

FUTURE TENSE DENSE:  
AFFORDABLE HIGH-RISE RESIDENTIAL



# DUPLEXCITY

STUDIO **ViLOZ**

LONGNEY LUK, ISABELLA OUYANG, CHITIKA VASUDEVA, CURRAN ZHANG

SITE PHOTOS



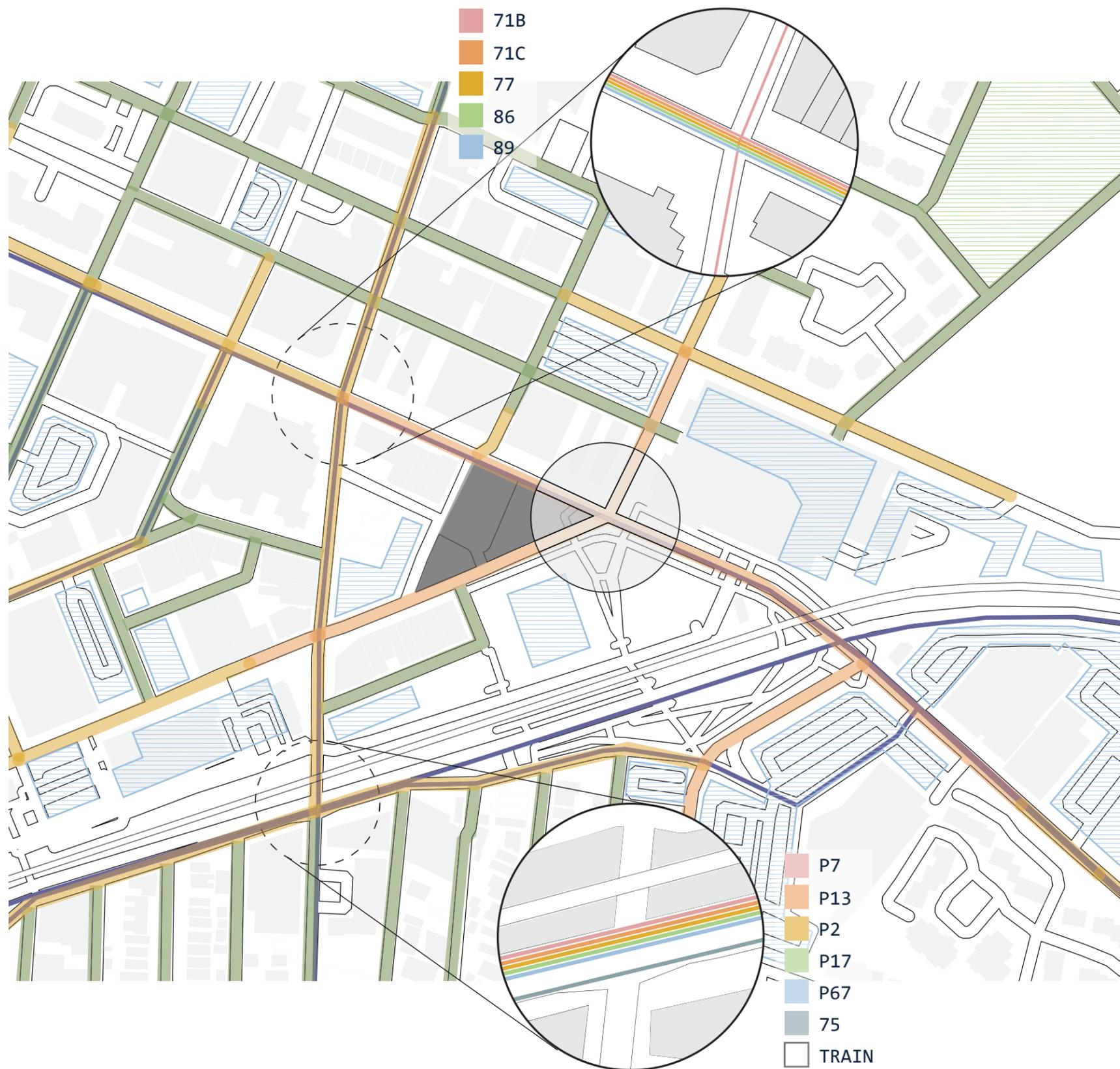
UNDERSTANDING SITE CONTEXT



The site is located at the corner of Penn Ave and Center Ave in the East Liberty neighborhood of Pittsburgh. A historically significant area of the city, East Liberty has been developing rapidly in recent years and is currently dominated by low- to mid-rise commercial and civic infrastructure, with some residential buildings.

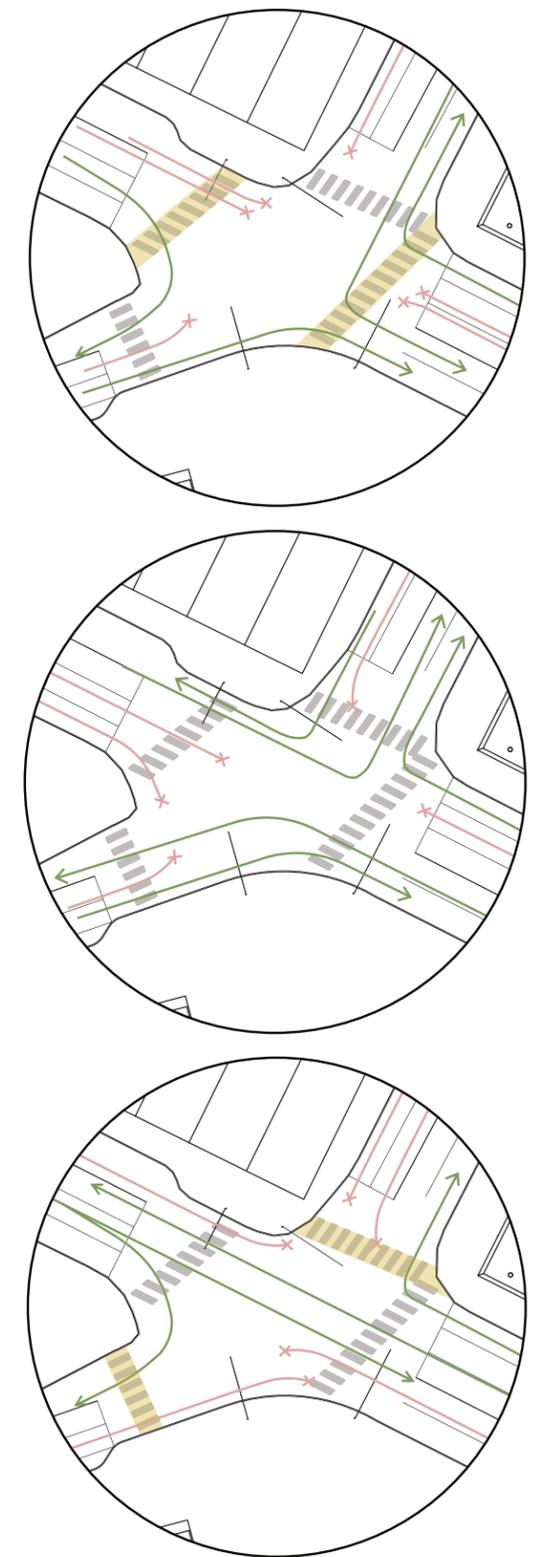
- Commercial
- Residential
- Civic
- Green Space
- Parking

SITE TRAFFIC ANALYSIS



Penn Ave, one of the major roadways in the city, runs through East Liberty and forms one edge of the triangular site of this project. Studying traffic patterns was key to developing an understanding of the activity along all edges of the site. Documenting the occurrence of dedicated green space and vehicular traffic patterns also fed into a subjective analysis of the influence of air quality and noise pollution on pedestrian experience on the site.

- Heavy Traffic
- Medium Traffic
- Light Traffic
- Bus Route
- Green Space
- Parking



TRAFFIC PATTERNS & PEDESTRIAN EXPERIENCE

## FIRM GOALS

## FORMAL GOALS

**Multi-level** units (“jigsaw”)

Include ALL UNIT TYPES on each floor

## PROGRAMMATIC GOALS

Semi-outdoor spaces

COMMUNAL GREEN SPACE

Public **access** into podium

Farmers’ market

## CONCEPTUAL GOALS

**Every two or three floors** is a small community

Transition of materials from contextual to “modern”

Limited access after fourth floor

## ENVIRONMENTAL GOALS

Create BUFFERS for noise and polluted air

Natural daylight and ventilation

**Programmed green spaces** (learning space vs. garden)

## COMMUNITY GOALS

GREEN SPACE for all residents

Combinations of different kinds of units to **mix populations**

Encourage long-term settlement in the area

Revive MULTIGENERATIONAL housing practices

Creating a strong sense of community and neighborhood

**Accessibility** across age and ability

## ENVIRONMENTAL GOALS

**Natural light** and ventilation through operable windows

Outdoor space (may be elevated)

Pursue **100% green roof** coverage

## PROGRAMMATIC GOALS

SPACE FOR CHILDREN to learn, play and feel engaged

Multipurpose space for **performances and events**

Restaurant or bakery at the **northeast corner** of the site

Retain CVS and Citizen’s Bank

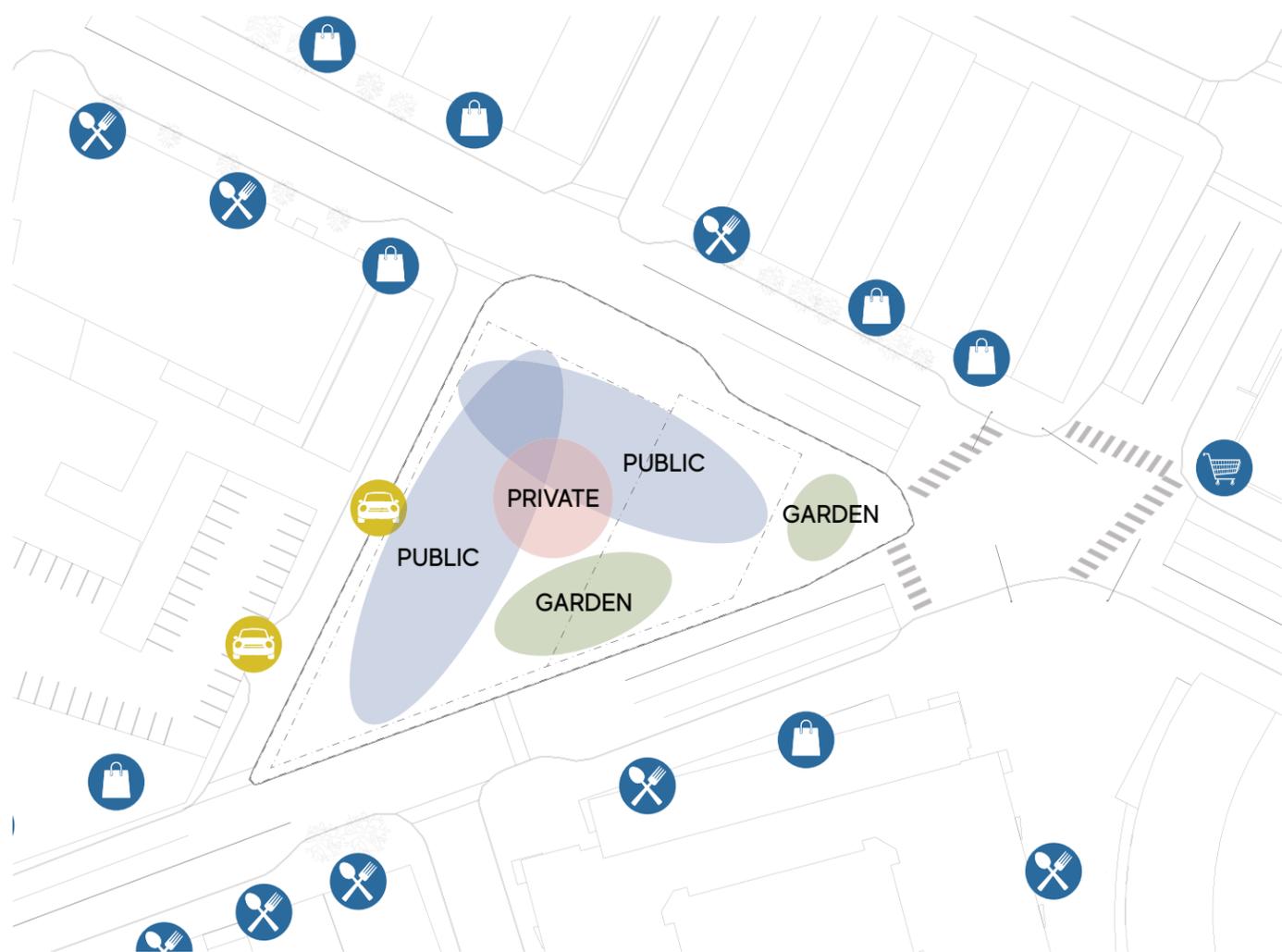
Introduce a fitness center on the second floor

## SITE STRATEGY

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The complex nature of the site posed a number of challenges and opportunities, both programmatically and formally. The larger planning moves aim to facilitate a range of commercial and dining activities while taking into consideration pragmatic issues such as vehicular and pedestrian traffic.

INITIAL SITE STRATEGY  
- ACCESSING SITE NEEDS

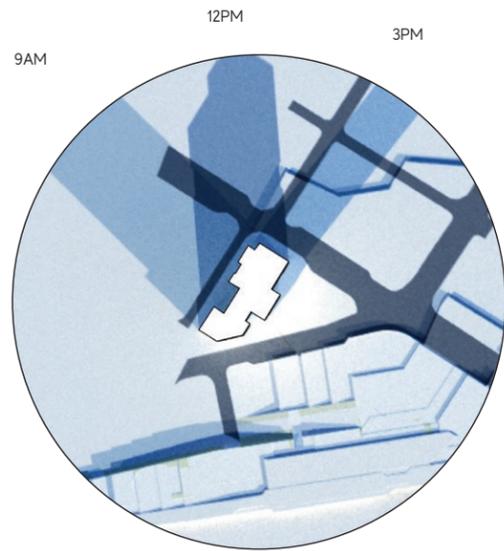


INITIAL SITE STRATEGY  
- PROGRAMMATIC RESPONSE

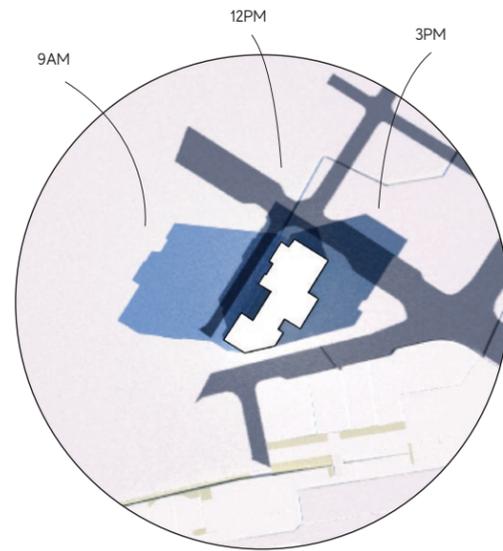


The program of the building podium was developed in response to existing site conditions and programming, as well as according to guidelines determined by client interests. The CVS and Citizen's Bank on the first floor are preserved.

