architecture

portfolio 2026

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2025-2026 Columbia GSAPP

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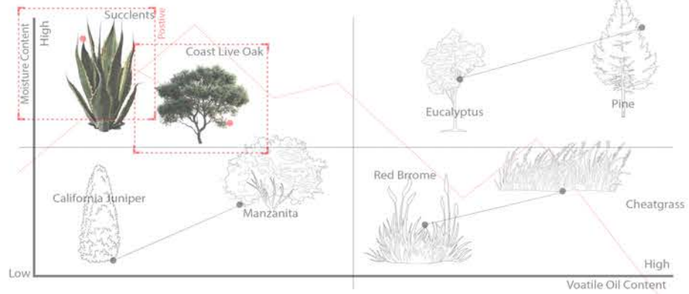
'BASE' GROUND
columbia GSAPP

NEW INFRASTRUCTURE : HYDRO FIREBREAK COMMONS

Summer 2025
_2025.05 ~ 2025.08
_Academic_Columbia GSAPP, Team Work with Andrew Yang, [illegible]eng Syun Sung_Concept, Design, Visual Work
_Professor David Eugin Moon(d.moon@nhdm.net)
_Infrastructure + Bath House + Community, Los Angeles, CA

Adaptive Infrastructure Across Time

This project is not simply proposing a facility for disaster response, but explores the possibility of a space transforming across different stages of disaster and time. Under normal conditions, the space functions as an open public environment shared by residents and wildlife, integrating community activity with the surrounding ecology. During wildfires, the stored water becomes a resource for firefighting and cooling systems, while the structure transforms into a space for refuge and temporary safety. Rather than operating as an isolated emergency facility, the project imagines everyday public infrastructure itself becoming part of an active disaster response system. After the disaster, the space can further adapt into a temporary shelter and communal environment for displaced residents. Through its semi-outdoor structures and modular systems, the project proposes a new type of public infrastructure that continuously transforms before, during, and after the wildfire.



Plant-based Fire Risk

Comparison of Structural Characteristics: Native vs. Invasive Vegetation

Native Species

Native plants typically have small, narrow leaves that are gray-green or silvery in color. The leaf surfaces are often covered with fine hairs, which help reduce water loss by minimizing transpiration. These leaves reflect sunlight and lower internal leaf temperature, making them highly adapted to dry, sunny climates. They tend to be tough or rigid in texture, which further reduces moisture loss. Although they can burn, their low oil content makes them less flammable compared to invasive species.

Native plants usually develop a long central taproot that grows deep into the soil. From this main root, smaller lateral roots branch out, like twigs. This structure allows the plant to access deep underground water and stabilize the soil effectively. The roots grow slowly and anchor the plant firmly, helping to prevent erosion even in arid environments.

Invasive plants often have broad, large leaves that are glossy, soft, or thick. These leaves support rapid growth and fast photosynthesis, but they also consume more water. As they dry out, their dense leaf tissue becomes highly flammable. Some species contain oils in their leaves, which can further increase fire risk.

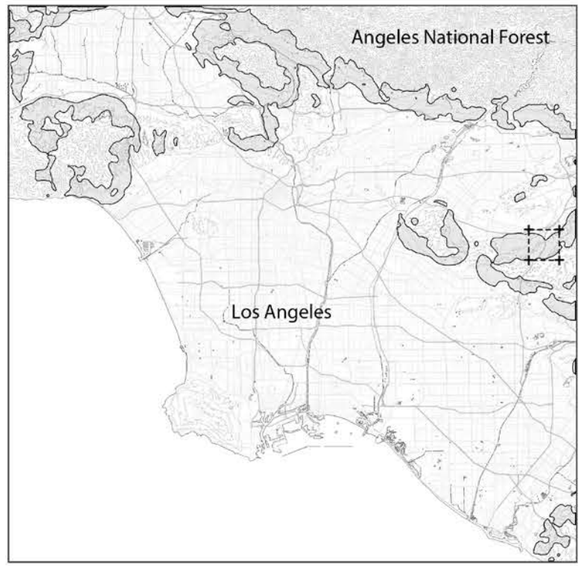
Invasive plants typically develop a wide, shallow fibrous root system with many fine root hairs. These roots spread quickly across the upper soil layers, allowing the plant to dominate surface water and nutrients. Some invasive species also grow underground stems, or rhizomes, which enable them to spread aggressively and regenerate even after being cut.

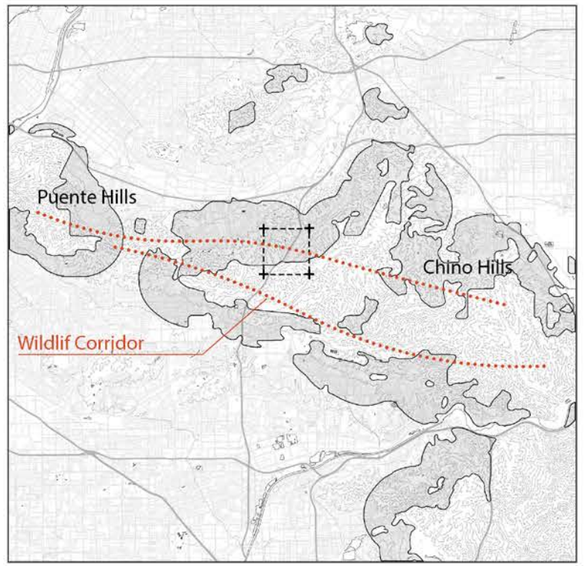
Flora, Fauna, and Fire Resilience

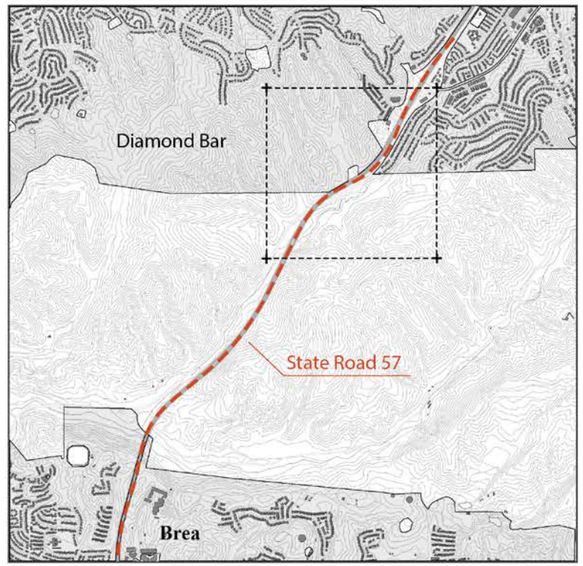
We investigated native vegetation, invasive species, and the habitats of various wildlife distributed throughout LA's wildland areas. Rather than simply categorizing ecological species, we also analyzed the fire resistance of different vegetation types and their capacity for recovery after wildfires. Through this process, we aimed to identify which plants are more vulnerable to fire, as well as which species could help slow the spread of wildfires or play an important role in ecological restoration afterward.

