



FROM TRADITION TO INNOVATION

RECONTEXTUALISING JAPANESE VERNACULAR
ARCHITECTURE THROUGH BIOPHILIC DESIGN

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ABSTRACT

INTENTIONS, GOALS AND METHODOLOGY

In contemporary architectural discourse, sustainability has become one of the deciding factors in shaping the architecture of the future. One important yet often overlooked aspect of both ecological and social sustainability is engaging people with their surrounding nature. In order to inspire more substantial sustainable solutions the relationship between humans and nature needs to be nurtured, and its importance highlighted. By creating a strong mutual relationship, both the responsibility for, and responsiveness to nature becomes prioritized. Researching how this relationship can be enhanced through our built environment led to the creation of biophilic design, attempting to create tangible frameworks for implementing nature into architecture. However, biophilic design remains vague, and mainly looks forwards in trying to find new innovation. This thesis argues that looking backwards at vernacular examples could lead to new innovations, enhancing the already existing biophilic design framework by researching how such architecture could inspire new solutions.

The purpose of this thesis is thus to evaluate vernacular architecture through the lens of biophilic design in order to gauge its relevance for future architecture. This thesis evaluates one particular vernacular context - the traditional architecture of Japan - by asking the question if Japanese vernacular architecture could be used as a creative asset for innovating upon, and enriching contemporary biophilic architectural design.

By first presenting the relevance of biophilic design theory, and applying this on Japanese case studies, many aspects of the Japanese vernacular were evaluated in pursuit of design strategies that offer new ways for architecture to interact with its environment in a meaningful way. This culminated in a new qualitative framework of architectural concepts, suggesting new methods for utilizing lessons from the vernacular in biophilic architecture, along with a design project that explored the connection between the Japanese architecture and its apparent biophilic tendencies, and how this relationship could lead to innovation in a contemporary setting.

KEY WORDS: *vernacular architecture, sustainable design, Japanese architecture, biophilic design, innovation*

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ACADEMIC FRAMEWORK

PURPOSE AND AIM

This thesis aims to bridge the gap between traditional and contemporary architectural design by evaluating a specific technique of vernacular architecture and explore how lessons from the past can be adapted for the future. The evaluation of vernacular architecture is done through the lens of biophilic design to tie the subject to relevant architectural research and highlighting the sustainable aspects of traditional techniques, and how to adapt them, making the thesis relevant for future discussion within the field of architecture as a whole. Specifically, this will be done through designing an exhibition- and study building in a green urban setting which incorporates element of traditional Japanese timber design and spatial design. This is an effective combination when studying the sustainability of vernacular architecture and allows exploratioton of the mutually beneficial relationship that built structures can have to local nature. Through designing a space with different distinct functions, with distinct spatial requirements, the project will demonstrate how the diverse qualities of Japanese architecture enhances the human-nature relationship through materials, space and principles of biophilic design.

Inspiration will be taken from traditional Japanese architecture, with the aim to adapt and translate constructional, spatial, and atmospheric principles of traditional techniques into a sustainable building with contemporary functions, resulting in new architecture which innovates on contemporary biophilic design by being inspired by the past. The exploration of traditional techniques will not result in a recreation or duplication of traditional architecture, but aims to reinterpret, adapt and translate vernacular elements into a building that achieves innovation through inspiration of these techniques. The final thesis project aims to be referential, but not imitative.

Vernacular architecture offers many opportunities for contemporary life which will be showcased through the thesis project. By designing a building with distinct functions that require different scales, the project aims to showcase how similar vernacular solutions can create contemporary spaces of different types, with a shared goal of adhering to biophilic design principles.

RESEARCH QUESTION & OBJECTIVES

1. Can structural principles and spatial concepts from vernacular Japanese architecture be used as a creative asset for innovating upon and enriching contemporary biophilic architectural design?

2. Can vernacular Japanese structural and spatial design principles help create a better understanding of how architecture can be localized and responsive to different environments?

3. What does it mean to translate a vernacular style to a new local context?

OBJECTIVE

Exploring vernacular design principles through a contemporary design project, specifically a building for exhibitions and study in Kungsparken, Gothenburg, Sweden. There will be an emphasis on the theoretical research foundation which will be translated first into a new theoretical framework and then into an architectural design expressed through accurate drawings and renderings with a focus on connecting vernacular methods to contemporary goals of biophilic design strategies.

DELIMITATIONS

THESIS DELIMITATIONS

The thesis will focus on the qualitative subjective and theoretical analysis of vernacular features relationship to biophilic design and will not delve into thorough objective quantitative analysis of aspects such as environmental impact or thermal comfort.

PROJECT DELIMITATIONS

This project is speculative, and economic feasibility has not been considered within the scope of this project. The resulting thesis project is not a replication or direct showcase of traditional features found in the Japanese vernacular, but a translation and reinterpretation of these elements adapted for a contemporary project. The thesis project is limited in scale and is therefore focused on how tectonic expression and spatial concepts found in the Japanese vernacular may enhance the connection between architecture and nature.

RELEVANCE FOR SUSTAINABLE DEVELOPMENT

Sustainable development as a subject and issue delves into many different fields which architectural design can contribute to. By embracing sustainable practices architecture may align itself with environmental, social, and cultural questions and provide solutions or alternatives for creating a more sustainable future. This thesis in particular explores the potential of harmonizing the built an natural environment by focusing on the mutually beneficial relationship beetween the two, as presented in the theory of biophilic design. Futhermore, by putting focus on the exploration of vernacular architecture past sustainable solutions are showcased as relevant angles for solving modern problems regarding nature implementation and sustainable design solutions.

The Japanese vernacular in particular can be analysed as an especially good example of this, as its sustainable thinking, both physically and philosphically, has remained relevant. By implementing Japanese elements outside of its original setting this thesis hopes to exemplify and add to the the existing knowledge of how a global exchange of ideas, competence and skills may inspire solutions to local problems as well as contribute to new ideas fo solving shared issues.

EXPECTED RESULTS

THESIS OUTCOME AND CONTRIBUTIONS

The relevance of Japanese traditonal methods have been extensively explored by many architects and theorists. However, treating the example of Japanese vernacular as inspiration for answering broader questions connected to the contemporary theory of biophilic design has yet to be investigated to such a degree.

The thesis will contribute to architectural discourse regarding biophilic design, the relevance of the Japanese vernacular in other contexts, and challenge contemporary methodology by finding answers in tradition and historical precedent.

THEORY

The theoretical spectrum of the thesis follows a linear structure, first as an analysis och biophilic design and the vernacular architecture of Japan, followed by case studies of Japanese architecture, and finally synergizing these principles into a design framework for implementing the ideas into a tangible design project. Exploring the relationship between principles of biophilic design and vernacular architecture thus contributes to the theoretical discussion of both, and will finally be evaluated through the discussion surrounding the final design project.

FRAMEWORK

The framework will consist of a selection of tools for using the lessons from Japanese architecture and their potential contributions to biophilic design strategies. This suggests concrete ideas for how to work with vernacular influence for innovative design, thus recontextualizing the Japanese vernacular.

DESIGN PROJECT AND CONTEXT

The final project will be non-imitating, and focus on the innovative aspect on how a particular architectural heritage can be a catalyst for innovative, sustanable design. As a public building, the project will demonstrate how Japanese vernacular architecture can inspire different types of spaces with varying degrees of public and private.

The chosen site is Kungsparken in Gothenburg. This is due to its strategic location in the urban fabric of the city, and vicinity to several institutions which may benefit from an exhibition space. An urban park clearly demonstrates the benefits of how local nature affects the built environment as it challenges the relation and functions of the space. It also creates opportunities for exploring how vernacular architecture relates to contemporary motivations, which the project will showcase.