SUN AND SHADOW ANALYSIS



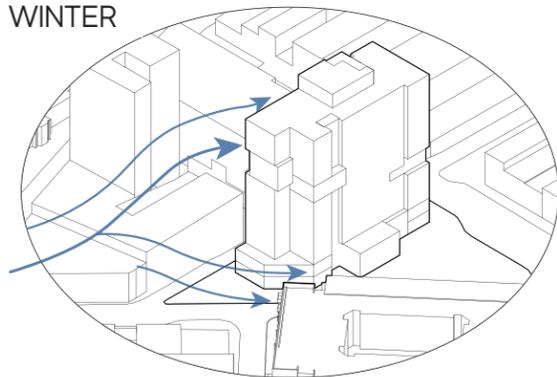
WINTER SOLSTICE



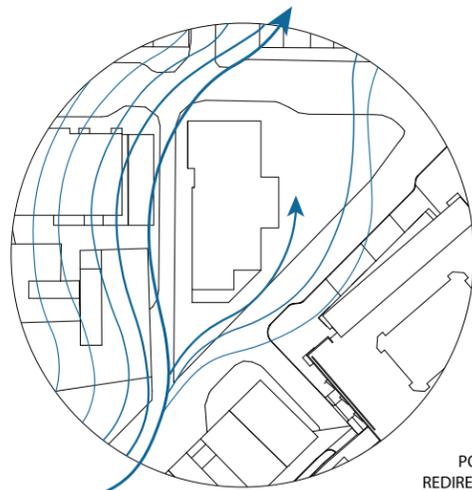
SUMMER SOLSTICE

WIND ANALYSIS

WINTER

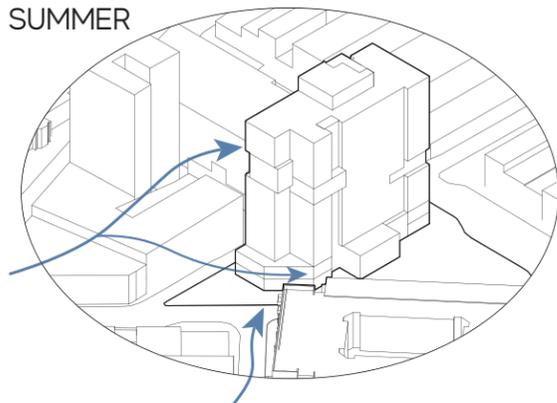


PRIMARY WIND DIRECTION  
WINTER

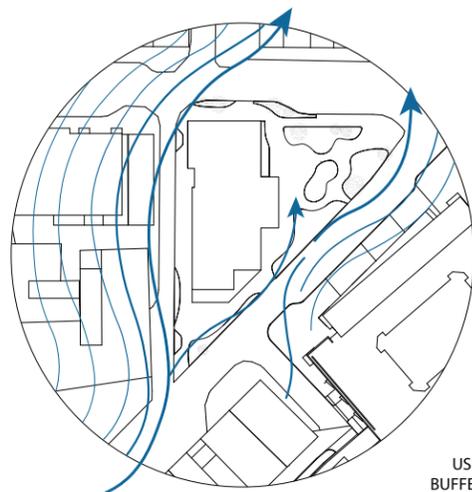


POSITIONING MASS TO  
REDIRECT WESTERLY WINDS

SUMMER

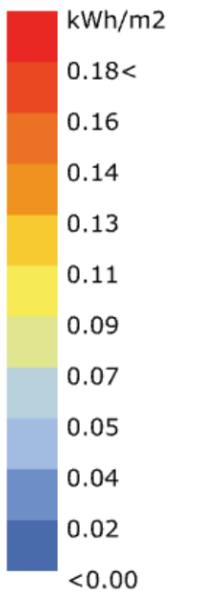
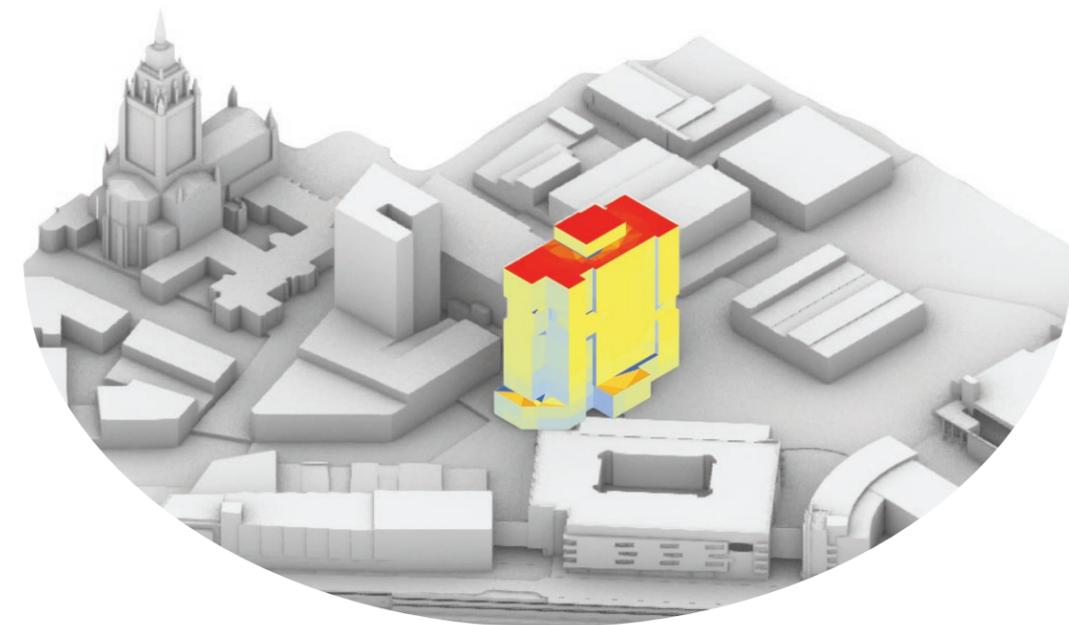


PRIMARY WIND PATTERNS  
SUMMER

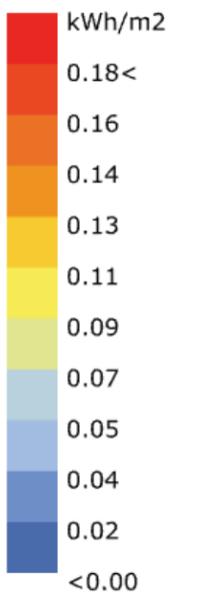
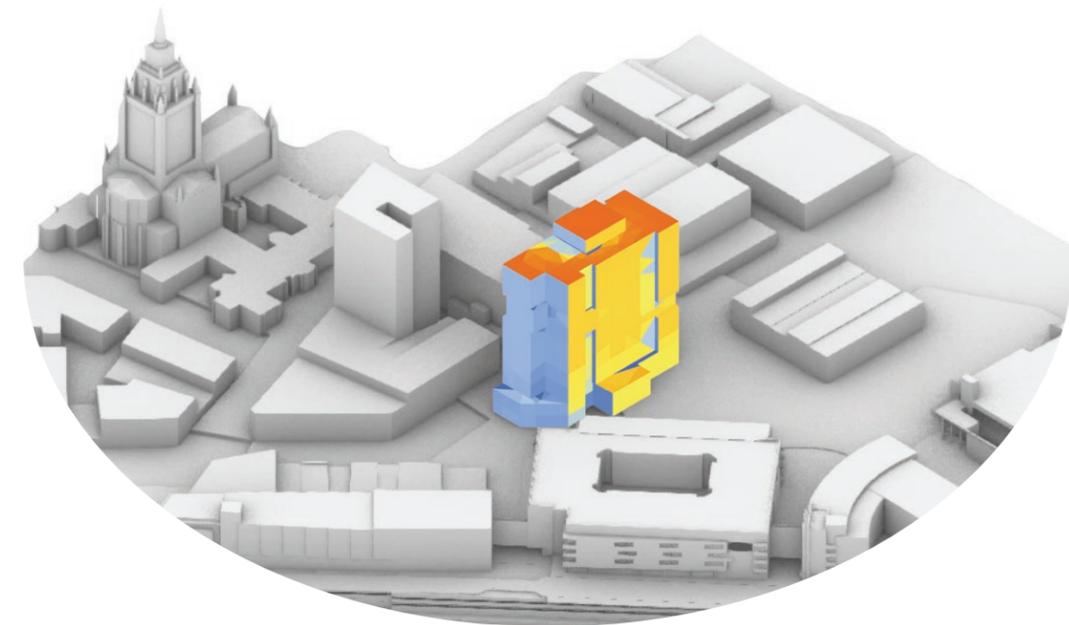


USE OF PLANTATION TO  
BUFFER SOUTHERN WINDS

SOLAR RADIATION ANALYSIS

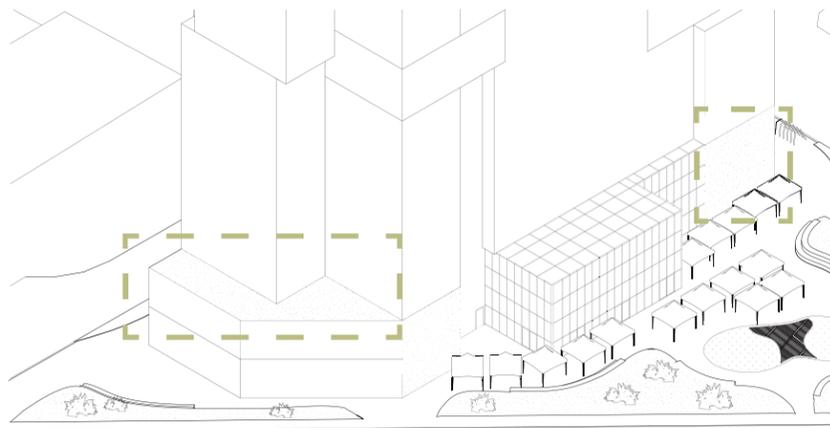


SOLAR RADIATION  
MARCH 22 | 11:00-12:00



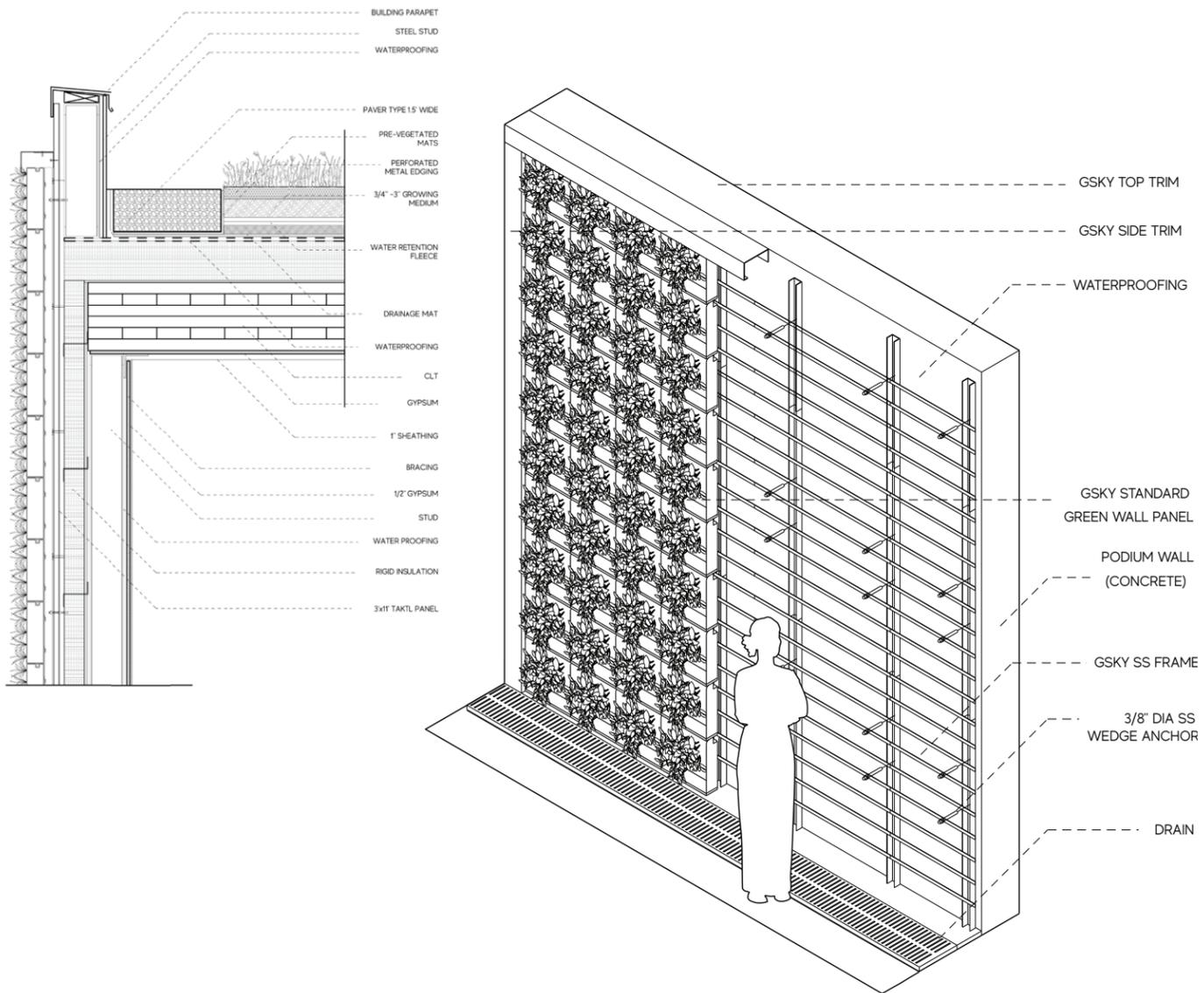
SOLAR RADIATION  
MARCH 22 | 11:00-12:00