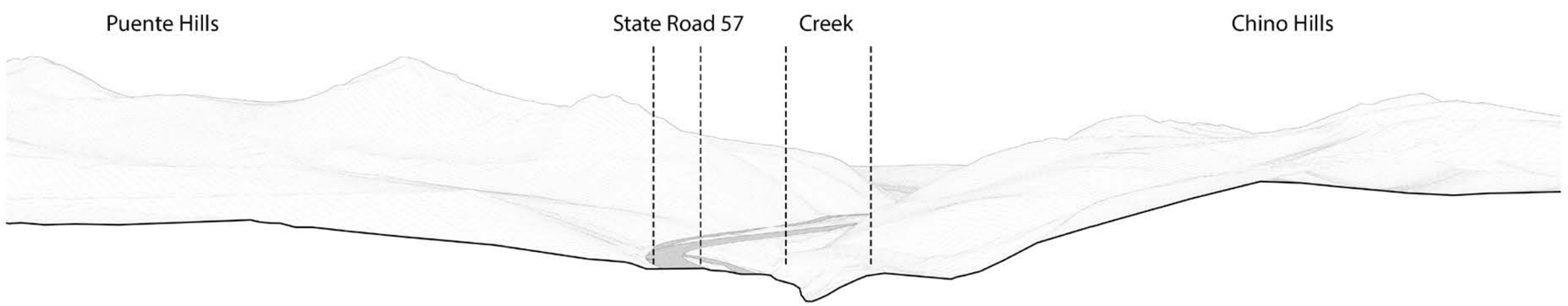
This analysis was not limited to vegetation alone, but also involved understanding wildlife movement patterns and habitat conditions. Although LA is recognized as a region with high biodiversity, large-scale roads and urban development have continuously fragmented ecological corridors and reduced natural habitats. By mapping these relationships, we examined how different species coexist within increasingly constrained environmental conditions.

Ultimately, this data became a foundation for understanding the ecological context of LA in a more comprehensive way and served as an important basis for the later landscape design process. Rather than simply introducing greenery, we explored planting strategies using fire-resistant native vegetation to strengthen wildfire resilience, while also proposing new forms of ecological infrastructure that consider wildlife movement and habitat connectivity.









State Road 57

WUI+ Water Backup Source

In selecting our site, we prioritized maximizing the impact of the existing active fire suppression infrastructure. This led us to analyze auxiliary water sources to identify water-scarce regions.

Our final decision was to designate Puente Hills and Chino Hills as our design and operational areas. These two hills are unique urban wildlands, nestled between developed cities.

State Route 57

Ultimately, we selected the State Route 57 corridor in the northeastern part of the city.

Situated in Brea Canyon between the Puente Hills and Chino Hills, this site is itself a mega-road firebreak, an 8-to-11-lane highway measuring 36-40 meters in width. It is a vital transportation nexus for the cities of Diamond Bar and Brea.

Urban+ Nature Context

State Route 57, a critical hub, bisects the landscape. It creates a pronounced urban development gap, isolating Diamond Bar's western commercial and administrative core from its eastern low-density residential areas, fragmenting both communities.

Likewise, the highway severs the crucial Puente and Chino Hills wildlife corridor; annual roadkill evidence this urban wildland's division.

Floor Plan

a. Hydro Firebreak
b. Route 57
c. Pedestrian Bridge
d. Big Swimming Pool
e. Small Swimming Pool
f. Community Space
g. Water Treatment System
h. Storage
i. Toilet
j. Public Stairspace
k. Little Garden
l. Playground
m. Park
n. Bath House
o. Elementary School
p. Residential Area
q. Educational Centers
r. Eco-Bridge
s. Small Creek

1 : 1000 0 5 10 20 30m

Plan A

c. Pedestrian Bridge
d. Big Swimming Pool
f. Community Space
g. Water Treatment System
i. Toilet
j. Public Stairspace
k. Little Garden
m. Park

Plan B

a. Firbreak
b. Route 57
c. Pedestrian Bridge
g. Water Treatment System
i. Toilet
m. Park
n. Bath House

Hydro Firebreak as Public Infrastructure

Our design begins by rethinking the massive State Route 57 not simply as transportation infrastructure, but as a new type of "Hydro Firebreak" that reconnects the fragmented relationship between the city and nature. At the center of the main diagram is a new linear Hydro Firebreak positioned along the leftover space beside the existing elevated roadway. Above it, a continuous public green belt creates a new linear public space for residents while also establishing a new interface between the urban environment and the surrounding landscape.

The structure is composed of modular systems designed to collect and store rainwater. Smaller storage spaces are integrated above, while larger water storage capacities are embedded within the raft foundation below. Under normal conditions, the stored water is used to irrigate and sustain the vegetation above. During wildfire events, however, the structure actively sprays water outward, functioning as a Hydro Firebreak for firefighting and cooling. Water outlets are also integrated into the roadside columns, allowing fire trucks to directly access and replenish water from this new public infrastructure.

Connecting Ecology, Community, and Adaptability

On both sides of the main axis, lightweight bridge structures connect a series of architectural spaces. Various water-related programs are placed on the flatter terrain, while scattered pavilion-like structures along the creek create semi-outdoor spaces and connected pathways. These areas function as public gathering and resting spaces in everyday conditions, but were also designed with the possibility of transforming into temporary dwelling units after disasters.

Closer to the wildland areas, eco-bridges are introduced to reconnect fragmented ecological corridors. Pathways for humans and wildlife are placed on different levels, allowing visual connection while minimizing direct interference.

Ultimately, the project proposes a linear infrastructure centered around a new type of Hydro Firebreak that connects public programs, ecological systems, and open spaces. Through this strategy, the design aims to reconnect the fragmented relationship between the city and nature while proposing new forms of rainwater collection, water storage, active wildfire response, and public space infrastructure.

SWEET NEGOTIATION

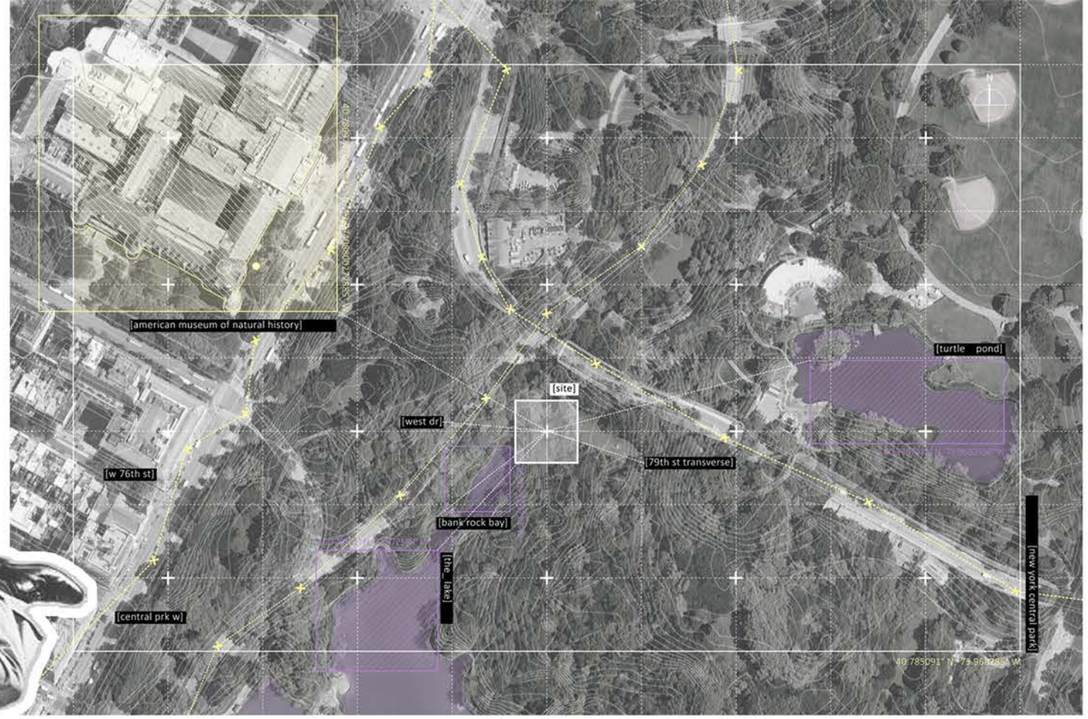
Fall 2025
_2025.09 ~ 2025.12
_Academic_Columbia GSAPP, Team Work with Fu Chang_Concept, Design, Visual Work
_Professor Michael Wang(mw3405@columbia.edu)
_Ecological Pavilion, New York, NY

