VILLAGE NO SPRAWL

07-05-2024

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Sustainable Densification Of Villages Along Prague's Periphery

Location:

Prague, Czechia

Year:

2023/2024

Architectural Institute in Prague

School of Architecture

Bachelor Thesis

Bachelor degree in Architecture

Professor Supervisor:

Elan Fessler
Zuzana Drahotová

Individual Work

Brief:

What will HERITAGE OF THE FUTURE look like? By exploring the past and imagining the future we will get an idea for what to do today. We will have two basic parts to this semester: making city maps, and proposing specific architectural scale projects for the year 2150. Upon the assumption the population will double, and society will change (to some degree), architecture will be considered at a scale that is not quite building and not quite city.

Abstract

Key Words:

This architectural bachelor project explores the challenges faced by villages on the outskirts of Prague, focusing on defining sustainable borders to prevent sprawl, densifying these communities while maintaining quality of life, and integrating them into existing city infrastructure.

The rapid expansion of Prague's urban areas has led to increased pressure on neighboring villages, threatening their unique identity and causing environmental strain. To address this, the project proposes a comprehensive strategy that balances growth with preservation.

Through extensive research and analysis, the project identifies suitable boundaries for each village, considering factors such as natural features, cultural heritage, and future development needs. These defined borders serve to protect the villages from uncontrolled expansion while promoting compact, efficient land use within.

Densification strategies are then implemented within these boundaries, emphasizing sustainable design principles such as mixed-use development, green spaces, and pedestrian-friendly environments. By optimizing land use and infrastructure, the project aims to accommodate population growth without compromising the charm and tranquility of village life.

Crucially, the project also focuses on integrating these villages into Prague's existing urban fabric. This involves enhancing transportation networks, promoting public transit, and fostering connections to amenities and services in the city center. The goal is to make suburban living in these villages not only sustainable but also convenient and appealing to residents.

Through innovative design solutions and thoughtful planning, this bachelor project offers a holistic approach to sustainable village development on the outskirts of Prague. By defining borders, densifying communities, and integrating with city infrastructure, it seeks to create vibrant, resilient villages that thrive within the larger urban context while preserving their unique character and heritage.

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01

Introduction

City Map

Area of Prague:

496.2 km^2

Population of Prague:

1 240 000

Local Site Map

Area of Site:

2.72 km^2

Population of Site:

874

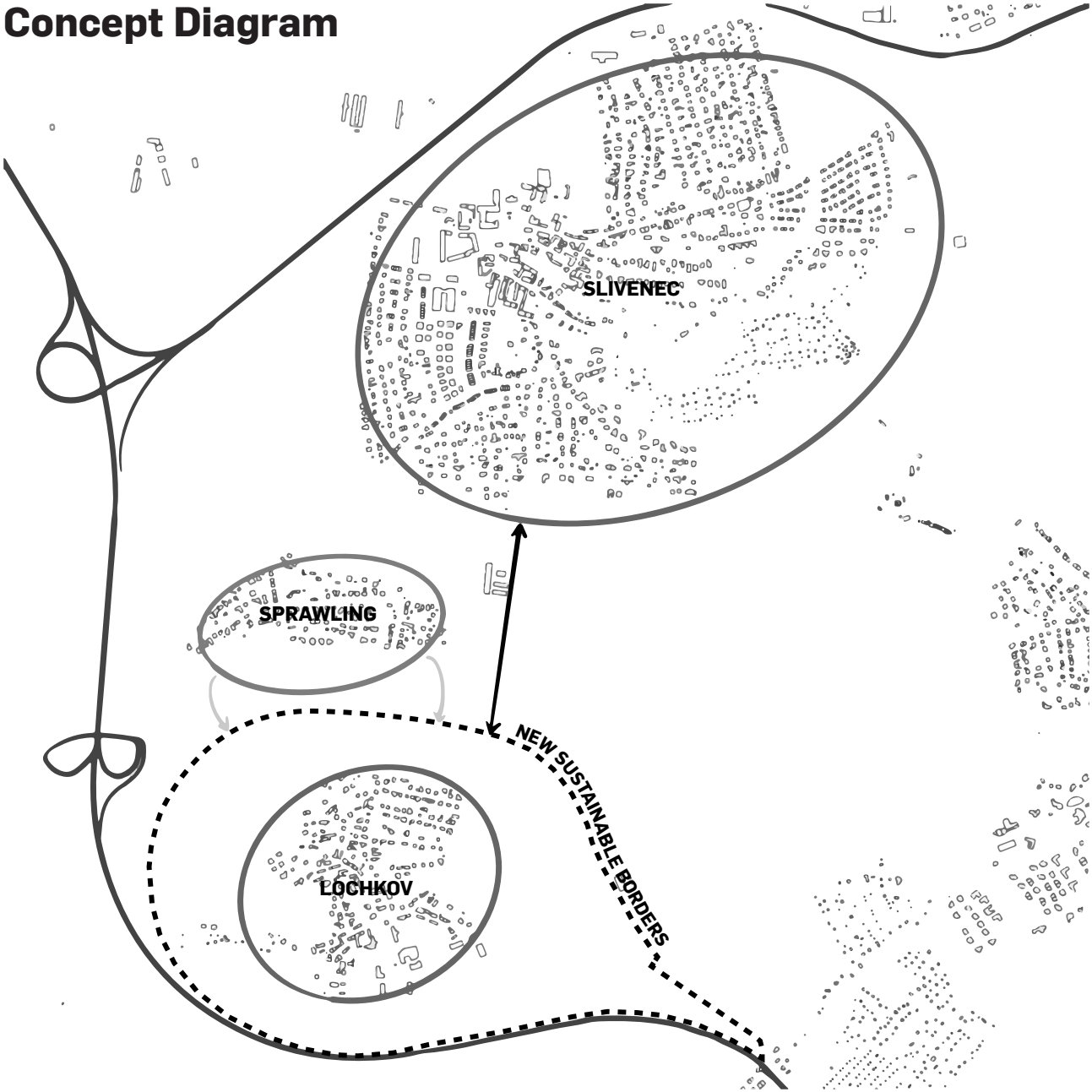
Art Inspiration

The Aesthetics of Densification

Martin Popplewell

"The Aesthetic of Densification" by Martin Popplewell encapsulates a multifaceted exploration of urban housing dynamics, particularly centered around Auckland, New Zealand. Through a narrative intertwining personal experiences, architectural analysis, and socio-economic critique, Popplewell delves into the complex interplay between housing affordability, urban planning, cultural identity, and aesthetic considerations. The artwork reflects on the tensions between different visions for Auckland's future development, emphasizing the necessity of densification while navigating contrasting approaches—detached houses versus high-rise apartments. Popplewell highlights the intrinsic value of Auckland's historical weatherboard villas and bungalows, not merely as individual structures but as components of a collective urban fabric and cultural heritage. "The Aesthetic of Densification" prompts viewers to contemplate the broader implications of urban development, urging a reevaluation of aesthetic principles within the context of social, cultural, and environmental sustainability.

Concept Diagram



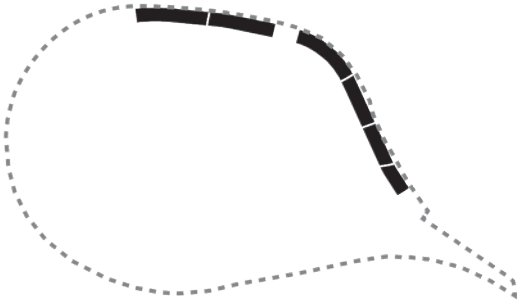
SLIVENEC
VILLAGE GROWTH
NEW SUSTAINABLE BORDERS
LOCHKOV

02

Project

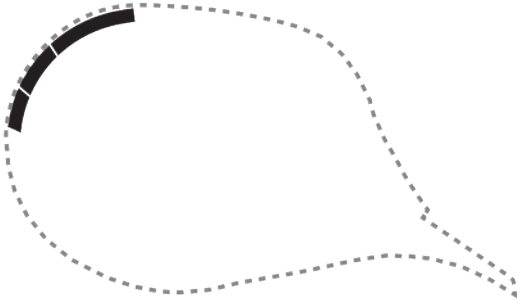
Zoning

Original Village



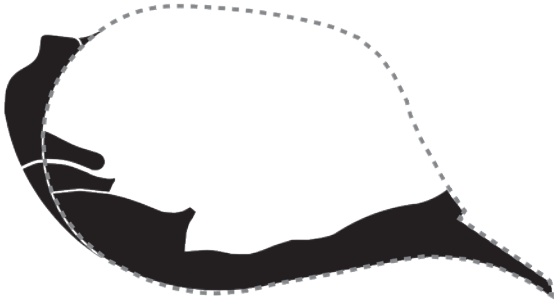
Rural Retreat

"Farm House Typology"



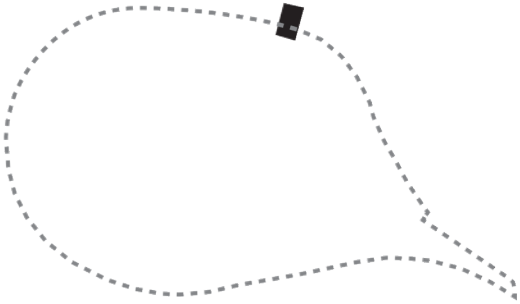
Neighbor Nexus

"Community House Typology"



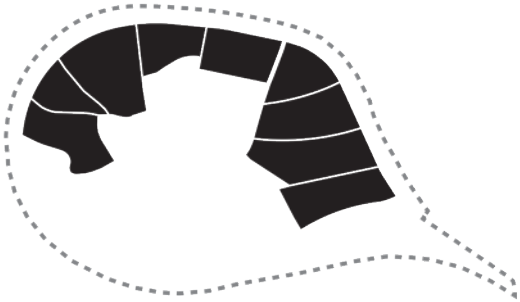
Woodland Retreat

"Forest House Typology"



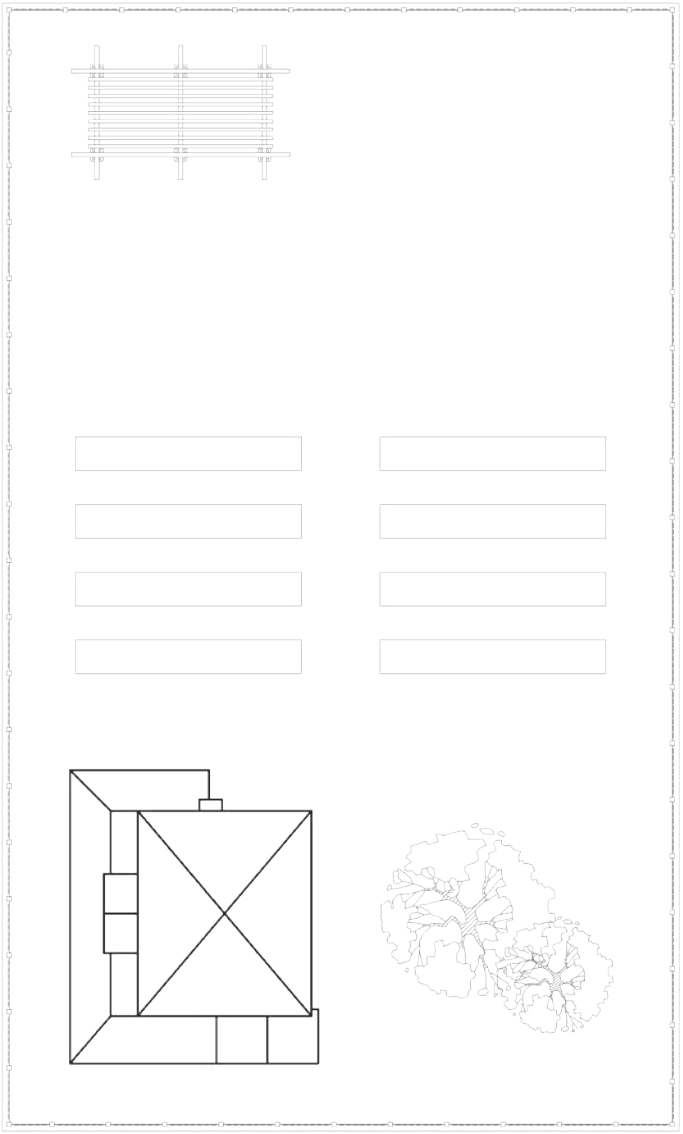
Downtown Hub

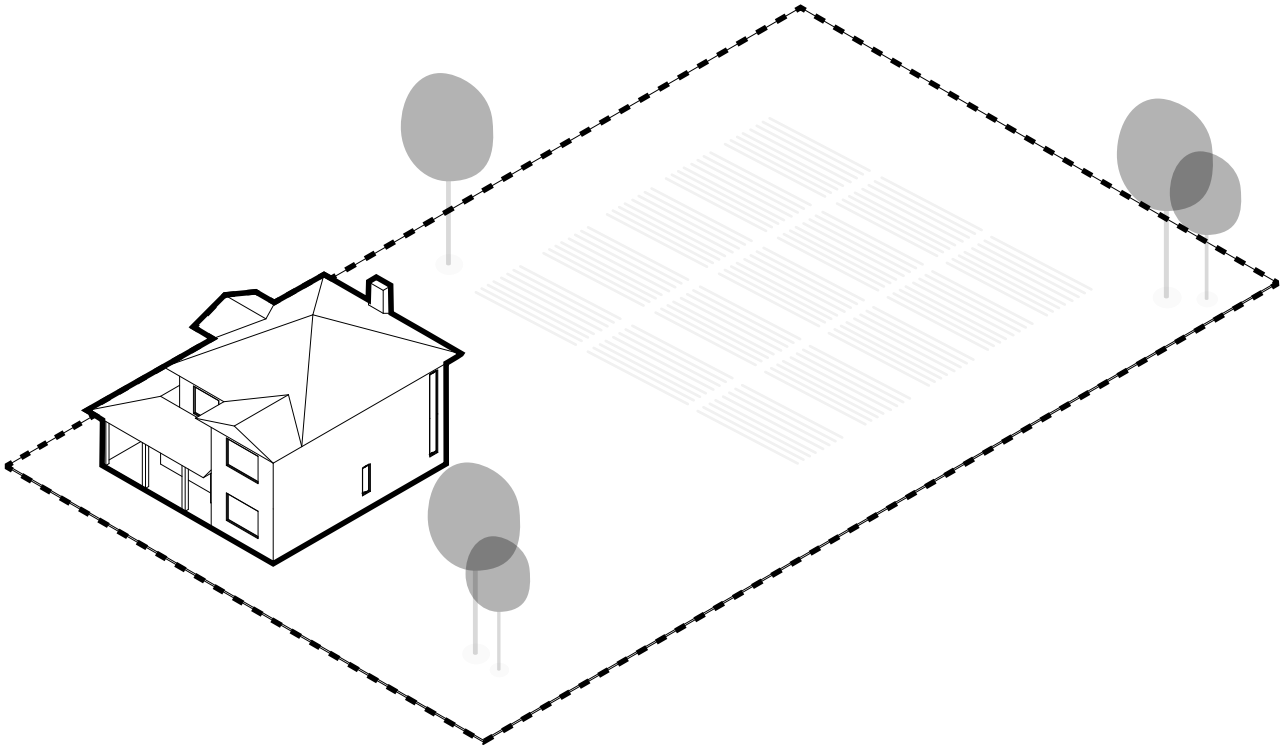
"CommercialTypology"