GREEN ROOF & WALL

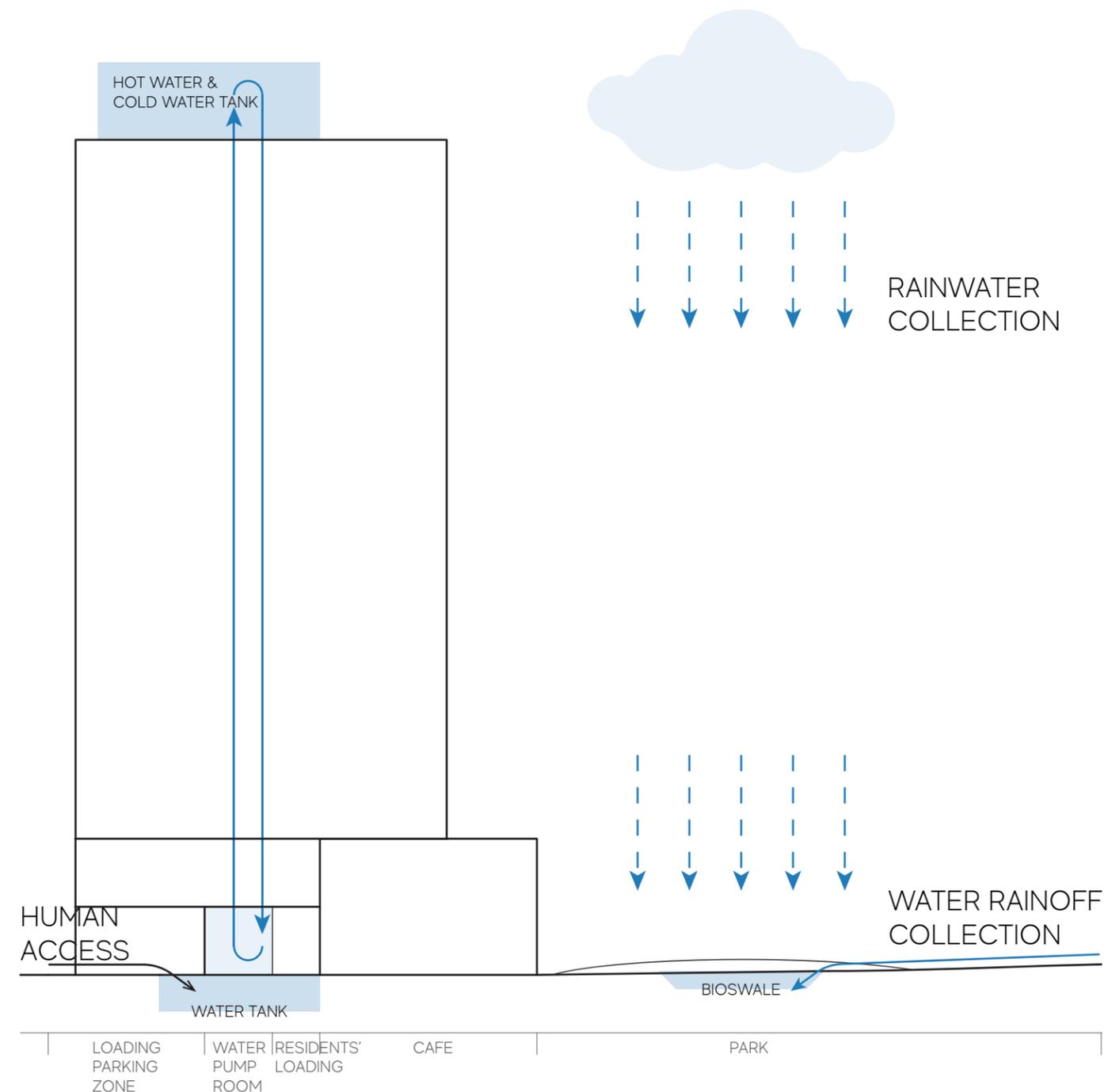


GREEN ROOF

GREEN WALL



WATER SYSTEM

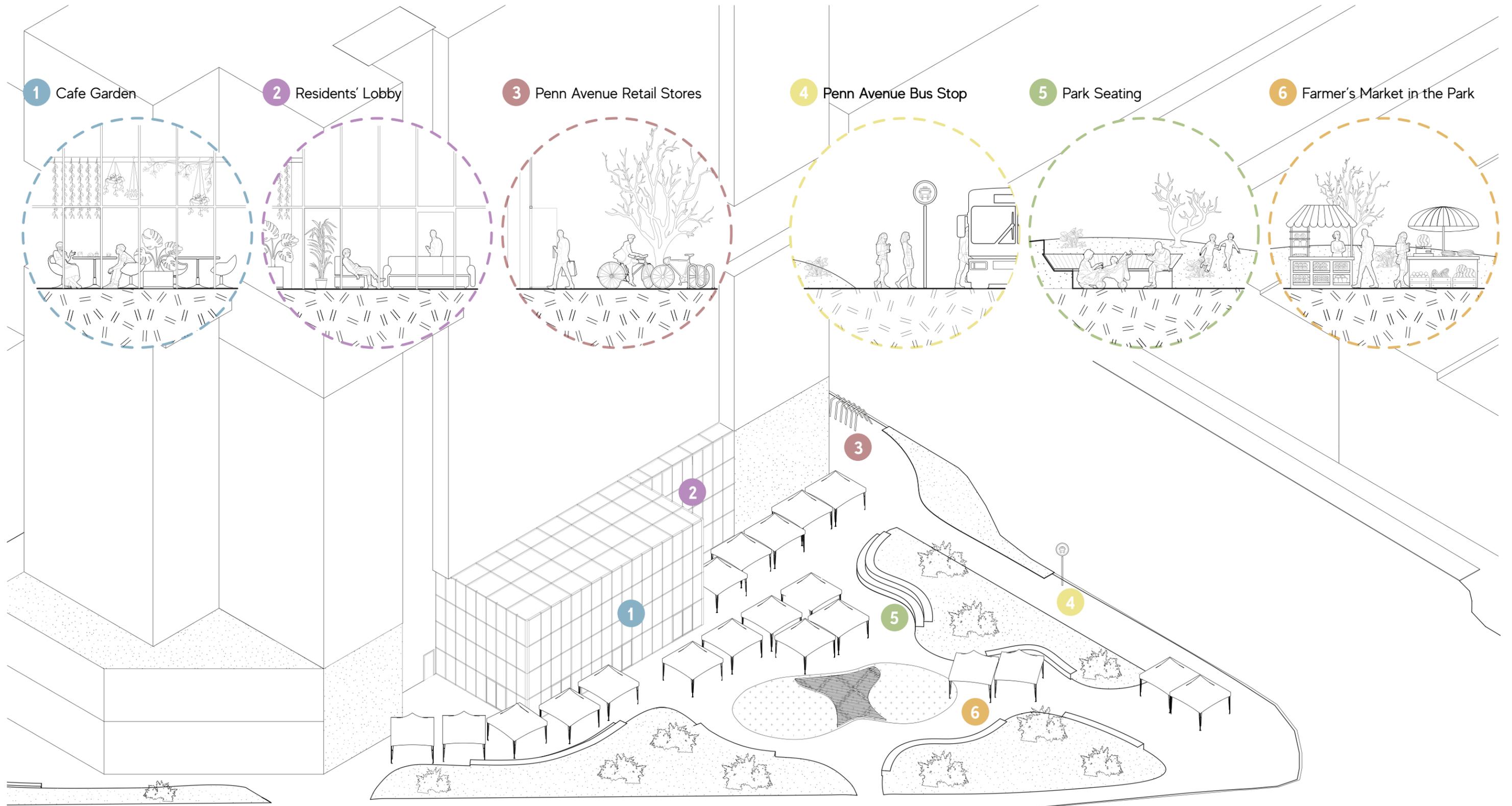


GROUND FLOOR CIRCULATION

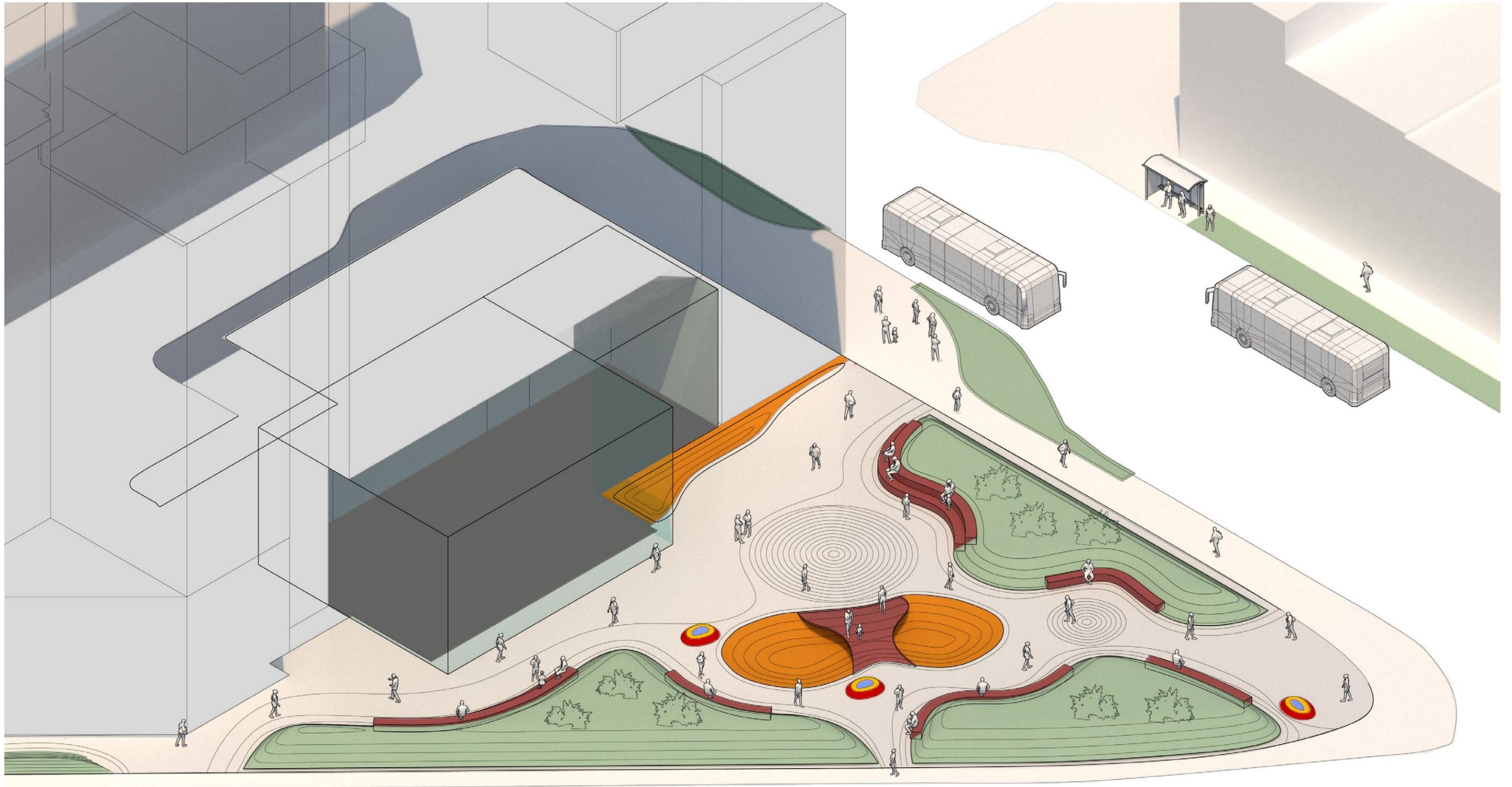
SECOND FLOOR CIRCULATION



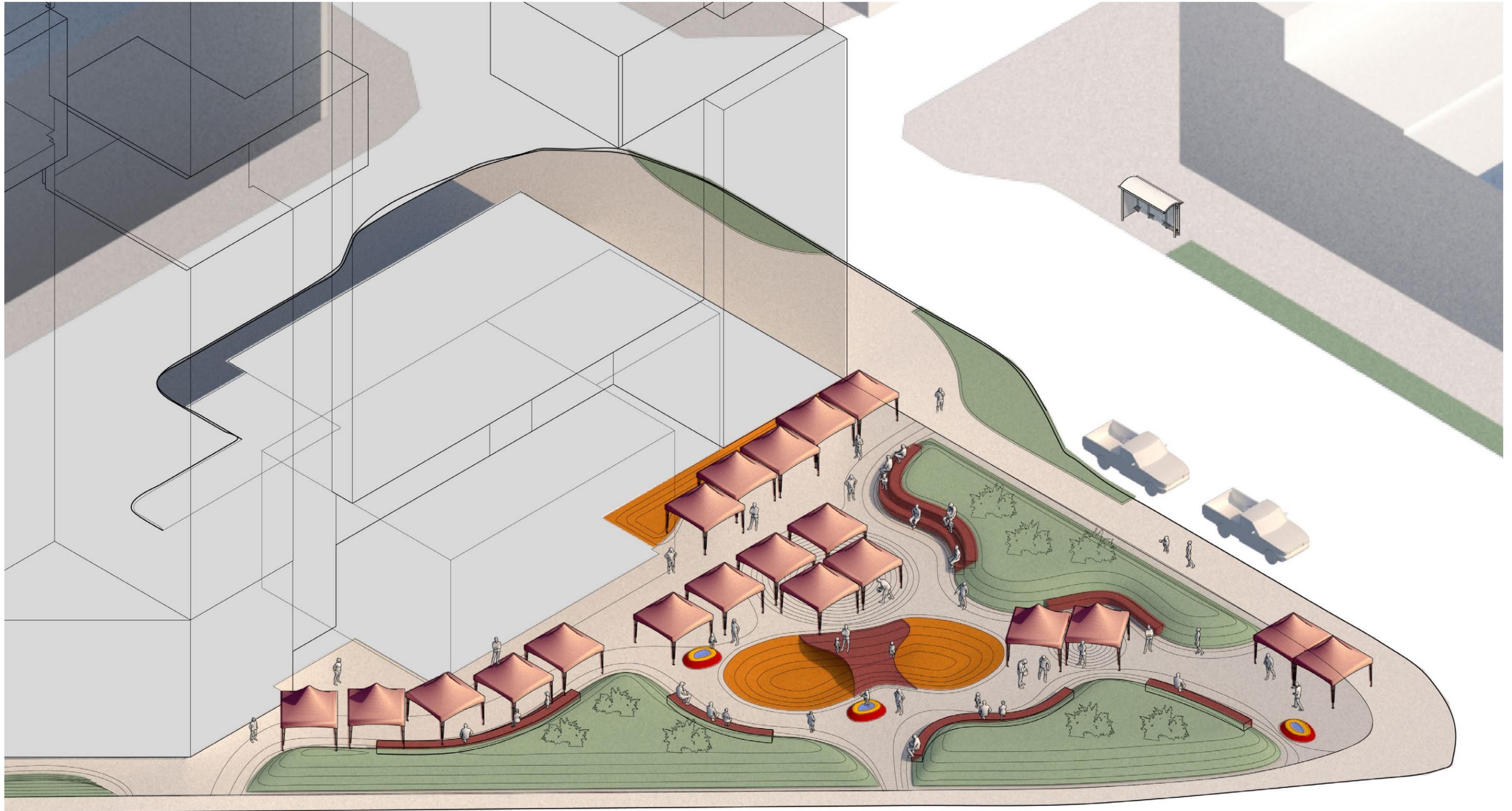
ACTIVITY DIAGRAM



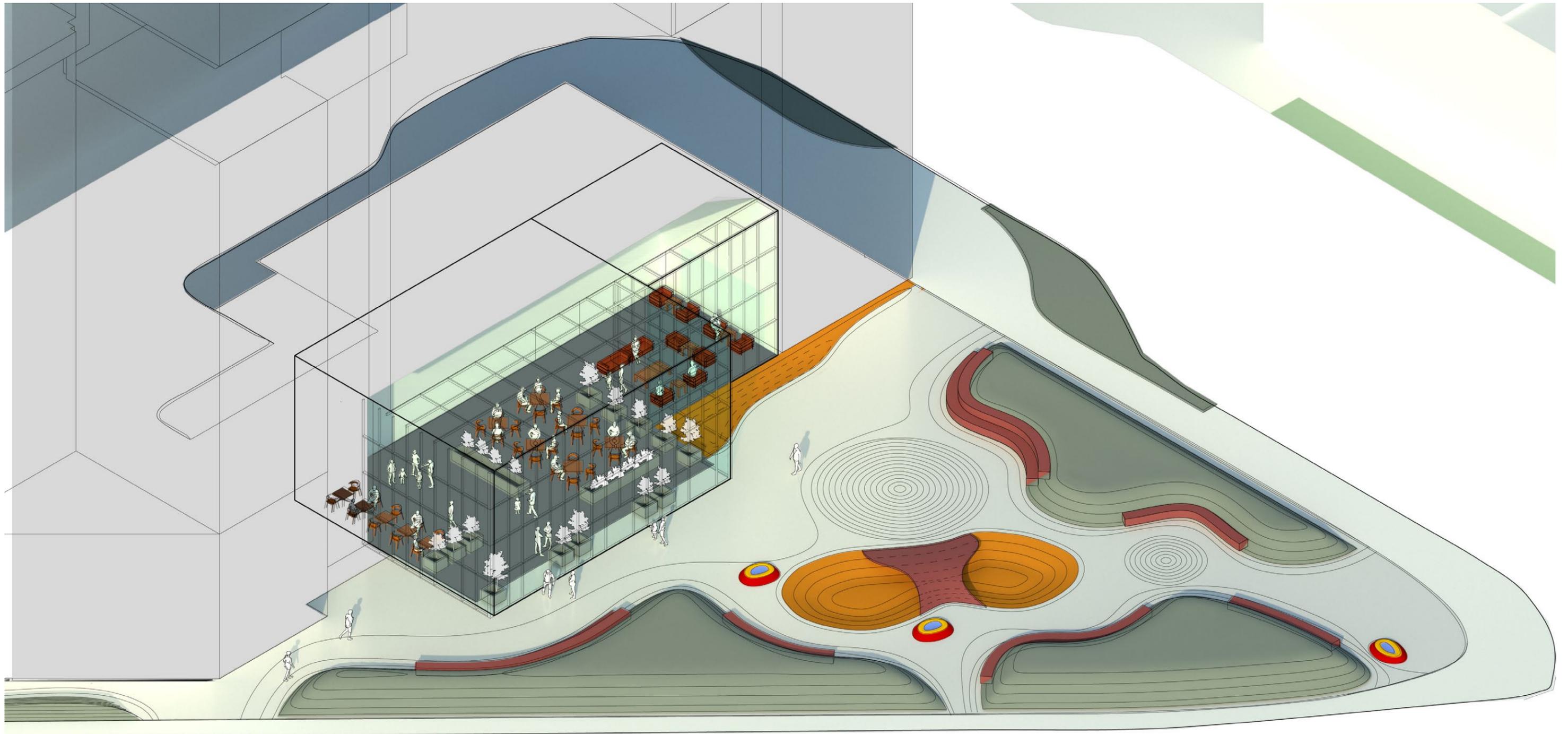
WEEKDAY ACTIVITY DIAGRAM



WEEKEND ACITIVITY DIAGRAM WITH FARMERS MARKET



WINTER ACTIVITY DIAGRAM WITH INTERIOR CAFE

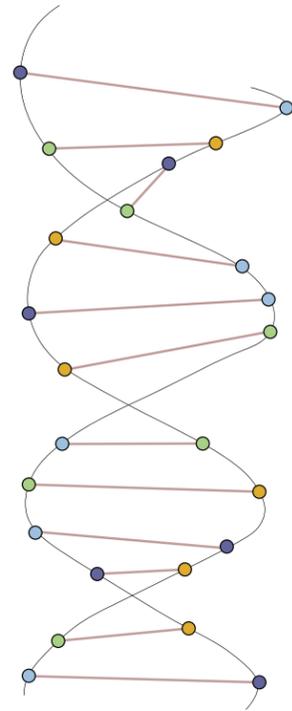
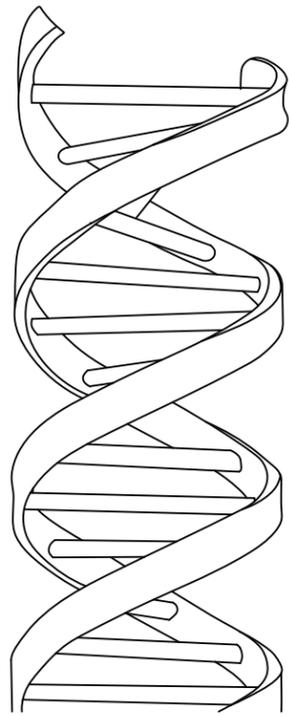


## RESIDENTIAL TOWER DESIGN

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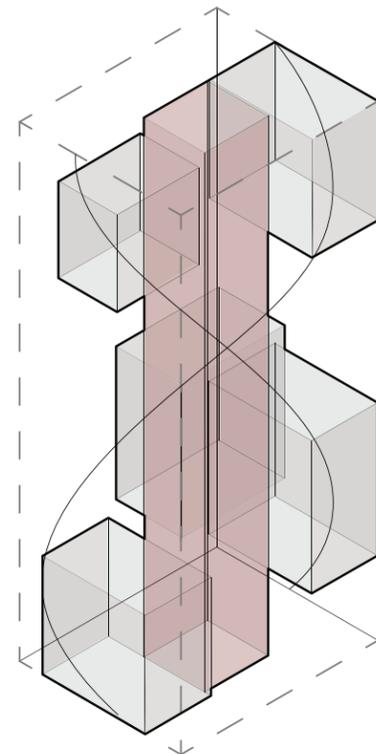
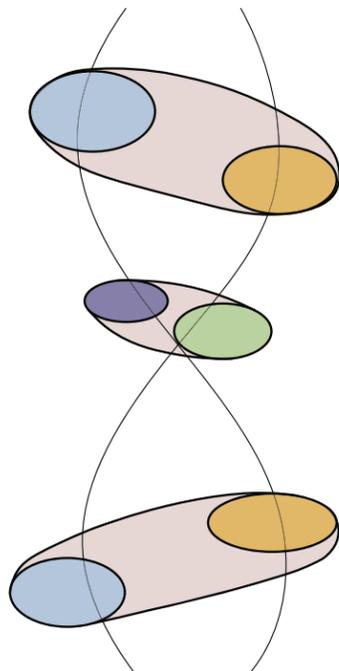
The design of the tower was motivated in part by an interest in strategies of 'vertical landscapes', as seen in precedent analyses, and partially by the firm's aspirations to explore possibilities surrounding multi-level residential and common spaces.

ABSTRACTION OF DNA HELIX

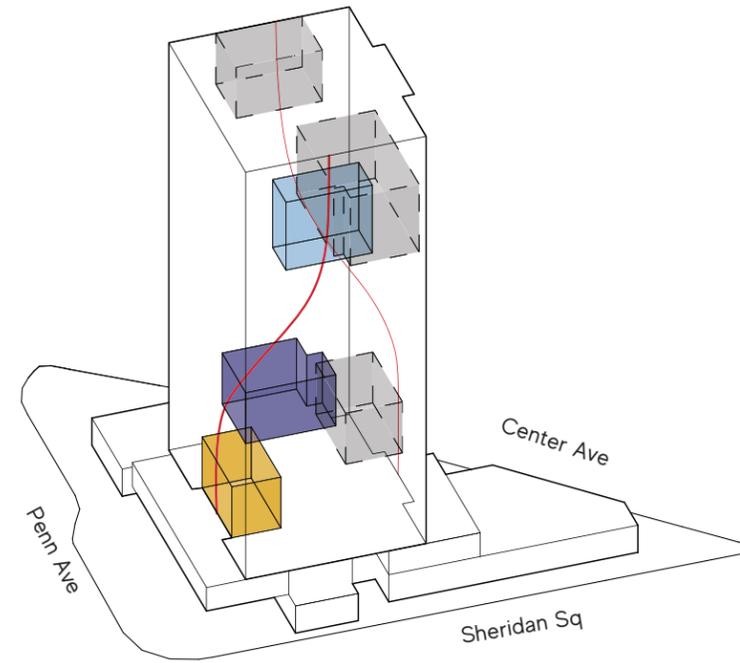