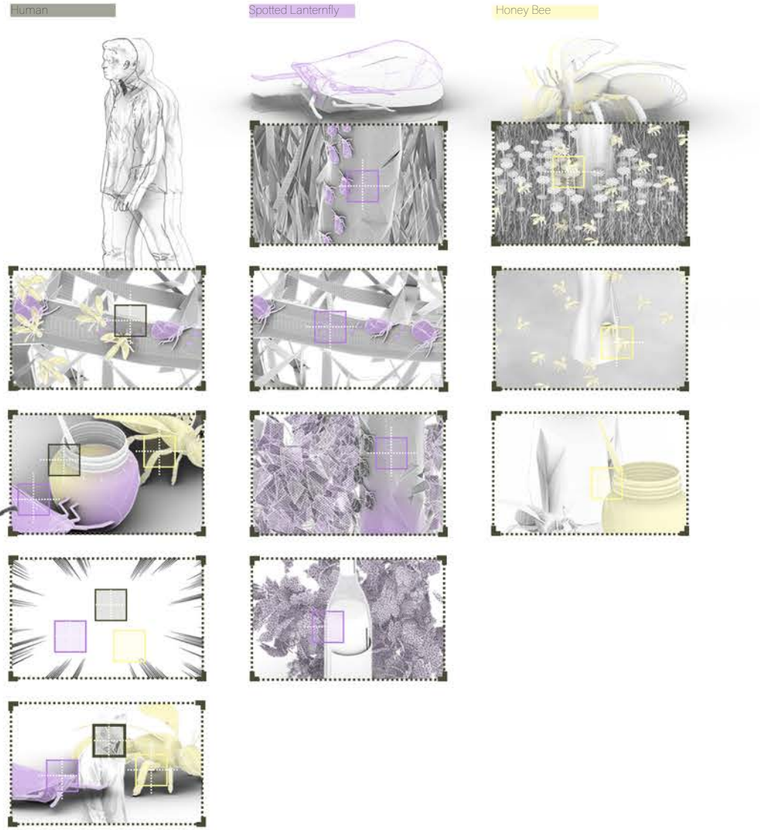
Sweet Negotiations

New Yorkers have been advised to kill the spotted Lanternfly, a so-called invasive species, on sight. "Sweet Negotiations" refuses military metaphors and instead accepts and accommodates the lanternfly as a permanent part of the urban environment. The project discovers emerging relationships between the lanternfly and another non-native species ,such as the honeybee to find new possibilities for ecological balance and, even, new forms of urban agriculture: specifically, the cultivation of lanternfly honey.

Playful Violence

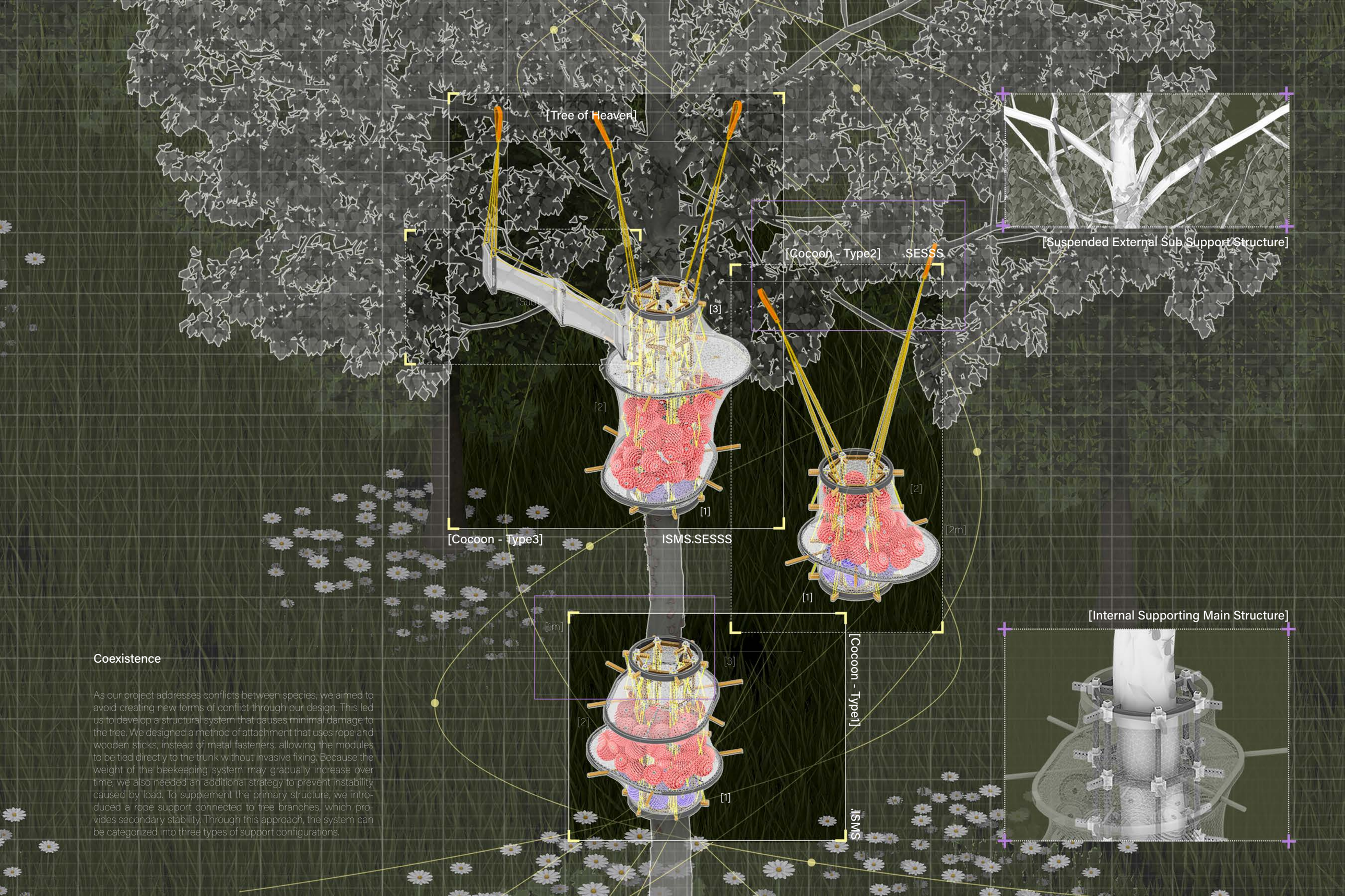
As seen in the collage, the project questions the human tendency to treat the spotted lanternfly as an unnecessary presence that can be eliminated without context. Often labeled as a "pest," the SLF is reduced to a biological problem—described as an invasive migrant that arrived through global shipping routes from China and adapted to a new environment. The image of the SLF crushed beneath human footsteps reframes interspecies conflict not as a natural ecological issue, but as the result of human-centered judgment and control. Rather than seeking to protect or justify the SLF, the project examines the structure of exclusion that shapes relationships between humans and nonhuman species.





