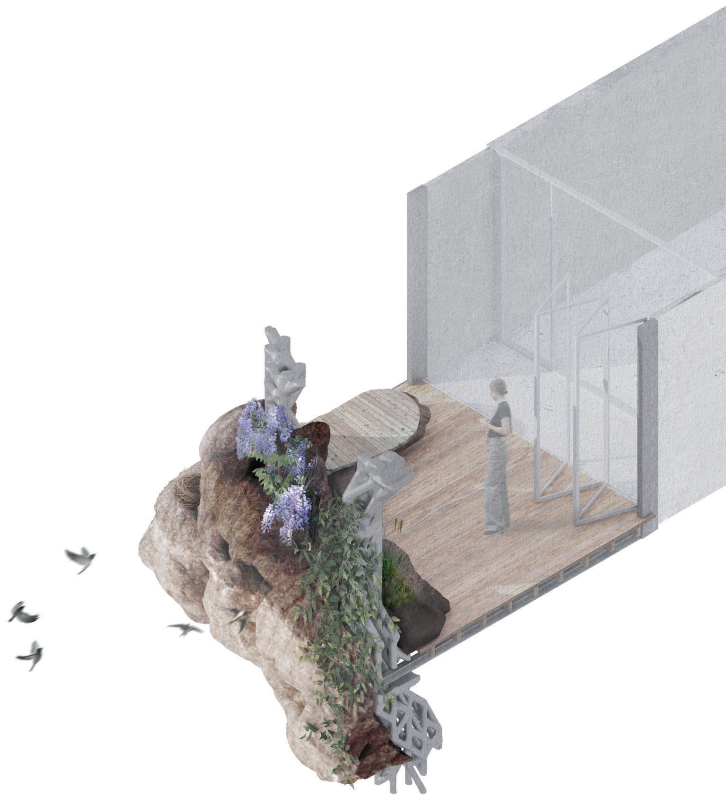
Animated Envelopes

Transforming Post-War Housing Facades toward
Interspecies Cohabitation



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Thesis Report



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Abstract

Post-war housing in Vienna is facing an urgent need for transformation resulting from aging building stock, climatic requirements and changing urban conditions. Current renovation strategies largely focus on energetic performance and the preservation of the existing building envelope, often leaving its spatial and ecological potential underexplored.

With this thesis I propose the reinterpretation of the facade as a spatially layered interface rather than a static boundary. Focusing on a case-study building at Vorgartenstraße 168 in Vienna, an additive façade-system capable of mediating between human occupation, ecological occupation and its surrounding urban context is developed.

The thesis understands post-war housing-facades as fields that can be conditioned by localized ecological, climatic, contextual as well as typology-inherent information. Using weighted overlay strategies, information layers were superimposed to generate increasingly differentiated conditions for the new envelope, informing facade depth, permeability, transparency and varying ecological hosting potential.

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Research Questions

Hypothesis

Treating post-war housing facades as rule-based, additive systems rather than fixed envelopes enables their transformation into spatial and ecological interfaces, challenging conventional renovation approaches focused primarily on energetic performance.

Main Questions

1. How can the facade be reinterpreted as an active interface between interior space, urban context, and surrounding ecological systems?

2. How can additive facade systems support spatial conditions for human and non-human cohabitation in post-war housing?

3. How can local environmental, typological and programmatic conditions inform conditional additive facade transformations?

Dictionary

Conditional Facade Framework

research methodology describing how contextual and typology-inherent information of post-war housing in Vienna can inform the spatial and ecological expression of additive facade systems

Facade Cell/Pixel

smallest typological unit of a Viennese post-war housing facade, drawing from its repetibility and standardisation - if arrayed it can generate the entire facade

Facade Map

a 2-dimensional facade-image resulting from the accumulation of facade pixels

Shared Edge Zone

a spatial threshold condition, positioned between human extension and ecological occupation, enabling controlled coexistence, environmental mediation and varying degrees of visual, climatic and spatial overlap

Depth Allocation

the localized distribution of spatial depth across the facade system based on overlapping environmental, ecological and programmatic intensities

Occupation Gradient

a gradual spatial transition between varying degrees of human, non-human and shared occupation across the facade system

Coupling

the degree of spatial and environmental interdependence between the existing building and the additive facade

Ecological Hosting Capacity

the ability of a spatial condition to support non-human inhabitation through shelter, climatic protection, material suitability and reduced disturbance

Overlay

process of superimposing multiple information layers to generate differentiated spatial tendencies within the facade field

1. Introduction

Post-war Housing in Vienna is facing a pivotal time, since many of those buildings - which make up around 12% of the city´s built environment – have now reached a critical age with a pressing need for renovation and modernization.

In the Urban Development Plan until 2035 provided by the City of Vienna the central message is retention rather than demolition, motivated by the need for recourse saving and preserving the "grey energy" stored in the existing building stock.
Post-war housing facades embody the idea of enclosing the human realm, shielding it from our ecological context, which in turn makes building skins unapproachable, clean surfaces with spatial priorities centered predominantly around human occupation and environmental separation.

As opposed to common modes of renovation, that focuses on the preservation of original aesthetics while still affording ample recourses and complex interventions to improve energy efficiency, this thesis presents an alternative that puts facade transformation at its center.

Drawing from the logic and repetitiveness of post-war housing facades it proposes the creation of an additive system which is spatially layered to dissolve boundaries between the building and its surroundings. Within the facade´s depth the potential for cohabitation between non-human and human actors is explored to bridge interspecies gaps and propose solutions for how our natural context can be preserved parallel to a rapidly expanding urbanity. Simultaneously, it is tested whether the addition can support climatic improvement of the existing building, by integrating buffer layers.

A case study building is selected on which an additive facade solution is applied, making the architectural expression of cohabitation dependent on building-internal and outer factors, that when overlayed inform the expression and layering of the facade system.

Eventually, the developed concept is tested through an architectural intervention on the northern and southern facade of the case-study.

2. Background

2.1 Post War Building Stock Vienna: Demands

Until 2040 the city of Vienna is expected to reach 2.2 million inhabitants, which demands the construction of circa 8500 apartments per year. (Der Wien-Plan, 2025)

Hereby, the expansion of existing buildings is a central possibility to create the necessary apartment density in central locations across the city (Lackner, 2022) Since over 75% of these buildings are owned by the City of Vienna, their preservation is also central to providing affordable housing (Der Wien-Plan, 2025)

However, due to the age of these buildings there are demands for immediate maintenance and renewal. Post-war buildings tend to have poor energy efficiency and high CO_2 emissions as a result of the resource-conserving construction methods used at the time (thin walls, with minimal insulation) (Lackner, 2022)

Renovation saves energy and waste products and helps avoid additional ground sealing.(Der Wien-Plan, 2025) For this the City of Vienna has proposed transformation steps that include unsealing of courtyards, facade greening, and the creation of „cool spots" to prevent summer overheating. More specifically, dwellings built between 1950-1990 should be revitalized through the integration of common areas and small-scale economic facilities in the ground floor (Der Wien-Plan, 2025)

post-war social housing at Vivariumstraße 13-17, Vienna



2.2. The „thick" facade

This discussion about facades emerges from the general potential for horizontal expansion among the typology of post-war housing. For example, buildings with "cross-wall" construction, a frequently encountered construction system, offer ideal circumstances for additive facade elements, since the cross walls are load-bearing, freeing the longitudinal walls for possible space extensions, loggias or balconies (Lackner, 2022)

Also, the spatial reserves of the so-called "aufgelockerte Bauweise" (loosened construction), where the building slabs are embedded in large green areas, enable horizontal extensions, without critically limiting the neighboring properties' access to light (Lackner, 2022, p. 15)

As always discourse is also rooted in aesthetics. Post-war housing, prominently characterized by a high degree of standardization, for instance observed in Panel-buildings ("Plattenbauten"), has often been criticized for exactly that. "Liquidized abstraction" is a term describing a surpassing of individuality and a sense of place through its leveling regularity (Haderer, 2023)

As opposed to early modernism of the 1920s, that followed radical social emancipation goals, post-war housing is often criticized as "reduced modernism", characterized by technical industrialization and standardization (Taylorism) (Haderer, 2023)

I strongly believe it is the facade, where impact on the building´s existing substance can be held minimal and yet have a profound impact on the quality of life in the building. I propose a thick, inhabitable facade as an answer to the issues that need to be tackled in post-war housing in the coming years.

In big residential areas these minimal and in many cases flat facades without spatial differentiation have frequently led to vandalism and neglect, not giving residents the chance for individual acquisition.

This is the case in the „Unitas-Complex" in Bratislava (1930), where undifferentiated green-spaces between the blocks and a solely-aesthetic facade insulation gave the residents insufficient impulses to identify themselves with their surrounding, which eventually led to an increased sense of anonymity. (Bacova, Majzlanova and Bergerova, 2019)

Furthermore, in many high-rise residential areas of the 1960s where pergolas didn´t offer sufficient space for benches or plants, elements that could counteract this anonymity. It is a lack of social ambition that has also reemerged in contemporary architecture, reducing facades to a mere decorative object or even a marketing product. (Jürgenhake, 2013)

In modernism the ambition for total transparency has resulted in a "subtle censorship", as Till Boettger describes it, where thresholds are consciously blurred, contradicting the human desire for safety and retreat. This can for instance be observed in the "City Building" in Rotterdam where spatial differentiation is abolished through excessive use of glass, making the connection between inside and outside merely visual (Boettger, 2014)

Postmodernism on the other hand treats the facade as a "mask", a term used by Thomas Schumacher, describing a superficial tool of communication, that hides and falsifies the connection between inside and outside. The "Best" stores by Venturi and Scott Brown as the epitome of the "decorated shed" present the facade as disconnected from the actual building, functioning like a billboard surface. (Martinelli, 2020)

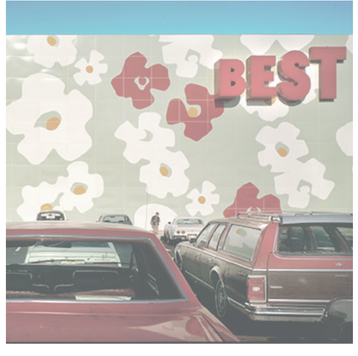
In essence, the facade has often been regarded as a thin, dematerialized separator between Exterior and Interior. In modern architecture it frequently was a mere result of space-programming without representational or performative depth. (Trubiano, 2013)



Unitas-Complex - *Vécsei Ignác, Weinwurm Friedrich*



City Building - Bosch Haslett Architects



"Best" Stores - Robert Venturi and Scott Brown

As opposed to these principles, the "thick" facade could function as a spatial threshold, acting as a communicative bridge between external and internal space. This allows the inhabitants to individually control their degree of interaction with their surroundings. Hence, spatially differentiated facades through loggias, balconies and verandas enable partaking in urban life without fully giving up privacy. (Kousidi, 2023) Inhabitable facades also invite individual appropriation using furniture and plants, battling anonymity often found in flat, sealed facades.

"Wohnblock Hellmutstraße" in Zürich, for instance, features a four-layered stratification (metal balustrades, balcony walkway, stone wall, windows) to create a gradual transition from public to private building zones, with the balcony walkway being "annexed" by the households as a private outdoor area. (Jürgenhake, 2013)

Simultaneously, the thick facade can provide an approach on "time-based" living. This form of living implies that domestic spaces are able to adapt to changing demands of their inhabitants without having to turn to complex architectural interventions, like building structure adaptations. (Jürgenhake, 2013) This aspect of living can become crucial for the transformation of post-war buildings, since this architecture often oriented towards an "existence minimum" logic, featuring rigid, inflexible floorplans, that leave little room for the individual lifestyle choices of today.

The projects "Next 21" in Osaka uses the "open building" principle, where facade elements can be moved to flexibly transform interior spaces into exterior spaces, thereby accommodating the residents' shifting demands over time. (Haderer, 2023)

Another crucial advantage of thick facade concepts is the impact on climatic performance. Spatial elements such as Brise-soleil and deep loggias regulate sunlight input and solar heat, drastically decreasing energy consumption required for cooling.(Kousidi, 2023) Hybrid atriums within the facade depth can preheat and humidify air, prior to reaching the building interior.(Trubiano, 2013)

Thiago Albino Maso argues that the spatial facade can also be a means of architectural expression and identity for the building. It is the idea that the facade is no longer a mere representation of the program behind, but rather its interior ongoings become part of the outer expression. (Albino Maso, 2020) Light and shadows furthermore hand the building a certain plasticity, creating urban identity.

"Lerner Hall" at the Columbia University interprets the facade as an envelope of ramps, where user activities as "living" choreographies become part of the architectural representation of the building. (Martinelli, 2020)

In this thesis facade additions will be understood as mediating environments rather than static boundaries. Not only will the potential of the thick facade as a climatic buffer and a social interface be investigated, but also how the facade depth could support ecological occupation. In times of rapidly expanding cities, space claimed by humans needs to be negotiated with its non-human actors, who should have an equal claim on the territory that they already inhabit. Post War housing in its abundance in big cities like Vienna serves as an adequate ground for reflection on these topics, since aesthetic controversy and yet a demand for preservation is imminent.



Next 21 - Yositika Utida, Shu-koh-Sha Studio



Wohnblock Hellmutstraße - A.D.P.



Lerner Hall - Bernard Tschumi

2.3. Multispecies Theories in architecture

"Opening up to animals means de-centering ourselves". (Dobraszczyk, 2023)

This is how Paul Dobraszczyk describes in his book "Animal Architecture" we should approach the integration of non-humans in our built environment.

Facades, in many cases planned as a "protective" shell of a building that help shield their inhabitant from outside conditions, including its manifold organisms. One could say, space has been claimed from the environment and facades help make sure that it can´t be reclaimed.