Village Expansion

Farm House Typology

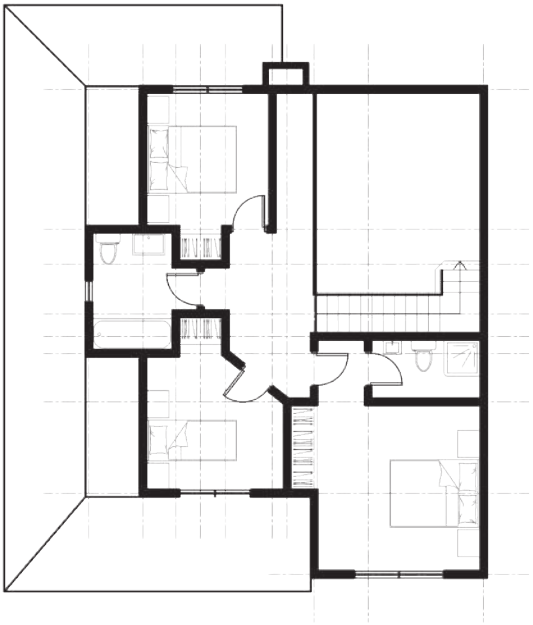


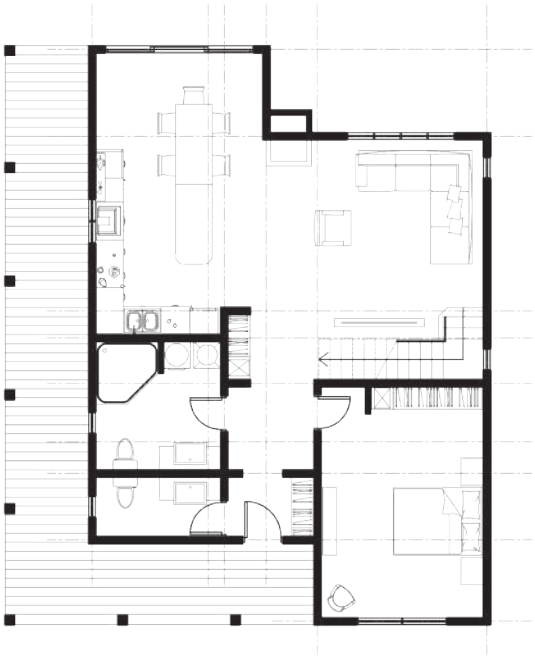


Farm House Typology:

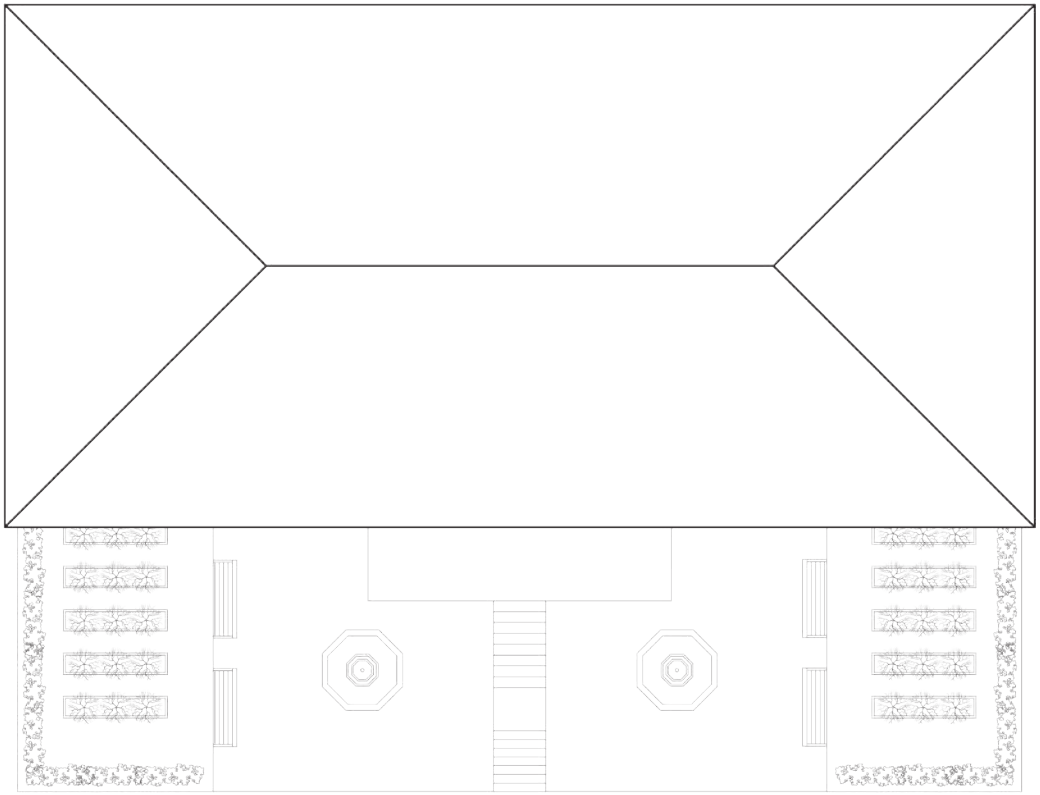
Plot Area: 1500m sq.
Built-Up Area: 200m sq.
Capacity: 4-6 People

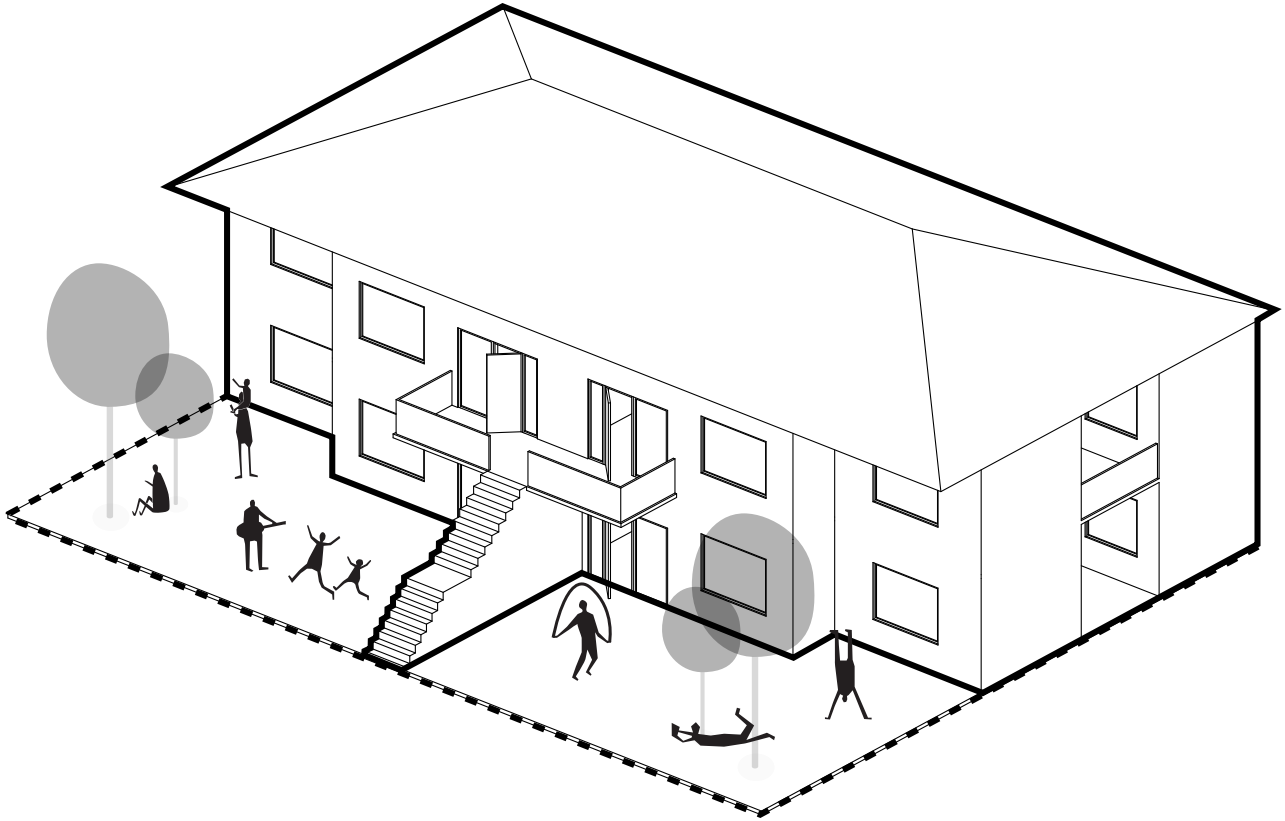
This typology is a multigenerational farm house to promote self-sufficiency and sustainability with aple space for cultivating crops, raising livestock and tending to orchads and vegetable gardens.





Community House Typology

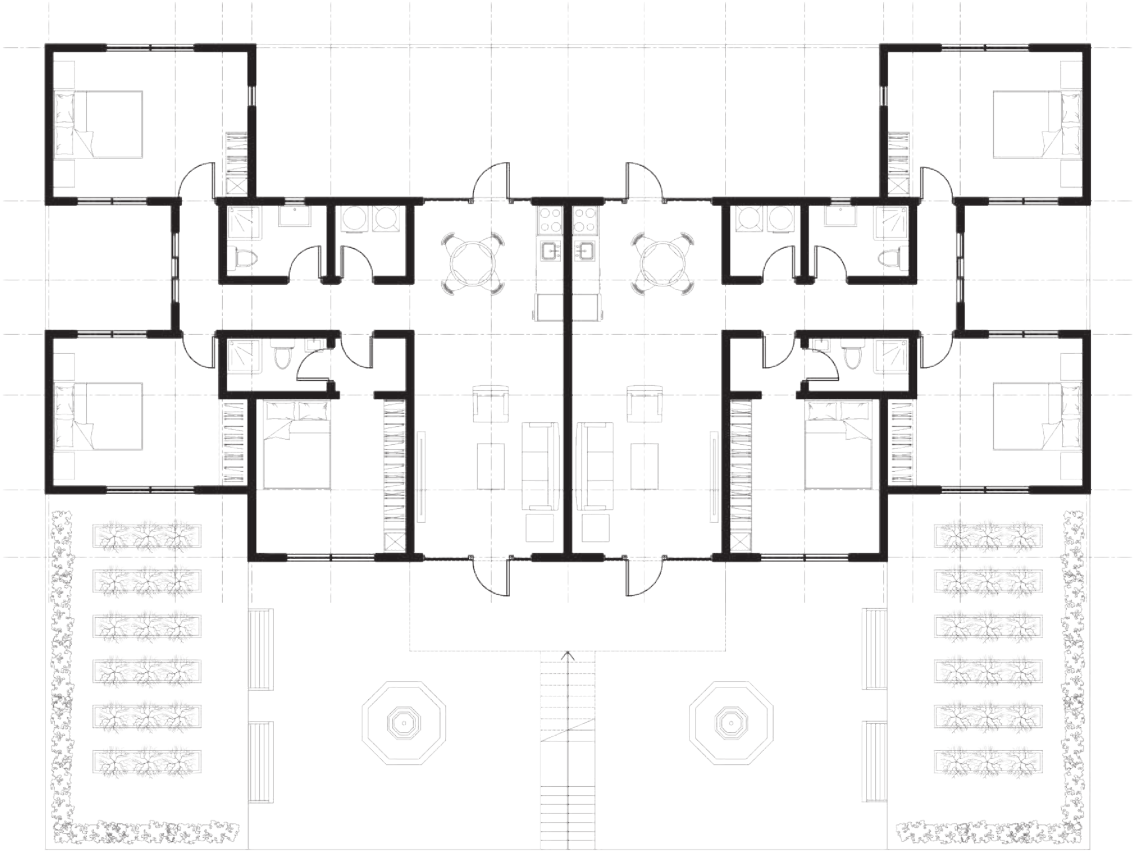


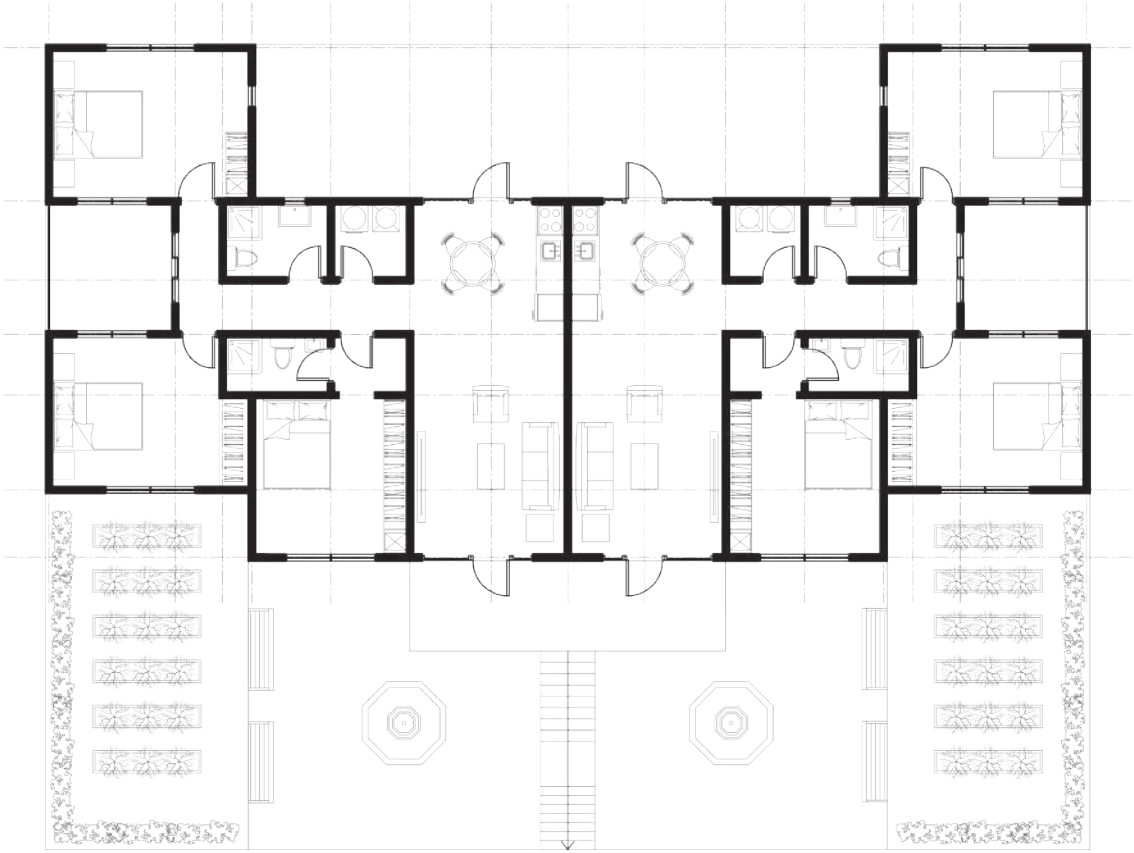


Community House Typology:

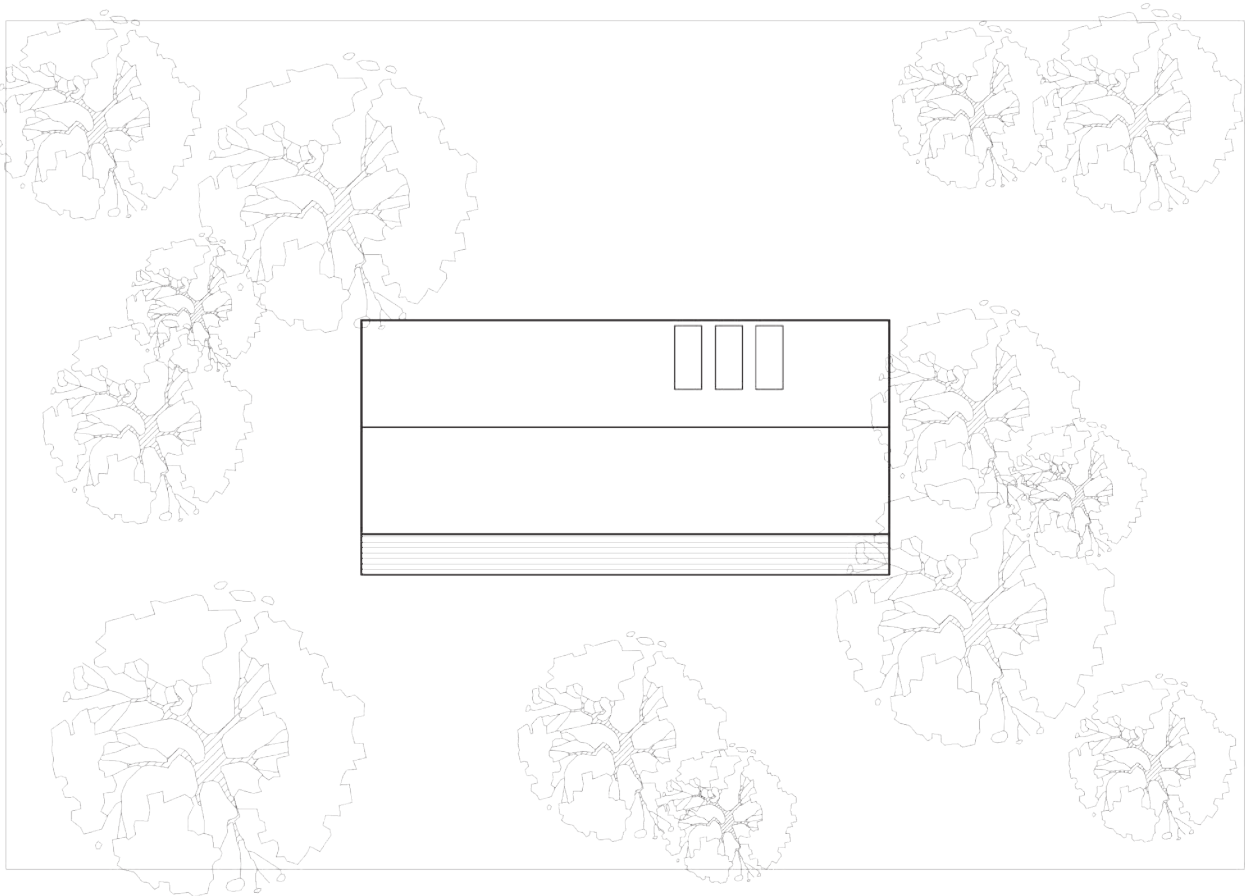
Plot Area: 200m sq. (per 2 units)
Built-Up Area: 125m sq. (per unit)
Capacity: 4 People

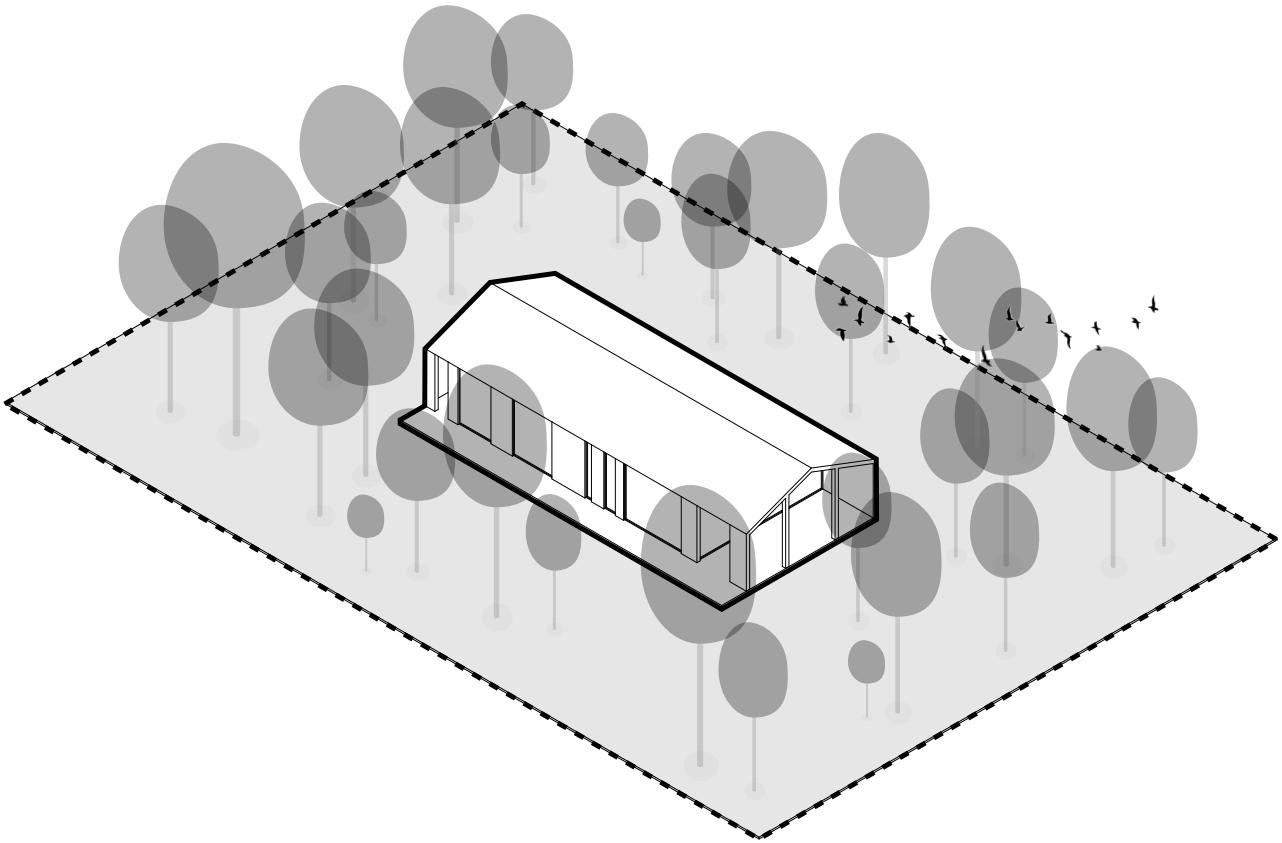
Communcal living dwellings are designed to facilitate interaction and collaboration among residents, with shared amenities and gathering spaces fostering a sense of unity and belonging.





Forest House Typology

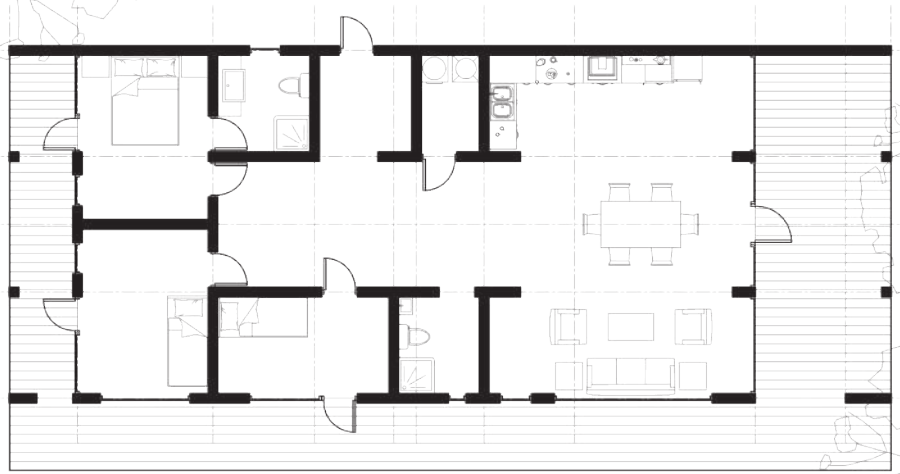




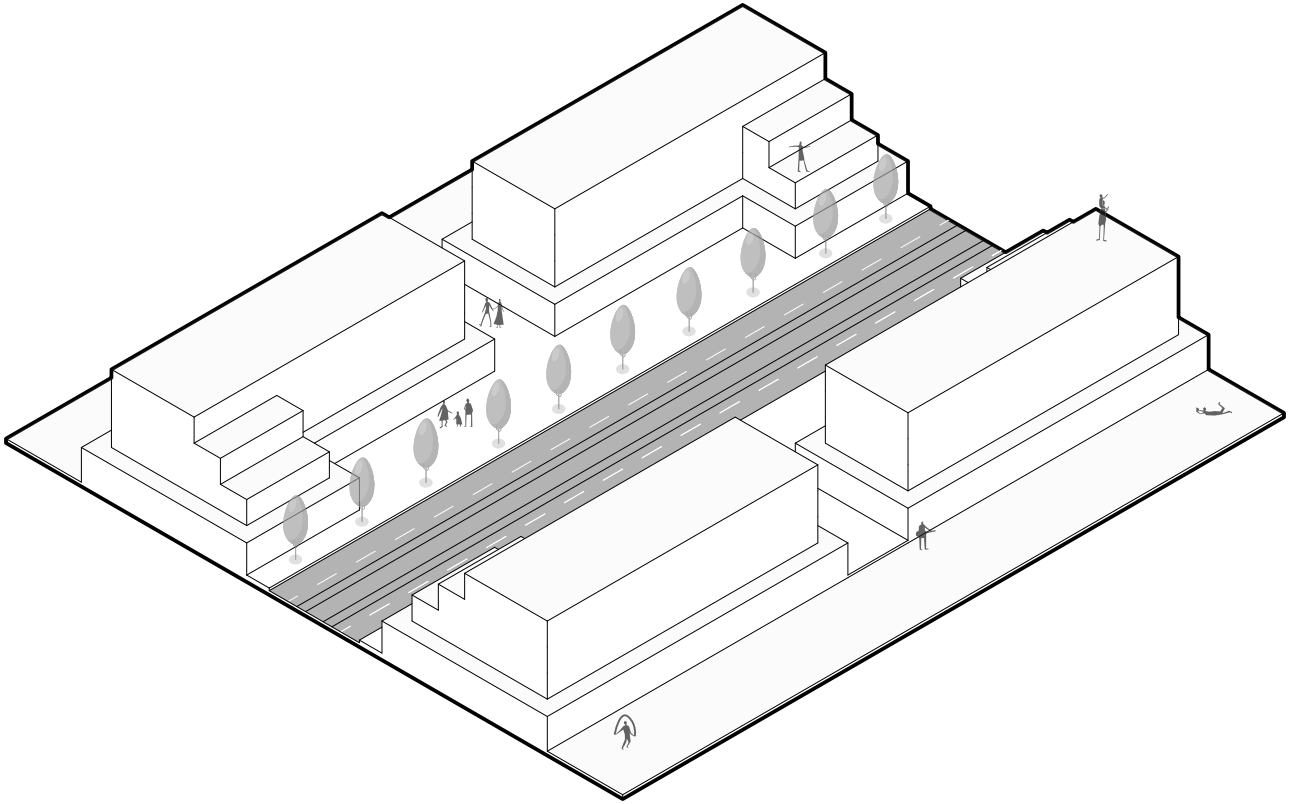
Farm House Typology:

Plot Area: No plot area
Built-Up Area: 185m sq.
Capacity: 4 People

Each Forest Retreat Residence harmoniously blends with its forest surroundings, utilizing natural materials and earthy tones to create a warm and inviting atmosphere.



Commercial Typology



Mixed-Use Commercial Typology: "Main Street Plaza"

"Main Street Plaza" serves as a vibrant hub of activity along the main road artery connecting Slivenec and Lockov. This dynamic mixed-use typology offers a diverse range of housing options, from studios to apartments, alongside ground-level commercial spaces, creating a lively and inclusive urban environment for residents and visitors alike.

Key Features:

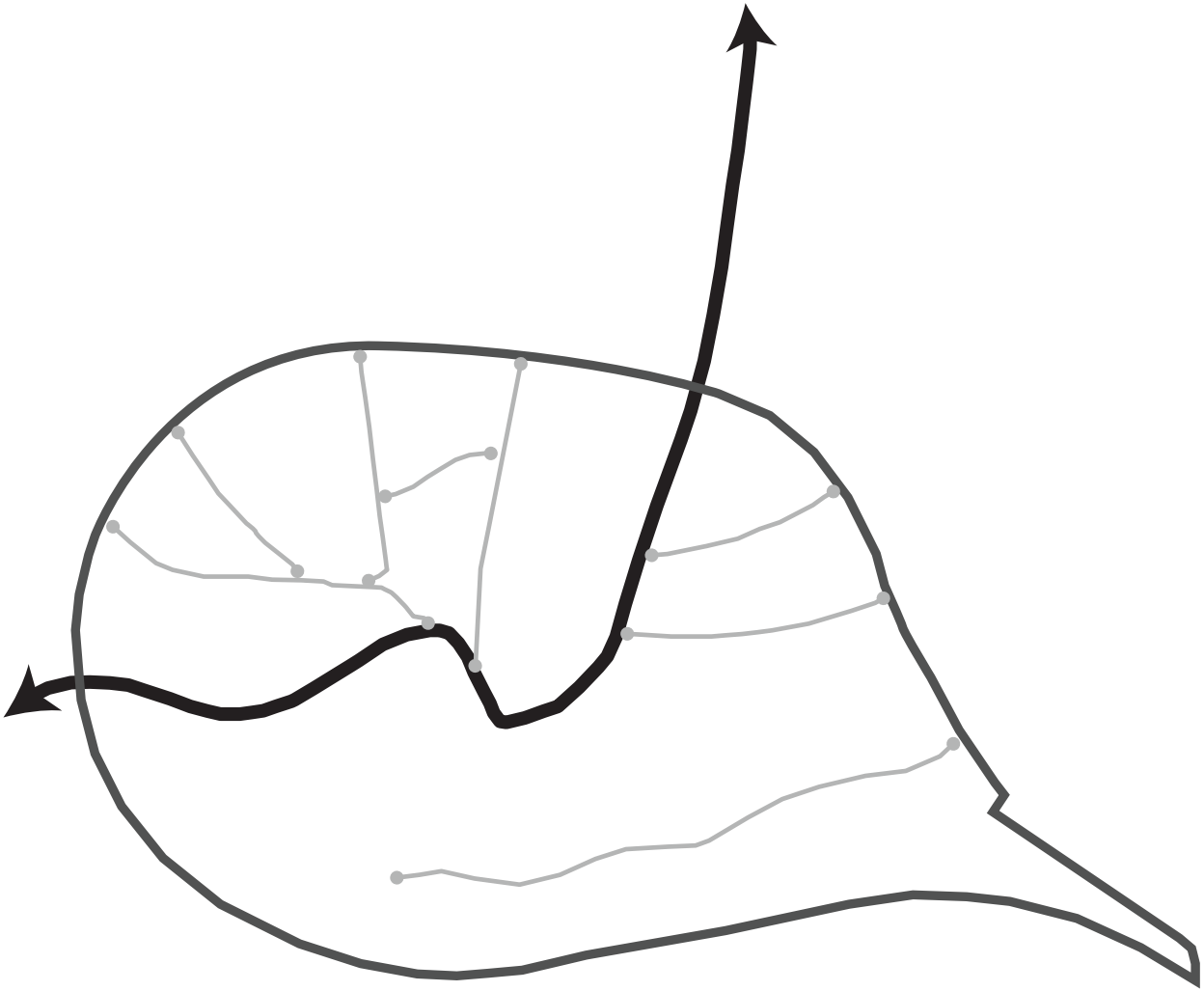
Versatile Housing Options: "Main Street Plaza" provides a variety of housing options to accommodate diverse lifestyles and preferences, including studios, one-bedroom, and two-bedroom apartments, catering to individuals, couples, and small families.