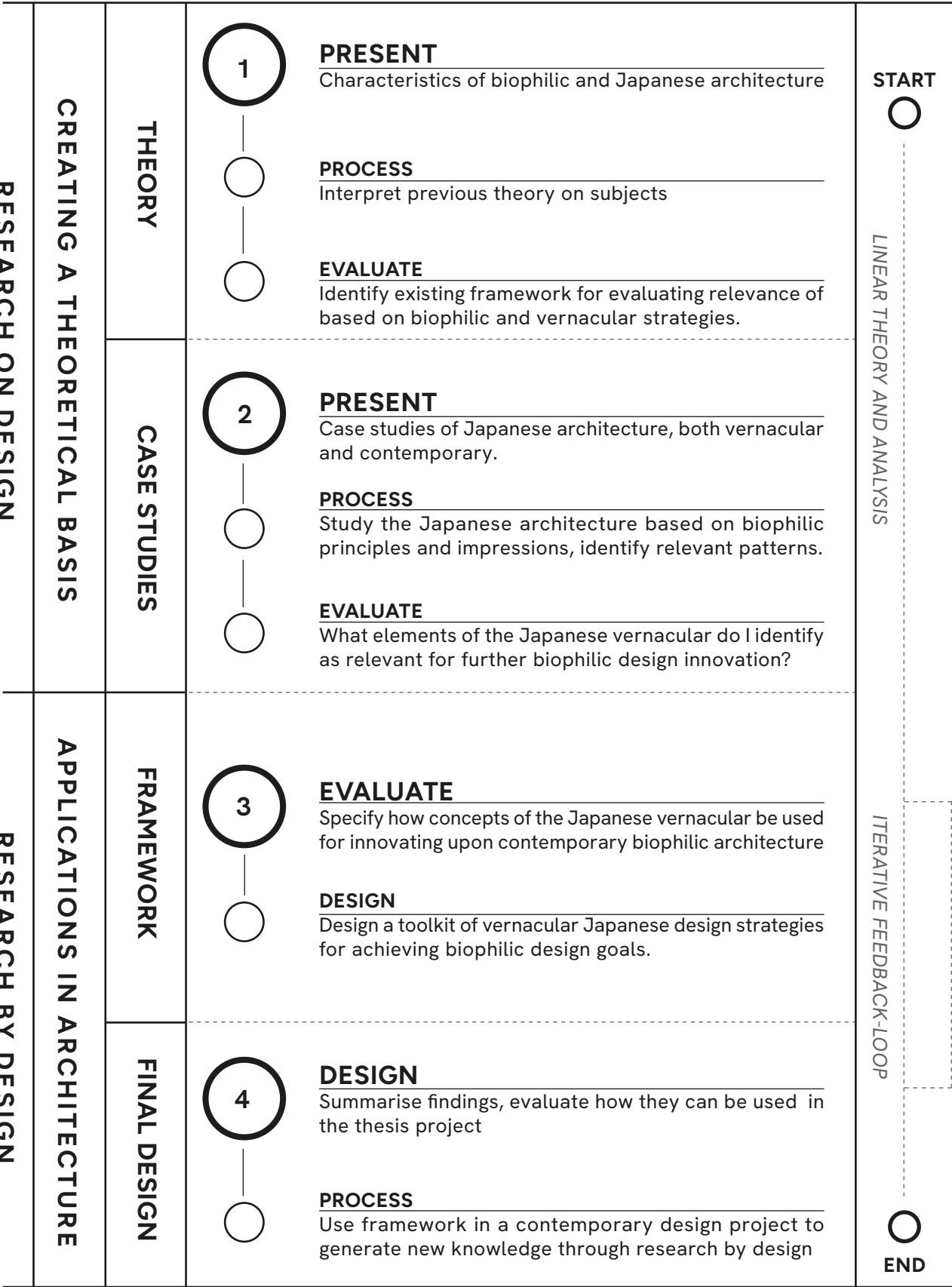
THESIS METHODS

RESEARCH ON DESIGN	RESEARCH BY DESIGN
<p>Through extensive literature studies different types of discourse on vernacular architecture can be incorporated into the design process, from why traditional buildings were designed a certain way, to how contemporary projects incorporate these ideas. A theoretical understanding of the importance of vernacular architecture is reflected in the design project.</p>	<p>The answer to the thesis question will be explored through the architectural design process, and will progress parallel to all other work and analyses in order to view design work as the solution to the research question. The research will be conducted through iterative design work.</p>
<p>BIOPHILIC DESIGN AS A STRATEGY</p> <p>As an additional layer, the concept of biophilic design will be used as a theoretical lens to evaluate the vernacular architecture of Japan by connecting it to a contemporary theory and highlighting the relevance of how vernacular Japanese architecture can contribute to architecture today. The thesis will follow a linear model for evaluating the relevance of Japanese design.</p>	<p>DESIGNING A NEW FRAMEWORK</p> <p>Through case studies a framework will be created with features and ideas of Japanese architecture which will be evaluated in terms of how they can be used to innovate in a contemporary context, motivating the thesis question through tangible design. The framework will provide general strategies for any contemporary architecture, and its relevance will be tied to this specific design process in hopes of showcasing how a framework based on the precedent of Japanese vernacular architecture may inspire innovation and creative solutions for the future.</p>
<p>CASE STUDIES</p> <p>Studying and analysing specific architecture creates an understanding of why and how these buildings came to be, and thus enables similar reflections to be made in a contemporary context.</p> <p>Case studies were selected amongst both vernacular and contemporary Japanese buildings, which were researched and explored closely in person on a study trip to Tokyo, Kanazawa and Kyoto in the spring of 2025. The selection aims to find relevance in the historical precedent as well as identify methods in which these have already inspired contemporary architectural design.</p>	<p>DESIGN PROJECT</p> <p>Finally, the relevance of the Japanese vernacular through the theoretical lens of biophilic architecture will be evaluated through a concluding design project.</p>

ITERATIVE FEEDBACK LOOP

The framework will be based on research and case studies on the Japanese vernacular, and will inform the design process. The final design process will in turn also evaluate the framework and help iterating it , creating a feedback loop of iterations where framework informs design, and design informs framework.

STRUCTURE & METHOD PROCESS



III. **BACKGROUND**
*CURRENT DISCOURSE, SUBJECT
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DISCOURSE ON VERNACULAR ARCHITECTURE

Vernacular architecture is a style of architecture based on local building customs, local materiality, and its surrounding environment, and can therefore be found in many different forms around the world. Historically, it reflects traditions and behaviour of the cultures in which it arises and was generally created from skilled builders based on local needs. In today's architectural discourse, vernacular architecture is praised for its material beauty, genuine connection to the local environmental context and defined craftsmanship in its construction. Vernacular architecture has been studied as a model for simple yet functional design as well as for its historical importance, but as Dr. Neveen Hamza puts it in *Sustainable Vernacular Architecture: How the Past can Enrich the Future* (2019), "Little attempt has been made to address the contemporary decline in the traditions, the difficulties in contemporary design or the opportunities they could offer to the architecture of today."

CONTEMPORARY SUSTAINABLE RELEVANCE

From a generalized viewpoint when taken out of a specific geographical context, vernacular architecture is based on several core principles. Vernacular architecture is localized and is by nature responsive to its surrounding environment and potential function (Hamza, 2019). In the end, the flexibility and adaptability of vernacular architecture is possible due to clever construction, choice of material and inherently sustainable mindset that traditional architects and builders had to adapt to out of both necessity and appreciation for what the local environment had to offer them. In other words, the methods and motivations behind vernacular architecture greatly impacts its potential as atmospheric, practical, and sustainable architecture. Therefore, knowledge derived from vernacular architecture can be seen as a core to sustainable design, where the building is directly connected to the landscape through its construction methods, materiality, and spatiality, which offers adaptiveness and longevity. Amos Rapoport proposes in his paper *Vernacular Design as a model System* (2006) that studying vernacular examples should not simply describe a building, but use it as a theoretical and conceptual precedent for architects to explore new sustainable design practises, with the goal to use the vernacular as a model for finding general lessons and principles, rather than copy specific design solutions.

Through hindsight, the architecture of the past can be a model for contemporary architecture as it has evolved through experience during a long period and represents the best solutions to past failures. As a model for contemporary design, vernacular lessons could connect modern architecture to the local context and landscapes while paying closer attention to the individual needs of both the people and the environment. Additionally, features which were a requirement for vernacular architecture can in present day be appreciated for reasons other than necessity, as modern technologies have eliminated many issues which decided certain constructional solutions or spatial arrangements in the past. These features are however far from obsolete and can through creative adaptation become something entirely new, and by innovating on tradition these features will be valued both for what they have been able to accomplish in the past, but more importantly what they may accomplish in the future.

RE-CONTEXTUALIZING THE VERNACULAR

Courtney Angen reiterates in her research paper *How Traditional Japanese Architecture can contribute to Contemporary Sustainable Design Practices* (2013) that being categorized as "traditional" or "vernacular" does not necessarily determine the relevance of a design concept in relation to how it could be used in sustainable, contemporary practice. Rather, the adaptability of the concept is key, and while specific features may no longer be appropriate for modern usage one could instead derive knowledge from the concept embodied in these features, which in turn could inspire new solutions and criteria for sustainable design practices.

There are many lessons to derive from vernacular architecture. Some general concepts from vernacular architecture which could be adapted and used in contemporary architecture include the longevity of a building, enhanced by creating a space which offers interactivity with the environment and quality of life, the material choice mainly including natural materials such as wood and clay, ensuring the ability to reuse and recycle as well as the possibility to dismantle structures, and creating architecture which has a mutually beneficial relationship to the site through taking care of the nature, and enhancing its purpose in the eyes of the building's inhabitants (Angen, 2013).

CONTEMPORARY EXPLORATION OF THE JAPANESE VERNACULAR

Many aspects of the Japanese vernacular are worth studying as an example for contemporary architecture, and while each specific element should be closely examined to evaluate their individual relevance, the whole system of the Japanese vernacular building still serves as an example of designing with longevity, adaptiveness and sustainability in mind (Angen, 2013).

