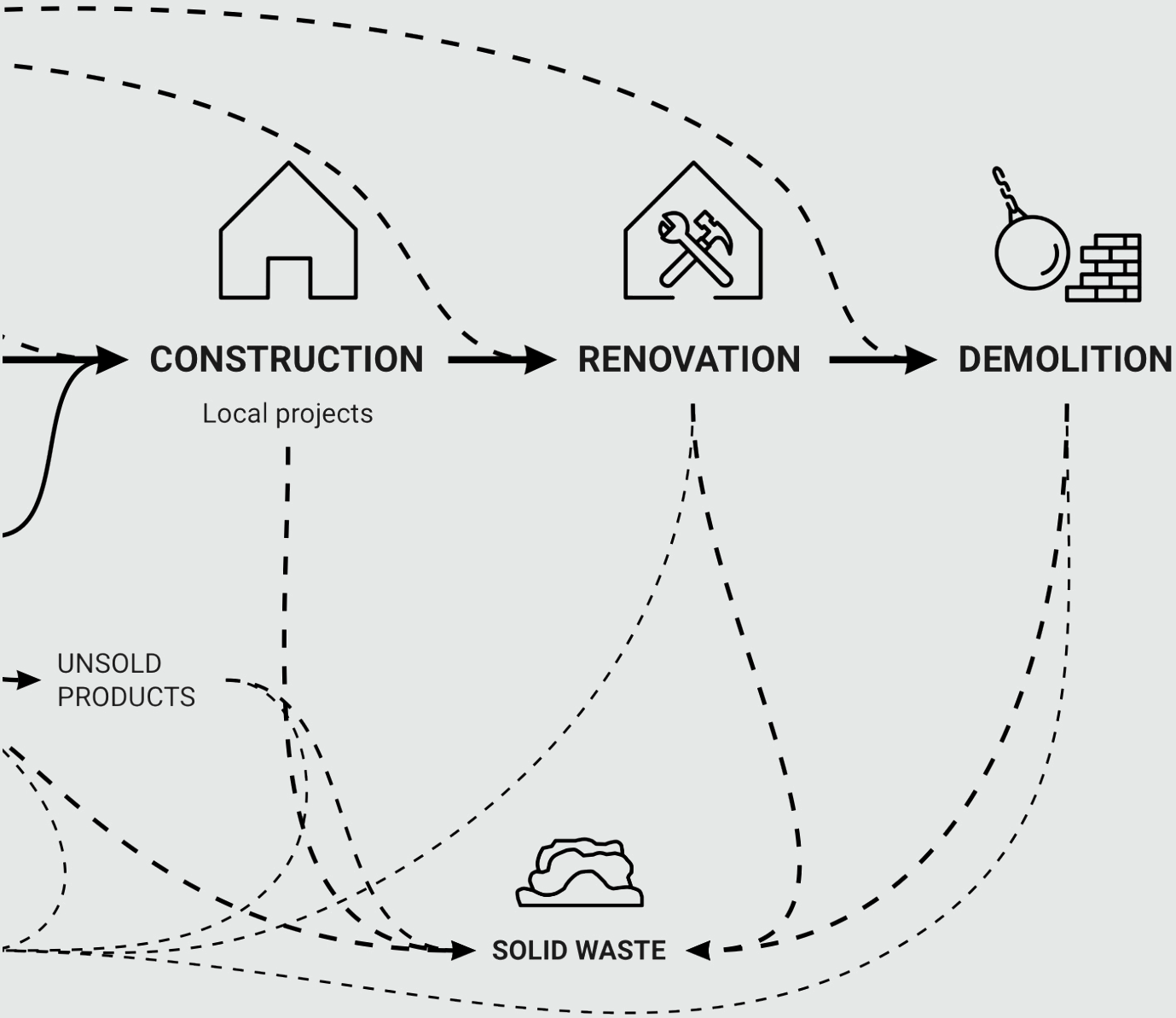
Fig. 1 National production of construction plastics



the abundance of plastics sent for recycling. By reusing the already existing material, the proposal establishes a closed loop system of plastic application in the region. More importantly, the proposed product facilitates the ease of eventual building disassembly and can be subsequently reused in new construction.

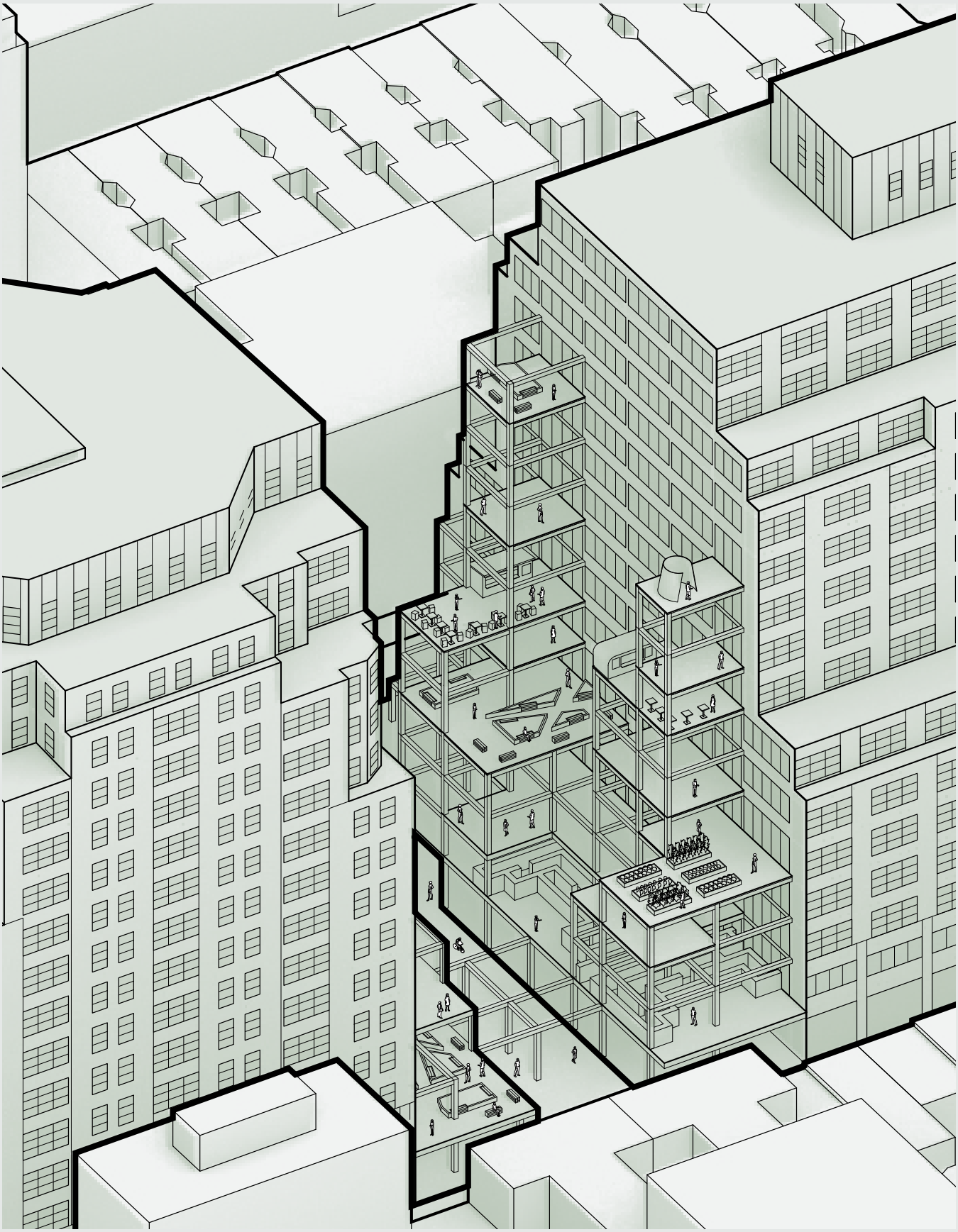
Fig. 2 Supply chain diagram of construction plastics industry




CONSTRUCTION
RENOVATION
DEMOLITION
Local projects
UNSOLD
PRODUCTS
SOLID WASTE

LIMITS TO ADAPTABILITY

When setting out to increase the adaptability of a building, one's first instinct might be to envision limitless adaptations over time. However, it is important to acknowledge that architectural adaptability cannot be implemented without limits. The spatial specifics of a building's site will impose certain limitations. The natural deterioration of material over time would also prevent limitless adaptability. Finally, the social and environmental impact of extreme adaptability should also be viewed as a limitation. Without such considerations, a limitlessly adaptable building might easily become appropriated for unsustainable or damaging purposes. Therefore, the goal of adaptable architecture should be a strategic approach to the limitations the project imposes.



AGAINST GOOGLE BUILDING

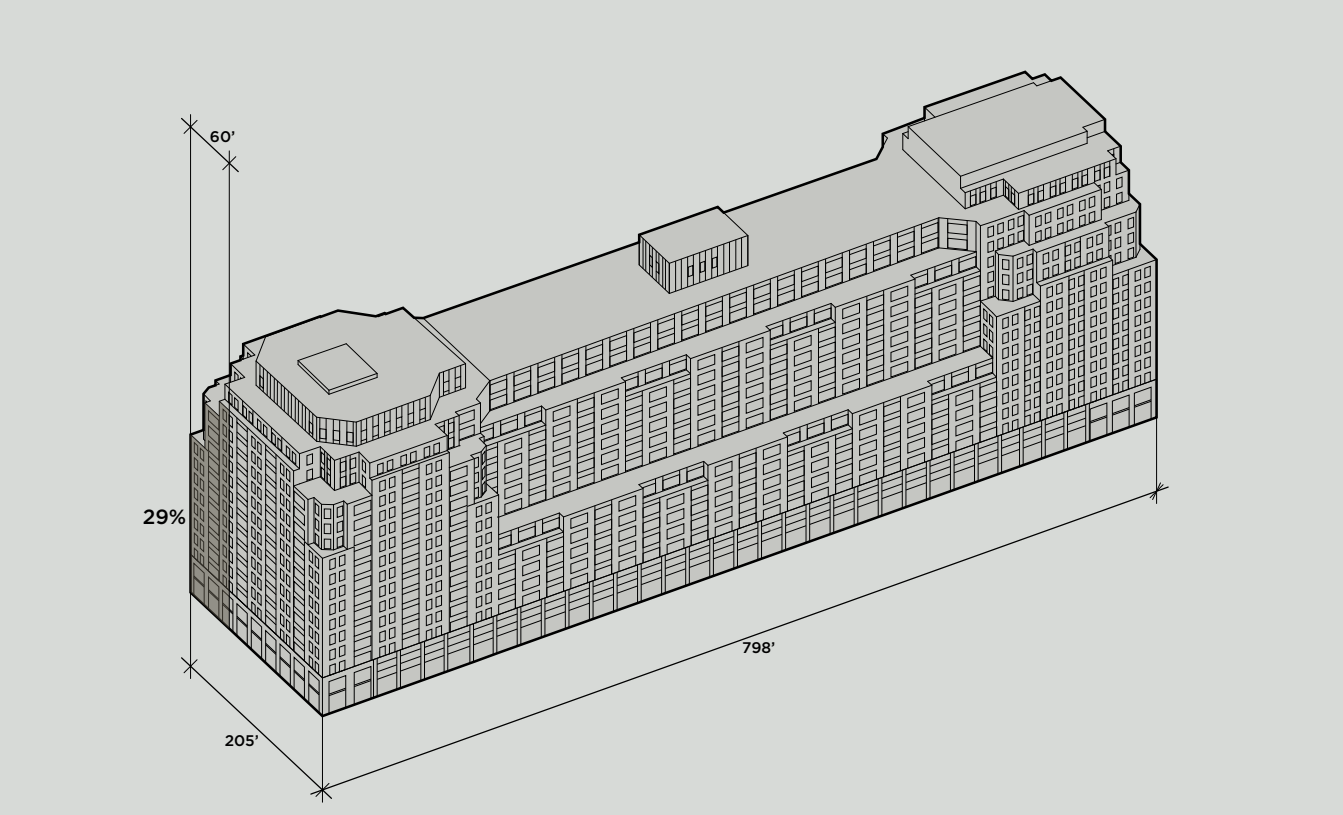
ARCH 6308: Overcoming Carbon Form
Fall 2021
Instructor: Elisa Iturbe

Elisa Iturbe's work describes **carbon form** as the spatial manifestation of the abundant fossil fuel energy paradigm.[23] **Against Google Building** identifies 111 8th Avenue, more widely known as the Google Building, as such an example. My project recognizes the initial reasons for the building's construction and its subsequent uses as the features that make it carbon form. The most important aspect, however, is the enormous scale of the building, which occupies a whole city block in Midtown Manhattan (Fig.5). Interestingly, the building's open floor plan has allowed it to be adapted for multiple purposes over its lifespan. However, because of the floor plates' massive scale, large parts of the building lack access to the facade and therefore daylight. Based on this fact and within the context of the free market economy the building was adapted for an economically viable but largely unsustainable purpose of a data center.[24] The high adaptability of the open floor plan buildings thus does not necessarily ensure their sustainability.

[23] Elisa Iturbe, "Architecture and the Death of Carbon Modernity", *Log 47* (2019), 11–23.

[24] For an detailed historic overview of the Google Building's development, see Greg Estren's talk: https://www.youtube.com/watch?v=fVx59XOZtSA.

Against Google Building proposes to break down the enormous scale of the building in order to disrupt the structure's impact as a carbon form (Fig. 6). Two cuts made through the volume transition the private property of the building into public ownership and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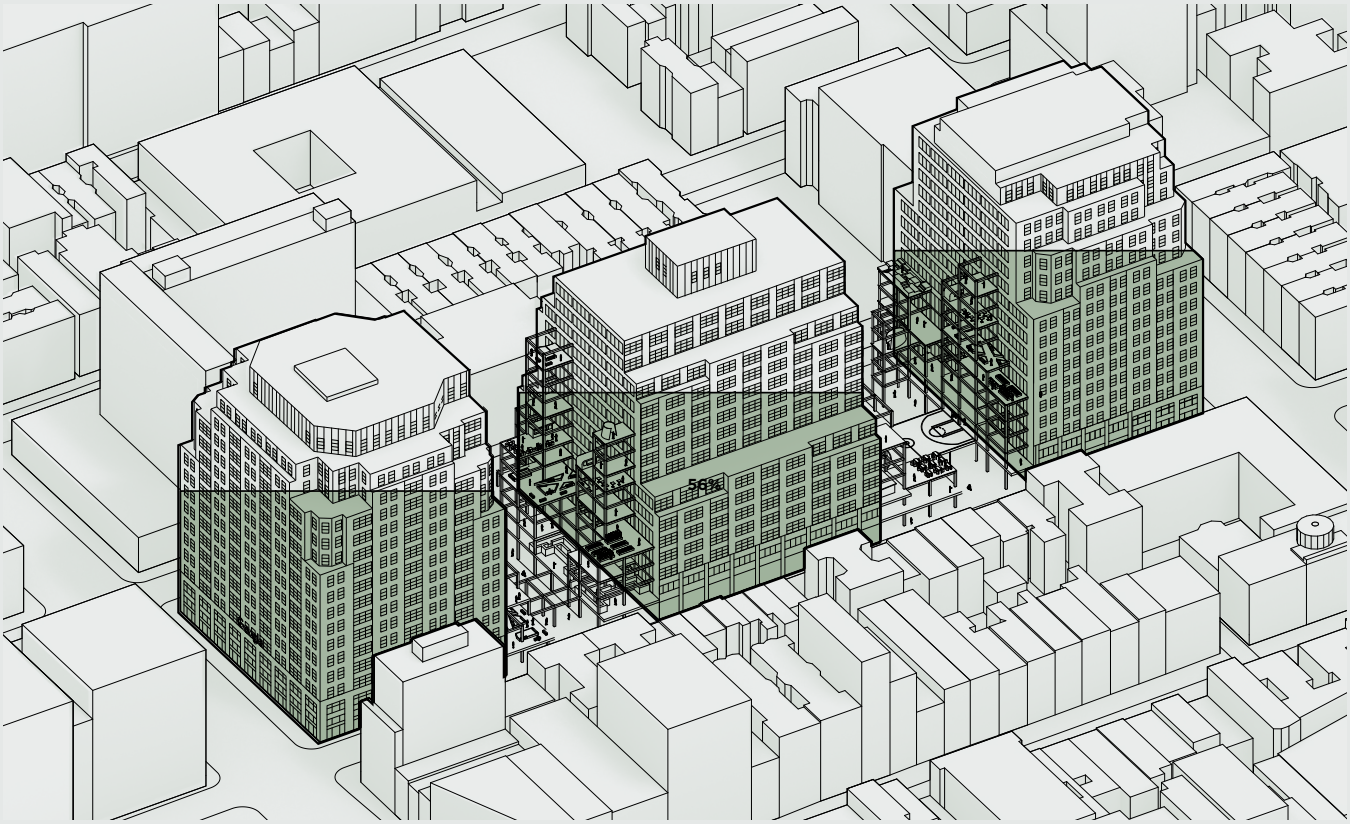
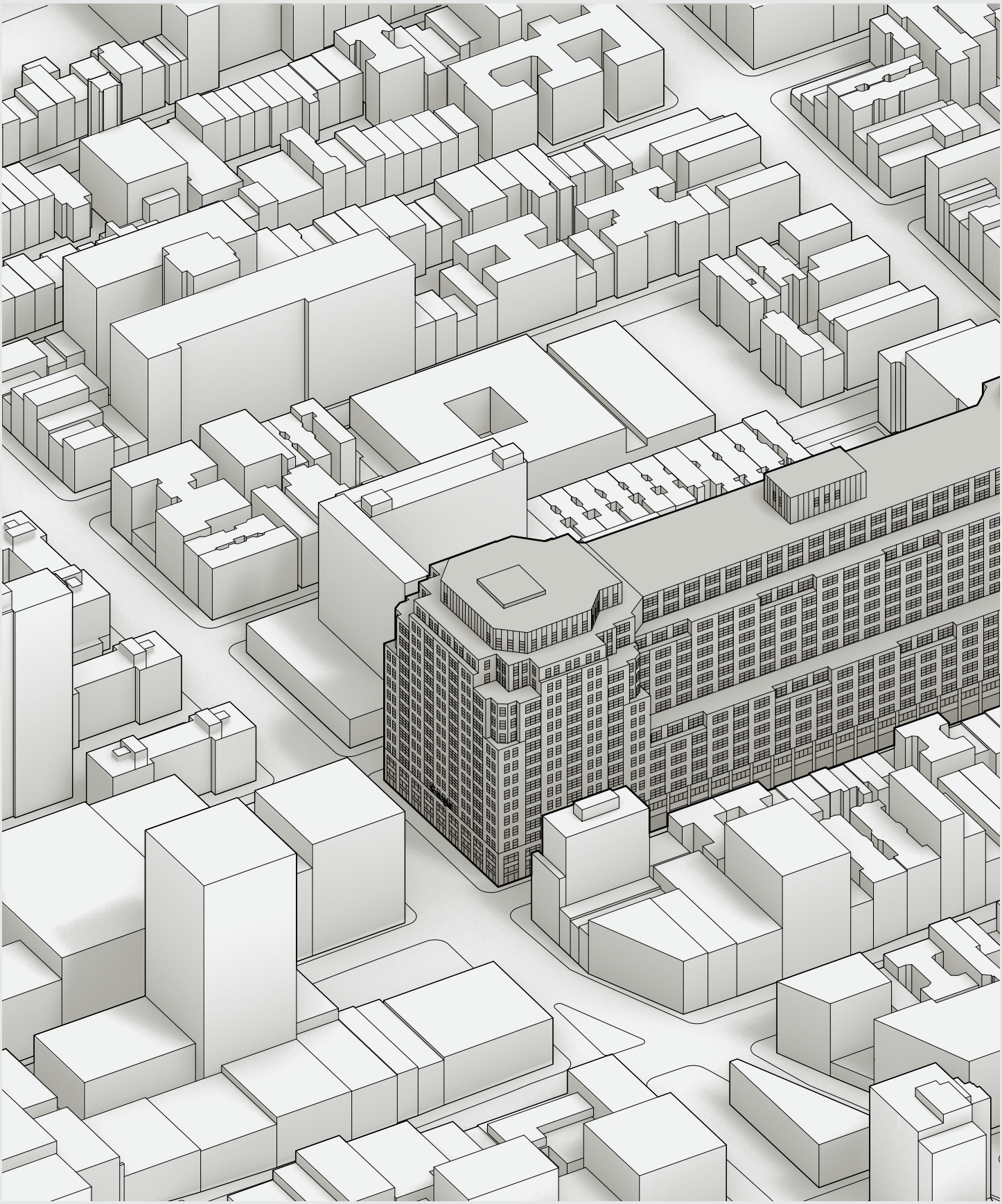

56%

programmatic uses. Technically, the intervention would increase the naturally illuminated area of the building from 29% to 56% (Fig 3, 4).[25] Conceptually, the project aims to redefine the relationship between the public and private ownership of space into a more sustainable intertwined system. Ultimately, it demonstrates how through the implementation of strategic limitations into the design a more sustainable and responsible result could be achieved.