Ecological Reprogramming

The site selection is not based on conventional planning logic, but on the environmental conditions that support the survival of the SLF. Proximity to water, dense forest cover, and adjacency to roads guide the site's designation, reversing a typical human-centered approach to space. In Pennsylvania, cases of honey production using by-products generated by the SLF suggest that interspecies conflict can become a productive resource rather than a problem to eliminate. Through this framework, the project proposes a spatial condition that converts conflict into opportunity and redefines coexistence through shared environments.



Coexistence

As our project addresses conflicts between species, we aimed to avoid creating new forms of conflict through our design. This led us to develop a structural system that causes minimal damage to the tree. We designed a method of attachment that uses rope and wooden sticks, instead of metal fasteners, allowing the modules to be tied directly to the trunk without invasive fixing. Because the weight of the beekeeping system may gradually increase over time, we also needed an additional strategy to prevent instability caused by load. To supplement the primary structure, we introduced a rope support connected to tree branches, which provides secondary stability. Through this approach, the system can be categorized into three types of support configurations.

Water Provider

The water-supply module is composed of a balanced structure that ensures the water surface always remains level. An opening is positioned at both the top and bottom, providing access points for bees to drink. A reliable water source is an essential element for the hive's survival

Beehive Mesh

The beehive mesh is sized between the scale of the Spotted Lanternfly and that of the bee. Its primary purpose is to prevent SLF from interfering with the bees while still allowing the bees to pass freely. The mesh also enables certain water-provider modules to be stored within the structure

SLF Mesh

The SLF mesh is sized larger than both species, allowing insects to move freely through it. However, the mesh openings are smaller than the modules, enabling the modules to be held securely in place within the structure

Mesh Operates

The mesh operates as a flexible interface, fastened to the main structure using plastic zip ties. It can be opened at any point, allowing modules to be inserted, removed, or replaced as needed. Since neither the top nor bottom is fixed, the direction of opening—top, bottom, or both—depends on the placement and size of the module being installed

Smooth Wooden Panel

The placement angle can be fairly flexible as long as it remains between 60 and 90 degrees. Beyond ensuring that the width and length are sufficient for SLF egg-laying, the material must be a smooth wooden board to create a secure and sheltered surface for the SLF to deposit its eggs

Bee Hive

The beehive box is connected to the main structure and secured in place using a rope system. The hexagonal primary frame allows each of its six edges to serve as potential attachment points for the beehive box, offering flexible positioning. Once the box is fixed to the structure, a mesh layer is wrapped around it to prevent other insects from interfering with the bees while maintaining ventilation and accessibility

Tree Species

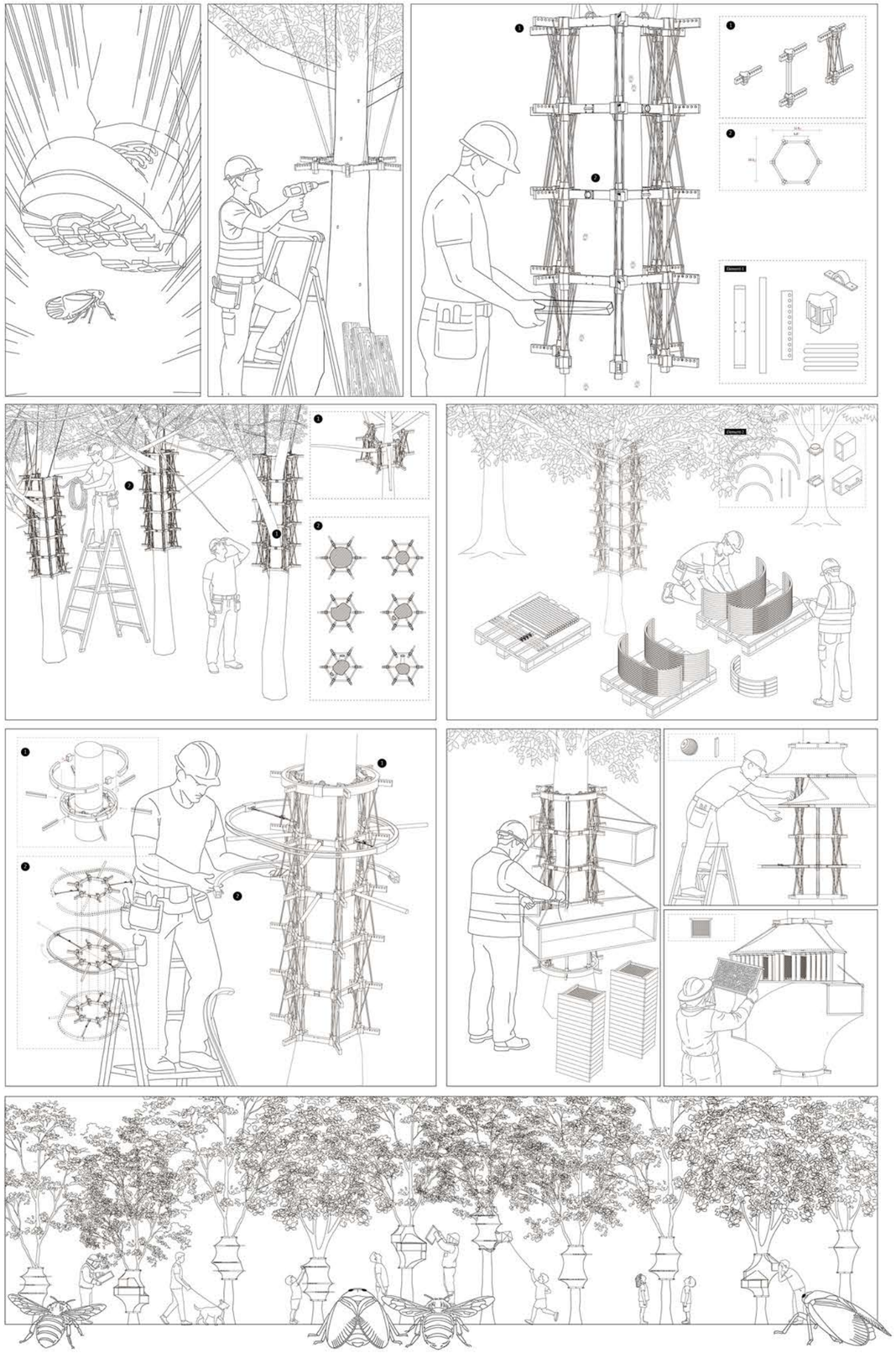
The beehive tree does not need to be a Tree of Heaven; it can be any tree species. The selection of the tree depends primarily on its distance from the Tree of Heaven host