Natural elements and systems are, as with any type of vernacular architecture, great influences on how the architecture of Japan has developed. The architecture of Japan has an additional relevance as these systems are not seen as simple physical factors, but relate to society and the individual resident's relation to nature. Jiro Harada (2011) describes the Japanese relation to its vernacular materiality, stating "... the plain surface of wood is a manifestation of the love of nature so strong in the Japanese", thus contextualizing the contemporary inclination to work with nature and natural materials.

Heino Engel describes the dissatisfaction with how contemporary architects at the time used the Japanese vernacular as an inspiration. He states that modern interpretations simply imitate or adopt features found in Japanese architecture without thinking of their essential reason for existing in relation to the factors which influence the architecture itself. "Form and features have been transplanted to different times and locations ignoring the fact that their aesthetic meaning bears no relationship to contemporary living and thinking" (Engel, 1964). Present conditions have eliminated many issues which may have motivated vernacular architecture, but other factors and standards have appeared in their place. Engel hoped for architects to understand the potential of Japanese architecture through exploring the motivations behind how and why the Japanese designed as they did and apply similar a mindset to new architecture, not emulate what they in fact designed. This thesis similarly does not transplant features, but explores the larger scope of how to relate vernacular ideas to contemporary conditions.

RELEVANCE OF BIOPHILIC DESIGN STRATEGIES

THE PURPOSE OF BIOPHILIC DESIGN

The word biophilia was first used by social psychologist Erich Fromm (1964) to express the inherent "love of life" that exists within people and the need to interact with living organisms, either other people or nature. Fromm's definition of biophilia is not directly translatable into architectural design, but the term has since its initial definition been further evaluated and discussed in several other fields, giving it new meaning and contextual relevance. Stephen Kellert (2008) describes biophilic design as "a deliberate attempt to satisfy the need of contact with natural systems and processes in the contemporary built environment, and to improve people's physical and mental health, productivity and wellbeing" which can more closely be connected to the type of environmental connection contemporary architecture often seeks (Zhong et al. 2021).

CONTRIBUTIONS OF BIOPHILIC DESIGN

In contemporary architecture, biophilic design is an approach for incorporating nature into the built environment, and as a specific strategy biophilic design can create a foundation for how to view and create architecture in symbiosis with nature. As a method biophilic design helps define words such as 'sustainability' and 'green architecture', providing a clearer framework for approaching architectural design with a sustainable mindset.

Kellert (2008) also states his understanding of the main difficulties related to biophilic design. The main issue of biophilic design explored in this thesis is the limitations of translating the understanding of biological value of nature into specific approaches for designing the built environment, which the case studies, framework and design-based research approach will contribute to.

PROBLEM DESCRIPTION

LARGE SCALE PROBLEMATIZATION

The European Comission recognized the importance of "nature-based" solutions in its report *Towards an EU Research and Innovation policy agenda for Nature-Based Solutions & Re-Naturing Cities* (2015) in which nature based design is evaluated on an urban scale, specifying benefits such as resource-efficiency, resilience and residential health. This report discusses a larger urban scale compared to this thesis, and the potential of the individual building is not detailed. Timothy Beatley (2017) reiterates the challenges of meaningfully implementing nature into the built environment stating that "educational efforts are needed to help us re-imagine a city as a nature-immersive place." In order to improve the presence of nature in an urban setting, the individual building plays a vital role, which will be the focus of the thesis.

BIOPHILIC DESIGN AS A SOLUTION

When discussing sustainable architecture Stephen Kellert (2008) puts the modern construction industry into perspective, stating that "the dominant paradigm of design and development of the modern built environment has become one of unsustainable energy and resource consumption, extensive air and water pollution, widespread atmospheric and climate alteration, excessive waste generation, unhealthy indoor environmental conditions, increasing alienation from nature and growing placelessness". Zhong, Schröder and Bekkering (2021) describe the relevance of the issue by stating two reasons to explore biophilic design in a contemporary context. The first being to better understand the recongnized "craving" for nature in the built environment by providing frameworks to understand nature in this context, and secondly to battle sustainable placebo strategies such as "green-washing" and instead create truly substaintial and sustainable solutions that stand the test of time. The construction industry constantly strives for sustainable improvements but there is still potential for further perspectives and solutions, with Kellert's statement being a clear account of the context in which this thesis will proceed from.

VERNACULAR PRECEDENT AS A STRATEGY

Biophilic design and vernacular architecture share an inherent interest for responsibility and responsiveness towards our natural surrounding. The importance of studying vernacular architecture lies in its potential as a precedent for sustainability.

What motivates Japanese architecture as the candidate for this study? Contemporary architecture is by definition based on the most current developments and trends. The label of traditional associated with the vernacular is by that same definition an antithesis to what contemporary architecture often aims to achieve. It should be acknowledged that some traditional techniques become obsolete over time as technologies improve, but what makes Japanese architecture especially relevant in bridging the gap between past and present is how its traditional techniques and spatial ideas tie in to both physical, conceptual as well as philosophical ideas. For instance, comfort has always been a factor for which solutions have been equally deduced from physical and emotional needs (Angen, 2013). Japanese architecture has for this reason developed to have a unique atmosphere based directly in its tangible and decipherable methodology. Subsequently, the solutions found in the Japanese vernacular would not only inspire a more sustainable approach to building and constructing, but would complement the biophilic approach to improving the way people relate to nature and sustainable thinking in the built environment.

THESIS APPROACH

At its core, this thesis aims find a place for vernacular methods in relation to the contemporary demands of architecture as both an art form and an industry. It does so by seeking new ways to innovate upon contemporary architecture through relevant theory connected to sustainable development and the importance of how people interact with nature. By finding new solutions to how to emphasize this important relationship not through using new methods but by evaluating historic design principles, new discoveries can be made regarding the opportunities and potential that vernacular design methods still offer for contemporary issues, and explore what it means for the architect to act as translator of cultur, behaviour and design philosophy.

With all this in mind, designing a building for public use, within a crowded urban environment will constitute a tangible example of the symbiosis and relationship between biophilic and vernacular design strategies, both of which aim to engage people with nature through architecture, thus exploring the potential of historical techniques in a new way.

IV. THEORY

BIOPHILIC DESIGN, JAPANESE
VERNACULAR AND THEIR SYNERGY

The theory seeks to combine principles of Japanese vernacular architecture and biophilic design strategies in line with the thesis questions. First the reasoning and motivation behind why it could be suitable to translate and recontextualize vernacular architecture is discussed. Furthermore the theory describes the specifics of biophilic design, its relevance and suggestions for how to incorporate it into contemporary practice. Additionally, the specifics of the Japanese vernacular is discussed, from how it uses nature as an asset in its design philosophy to the details of the Japanese space and Japanese timber construction. The theory will serve as a base for understanding the relevance of the subjects of biophilic design and the Japanese vernacular, and most importantly their relationship. The theory shapes the final design as a theoretical lens for the qualitative analysis of case studies across Japan, and the design framework this analysis will inform.

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TRANSLATING TRADITION

VERNACULAR ARCHITECTURE AS A CREATIVE ASSET IN OTHER CONTEXTS

REDIFINING CONTEMPORARY CONDITIONS

In *The Japanese House: Architecture and Art after 1945* (2017) Yoshiharu Tsukamoto discusses the relationship between vernacular and contemporary functions of a building. He argues that there is a discrepancy between the two regarding what values were brought into creating vernacular space compared to contemporary ones, stating that vernacular architecture is based on from trial-and-error efforts, grounded in the ecology of living - using surrounding resources and nature as means for design. This means that vernacular architecture comparatively consists of spaces which hold no value besides being a place to experience life by making use of the surrounding ecology, as the spaces were designed by means of living in tandem with nature, lacking any institutional purpose by being "designed" without a prior concept. Contemporary spaces are on the other hand more dictated by function, as buildings for specific purposes became required for modern life (Tsukamoto, 2017).

Furthermore, Tsukamoto discusses how to approach contemporary architecture with vernacular practices. He argues that the complexity and multitude of factors affecting contemporary institutional architecture creates barriers which prevent modern buildings from making use of their surrounding resources. By breaking through these barriers, and reinterpreting which factors may affect contemporary buildings, new architecture can have greater access to the same resources which dictated vernacular space. Tsukamoto concludes that the factors and behaviours which affected the design of vernacular spaces can be reinterpreted by viewing modern conditions as influences which may affect the architecture similarly. Factors such as institutional purpose and modern technology would look backwards to achieve contemporary functions by maintaining the use of nature and what resources it offers, materially, spatially and atmospherically. This recontextualizes the ecology of living, proposing thinking about the ecology of contemporary living in a similar sense (Tsukamoto, 2017).

Traditional design principles can thus influence modern architecture whilst maintaining the contemporary factors which did not affect the vernacular. Instead of viewing contemporary functions as an additional layer to the vernacular approach, these functions would be recontextualized as means to achieve the same goals as that of vernacular architectural precedent. As vernacular architecture has responded to local contextual conditions, these conditions could be redefined in alignment with the socio-cultural and environmental conditions of the modern day, thus providing opportunity for contemporary architecture to use vernacular methodology.