[25] Calculations based on the optimal for daylighting depth of 60 feet, referenced from a Whole Building Design Guide article.

Fig. 3 (16, top) Existing daylight efficiency

Fig. 4 (16, btm) Proposed daylight efficiency



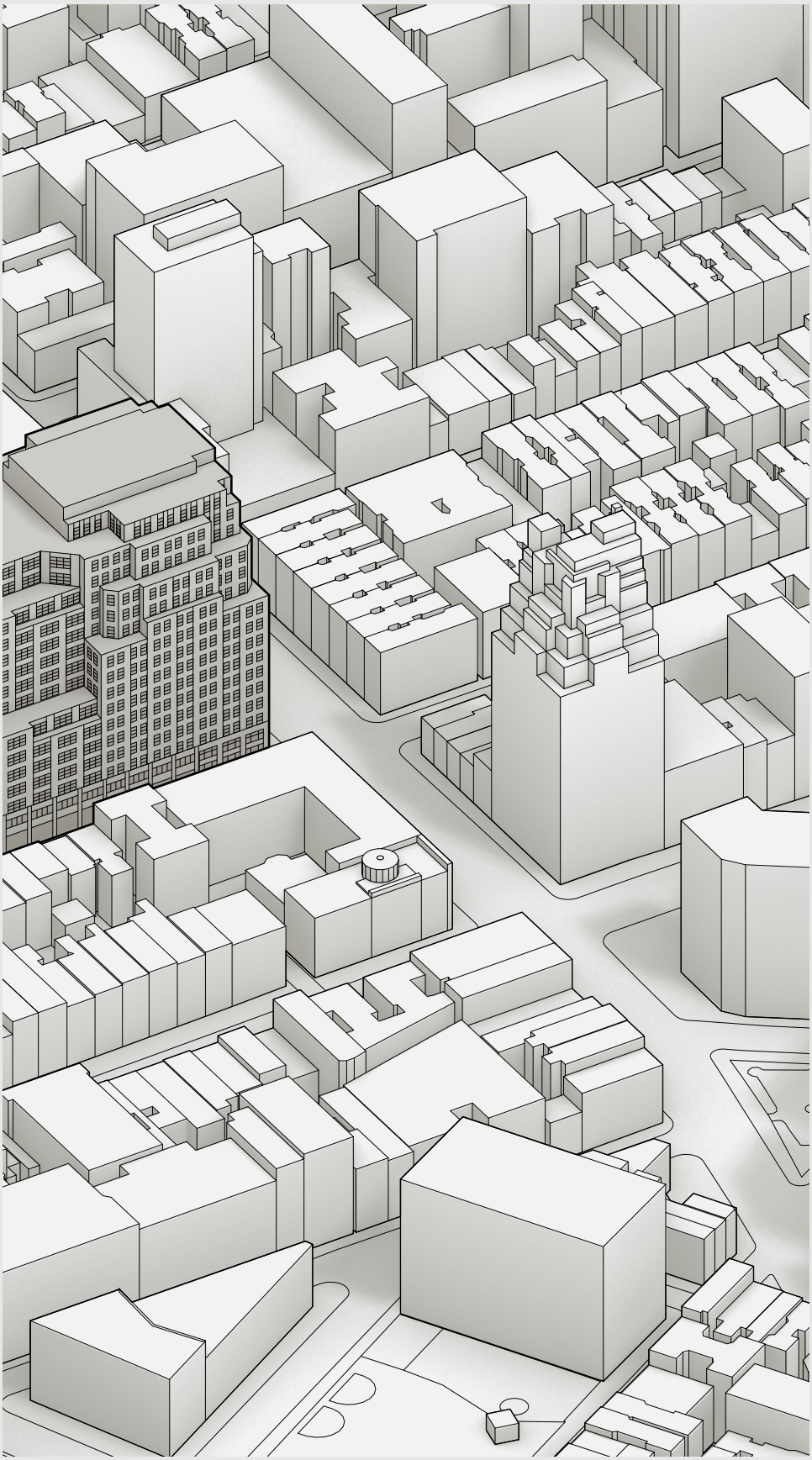
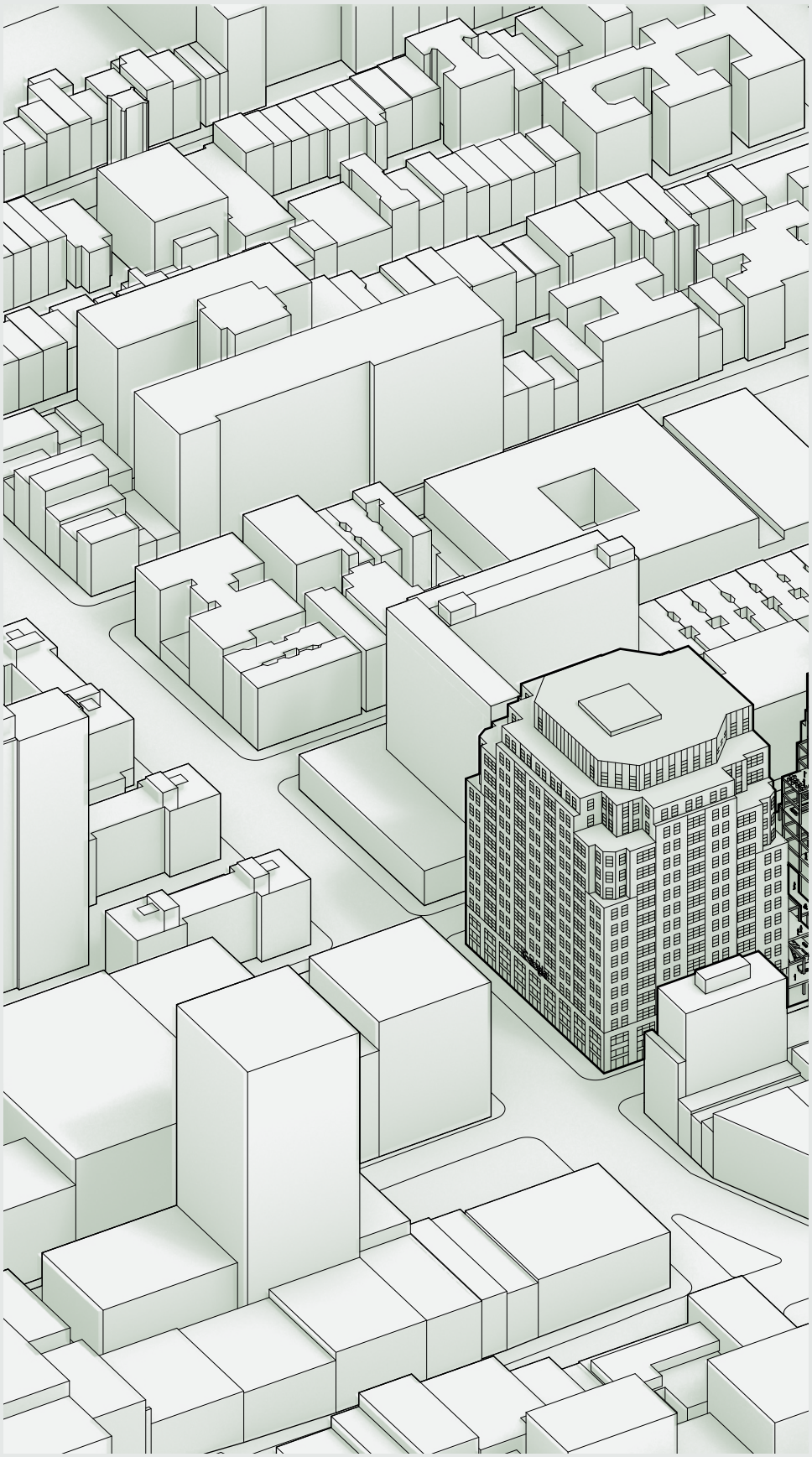
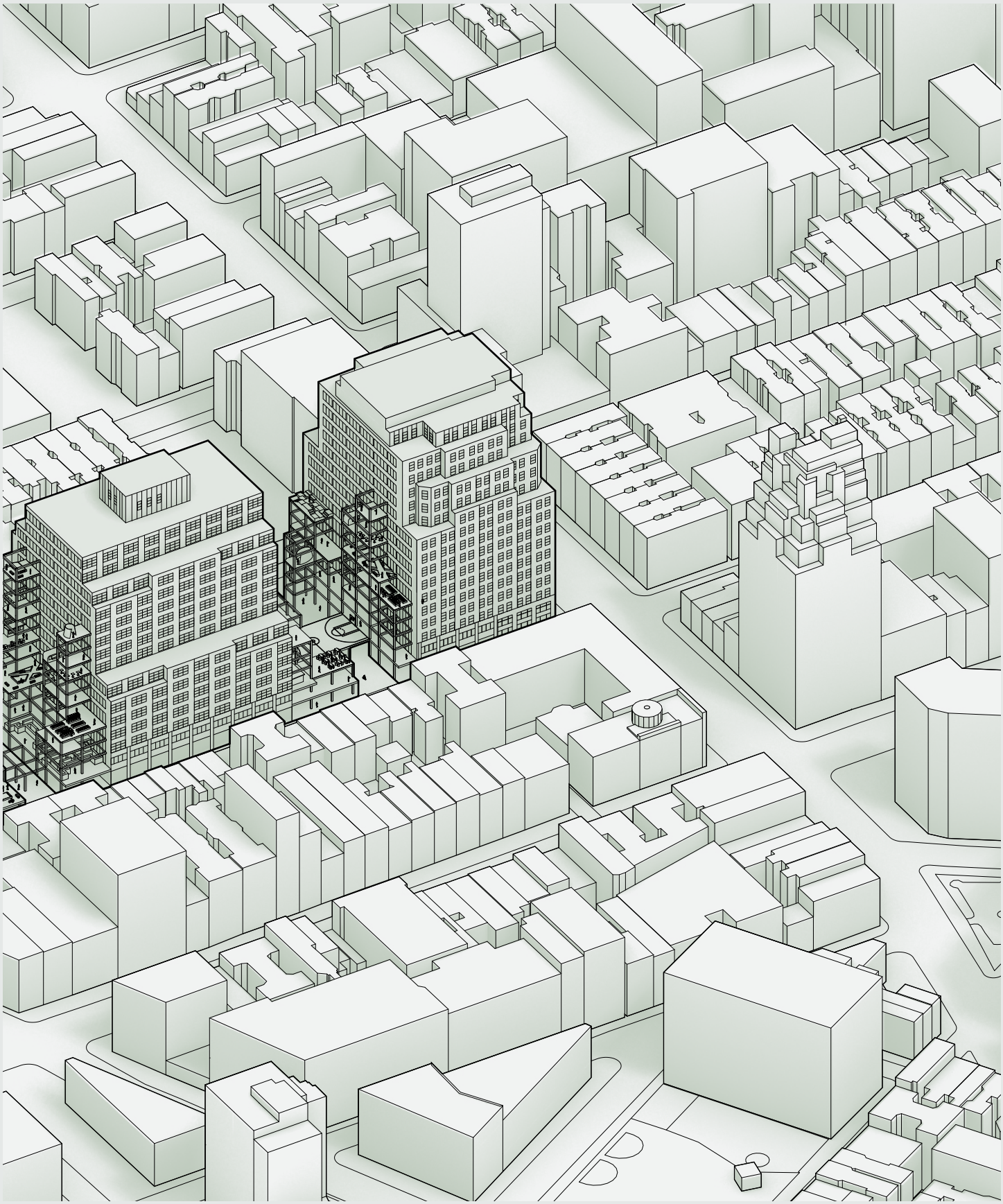


Fig. 5 Existing condition of the Google Building

Fig. 6 Proposed deconstruction of the Google Building





ANTICIPATING ADAPTABILITY

One approach to pursuing adaptability is figuring out which potential future developments that the building might be forced to respond to, known in urbanism as **scenario planning**.[26] While such scenarios of adaptation might not become the reality, there is still value in outlining and considering the extent of their impact. They can be further classified into several general categories based on the nature of the processes.

[26] For an overview of scenario planning, see "Scenario Planning", American Planning Association, https://www.planning.org/knowledgebase/scenarioplanning/.

Ecological scenarios might be the most straightforward ones to plan for, since the processes of climate change could be largely anticipated with at least partial accuracy. They would include such developments as sea level rise, more often extreme weather events, and more extreme temperature fluctuations, among others. Responses to shifting climates are already widely implemented in architectural and planning projects.[27]

[27] See Robyn. Wilson "Designing buildings to cope with extreme weather events". *World Built Environment Forum*. March 16, 2020. https://www.rics.org/es/wbef/megatrends/.

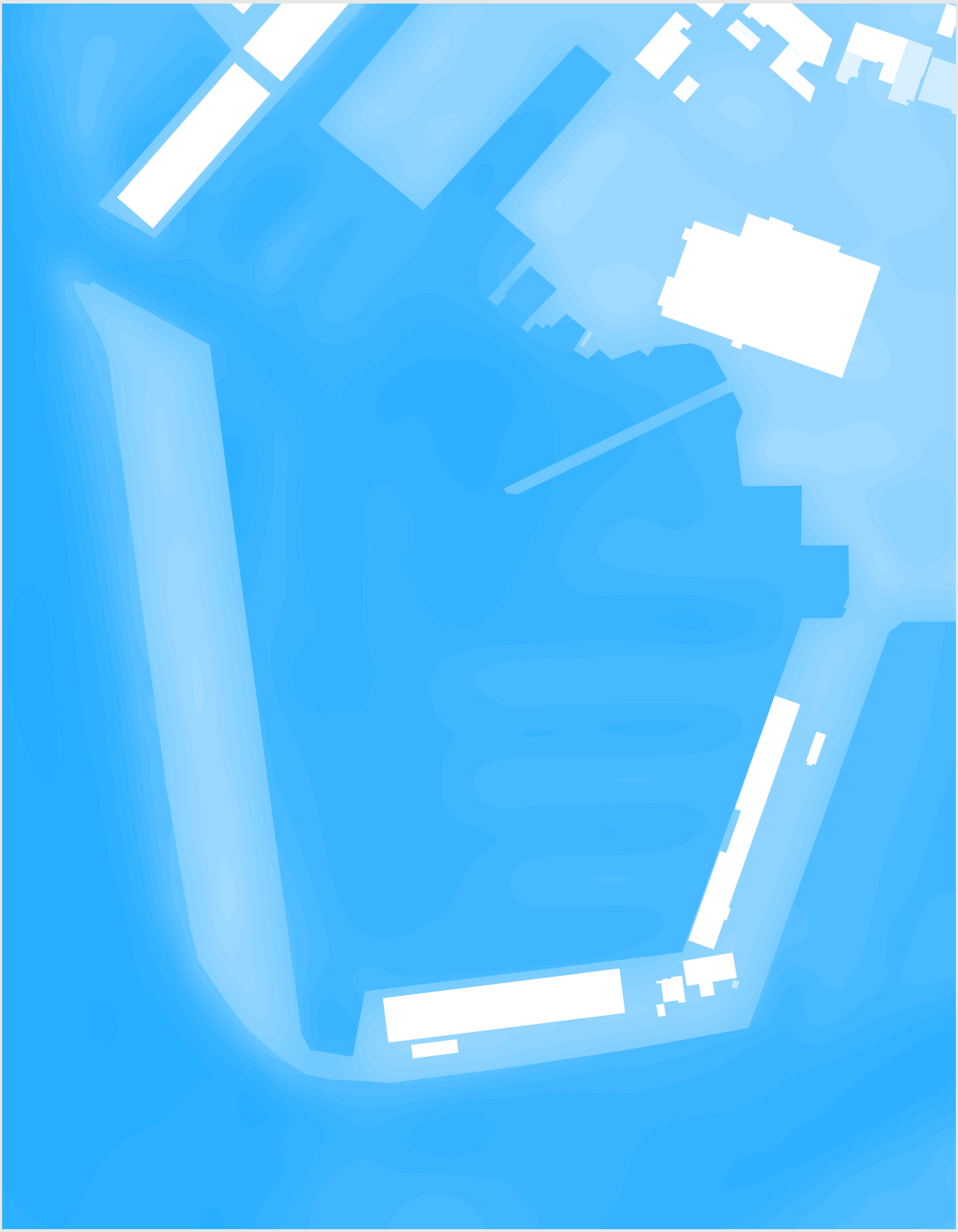
Demographic scenarios could also be to an extent anticipated and taken into account in the development of projects. They would include population growth, centralization or decentralization tendencies of urban settlements, and aging of the population.

Economic scenarios might be more difficult to predict, since economic processes can develop in both directions

and fluctuate relatively easily. Economic developments with a direct impact on the built environment include gentrification of an area, disinvestment after an economic crisis, or rising economic inequality.

Political scenarios are perhaps the most difficult to anticipate. Some of the more obvious political developments involve urban planning policies, such as rezoning of neighborhoods, or construction of massive infrastructural projects.

Finally, it is also important to remember that particular developments that would require architectural responses do not happen in isolation and therefore cannot be easily classified. In most cases, the reasons for adaptations would involve a combination of the categories listed above.



RED HOOK FLOODED

ARCH 6509: Urban Nature
Fall 2021
Instructor: James Lowder, Misako Murata
Partners: Seerat Athwal, Ian Crouch

Red Hook Flooded investigates the historic, currently existing, and potential future conditions in the Brooklyn neighborhood of Red Hook. The project demonstrates that the topography of the area, with large parts of the urban fabric located very close to the water level,[28] makes the neighborhood very prone to flooding (Fig. 7).[29] In fact, the impact of Hurricane Sandy in 2012 was extremely severe, with the majority of the neighborhood flooded.[30] Additionally, the history of heavy industrial use left Red Hook with various types of toxins buried underground.