Ground-Level Commercial Spaces: Situated along the main road artery, the ground-level commercial spaces offer a mix of retail shops, cafes, restaurants, and services, providing convenient amenities and fostering economic activity within the community.

Public Gathering Spaces: Thoughtfully designed public spaces, such as plazas and pedestrian promenades, encourage social interaction and community engagement, serving as gathering points for residents and visitors to connect and unwind.

Transit-Oriented Design: "Main Street Plaza" benefits from its strategic location along a major transportation corridor, promoting accessibility and connectivity via public transit, cycling infrastructure, and pedestrian pathways, reducing reliance on private vehicles and supporting sustainable mobility options.

Infrastructure Development



Expanding Main Road Artery

Creating a Ring Road

Improving Inner Village Connections

Infrastructure development in villages is a strategic endeavor aimed at enhancing essential physical structures and facilities to foster economic growth, bolster transportation efficiency, and elevate residents' overall quality of life. Widening the **main road artery** to accommodate a tram system is often an initial step, facilitating smoother traffic flow and promoting eco-friendly transportation alternatives, thereby reducing carbon emissions and congestion. Integrating a tram into the main thoroughfare not only enhances connectivity with neighboring areas but also encourages sustainable mobility options.

Moreover, the creation of a **ring road** encircling the village serves as a strategic solution to mitigate traffic congestion within the urban core. By diverting through traffic away from residential and commercial areas, the ring road enhances safety, minimizes noise pollution, and preserves the charm of the inner village.

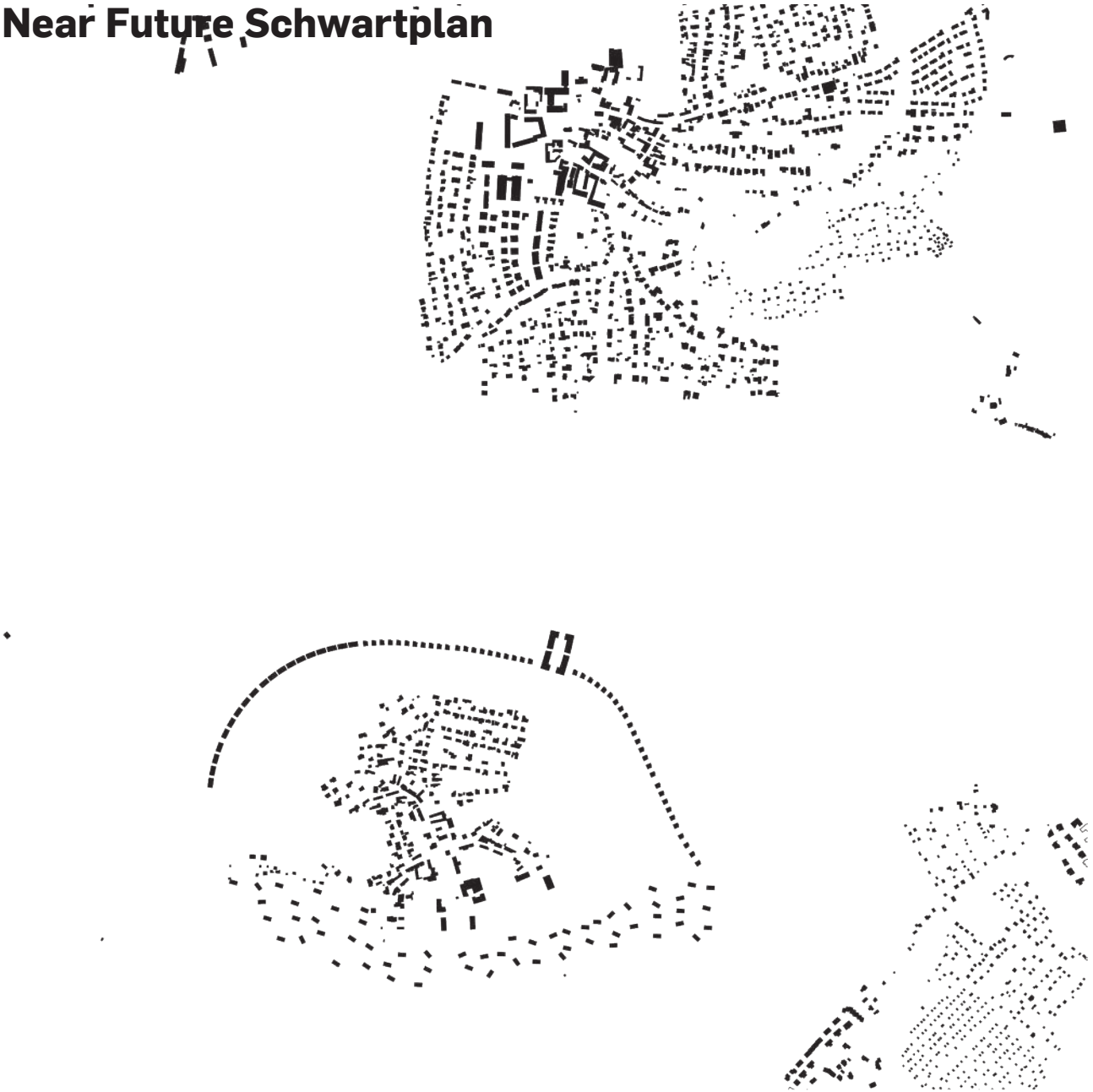
Furthermore, improving **street connections** within the village itself is pivotal for accommodating future expansion. Upgrading existing streets and establishing new connections not only enhance accessibility but also facilitate the seamless integration of new developments. Through meticulous planning and optimization of street layouts, the village can effectively manage population growth, residential expansion, and commercial development while preserving its unique character and charm.

In essence, infrastructure development in villages involves initiatives such as widening main roads for trams, creating ring roads, and improving street connections. These measures are instrumental in shaping vibrant, sustainable communities capable of thriving amidst evolving urban landscapes.

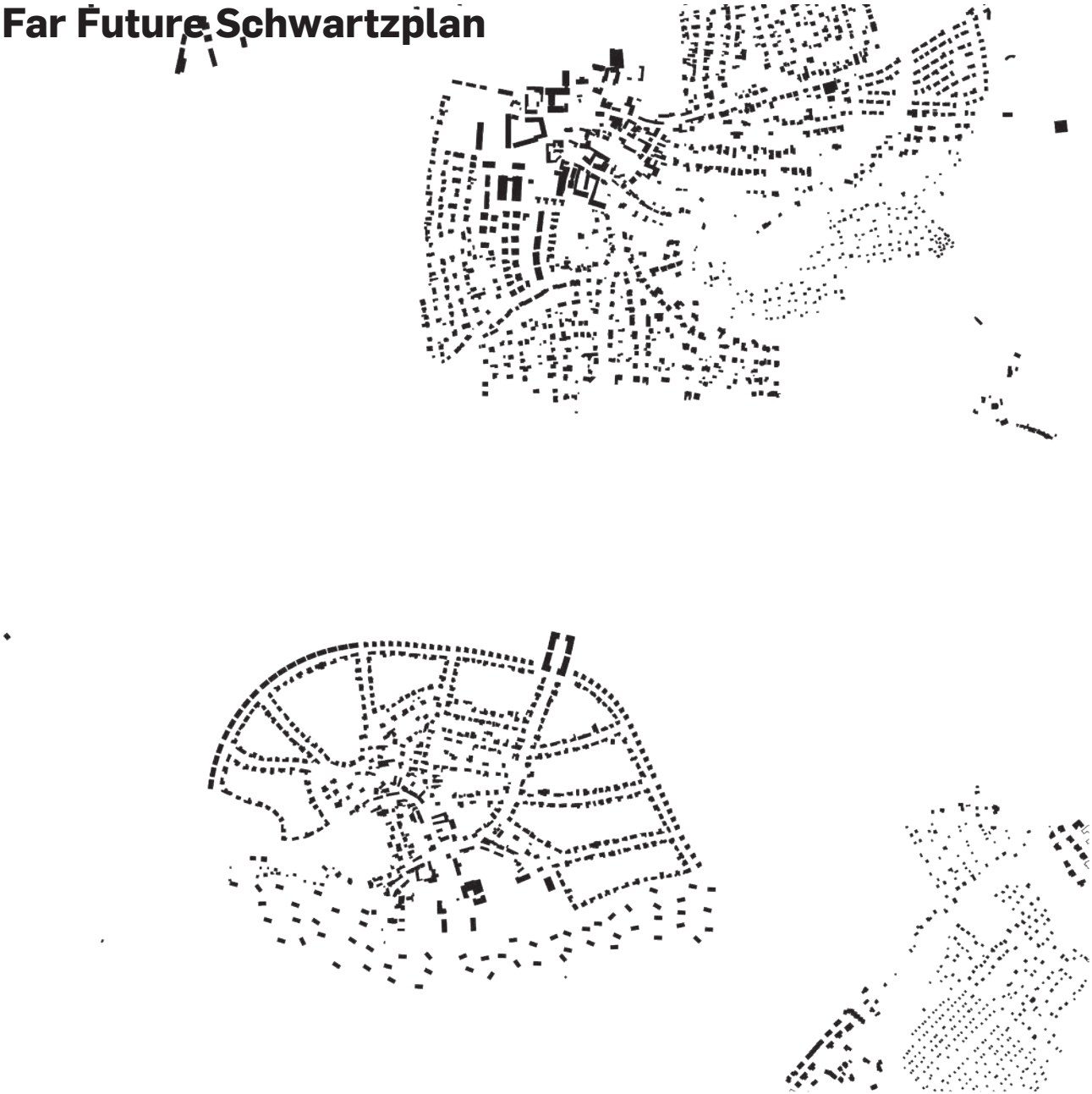
Masterplan

Present Day Shwartzplan

Near Future Schwartplan



Far Future Schwartzplan



Impact

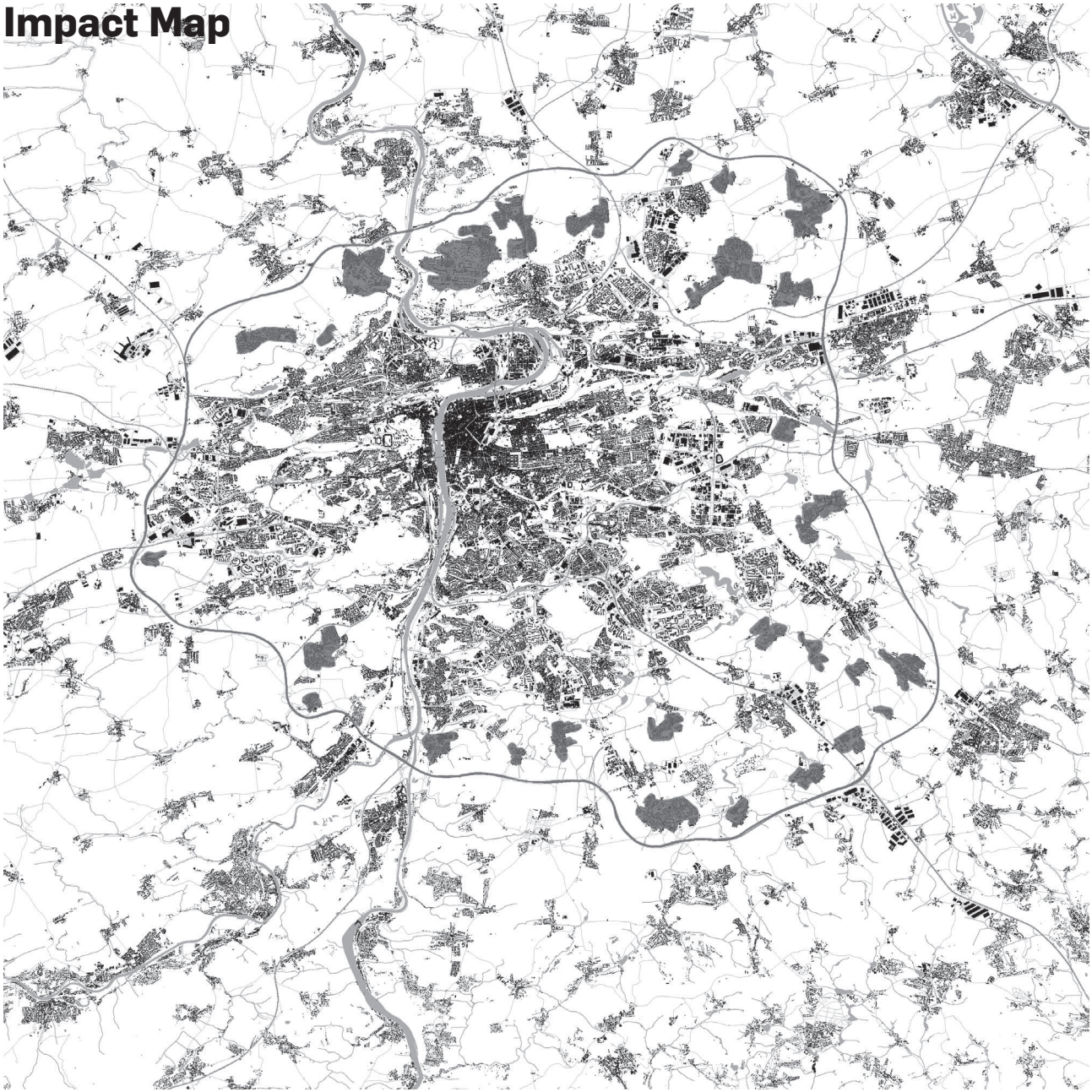
The new infrastructure project will have a profound impact on the village, accommodating both current and future residents while also fostering sustainability. With **446 existing** residents in the sprawling village and an additional **390 newcomers**, the project will cater to a total population of **836 individuals**. However, considering the potential for village growth, which could double the population, the total number of residents could reach **3,424**.

Furthermore, the project's strategic design includes creating a sustainable border for the village to prevent unchecked sprawling, ensuring that future development occurs in a controlled and environmentally conscious manner. This approach not only supports the existing community but also lays the groundwork for long-term sustainability and a high quality of life for all residents.