THE VERNACULAR AS INSPIRATION

Will Weber and Simon Yannas write in *Lessons From Vernacular Design* (2014) that vernacular architecture can inspire the development of new ideas by acting as a springboard for innovation. The important distinction here lies in seeking innovation rather than seeking imitation or derivation when designing with vernacular inspiration. Reiterating this approach, Amos Rapoport presents in his paper *Vernacular Design as a Model System* (2006) how studying vernacular examples on a problem-oriented, theoretical and conceptual level can provide new creative insights. He proposes thinking about vernacular architecture as a "model system", of trying to find general ideas, strategies and principles which can then be applied to new design projects. By acknowledging these general lessons, the essence of the vernacular is reframed as a tool for problem solving today, and not simply as a study on the past. Finally, Rapoport suggests vernacular architecture as an entry point for solving contemporary design problems as historical precedent are more extreme and daring in their solutions, and subsequently less ambiguous than modern examples, which can then through a model system of general applications and lessons be a tool for finding a multitude of inspired solutions by reinterpreting, translating, and recontextualizing vernacular architecture (Rapoport, 2006).

MOTIVATION AND APPLICATION OF BIOPHILIC DESIGN

THE IMPORTANCE OF NATURE-IMMERSIVE ENVIRONMENTS

Science, innovation and architecture all play vital roles in the progress of human culture. When searching for new, better ways of developing our built environment architects and scientists of multiple disciplines have collaborated to understand both the basis of, and tools for, change. Initially, the idea of biophilic design was a postulation based on the hypothesis that a nature-immersive environment is beneficial for the psychological and physiological well-being of humans due to the innate connection that humans have with nature. Having recognized this, along with the fact that this connection is no longer prioritized in the contemporary built environment, the discussion around the practical applications of biophilic design began (Söderlund & Newman, 2015). In *Biophilic Design: The theory, science, and practice of bringing buildings to life* (2008), Stephen Kellert presents biophilic design as a necessary innovation for architects to consider, but is also quick to point out the irony that buildings have for many centuries of human history already followed the principles of biophilic design by utilizing local materials, mimicking natural behaviours and embracing the strengths of natural processes to create comfort and unison with nature. However, the intent of these vernacular buildings might not have been innovation and progress, but rather comfort and necessity. Regardless, the often subconscious utilization of early nature-immersive strategies could serve as evidence of the innate connection between humans and nature, and as proof that the built environment can play an integral part in maintaining this relationship rather than raising barriers. Kellert (2008) makes the argument that this relationship has been deprioritized, and that innovation is now necessary to find what has been lost to history.

Biophilic Design as a concept has come a long way from the initial claim by psychoanalyst Erich Fromm that this innate connection in fact exists (Fromm, 1964). The innate response to natural elements has since Fromm's initial hypothesis been debated by scholars and multidisciplinary practitioners such as psychologists, ecologists, urbanists and architects, and it was not until these practitioners collaboratively created the book *Biophilic Design: The theory, science, and practice of bringing buildings to life* (2008) that the theory was first reframed into practice, creating a toolkit for designers to use (Söderlund & Newman, 2015).

This writing has in turn been recontextualized and questioned, and several authors have reworked the initial guidelines to make them more tangible over the last decades.

For a long time, the necessity of biophilic design and motivations for its usage remained vague. Söderlund and Newman argue for its relevance and through critical reviews compile scientific evidence in their work *Biophilic Architecture: A Review of the Rationale and Outcomes* (2015). Ultimately they argue for several empirically supported fields which benefit from biophilic design, which in turn supports the necessity of the approach. The first field is health, both psychological and physiological. Environmental Psychologists Kaplan and Kaplan proposed that natural immersion could restore or improve voluntary attention, meaning the ability to focus and block out unwanted stimuli (Kaplan & Kaplan, 1989). Psychologist Rita Berto performed experiments to further test this hypothesis with the conclusion that natural environments have a restorative effect, decreasing mental fatigue (Berto, 2005). Several more experiments were conducted by different researchers to test Kaplan and Kaplan's hypothesis as well as other emerging theories. Among these were Guégan and Stefan who observed that nature immersion generated a positive change in mood, as well as a greater impulse to help others (Guégan & Stefan, 2014). In total these results strongly support the innate human response to nature, and more evidence is emerging to suggest that there is a scientific psychological basis for the necessity of biophilic design (Söderlund & Newman, 2015).

Furthermore, Söderlund and Newman present evidence for societal and economic benefits, both of which are closely tied to the impact biophilic design has on health. They conclude that the psychological benefits lead to more productive work at less risk to a workers health, improving sociopsychological working conditions through biophilic design which in turn positively impacts economy. Economically, one major draw of biophilic architecture is the possibility to make densification a more attractive approach stating that denser cities attract more people, knowledge and capital and that by introducing biophilic strategies into the built environment the city and individual buildings can become denser at no cost of losing urban-adjacent nature (Söderlund & Newman, 2015).

BIOPHILIC DESIGN AS A CONTEMPORARY PRACTICE

IDENTIFYING A FRAMEWORK FOR NATURE IMPLEMENTATION

EXISTING BIOPHILIC FRAMEWORK

In order to create tangible design strategies for implementing biophilic design strategies, different scholars and practitioners have consistently iterated upon and reworked the practical approach to biophilic design since its inception as a theoretic point of view. Most contemporary and arguably relevant of these is the work of William Browning and Catherine Ryan in their book *Nature Inside* (2020) who have iterated upon the previous work of other biophilic design pioneers with the intent of providing a clearer framework for both applying biophilic design strategies into new projects, as well as evaluating existing architecture in accordance with these principles.

The foundation for Browning and Ryan’s approach is presenting three broad categories which give structure to their “pattern language” for biophilic design which provides discrete design parameters. Within these three categories are 15 recognized design patterns for use in architecture, as presented in figure A.

Browning and Ryan present not only their discrete proposal for a specific design framework, but also the general principles for adopting this framework as a “toolkit” for architecture. One key aspect for successfully realizing biophilic design is viewing it as an adaptable methodology, and identifying the existing opportunities for the “palette” of biophilic design and which patterns that could be feasibly implemented to create the desired quality and substance. This means that not all patterns are applicable in each project without sacrificing the integrity of the desired experience and outcome as architecture, and that by prioritizing certain patterns the overall biophilic integration becomes stronger. The experiential context is based on what typology is being designed and what the occupants needs are, so considering this context is key in targeting certain experiences in relation to biophilic design patterns in order to narrow down the potential implementation of these design interventions. “The most effective biophilic design experiences emphasise a few patterns with particular thoughtfulness and rigour, applying secondary patterns as enhancements to those experiences” (Browning & Ryan, 2020).

BIOPHILIC DESIGN AS A RESEARCH THEORY

Biophilic design was proposed as a way to concretize the ambiguity of sustainable approaches to architecture and the role nature interaction can play in bridging the gap between theory and practice. In this thesis the interdisciplinary knowledge of biophilic design strategies can be deepened by relating it to both the contemporary design process presented as well as historic precedents, thus attempting to demonstrating how biophilic design strategies found in the Japanese vernacular may contribute to a contemporary architectural design project. For the sake of both transparency and to in a nuanced way tie biophilic design to the thesis methodology the patterns and general ideas of the strategy have to be put into perspective by questioning their relevance.

The Japanese vernacular will be evaluated based on how they utilize the biophilic design patterns presented by Browning and Ryan (2020), but first the patterns themselves need to be assessed. Despite being developed as a mean to reduce the ambiguity of sustainable design practices, many of the pattern remain broad. This may create more opportunities for their implementation, but on the other hand the the overall success of the pattern’s implementation could become inconclusive due to the broader evaluation criteria. This issue may be overcome by following Browning and Ryan’s instuction for the implementation of the patterns by emphasizing only a few patterns, supported by secondary patterns. By doing so, evaluating the success of the pattern implementation becomes a question of judging the totality of the impact biophilic design has on the architecture created. The biophilic design framework thus works on a purely quantitative and subjective layer, motivated by an empirical scientific basis for its relevance, as presented by Söderlund and Newman (2015).

This biophilic framework presented informs the thesis framework of Japanese design strategies in pursuit of innovative and creative biophilic design solutions., and will serve as evaluation criteria for identifying these elements in Japanese case studies. These findings will in turn be processed into the new framework for using lessons from Japanese architecture in a contemporary setting.