The current reality of climate change and sea level rise makes the situation increasingly more serious. With the more often extreme weather events, certain types of toxins are expected to rise from the ground and contaminate the harbor. Through the close investigation into the urban ecologies of the neighborhood, past, present, and future, the project uncovers the broad processes of change on urban scale that would force the property owners and the neighborhood in general to adapt in order to keep functioning.[31]

28 Topographic information sourced from www.cadmapper.com.

29 See New York City Department of City Planning's 2014 report on Red Hook.

30 See Surging Seas: Risk Finder website for an interactive projection: https://sealevel.climatecentral.org/about.

31 Watch the competed video project for the class here: https://vimeo.com/manage/videos/656391380.

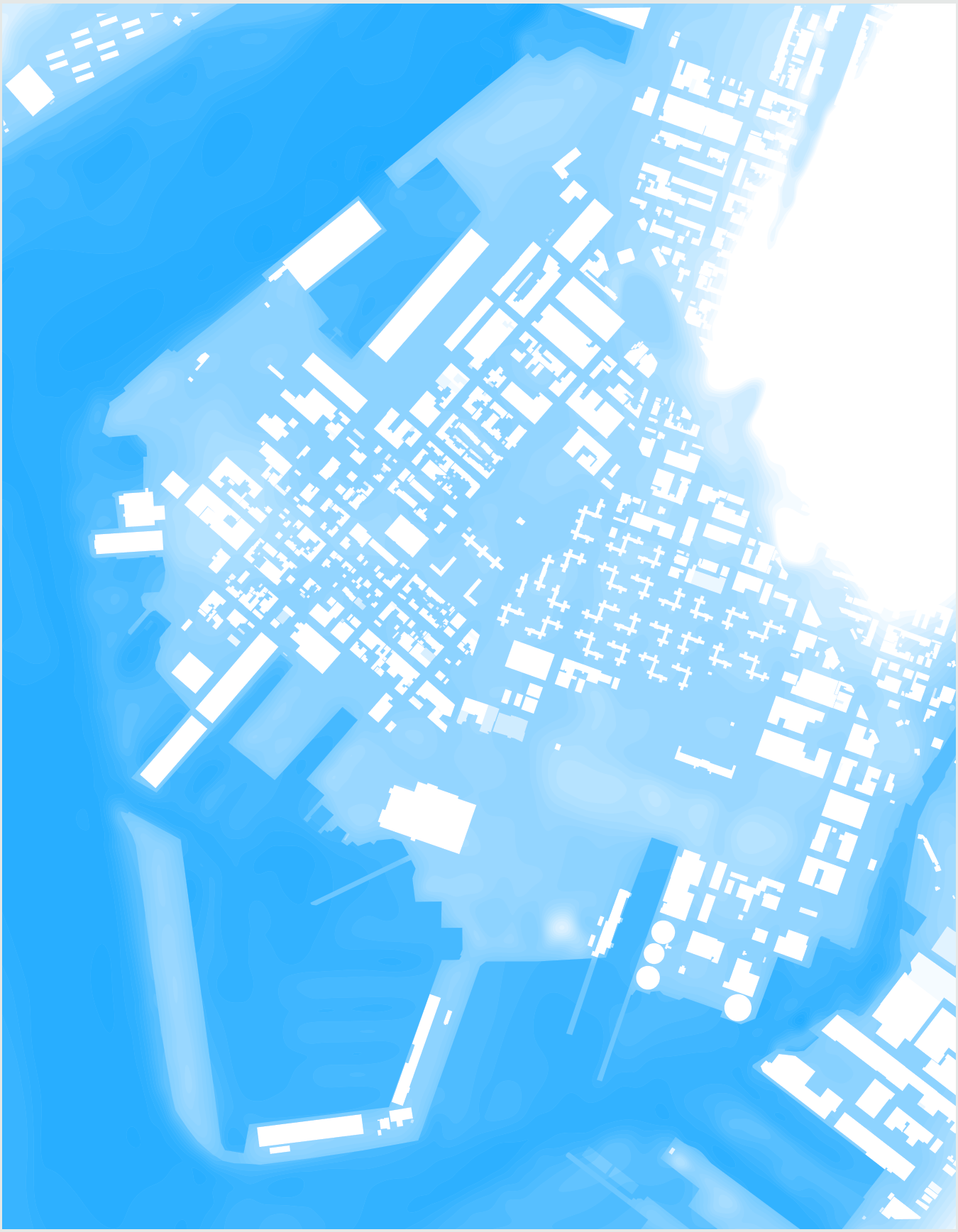
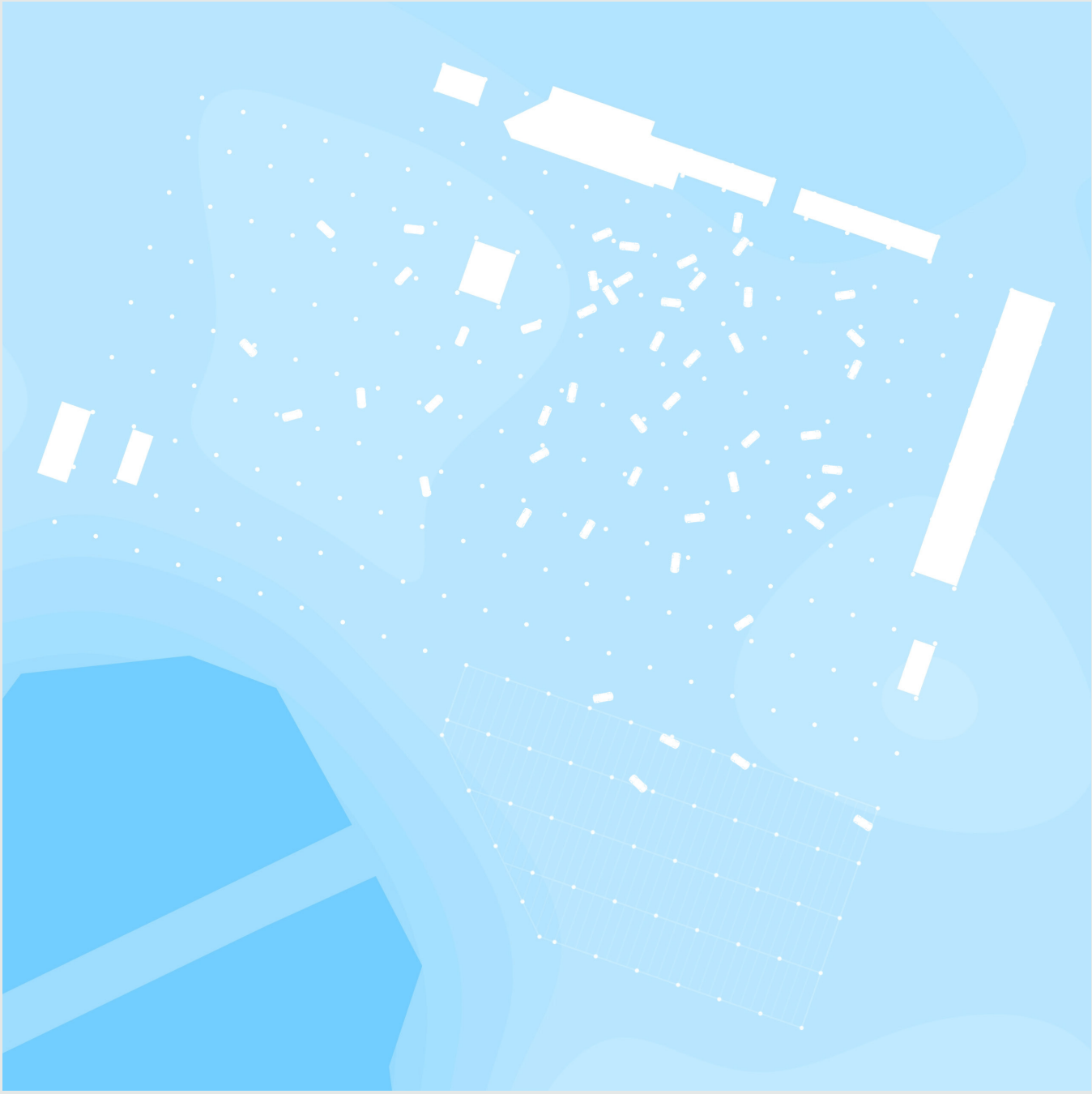


Fig. 7 (26) Storm surge flooding of 20 feet

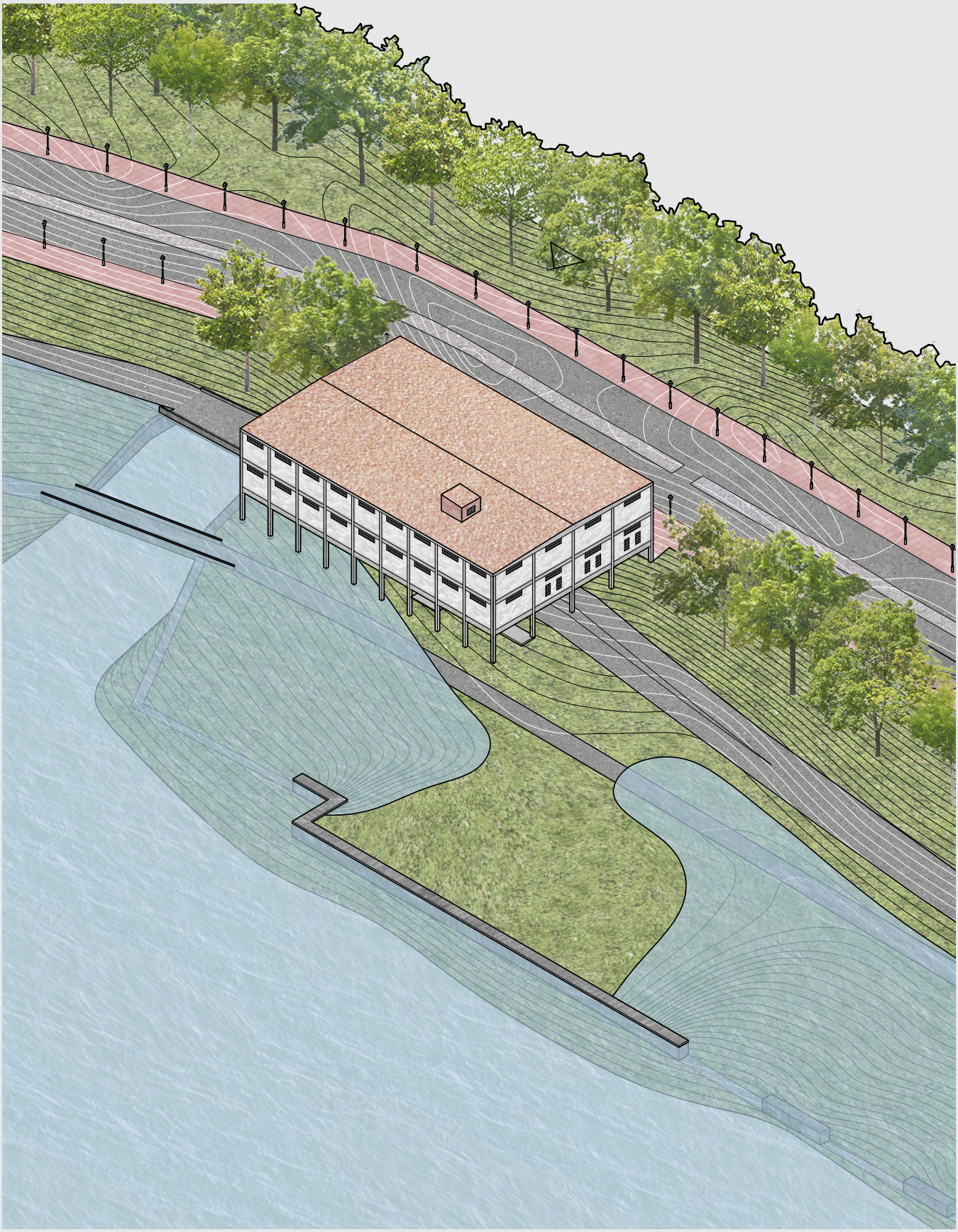
Fig. 8 (27) Impact of the storm surge on the IKEA Brooklyn store



POST–HUMAN ADAPTABILITY

It could be valuable for the discussion of adaptability to extend one's scope of study beyond the human uses of the architecture. This consideration of post-human end of a building's life span is almost entirely absent from both architectural practice and architectural discourse.[32] However, while left largely overlooked, the increasing accumulation of the built environment has very real material consequences on the ground. Once constructed, any project is set to remain on Earth in one form or another, whether as a functioning building, an abandoned ruin, or a dispersed pile of debris in a landfill. Therefore it becomes the architect's responsibility to consider what agency the buildings they design could potentially have after their human uses expire. Could the building provide a habitat for non-human species or would it act as a barrier in its context? Could its material decompose over time or would it result in the contamination of its site? How would the building look like, feel like, and act like as a ruin?

[32] Outside of the architecture, the subject gets extensively addressed in the discourse on ruination. See, in particular, works of Caitlin DeSilvey, Shannon Lee Dawdy, Walter Benjamin.



RUINS AS FUTURE MONUMENTS

A+D Design Studio Module
Fall 2020
Instructor: Jeremy Foster
Partners: Chen Chen, Yangli Hu, Zhongyuan Liu

Ruins as Future Monuments proposes to develop a new definition of monumentality at the sites that have been abandoned and turned to ruination. **Ruins** should be viewed not as static objects, but rather as active processes of cultural memory and natural decay. Ruins become a representation of a non-defined temporality, acting as an intersection between their past lives and their future deterioration.[33] It is this fluid nature of ruins that allows them to achieve their status as monuments.

My project specifically looks at an abandoned waterfront warehouse site in Richmond, Virginia.[34] It proposes to remove parts of the hard edge waterfront (Fig. 9), thus allowing for the rising water levels to progressively flood the site (Figs. 10–17). This intervention is not meant to reintegrate the building into the urban life, but rather create a visual indicator of the climate change's effects on the built environment for the people visiting the site.

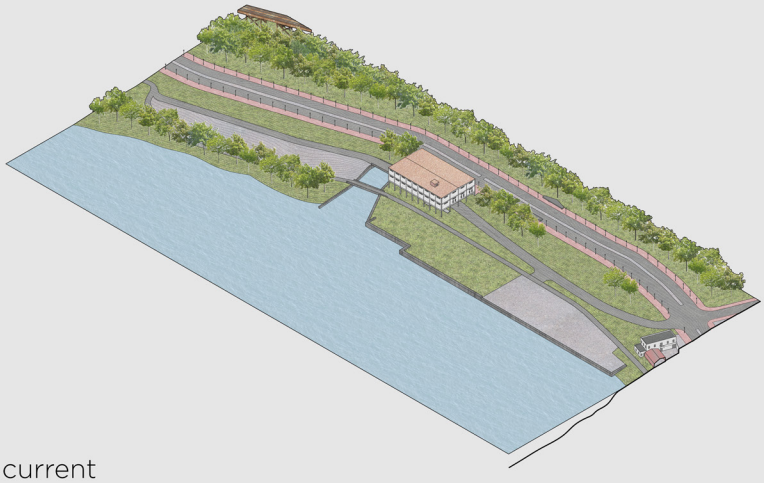
The project ultimately poses the question of how the remains of the abandoned past can inform our understanding of the upcoming future. Rather than providing a conclusive answer, it encourages people to search for new frameworks of understanding in the very transience and non-definition that the ruins represent.

33 The project has been specifically informed by Caitlin DeSilvey's *Curated Decay: Heritage Beyond Saving* (Minneapolis: University of Minnesota Press, 2017).

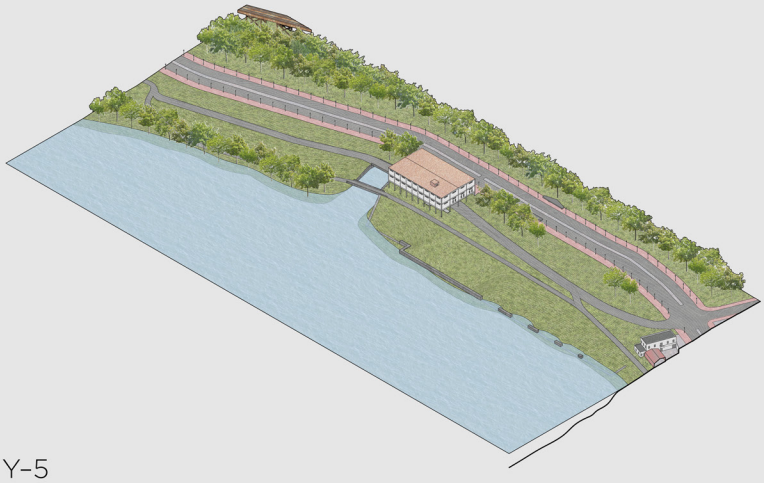
34 This particular site is Intermediate Terminal Warehouse No.3, constructed in 1937 and abandoned in 1980.