What is often overlooked is that animals must remain on the land they were removed from, since space is shrinking where they can retreat to. This is why urban animals need to find ways to appropriate human structures which, over time, has created mostly one-sided dependencies.
Buildings for example offer "prosthetic" habitat opportunities, which includes nesting sites in roof cavities, overhangs and crevices. (Hutt, 2024) Buildings furthermore act as a refuge from predators, that hunt in open, natural landscapes and protect animals from ground-based dangers.(Saeidi, Anderson and Davidová, 2023)

Food in the form of human scraps and easier access to water make urban settings attractive addresses for different non-human species. Some species even benefit from extending hunting hours, due to artificial street lightning. (Grobman et al., 2023)

Cohabitation encourages acculturation, meaning that animals have become more tolerant of human presence and even disturbance, allowing them to prosper in novel urban ecosystems. (Parker et al., 2022)

In turn also humans can benefit from living in proximity to non-human species. Exposure to animals and nature in general positively influences psychological and emotional well-being, with engagement with nature through senses like touch and vision can generate positive emotions, relieve stress, enhance mood and have a restorative effect on mental health, improving overall life satisfaction.(Grobman et al., 2023)

Apart from that, exposure to microbiota found in soil, plants and animals can strengthen the human immune system and mitigate allergies and sensitivities.

In general dwelling in proximity to non-human species helps overcome the so-called "extinction of experience", as stated by ecologist Robert M. Pyle, describing the loss of tangible contact between humans and their surrounding natural systems.(Saeidi, Anderson and Davidová, 2023)

Furthermore, facades that allow multispecies cohabitation can provide functional benefits such as flood mitigation through rainwater retention and improved thermal insulation, that could help reduce radiation and energy costs for human dwellers. (Uthaya Selvan et al., 2023)

Following the discussed advantages of interspecies cohabitation, I am proposing the utilization of existing facades not only as interface between building interior and urban functions, but also as threshold and zone of encounter between human and non-human realms. It shall be an exploration on how to design human structures in a way that they grant non-human actors increased spatial opportunities for occupation, retreat and adaptation within the built environment.

The following additive system and design proposal, tested on post war housing facades aims to negotiate interspecies approximation, while at the same time allowing animals to moderate the distance to humans themselves, within a shared environment.

birds nesting in roof cavities



3. Case Study Vorgartenstraße 168

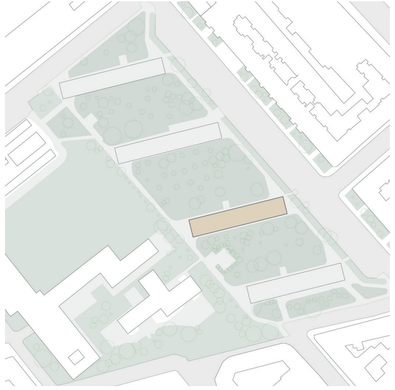
3.1. Reasons for selecting the building

The building uses a cross-wall construction system, where only the parallel transverse walls are load bearing. This leaves the longitudinal facades non load bearing, which gives them an open and freely designed surface, offering ideal conditions for additive systems such as room extensions and balconies.

Apart from that the building features a dissolved construction method, integrating it into generous green spaces that provide the necessary space for horizontal additions without obstructing views and sunlight input to neighboring buildings or infringing on density requirements. The original 1959 building description also explicitly emphasized using materials that minimize long-term damage and facilitate maintenance.

The buildings functions like a "modular framework" since its "bones" (cross-walls) are stable and the "skin" (facade) is non-structural which offers maximum freedom for interventions.(Lackner, 2022)

I chose the building marked in "red" on the graphic as it features green spaces towards north and south enabling me to plan interventions in both directions. The southern two and northern two buildings are identical in construction.



site plan showing selected case study building







existing conditions of case study building (photographs by author)

4. Methodology

4.1. Facade Observations

In a first step the facade of the building at Vorgartenstraße 168 is analyzed to establish a rule-based framework for horizontal building additions. I highlighted structural logic, repetition, and the existing facade depth as key points of interest, since they represent essential formal characteristics of post-war social housing facades. The intention is not merely to analyze shapes, but information that organizes the facade.

Repetition

Repetition is found within the facade's appearance on a surface level and the building programming behind. On the south-facade zones between the cross-walls feature balconies and a glass-curtain wall behind, except in the zones, where the three elevator-shafts are located – here, small windows are inserted.

On the north-facade the building also features a curtainwall characterized by horizontal window-bands, interrupted only be the 3 elevator shafts. The building skin is mirrored around the central elevator shaft, a direct representation of the mirrored floorplans behind.

Vertically the facade is repetitive, accept on the ground floor, where the windows are a result of a more differentiated programming.

Structure

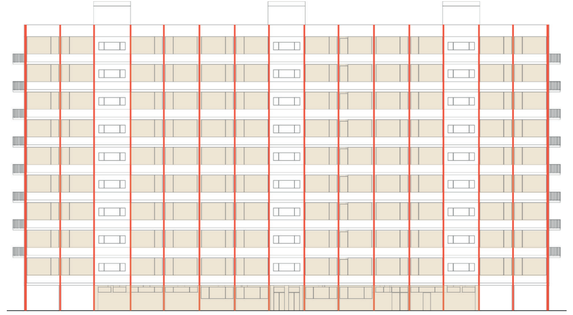
The cross-walls are the main load-bearing element of the building, freeing the longitudinal facades towards south and north from their load-bearing duties.

Depth

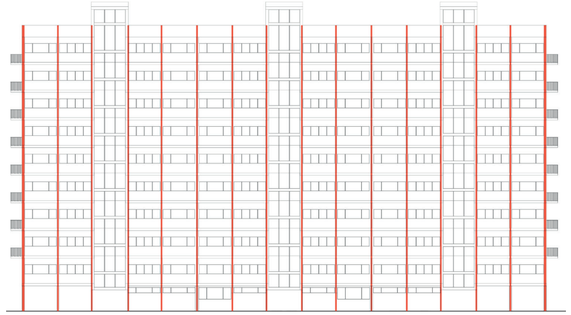
The southern facade is completely covered in loggias, except for the elevator shafts, which interrupt the horizontality of the building.

On the southern side of the building the whole ground floor is pushed back and the south facing end of the elevator shaft becomes part of an apartment. Apart from that side of the building is flat while still featuring windows that span across the whole width of the apartments behind.

Depth on the northern facade is only created on the ground floor, which is pushed back between the elevator shafts. The rest of the building features a flat envelope.



facade elevation South



facade elevation North

depth

repetition

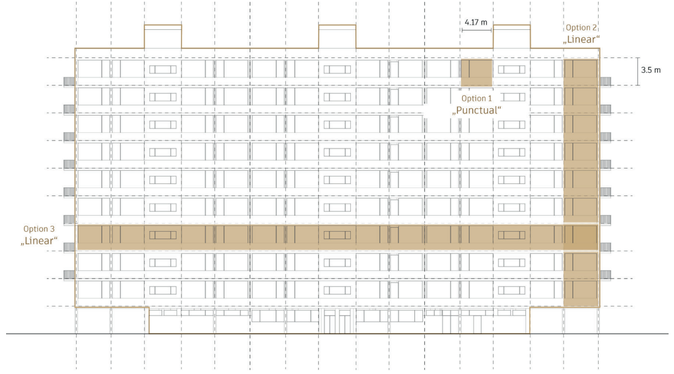
This first analysis has proven how the facade of the case study at Vorgartenstraße 168 is characterized by rationalization, standardization and repetition, following the common principles of post-war housing in Vienna. It is an expression of constructive logic, serial production and internal apartment-organization.

Across the facade, multiple repetitive units can be identified, as shown in diagram "repetitive facade components". Each one, if arrayed, can generate the buildings' entire skin. The "punctual" unit comprises the exact space spanned between two cross-walls and covers 1 or a maximum of 2 room-types making it simultaneously representational of the building program in a selected facade area. Hence this version can be described as the essential component or "Pixel" of the façade.

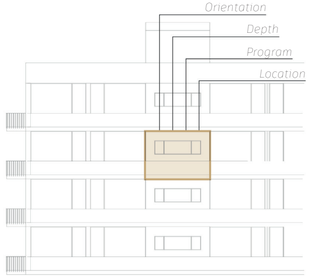
In this context, the term "Pixel" describes – like a digital Pixel – the position of the unit within a system, holding in this case spatial, constructive and programmatic data that can for example condition neighboring elements.

A potential additive system is hence able to respond to the Pixel-Information connected, enabling controlled variation as opposed to a fixed module-approach. This is also where the concept could become transferable, since it is not form that is transferred, but a rule-framework.

Parallelly, these same facade-fields can store local-information derived from the building context and environmental conditions, making the additive façade a mediator between building-internal and external factors.



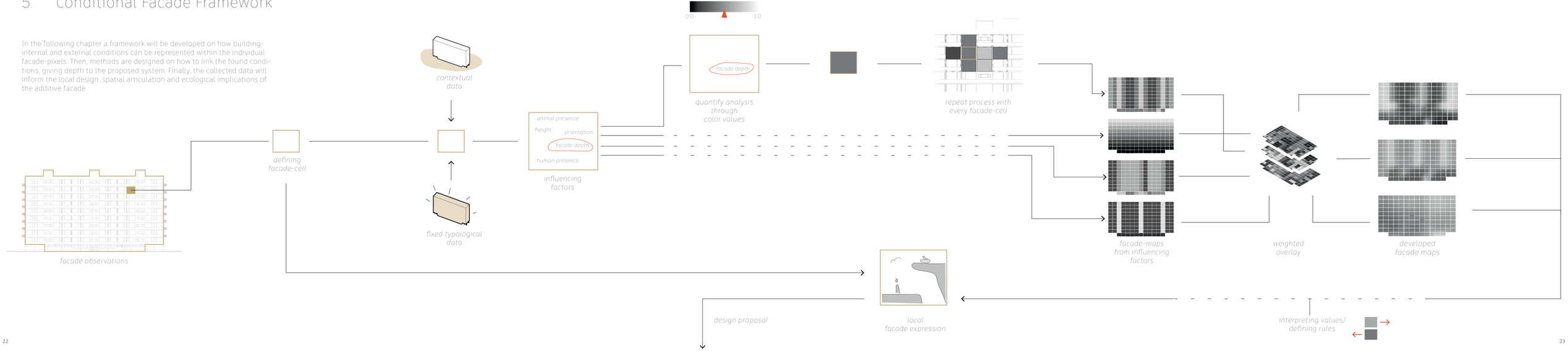
repetitive facade components



potential information stored in facade „pixel"

5. Conditional Facade Framework

In the following chapter a framework will be developed on how building-internal and external conditions can be represented within the individual facade-pixels. Then, methods are designed on how to link the found conditions, giving depth to the proposed system. Finally, the collected data will inform the local design, spatial articulation and ecological implications of the additive facade.



After defining the Pixel as a carrier of typological information that locally conditions the expression of the additive system, it is important to find a way to bridge the gap between the data collected and architectural form.

The following approach was developed: Like a computational Pixel, the façade-pixel could be filled with a color/greyscale value, that could in turn carry information. Apart from responding to building-internal data, numeric values stored in grayscale can be used to represent expected non-human and human presence on selected façade-zones, as well as provide information about climatic, acoustic and other environmental conditions that potentially influence façade morphology.

Hereby the color does not solely inform shape of the connected façade unit but differentiated spatial behavior – being for example porosity, transparency or means of coupling with the existing façade.

The assignment of grayscale values will therefore not solely be based on intuition, but on a combination of program-based, spatial and ecological criteria. However, these values are not used to represent fixed spatial categories but relative intensities across the facade field.

Following the intention to create façade additions that foster interspecies cohabitation and climatic improvement, I gathered the subsequent influence factors that I consider relevant.

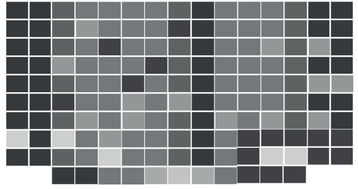
Fixed typological data: program, height, structure, façade depth

Contextual data: Urban and ecological exposure, orientation

To simplify the process, only greyscale value will be used. Each module receives a greyscale-value from 0-1 for each one of the relevant investigations. Taking non-human presence in a selected façade zone for instance indicating the greyscale value 0.5 – this means that in relation to the whole façade, this chosen area indicates an expected presence of non-human species that is average considering the whole envelope, eventually informing design decisions.

Pixel articulation is then either conditioned by one of these factors or an overlay of multiple, further defining façade expression.

In the following steps the approach will be illustrated utilizing the south-facing façade, however the same steps were implemented with the north-facing façade, as shown in the design proposal.



„pixel"-stored information

5.1 Conditional Information Layers

5.1.1 Fixed typological data

1.) Program:

In this experiment each façade field is investigated in plans, to test how the existing program informs the added envelope. Hereby, exclusively the northern and southern façades are chosen since they are most suitable for potential transformation, following the curtain façade construction. Also, 2 facades constitute a manageable scope for the thesis. Decision-making during investigation rest upon research into wildlife´s behavior, especially birds, around human occupied structures.

To clarify, within the current investigation, only the impact the program can have on investigated aspects will be looked at and other influences such as direction or height are ignored at this stage.

The following findings were collected and respected during the process: A critical factor for cohabitation is the distance of possible nesting sites to entrances, terraces and large windows. Increased human activity, especially the visibility of human movement behind glass facades can lead to extensive stress and even, in birds, to abandonment of their nests. (Saeidi, Anderson and Davidová, 2023) It is important that animals have the opportunity to have access to retreats that are not observable for humans.(Yee, 2021)

In plan the additive system is represented by a preliminarily consistent offset of the building edge depicting the façade as a spatial envelope with a yet undefined depth. The offset is then partitioned into section the size of the previously defined façade pixels, that each carry a single color value.