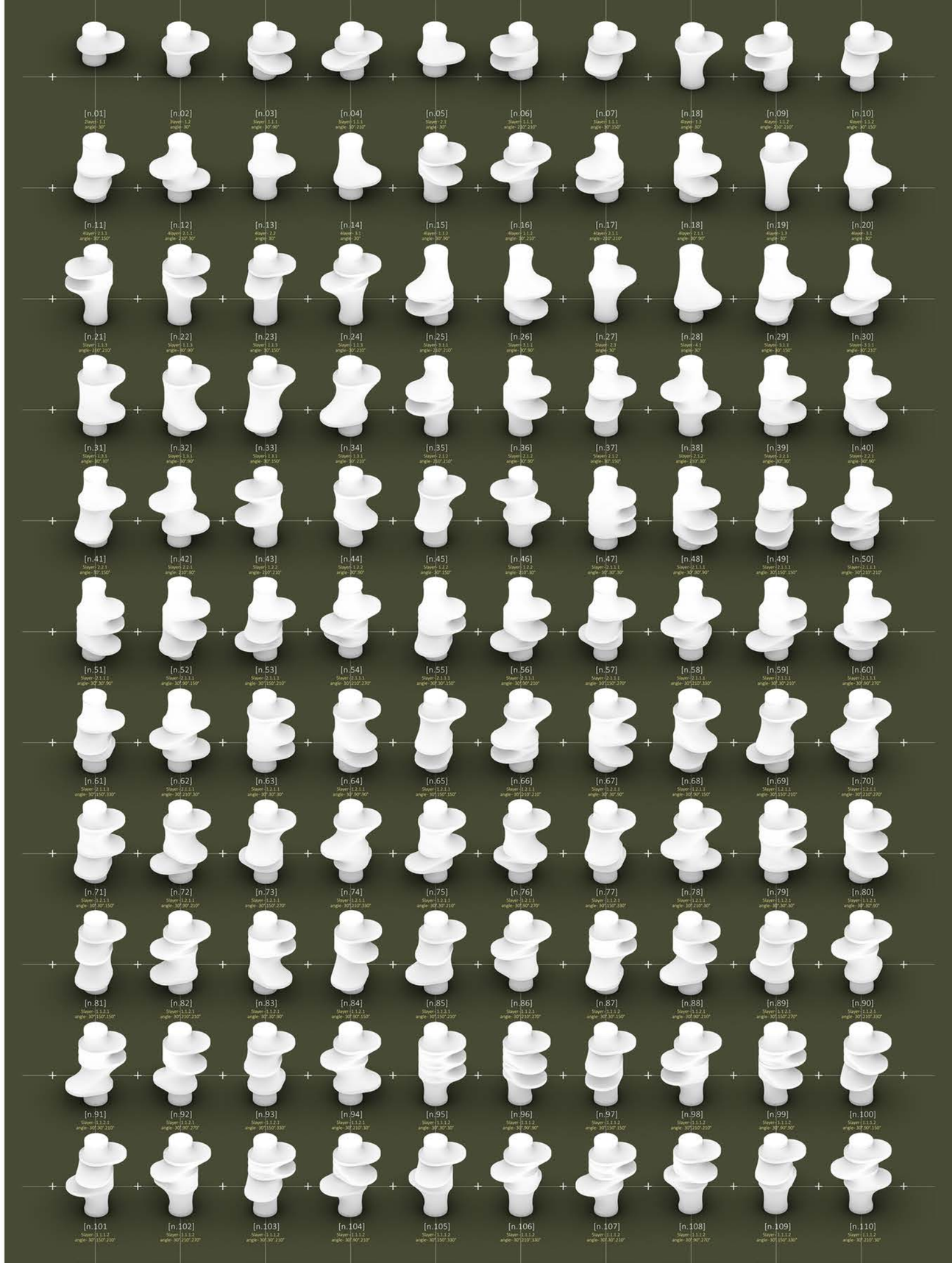
Tree Species

The honeydew collector must be placed where SLF naturally prefers to inhabit; therefore, the tree species for this module must be the Tree of Heaven

Honeydew collector

The honeydew collector is designed in a form similar to a honey stick and can be freely inserted into the mesh. It functions as a module that gathers honeydew produced by the Spotted Lanternfly, providing a resource for bees to collect and convert into honeydew honey

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Distributed Ecological Connection System

We treat each tree as a unit module, arranging these modules within a defined spatial radius. The minimum radius of each module is determined by the mobility of the Spotted Lanternfly (SLF). Since SLFs can jump approximately 1 meter and can move relatively easily within a 10-meter range, we set 10 meters as the minimum module radius and allow flexible placement of structures within this boundary.

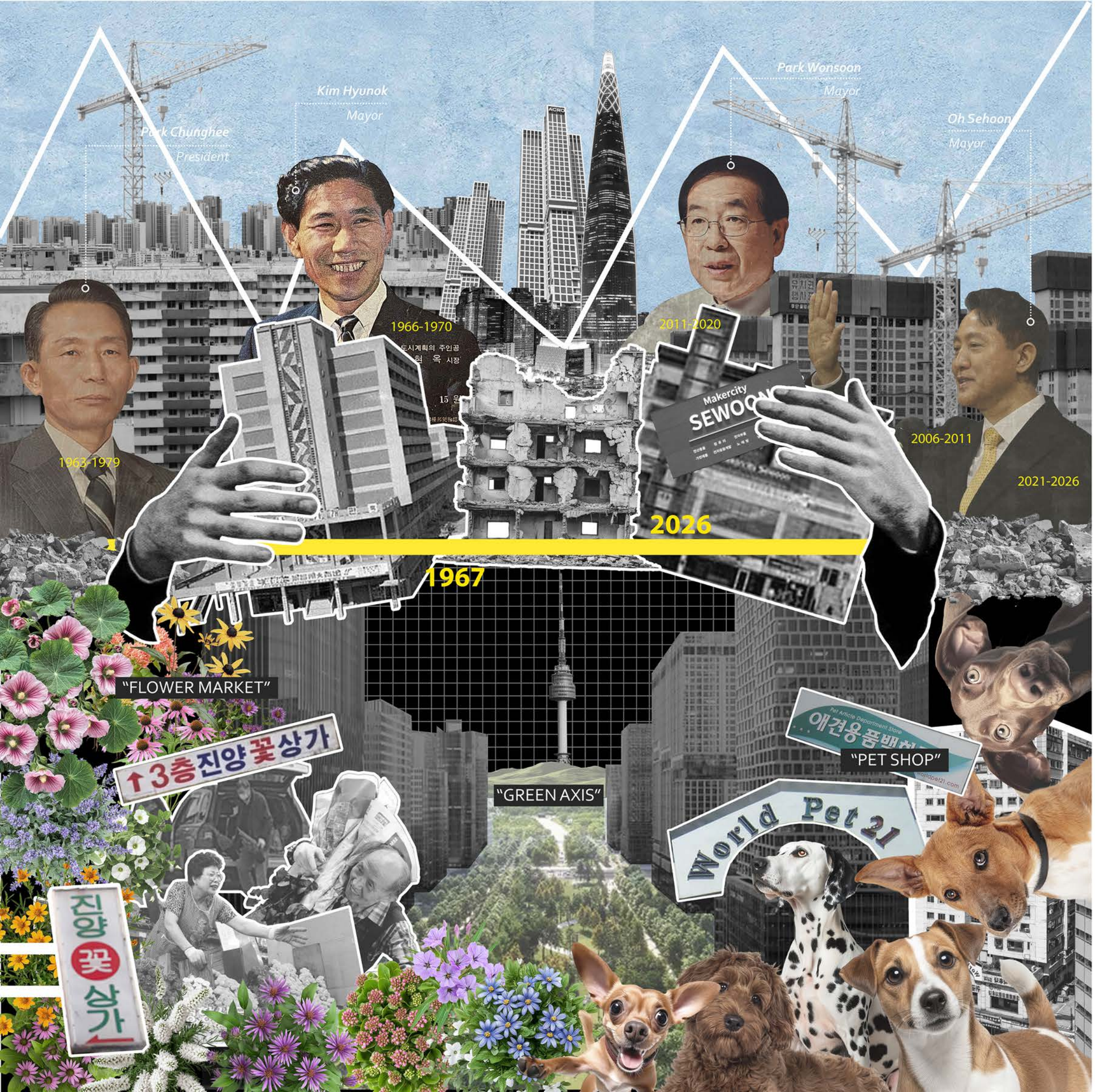
In contrast, honeybees can fly up to 5 kilometers, yet conventional beekeeping recommends maintaining a distance of approximately 30–50 meters between hives to prevent colony interference and support efficient honey production. Following this principle, our system adopts a flexible distribution of modules within the 30–50 meter range, rather than rigid spacing.