Fig. 9 Current state of the site

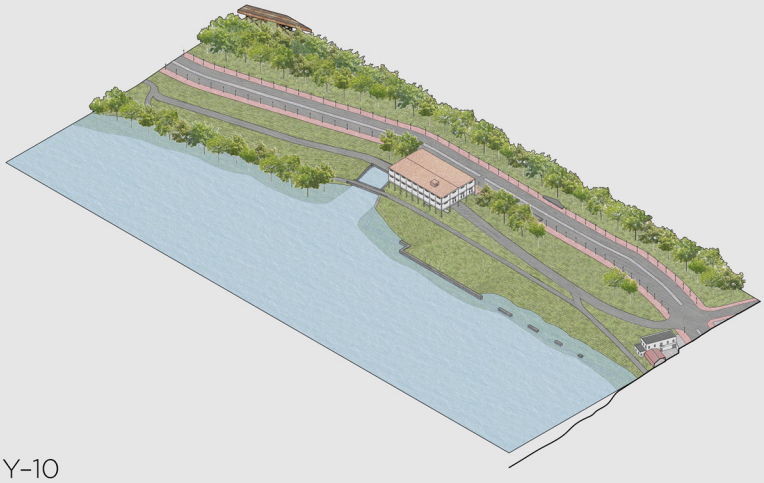
Figs. 10–11 Progressive flooding of the site



current

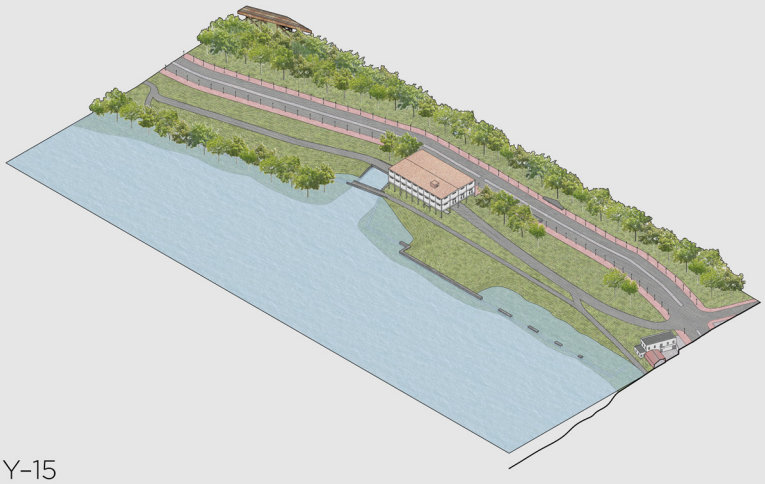


Y–5

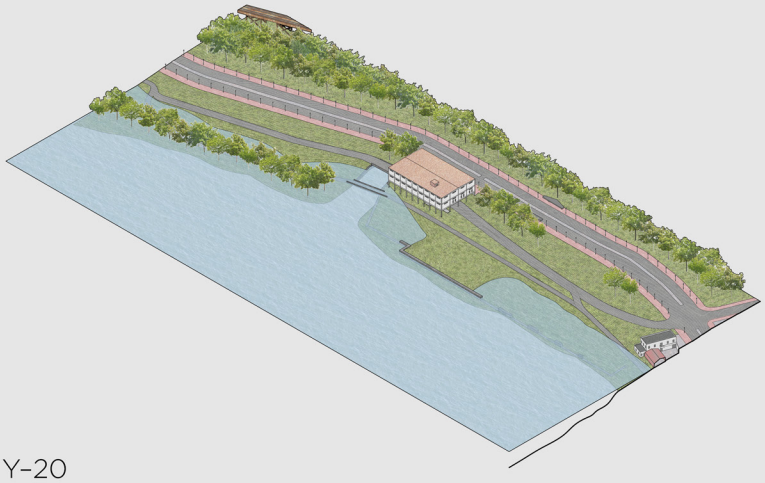


Y–10

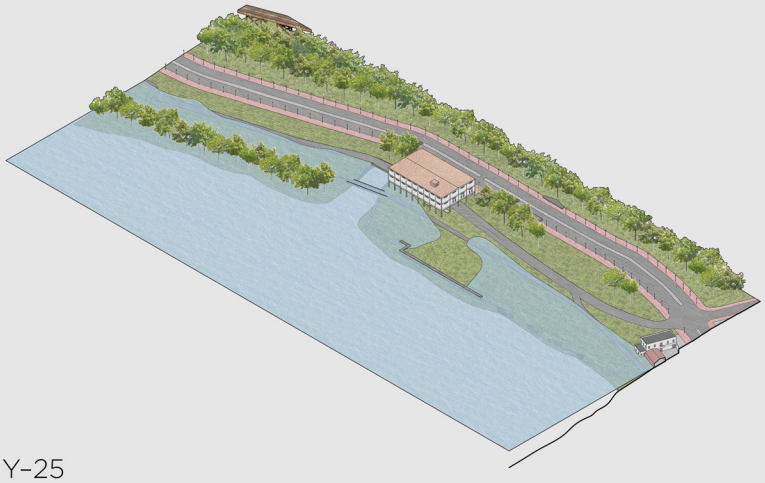
Figs. 12–14 Progressive flooding of the site



Y–15



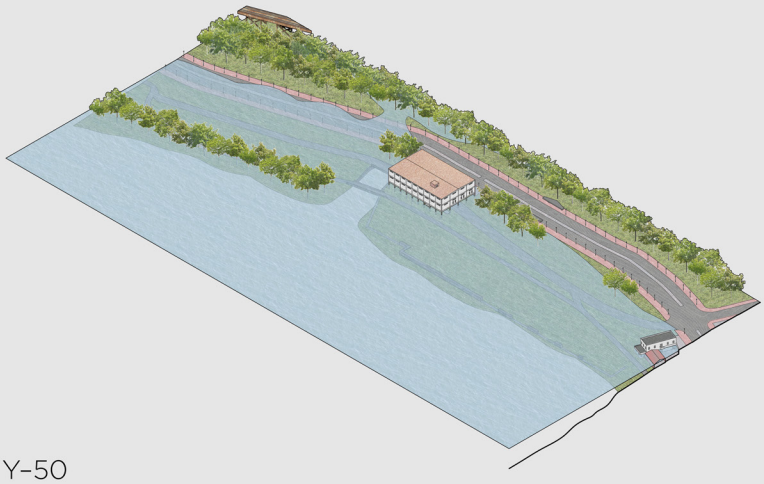
Y–20



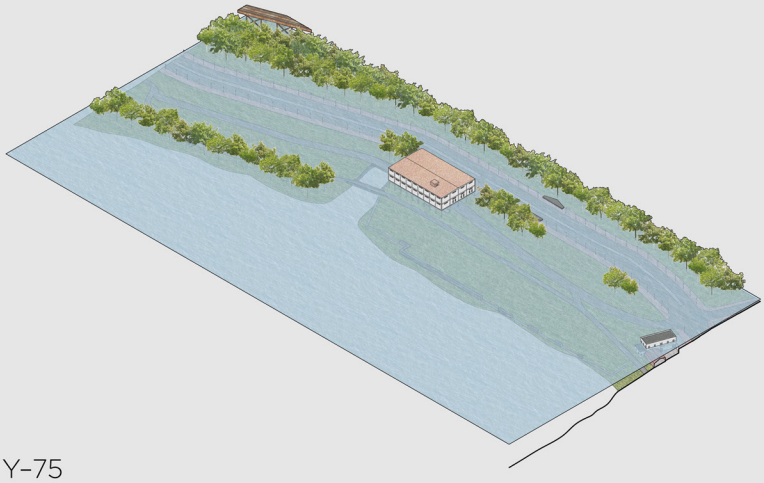
Y–25

Figs. 15–17 Progressive flooding of the site

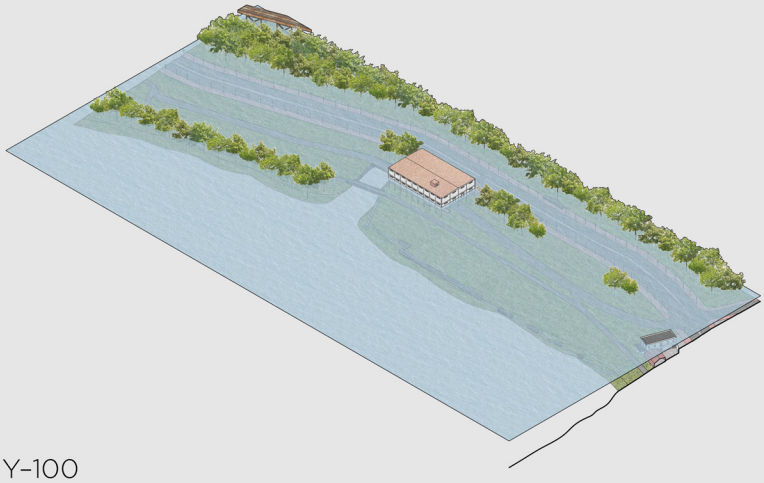
Fig. 18 (35) Site plan with indication of flooding periods for particular site features



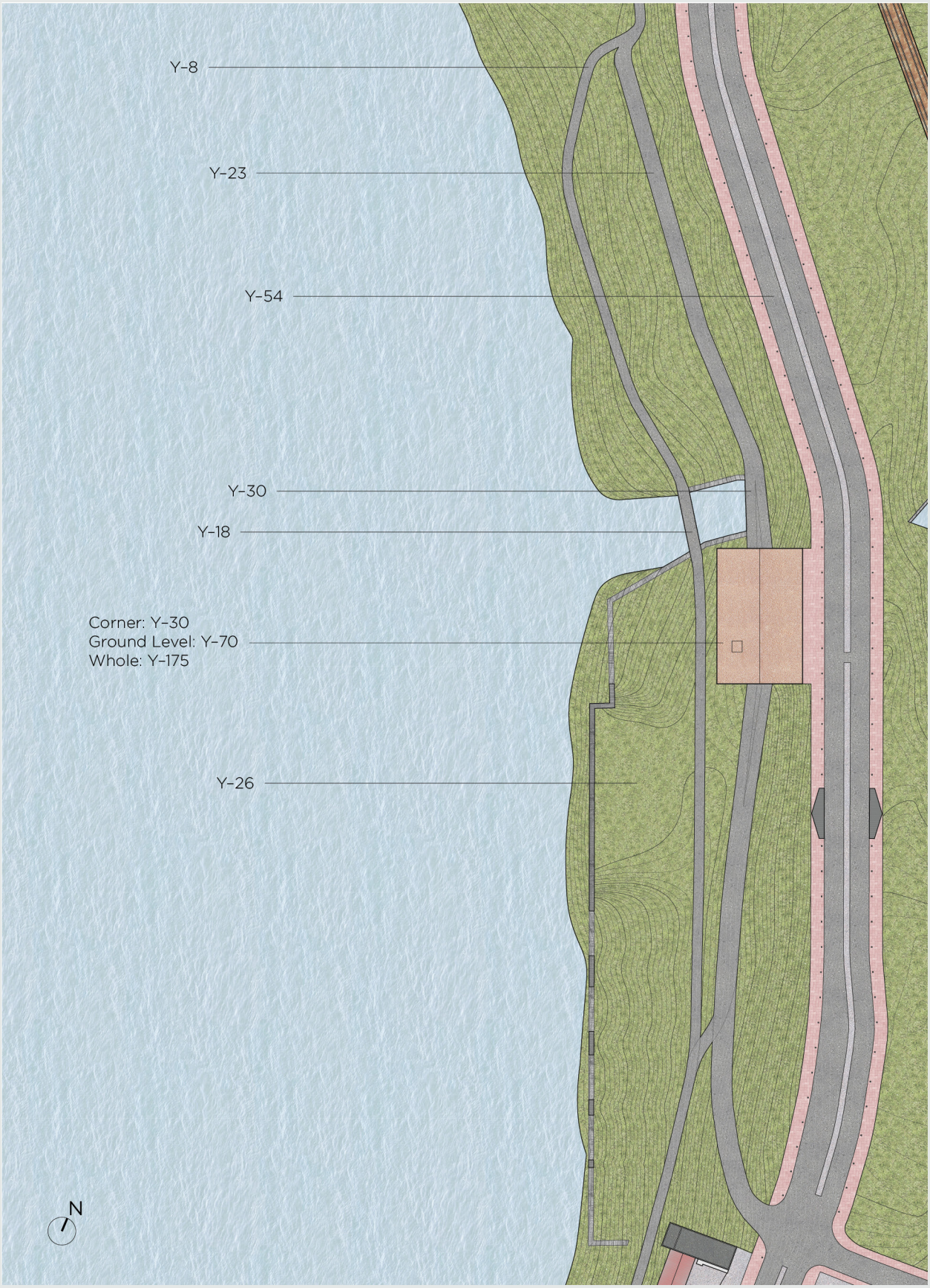
Y–50



Y–75



Y–100


Y-8
Y-23
Y-54
Y-30
Y-18
Corner: Y-30
Ground Level: Y-70
Whole: Y-175
Y-26
N

ADAPTABILITY AS A SYSTEM

When attempting to practically deploy adaptability for an architectural production, it becomes important to approach the project in a systematic way. As discussed previously, certain limitations are required for adaptability to be applied in a sustainable manner. A developed **systematic thinking** builds upon those constraints to establish a framework for expansion and adaptation.[35]

Several architectural approaches can be applied for the physical manifestation of such a system. The structure-infill approach focuses on the construction of a fixed structural frame to be populated with flexible infill over time. The modular approach develops a modular logic for the allocation of spaces and distribution of programs within the building. The prototype approach generates a prototypical condition that when deployed on different sites can be adapted to satisfy their specific conditions.[36] Ultimately, systematic architecture therefore transcends its status as a singular object and becomes a part of a wider approach to architectural production.

35 Systematic thinking is specifically addressed in the discourse on infrastructure. See, for example, Brian Larkin, "The Politics and Poetics of Infrastructure".

36 Modular approach to infrastructural systems is at length discussed by Jesse LeCavalier in *The Rule of Logistics* (Minneapolis: University of Minnesota Press, 2016).

URBANANAS

A+U Design Studio Module
Fall 2020
Instructor: Jesse LeCavallier
Partners: Ien-Jung Chen, Karisma Dev,
Youngnjune Lee, Felix Samo

Urbananas is developed around the study of how a single commodity — bananas — is produced, transported, and distributed around the world. The inefficiencies, frictions, and injustices within the current global supply chain (Fig. 19) serve as a starting point for proposing a more considerate and sustainable system.[37] The project first develops a prototype proposal for a food hub that accommodates the processes of growing the fruit, its storage, distribution, and public education (Fig. 20). The central idea is to make all the stages of the global supply chain that are usually obscured from the final consumers visible to the public and, moreover, allow the public to engage in these processes.

The prototype is then deployed on two very different sites — a suburban neighborhood (Fig. 21) and the city center (Fig. 22).[38] The core principles that govern the spatial organizations in the project make possible the prototype's application in different contexts and at different scales. The modular logic of the project additionally allows for volumes to be added or subtracted over time, thus implementing a consideration of temporal adaptability within the system.

37 For a quick summary of the global supply chain of bananas see Chelsea Semiklose's "Going Bananas": https://blog.americold.com/blog/going-bananas-a-look-at-the-supply-chain-for-the-most-consumed-fruit.