The following influence factors are investigated:

Human/Animal Intensity: Greyscale values assigned to the façade field describe program-based potential for human and animal occupation within the attached envelope. Darker façade zones closer to value "0" describe zones that are more likely to attract non-human dwellers while values close to "1" are more likely to feature human occupants.

Buffer: Greyscale values describe the demand for buffer layers within the façade zones that are programmed to regulate climatically and absorb shock and sound from the environment.

Coupling: Coupling describes to which extent a potential additive system can be spatially merged with the existing program, allowing outdoor conditions to reach the interior spaces. In the "Intergrown" case the facade has the potential to protrude inside the building bringing outdoor conditions inside – this aspect becomes more relevant in subsequent chapters when other factors than program influence it. It needs to be stated, that the residential spaces investigated here don't feature the potential to take on the intergrown state in my opinion.

baseline: generic building floor plan, floors 1–9



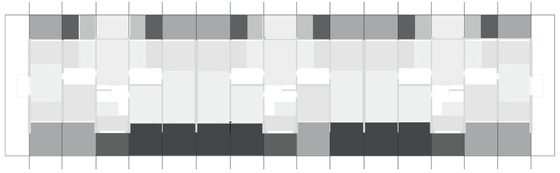
A

bath
kitchen
sleeping
living
staircase

Expected Human Presence

High Presence

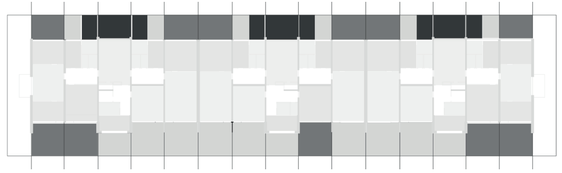
Low Presence



Buffer

Strong Buffer

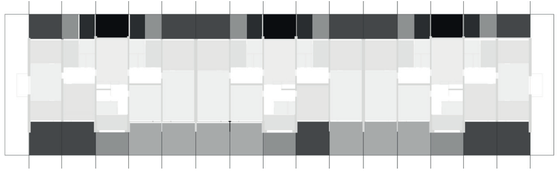
Weak Buffer



Expected Animal Presence

High Presence

Low Presence

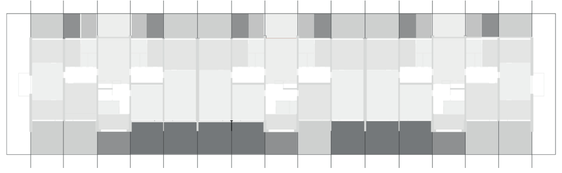


Coupling

Intergrown

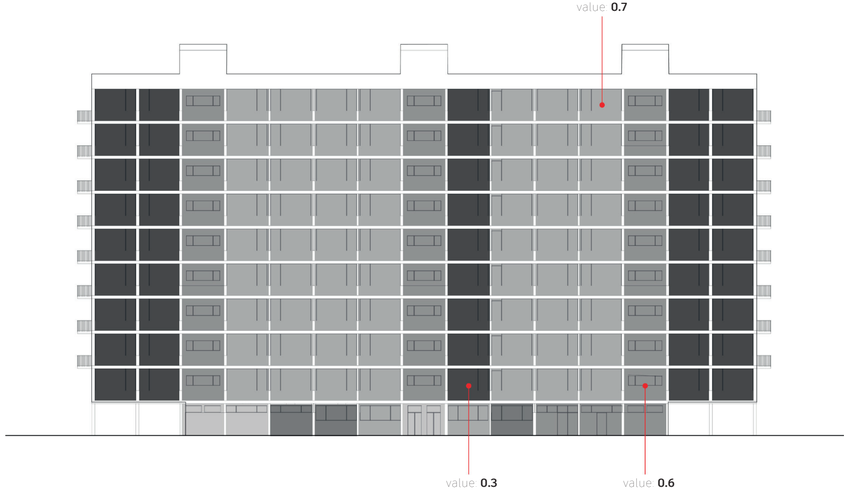
Anchored

Detached



From the individual floor plans an entire **facade map** is developed that serves as a base for subsequent information overlays**.**

output : southern facade
(example „animal presence potential“)



2.) Height:

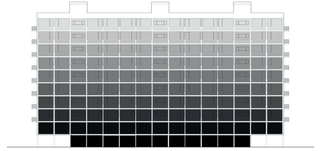
Height. Again, greyscale-based information from 0-1 gives clear indications on the height of the individual field. From my point of view, height encodes changing relationships between façade and ground conditions, which becomes relevant in subsequent investigations, since altitude can influence the facade´s spatial expression.

3.) Façade Depth:

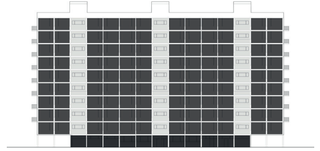
Façade zones that feature loggias will influence the depth needed for terrace spaces on the additive façade, making this aspect an important one.

4.) Spatial Depth behind the facade:

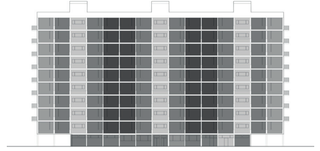
Spatial depth behind the façade can have consequences for the additive façade, influencing for example light requirement.
Color values hereby represent the distance between interior walls and building envelope.



Height



Facade Depth



Spatial Depth behind Facade

1.) Urban Exposure

Software is used to measure distances between each individual façade module and the contextual object, resulting in proximity based color-values. Information on which areas in proximity to the building feature increased human/animal activity has not been gathered, since this is beyond the scope of this thesis – but can be considered to further develop the system.

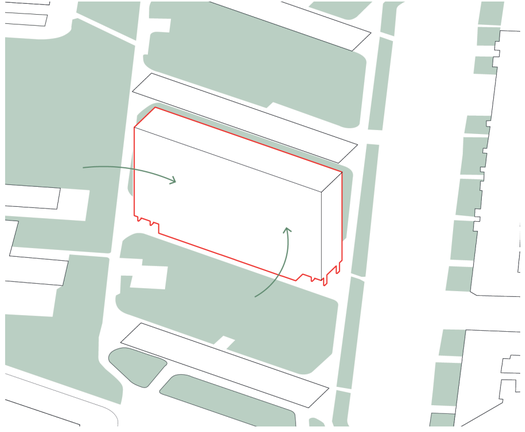
- Street Side: Façade areas in proximity to street allow for deep, filtered, human activated spaces due to increased sound and urban connection/ intensity.

- Pathways: Façade zones close to pathways around the building allow for less animal occupation but rather open to connect with the urban fabric, drawing passengers in with their program and therefore featuring an increased human intensity.



2.) Ecological Exposure

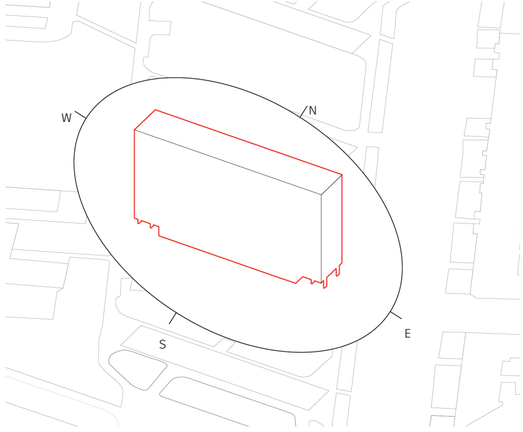
Green spaces allow for the connection of deep, soft and porous spaces since they feature less sound and most likely existing wildlife habitats. Again, distance between green spaces and facade pixels is measured, resulting in distance-based greyscale-values.



3.) Orientation

Orientation influences the depth and spatial conditions within the additive system, due to data about sunlight hours and intensity. Demand for shading and potential thermal buffer material being used in facade construction differs significantly on the northern and southern façade.

Due to the façade pixels´ parallel array each one on a chosen facade side receives the exact same greyscale value.



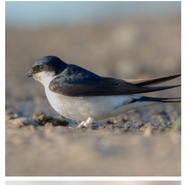
4.) Species-based data:

To foster non-human interaction with the façade-system I selected specific species in Vienna´s urban context that are threatened around Vienna. Keeping the number low allows for more tailored solutions, which might increase the potential for a successful intervention.

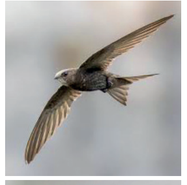
The species are the common swift, jackdaw and house martin, on which I collected relevant data for façade design. Information I deemed most important for current investigations is the nesting heights of the animals which if overlayed, create a gradient of expected bird intensity map on the façade. Again, software was used to digitally overlay the collected data, resulting in a specific greyscale-value for each façade field.

The diagram shown is only a representation of the mapping that happens within the software.

Other relevant data about the different species is considered later in the process, when nesting-cavities are designed and decisions about materiality are made.



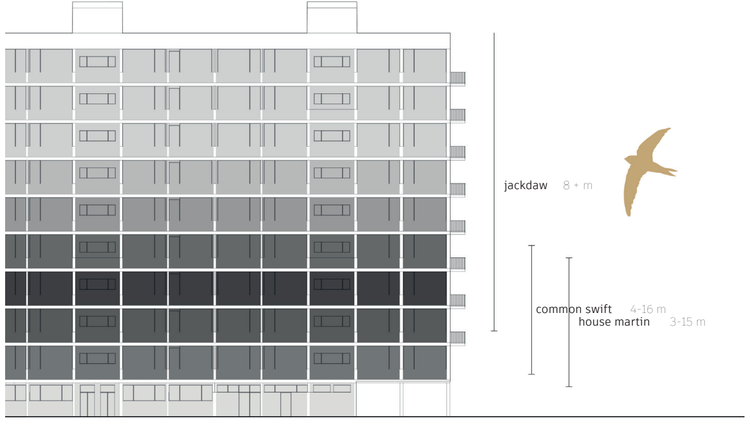
house martin



common swift



jackdaw



overlay of selected birds nesting-heights

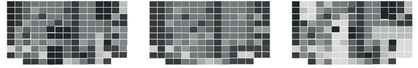
5.2. Overlay

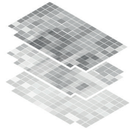
Individual facade-maps, as created in the previous step, describe isolated spatial or environmental conditions, that can be embedded in the pixel.

In this next step, the facade maps will be overlayed to make first suggestions on how the additive system can be spatially articulated. The designer receives agency in deciding the weight in which the color fields are overlayed, depending on the impact of each component on the investigated aspect. This is a crucial aspect, since the overlays cannot "generate" architecture, but are only capable of structuring spatial tendencies.

Within the overlay process there is a differentiation between "reinforcing" and "reducing "information fields. Factors that for instance favor non-human presence on the façade are related factors that diminish the same.

On the right-hand side, a graphic shows 3 exemplary facade-maps being overlayed in varying intensity, resulting in a new map with – again – a maximum greyscale value of 1 and a minimum of 0. This updated map does not represent a simple accumulation of information but depicts differentiated intensities in which certain parameters exert stronger influence on the façade cells than others.

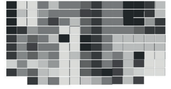




x 0.5

x 0.3

x 0.2



Initially, 3 overlays are realized that are important to reach the thesis goals, being interspecies cohabitation and a climatic improvement of the case-study. **"Human Presence Potential", "Animal Presence Potential" and "Buffer".** These are aspects already discussed through the program-based investigations that are now being further contextualized.

Following the data-overlay, the resulting values are interpreted by the designer, who decides upon a consequential spatial expression. Color thresholds help simplify the process by framing ranges and therefore reducing the amount of differentiated spatial expressions.

At the beginning of this chapter, it is important to mention that the weighting factors used are intentionally heuristic and not scientifically deterministic. Their role is not to automate design decisions, but to structure spatial trends through the negotiation of ecological, climatic, and programmatic priorities. Hence the "reinforcing" and "reducing " factor should not be read as mathematically complementary values that necessarily result in a sum of "1".

5.2.1 Animal Presence Potential Overlay

This first overlay treats likelihood of non-human occupation within the additive facade. Rather than describing fixed habitats in detail, the overlay identifies spatial conditions that may support temporary occupation of the structure, nesting or ecological interaction.

Factors increasing animal presence:

- low-disturbance building programs
- proximity to green spaces
- preferred nesting height ranges

Factors decreasing animal presence:

- street proximity (high pedestrian exposure, acoustically active zones)
- pathway proximity

+ Reinforcing

Program-based conditions: 0.35

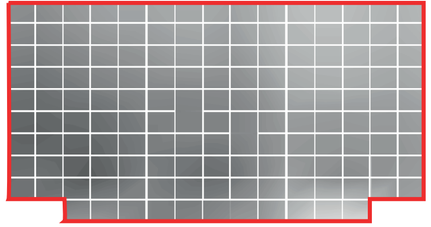
Nesting height suitability: 0.3

Green space proximity: 0.1

— Reducing

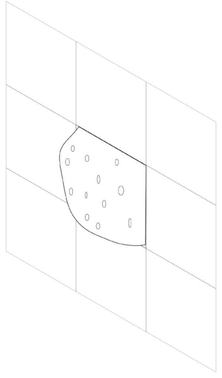
Proximity to streets: 0.2

Proximity to pathways: 0.05

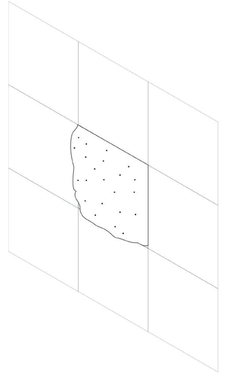


"Animal Presence Potential" resulting facade-map from overlay

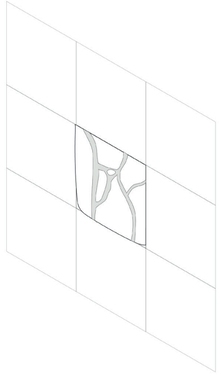
0.0 – 0.3 → conditions favorable to dense ecological occupation



0.3 – 0.5 → small niches and micro-habitats



0.5 – 1.0 → few remaining habitats, plant growth and exposed structural elements



5.2.2. Human Presence Potential Overlay

Human Intensity is investigated similarly in this overlay. Results come predominantly from the plan-based gradients since a major chunk of the building is residential and is not expected to feature major fluctuations in the people present on the facade. Another influence factor is the orientation: South facing apartments will most likely lead to increased façade occupation within the dwellings, due to increased sunlight hours.