CATEGORY	DESIGN PATTERNS	IMPLEMENTATIONS
NATURE IN SPACE <i>“Direct experiences with nature.”</i> Browning & Ryan, (2020).	1. Visual Connection with Nature	Focusing on a view of an element of nature.
	2. Non-Visual Connection with Nature	Directing sensory experiences which positively references nature.
	3. Non-Rhythmic Sensory Stimuli	Enhancing the ephemeral connection with nature.
	4. Thermal and Airflow Variability	Mimicing the dynamic climactic flow of nature.
	5. Presence of Water	Creating opportunities for seeing, hearing or touching water.
	6. Dynamic and Diffuse Light	Creating lighting variety similar to those in nature.
	7. Connection with Natural Systems	Embrace seasonal and temporal changes found in nature.
NATURAL ANALOGUES <i>“Indirect or representational experiences of nature in the built environment.”</i> Browning & Ryan, (2020).	8. Biomorphic Forms and Patterns	Using symbolic refernces to patterns, contours and numerical arrangements found in nature.
	9. Material Connection with Nature	Using materials from nature which retain its natural feeling, and reflect local conditions thus creating a sense of place.
	10. Complexity and Order	Using rich sensory information that adheres to spatial hiererchies found in nature.
NATURE OF THE SPACE <i>“Four-dimensional characteristics of common spatial experiences in nature.”</i> Browning & Ryan, (2020).	11. Prospect	Designing unimpeded views over a distance for surveillance and decision making.
	12. Refuge	Creating a place for withdrawal, from environment or main flow of activity.
	13. Mystery	Directing the experience with partially obscured views, enticing individual exploration.
	14. Risk/Peril	Navigating an identifiable threat, and creating suitable protection.
	15. Awe	Defying the existing frame of reference, leading to a change in perception.

Figure A, Browning & Ryan’s 15 patterns of biophilic design strategies (2020)

RELATIONSHIP TO NATURE IN THE JAPANESE VERNACULAR

THE RELEVANCE OF JAPANESE ARCHITECTURE FOR BIOPHILIC DESIGN

Architectural design is a tool for local problem solving in the vernacular contexts, which is one reason vernacular tradition from different cultures is worth studying in a contemporary context where universal design solutions are often prioritized (Sala et. al., 2019). Out of all vernacular techniques of building, the Japanese vernacular is arguably particularly relevant in terms of future sustainable adaptation.

In *Sustainable Architecture in Japan: The Green Buildings of Nikken Sekkei* (2000), author Eiji Maki describes the relationship that the Japanese architecture firm Nikken Sekkei has to its vernacular heritage. She states that “Traditional Japanese buildings offer superb examples of what we are trying to achieve in our buildings for the new century and the future. Their underlying principle is amity with the environment. They are close to nature and tailored to local conditions in ways that provide comfort with minimal consumption”. As stated by Hamza (2019), ideas such as environmental responsiveness and locality are general lessons to be acknowledged and appreciated from many vernacular architectures, similarly to what Maki (2000) expresses about the Japanese vernacular in particular. Although vernacular architecture as a point of departure offers many universally applicable lessons such as these, the Japanese vernacular stands out not in *why* it was initially formed, but *how* it developed as well as the way it remains relevant, which make a significant difference when discussing future adaptations of its techniques and philosophies compared to other types of vernacular architecture. In most geographical contexts, vernacular architecture varied drastically depending on who used it, as a regular family residence and a public church, palace or other buildings of a higher status were vastly different in what could be afforded in terms of material and spatial allocation. Today, a relatively small amount of vernacular buildings used by the lower class remain standing in other parts of the world, with an unrepresentative amount of higher status buildings remaining, further increasing the divide between the vernacular and the contemporary (Hamza, 2019).

In Japan on the other hand, buildings used by all walks of life shared similar spatial values, materiality, and function - a consequence of economical, philosophical, and religious factors (Engel, 1964).

As a result, vernacular buildings are still valued not simply as objects of interest but as relevant functional examples, and since they remained for such a long period of time the same structural techniques and spatial values such as spatial flexibility, natural materials, and relationship to nature were shared homogeneously throughout the Japanese society and were continuously iterated upon rather than exchanged for new solutions (Engel, 2020). Cultural values were expressed directly in the building, and in some ways the perceived “ideal” ways of interacting with and being responsive to nature were achievable and strived for by everyone regardless of background. While the economical divide was large, the modesty expressed in all architecture in Japan allowed values to be shared throughout the entire society, both up and down the societal hierarchy, and while ornamentation, size and access to nature differed greatly between the societal classes, the same core principles were shared and realizable regardless of status (Engel 1964). Important to note however, is that the Japanese vernacular remains globally relevant not because it still physically exists, but because its influence persisted and has become more relevant as contemporary architecture aims to accomplish what it had already succeeded in centuries ago.

Historically, Japanese architecture has demonstrated a clear understanding of how to create a relationship between people and nature, and how to express this relationship directly in the built environment. Japanese architecture acknowledges the importance of accessing the qualities of the outdoors regardless of location, where traditional forms display a distinctive relationship to the environment through use of natural light, flexibility of space and material selection. Vernacular architecture not only combats the elements but necessitates using them to its advantage, and the vernacular architecture of Japan utilizes many strategies that in turn connect the architecture to its environment both functionally and philosophically. For example, many public spaces are designed around exterior courtyards which naturally ventilate the indoors environment, and allow the flow of people to be centered around natural features (Angen, 2013).

The indoor-outdoor relationship is further elevated through the use of verandas between the facade and landscape, an “engawa”-veranda, as a main communication method between spaces.

Even in building typologies that lack sufficient space on the plot for regular garden area, the outdoor connection is prioritized, with elements such as the “torinawa”, a clear ventilated double-height axis from end to end, or a “tsuboniwa”, a small enclosed garden atrium that provides interior daylight (Angen, 2013). Discernibly, the Japanese vernacular made a very active effort to prioritize the connection between human and nature, with such philosophy being directly expressed in the architecture. Flexible linked spaces with diffuse layered zones between indoors and outdoors has allowed a close connection with the landscape, and the method of “shakkei”, meaning “borrowed landscape”, factors in to how both the landscape can shape the building, but also how the building can be designed to enhance intractability with the local nature.

Intractability with nature is directly reflected in the dynamic way the Japanese utilize natural light. Sunlight is filtered through slideable translucent shoji and opaque fusuma-screens which separate the rooms whilst maintaining flexibility, and makes daylight a controllable and dynamic component. This is enhanced by the Japanese rooms consistently being adjacent to a facade, and the way rooms are separated not only through flexible screens, but by varying ceiling and floor height (Angen, 2013). In addition to allowing soft or direct light by changing the position of the shoji-screen, they also serve to create additional layers between interior and exterior spaces, which are also dynamically affected by how the screens are used. Supposedly, by creating layers between exterior and interior the gap between the two would become more tangible, but by having these physical borders and layers be firstly flexible, and secondly traversable, the zoning between interior and exterior environments blend into each other, diffusing the borders further. This type of zoning unique to the Japanese vernacular is referred to as “ireko”, and further connects the interior spaces to the natural elements (Maki, 2000).

Furthermore, mixed use buildings with functional flexibility allow for efficient use of resources and reduced impact on the site, which further contributes to the longevity of the architecture.

The human-nature relationship is not only functionally practical due to allowing flexibility and comfort but is expressed as a priority and desire. Features that enhance the connection to nature and means to create hybrid environments that benefit the architecture, nature and people were not only functionally but emotionally and atmospherically important (Angen, 2013). In short, the Japanese vernacular aims to create a mutually beneficial relationship between building and the landscape.

In specific relation to biophilic design strategies, many of the patterns presented by Browning and Ryan (2020) are decipherable in the Japanese vernacular, especially when discussing the “vagueness” of implementing nature and gaining the desired benefits of improved psychological well-being and productivity. The Japanese space as defined by Bruno Taut in his work *Houses and People of Japan* (1937) is one of “simplicity almost to the point of poverty”, with an emphasis on aspects such as “simplicity”, “emptiness” and “openness to nature” (Ueda, 1990). These aspects characterize not only the nature of the Japanese vernacular, but are closely related to the vagueness of biophilic design. As discussed in relation to the theoretical implications of the biophilic design framework, vagueness is not an inherent indicator of poor strategy, but can be viewed as a strength in the design process by offering a broad potential for application, and may allow many broader strategies to synergize to create a totality which can be quantifiably evaluated. The Japanese relation to nature, and in turn its relevance for biophilic design may then be assessed in a similar manner, where qualities such as emptiness, simplicity, flexibility and openness to nature all play equal parts in a whole, and may be misjudged if these unique strategies are evaluated individually. When using the Japanese tradition as a creative asset for contemporary architecture, applying a broader perspective and aiming to capture the essence of its unique qualities might be of greater benefit than mimicking certain strategies in hope of achieving a superficial similarity. This falls in line with both Engel’s (1964) concern about the modern influence of the Japanese tradition, and Browning and Ryan’s (2020) holistic approach to implementation of biophilic design methods, where creating a symbiosis between different methods is more important than the effect of individual strategies.