38 The sites are located in the city of Rochester, New York.

Fig. 19 Mapping the global supply chain

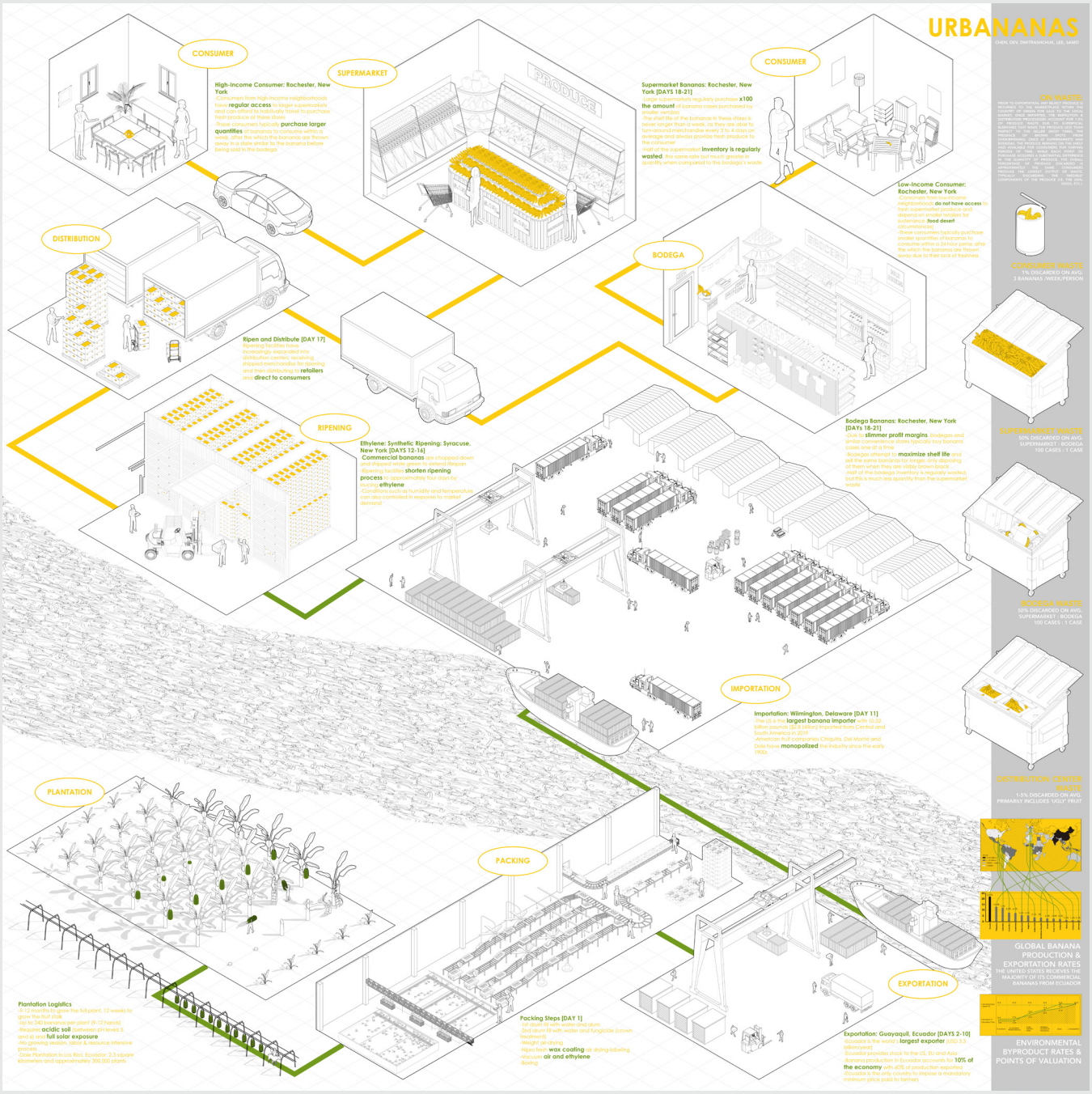


Fig. 20 Prototype Food Hub

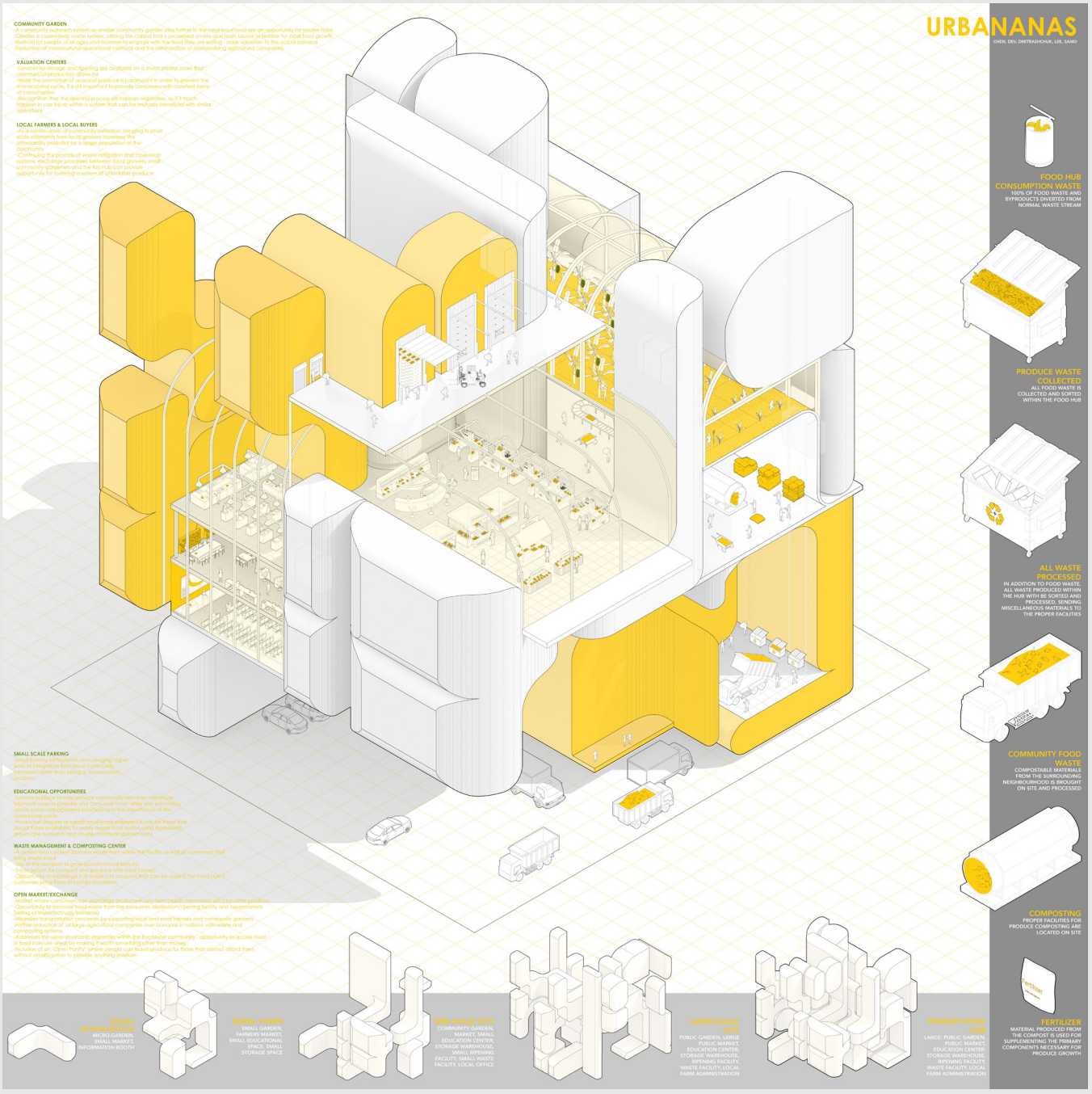


Fig. 21 Food Hub deployed in a suburban neighborhood

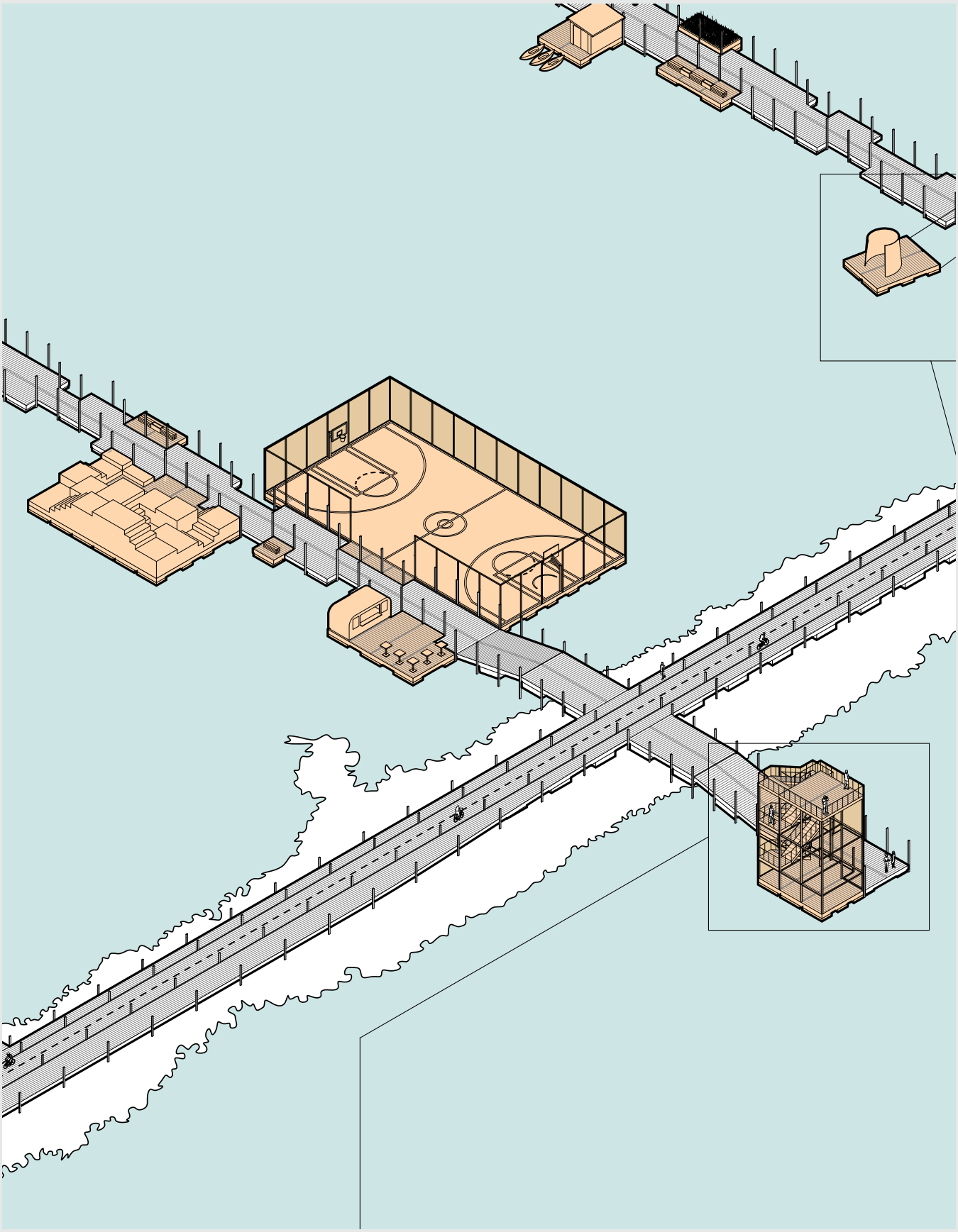
Fig. 22 Food Hub deployed in a city center

ADAPTABILITY AS A STRATEGY

Rather than focusing on the physical manifestations of adaptability as systematic thinking does, **strategic thinking** brings the consideration of adaptability into wider strategies of development.[39] As such, it addresses the full extent of potential adaptations on a range of spatial and temporal scales. It brings together multiple previously discussed approaches to adaptability into a comprehensive conception of a project. Potential scenarios of the future are recognized as drivers for adaptation. Ecological factors and non–human agencies are also acknowledged. Different organizational systems are seen as potential solutions to implementing adaptability.

Ultimately, strategic thinking ingrains the consideration of adaptability into the very core of one's thinking about a project. Its ultimate product is not a specific built environment, but rather the complete way of strategically conceptualizing the potential for future development.

[39] An original concept defined within the context of this essay.



MEADOWLANDS REIMAGINED

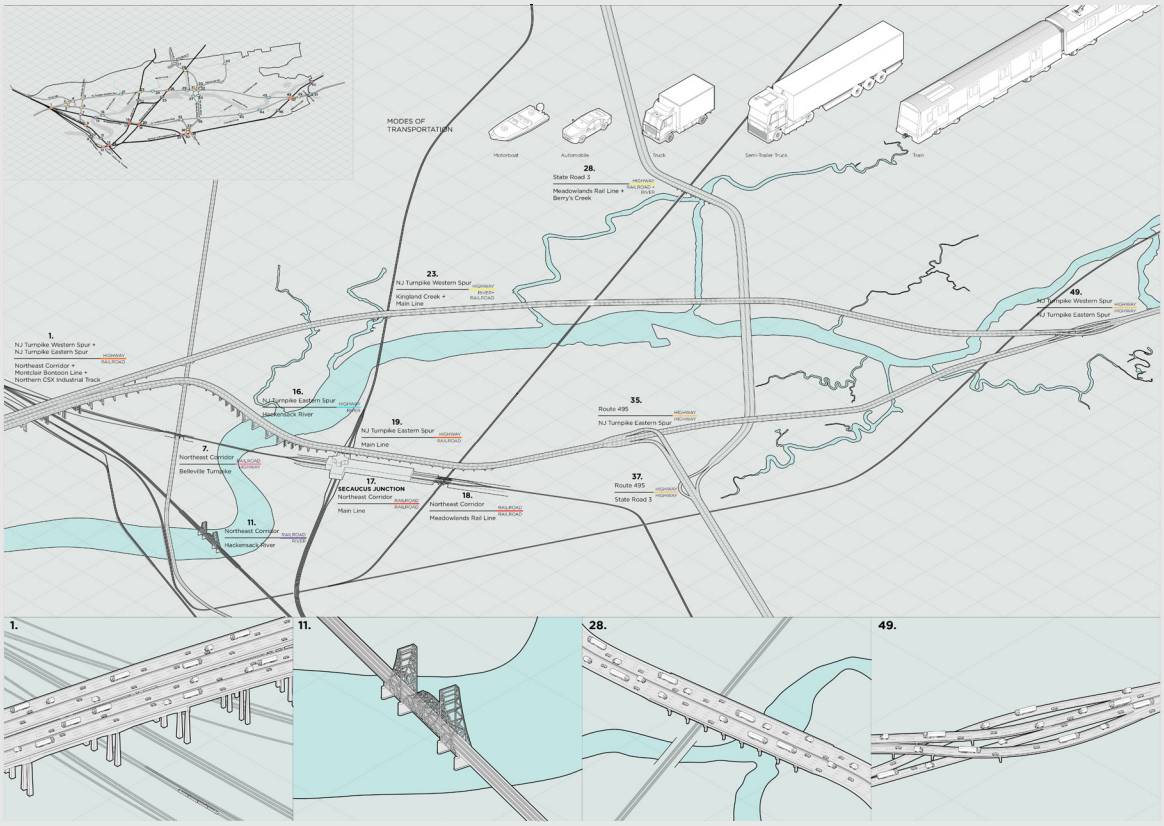
Design Option Studio
Fall 2021
Instructor: Jesse LeCavalier
Partner: Natane Deruytter

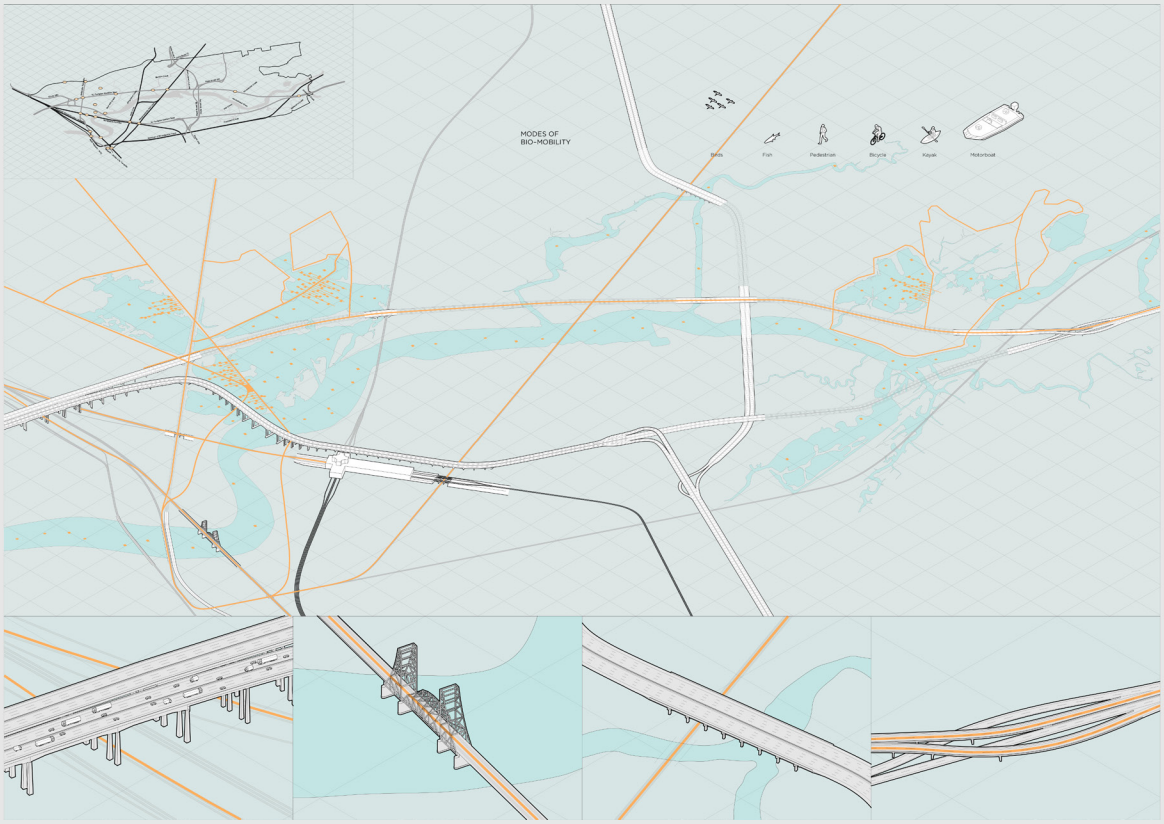
Meadowlands Reimagined attempts to propose new sustainable strategies for the region of the New Jersey Meadowlands. The project acknowledges that developing a masterplan vision for the area proves challenging, as it is hard to predict the specifics of the future economic, ecological, and social developments.[40] The intervention it proposes is deliberately designed as open-ended strategy that could accommodate change, expansion, and underutilization over time.

The project specifically focuses on the bio-mobility of the Meadowlands. It proposes to transition away from the current vehicular-dependent regional system of mobility into a more sustainable human-centered system (Figs. 23, 24). It utilizes the abundance of existing abandoned or underutilized infrastructural material in the Meadowlands[41] (Fig. 27) to create a new network of pedestrian trail circulation (Fig. 26). Most importantly, instilled into the very core of the project is the anticipation of sea level rise, which is perceived not as a threat to the infrastructural systems, but rather as an opportunity to create a more sustainable system. All the pathways are designed to be floating, allowing them to rise up with daily tides, extreme weather events, and ongoing sea level rise. Extending out from the central

[40] Nevertheless, New Jersey Sport & Exposition Authority's "Hackensack Meadowlands District Master Plan Update 2020" could be a useful resource for an overview of the region.

[41] Such as abandoned rail lines, abandoned swing bridge, and a historic vertical lift bridge planned for demolition.


MODES OF TRANSPORTATION
Motorboat
Automobile
Truck
Semi-Trailer Truck
Train
28.
State Road 3
Meadowlands Rail Line + Berry's Creek
HIGHWAY RAILROAD + RIVER
23.
NJ Turnpike Western Spur
Kingland Creek + Main Line
HIGHWAY RIVER+ RAILROAD
49.
NJ Turnpike Western Spur
NJ Turnpike Eastern Spur
HIGHWAY HIGHWAY
1.
NJ Turnpike Western Spur + NJ Turnpike Eastern Spur
HIGHWAY RAILROAD
Northeast Corridor + Montclair Bontoon Line + Northern CSX Industrial Track
16.
NJ Turnpike Eastern Spur
Hackensack River
HIGHWAY RIVER
19.
NJ Turnpike Eastern Spur
Main Line
HIGHWAY RAILROAD
35.
Route 495
NJ Turnpike Eastern Spur
HIGHWAY HIGHWAY
7.
Northeast Corridor
Belleville Turnpike
RAILROAD HIGHWAY
17.
SECAUCUS JUNCTION
Northeast Corridor
Main Line
RAILROAD RAILROAD
18.
Northeast Corridor
Meadowlands Rail Line
RAILROAD RAILROAD
37.
Route 495
State Road 3
HIGHWAY HIGHWAY
11.
Northeast Corridor
Hackensack River
RAILROAD RIVER
1.
11.
28.
49.


MODES OF BIO-MOBILITY
Birds
Fish
Pedestrian
Bicycle
Kayak
Motorboat

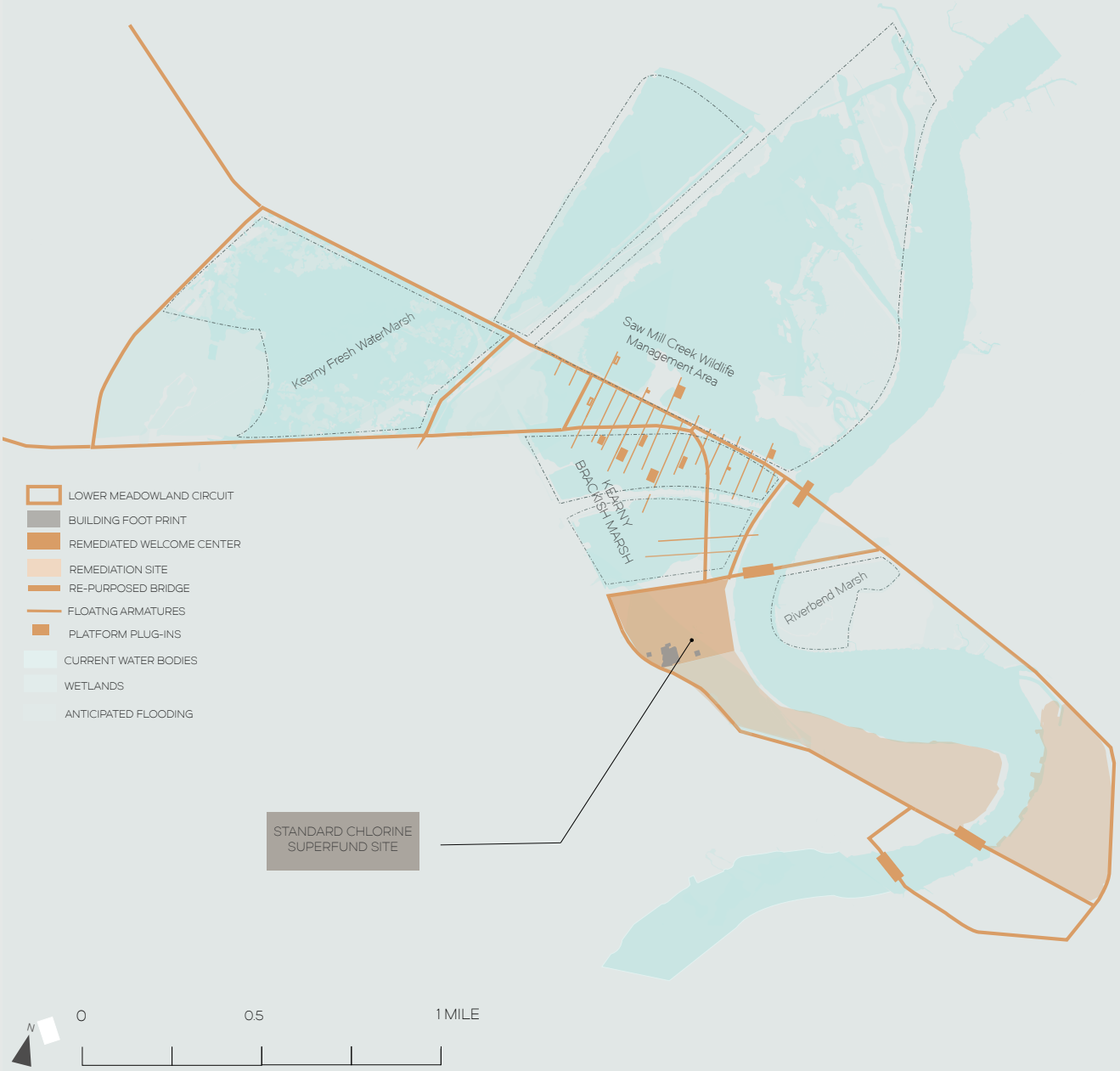
circulation pathways are floating armatures, which house floating platforms with a variety of programs (Fig. 28). The platforms are conceived as plug-ins that would be able to rotate around the region based on the specific requirements of the people occupying the spaces. Ultimately, **Meadowlands Reimagined** proposes a fundamentally new approach to occupying available space within the reality of rising sea levels.