Factors increasing human presence:

Factors increasing human presence:

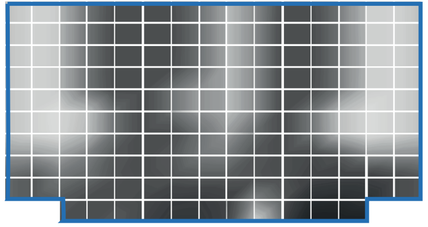
- building programs with increased human presence
- orientation

+ Reinforcing

Program-based conditions: 0.7

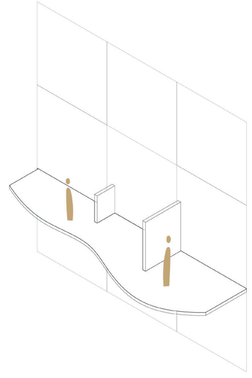
Façade Orientation: 0.3

— Reducing

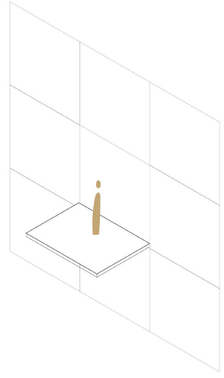


"Human Presence Potential" resulting facade-map from overlay

0– 0.3 → large continuous platforms



0.3 – 0.7 → small balconies / niches



0.7 – 1.0 → no walkable space



5.2.3. Buffer Demand

This overlay investigates the demand for buffer-zones that are not only dependent on program-based reflections but simultaneously from multiple contextual conditions.
The buffer is not necessarily understood as a single solid layer, but as a spatially differentiated filtering system. It influences distance, materiality, transparency and environmental performance rather than only thickness.

Factors increasing buffer demand:

- building program that demand increased buffers
- proximity to streets
- proximity to pathways
- facade orientation (south-facing facades may demand sun light filters)

Factors decreasing buffer demand:

- Proximity to greenspaces: 0.15

+ Reinforcing

Program-based conditions: 0.4

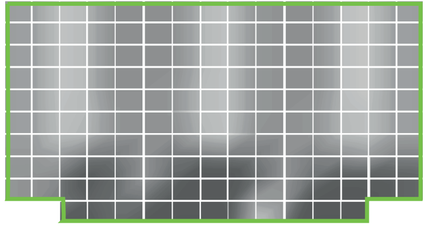
Proximity to streets: 0.1

Proximity to pathways: 0.05

Orientation: 0.3

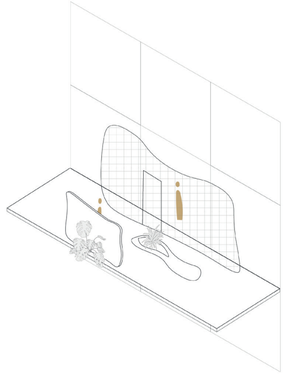
— Reducing

Proximity to greenspaces: 0.15

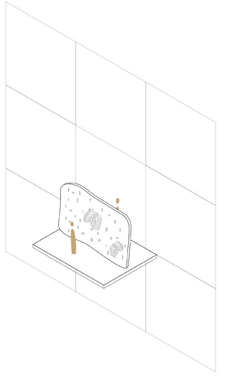


"Buffer" resulting facade-map from overlay

0.0 – 0.3 → spatial buffer (e.g. wintergarden / inhabitable intermediate zone, absorbing walls with moss and greenery)



0.3 – 0.6 → filtered zone (e.g. perforated / semi-open layer)



0.6 – 1.0 → no buffer



5.3 Secondary Overlay

To further specify local façade-field expression secondary overlays are generated, utilizing the 3 base overlays generated. The aim is to increase the number of factors influencing the additive system and therefore facilitating possible transferability.

5.3.1 Transparency

Refers to the use of transparent or porous materiality influencing the amount of light that can penetrate the façade.

Factors increasing transparency:

- Facade zones with high human presence, demanding access to view and light

Factors decreasing transparency:

- Facade zones with high animal presence: visual exposure to humans will likely decrease bird presence on the façade. (Saeidi, Anderson and Davidová, 2023)
- Proximity to shear walls: less transparency needed, since facade zones with shear walls feature fewer deep spaces.

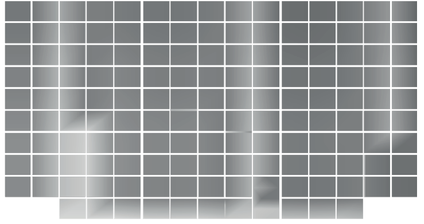
+ Reinforcing

Human Presence Potential 0.5

− Reducing

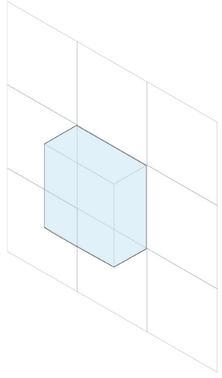
Animal Presence Potential 0.4

Spatial Depth behind Facade 0.1

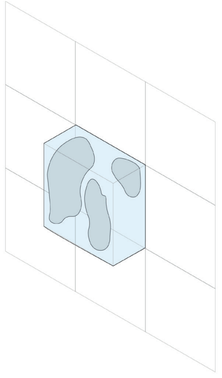


"Transparency" resulting facade-map from overlay

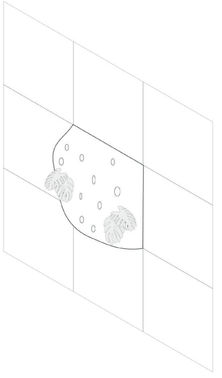
0.0 – 0.3 → highly porous or transparent materiality, light is able to reach the depths of the space behind facade



0.3 – 0.6 → semi-transparent materiality through introduction of animal cavities and plants



0.6 – 1.0 → dense material for intense animal and plant occupation



5.3.2. Permeability

This aspect refers to the degree of openness the facade exhibits. Zones that feature high permeability are usually zones where increased movement is possible, making the human gradient a significant influence factor, while simultaneously a lower animal presence will most likely result from that. Also, on ground floor level where the urban connectivity leads to even more movement, the facade will be most permeable.

Factors increasing permeability:

- Facade zones with increased human presence

Factors decreasing permeability:

- Facade zones with high animal presence
- Facade zones that demand strong buffers

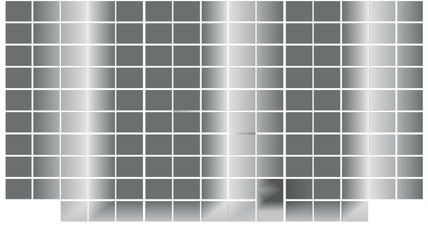
+ Reinforcing

Human Presence Potential 0.5

— Reducing

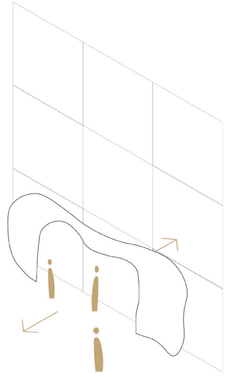
Animal Presence Potential 0.3

Buffer demand 0.2

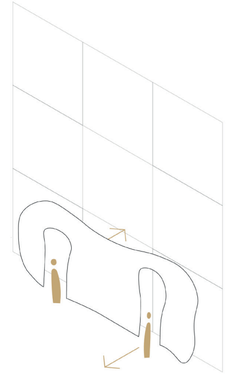


"Permeability" resulting facade-map from overlay

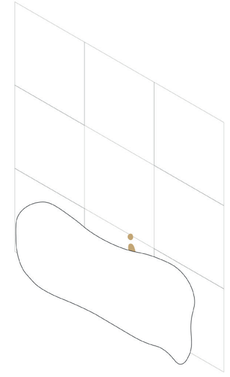
0.0 – 0.3 → highly permeable with featured openings that allow significant human flow through the facade



0.3 – 0.5 → smaller openings



0.5 – 1.0 → non-walkable zones for human, with openings that still allow visual connection



5.3.3. Coupling

This investigation refers to the facades modes of connecting to the existing building, as already touched upon in a previous chapter. 3 scenarios of coupling are defined – detached, attached and intergrown.

"Detached": The additive system does not touch the existing, leaving an air gap. This reversible system aims to minimally interfere with the current program.

"Anchored": Spaces within the additive parts become walkable extensions of the existing.

"Intergrown": This measure implies a spatial merge of interior and façade addition, parallelly creating a thermal and programmatic merge. It appears that within scenario, there is a potential of shifting boundaries of non-human zones towards the building interior, transferring qualities found in the addition onto the existing. Conditions for these more strongly intergrown scenarios emerge from the building program and the resulting human presence, the possibility of light reaching the depths of the building to foster habitat creating as well as the unmeasurable aspect of human willingness for cohabitation, which can unfortunately not be considered.

In the design proposal means of coupling will be locally determined, while the current gradient analysis can depict potentials.

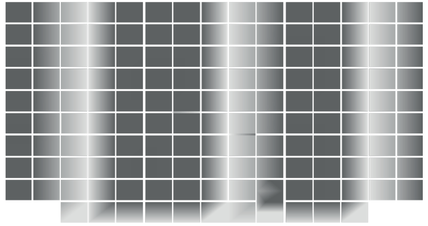
+ Reinforcing

Animal Presence Potential 0.5

− Reducing

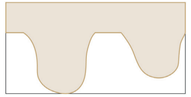
Human Presence Potential 0.25

Buffer demand 0.25



"Coupling" resulting facade-map from overlay

0.0 – 0.3 → Potential for Intergrown



0.3 – 0.6 → Potential for Anchored

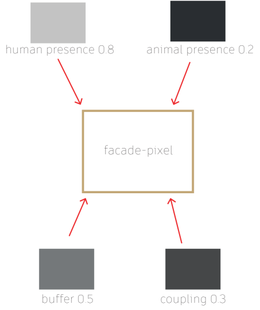


0.6 – 1.0 → Potential for Detached

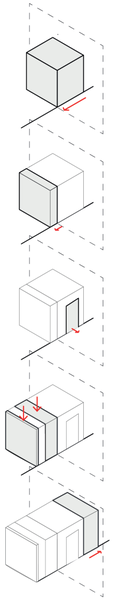


additive system

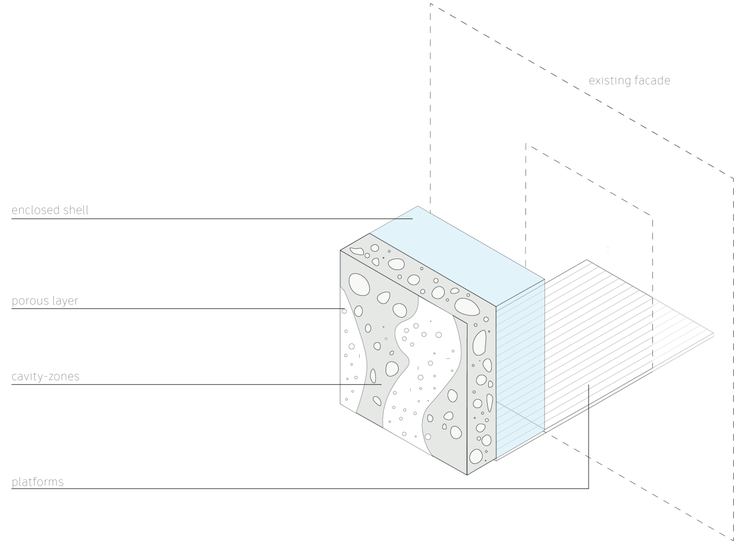
existing building



Parameter	Operation
high human presence	extrusion outward
high animal presence	cavity space extrusion
high permeability	opening incision
high buffer	inserting layers
high coupling	extrusion inward



Resulting Geometric Condition



5.5. Depth Allocation Model

This next overlay aims to inform an extrusion representing the expected depth of the facade system, establishing a first understanding on how the individual facade zones articulate themselves spatially. Depth is not created arbitrarily but from accumulated spatial requirements.

Factors increasing facade depth:

- Human activity: walkable platforms need extensive depths
- Animal activity: cavities for animals also manifest spatially, ho wever less extensively
- Multi-layered spatial buffers
- Height: depth strategically decreases with height, creating a slightly terraced construction leading to less shade shading in the apartments
- Orientation:

Factors decreasing facade depth:

- None

Orientation is not directly considered in the overlay, since, for example, facade-pixels on the southern façade are all equally oriented. However, facade orientation will determine the maximum depth by which the additive facade is bound.