THE JAPANESE SPACE

FLEXIBLE, CONTINUOUS AND LAYERED

Many spatial characteristics are still associated with specifically Japanese architecture to this day. The strong emphasis on horizontal movement, continuity between rooms possible by the open frame timber structure, movable “shoji” and “fusuma” screens, and immediate contact with the outdoors from almost any point in the buildings are some of these characteristics (Mori Art Museum, 2018).

The flexibility and fluidity of the Japanese space is further elevated by the nature-connectedness that relate the ends of the house to each other by openable facades and different uses of daylight, such as the translucent shoji screen, and solid fusuma screen which separate spaces. Every room is affected by the exterior, making the exterior structure of the building important for the atmosphere of the interior. This in turn creates a lack of finality in the circulation of the Japanese plan, reinforced by the lack of central interior corridors dedicated to connecting different rooms, as interior circulation occurred directly from room to room through the movable screens. This might seem disorienting, but problems in circulation did not arise as many rooms were linked by a more linear exterior connection in the form of an engawa, one or several layers of veranda which is neither part of the interior nor exterior. Movement and circulation is designed to happen along the facade, giving each room additional exterior connection, and enhances the interior fluidity as spaces are directly connected both physically and visually. This also meant that that rooms did not need to be aligned linearly along one single axis of movement. Although the Japanese space does prioritize strong horizontal views, these were not always structural or created by a sequence of rooms, but by a strong visual axis from facade to facade (Engel, 2020).

Due to the modularity and additive nature of the load bearing system, rooms were generally structured following a two-dimensional lateral grid. While the rooms were often void of permanent furniture and looked very similar apart from size, each room often had one or several specific purposes, such as sleep, tea, or study. Which rooms were private, and which were not was clearly defined by their relation to each other. Due to the standardized measurements and structural grid, room “units” could be freely placed, as well as freely added over time. The units often fell into a “step-like” system of connectedness, but never lost cohesiveness between spaces despite the total freedom of placement. (Engel, 2020).

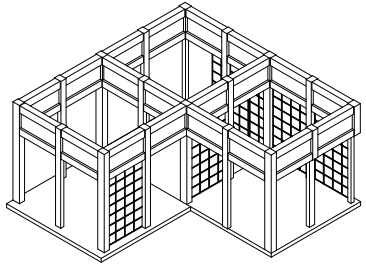

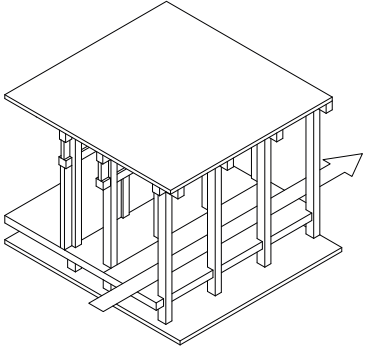

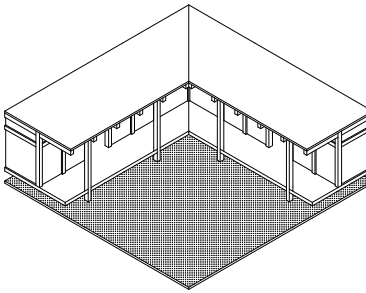

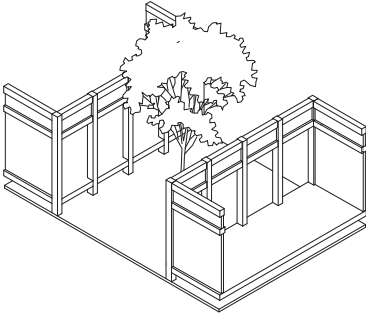

Arata Isozaki notes that the sense of endlessness is grounded in the structure. Dark columns and different screens create a criss-cross throughout the volume, creating depth, mystery and awe through a sense of modular infinity, yet remains orientable and approachable (Isozaki, 2003).

While the spatial layout of a traditional Japanese building strove to maintain flexibility, some design strategies were used to clearly separate spaces. Christopher Alexander elaborates in *A Pattern Language* (1977) that the ability to both separate and open up spaces is the core of the flexibility, as identified in the Japanese tradition. Spaces become smaller or larger, separated or continuous depending on occasion, yet always remaining linked. Furthermore, he describes one important method for a more permanent separation of space - ceiling and floor height. Larger rooms tend to have higher ceilings, and thus the purpose of a room can be supplemented by the atmosphere of a changing and often dynamic disposition of heights (Alexander, 1977). This strategy can likewise be found in Japanese spaces.

Finally, the layered nature of Japanese space should be addressed in order to create a clear overview for how to potentially implement Japanese spatial principles into a contemporary design project. Physically, the layering of spaces occurs in multiple ways. The exterior connection through the engawa and subsequent layering of screens and windows along the facade generates a gradient between interior and exterior where the relationship between indoor and outdoor becomes more diffuse. Interior spaces are layered in the sense that the boundaries between spaces are movable, letting each room become a layer in a larger sequence, creating a layered traversal through the building. Layering and filtering functions makes the integration of rooms and natural systems tangible and dynamic, creating non-static relationships which alters the whole building through each small part or layer. (Belfiore, 2012). The layered nature of Japanese architecture is not only relevant for the physical manifestation of its space, but also carries a lot of philosophical weight. Architect Kengo Kuma refers to the layered approach to spatial design as “an architecture that can control boundaries at will, that is, an architecture that can subtly adjust relationships between human beings, between human beings and things, between human things and nature. It is not a self-centered, sculptural architecture that is formally self-assertive, but an architecture of relationships” (Belfiore, 2012).

KEY ELEMENTS OF SPACE

EXAMPLES OF VERNACULAR JAPANESE SPATIAL DESIGN

DESIGN FEATURE	DESCRIPTION	REFERENCE
 LAYERED SPACE	Interior spaces are oriented and linked without interior circulation areas such as corridors, making each space or room linked to another space without need for further traversal. This creates a continuity and fluidity - a layered approach. Flexibility is increased as room dividers can be adjusted according to demand (Engel, 2020).	 Layered Space of Tea House
 ENGAWA	An exterior veranda along the building's facade, serving as both a neutral circulation space that connect rooms to each other, and as a connection and outer layer to the exterior environment. Engawas are designed in different sizes and can have additional purposes outside of circulation such as seating, or extending to create spaces between volumes, adding layers to interior and exterior (Engel, 2020).	 Engawa, Tenmyo Farmhouse
 COURTYARD	The Japanese courtyard, often surrounded by an engawa, creates a direct connection to nature. Courtyards may frame certain focal points in the nature, and also serves to bring light into the building if placed between additive volumes or as a central interior atrium (Angen, 2013).	 Courtyard, Nanzen-Ji Hojo
 SHAKKEI	The term shakkei means “borrowed landscape” and was initially used in garden design as a way to frame the natural landscape by incorporating elements of it into garden design, and eventually informed how a building may frame natural features. Surrounding scenery is brought in as a part of the design and plays an important role in the relation between landscape and architecture (Angen, 2013).	 Framed Landscape, Tenryu-Ji

JAPANESE TIMBER STRUCTURES

NATURAL EXPRESSION THROUGH MATERIALS AND CONSTRUCTION

Materially, the timber used in traditional Japanese architecture is locally sourced, and is generally untreated as to not hide the natural aspects of the material. Timber buildings built in Japan were designed with a strict and visible logic to its structure, with complex joinery and stacking of the members being both practically and esthetically impactful. By utilizing these complex techniques, the timber systems could be easily dismantled, replaced and reused.

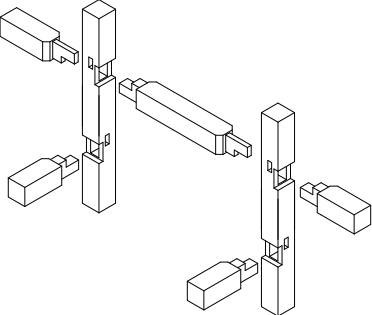

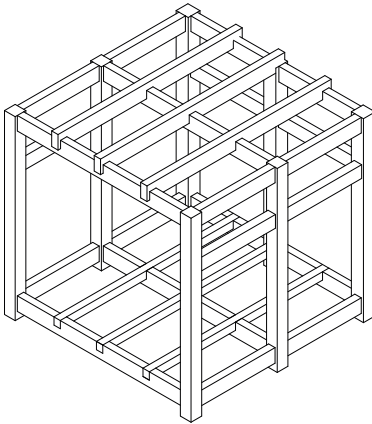

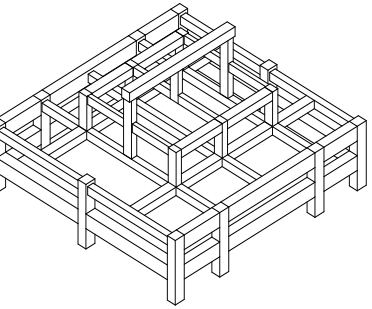

Historically, timber has been viewed as the primary construction material in Japanese architecture. Timber is used in every aspect of a building's construction, from structural system to facade, foundations, and roofs. One of the main features, or perhaps lack of feature, is the lateral load bearing system. The structure of a typical vernacular building in Japan entirely lacks diagonal supports, sacrificing strength but adding both structural and spatial flexibility. The use of simple orthogonally oriented timber members is likely, according to Heino Engel in his book *The Japanese House* (1964), a consequence of economic hindrances, specifying that the modesty commonly found in the Japanese vernacular was a result of large class differences, with feudal distribution of political power and subsequent extorsions being the main contributor to an economic friction. The properties of wood then contributed to the form of the building, with simple structural hierarchies and order. Simplicity, modesty, and restraint were thus not an inherent value, but a direct consequence of very tangible societal divides. The relationship that the general Japanese population had to wooden construction was thus not sought after, but necessary. Eventually however, these elements of both structure and space became intrinsically connected to societal values after religion, specifically Buddhism, became an important influence which valued modesty and restraint. (Engel, 1964) The timber architecture that is mainly associated with the Japanese vernacular practice these acts of structural simplicity, which consequently mandated the flexible programs as well as the tectonic and material expression present in most vernacular buildings. In a sense, the usage of Japanese space is directly tied to the potential of timber on a detail level.