The organizational logic driving the architecture of the vertical community space is derived from the organization of genes along strands of DNA. As shown in this series of diagrams, the structure of DNA is abstracted to an idea of connected pairs of entities.

Spatially, this translates into a strategy of designing two "strands" of vertically and horizontally offset spaces, which are connected in pairs through a central space.

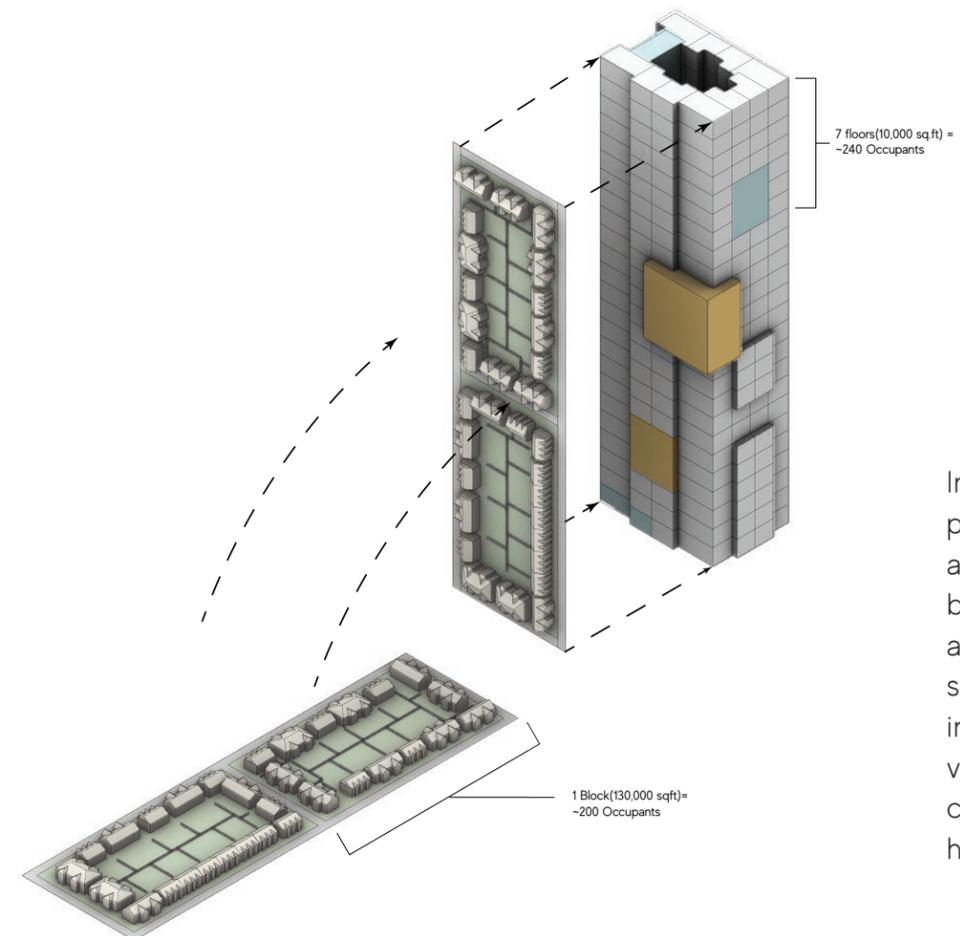


HELICAL ORGANIZATION OF COMMUNITY SPACES



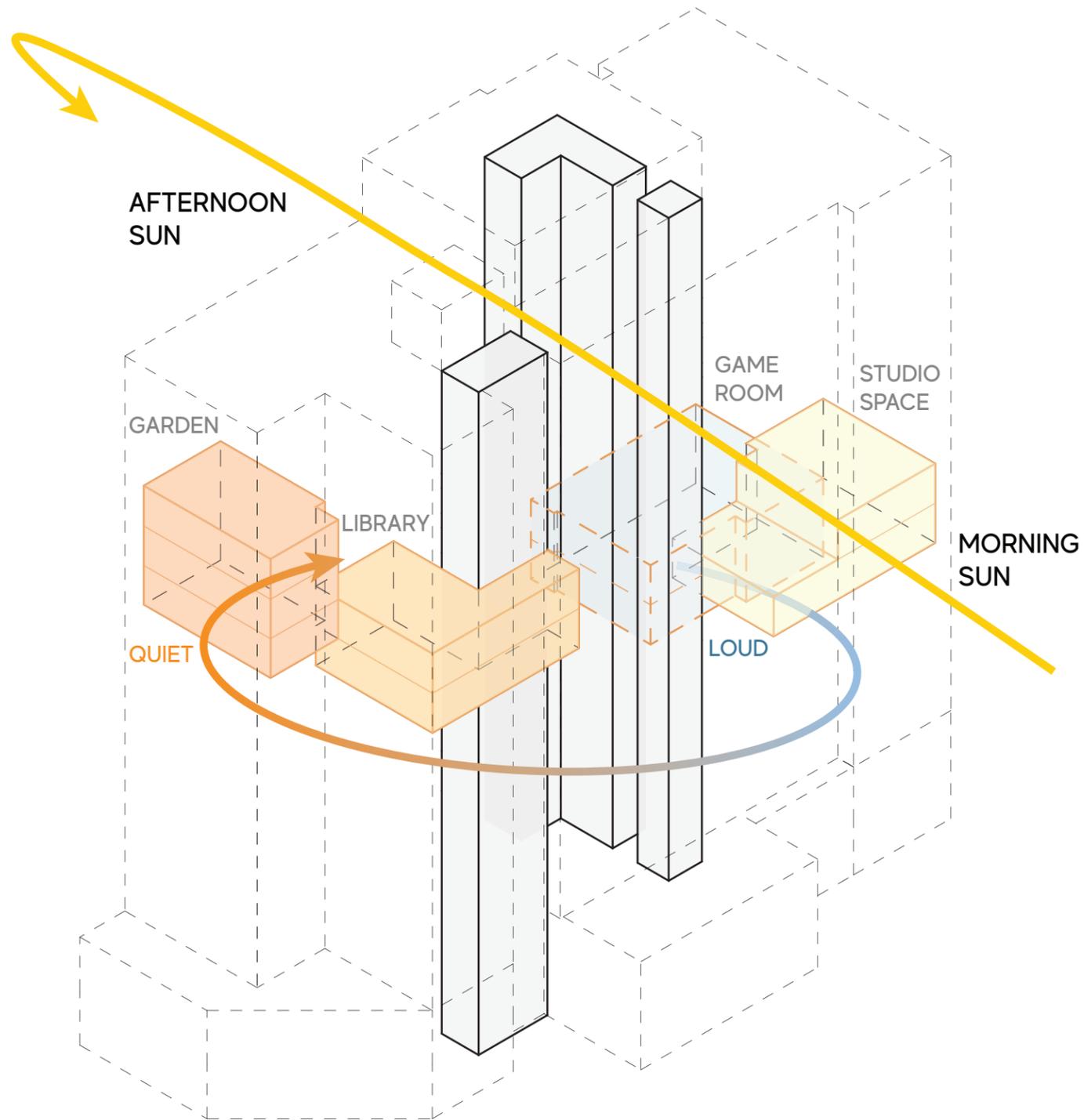
In an effort to contain the overall mass of the residential tower, the helix was constrained to the southeast and northwest corners. This helped in devising a more regular organizational logic, while facilitating an easily legible manifestation of the diagrammatic helix.

The concept presented here proposes the placement of three multi-level programmed community spaces each, along the southeast and northwest corners of the building.