+ Reinforcing

Animal Presence Potential 0.1

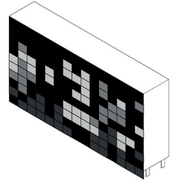
Human Presence Potential 0.45

Buffer demand 0.25

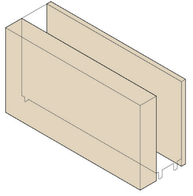
Height: 0.15

— Reducing

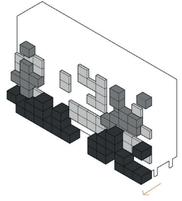
The image depicts an extrusion on the southern façade, that is framed by a 5 m offset from the building boundary. The limit of 5 m is also set by me in response to the depth of the green space, that allows for deep facade additions without obstructing light input in neighboring buildings.



gradients representing differentiated facade cell properties



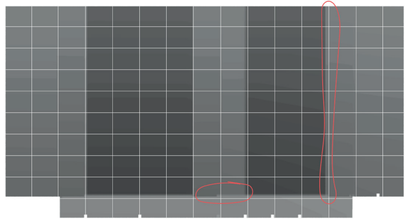
defining max depth



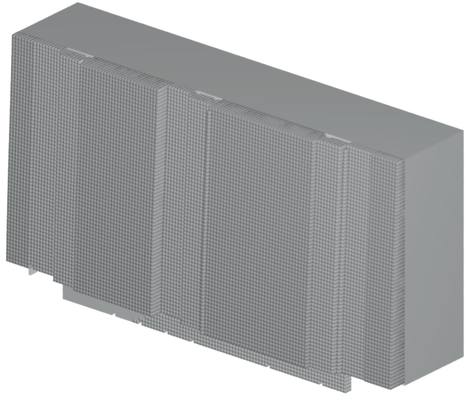
resulting geometric strategy within defined spatial boundary

Looking at the extrusion, it becomes visible that many neighboring facade fields are object to quite different extrusion depths. This can in turn imply that these zones feature substantially different programming – for example a high non-human presence next to a high human density, that are not desirable, as well as structural difficulties.

To diminish these harsh boundaries between zones of different expressions values were approximated around that boundary through simple color-"blurring".



facade depth map



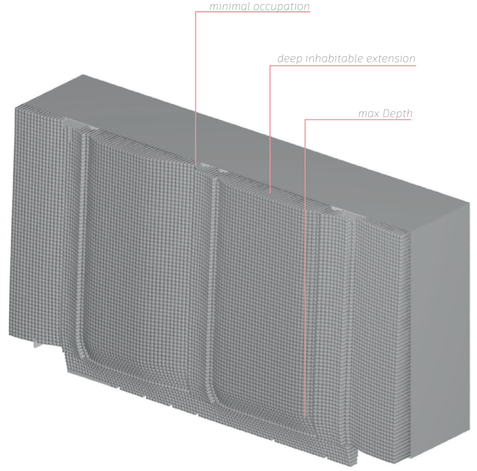
south-facade extrusion

The blurring led to less sharp edges, hence simulating graded transitions between the zones. Parallelly, smoothing creates a more uniform overall facade shape, potentially facilitating the construction of such additive-systems.

To generate the updated façade shape, the facade-pixel size was significantly reduced to achieve a correspondingly smoother 3-dimensional output.

Interpretation: It is clearly visible that above ground floor level the façade morphology is entirely repetitive, due to the identical programming on each floor, potentially diminishing the range of possibilities for animals to interact with the facade. Also, the ground floor extrusion is largely shallow, since the program doesn't afford intense human presence.

In the following chapter it is therefore investigated how alterations in building-programming can add to a bigger variety of cohabitation scenarios, also taking into account an integration of increasingly public functions. This is an important next research step, since the city of Vienna is actively engaging in vitalizing socket-zones of apartment buildings and hereby inevitably establishing new conditions for potential renovations.



blurred transitions

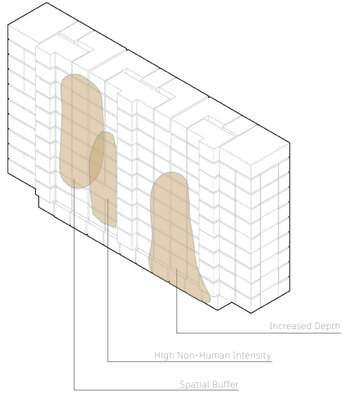
5.6. Sectional Organization

Before the conditional facade framework can be implemented in a design proposal it needs to be understood how information stored in the façade cell can be processed by the designer.

The system is capable of representing zones of high transparency or permeability among other factors, however a second party needs to step in making decisions on which material to use and where the opening is exactly located within the façade cell.

A method is proposed using sections through the generated facade extrusion assigning a certain spatial constraint to the facade pixels.

The difference in this investigation as compared to the previous one is that now not the intensity of for example, non-human and human presence, but the location and thickness of layers within the depth of the facade addition that are resulting from these intensities are becoming the focal point of the approach. Hereby, the section serves as a central tool to understand thresholds, check lighting conditions and evaluate spatial qualities.



What it can do (...)

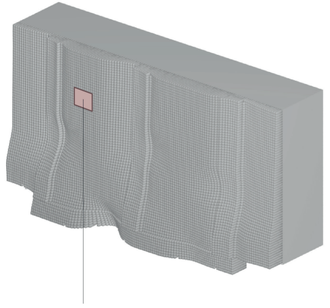
Hint on geometric expression (transparency, porosity, ..)

Give clues on materiality

Represent expected facade depth

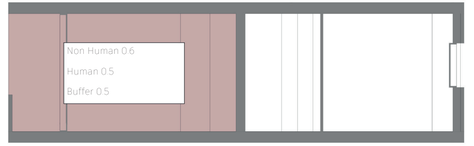
What it can´t (...)

Inform inner facade **composition and layering**

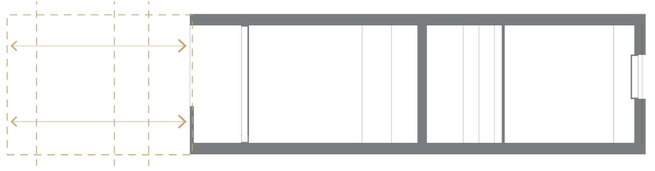


Selected Facade-Pixel

Section



Differentiated Layer Depth



The following four zones within the facade-depth are defined:

1. Human Extension: Walkable zone for collective human use, like balcony/terrace/wintergarden. Plants are found in this zone, while cavities for birds are not.

2. Non-Human Cavities: Porous zone with layered depth and niches for small animals and plants only. Zones allocated for birds constitute the outer layer of the additive façade, making the openings approachable and enabling in-flight entering. Cavities for smaller animals such as insects and lizards are found within the entire depth of the skin. Local frequency of cavities depends on values generated through the overlays.

3. Shared Edge Zone: Transition-zone with plant substrate and micro habitats that is not used by humans only. The "shared edge zone" more strongly articulated in façade zones with high human and parallelly high animal presence. Also, it only occurs in zones where species are expected to dwell that prefer little human contact. This happens in facade zones for birds such as jackdaw, common swift and House Martin. (source)

The design strategy of "shared edge" spaces includes either the use of vegetation and architectural elements as soft separators that create distance between human and animal, or a scale shift where space gradually tightens towards the non-human cavities, achieving zones with less human movement. The latter also reduce sunlight input, creating zones with dense shading.

4. Buffer: Transformation from the buffer as a field condition to an actual spatial layer. A filter zone that either regulates climate and/or provides shading, an interface (boundary zone mediating between indoor/outdoor or nonhuman/human) and a sound shield to moderate between noisy and quiet areas.

The localized need for buffers in general is determined through the previous method, providing information about whether it is multilayered and spatial or rather a single filter layer.

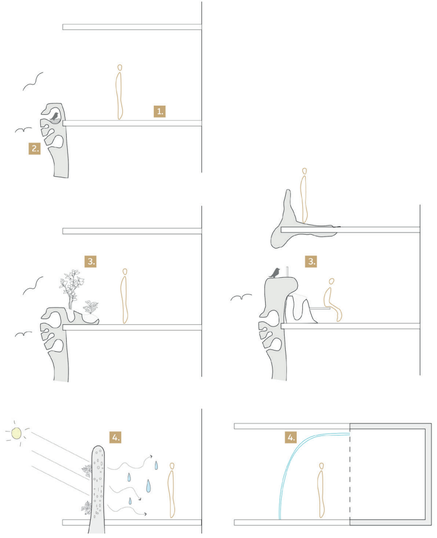
Furthermore, I distinguish between 2 basic elements that can constitute the buffer layer. The first one is a porous element that absorbs water, resulting in a cooling effect when it evaporates and filters sunlight to achieve a similar result. The second one is a transparent or translucent shell with characteristics of a wintergarden, creating a climatic threshold space between interior and exterior that can save energy.

Human Extension **1.**

Non Human Cavities **2.**

Shared Edge Zone **3.**

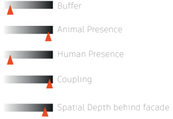
Buffer **4.**



5.7. Facade Occupation Scenarios

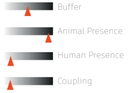
1. Intergrown Structure

Low human movement allows wildlife to take shelter within the existing building, if light supporting habitat creation reaches the depth of the spaces.



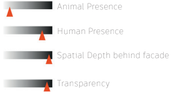
2. South-Facing Habitat Zone

Bird cavities are located at a safe distance from human activity and are placed at nesting heights suitable for selected species. South-facing positions require a buffer to protect the cavities from direct sunlight.



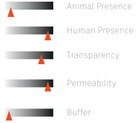
3. Porous facade layer

Deep spaces behind additive facade require a transparent shell, especially if its spaces of intense human frequency. Animal presnce will be lower due to increased human movement.



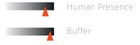
4. Permeable shell

Facade zones with high degree of openness allow free human movement. These areas do not require significant climatic buffering.



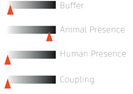
5. Inhabited Wintergarden

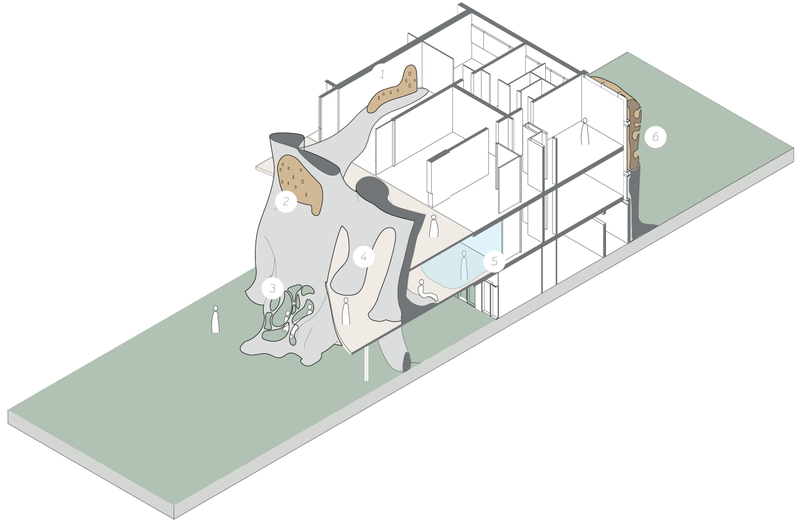
Climatically sealed zones act as thick spatial buffers high expected human presence generates large platforms.



6. North-Facing Detached Habitat Zone

Bird cavities in safe distance from ground and detached from facade-zones that do not benefit from facade-occupation and need little daylight, like stairwells.





6. Programmatic Changes

The following chapter deals with alternative building programming scenarios to test how the developed system responds to changing conditions. Programmatic change here is not understood as a neutral modification of the building usage but as a transformation of spatial intensities and interspecies relationships. For instance, human behavior directly influences the implications of proximity, exposition, sound, permeability and ecological stability in the facade system. The following scenarios therefore test the adaptability of the developed framework when undergoing changes in urban and social conditions and investigate, how architectural and ecological use renegotiate continuously.

To clarify, the programming is no random operation but based on realistic needs for program alterations within the post-war housing typology, especially in the building socket-zone.

Initially, the socket zone of the building, comprising Floor 0-2 is examined on its compatibility with possible public functions, while the remaining floors (3-9) are preserved in their original layout.

Program alterations are realized based on the following 3 criteria:

1. Urban Needs: Which public functions are missing in the area and in the city in general according to the Vienna Plan until 2035.

2. Gradient Logic: Which programs support differentiated interaction gradients between non-humans, while also promoting a level of human activity that remains compatible with the presence and well-being of non-human inhabitants.

3. Building logic: Where can interventions happen without or a minimal impact on the existing structural system.

According to the Vienna plan, socket zones of post-war residential building, especially those built between 1950-1990 including Vorgartenstraße 168, are planned to be transformed from mere building parts to active interfaces of urban life.

Necessary steps towards this goal include openness of use and structural flexibility, activation of vacant spaces and functional upgrading for mixed use.

The proposed approach will take these aspects into account and unlike traditional programming, the chosen solutions are derived from ongoing negotiation with non-human presence, creating a space that is not solely characterized animal acceptance but fosters cohabitation.



„Creative Cluster" - Vienna

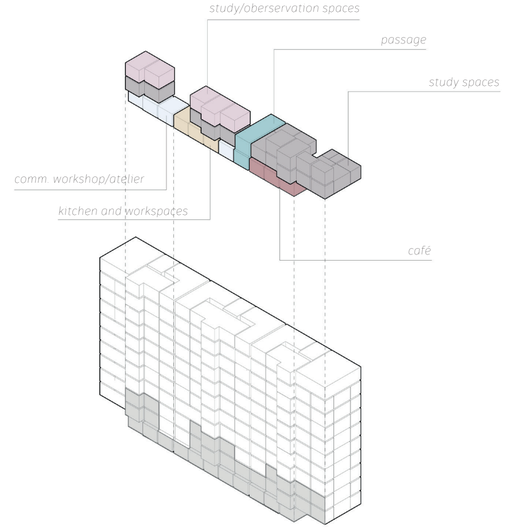
transforming former classrooms into shared spaces for artistic practice

6.1. Socket Transformation

The proposed socket solution comprises the ground floor, first and second floor.