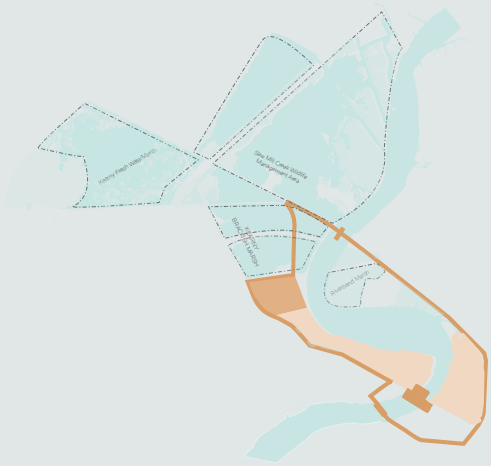
Fig. 23 (48, top) Existing vehicular-based system of mobility

Fig. 24 (48, btm) Proposed human and non-human centered system of mobility

LOWER MEADOWLANDS CIRCUIT SITE PLAN

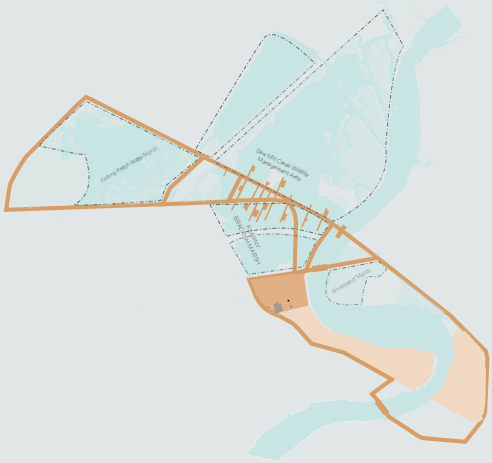
PILOT SITE FOR A LARGER HUMAN CENTERED NETWORK





PHASE 1

PHASE 2

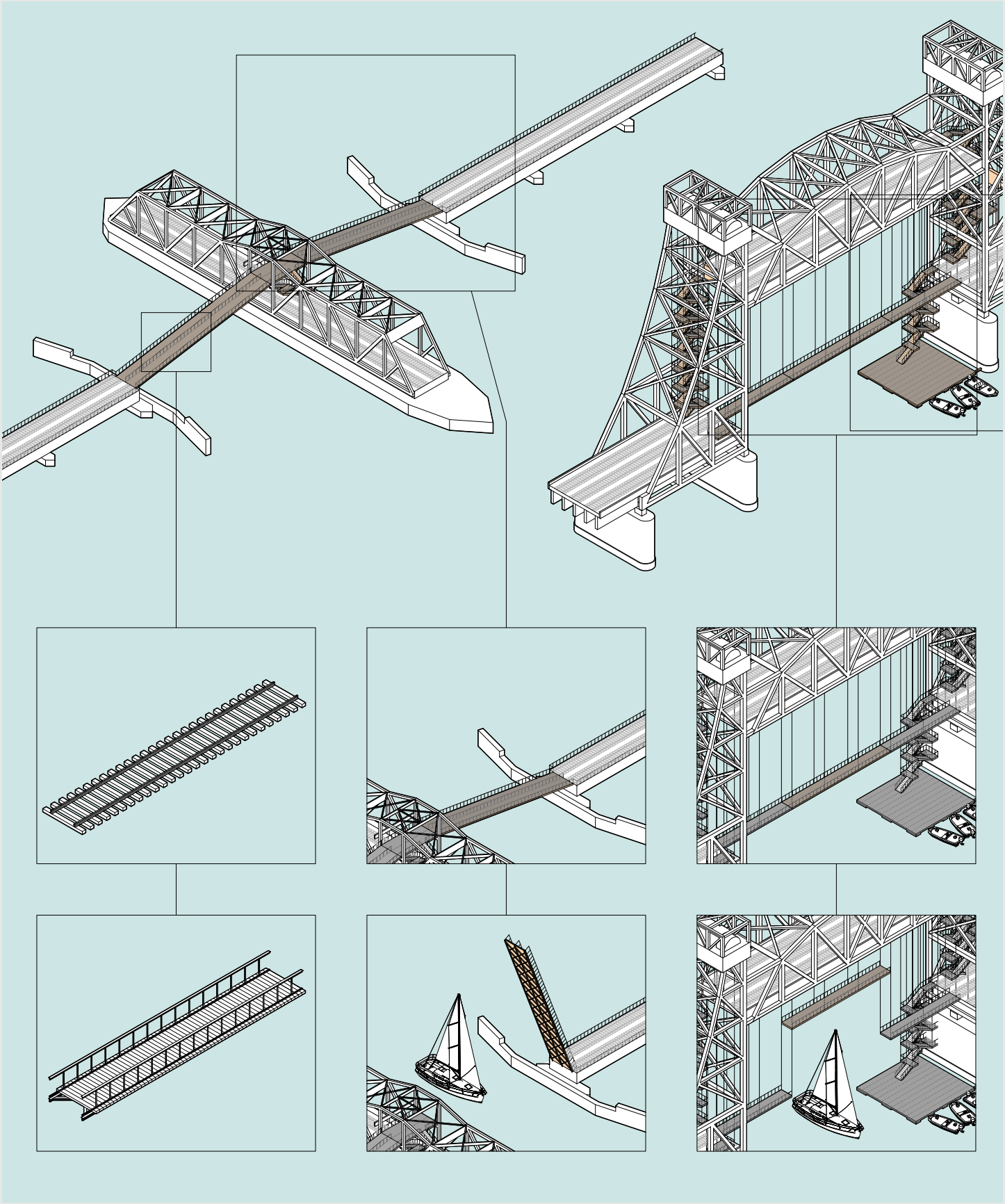


PHASE 3

PHASE 4

PHASE 5

PHASE 6



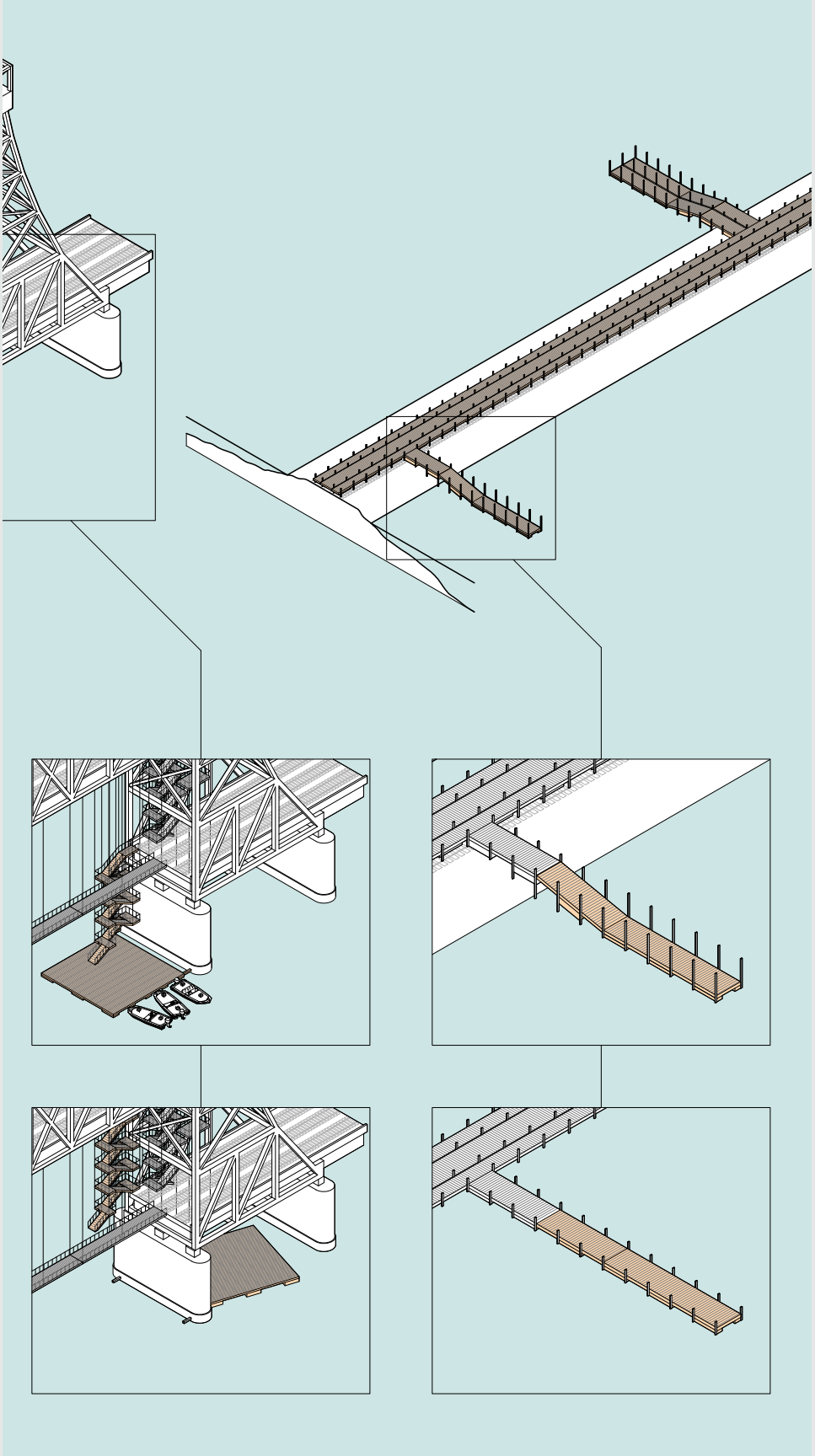
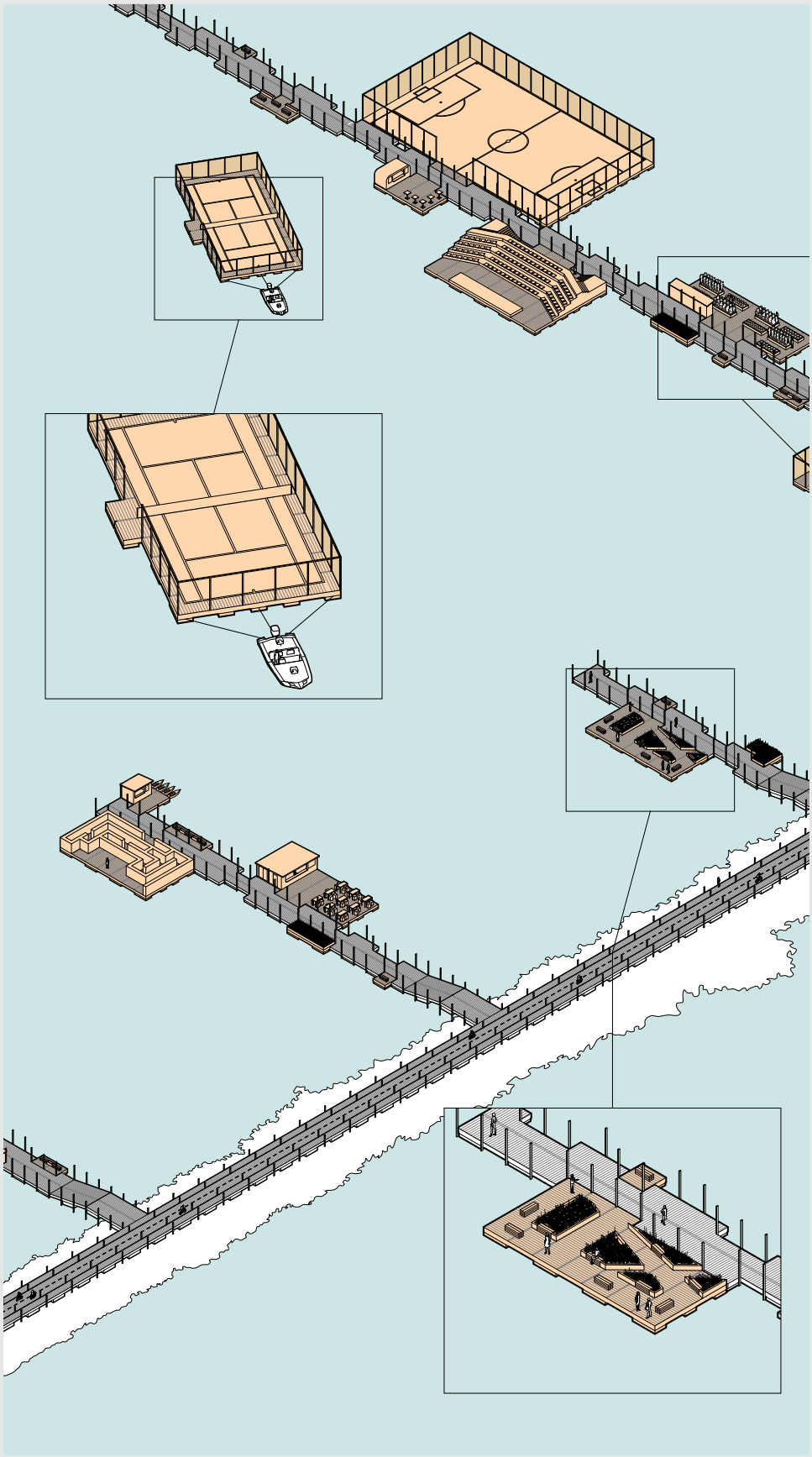


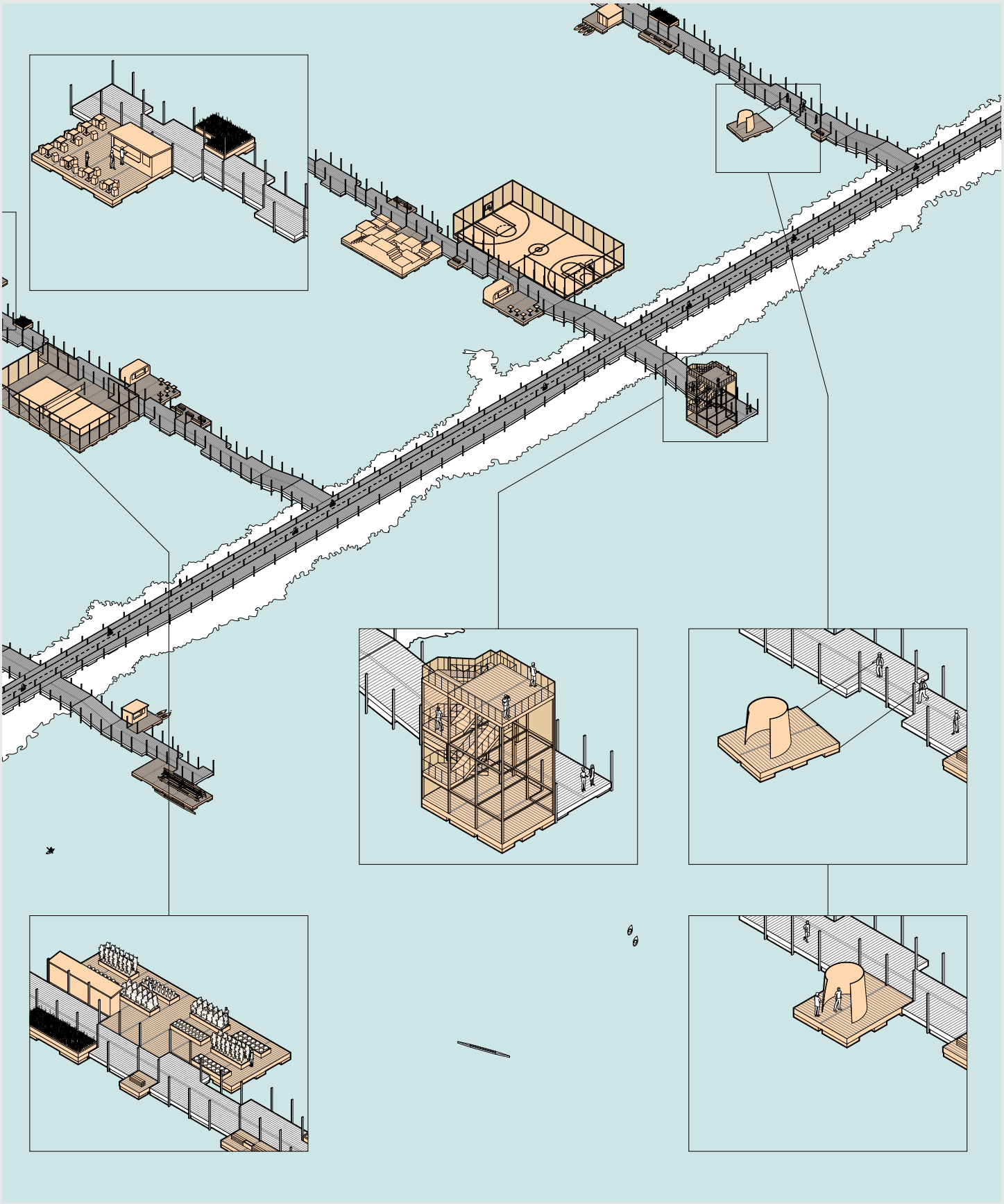
Fig. 25 (50) Proposed pathway layout

Fig. 26 (51) Proposed phases of project development

Fig. 27 (52–53) Reactivation of existing infrastructures

Fig. 28 A system of floating armatures and plug-in platforms



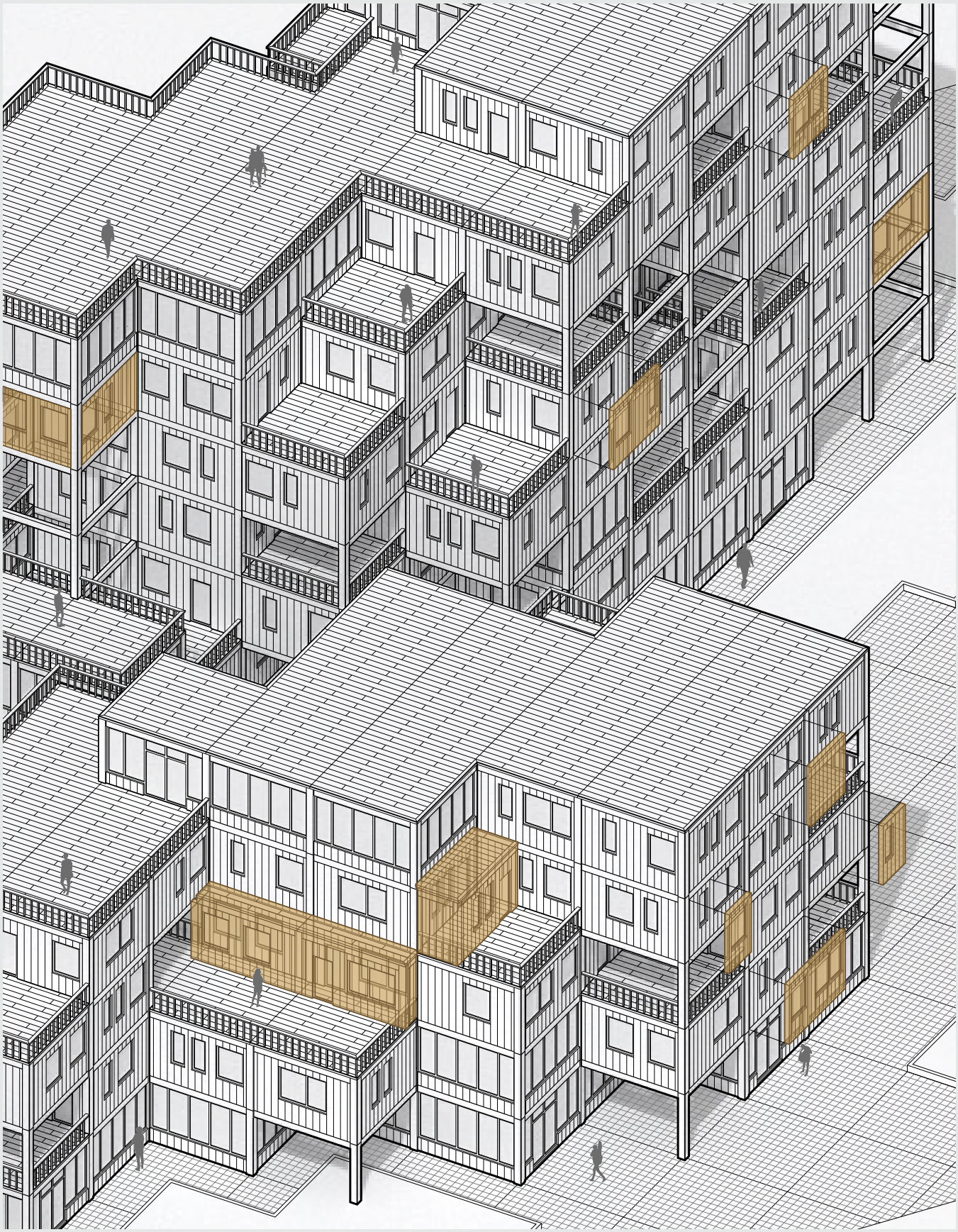


DESIGNING FOR ADAPTABILITY

All of the strategies and expressions of adaptable architecture discussed above could prove useful when designing a building for adaptability. Many of these approaches are mutually exclusive, therefore they should be viewed as a wide range of possibilities out of which the more appropriate ones for the building's program and context can be selected. At the same time, based on the specifics of a project, there can be also opportunities for synthesizing multiple approaches to develop a more adaptable system.