120% Increase in Density

If intervention were to be applied on possible **29 villages** around Prague, then it Prague village would be able to accomodate **257520 new citizens.**

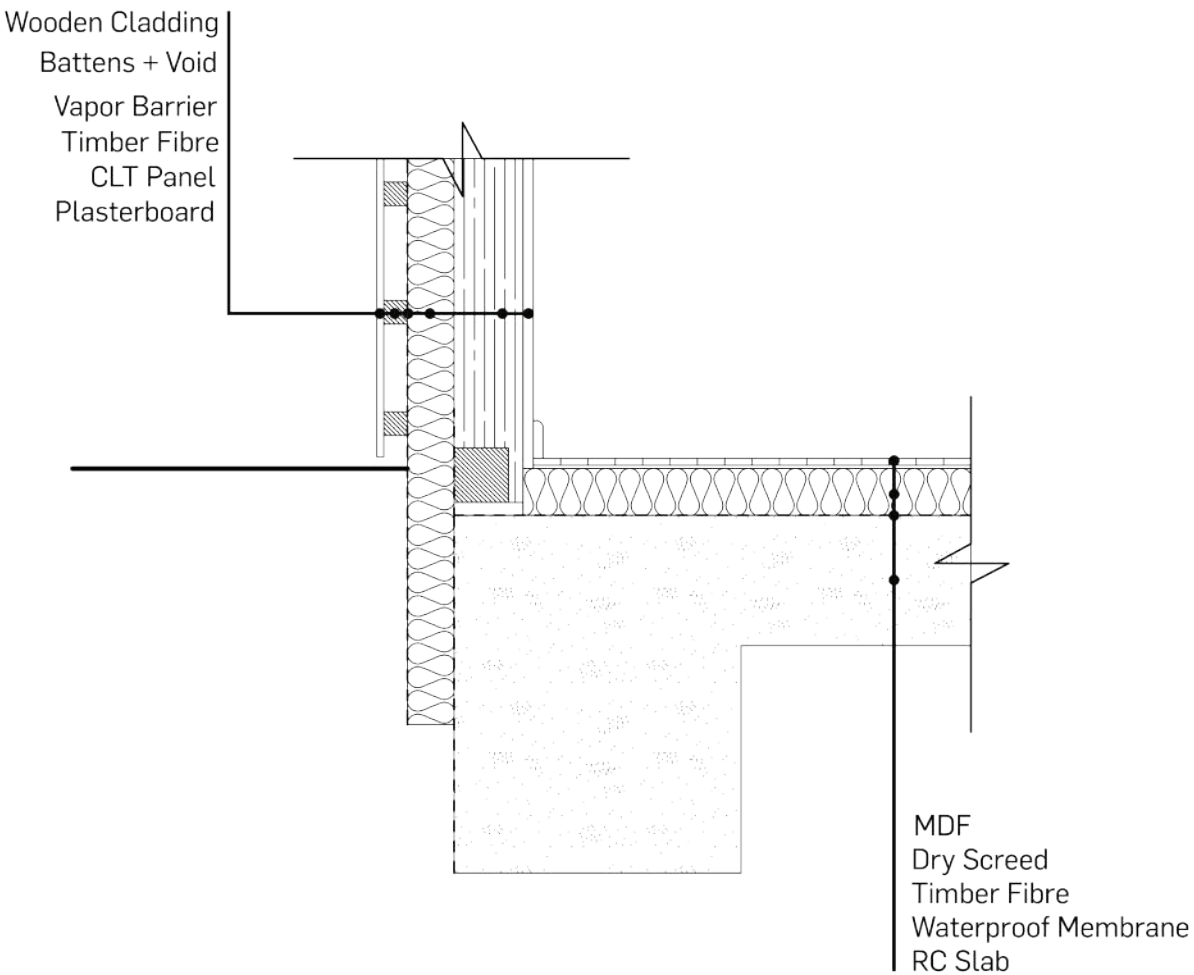
Impact Map



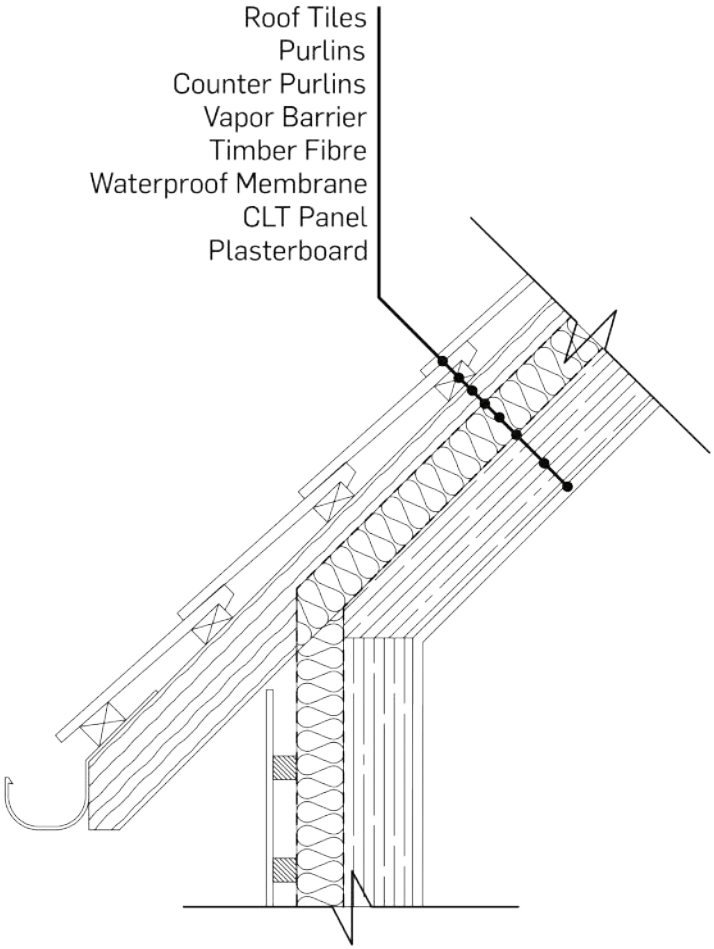
03

Structural Analysis

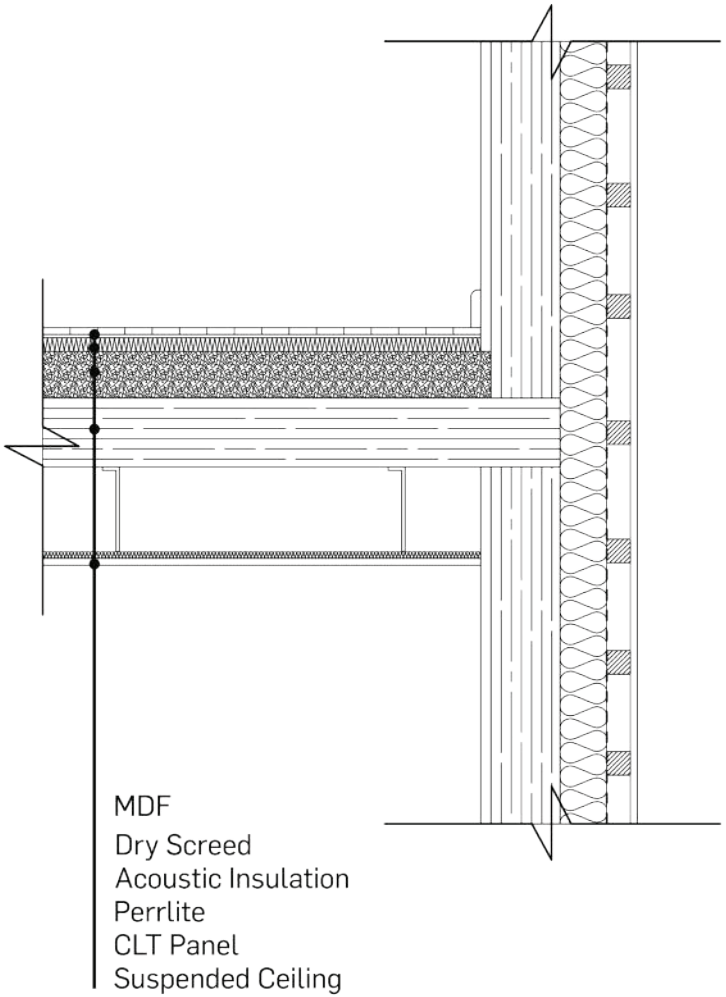
Foundation Detail



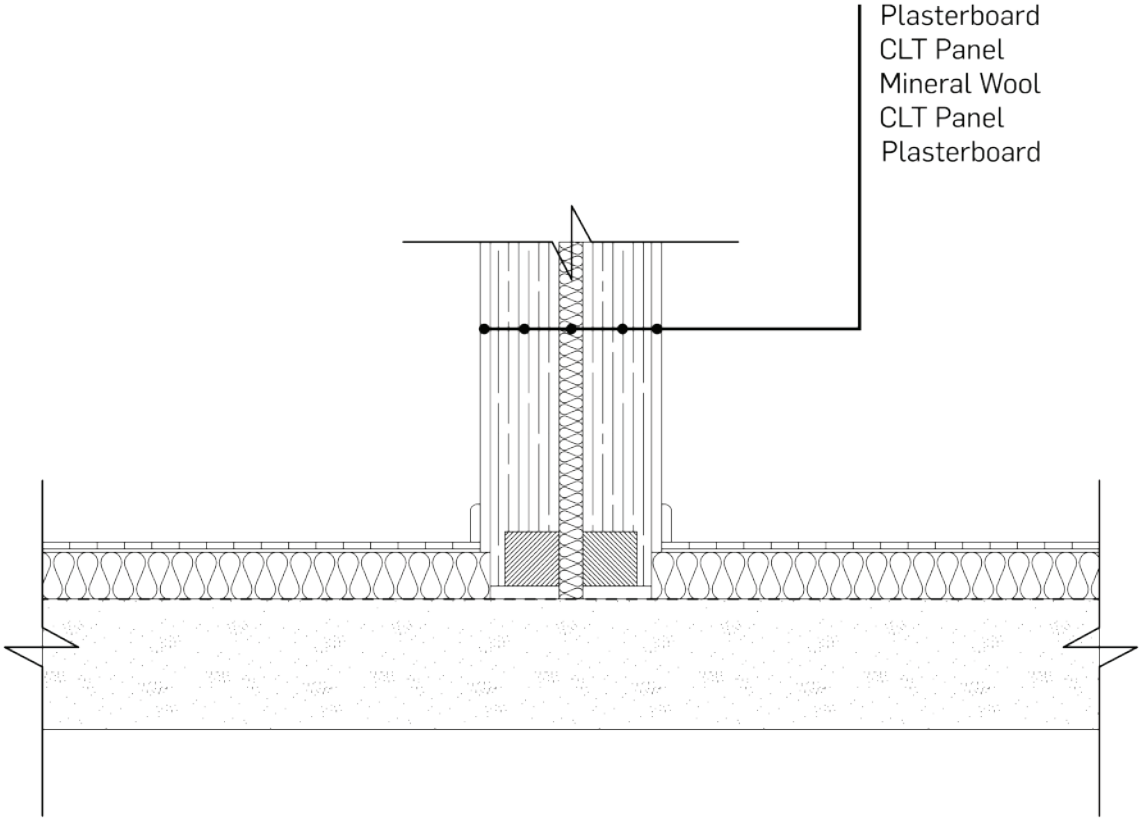
Roof Eave Detail



Ceiling-Floor Detail

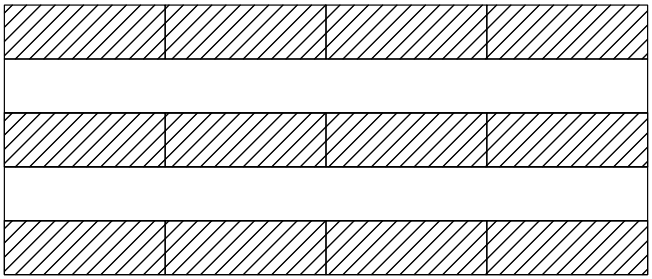


Partition Wall Detail



Loads on CLT Floor & Ceiling

Sectionof CLT Grade E1, 5 PLY



Cross-Laminated Timber Properties:

Bending Moment:

$F_bS = 46.261$

Bending Stiffness:

$El = 442.776$

Shear Rigidity:

$GA = 13.426$

Shear Capacity:

$V_{s,o} = 36.193$

Shear Adjustment Factor:

$K_s = 11.5$

Gross Thickness:

$t = 175mm$

Specific Gravity:

$SG = 0.42$

Span:

$l = 5m$

Width:

$b = 1m$

Load Conditions:

Live Load:

$LL = 1.5kN/m^2$

Dead Load:

$DL = 2kN/m^2$

Total Load:

$w = (LL + DL) \times b = 3.4kN/m$

Allowable Deflection:

$\Delta_{allowable} = \frac{L}{360}$

Load Duration Factor:

$C_D = 1$

Wet Sevice Factor:

$C_M = 1$

Temperature Factor:

$C_T = 1$

Beam Stability Factor:

$C_L = 1$

Bending Check:

Applied Moment:

$M = \frac{w \times L^2}{8} = 10.93810^6 Nmm$

Adjusted Bending Capacity:

$F_bS' = C_D \times C_M \times C_T \times C_L \times F_bS \times b = 46.26110^6 Nmm$

Bending Criteria:

$\frac{M}{F_bS'} = 0.236 < 1$

Bending is **OK!**

Shear Check:

Applied Shear:

$V = \frac{W \times L}{2} = 8.75kN$

Adjusted Shear Capacity:

$V_s \doteq_d \times C_M \times C_T \times V_s \times b = 36.193kN$

Shear Criteria:

$\frac{V}{V_s'} = 0.242 < 1$

Shear is **OK!**

Deflection Check:

Apparent Bending Stiffness:

$El_{app} = \frac{El_{eff}}{1 + \frac{K_s \times El_{eff}}{GA^2_{eff} \times b}} = 8627.852 \times 10^9 Nmm^2$

Total Long Term Deformation:

$\Delta_{total} = \frac{5}{384} \times \frac{w \times L^4}{El_{app}} = 7.851mm$

Allowable Deformation:

$\Delta_{allowable} = \frac{L}{360} = 13.889$

Deformation Criteria:

$\frac{\Delta total}{\Delta allowable} = 0.565 < 1$

Deflection is **OK!**

Vibration Check:

Area:

$A = t \times b = 0.175m^2$

Adjusted Specific Gravity:

$\rho = 1.0625 \times SG = 0.446$

Vibration Criteria:

$l < \frac{1}{12.05} \times \frac{(El_{app})^{0.446}}{(\rho \times A)^{0.122}}$

$5m < 5.341$

Vibration is **OK!**

In the meticulous design calculation process for CLT floor/ceiling panels, a thorough analysis is conducted to ensure that every aspect of the structure is accounted for, from the initial load considerations to the final structural integrity checks. This involves not only calculating the maximum possible loads that the panels will experience, including live loads such as occupants and furniture and dead loads like the weight of the panels themselves, but also factoring in potential variations and uncertainties in these loads over time. The chosen grade of CLT panels plays a crucial role here, as it determines the material properties and strength characteristics that will ultimately govern the panel's performance under load.

Furthermore, the design process places a strong emphasis on safety, incorporating appropriate safety factors to provide a margin of safety against unexpected events or variations in load conditions. This ensures that the panels not only meet the minimum required standards but also exceed them, providing an additional layer of reliability and peace of mind.

The confirmation of the maximum possible load on a span of 5 meters at 6 kNm underscores the robustness of the design, demonstrating that even under the most demanding conditions, the CLT panels are capable of withstanding significant forces without compromising structural integrity. Similarly, the determination of the maximum span length of 5.2 meters highlights the versatility and flexibility of CLT panels in accommodating various architectural and structural requirements.

Overall, these elaborate design calculations and assessments serve to validate the suitability and resilience of CLT panels for the intended application, providing engineers, architects, and builders with the confidence to rely on these innovative materials for their projects while ensuring the safety and well-being of occupants for years to come.