The emphasis lies on selecting programs with contrasting and different-iated profiles, with more human-dominated zones located on ground floor and in proximity to the street, where urban interface intensity is highest, while calmer zones, featuring fewer movement, are planned on floor 1 and 2. This will parallelly foster a smoother vertical transition from public to private building zones.

The selected programs are study spaces, several community atelier/ workshop spaces and a café as the most intensely human space, all oriented towards the south. Dwelling-related functions with shorter durations of stay are in the north-facing section of the socket area.



Study Spaces:

Urban Needs: Around the 2nd district of Vienna, due to proximity to the "WU"-Campus, (University of Economics, Vienna) and hundreds of student apartments, there is an increased local demand for study spaces. Through the integration of common areas and freely accessible spaces can be used for neighborhood meetings or club activities, which increases the spatial efficiency of the building.

System Logic: Study spaces are created further away from the streets toward the deep green space on the south-facing facade. Lower noise levels are anticipated, and temperature gradients acceptable, making it a functional transition zone between human- and animal-dominated façade layers. The space can open up towards the green area, providing spaces for quiet urban sitting and allowing for the integration of plants in the environment. Long-duration but low-intensity strengthens the "shared edge" conditions and allows closer spatial coexistence between human and wildlife.

Building logic: Removal of selected facade zones, creating semi-interior and interior spaces, while no load bearing cross-walls will be taken down.

Community Atelier/Workshop:

Urban Needs: As mentioned in the "Wien Plan 2035" Vienna plans to expand on cultural infrastructure such as ateliers, workshops, rehearsal rooms and event venues. (Der Wien-Plan, 2025, p. 58) Rentable spaces can provide opportunities for non-profit organization such as „multi-pull", that aims to lower barriers to art production through formats like exhibitions, workshops, and publications. (kreative, 2026)

In this context ateliers and workshops are subtly programmed zones, that can be relevant for the buildings inhabitants and simultaneously by the public entering the space. This feeds into the strategy formulated in the plan, which aims for long-term flexibility in the design of socket zones. (Der Wien-Plan, 2025)

System Logic: Workshops and ateliers can act as a threshold between the café and quieter/animal dominated zones. Through intermittent activity patterns fluctuating gradients of occupation are created, that require spatial thresholds and more resilient ecological buffer zones. Building logic: Removal of selected facade zones, creating semi-interior and interior spaces, while no load bearing cross-walls will be taken down.

Building logic: Removal of selected facade zones, creating semi-interior and interior spaces, while no load bearing cross-walls will be taken down.

Café:

Urban Needs: The Café acts as an "attractor" for the connected urban spaces, bringing life to the socket zone, while also giving residents the opportunity to have important social infrastructure in short walking distance, which is a central goal in urban development in Vienna (Der Wien-Plan, 2025) Apart from that, it is planned to offer consumption-free sitting, functionally merging with the study spaces. Restaurants are found in abundance in the area, while spaces for consumption free sitting are a rarity, especially in proximity to greenery and shade-giving trees.

System Logic: The café sits right next to the street, in a less sensitive location from an ecological perspective. The increased intensity of public occupation results in higher permeability, while at the same time reducing conditions favorable to sensitive ecological occupation.

Building logic: Removal of selected facade zones, creating semi-interior spaces, while no load bearing cross-walls will be taken down.

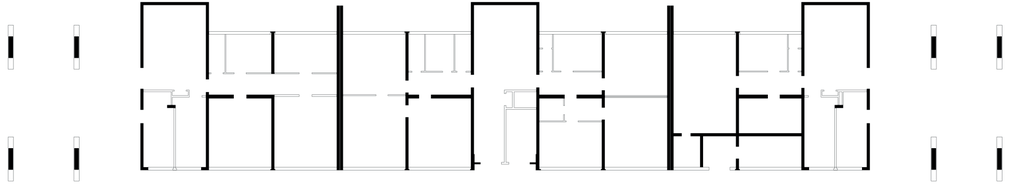
Passage:

The passage is an ecological corridor between the human-dominated Café and Study Spaces and is used largely as a zone of transition, connecting spaces on the ground floor with those on the first floor as well as creating a pathway through the building. Through its depth it becomes part of the spatial buffer between café and its adjacent functions. As some areas within the channel are decoupled from human movement, it can also serve as a shelter or passageway for animals.

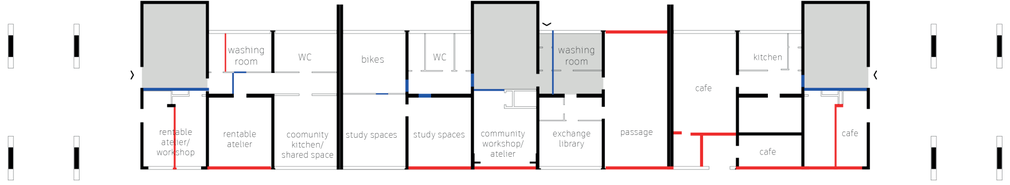
Northern façade

The northern façade houses the more sparsely used functions such bike storage, shared washing rooms and toilets serving the public functions, as well as private entrances to the staircases leading to the dwellings.

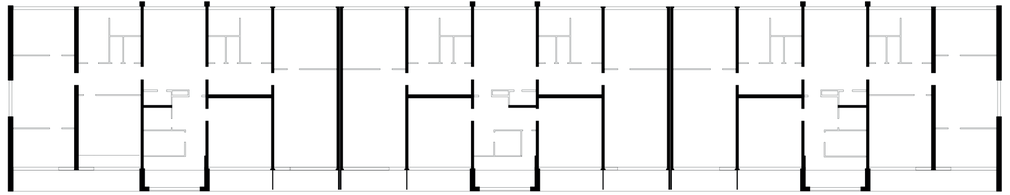
In conclusion, the introduction of new public and semi-public programs doesn't automatically improve coexistence conditions. Increased accessibility, human activation and visibility can simultaneously cause ecological disturbance through acoustic exposure or potentially lead to stronger competition between species. It is important to state that the framework doesn't seek to create a stable condition, but rather negotiates temporary and changing balances human occupation and ecological resilience.



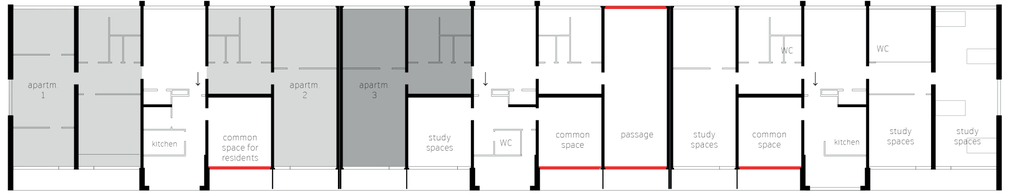
original floorplan, Floor 0



altered floorplan, Floor 0

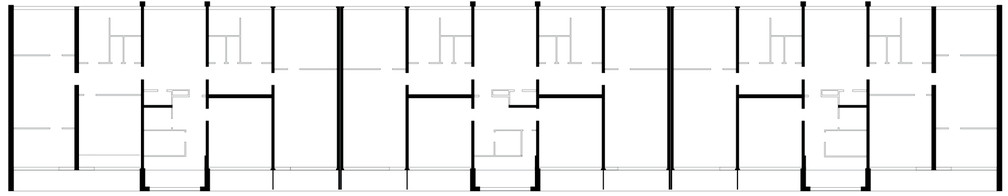


original floorplan, Floor 1



altered floorplan, Floor 1

added walls
removed walls



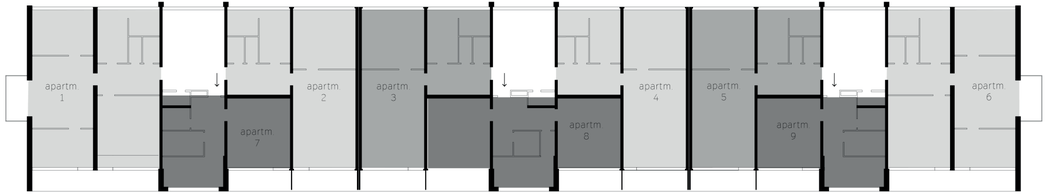
original floorplan, Floor 2



altered floorplan, Floor 2

6.2. Floor 3-9

Facade additions on floor 3-9 are attached to residential zones, preserving the building´s original use. No walls on the interior are moved or replaced, with the only intervention being the facade additions. Those are providing outdoor space shared between apartments on the same level and human-nonhuman interaction zones.



unaltered floorplan, Floor 3-9

added walls

removed walls

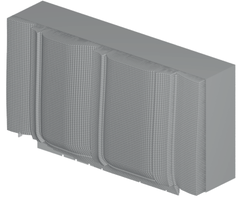
6.3. Updated Depth Allocation Model

An updated extrusion of the southern facade is generated from the value overlay, showcasing morphological changes within the envelope resulting from the programmatic changes.

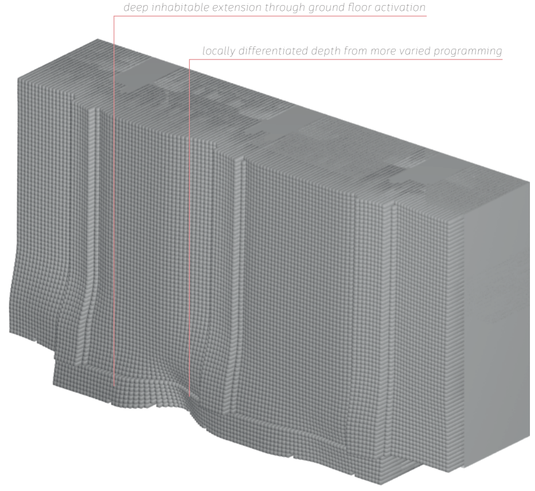
Instead of creating completely new architectural objects the modified facade geometry reflects shifts in local user-intensities resulting from the altered programming. The extrusions therefore serve as indicators of changing conditions between inhabitation, ecological hosting capacity and urban exposure.

This time the socket area is much more developed, protruding visibly from the building contour. Though the multi-level adaptations in this zone the transition is also visibly smooth between those public functions and the apartments on the upper floors.

Still, looking at the 2-dimensional facade map there are some abrupt color transitions. Given that still some programs that are less intensely human, such as bedrooms, are located adjacent to public functions such as study spaces and common areas, subsequent program changes also on upper levels could become necessary.



original extrusion (south-facing)



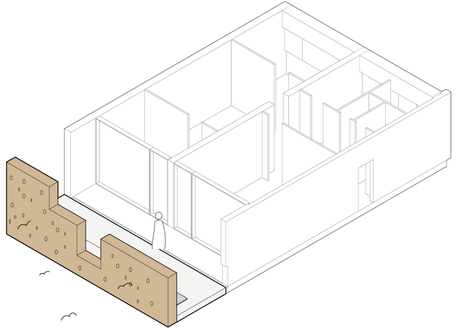
extrusion following altered program (south-facing)

6.3.1. Local shifts in depth organization

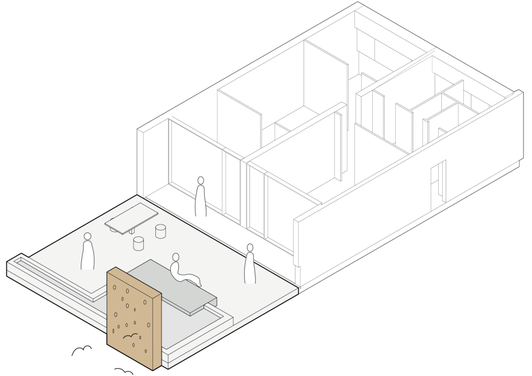
The illustration on the right-hand side exemplifies how depth can shift parallel to changing programs in the building. If, for example the same space is converted from a bedroom connected to the facade into study spaces, which happens within the program alterations, the depth of layers like "buffer", "animal cavities" or „human cavities" is impacted.

Apart from depth, also spatial organization of that depth is shifting. for instance, study spaces that appear in areas of still moderately high expected wildlife presence, threshold spaces connecting human and animal zones, like the "shared edge zone" need to be more strongly articulated, since human movement will be higher than around bedrooms.

In the diagram a system of plant-pods and platforms for seating mediates between strictly human and animal zones within the facade depth, facilitating unobstructed access to cavities for birds.



unaltered apartment



possible spatial response to program change into Study Spaces

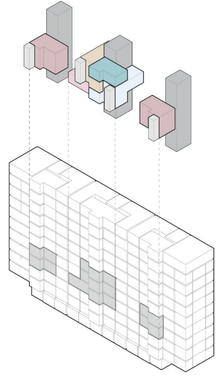
6.4 Program Alterations

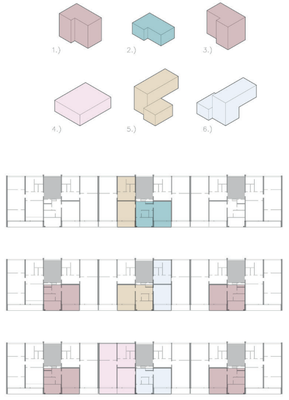
I propose introducing a layer of duplex apartments separating socket and remaining apartments. An advantage this strategy could carry is that zones with higher human presence like living rooms and kitchens can be planned in the 1st level of these apartments, locating them in close proximity to the public functions.

The following diagrams depict this scenario on a system-level, where the apartment adaptations are only represented by the corresponding color-value changes on the façade map and are not further developed in plan.