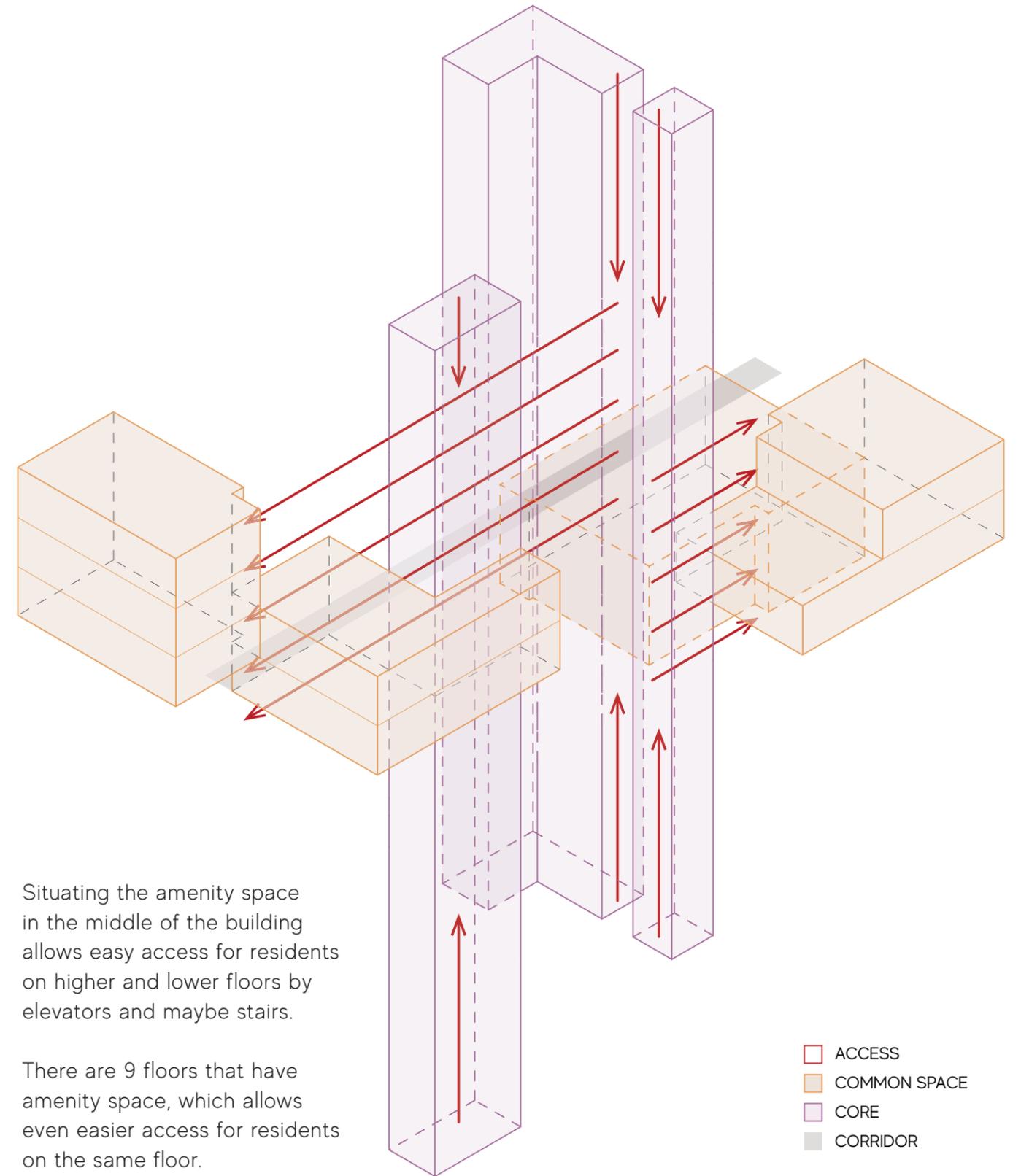


In response to the client's priorities, the creation of a "vertical neighborhood" became a primary focus. This also proved to be a useful strategy to reduce sprawl and increase density by opting for a vertically extending community corridor over a more traditional horizontal layout.

AMENITY SPACE PROGRAM



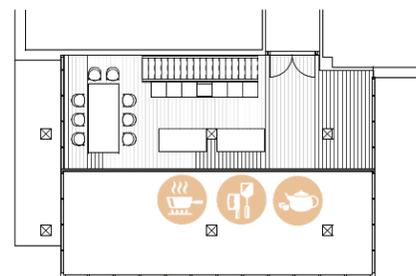
AMENITY SPACE ACCESS



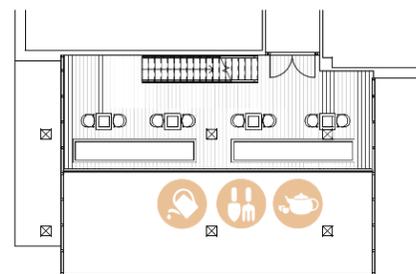
Situating the amenity space in the middle of the building allows easy access for residents on higher and lower floors by elevators and maybe stairs.

There are 9 floors that have amenity space, which allows even easier access for residents on the same floor.