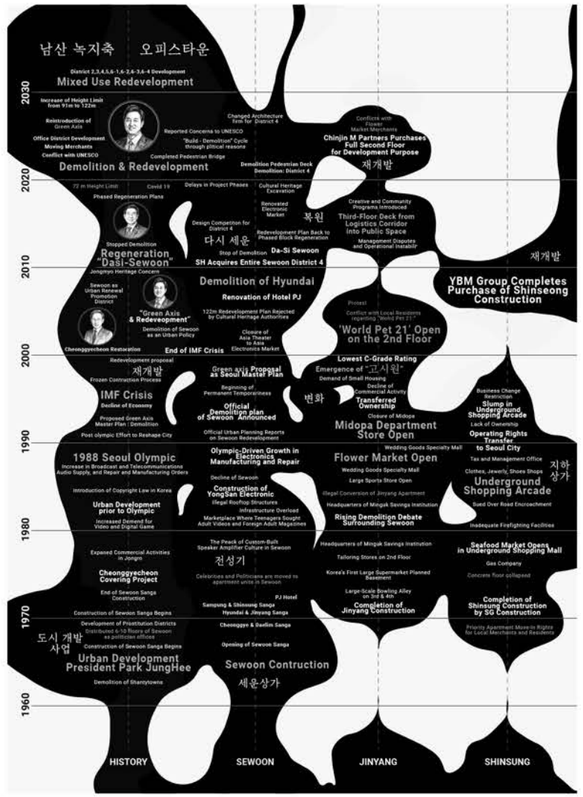
AN OPEN FRAME FOR COLLECTIVE LIFE

Spring 2026
_2026.01 ~ 2026.04
_Academic_Columbia GSAPP, Team Work with Hyunyoung Kim, Danillie Min_Research, Design, Visual Work
_Professor Nahyun Hwang(n.hwang@nhdm.net)
_Ball Room + Bath House + Residences, Seoul, KR

Coexistence

...addresses conflicts between species, we aimed to avoid creating new forms of conflict through our design. This led us to develop a structural system that causes minimal damage to the host. We designed a method of attachment that uses ropes and sticks, instead of metal fasteners, allowing the modules to be tied directly to the trunk without invasive fixing. Because the weight of the beekeeping system may gradually increase over ...so needed an additional strategy to prevent instability ...load. To supplement the primary structure, we intro... ...pe support connected to tree branches, which pro... ...ondary stability. Through this approach, the system can ...be categorized into three types of support configurations.





Fragmented Histories and New Possibilities for Coexistence

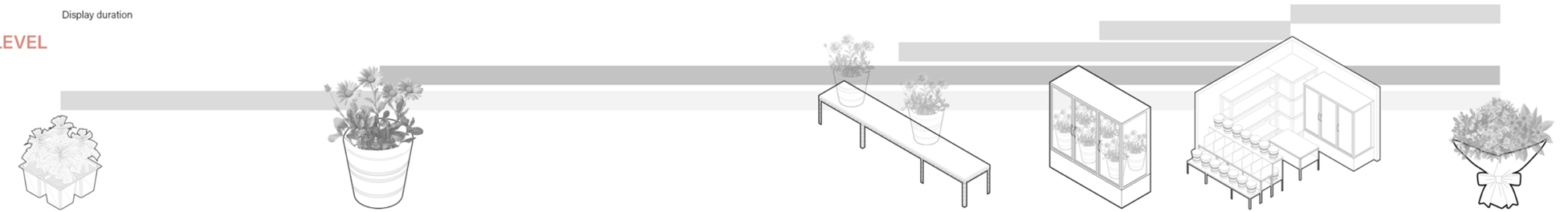
Our project began by examining the layered history and unstable urban condition of the Sewoon Sangga district. Built in the late 1960s, Sewoon Sangga was envisioned as a megastructure combining housing, commerce, and the state's ambition for modernization. After the 1990s, however, the complex declined as Seoul rapidly expanded and transformed. With each political administration, the site became caught between two opposing agendas: total demolition or preservation through urban regeneration. As a result, Sewoon Sangga remains a landscape of "delayed redevelopment," shaped by the continuous collision of political and urban ideologies. We selected Jinyang Sangga as our site because it most clearly reveals these overlapping conditions.

Jinyang Sangga also reflects how the meaning of housing has changed over time. Originally designed in 1971 as a luxury residential complex with diverse unit types, it later became increasingly fragmented after the IMF financial crisis, as housing shifted from a stable living environment into a tool for rental profit. Entire floors were subdivided into extremely small goshiwon units, creating a fragile coexistence between isolated elderly residents displaced by gentrification and young university students searching for affordable housing. At the same time, the flower market and failed pet mall development reveal how nature itself was planned and commodified through systems of capital. Within this condition, where generations, species, and lifestyles collide—we began to explore the possibility of a new model of coexistence for the contemporary city.for the contemporary city.political and urban ideologies rather than by a single coherent vision. We selected Jinyang Sangga, located at the southern edge of the complex, as our site because it most clearly reveals these overlapping urban conditions.

FLORA Flower Market

FLOWER MARKET
SPATIAL CONTROL LEVEL

Display duration



TYPE1. SEEDING

Flowers grow within cultivation facilities where environmental conditions are precisely controlled.

TYPE2. POT

Placed in individual pots, they are standardized into movable retail units.

TYPE3. SHELF

Arranged on shelves, they are organized visually as commodities awaiting purchase.

TYPE4. COOLER

Stored in refrigerated spaces, their lifespan is regulated by temperature and time.

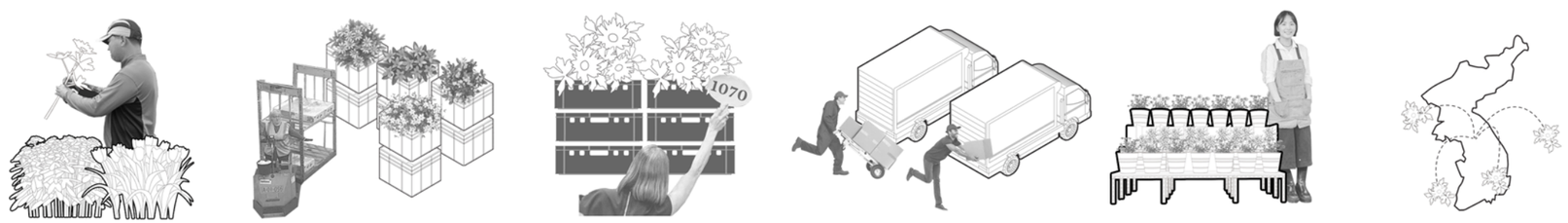
TYPE5. STORE

Within the shop interior, spatial layout and circulation enhance their commercial value.

TYPE6. WRAPPING

Through wrapping, flowers are reassembled into finished products for individual consumption.

FLOWER MARKET
SUPPLY CHAIN



STEP1. FLORICULTURE

Flowers are cultivated in controlled agricultural environments for large-scale commercial distribution.

STEP2. WHOLESALE FLOWER

Harvested flowers are sorted, packaged, and transferred to wholesale distributors.