04

Smart Village

Establishing a Smart Village

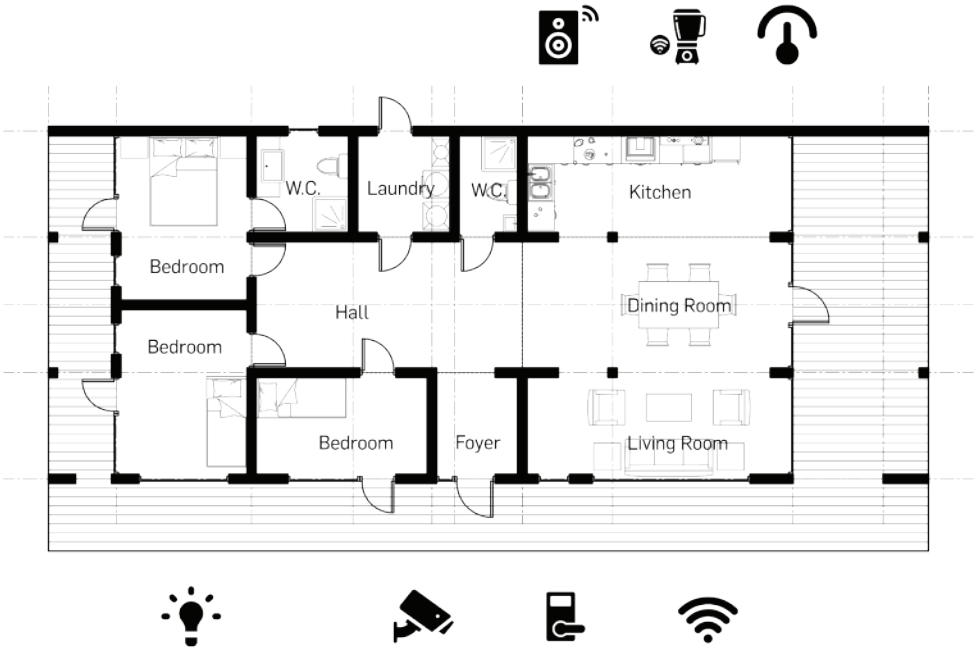
Introduction of Smart Meters and Appliances:

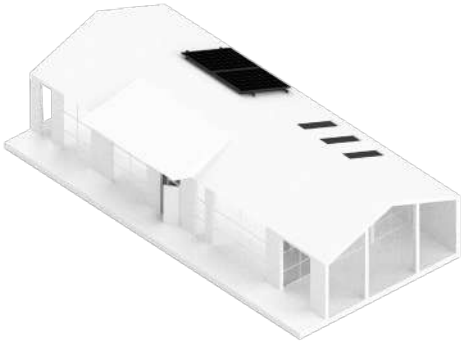
- Smart meters will be installed in each household and at the electricity substation. These meters enable real-time monitoring of energy consumption and facilitate two-way communication between consumers and the utility company.
- Smart appliances, embedded with software, will be introduced in households. These appliances can be controlled remotely by smart meters, allowing for optimization of energy consumption based on demand and renewable energy availability. Examples include smart thermostats, smart lighting systems, and smart home appliances.
- Integration of Renewable Energy Sources:
- Solar panels will be installed on rooftops of houses to harness solar energy. The panels will be strategically placed to maximize sunlight exposure and energy generation.
- Biogas digesters will be implemented to convert organic waste into biogas, which can be used for heating or electricity generation. These digesters can utilize various organic materials such as food waste, garden waste, and manure from farms.

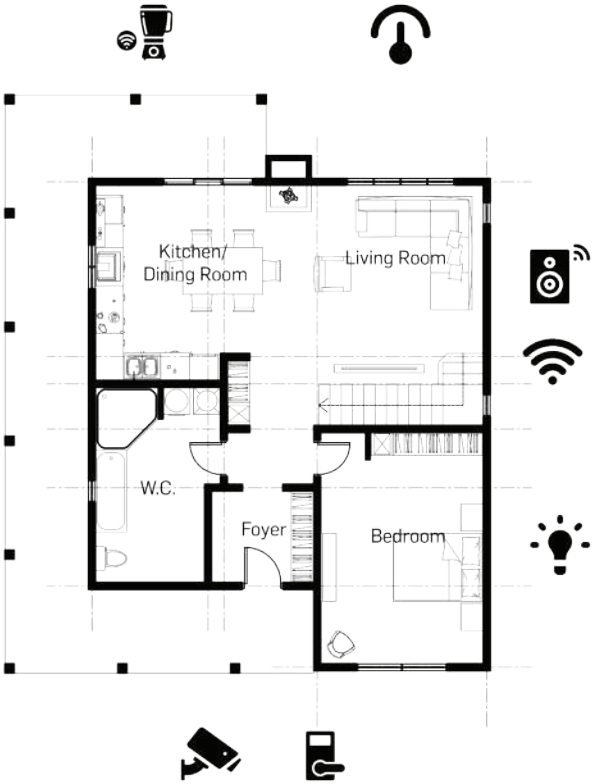
Storage Solutions (Sand Batteries):

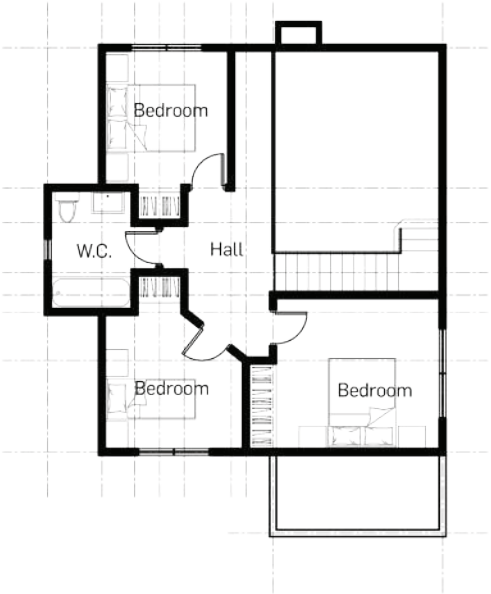
- Sand batteries, also known as flow batteries, will be employed for energy storage. These batteries offer large-scale energy storage capabilities, suitable for storing surplus energy generated during peak production periods.
- Sand batteries utilize a chemical reaction between electrolytes stored in separate tanks, allowing for efficient and long-duration energy storage. They are durable and have a long lifespan, making them ideal for village-scale energy storage solutions.

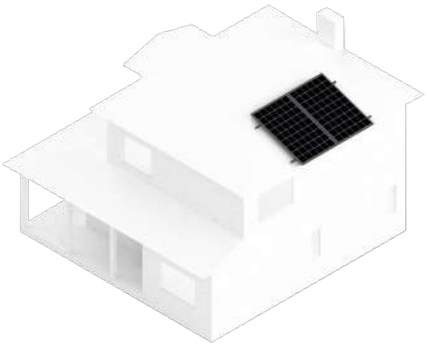
Renewable Energy Sources & Smart Appliaces

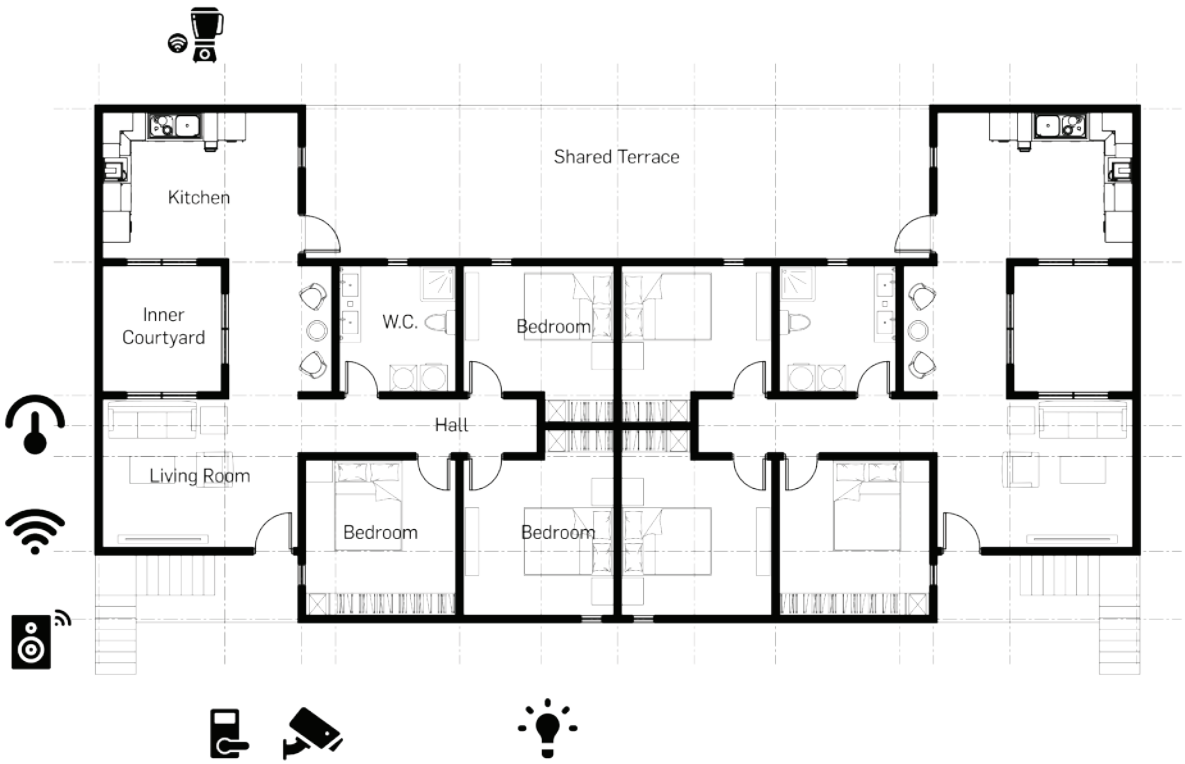


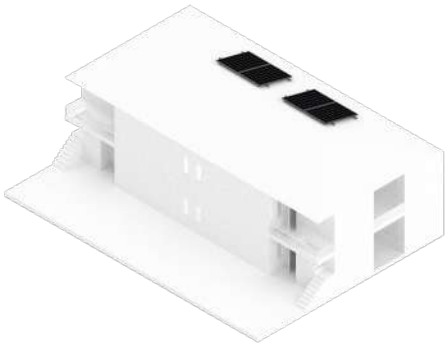



Kitchen/
Dining Room
Living Room
W.C.
Foyer
Bedroom

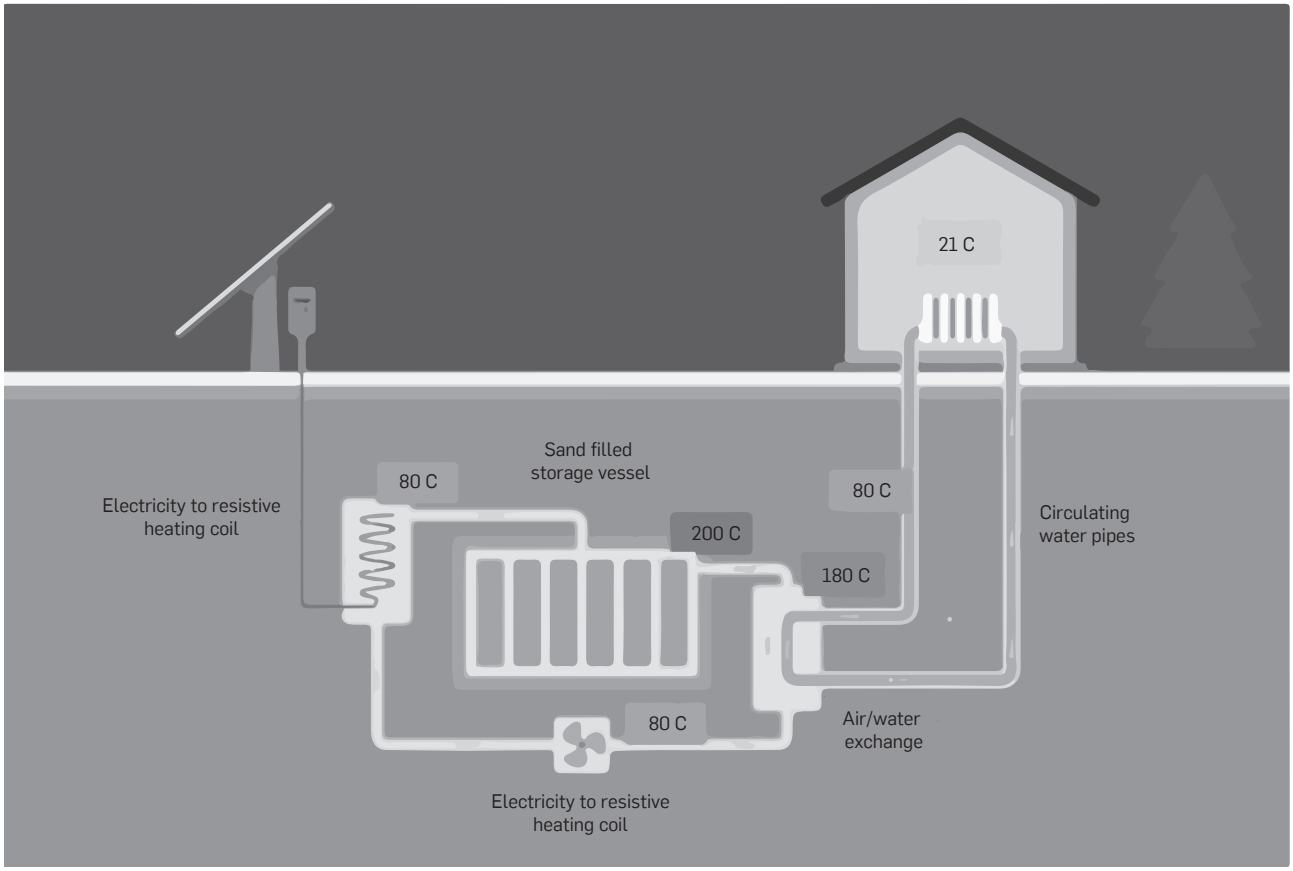

Bedroom
W.C.
Hall
Bedroom
Bedroom




Kitchen
Shared Terrace
Inner
Courtyard
W.C.
Bedroom
Hall
Living Room
Bedroom
Bedroom



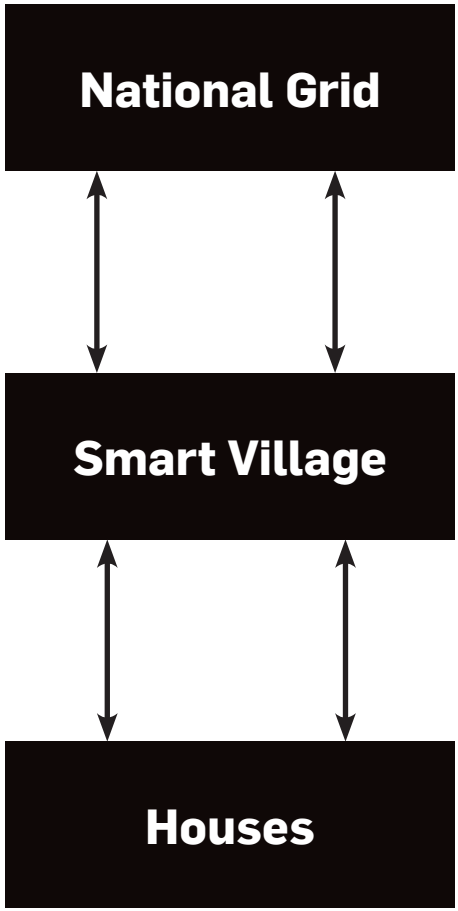
Storage Solutions



An underground sand battery stores surplus electricity by heating resistive soil with electric coils, transferring the generated heat to sand-filled storage vessels. When heating is needed, air or water circulating through pipes in the warm sand absorbs heat, which is then distributed to heat buildings. This system efficiently stores energy and provides heating using renewable electricity. By leveraging the high thermal mass of sand, the underground sand battery offers an effective means of energy storage and sustainable heating for residential and commercial spaces.