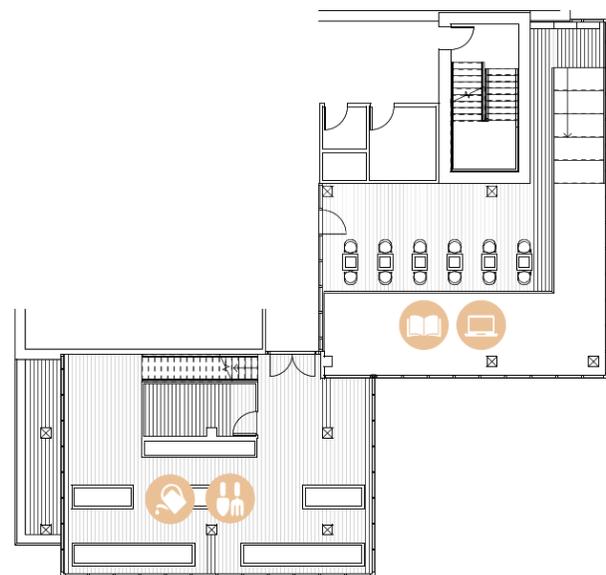
AMENITY SPACE PROGRAMS



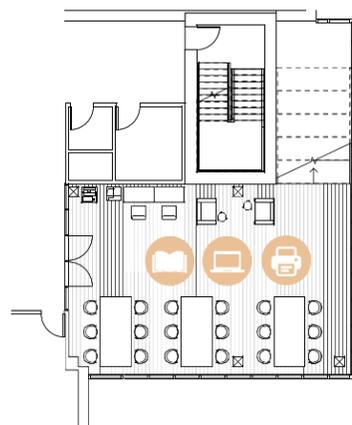
FLOOR 13  
SKY GARDEN



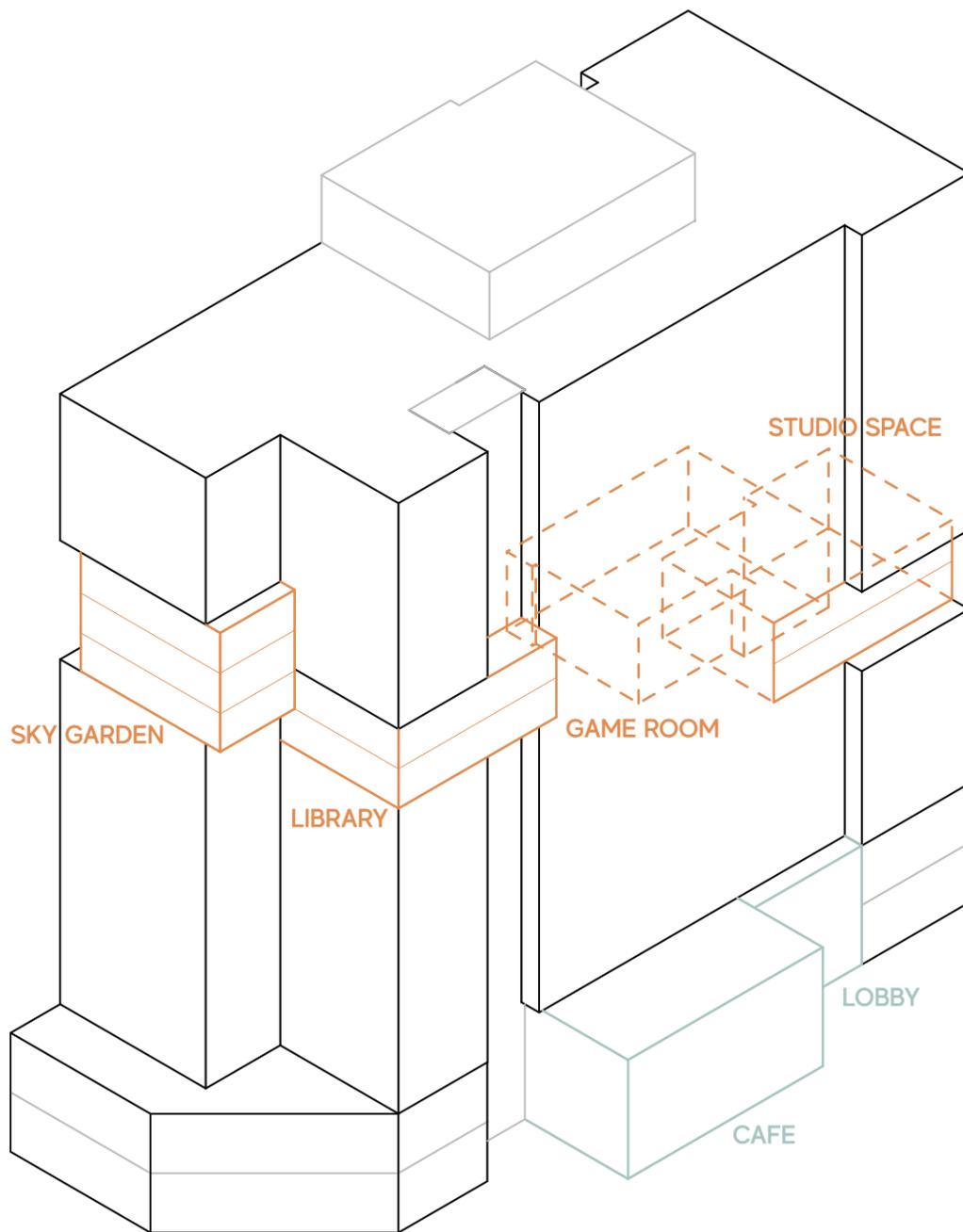
FLOOR 12  
SKY GARDEN



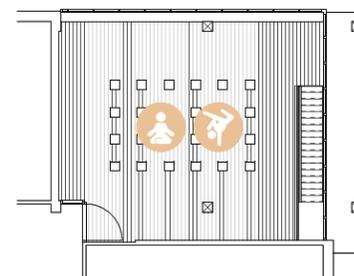
FLOOR 11  
LIBRARY  
SKY GARDEN



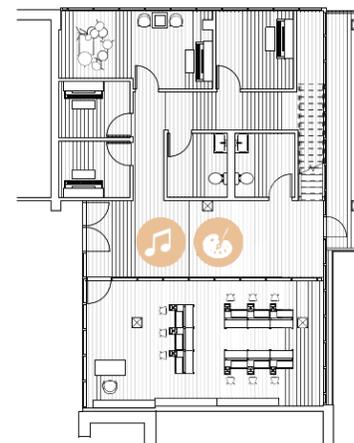
FLOOR 10  
LIBRARY



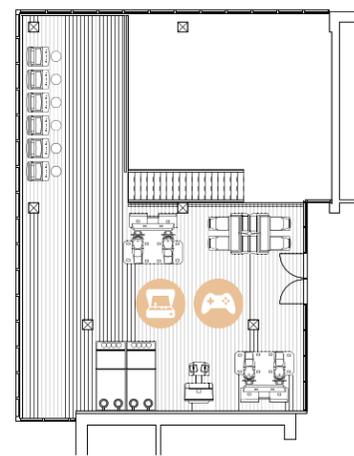
FLOOR 8  
STUDIO SPACE



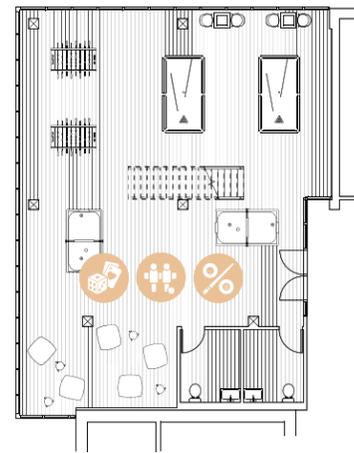
FLOOR 7  
STUDIO SPACE



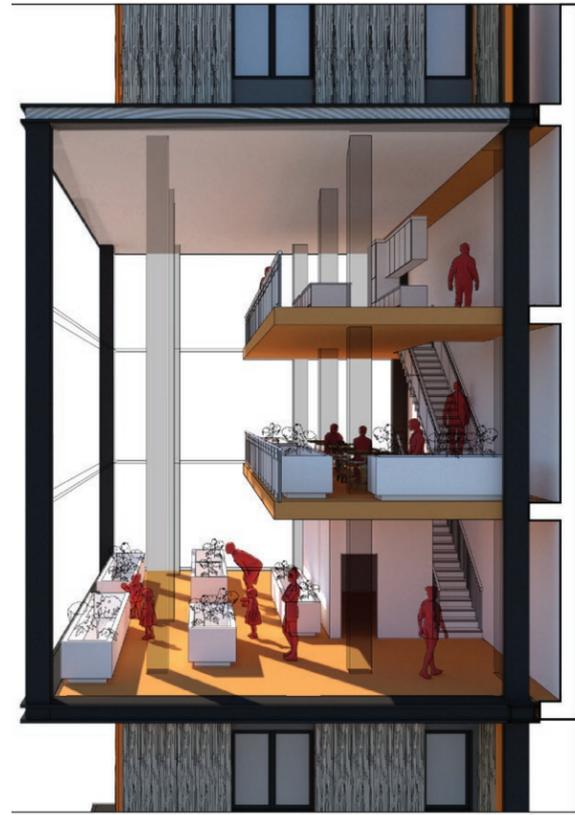
FLOOR 6  
GAME ROOM



FLOOR 5  
GAME ROOM



SKY GARDEN LIGHTING ANALYSIS



SUMMER 4PM  
SKY GARDEN

SUMMER 4PM LIGHTING ANALYSIS

13TH FLOOR  
COMMUNITY KITCHEN

12TH FLOOR  
DINING HALL

11TH FLOOR  
GARDEN

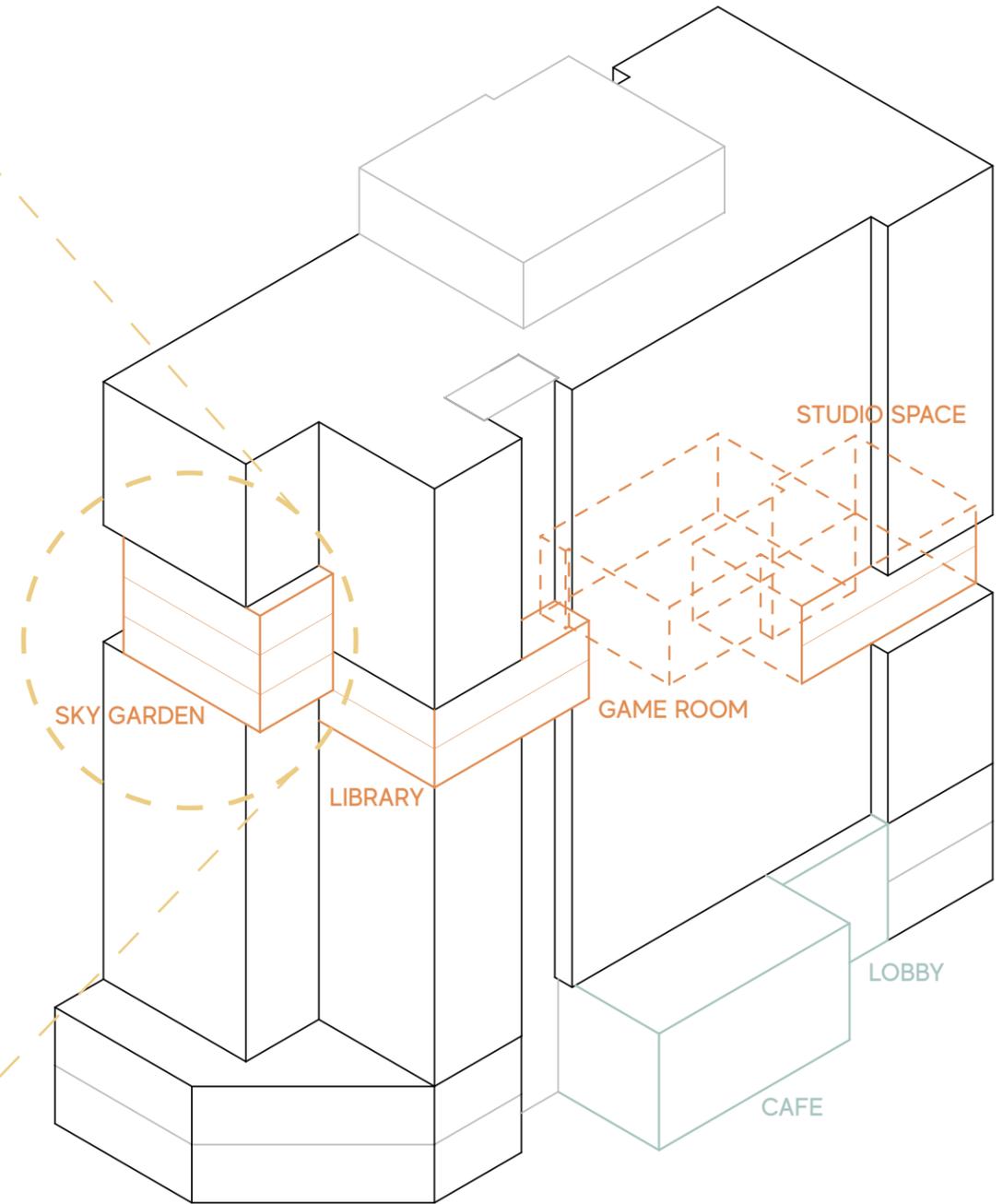


WINTER 1PM  
SKY GARDEN

13TH FLOOR  
COMMUNITY KITCHEN

12TH FLOOR  
DINING HALL