STEP3. FLOWER AUCTION

At auction markets, flowers are rapidly traded and priced according to demand and seasonality.

STEP4. FLOWER DELIVERY

Purchased batches are transported through logistics networks to urban markets.

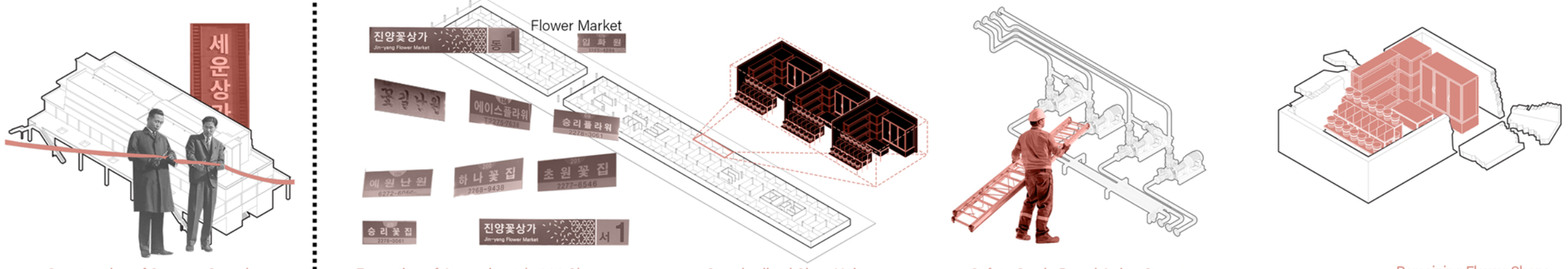
STEP5. FLOWER MARKET

Flowers are displayed and sold in market stalls where freshness and visual appeal determine value.

STEP6. NATIONWIDE

Through expanding logistics systems, flowers circulate across regions, linking local markets into a national network.

FLOWER MARKET
HISTORICAL CYCLE



Construction of Sewoon Complex

Formation of Approximately 300 Shops

Standardized Shop Units

Safety Grade D and Aging Structure

Remaining Flower Shops

FRAMEWORK

The Sewoon and Jinyang complexes were constructed as part of an urban redevelopment plan.

OCCUPATION

Commercial units filled the structure, and the flower market occupied the interior.

STANDARDIZATION

Uniform shop modules and display systems established a stable market structure.

DETERIORATION

Structural aging and a Grade D safety rating revealed physical and systemic decline.

RECONFIGURATION

Despite redevelopment discussions, several flower shops continue to operate within the complex.

FAUNA Pet Shop

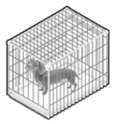
PET RETAIL
SPATIAL CONTROL LEVEL

70 × 80 × 60 cm

TYPE1. MILL CAGE

The smallest and most compressed space, where animals are confined within breeding facilities under maximum reproductive control.

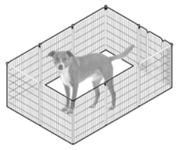
90 × 90 × 80 cm



TYPE2. SMALL CAGE

A slightly larger and partially voided enclosure used for redistribution, allowing minimal expansion while maintaining control.

120 × 100 × 120 cm



TYPE3. OPEN CAGE

An expanded cage with an open upper boundary, where spatial freedom increases but controlled zoning remains.

80 × 60 × 100 cm/each

TYPE4. SHOWCASE

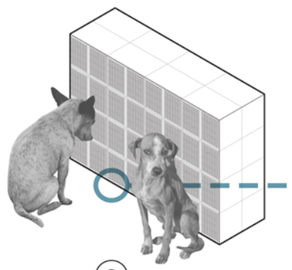
A vertically organized display space that intensifies visual exposure, representing the peak of commodified control before sale.

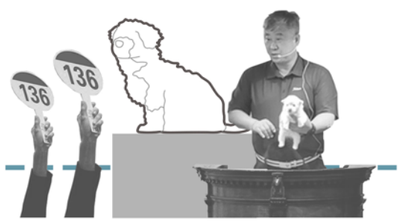
100 × 90 × 100 cm

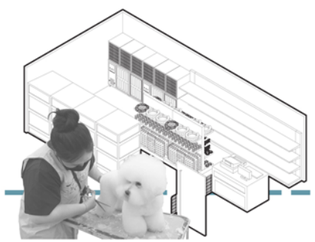
TYPE5. PUPPY'S HOUSE

After purchase, the animal is given a private domestic space, which appears liberated but continues to function as a regulated environment.

PET RETAIL
SUPPLY CHAIN



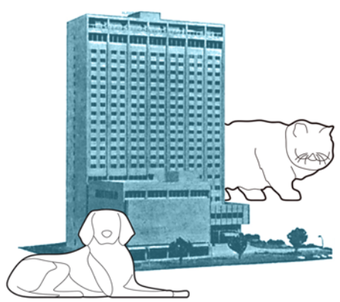




PET RETAIL
HISTORICAL CYCLE

STEP1. PUPPY MILL

Animals are bred in large-scale facilities where reproduction is prioritized for continuous supply.



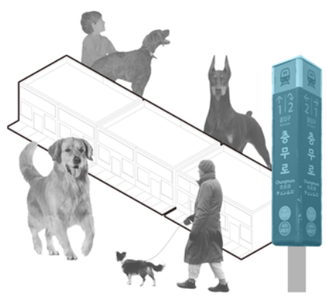
1950's

AEJO-WON

ThAejowon emerged inside Lotte Jeil Department Store, framing animals as consumer displays.

STEP2. PUPPY AUCTION

The animals are transported to auction houses, where they are traded and distributed to retail buyers.



1960's

CHUNGMURO PET STREET

Relocating to Chungmuro, the pet trade expanded alongside economic growth and rising demand.

STEP3. PET SHOP

Selected animals are displayed and sold in pet shops as consumer commodities.

1970's

JINYANG PET SHOP

Amid ethical concerns, pet shops moved indoors to Jinnyang Arcade, where the industry began to weaken.

RETURN TO **STEP1**

If an animal is not sold, it may be offered for free adoption, or in the case of females, returned to the breeding facility for reproduction.

Molly's
PET SHOP
SHINSEGAE

2010

MOLLY'S FRANCHISE

The entry of corporate franchises like Molly's restructured the market and disrupted independent shops.

STEP4. HOME

Purchased animals are transferred into domestic space and redefined as companion animals within the family.