One additional consideration that is important to keep in mind is the actual users of the built environment, who would ultimately benefit from its potential adaptations. All architecture should be designed with the primary goal of enhancing lived experiences of the people. A socially responsible system therefore needs to give the agency over adaptability to the architecture's occupants, rather than removed governing agencies.[42] Only then can adaptability transcends its notion as a theoretical framework and become a practical system that improves the lives of people it is supposed to serve.

42 A similar approach of participatory design is explored in Esra Ackan's *Open Architecture* (Basel: Birkhauser, 2018).



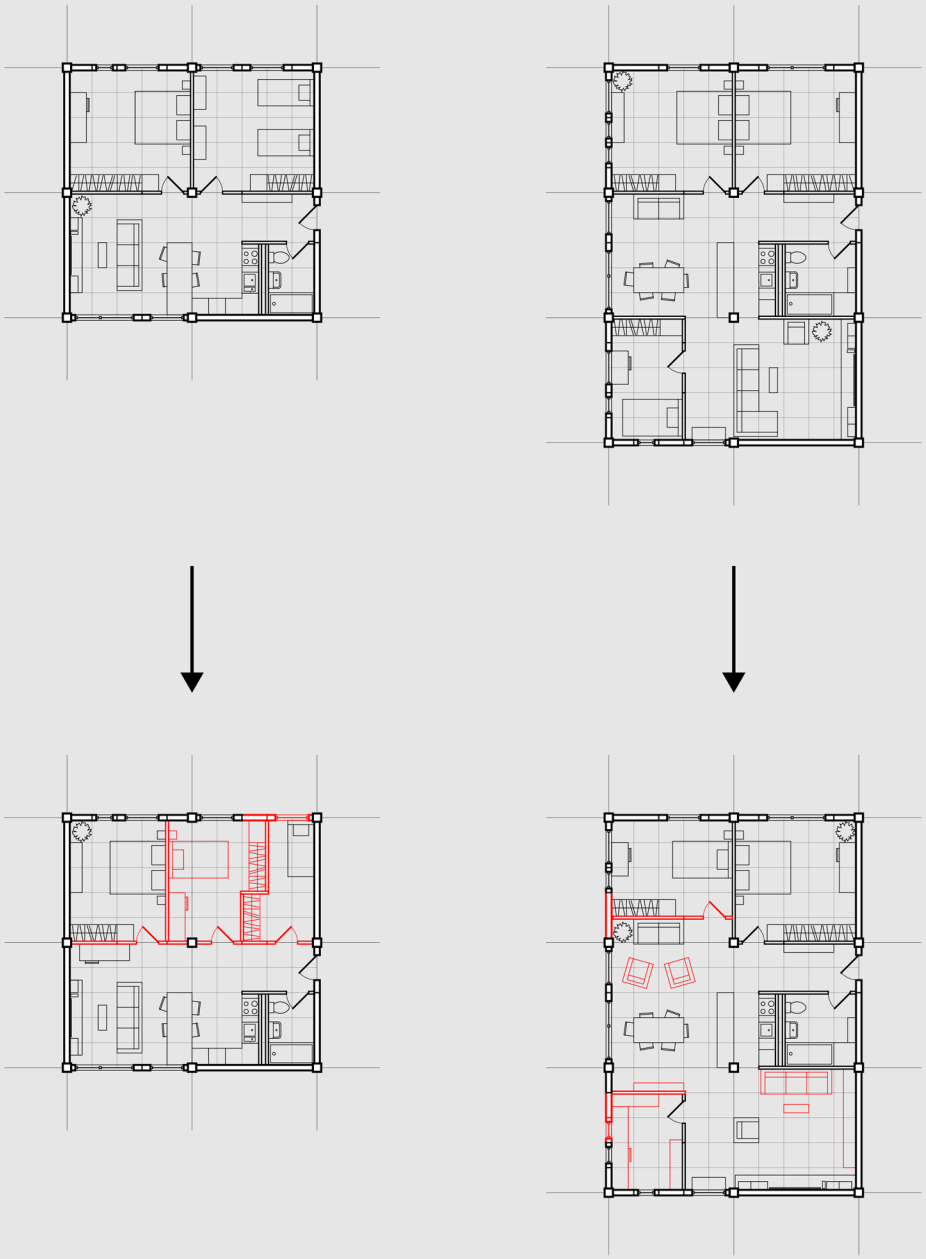
HOUSING AD-APT

Design Option Studio
Spring 2021
Instructor: Katharina Kral

Housing AD-APT is a multi-family affordable housing development on the Long Island City waterfront of Queens, New York.[43] From the outset the project is developed around the core idea of adaptability. The building is designed to have a fixed space frame structure and easily adjustable walls and partitions separating the spaces within it. Thus, the layouts of the units in the project are open to adaptations over time, such as inserting an additional bedroom for a new child, sacrificing part of a bedroom for a larger living room, or transforming a part of the living room into an enclosed home office (Fig. 29). Likewise, the cluster arrangements can be transformed, combining neighboring units to create a larger apartment, separating large apartments into smaller ones (Fig. 30), or expanding the area of the unit by building outward into the previously empty parts of the space frame (Fig. 31). Thus the residents are granted additional agency over the spatial layouts of their units, allowing the architecture to respond to their changing family structures, professional requirements, or even personal preferences.

[43] The design studio addressed multiple aspects of a socially responsible housing design: affordability, sustainable mass timber construction, healthy environments, etc.

Fig. 29 (60–61) Adaptations of the interior layouts of the units



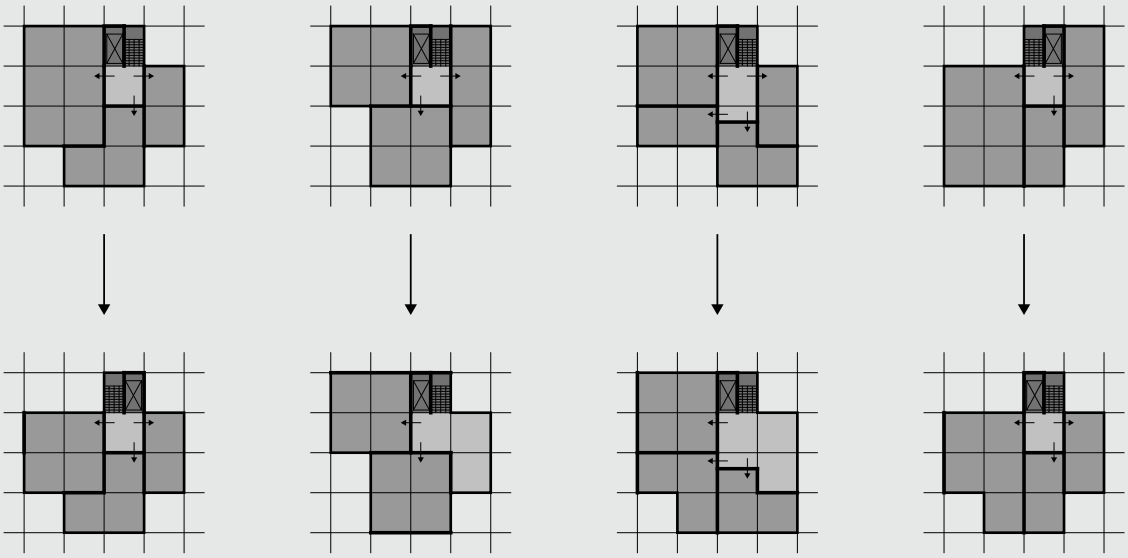
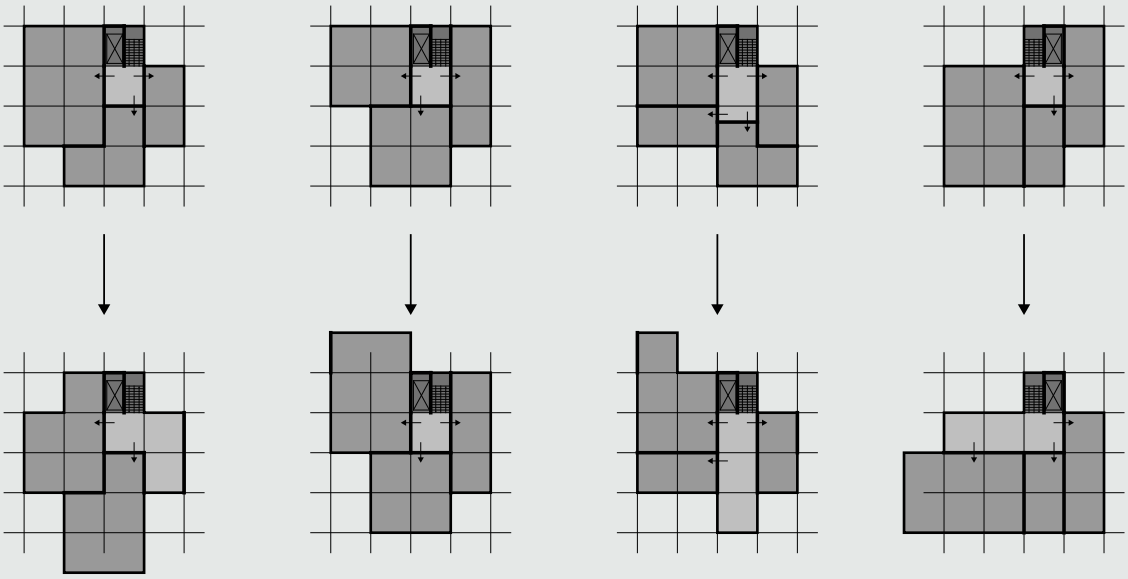


Fig. 30 (62) Reconfigurations of the cluster arrangements

Fig. 31 (63) Expansions of the units



An important part of the project is the modular nature of the building components. Built from sustainably sourced timber,[44] there are multiple types of structural members, floor and wall panels that are inserted into the structural system (Figs. 33–38). The project allows for these panels to be easily removed, replaced, and reused over time. The building stores extra panels on site, thus allowing for the residents to request changes to the layouts or the window arrangements of their units (Fig. 39).

Housing AD-APT ultimately achieves a high degree of adaptability by balancing the developed system and the open-ended anticipation of changes within this system.

44 For more on mass timber construction see *Mass Timber Design Manual*, published by Think Wood and WoodWorks.

Fig. 32 (64–65) Floor plan of the housing complex, Floor 3

Fig. 33 (67, top) Modular system, structural frame

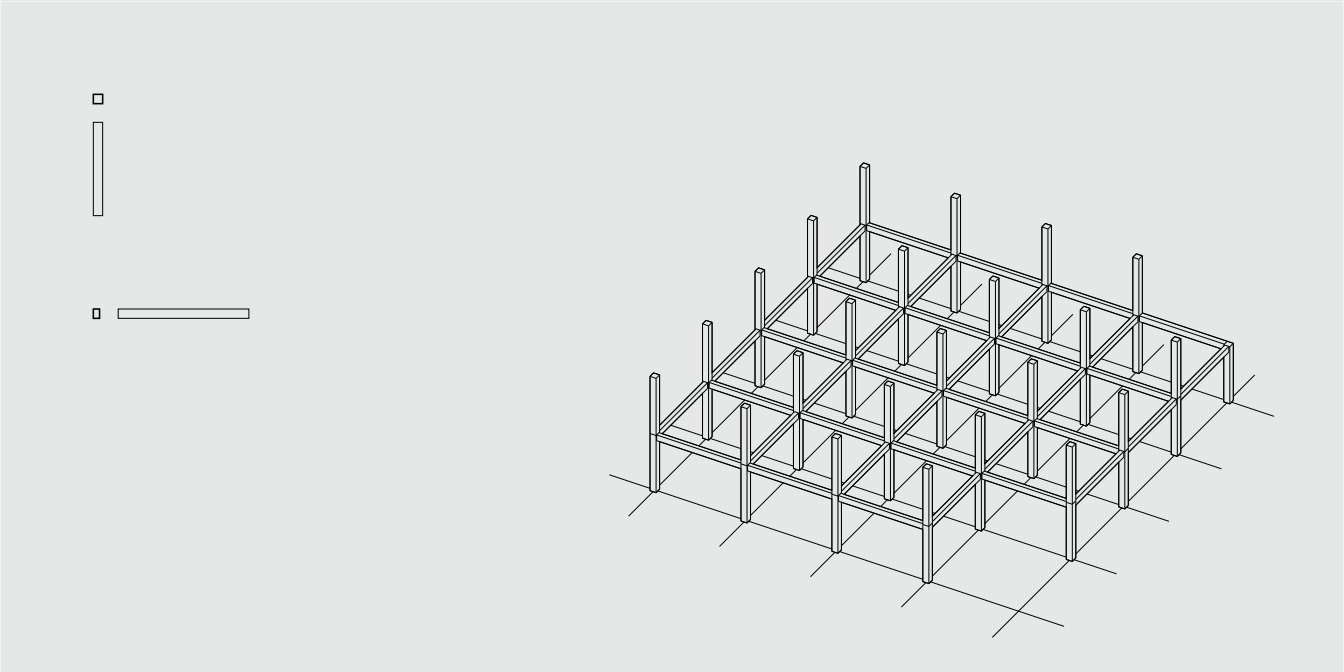
Fig. 34 (67, btm) Modular system, floor plates

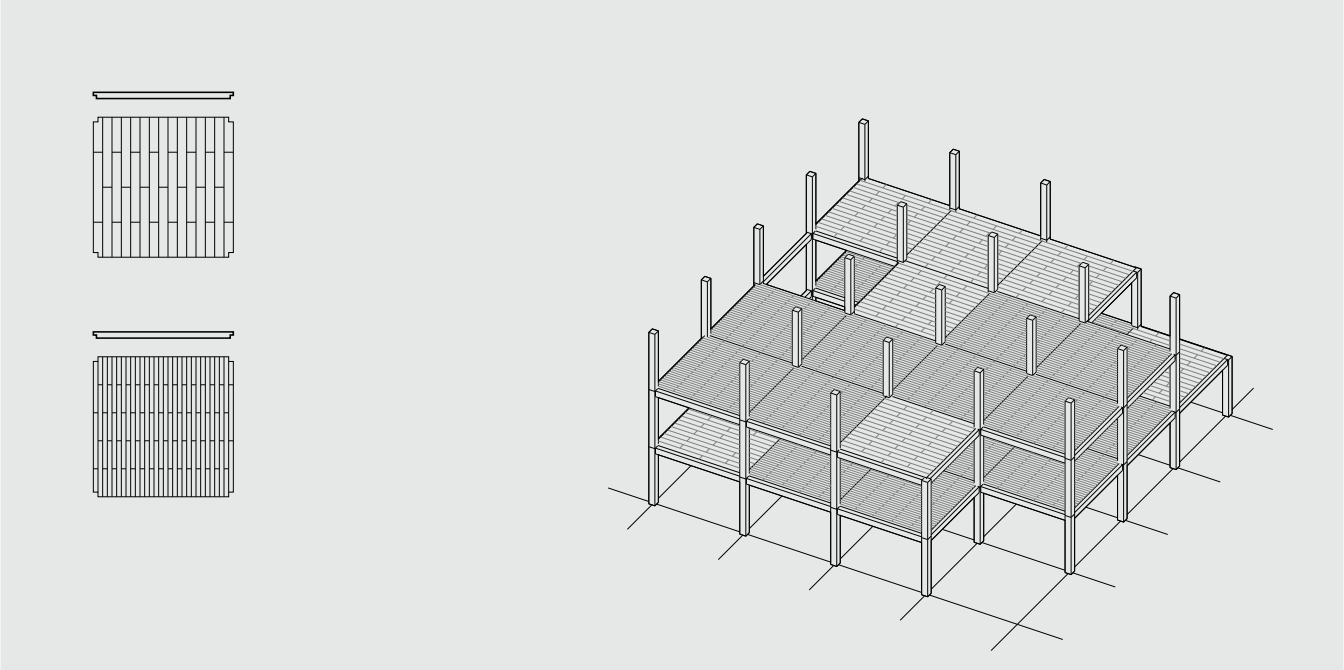
Fig. 35 (68, top) Modular system, interior unit-to-unit walls

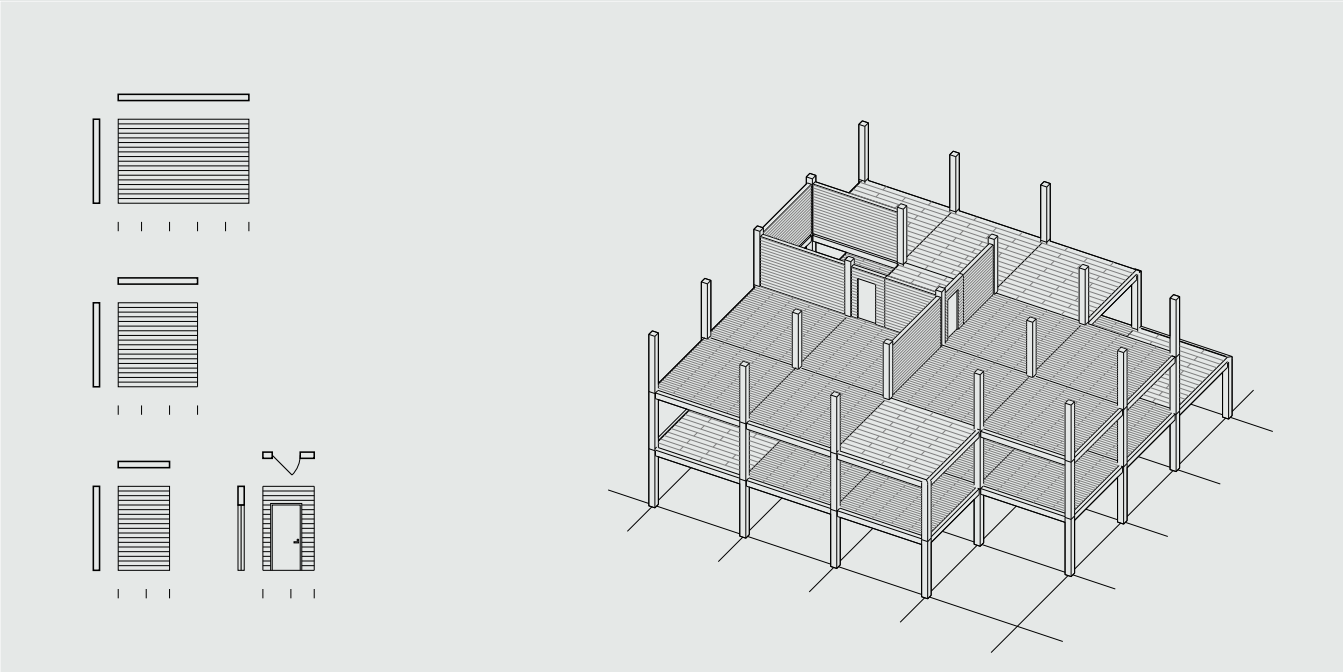
Fig. 36 (68, btm) Modular system, interior in-unit partitions