11TH FLOOR  
GARDEN



SKY GARDEN

LIBRARY

GAME ROOM

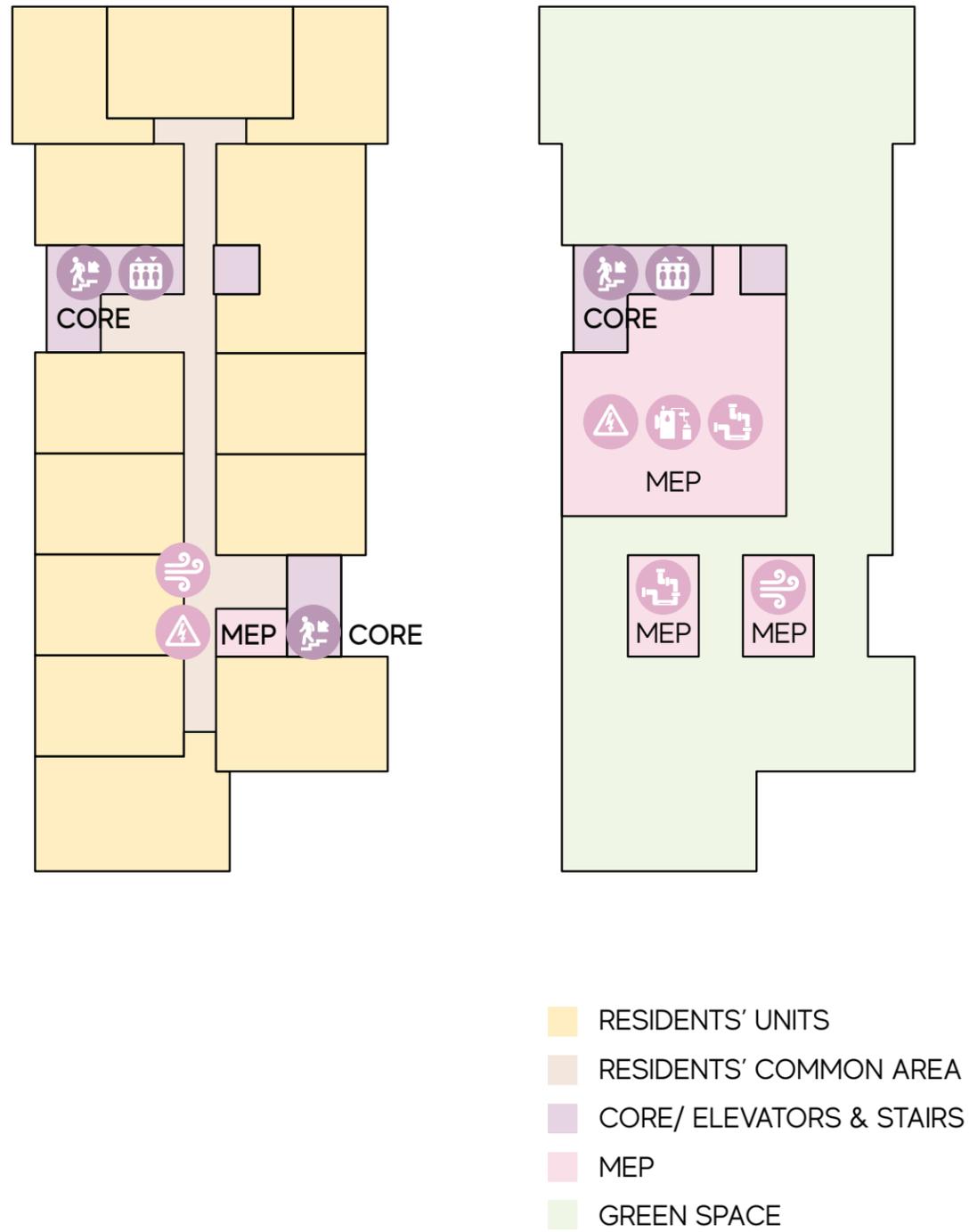
STUDIO SPACE

LOBBY

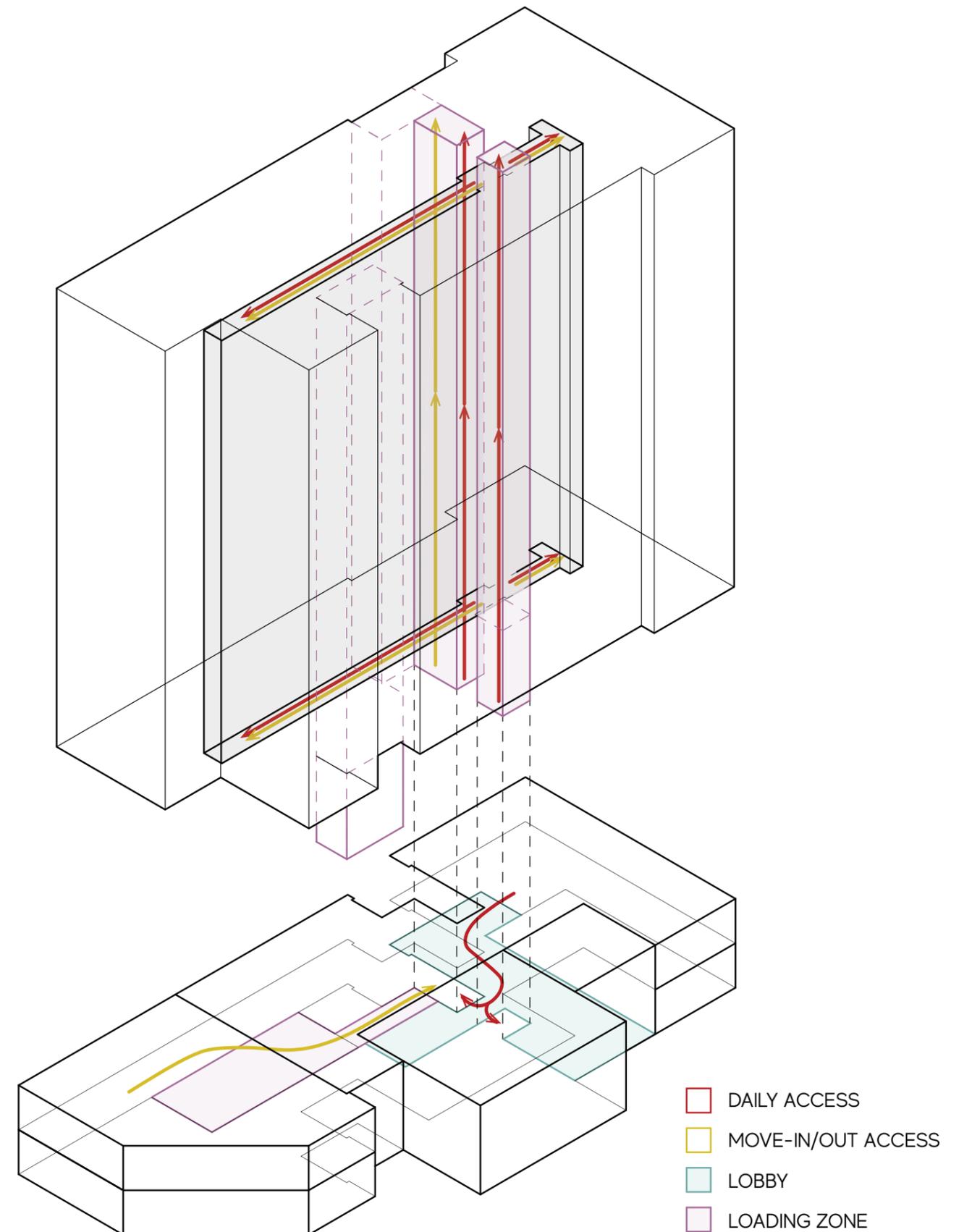
CAFE

WINTER 1PM LIGHTING ANALYSIS

THIRD FLOOR AND ROOF PROGRAMS



UNIT ACCESS

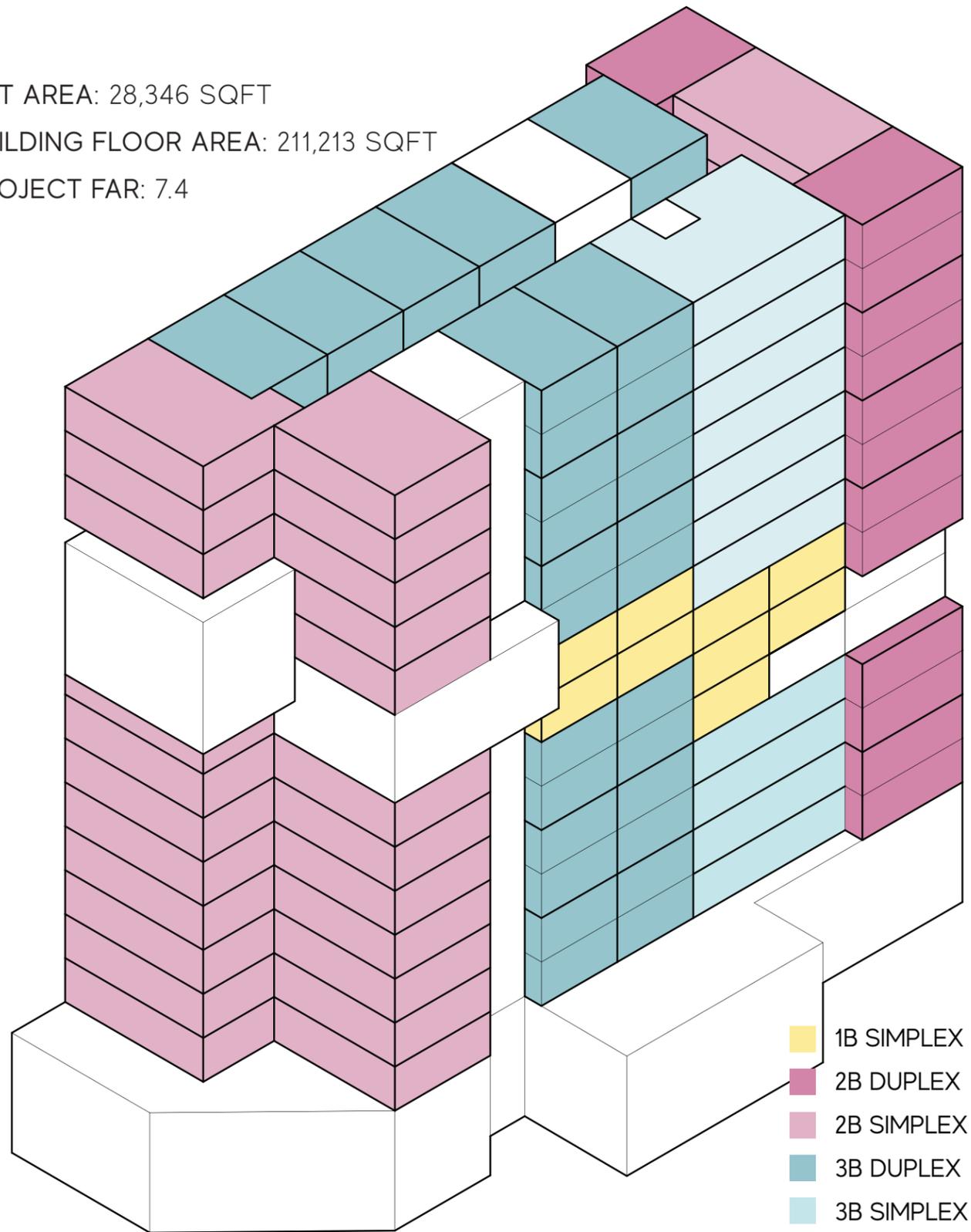


UNIT TYPES

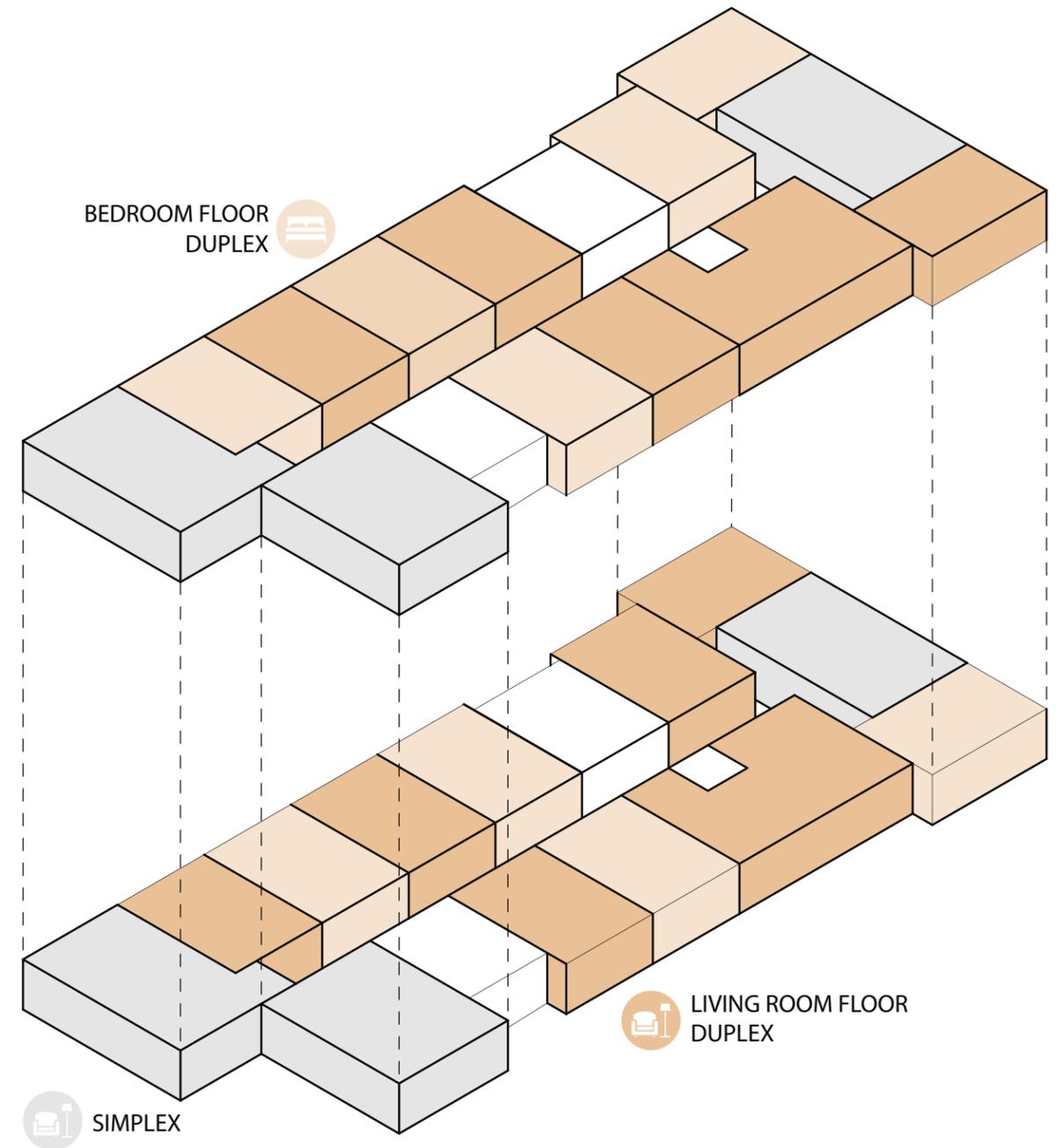
LOT AREA: 28,346 SQFT

BUILDING FLOOR AREA: 211,213 SQFT

PROJECT FAR: 7.4



ORGANIZATION OF PRIMARY ACCESS FLOOR

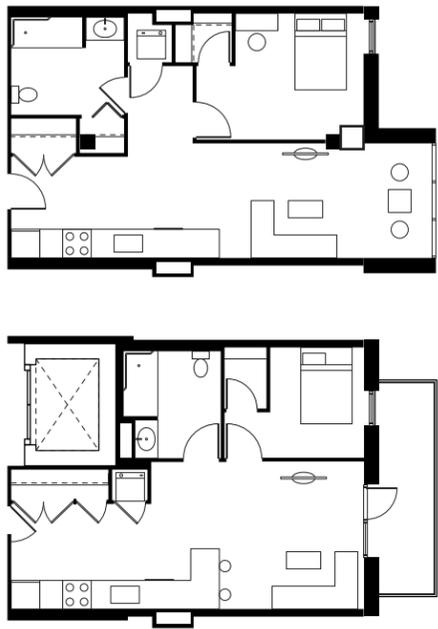


There are 116 units in total, which there are 8 unit layouts in total- 2 unit types of 1B, 4 unit types of 2B, 2 unit types of 3B.

	# of units	% of total
<b>1B</b>	<b>9</b>	<b>8%</b>
<b>2B</b>	<b>49</b>	<b>42%</b>
: simplex	10	
: duplex	39	
<b>3B</b>	<b>58</b>	<b>50%</b>
: simplex	11	
: duplex	47	
<b>Total # of units</b>	<b>116</b>	<b>100%</b>