2010's

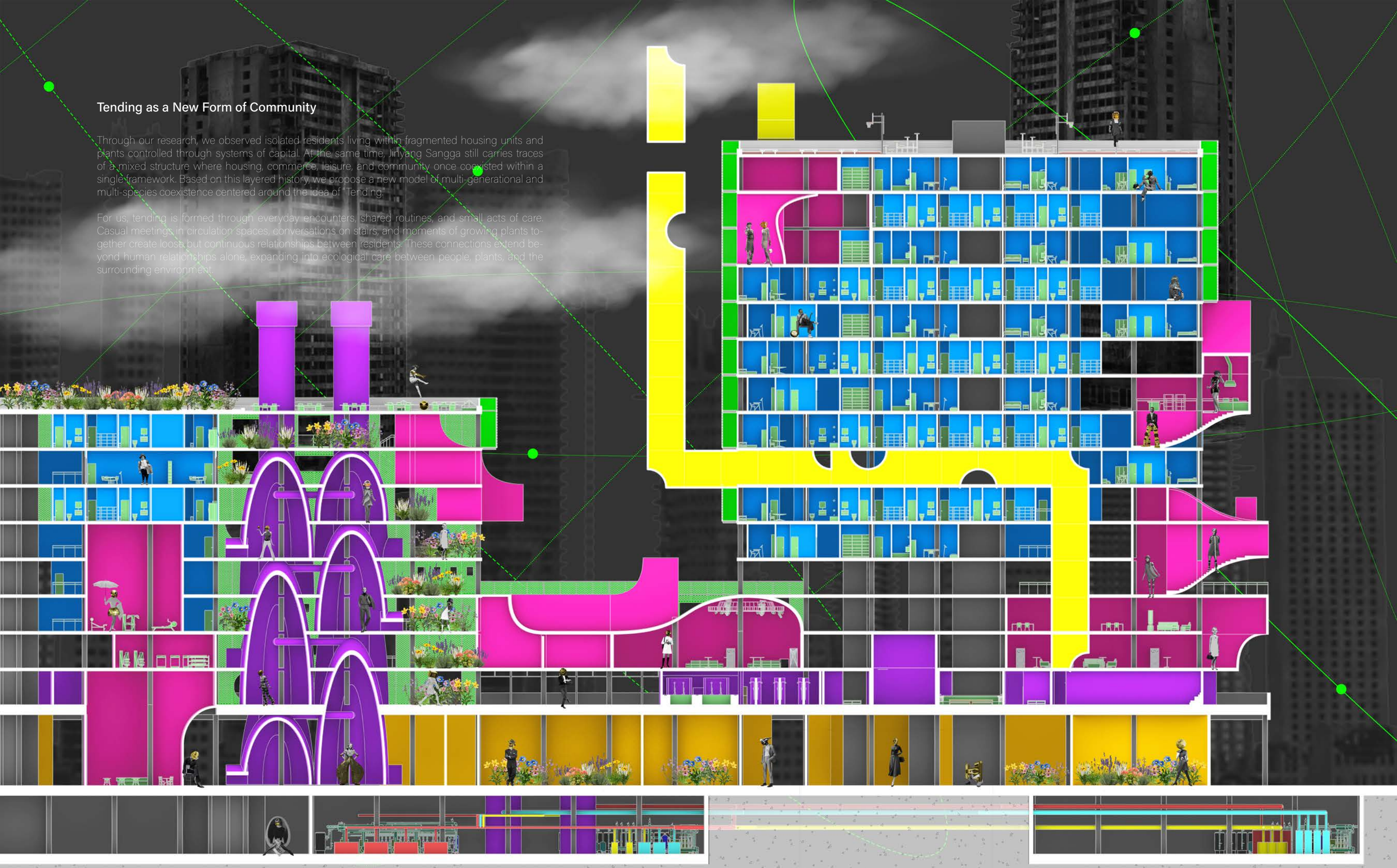
ONLINE STORE

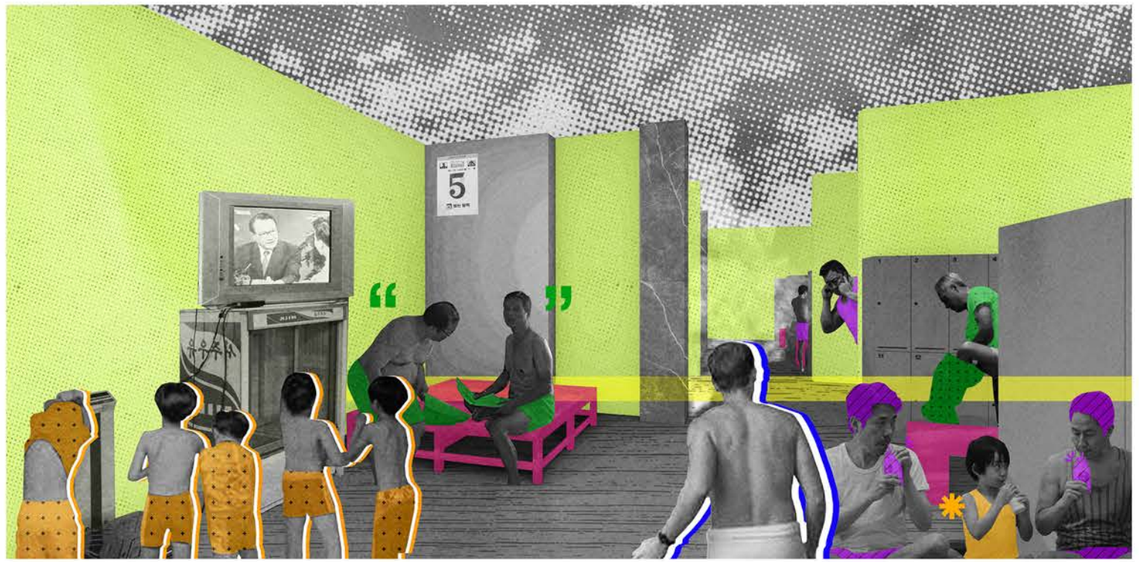
The rise of online platforms accelerated the decline of traditional pet retail districts.

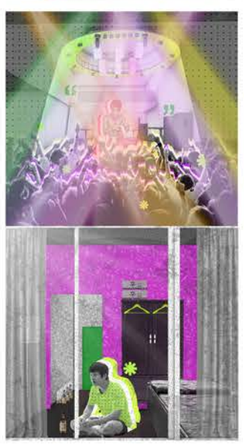
Tending as a New Form of Community

Through our research, we observed isolated residents living within fragmented housing units and plants controlled through systems of capital. At the same time, Jinyang Sangga still carries traces of a mixed structure where housing, commerce, leisure, and community once coexisted within a single framework. Based on this layered history, we propose a new model of multi-generational and multi-species coexistence centered around the idea of "Tending."

For us, tending is formed through everyday encounters, shared routines, and small acts of care. Casual meetings in circulation spaces, conversations on stairs, and moments of growing plants together create loose but continuous relationships between residents. These connections extend beyond human relationships alone, expanding into ecological care between people, plants, and the surrounding environment.







Spaces of Encounter and Shared Care

Rather than inserting completely unfamiliar programs into Jinyang Sangga, our proposal reinterprets the building's existing spatial DNA—such as the goshiwon, bathhouse, ballroom, and flower market—as new infrastructures for coexistence. Shared circulation, kitchens, and resting platforms encourage everyday encounters between residents while maintaining individual privacy. The bathhouse is revived as a contemporary public bathing and jjimjilbang facility, functioning as an "extended living room" where different generations naturally gather and interact. Its former chimney void is transformed into a vertical infrastructure that brings light, air, and movement deep into the building.

We also merge the nostalgic dance hall for the elderly and the youth club culture into a single ballroom, creating a space where different generations and lifestyles intersect through music and movement. Finally, the flower market is relocated to the ground floor and rooftop, where a Seed Bank and urban farming spaces reconnect residents with nature. Through these programs, spaces of labor, leisure, care, and ecology become intertwined, allowing relationships between people, plants, and daily life to gradually emerge over time.

An Open Framework for Living Together

Ultimately, our project does not propose architecture as a fixed and completed object. Instead, Jinjang Sangga becomes an open framework that continuously evolves through the actions, relationships, and daily routines of its users. Encounters along shared circulation paths, conversations in the bathhouse, collective energy within the ballroom, and moments of cultivating plants together all become forms of connection and care.

Through the act of "tending," relationships gradually expand beyond boundaries between individuals, generations, and even species. Rather than defining community through rigid systems, the project imagines coexistence as something slowly built through repetition, familiarity, and shared everyday life.