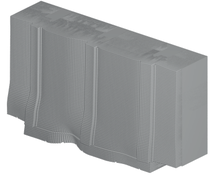
The aim is hereby to showcase how the feedback derived by color-based facade extrusions and the connected 2d-gradient can inform steps to further optimize the system created.

In the following design proposal these apartment changes are considered to produce the overall façade expression, while a detailed solution is only created for the ground floor, 1st floor and 2nd floor, as discussed in the previous chapter.

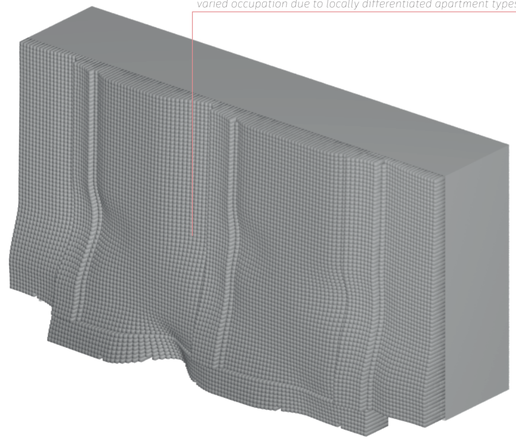




To summarize, the programmatic scenarios demonstrate that the façade-system functions less as a fixed architectural solution but a responsive spatial framework, that can adapt to shifting urban, ecological and social conditions occurring. Instead of creating stable forms of cohabitation, the project proposes an architecture of negotiated gradients, where occupation remains layered and continuously subject to transformation.



previous extrusion (south-facing)



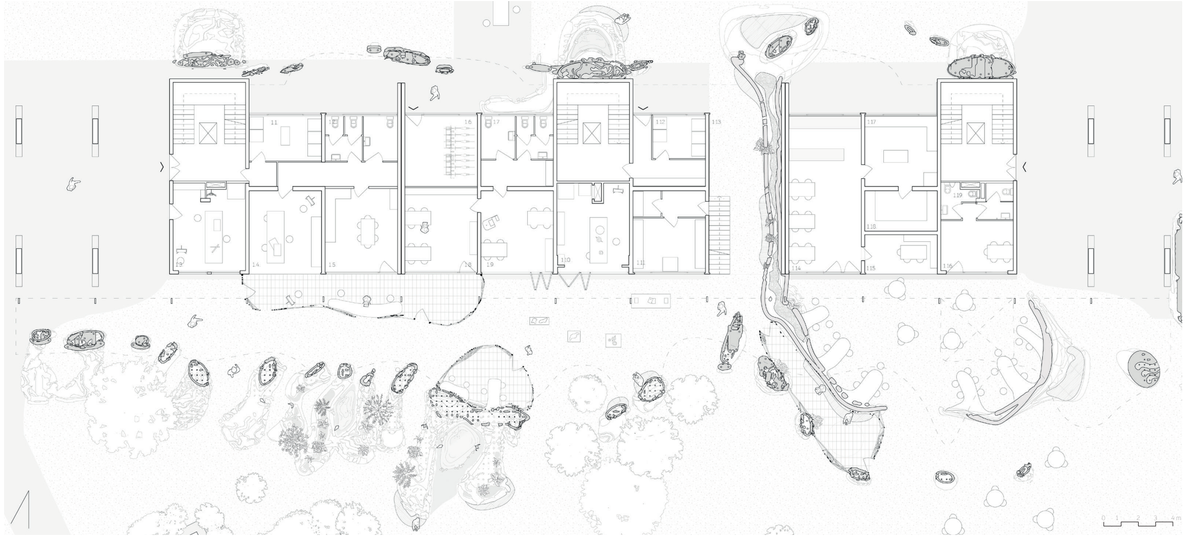
extrusion following altered program (south-facing)

7. Design Proposal

The following chapter translates the developed conditional facade framework into an architectural proposal for the North and South facade at Vorgartenstraße 168. While previous chapters were mainly focusing on mapping, overlay strategies and sectional organization, the design investigates how these spatial conditions materialize within the chosen case study.

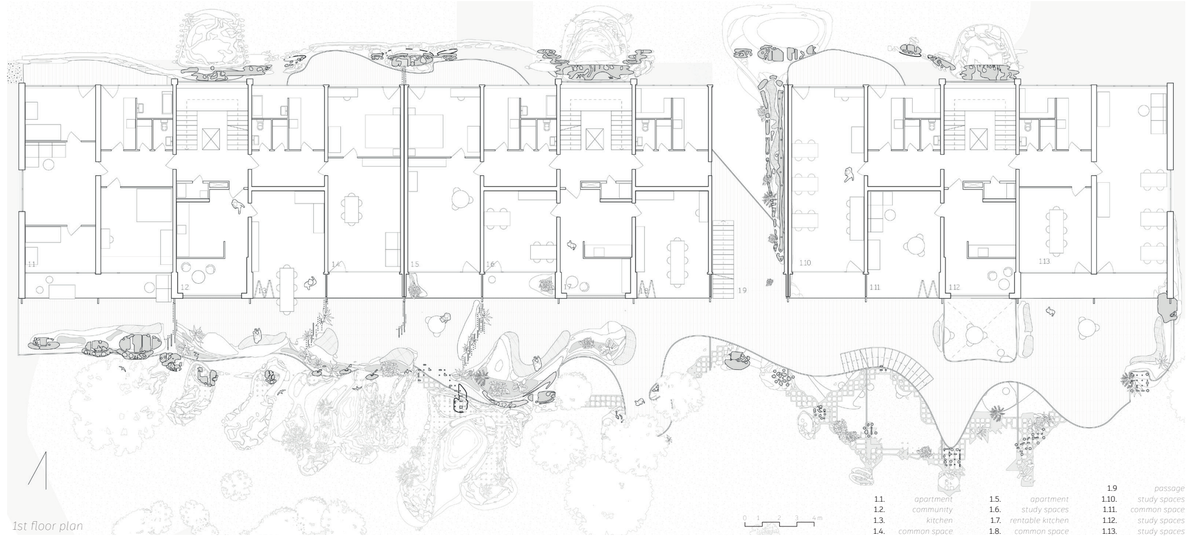
It needs to be clarified that the proposal should not be understood as a final architectural object, but rather as a potential spatial manifestation that emerges from the system and my personal way of reading it. Through sections, renderings and assembly-logic diagrams it is explored how the additive facade mediates between human occupation, wildlife occupation and the existing post-war housing fabric.





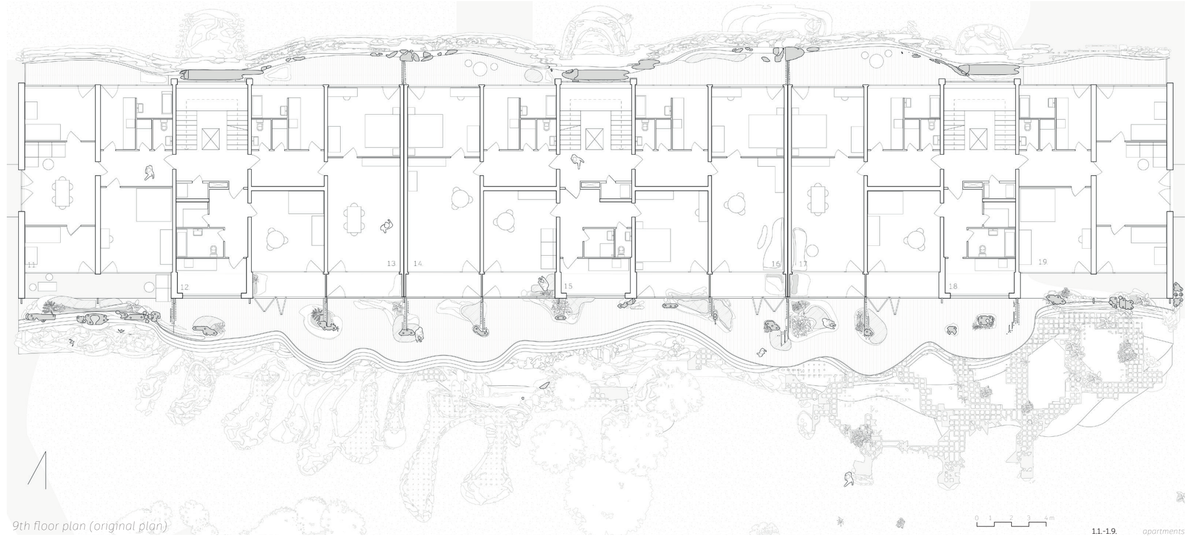
groundfloor plan

1.1. *washing room*
1.2. *WC*
1.3. *rentable atelier/workshop*
1.4. *rentable atelier*
1.5. *community kitchen/shared space*
1.6. *bikes*
1.7. *WC*
1.8. *study spaces*
1.9. *study spaces*
1.10. *community workshop/atelier*
1.11. *exchange library*
1.12. *washing room*
1.13. *passage*
1.14. *cafe, sitting area*
1.15. *cafe, sitting area*
1.16. *cafe, sitting area*
1.17. *cafe, kitchen*
1.18. *cafe, kitchen*
1.19. *WC*



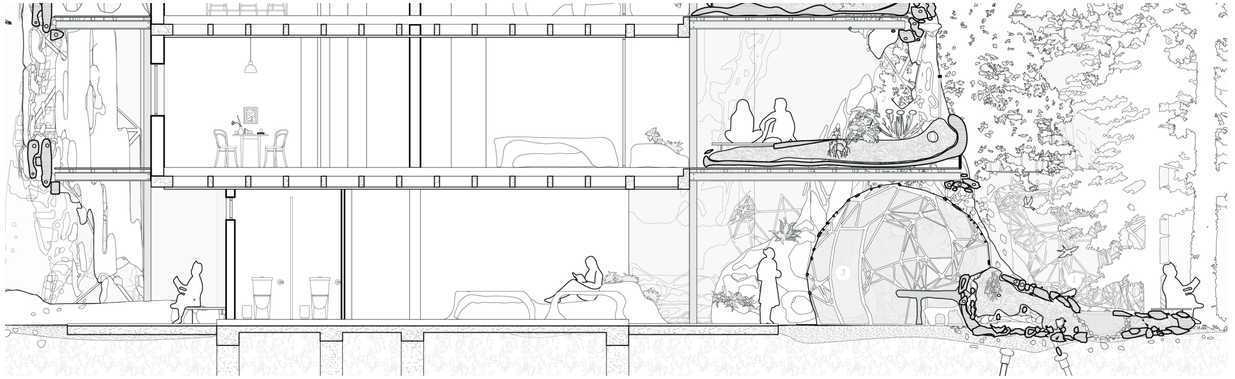
1st floor plan

1.1. apartment
1.2. community
1.3. kitchen
1.4. common space
1.5. apartment
1.6. study spaces
1.7. rentable kitchen
1.8. common space
1.9 passage
1.10. study spaces
1.11. common space
1.12. study spaces
1.13. study spaces



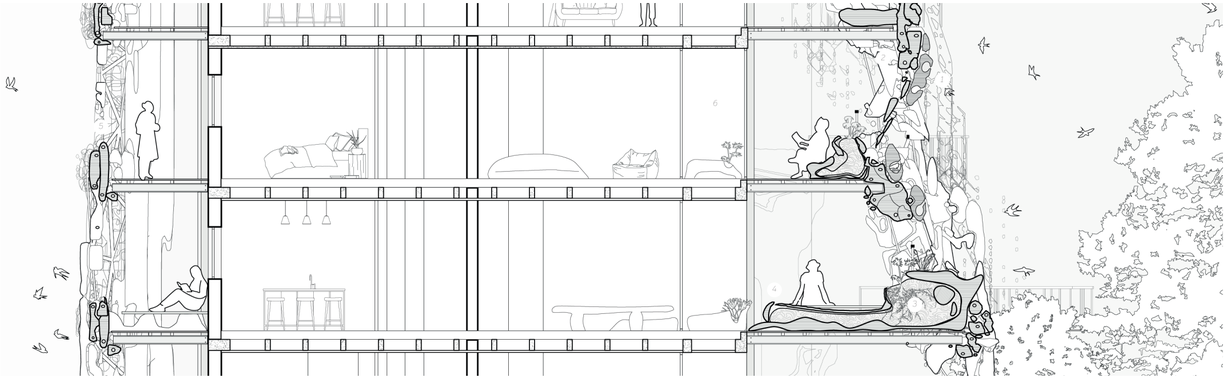
9th floor plan (original plan)

1.1.-1.9. apartments



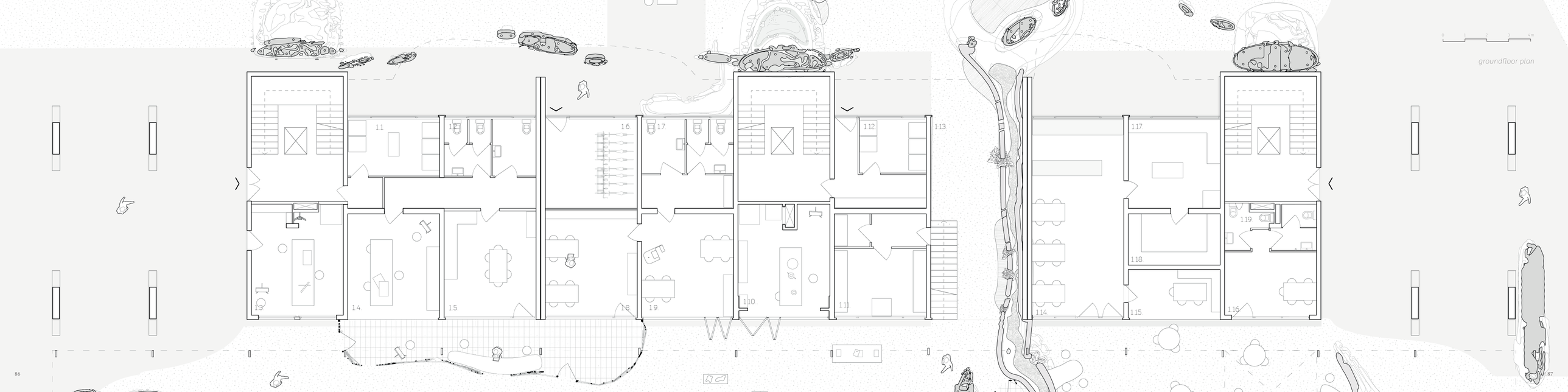
1) shared edge outside
2) shared edge inside
3) inhabited wintergarden