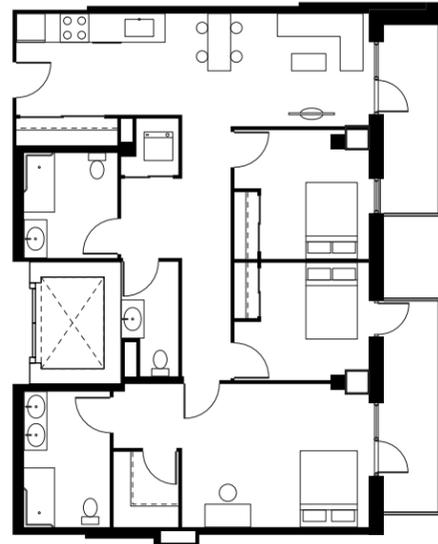
1B SIMPLEX

FLOOR AREA: 708 sqft



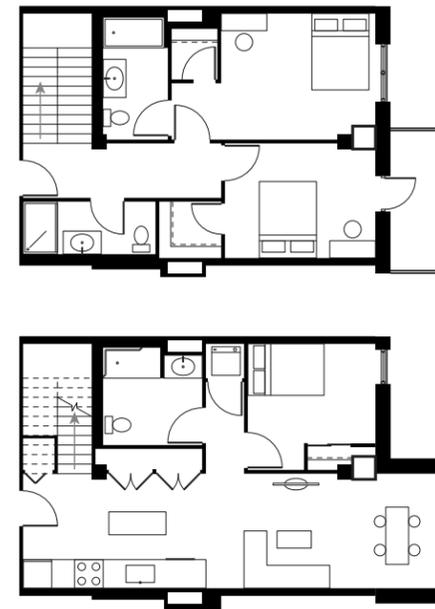
3B SIMPLEX

FLOOR AREA: 1260 sqft

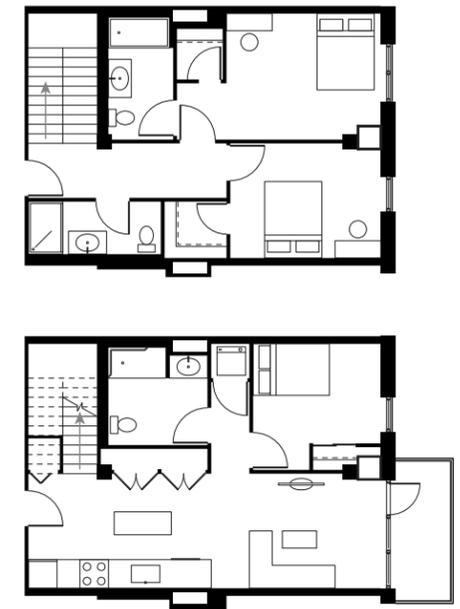


3B DUPLEX

FLOOR AREA: 1366 sqft

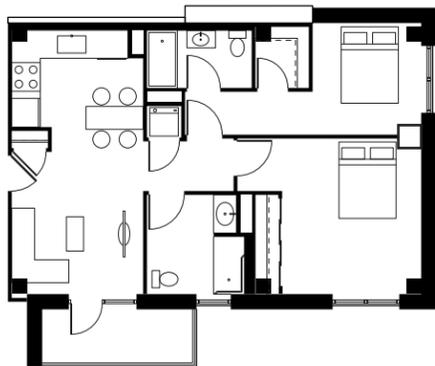


FLOOR AREA: 1316 sqft

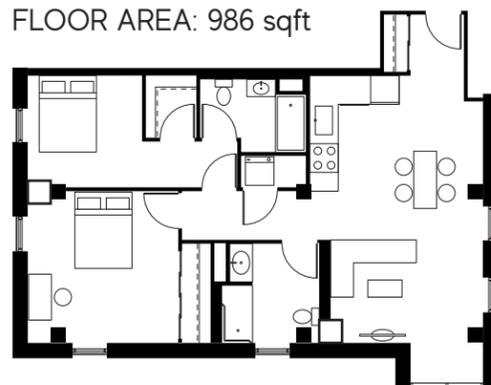


2B SIMPLEX

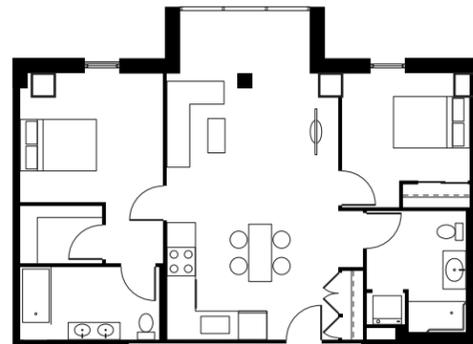
FLOOR AREA: 832 sqft



FLOOR AREA: 986 sqft

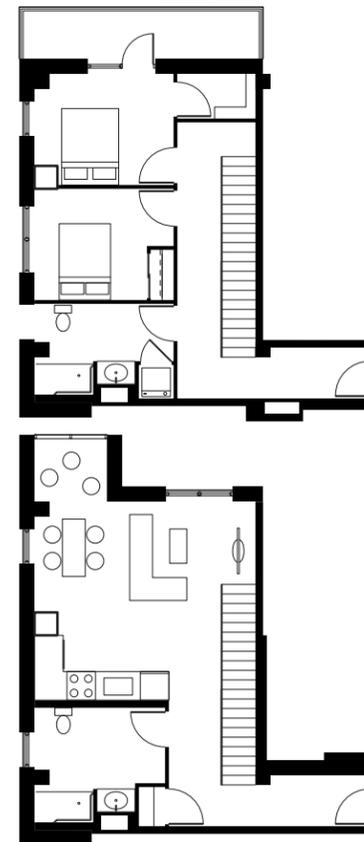


FLOOR AREA: 966 sqft

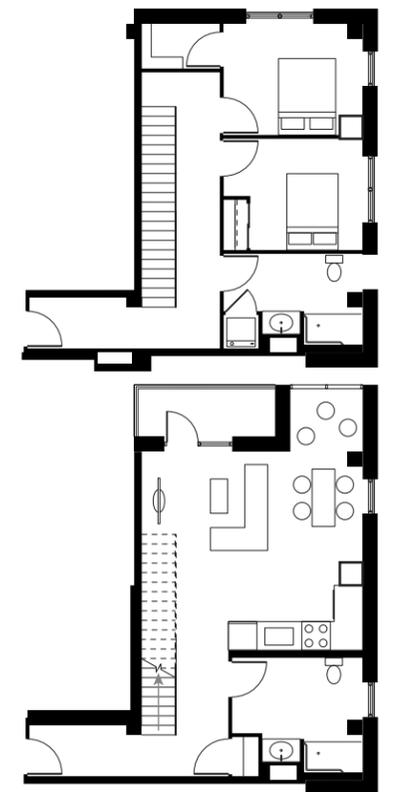


2B DUPLEX

FLOOR AREA: 1216 sqft

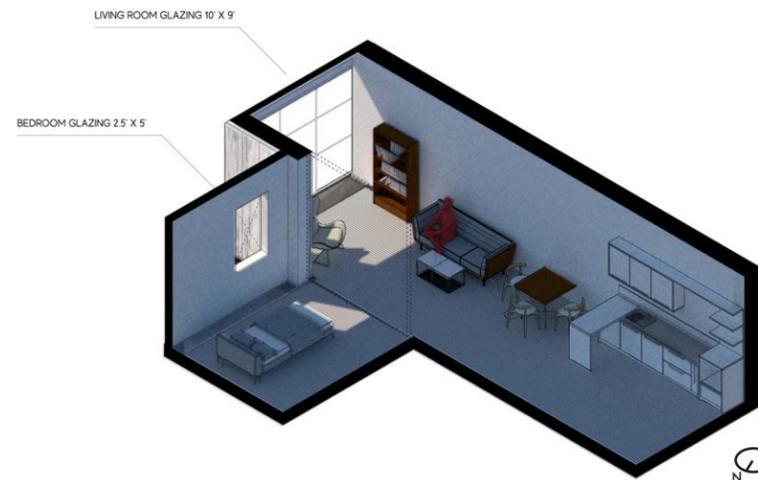


FLOOR AREA: 1216 sqft

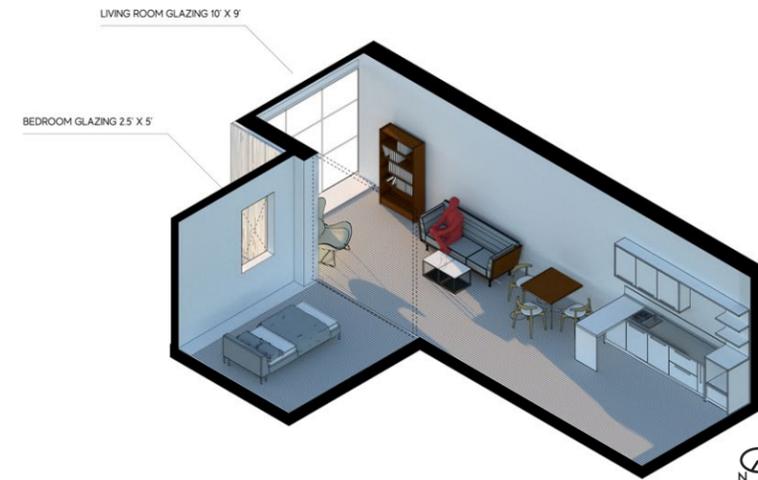


SUMMER 9AM LIGHTING ANALYSIS

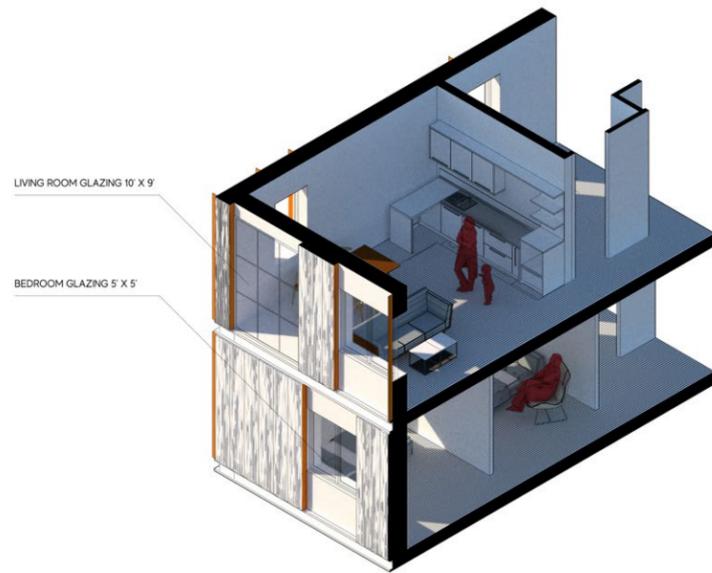
WINTER 9AM LIGHTING ANALYSIS



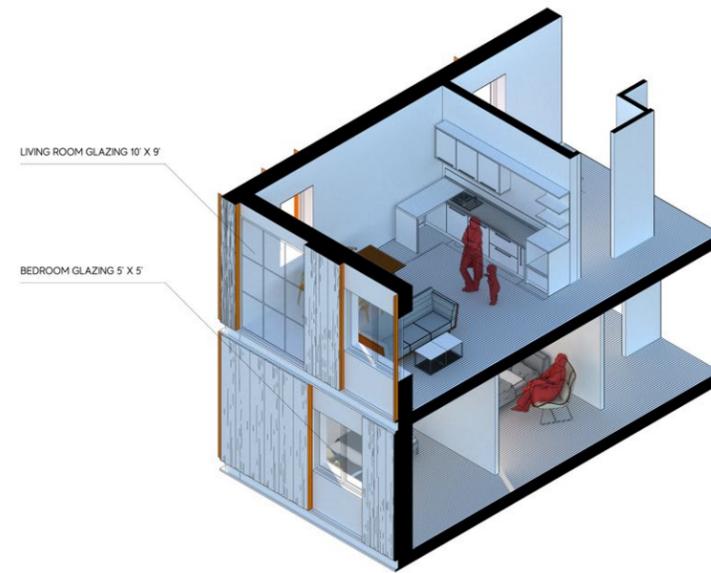
1B SIMPLEX



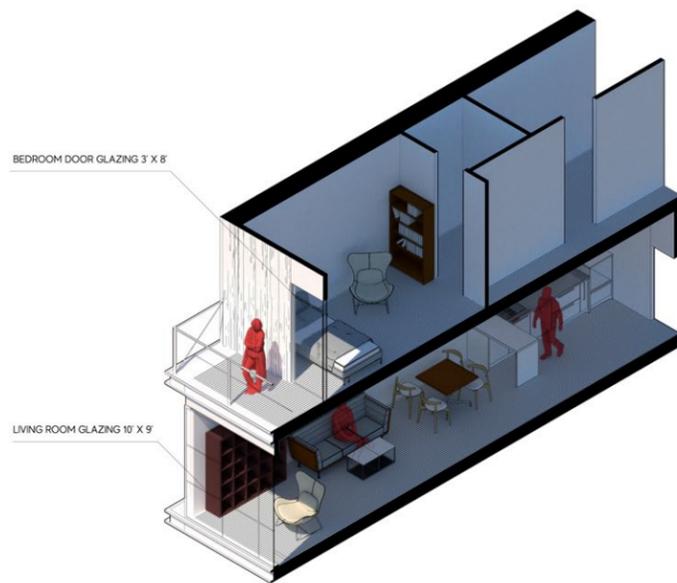
1B SIMPLEX



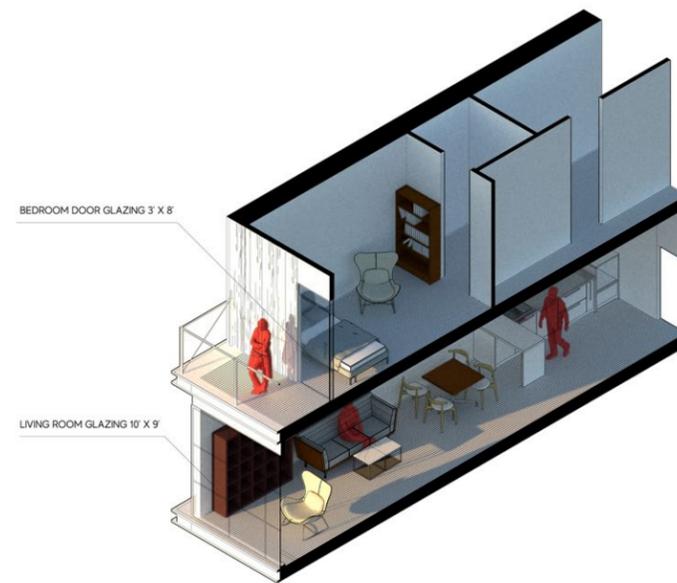
2B DUPLEX



2B DUPLEX

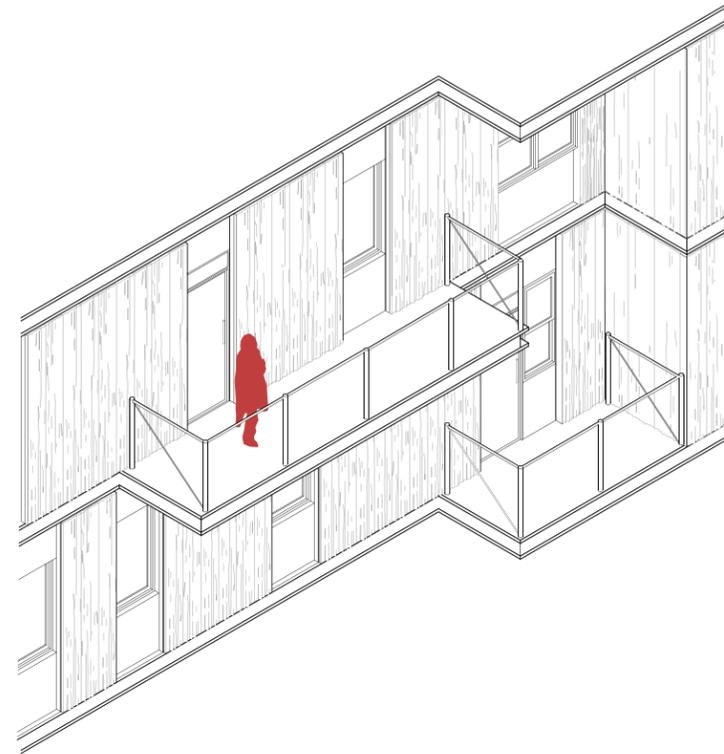
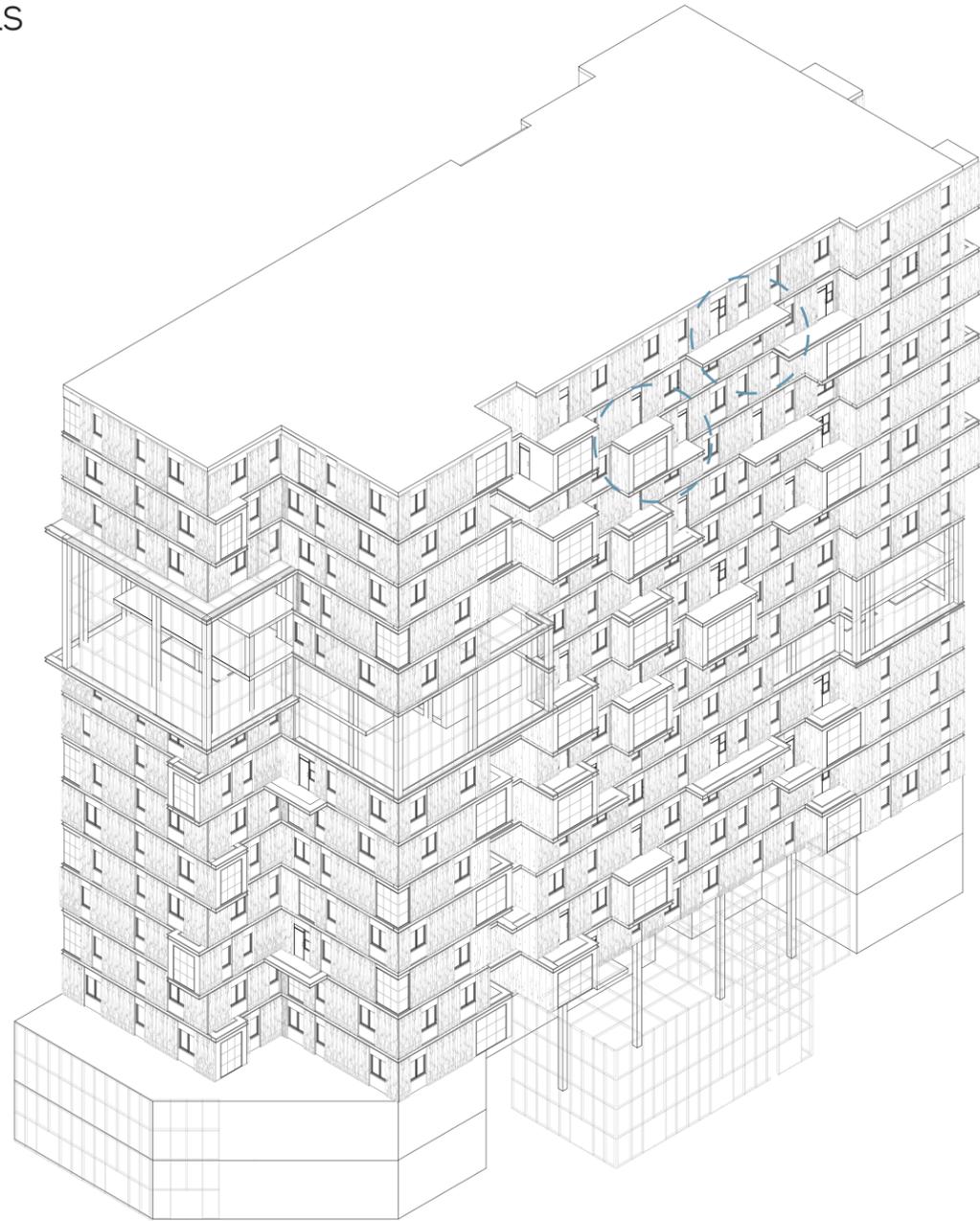


3B DUPLEX



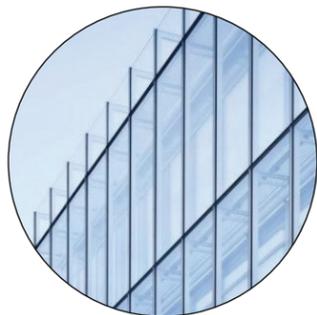
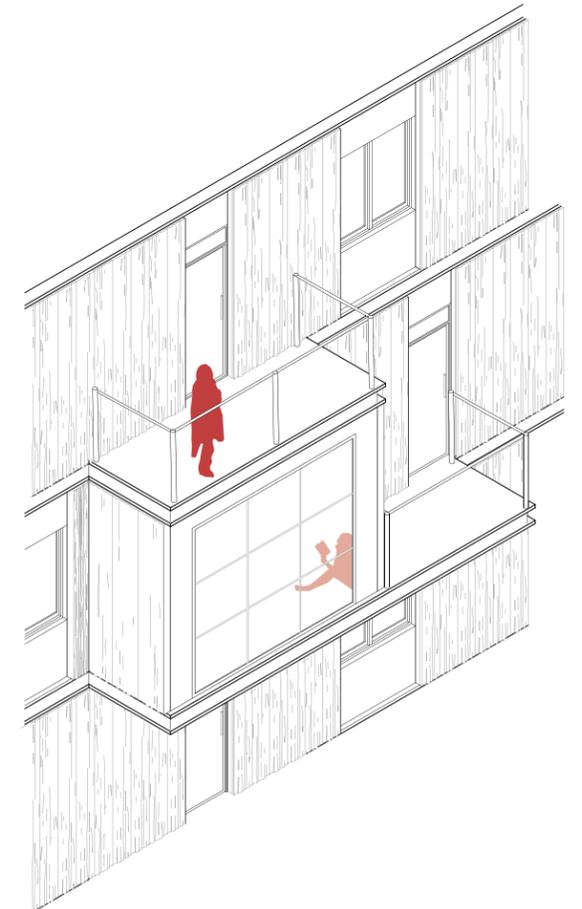
3B DUPLEX

FACADE DETAILS



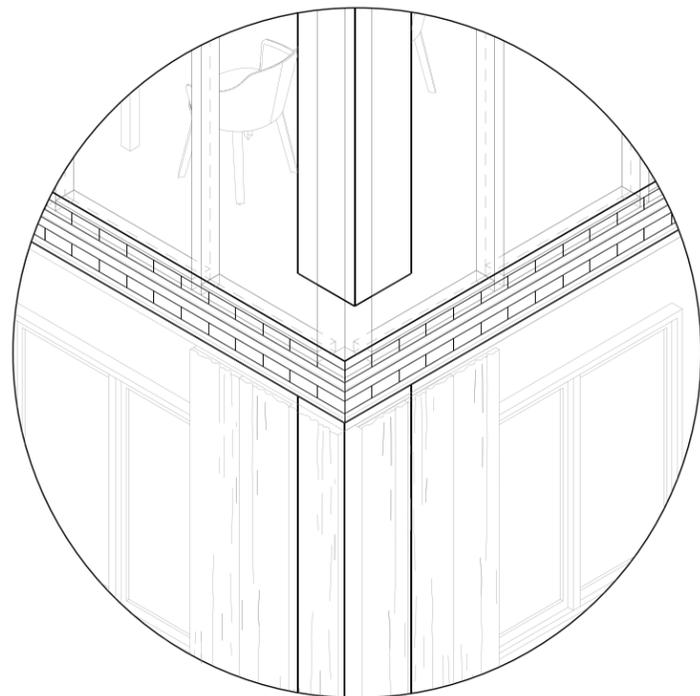
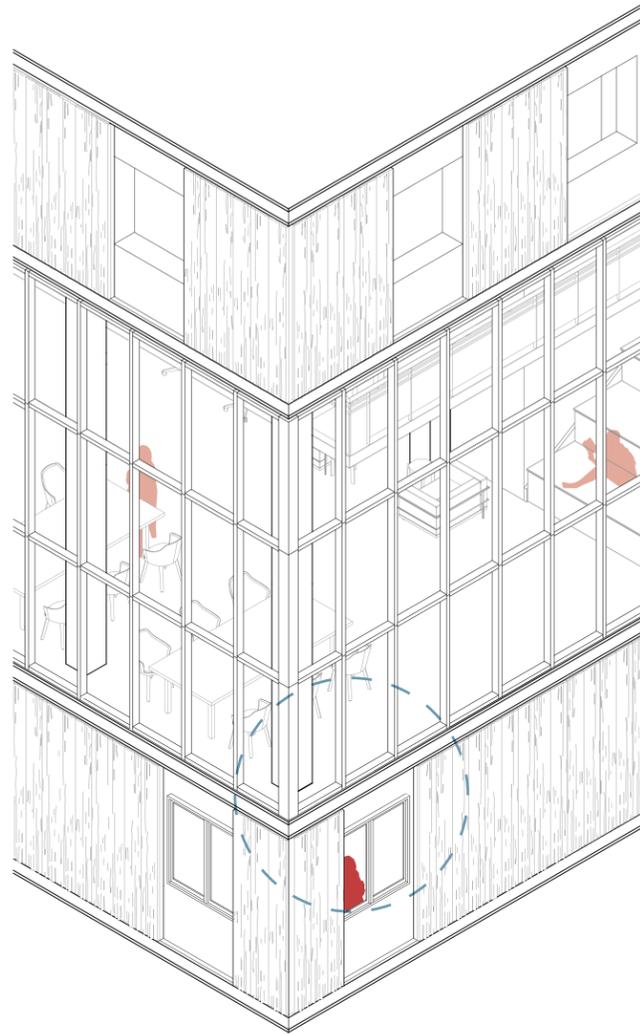
Several types of occupiable outdoor spaces pixelate the facade. There are mainly two types: enclosed (below) and open (left). The open “balcony” type is constructed by extending the CLT floor and finishing it with wood decking. The glass railing all around ensure safety without compromising visual qualities.

The enclosed type is essentially an extension of the living room of select units. It also entails extending the CLT floor, followed by opaque paneling on two sides and glazing on the third. Moreover, it offers an opportunity for an “open” type balcony on top of the enclosed box.



STRUCTURE

Cross-Laminated Timber (CLT) was chosen as the primary material for the structural system not only due to its insulating and fire-retardant qualities but also because it offered a sustainable alternative to more conventional materials.



This system is primarily composed of layers of solid-sawn lumber glued together, with each successive layer oriented perpendicular to the first. This project uses 16" thick square column and 12" thick floor plates, as shown on the left.