Distribution Management

- The smart village will establish an independent energy grid to manage energy production, storage, and distribution within the community.
- Energy produced from renewable sources, such as solar panels and biogas digesters, will be prioritized for local consumption within the village.
- Excess energy generated by the village can be supplied to the national grid, contributing to the overall energy supply. This excess energy can be monetized, providing additional revenue for the village.
- In case of insufficient energy production within the village, the smart grid can access the national grid as a last resort to meet the energy demand of residents.
- Overall, the implementation of a smart village involves integrating advanced technologies, renewable energy sources, and efficient distribution management to create a sustainable and self-sufficient energy ecosystem tailored to the needs of the community.



05

Physical Model

To be added

To be added

06

Sustainability Report

Creating a Self-Sufficient Lochkov

Nestled amidst the lush embrace of verdant landscapes, Lochkov emerges as a beacon of sustainability, where the convergence of ecological harmony and human ingenuity gives rise to a transformative vision of community resilience. Embarking on this visionary quest unveils a symphony of sustainable initiatives, each orchestrated with meticulous care to cultivate a thriving ecosystem of interconnectedness, resource efficiency, and vibrant community life.

Resource Efficiency: A Symphony of Sustainability

Lochkov's sustainable ethos resonates with a symphony of resource efficiency, where every architectural decision is imbued with reverence for the natural world. Drawing inspiration from the timeless wisdom of indigenous craftsmanship and modern innovation, Lochkov's architectural landscape comes alive with the harmonious interplay of locally-sourced materials, artisanal craftsmanship, and sustainable construction techniques. From the majestic timber harvested from nearby forests to the earth's clay imbued with ancestral knowledge, each element of Lochkov's built environment pays homage to the sacred bond between humanity and nature. Cross-laminated timber (CLT), celebrated for its structural integrity and minimal environmental footprint, emerges as the cornerstone of Lochkov's architectural narrative, symbolizing a harmonious fusion of tradition and innovation. Through the judicious use of renewable materials, advanced construction techniques, and a commitment to circularity, Lochkov pioneers a new paradigm of resource-efficient design, minimizing waste, reducing embodied carbon, and nurturing a regenerative built environment that thrives in symbiosis with the natural world.

Renewable Energy Integration: Harnessing Nature's Bounty

At the heart of Lochkov's sustainable tapestry lies a commitment to harnessing the boundless energy of the sun and earth, ushering in an era of renewable abundance and energy sovereignty. Emboldened by the sun's radiant embrace, Lochkov's rooftops glisten with an array of solar panels, transforming sunlight into a prolific source of clean, renewable energy to power homes, businesses, and communal spaces alike. Meanwhile, beneath the earth's surface, the village's innovative biogas facilities hum

with activity, converting organic waste into a potent source of renewable energy for heating, cooking, and community resilience. Through the seamless integration of solar, biogas, and other renewable energy sources, Lochkov charts a course towards energy independence, reducing reliance on finite fossil fuels, mitigating climate change, and ushering in a new era of sustainable energy abundance that empowers communities to thrive in harmony with nature.

Rainwater Harvesting and Reuse: Nurturing Nature's Gifts

In Lochkov's sustainable narrative, water emerges as a sacred gift to be revered, reclaimed, and cherished with utmost reverence. Guided by the ancient wisdom of water stewardship, Lochkov's innovative rainwater harvesting systems stand as testaments to the transformative power of ecological design. From the gentle patter of raindrops on rooftops to the rhythmic dance of water cascading down permeable pavements, every element of Lochkov's water infrastructure is imbued with a sense of purpose and interconnectedness. Through the judicious management of rainwater, Lochkov mitigates stormwater runoff, replenishes urban aquifers, and fosters a culture of water conservation that transcends generations. By harnessing the inherent abundance of rainwater, Lochkov charts a course towards water self-sufficiency, resilience, and ecological harmony, nurturing a verdant oasis where life flourishes in harmony with the rhythms of nature.

Mixed-Use Development: Fostering Community Vitality

At the heart of Lochkov's sustainable vision lies a commitment to fostering vibrant, interconnected communities where residents can live, work, and play in harmony with the natural world. Rooted in principles of accessibility, integration, and human-scale design, Lochkov's mixed-use development model emerges as a testament to the transformative power of community-centric planning. Within this dynamic tapestry of urban life, bustling marketplaces, verdant parks, and communal gathering spaces beckon residents to embrace a life of interconnectedness and vitality. By prioritizing walkability, cycling, and public transit, Lochkov minimizes reliance on private vehicles, reduces transportation-related emissions, and nurtures a culture of active living that enriches both body and soul. Through the seamless integration of residential, commercial, and recreational spheres, Lochkov cultivates a tapestry of sustainable living where human flourishing

and ecological harmony converge in perfect synergy.

Passive Houses: Envisioning a New Era of Energy Efficiency

Central to Lochkov's sustainable housing strategy lies a visionary commitment to passive house principles, where energy efficiency, occupant comfort, and ecological harmony converge to redefine the essence of sustainable living. Engineered to harness the natural elements of sunlight, ventilation, and thermal mass, Lochkov's passive houses offer unparalleled levels of energy efficiency, indoor comfort, and environmental stewardship. Through innovative design strategies such as optimal solar orientation, high-performance insulation, and air-tight construction, these residences minimize energy consumption while maximizing thermal comfort throughout the year. By championing passive house principles, Lochkov sets a new standard for sustainable housing, where environmental responsibility and human well-being intertwine to create a sanctuary of comfort, resilience, and ecological harmony.

Cultural Heritage Preservation: Honoring the Past, Envisioning the Future

Anchoring Lochkov's sustainable narrative is a profound commitment to honoring its rich cultural heritage and preserving its architectural legacy for generations to come. Within the village's hallowed precincts, historic structures stand as guardians of bygone eras, their weathered facades whispering tales of resilience, endurance, and human ingenuity. Through meticulous restoration, adaptive reuse, and community engagement, Lochkov breathes new life into these architectural treasures, seamlessly blending old-world charm with contemporary innovation. By nurturing cultural continuity, fostering community pride, and minimizing embodied carbon through heritage preservation, Lochkov emerges as a beacon of sustainable stewardship and cultural renaissance. In honoring the past, Lochkov charts a bold new course towards a future where tradition and innovation converge in perfect harmony, inspiring awe and admiration for generations to come.

In Conclusion: Crafting a Sustainable Legacy

The proposed architectural interventions for Lochkov transcend mere construction, emerging as a testament to the transformative power of sustainable design. By weaving together resource efficiency, renewable energy integration, water stewardship, mixed-use development,

passive houses, and cultural heritage preservation, Lochkov charts a bold new course towards self-sufficiency, resilience, and community vibrancy. Through visionary design, unwavering commitment, and a reverence for the interconnectedness of all living things, Lochkov stands poised to redefine the very essence of sustainable village living, inspiring awe and admiration for generations to come. As Lochkov embarks on this transformative journey, it beckons humanity to embrace a future where ecological harmony, human flourishing, and vibrant community life converge in perfect harmony, forging a legacy of sustainability that endures for eternity.

07

Diploma Report

1.0 Introduction

1.1 Unveiling the Heritage of the Future

What will HERITAGE OF THE FUTURE look like? By exploring the past and imagining the future we will get an idea for what to do today. We will have two basic parts to this semester: making city maps, and proposing specific architectural scale projects for the year 2150. Upon the assumption the population will double, and society will change (to some degree), architecture will be considered at a scale that is not quite building and not quite city.

1.2 Exploring the Charms of Slivenec and Lochkov

Slivenec and Lochkov are charming villages located on the outskirts of Prague, Czech Republic, each offering a unique blend of natural beauty and cultural heritage. Slivenec is situated in the southwest of Prague, surrounded by picturesque landscapes of rolling hills, forests, and meadows. Its peaceful atmosphere and proximity to nature make it an ideal retreat from the bustling city life.

Lochkov, located to the west of Prague near the Vltava River, boasts scenic views of the countryside and easy access to outdoor recreational activities. Both villages showcase traditional Czech architecture, quaint streets, and a strong sense of community, making them desirable residential areas for those seeking a suburban lifestyle within reach of Prague's urban amenities.

2.0 Analysis

2.1 Historical Insights

Slivenec and Lochkov have rich historical backgrounds that contribute to their unique identities within the Prague region.

Slivenec has a history dating back to the 13th century when it was first mentioned in written records. It originally served as an agricultural settlement, with farming and viticulture being the primary occupations of its inhabitants. Over the centuries, Slivenec grew into a thriving village with a distinct rural character, characterized by traditional Czech architecture such as wooden cottages and stone houses. During the Czech National Revival in the 19th century, Slivenec played a role in preserving Czech culture and language. Today, it maintains its agricultural heritage while also embracing modern amenities and infrastructure.

Lochkov's history traces back even further,

with evidence of human settlement dating back to prehistoric times. It was officially founded as a village in the 12th century and quickly became known for its fertile lands and proximity to the Vltava River, which facilitated trade and agriculture. Lochkov thrived as an agricultural and fishing community, with its economy centered around farming, fishing, and crafts. Throughout the centuries, it experienced periods of prosperity and development, contributing to the cultural tapestry of the Prague region. In the modern era, Lochkov has preserved its historic charm while adapting to contemporary lifestyles and urbanization trends.

Both Slivenec and Lochkov showcase a blend of historical heritage, cultural significance, and natural beauty that continues to shape their identities as vibrant villages on the outskirts of Prague.

2.2 Topographic Insights

The topography of Slivenec and Lochkov, two villages on the outskirts of Prague, contributes to their scenic beauty and distinct character.

Slivenec is characterized by rolling hills, gentle slopes, and verdant meadows, creating a picturesque countryside setting. The village is nestled amidst lush greenery, with patches of forests adding to the natural charm of the area. The terrain is relatively varied, offering scenic views from elevated points and opportunities for outdoor activities such as hiking and cycling. Slivenec benefits from its proximity to nature, with streams and small water bodies dotting the landscape, enhancing the rural atmosphere. The topography of Slivenec provides residents with a tranquil environment and opportunities to connect with nature. Lochkov's topography is influenced by its location near the Vltava River, which meanders through the region, shaping the land and offering scenic waterfront views. The village is situated on relatively flat terrain close to the riverbanks, providing fertile soil for agriculture and a favorable environment for fishing activities. Lochkov's proximity to the river also contributes to its recreational appeal, with opportunities for boating, fishing, and riverside picnics. The topography of Lochkov blends riverine landscapes with open fields and green spaces, creating a harmonious balance between natural beauty and human settlement.

2.3 Climatic Insights

The climate in Slivenec and Lochkov, being situated on the outskirts of Prague

in the Czech Republic, is characterized by a temperate continental climate with four distinct seasons.
In the summer months (June to August), Slivenec and Lochkov experience relatively warm and pleasant weather, with average temperatures ranging from 20°C to 25°C (68°F to 77°F). These months typically see longer daylight hours and occasional rainfall, which helps maintain the lush greenery and agricultural landscapes of the area.

Autumn (September to November) brings cooler temperatures and colorful foliage as the trees change their leaves. Average temperatures gradually decrease, ranging from 10°C to 15°C (50°F to 59°F) towards the end of November. This season also sees more frequent rainfall, contributing to the replenishment of groundwater and maintaining the region's natural beauty.

Winter (December to February) in Slivenec and Lochkov is cold, with temperatures often dropping below freezing. Average temperatures range from -2°C to 3°C (28°F to 37°F). Snowfall is common during this time, transforming the villages into winter wonderlands and providing opportunities for winter sports such as skiing and ice skating.
Spring (March to May) marks the transition to warmer weather, with average temperatures gradually increasing from 5°C to 15°C (41°F to 59°F) by May. This season is characterized by blooming flowers, budding trees, and longer daylight hours, making it a delightful time to explore the natural beauty of Slivenec and Lochkov.

2.4 Insights into Vegetation

Slivenec's vegetation is characterized by aThe vegetation in Slivenec boasts a charming blend of deciduous and coniferous trees like oak, beech, pine, and fir, creating a picturesque landscape. Lush greenery surrounds the village, with meadows and pastures adorned with vibrant wildflowers in the warmer months. Small woodlands and patches of forests provide habitat for various wildlife species, enriching the area's biodiversity. Agricultural activities flourish, with fields of wheat, barley, and sunflowers contributing to the rural scenery. Residents enjoy nature walks and picnics amidst this verdant backdrop.
In Lochkov, the vegetation is shaped by the nearby Vltava River and its fertile banks, hosting a diverse array of riverine flora such as willow and alder trees, along with reed beds. Open fields and meadows teem with grasses, wildflowers, and shrubs, supporting a rich ecosystem. Orchards and vegetable gardens showcase the village's agricultural tradition, enhancing local biodiversity. Nearby, Lochkovský profil Park adds another dimension to the area's natural beauty, drawing migratory birds and offering opportunities for outdoor activities like birdwatching, fishing, and nature

photography amidst scenic landscapes.

2.5 nsights into the Built Environment

The built environment in Slivenec and Lochkov, located on the outskirts of Prague, is characterized by a harmonious blend of traditional architecture, rural charm, and modern developments that cater to the needs of residents while preserving the area's cultural heritage.

Slivenec's built environment reflects its historical roots as an agricultural village while incorporating modern amenities and infrastructure. The village features a mix of traditional Czech architecture, including wooden cottages with pitched roofs, stone houses with colorful facades, and historic farmsteads that add to the village's rural charm. These traditional buildings are often surrounded by gardens, orchards, and courtyards, creating a cozy and inviting atmosphere. In recent years, Slivenec has seen the development of new residential areas with modern houses and apartments, designed to blend seamlessly with the existing architecture and natural surroundings. The village also has community facilities such as schools, churches, shops, and recreational spaces that cater to the needs of residents.

Lochkov's built environment reflects its historical ties to agriculture, fishing, and river trade, combined with modern developments that cater to a growing population. The village features a mix of historic buildings, including old farmhouses, fishermen's cottages, and traditional Czech architecture with gabled roofs and colorful facades. Along the Vltava River, there are boat houses, docks, and waterfront promenades where residents and visitors can enjoy scenic views and recreational activities. Lochkov has also seen the development of new residential areas with modern houses and apartments, as well as commercial establishments such as restaurants, cafes, and small businesses that contribute to the local economy. The village's built environment is designed to preserve its historical character while meeting the needs of a contemporary lifestyle.

2.6 Insights into Territory

The use of territory in villages like Slivenec and Lochkov on the outskirts of Prague is carefully planned to balance agricultural activities, residential areas, natural spaces, and community infrastructure. This thoughtful approach to land use aims to preserve the villages' rural character while meeting the needs of residents and promoting sustainable development.

Agricultural Land: A significant portion of the territory in Slivenec and Lochkov is dedicated to agricultural land, including fields for growing crops such as wheat, barley, sunflowers, and vegetables. These agricultural areas are essential for supporting local food production, maintaining green spaces, and preserving the villages' agrarian heritage. Farms and orchards also contribute to the biodiversity of the area and provide opportunities for agrotourism and rural activities.

Residential Areas: Both villages have designated residential areas where traditional cottages, farmhouses, and modern homes are clustered. These residential zones are carefully planned to ensure a harmonious blend of housing types, green spaces, and community facilities. New developments in Slivenec and Lochkov focus on sustainable design principles, energy efficiency, and preserving views of the surrounding countryside.

Natural Spaces: The territory of Slivenec and Lochkov includes natural spaces such as forests, meadows, and riverbanks that are protected and preserved for their ecological value and recreational opportunities. Residents and visitors can explore walking trails, cycling paths, and picnic areas in these natural spaces, fostering a connection to nature and promoting outdoor activities.

Community Infrastructure: Both villages have essential community infrastructure, including schools, churches, healthcare facilities, shops, restaurants, and recreational amenities. These facilities are strategically located to serve residents' needs while maintaining a walkable and cohesive community environment. Public transportation options, such as buses or tram connections to Prague, also ensure connectivity and accessibility for residents commuting to the city.