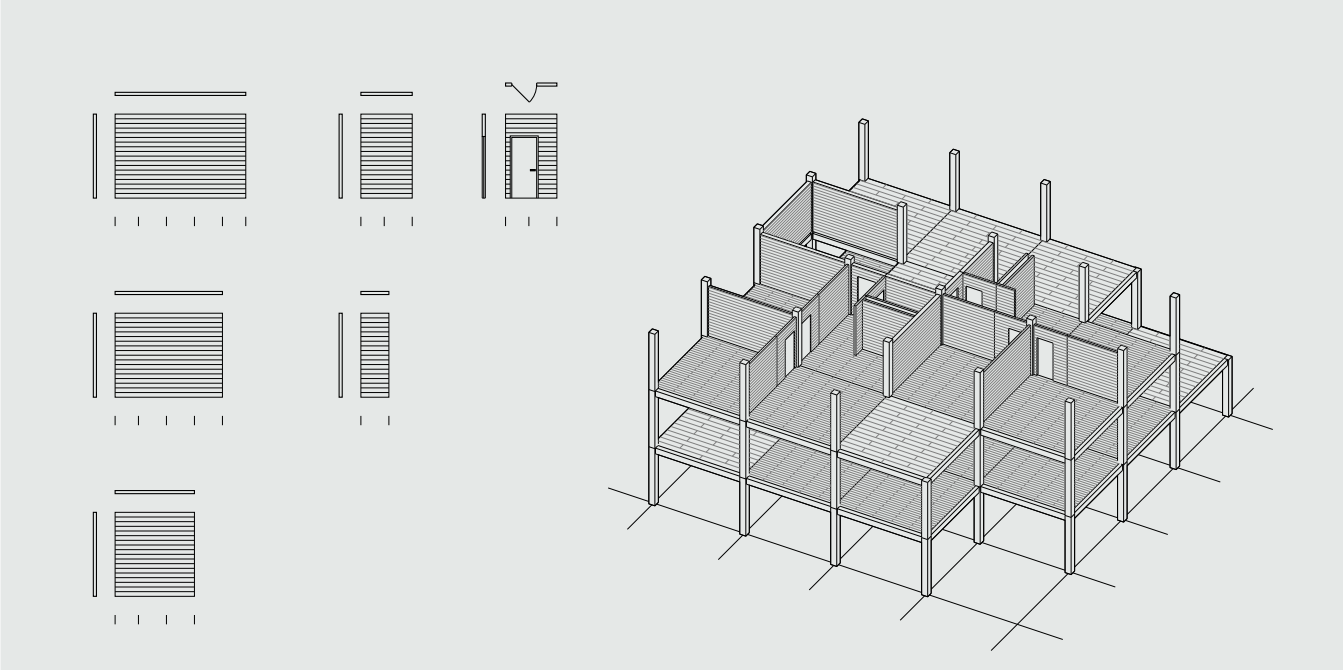
Fig. 37 (69, top) Modular system, facade panels

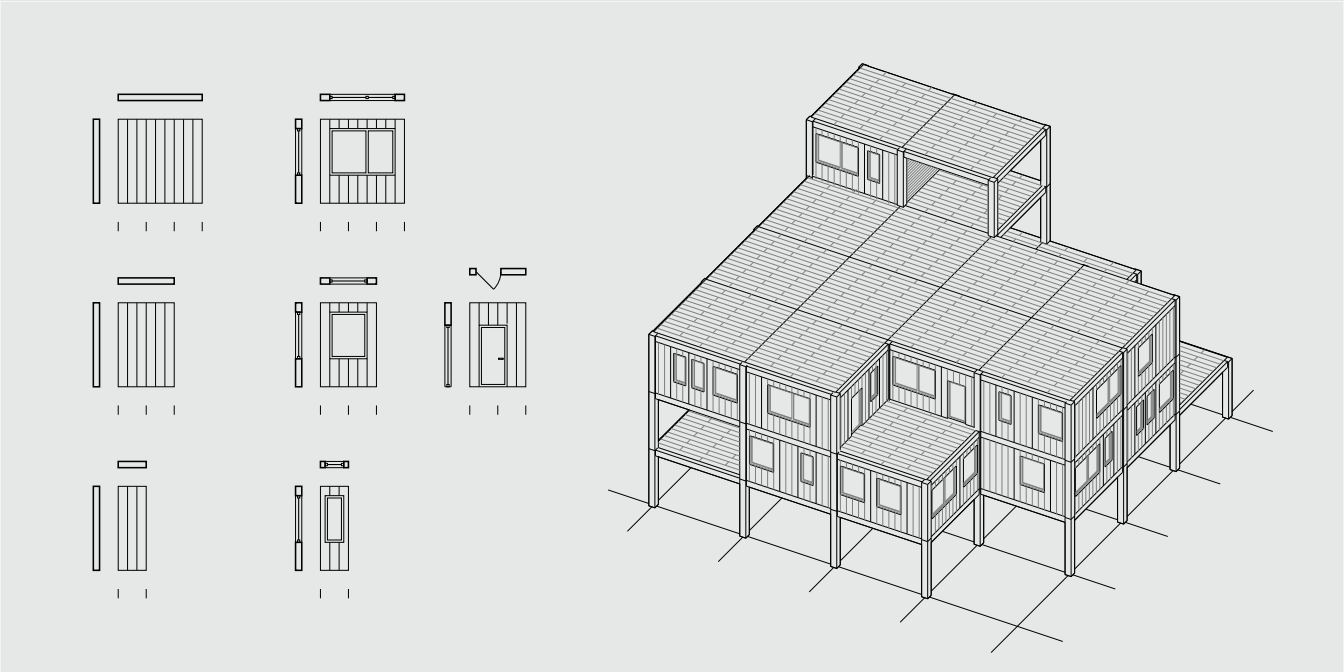
Fig. 38 (69, btm) Modular system, shared spaces facade panels

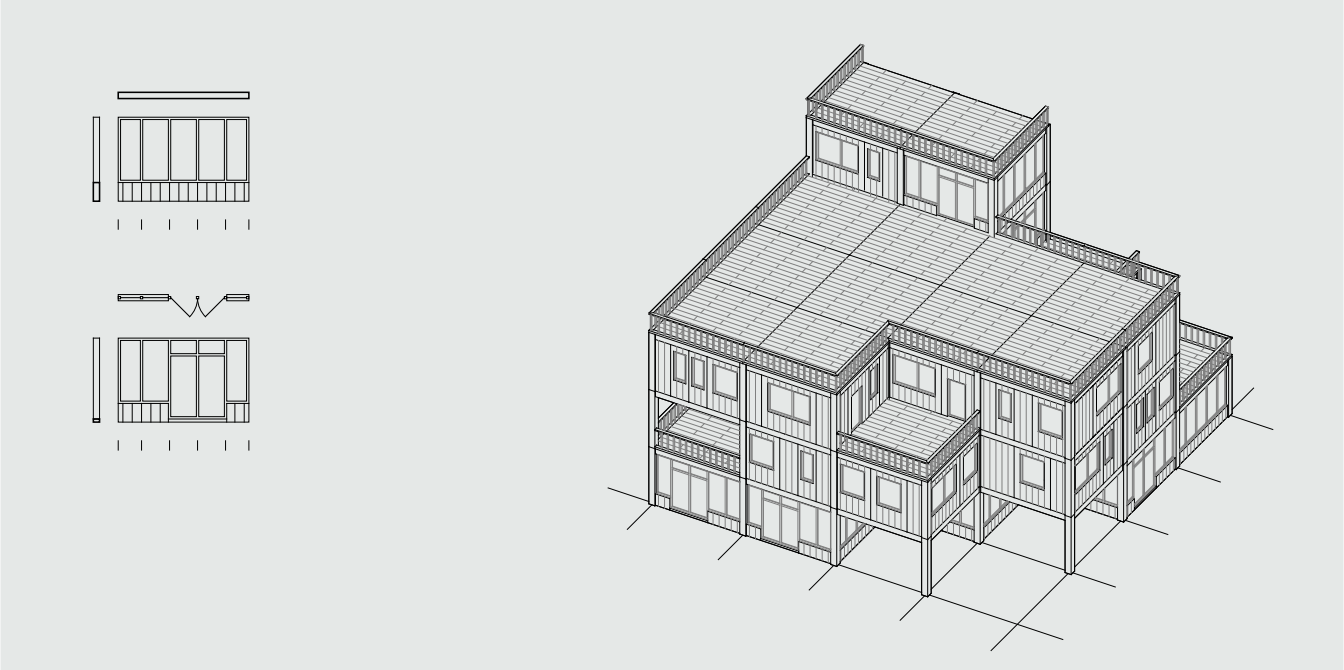


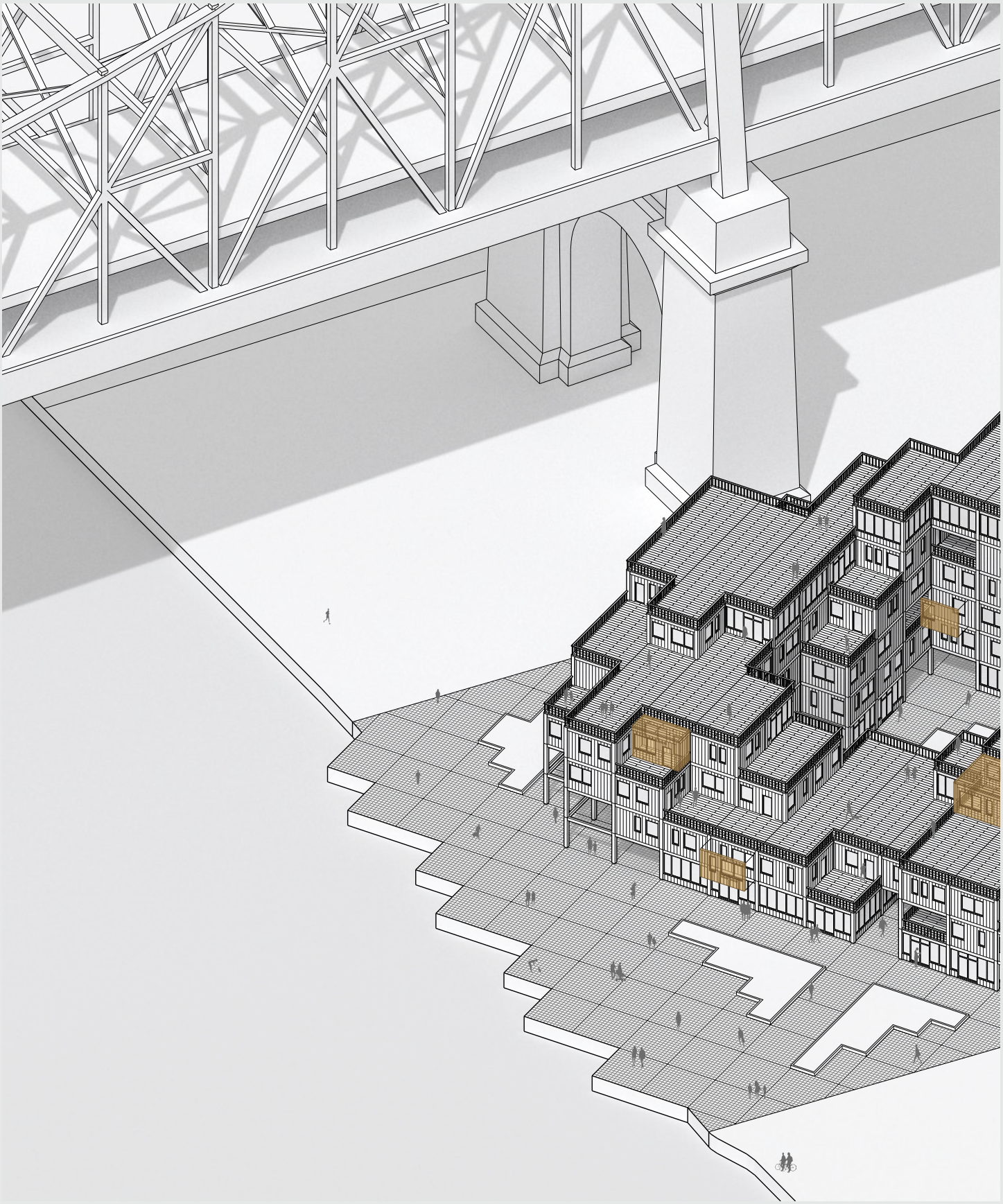












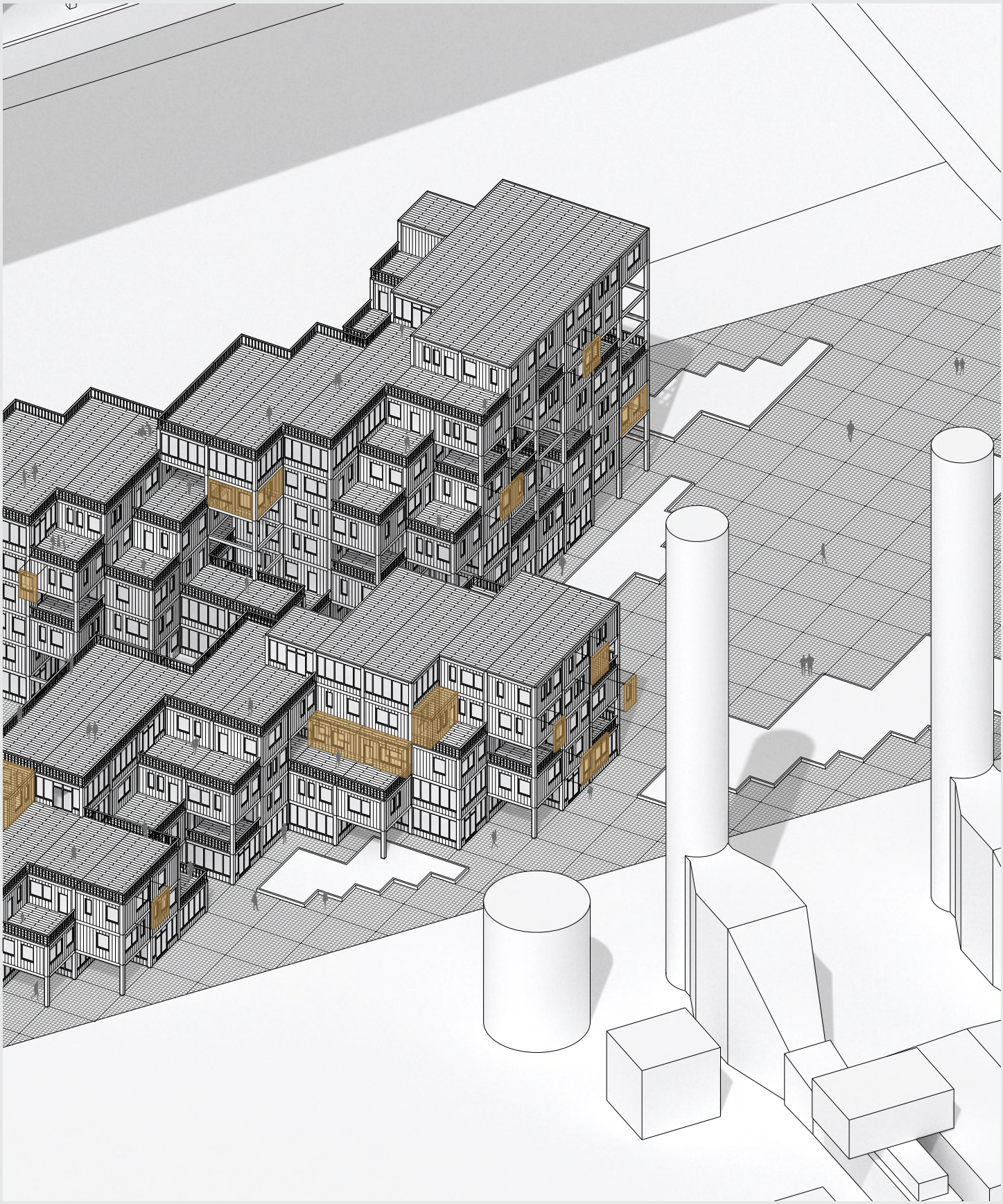


Fig. 39 (70–71) Formal configuration of the project, potential adaptations of the elements

Fig. 40 (72–73) Common roof terrace, replacement of a facade panel

CONCLUSIONS

My investigation into adaptability has uncovered the broad extent of the approach's definition, as its application can vary greatly in the specific contexts of different projects. Nevertheless, a number of common themes can be identified that help inform the thinking about adaptability in the architectural practice.

1. Adaptability can be deployed on a wide range of spatial scales, from private residences to public spaces and urban design;
2. Likewise, adaptability should be considered on different temporal scales: days, seasons, years;
3. A modular approach to building elements can allow them to be removed, replaced and reused, thus promoting adaptability;
4. A modular approach to the spatial organizations within a building can allow for them to be likewise expanded or modified;
5. It is impossible to accurately predict the full extent of the potential future conditions that the building would need to adapt to;
6. Instead, adaptable architecture should focus on establishing an open-ended system that can allow for the different adaptation scenarios to occur;
7. Adaptable architecture should seek the balance between the fixed and flexible elements within

the system it develops;

8. It is important to consider the actors of adaptability and assign agency to the immediate occupants of the space;

9. Limitless adaptability should not be the goal of a project;

10. Rather, a project should be strategic about the limitations it imposes.

ADAPTIVE VALUE

Over the course of my investigation, adaptable architecture has proven to be a viable and responsible approach to architectural production. Therefore, I argue for the need of its higher degree of implementation into the practice. In order to achieve this goal, I propose to define a conceptual framework of **adaptive value** — the capacity of the built environment to undergo a wide range of potential future adaptations.[45]

[45] This original concept, defined through the course of my investigation, was inspired by Alois Riegl's conception of values assigned to buildings, in "The Modern Cult of Monuments" (1903).

Adaptive value as a concept can be interpreted from two perspectives. First, it declares that there is indeed value in the adaptability. More projects need to start viewing adaptability as a feasible and valuable parameter of construction. Only then can adaptability be more widely implemented into the architectural practice. Second, adaptive value can be viewed as a metric for measuring the extent of a project's adaptability. While not suggesting to assign numeric values to adaptability, adaptive value can still be used as a tool to compare the degrees of adaptability in multiple projects. As discussed above, limitless adaptability should not be considered the optimal or desired condition. Through the adaptive value as a metric of comparison, the appropriate degree of adaptability could be determined for each specific project.

A paradigm shift towards adaptive value in the architectural practice could allow adaptability to become an important factor in the design of new construction. It is my belief that this new approach would ultimately establish a much more sustainable, responsible and enduring mode of architectural production.

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