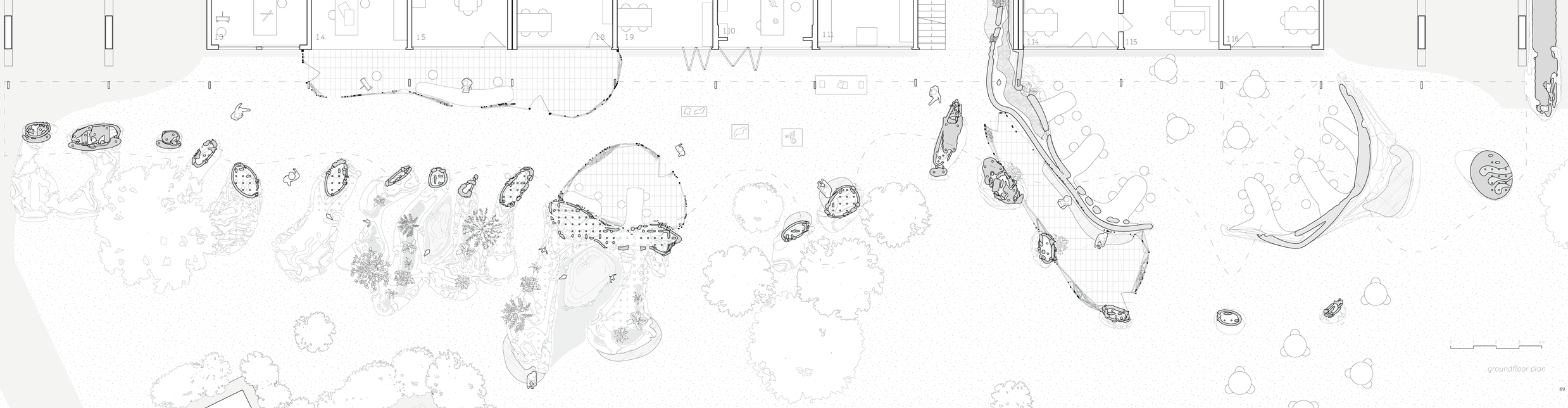
section 1:100



1) animal cavities
2) climate buffer
3) plant substrate
4) seating
5) exposed structure
6) inhabited wintergarden

section 1:100


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groundfloor plan



groundfloor plan

7.2. Spatial Experience



Interior View



Inside Facade



Perspective

7.3. Facade Assembly

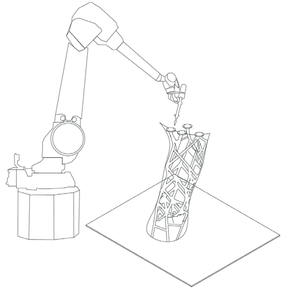
Since the facade system features locally differentiated depth including smooth morphological transitions the fabrication will most likely require digital assistance. The proposed strategy includes a prefabrication of part and in-situ assembly. Through this, the system becomes scalable, with the extent of intervention depending on local factors.

In this case-study the whole southern and northern facade is considered which suggests a steel-mesh construction. Hereby, the parts are assembled robotically, creating a steel mesh, where secondary structural or non-structural elements can be bolted or hung. Screwing foundations are attached to the mesh, enabling even load transfer.

The ecological cavities are 3D printed in clay enabling a high degree of porosity and local geometrical variation and either hung or on top or into the mesh. Over time seeds and water can be trapped in the porous structure, fostering plant growth within the building skin.

Human platforms made of wooden planks are assembled on a steel sub- construction following the dimensions of the facade-pixel. The steel frame is then mounted onto the façade-mesh, that takes in occurring shearing-forces.

As a result, the whole system becomes self-standing and only needs to lean on the exiting building, making it independent from the structural integrity of the original building.



Steel Mesh

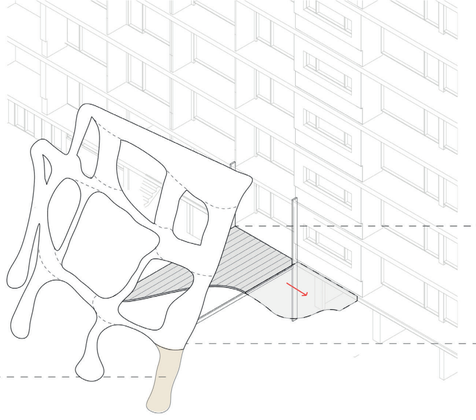
Primary elements of construction that are prefabricated.





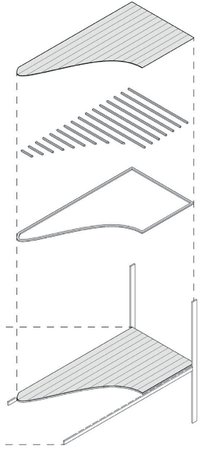
Ecological Infill

Cavities for animals and plants are prefabricated in Clay and attached to the scaffolding.



Wooden Platforms

Primary facade-extension and walkable zone. Beams carrying the platform are rested on the facade frame.











8. Discussion

8.1 Cohabitation and Comfort

With this thesis I question anthropocentric principles in architecture and explore what it means to give animals agency in interacting with manmade structures.

Within the proposed facade systems animals can appropriate spaces, while having the opportunity to retreat and maintain distance to any human activity.

This certainly raises the question about comfort among humans, since it is traditionally welcome to keep any unwanted animal intruders out of the human realm.

I, however, believe the eventual success of my proposed system depends not solely on human satisfaction but much more on the success of the negotiation. Certainly, living in immediate proximity to animals will cause reduced daylight input in selected zones, but at the same time animals can inhabit human structures previously inaccessible, resulting from the reduced visual connection to the human dwellers and reduced exposure to zones of intense movement.

On the other hand, there are also highly transparent zones within the facade featuring fewer cavities and extensive platforms to step onto the structure that serve predominantly the human dwellers.

In areas that are not walkable, for example, humans might still be able to sit within or in proximity to the structure, benefitting from the cooling effect originating from porous structures and the proximity to vegetation that comes with it.

In essence, rather than establishing fixed areas for human and non-human dwellers, this project consciously works with conditions of controlled ambiguity. The facade doesn't prescribe stable ownership but enables changing degrees of retreat and temporary cohabitation. This implies that occupation can never be completely controllable or predictable. Certain ecological processes can, for example, intensify unexpectedly, while human appropriation may also shift over time in ways the system cannot predict. The thesis therefore understands coexistence not as a resolved balance, but a continuing negotiation between control and openness.

At the same time, it is sure that not everyone will like a proposal that is so clearly different to the implications of living in these buildings today and very opposed to those of residential architecture in general.

The buildings at Vorgartenstraße are a perfect example of architecture where the proximity to "nature" is desired, as seen with the generous greenspaces, but the thought of living "within" it profoundly alien.

With this thesis established spatial boundaries of post-war housing facades are questioned. Expanding the existing building skin with habitable, ecologically active layers will inevitably challenge implications of privacy, maintenance, ownership and domestic comfort. The project here doesn't expect universal acceptance of these shifting living conditions but regards them as a contribution to broader discussions on how housing needs to adapt to ecological pressures and changing concepts of coexistence in the city.

8.2 Reflections on the Method

Beyond questions concerning coexistence and spatial occupation the project also raises questions concerning limitations as well as agency of computational methods in the architectural praxis.

In general, the facade-field method is always only a suggestion and a hint on how facade expression is articulated and will not replace the designer, making decisions that consider atmospheric and unmeasurable values within the architecture. This is why the facade conditions generated should not be interpreted as deterministic results, but rather as informed spatial tendencies that emerged from overlapping environmental, ecological and program-based data. Architectural decisions will eventually demand interpretation and a continuing negotiation between the actual measurable input and more atmospheric and experience-related qualities, that cannot be fully quantified within the Conditional Facade Framework.

For instance, assumptions made about the influence of certain building programs on the façade expression, meaning human presence, animal presence or buffer were made by me, partly based on personal experience and can consequently be to a much larger part based on actual measurable data.

This might include investigations into the amount of artificial light that is emitted from certain room typologies, availability of human scraps as food, exact movement and sound documentation and so on. All these factors can influence the value ultimately assigned to the façade field in the form of greyscale values.

Although the method, even though an overlay of multiple factors, might lead to a somewhat accurate result, it is of course often nuances that decide about the success of an architectural solution. The overlay itself can be considered modifiable, since its human decision-making defying the output.

However, it can serve as a valuable tool to analyze the potential of space, providing data that suggests, for example, the material properties to look out for. Also, it is in my opinion a strength that there is the chance to make decisions throughout the process, fighting the threat of seemingly universal solutions. In architecture there is always a context to consider, and one might afford a more animal-tailored solution than the other, which may change the intensities in which different factors are superimposed on each other.

There is no unambiguous way in which street proximity influences bird-nesting cavities but the method provides a tool to become aware of the fact that there are always multiple interacting factors that condition a context.

Furthermore, it should be considered that the long-term ecological development of the proposed system remains unpredictable. Factors such as growth of vegetation, seasonal usage, material aging and changing forms of human appropriation might significantly influence the spatial character of the facade over time. For this reason the project should not be understood as a static architectural object, but one that is shaped and constantly redefined through ongoing contextual transformations.

8.3. Additions following thesis presentation

The discussion following the thesis presentation was led by my examiner Per-Johan Dahl and featured an external critic and a school-internal critic, being Wiktor Bergh and Adreea Marcu.

An important question that was raised during the discussion was, where specifically generative input stops informing the design output? This question was also referring to my own experience on where generative steps enrich the process and where they need to be accompanied by interpretation and response.

Throughout the thesis computational tools such as mapping, overlay generation and depth allocation have been used to produce spatial tendencies, facilitating the management of large amounts of contextual and typological information simultaneously. The results always describe relations between different influence factors by introducing a common mode of representation through greyscale values. However, at every stage of the process, the architect or designer gets involved by deciding on what spatial response follows the presented values.

I would describe the design process as a non-linear one, where generated results inform morphological expression that again influence following generative steps. For instance, the "depth allocation model" is generated as representation of layer thickness, that itself is conditioned by data saved within the individual facade pixels, which is interpreted to define the maximum thickness of each facade layer.

It is this negotiation between computational generation and architectural interpretation during every design step that allows the project to be tailored to the exact context it is applied to.

Interestingly, the role of architectural interpretation increases with the development of the project from information processing toward actual inhabitation. With decisions revolving around spatial organization within façade depth, material articulation, atmosphere and sectional observations, architectural judgment inevitably grows in importance. The thesis argues that computational generation decreases in relevance, when the process moves closer to lived spatial experience.

This reflection also addresses another question raised during the presentation, asking whether the proposed façade design was an inevitable consequence of the system itself.

It can be stated that it is not, since the "conditional facade framework" as a proposed system of transforming post-war housing is developed to organize internal and external factors that can inform spatial tendencies within an additive system. However, decisions about materiality, construction or species considered among others in the design depend very much on the context the investigated building is situated in.

Another question that emerged referred to the projects position towards the term "ecocentrism".
During the design process, questions concerning the role of "ecocentrism" within architectural practice have emerged. While the thesis intentionally questions anthropocentric understandings of housing, trying to implement spatial opportunities for non-human occupation, it nevertheless remains fundamentally embedded in human decision-making.

Species selection, mapping systems, spatial translation and construction logic remain fundamentally human decisions.
That is why I claim that the project cannot be understood as an attempt to completely abolish anthropocentric architecture and replacing it with "ecocentric" design but is rather researching how architectural space might negotiate relationships beyond exclusively human priorities.

The thesis therefore positions itself less as an ecocentric proposal, but much more as investigation into mediated forms of coexistence within the post-war housing typology.

At the same time, the introduction of ecological occupation to human-dominated spaces raises questions about control and authorship. Through the organization of habitats, definition of occupation-gradients and assigning of ecological capacities a risk arises that ecological processes become curated systems. For this reason, the thesis actively accepts that ecological use will eventually remain uncontrollable to a certain degree and architectural interventions can ultimately only create conditions of possibility rather than predetermined ecological outcomes.

9. Conclusion

This thesis investigated how post-war housing facades can be interpreted as spatial interfaces, capable of mediating between human occupation, surrounding ecological systems and the existing urban fabric.

Through the development of a "Conditional Facade Framework" the project explored how typological and context-derived information can influence the spatial expression of possible additive systems, that connect to the exiting building skin. Hereby, instead of producing deterministic architectural results, the method organizes spatial tendencies, that can be translated into habitable depth and differentiated forms of use.

Breaking with traditional forms of renovation that predominantly focus on energetic improvement, the thesis generates arguments for additionally improving spatial and ecological capacities of the typology. By introducing occupation gradients, layered thresholds and differentiated forms of proximity the facade becomes a thick inhabitable space.

Ultimately, the project does not try to create a singular architectural solution or a completely ecocentric form of dwelling. A more fitting description would be the facade as a spatial field, where occupation, ecological performance and architectural expression are objected to constant transformation, resulting from an ever-changing context.

End of Thesis Report

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