2.7 Insights into Connectivity and Public Transport

Slivenec benefits from relatively good connectivity to Prague and neighboring areas through a network of roads and public transport options. The village is connected to Prague's city center and other districts via major roads and highways, making commuting by car convenient for residents. Additionally, Slivenec is served by bus routes that connect it to Prague's public transport system, providing access to tram and metro lines for further travel within the city. This integration with Prague's public transport network ensures that residents of Slivenec have access to essential services,

employment opportunities, educational institutions, and cultural amenities in the city.

Lochkov: Similarly, Lochkov enjoys good connectivity and public transport options that facilitate travel within the village and to neighboring areas. The village is well-connected to Prague via roads, with easy access to major highways for commuting by car. Lochkov also has a bus service that connects it to Prague's public transport network, allowing residents to access tram and metro lines for travel to different parts of the city. Additionally, Lochkov's proximity to the Vltava River enables water transport options for recreational purposes, such as boat tours or river cruises.

Both Slivenec and Lochkov prioritize sustainable mobility solutions, such as promoting cycling infrastructure, pedestrian-friendly pathways, and carpooling initiatives to reduce traffic congestion and environmental impact. The villages' connectivity and public transport systems are designed to enhance accessibility, improve quality of life, and support a seamless integration with Prague's broader transportation network.

3.0 Intervention

3.1 Statement of Objectives

This project aims to densify villages in Prague's peripheral areas while maintaining and enhancing residents' quality of life. The objectives include:

1. Sensitive Densification: Implementing strategies like infill development and mixed-use zoning to increase residential density while preserving village character.

2. Public Space Enhancement: Revitalizing public spaces to promote social interaction and community well-being.

3. Accessibility and Connectivity: Improving transportation infrastructure to ensure easy access to amenities and employment opportunities.

4. Cultural Heritage Preservation: Identifying and protecting historic landmarks and encouraging adaptive reuse of heritage structures.

5. Environmental Sustainability: Integrating sustainable design principles and green infrastructure solutions to mitigate environmental impact.

By pursuing these objectives, the project seeks to create vibrant and sustainable villages that contribute positively to Prague's

urban fabric.

3.2 Conceptual Framework

In embarking on this architectural journey, I am guided by a profound appreciation for the delicate balance between heritage preservation and sustainable development. At the heart of my concept lies the conviction that our villages, such as Slivenec and Lochkov, are not just repositories of history but also laboratories for innovation – where tradition and modernity intersect to shape a more harmonious future.

My vision revolves around the seamless integration of past and present, weaving together the timeless allure of historical architecture with the forward-thinking principles of ecological design. Here, cobblestone streets lead to verdant courtyards adorned with solar panels, and ancient facades provide a backdrop for vibrant communal spaces teeming with life and vitality. It is a landscape where the echoes of tradition resonate alongside the hum of sustainable technologies, creating a symphony of cultural richness and environmental consciousness.

In crafting this concept, I am driven by the belief that true sustainability transcends mere aesthetics, encompassing a holistic approach that nurtures both people and planet. I envision villages that serve as living laboratories for environmental innovation – where green roofs capture rainwater, native vegetation thrives, and renewable energy sources power communal spaces. By embracing principles of resilience and adaptability, I seek to create communities that not only honor the past but also thrive in the face of future challenges, resilient in their ability to withstand the tests of time and tide.

Ultimately, my concept is a testament to the transformative power of architecture – a medium through which we can bridge the gap between tradition and innovation, heritage and sustainability. It is a declaration of my commitment to crafting spaces that not only reflect the stories of the past but also pave the way for a more sustainable and inclusive future for generations to come.

3.3 The New Masterplan

Vision: The new masterplan for Lockov Village embodies a harmonious blend of preserving its historical core while embracing sustainable, green living in newly developed areas. With a focus on spaciousness, greenery, and community, Lockov will be a model of balanced urban development where residents thrive amidst heritage and nature.

Key Features:

1. Preservation of Historical Core: The heart of Lockov, its historical core, will be meticulously preserved, maintaining its architectural charm and cultural significance. Streetscapes will be enhanced to promote pedestrian-friendly environments, inviting residents and visitors to explore its rich history.

2. New Residential Clusters: In line with the masterplan, new residential clusters will be developed, offering modern living spaces nestled within nature. Each residential unit will boast a spacious plot with a private garden, allowing residents to cultivate their green oasis and foster a sense of ownership and connection to the land.

3. Shared Public Gardens: Complementing the private gardens, expansive shared public gardens will serve as communal gathering spaces for residents to connect, relax, and enjoy nature's bounty. These green lungs of the village will promote biodiversity, provide recreational opportunities, and strengthen social bonds among residents.

4. Mixed-Use Commercial Areas: Introducing mixed-use commercial areas will enhance Lockov's vitality by providing convenient access to essential amenities, local shops, cafes, and cultural venues. These vibrant hubs will invigorate the village with economic activity while fostering a sense of community and place.

5. Green Belt: A significant portion of the masterplan is dedicated to preserving a lush green belt surrounding the village. This expansive natural reserve will serve as a buffer against urban sprawl, protect biodiversity, and provide residents with opportunities for outdoor recreation, hiking, and contemplation.

Outcomes: The Lockov Village masterplan envisions a sustainable and vibrant community where heritage and nature coexist harmoniously. By preserving the historical core, creating spacious residential clusters with private gardens, fostering shared public green spaces, and integrating mixed-use commercial areas, Lockov will emerge as a model of thoughtful urban development, enhancing residents' quality of life and nurturing a strong sense of belonging and stewardship towards their environment.

3.4 New Infrastructure Initiatives

Ring Road and New Streets:
A new ring road will encircle Lockov Village, improving accessibility and traffic flow while reducing congestion within the historic core.

This strategic infrastructure addition will enhance connectivity between residential clusters, commercial areas, and the green belt. Additionally, new streets will be constructed to accommodate the expansion of the village, ensuring seamless integration of new spaces and efficient circulation for residents and visitors alike.

Tram Line Extension:
In a transformative move towards sustainable mobility, the tram line will be extended from Barrandov to Lockov Village, forging a vital link between the village and the city of Prague. This extension will provide residents with convenient access to the broader public transportation network, reducing reliance on private vehicles and alleviating traffic congestion. The tram line will serve as a lifeline, connecting Lockov's new and existing infrastructure to economic, cultural, and recreational opportunities in Prague, enhancing residents' quality of life and fostering regional integration.

Outcomes:
The integration of new infrastructure elements, including the ring road, new streets, and tram line extension, will catalyze Lockov Village's evolution into a modern, well-connected community while preserving its historical charm and green surroundings. Improved accessibility and connectivity will enhance residents' mobility and facilitate economic growth, reinforcing Lockov's position as a desirable place to live, work, and thrive in harmony with nature and heritage.

3.5 New Urban Typologies

1. Residential Typology: Forest Retreat Residences

Embracing the natural allure of the surrounding woodlands, Forest Retreat Residences offer a tranquil escape amidst Lochkov's lush forest landscape. These cozy homes seamlessly integrate with the surrounding environment, providing residents with a serene sanctuary immersed in nature's beauty.

Key Features:

Plot Area: No Plot Area
Built-Up Area: 185m sq.
Private Forest Access: Direct access to nearby forest trails and natural wonders
Capacity: 4 people

Design Highlights:

Seamless Integration: Each Forest Retreat Residence harmoniously blends with its forest surroundings, utilizing natural mate-

rials and earthy tones to create a warm and inviting atmosphere.

Nature Immersion: Residents can immerse themselves in the tranquility of the forest, with panoramic views and forest trails just outside their doorstep, offering endless opportunities for exploration and relaxation.

Sustainable Design: Forest Retreat Residences prioritize sustainability, with features such as passive solar design, eco-friendly building materials, and minimal environmental impact, ensuring a harmonious coexistence with the surrounding ecosystem.

2. Residential Typology: Communal Village Dwellings

Rooted in the spirit of community living, Communal Village Dwellings offer a shared sanctuary where residents come together to cultivate a sense of belonging and camaraderie. These residences foster a vibrant communal atmosphere, promoting social interaction and collective well-being.

Key Features:

Plot Area: 200m sq.
Built-Up Area: 125m sq.
Community Gardens: Shared green spaces for gardening and leisure activities

Capacity: 4 people

Design Highlights:

Collective Living: Communal Village Dwellings are designed to facilitate interaction and collaboration among residents, with shared amenities and gathering spaces fostering a sense of unity and belonging.

Sustainable Community: Residents collectively steward communal resources, embracing sustainable practices such as community gardening, renewable energy initiatives, and waste reduction efforts, fostering an eco-conscious lifestyle.

Cultural Exchange: The communal setting encourages cultural exchange and mutual support, fostering a diverse and inclusive community where residents learn from one another and celebrate shared traditions and values.

3. Residential Typology: Farmstead Residences

Nestled within the agricultural heartland of Lochkov, Farmstead Residences offer a unique blend of rustic charm and rural tranquility. These homes are designed to complement the farming lifestyle, providing residents with a comfortable retreat amidst the

verdant fields and rolling countryside.

Key Features:

Plot Area: 1500m sq.
Built-Up Area: 200m sq.
Capacity: 4-5 people

Design Highlights:

Farm-to-Table Living: Farmstead Residences promote self-sufficiency and sustainability, with ample space for cultivating crops, raising livestock, and tending to orchards and vegetable gardens, allowing residents to enjoy fresh produce straight from their land.

Rural Aesthetic: These homes exude a charming rural aesthetic, with traditional architectural elements and natural materials blending seamlessly with the surrounding countryside, creating a picturesque homestead that celebrates the farming heritage of Lochkov.

Community Engagement: Farmstead Residences foster a sense of community among farming families, with shared agricultural resources, cooperative farming initiatives, and communal gatherings strengthening bonds and promoting collaboration within the farming community.

4. Mixed-Use Commercial Typology: “Main Street Plaza”

“Main Street Plaza” serves as a vibrant hub of activity along the main road artery connecting Slivenec and Lockov. This dynamic mixed-use typology offers a diverse range of housing options, from studios to apartments, alongside ground-level commercial spaces, creating a lively and inclusive urban environment for residents and visitors alike.
Key Features:

Versatile Housing Options: “Main Street Plaza” provides a variety of housing options to accommodate diverse lifestyles and preferences, including studios, one- bedroom, and two-bedroom apartments, catering to individuals, couples, and small families.

Ground-Level Commercial Spaces: Situated along the main road artery, the ground-level commercial spaces offer a mix of retail shops, cafes, restaurants, and services, providing convenient amenities and fostering economic activity within the community.

Public Gathering Spaces: Thoughtfully designed public spaces, such as plazas and pedestrian promenades, encourage social interaction and community engagement, serving as gathering points for residents and

visitors to connect and unwind.

Transit-Oriented Design: “Main Street Plaza” benefits from its strategic location along a major transportation corridor, promoting accessibility and connectivity via public transit, cycling infrastructure, and pedestrian pathways, reducing reliance on private vehicles and supporting sustainable mobility options.

3.6 Unveiling Structural Strength: Structural Analysis

Both the “Green Haven Homes” residential typology and the “Main Street Plaza” mixed-use commercial typology are designed with sustainability and innovation in mind, featuring structures built using cross-laminated timber (CLT) construction. This advanced building technique offers numerous benefits, including strength, durability, and environmental sustainability. The CLT construction method allows for efficient assembly, reducing construction time and minimizing disruption to the surrounding environment. Additionally, the use of timber as a renewable resource aligns with Lockov Village’s commitment to eco-conscious living and responsible urban development. Through the integration of CLT construction, these new typologies exemplify Lockov’s dedication to creating modern, resilient, and environmentally friendly built environments for its residents and visitors.

3.7 Cultivating Sustainability: Insights into Sustainability

The proposed architectural interventions for Slivenec and Lochkov are deeply rooted in sustainability principles, aiming to create vibrant communities that thrive within a framework of ecological responsibility and resilience. Here’s a brief overview of how the design embodies sustainability:

1. Resource Efficiency: The design prioritizes the use of locally-sourced materials and sustainable construction techniques, such as cross-laminated timber (CLT), to minimize resource consumption and reduce carbon emissions associated with building construction. By using renewable materials and efficient construction methods, the project reduces its environmental footprint while promoting the use of sustainable building practices.

2. Renewable Energy Integration: Through the incorporation of renewable energy systems like solar panels and geothermal heating, the project reduces reliance on fossil fuels and promotes the use of clean, renewable energy sources. By harnessing natural

resources to power residential and commercial buildings, the design reduces energy consumption and lowers carbon emissions, contributing to a more sustainable energy future.

3. Green Infrastructure: The design integrates green infrastructure elements such as green roofs, rainwater harvesting systems, and permeable paving to promote natural stormwater management, reduce urban heat island effect, and enhance biodiversity. These green features help mitigate the environmental impacts of urbanization while creating healthier and more resilient communities.

4. Mixed-Use Development: By fostering mixed-use development patterns and prioritizing walkability, the design reduces reliance on private vehicles and promotes active transportation options such as walking, cycling, and public transit. This compact, mixed-use development model minimizes sprawl, reduces transportation-related emissions, and fosters a sense of community and belonging.

5. Cultural Heritage Preservation: The design incorporates adaptive reuse of historic structures and careful preservation of cultural landmarks to honor the rich heritage of Slivenec and Lochkov. By preserving the historical character of the villages, the project promotes cultural continuity and strengthens community identity while minimizing embodied carbon associated with new construction.

Overall, the proposed architectural interventions for Slivenec and Lochkov represent a holistic approach to sustainable village development, integrating environmental, social, and economic considerations to create vibrant, resilient communities that thrive within the larger urban context. Through innovative design solutions and thoughtful planning, the project aims to preserve the unique character and heritage of the villages while promoting long-term sustainability and quality of life for residents.

3.8 Gauging the Project's Impact

The impact of implementing this project in Lochkov would be significant, as it would allow for the accommodation of 836 new residents, contributing to the village's growth and vitality while maintaining its quality of life and charm. Furthermore, if similar strategies were applied to the other 29 potential sites situated on the peripheral areas of Prague, there would be a substantial increase in built-up area, totaling 1,111,570 square meters. This expansion could accommodate approximately 116,000 new inhabitants in Prague, addressing the city's growing population needs in a sustainable and effi-

cient manner. By densifying these peripheral areas while preserving their unique identities and integrating them into existing city infrastructure, this project has the potential to enhance Prague's overall livability, resilience, and sense of community for generations to come.

4.0 Conclusion

In summary, this architectural bachelor project offers a comprehensive strategy tailored to tackle the challenges confronting villages like Slivenec and Lochkov on the outskirts of Prague. With a keen focus on preserving their distinct identities and enhancing their quality of life, the project proposes sustainable solutions aimed at accommodating future growth while safeguarding their unique charm. Through meticulous research, thoughtful analysis, and innovative design interventions, the project not only identifies opportunities to strike a balance between growth and preservation but also aims to enhance connectivity, accessibility, and environmental sustainability. By embracing cutting-edge design elements such as mixed-use developments, verdant green spaces, and eco-friendly cross-laminated timber construction, the project strives to fashion vibrant, resilient villages that seamlessly integrate into the larger urban fabric. Ultimately, this endeavor offers more than just housing; it promises a lifestyle that celebrates community, sustainability, and interconnectedness with nature. For those seeking a harmonious blend of urban convenience and rural tranquility, this development beckons as an ideal haven, offering a nurturing environment where residents can thrive and flourish together for generations to come.

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