Despite the lateral post- and beam structures being simple, and in some ways inefficient in regards to handling horizontal loads, other aspects of the usage of timber became very refined. An economic and modest approach to the structural framework prohibited some innovations, but enabled other types of knowledge to be generated as standardization, and eventually respect for this tradition of construction became empirical knowledge for all carpenters to refine and iterate rather than to completely change or innovate (Engel, 2020). Some of these defining features include clever stacking of timber members, known as "to-kyou", and intricate joineries, known as "tsugite" and "shiguchi", all of which are integral to the general concept of the lateral system.

Dr. Yoshiako Amino elaborates on specifics of the Japanese timber heritage and lateral system in his paper *An overview of modern Japanese wood construction - Interaction with tradition* (2004). The generally used lateral structure of a Japanese building consisted of columns which stand on independent stone supports on the ground, and act as both stilts for the building to stand on thus elevating the floor above the ground, and then take on the role of wall supports. Horizontal strength comes from straight members, often slimmer than the column in order to penetrate them, or be joined to them through different joining methods depending on the size and application. The horizontal members are held in place by wooden wedges inserted into the intersection of beam and column, or through intricately shaped joining mechanisms. In order to accomodate certain ceiling heights or more structurally demanding sections, additional horizontal members are used to strengthen the entire system rather than the western appraoch of using diagonal ones. These horizontal members are usually visible in the different supporting structures, wether it supports a large roof or another floor (Amino, 2004). The logic found in the Japanese timber structures is entirely dependent on joining horizontal timber members to vertical timber members orthogonally in a way that complements the building structure and function through flexibility and homogenous, connected spaces. The timber structure is always showcased, as each member is important to the load bearing function and might need adjustment or replacement. This contributes to the atmosphere and appearance of complex simplicity found in the vernacular architecture.

KEY ELEMENTS OF TIMBER

EXAMPLES OF VERNACULAR JAPANESE TIMBER DESIGN

DESIGN FEATURE	DESCRIPTION	REFERENCE
 TIMBER JOINERY	The art of joining wooden members is integral to the tectonic and structural expression of the Japanese vernacular. Wood members may be spliced together vertically (known as "tsugite") or slotted into each other horizontally (known as "shiguchi") among other techniques, all of which allow wood as a material to create complex and refined structures. Wooden dowels or wedges may be used to further strengthen the structures and can be adjusted over time. Joining without metal allows for easy replacement and dismantling of the structural members (Seike, 1977).	 Horizontally joined support structure, Kiyomizu-Dera
 LATERAL SYSTEM	The lateral system is designed with only vertical and horizontal members, omitting diagonal support.. The logic of the lateral system extends from ground to roof, encompassing the entirety of the building, creating a homogenous expression and strong identity as the lateral system creates tectonic value on the interior and exterior alike. The lateral system has therefore developed to create clean and refined solutions for joining members (Amino, 2004).	 Lateral system through spaces, Tenmyo Farmhouse
 LARGE ROOF STRUCTURES	The roof is a main esthetic and tectonic feature of traditional Japanese architecture. The structure of the roof follow the rules of the lateral system, but creates large diagonal roofs by resting members on the lateral system, letting them extend beyond the facade of the building. The roof shelters interior space, but also extend to shelter the immediate exterior, and closely relates to spatial features such as the engawa. Like the spatial sequence, the expression of the roof is additive and dynamic depending on spatial necessity (Higashino, 2000).	 Large roof structure and brackets, Higashi Hongan-Ji

V. **CASE STUDIES**
*BIOPHILIC DESIGN STRATEGIES IN
SPECIFIC JAPANESE ARCHITECTURE*

The following case studies were done in person by the author, on a study trip to Japan in the early spring of 2025, made possible by a scholarship recieved from the Sven Steen Research and Scholarship Fund. All photographs were taken by the auhtor.

The case studies mark a point in the thesis in which the discussions become more subjective, where the established objective theoretical lens is applied to a subjective and qualitative analysis of Japanese architecture. Because of this, the intention with the analysis of the case studies in relation to biophilic design is to create a subjective framework based on impressions of biophilic qualities rather than producing quantitative data. The subjective approach works well due to the ambiguous nature of biophilic design, and how its interpretability offers opportunities for diverse design strategies to create the same biophilic result, and similarly how related design strategies might leads to the different biophilic outcomes. This made the analysis of the case studies rewarding as their potential to inspire new biophilic design solutions was found through exploration and relating them atmospherically and functionally to the guidelines produced by the authors of the biophilic framework, rather than analysing them based on a list of hard criteria.

Around 25 different buildings were visited and studied, with the following selection of eight cases being the most relevant for the discussion. The selection of the cases were made based on a few criteria. First, is the building an example of vernacular architecture? Secondly, if it is not a vernacular building, does it showcase an interesting reinterpretation of vernacular qualities? Lastly, location limited the scope to three cities: Tokyo, Kanagawa, and Kyoto, as these all had several promising buildings to use as case studies.

While the thesis question mainly deals with the qualities of the vernacular, studying contemporary projects were also beneficial in order to examplify the vernacular relevance for the future.

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1. NANZEN-JI HOJO

VERNACULAR FRAMING AND TRAVERSAL OF NATURAL FEATURES

REFERENCE TYPE: Vernacular
LOCATION: Kyoto
ARCHITECT: Unknown carpenters
YEAR: 1600s, rebuilt 1909
TPOLOGY: Abbots residence

The residence of the abbots of Nanzen-Ji Temple. It features an extensive rock garden framed by a large terrace and engawa extending inwards. Other parts of the garden are connected through covered walkways which orient the user throughout the landscape.



Exterior terrace by rock garden. The terrace acts as an outer layer of the building, with communication and a clear visual and material connection to the interior.



Layers of walkways in the garden. The position of the walkways both orient the user and frame the landscape, slowing the pace and creating anticipation.

MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
VISUAL CONNECTION TO NATURE The framed garden and exterior communication creates a clear natural connection.	FRAMING THE LANDSCAPE Nanzen-Ji Hojo clearly demonstrates the effect of framing the landscape, and designing building in unison with nature. By emphasising exterior communication as the main route for orientation, the landscape becomes a fuctional orientation feature in addition to offering views of nature itself.
MATERIAL CONNECTION Timber connects facade to facade throughout the entire interior, enhancing the gradience between interior and exterior.	
PROSPECT Unimpeded views create orientation and anticipation, offering decision making in the complex horizontal structure.	BUILDING ANTICIPATION As an expansive building, creating purpose in the traversal becomes important. By creating distant points of interest, desiging around these points, and managing communication in such a way that it becomes non-obvious, anticipation is built up. Anticipation could become a strong tool for relating interior and exterior features to one another and to nature by creating exterior communication which deliberately obscures interior functions in certain places, while opening up to long sightlines in others.
MYSTERY Combined with prospect, mystery acts to create anticipation by deliberately obscuring aspects of the building behind layers of exterior communication and dynamic interior functions.	

2. ZUISHO-JI TEMPLE CLOISTER

CONTEMPORARY REFUGE FROM THE URBAN SCALE

REFERENCE TYPE: Contemporary
LOCATION: Tokyo
ARCHITECT: Kengo Kuma & Associates
YEAR: 2018
TPOLOGY: Temple extension

This addition by Kengo Kuma & Associates creates a shelter amidst the dense urban environment of Tokyo. Through natural materials and features it creates a place of respite and contemplation rarely seen in the city, cleverly hiding it through a layered approach.



Exterior walkway similar to the traditional engawa, deliberately sheltering the user from both natural phenomena and the urban scale.



Overview of the courtyard. Some facades are open to the interior, while others are closed. The surroundings are reflected in the artificial pond.

MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
REFUGE Large overhang and U-shaped courtyard creates shelter and refuge from the urban scale chaos of Tokyo. Refuge is also found in the natural features of the building	DESIGNING REFUGE AND RESPITE FROM THE SURROUNDING URBAN SCALE When designing a building with biophilic goals in an urban environment, relating to this scale becomes important. This example demonstrates ways to find breathing room in a city by hiding it, and putting all focus inwards towards the natural features of the building which in turn offers tranquility.
PRESENCE OF WATER There is an obvious connection with the artificial pond. Interestingly it reflects the urban scale surrounding the building, even when sheltered by the natural timber structure.	
PROSPECT The layered nature of the building, from covered exterior walkway to glazed facade to flexible interior, creates sightlines for decision making and exploration.	RELATING INTERIOR AND EXTERIOR PROGRAM THROUGH NUANCED DESIGN The extension offers a harmonic integration of interior and exterior features. The layers of flexible spaces are reminiscent of the vernacular, but creates more nuance as interior functions are gathered around an equally flexible exterior, complemented by a simpler cleaner aesthetic. The relationship between interior and exterior becomes mutual, creating clear orientation and communication between the two.
MATERIAL CONNECTION The cloister offers connection to nature and adjacent temple through timber, contrasting the hard concrete surroundings.	

3. EDO RESIDENCES

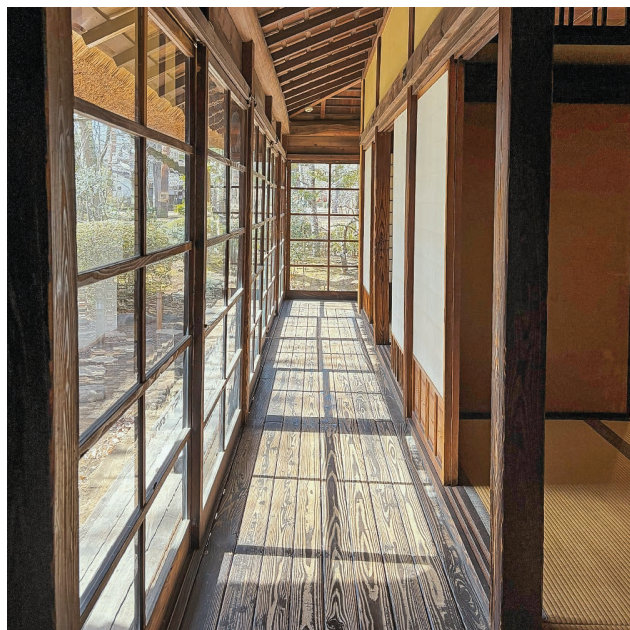
LAYERS OF FLEXIBLE INTERIOR-EXTERIOR CONNECTIONS

REFERENCE TYPE: Vernacular
LOCATION: Edo Open Air Museum, Tokyo
ARCHITECT: Multiple unknown carpenters
YEAR: 1600-1800s
TYPOLOGY: Residences and farmhouses

A collection of vernacular buildings replaced and restored, placed in an open air museum in the suburbs of Tokyo. Emphasis of analysis is placed on the layered nature of interior spaces, and clear showcase of vernacular building techniques.



Spaces linked without interior communication creating layers of rooms, all connected to the exterior. Spaces are divided by slidable screens, increasing flexibility.



A typical residential engawa, acting as an outer layer and main communication. Part of both interior and exterior, creating a gradience between the two.

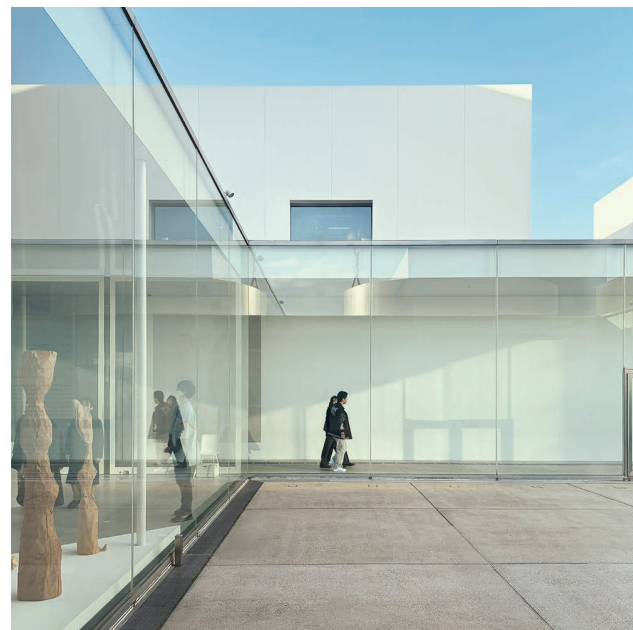
MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
DYNAMIC AND DIFFUSE LIGHT Layers of shiftable translucent shoji-screens and opaque fusuma-screens allows daylight to become manipulated and variable.	LAYERS AND GRADIENCE The continuity of spaces, from interior to exterior, with different forms of intended traversal create a clear gradience throughout the many layers of the horizontal plan. By having a gradient of spaces of different size, daylight access and function stretching from the nature to the inner core of the building, the borders become vaguer. The relationship between interior and exterior becomes stronger as a result.
CONNECTION WITH NATURAL SYSTEMS The gradience of nature interaction from the utmost exterior layer to the innermost flexible spaces creates a dynamic connection to nature. The engawa directs communication to be immediately adjacent to nature.	
PROSPECT Unimpeded views create orientation and anticipation, offering decision making in the labyrinthian structure.	VARIABILITY AND FLEXIBILITY Each space, from tatami covered interiors to the exterior engawa, can be closed of by the variable shoji- and fusuma-screens. Furthermore, each interior space is characterized by an emptiness in regards to both furniture and function, with the infinite looping of the plan creating great flexibility in how the rooms are used. They can be open to each other, or only to certain adjacent spaces, offering many possibilities.
MYSTERY Combined with prospect, mystery acts to create anticipation by deliberately obscuring aspects of the building behind layers of exterior communication and dynamic interior functions.	

4. 21st. CENTURY MUSEUM

JAPANESE TRADITION IMAGINED AS A BLANK SLATE

REFERENCE TYPE: Contemporary
LOCATION: Kanazawa
ARCHITECT: SANAA
YEAR: 2004
TYPOLOGY: Museum, flexible exhibition space

A museum of modern art, designed with Japanese vernacular design philosophies in a contemporary setting. The building is a maze of glazed corridors winding and meandering around core volumes for larger exhibitions, with constant nature connections.



Glazed walkway along one of several large exhibit-volumes. It also connects to a courtyard, allowing light to reach far into the large complex building.



Exterior view of the museum, with a large glazed area facing the adjacent park. The entire building allows for traversal along the facade with a view of nature.

MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
NON-VISUAL CONNECTION TO NATURE Nature is obscured at the core of the museum. Despite this, by using strategic openings, long sightlines and spaces dynamically affected by daylight and weather, nature is references and felt throughout.	TRANSLATING TRADITIONAL IDEAS FOR A CONTEMPORARY FUNCTION Design philosophies such as exterior communication, endlessness and layers are all present. Contemporary interpretations of the courtyard and engawa exist in the glazed corridors. This complements the modern functions of a flexible exhibition space as the undefined borders between spaces allow for greater flexibility.
PROSPECT The unclear and open traversal creates a sense of exploration, guided by the constant contact with light shining through the courtyards which you automatically feel a need to reach. The communication spaces are also used as exhibition areas, further enticing the user to keep exploring. The many volumes serve as points of interest and in the far distance, helping with orientation.	
MYSTERY The many volumes create anticipation as you never know what to expect around the corner. The homogenous aesthetic creates a deliberate labyrinth-structure.	COEXISTENCE THROUGH CONTRAST There are two main contrasts in this project. First, between the surrounding nature and the sterile interior, and secondly between the glazed bright corridors and the dark interior of the exhibit-volumes. Both of these contrasts highlights the opposite features, bringing an unexpectedly impactful coexistence between the inside and outside.

5. KATSURA TEA HOUSES

CONTINUITY AND FRAMING BY EXTERIOR-EXTERIOR CONNECTION

REFERENCE TYPE: Vernacular
LOCATION: Katsura Villa Garden, Kyoto
ARCHITECT: Unknown carpenters
YEAR: 1600s
TYPOLOGY: Tea houses for adjacent villa

Tea houses of the Katsura Imperial Villa, placed strategically in the large surrounding garden to maximize views and to let the nature affect the interior space. Their original purpose was to act as a place to feel the changing of the seasons in the garden.



First Tea House, with a clear axis from facade to facade, divisible by sliding shoji- and fusuma screens. It may be open to nature, or closed off in sections.



Second Tea House, clearly framing part of the garden. Daylight and wind have great effect on the space as it may be completely open to the elements.

MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
VISUAL CONNECTION TO NATURE The visual connection is clear as the houses work as focal points in the garden, and vantage points for the surrounding landscape. This is emphasized through clear framing and strategic openings.	PURPOSEFUL CONTINUOUS SPACES FROM FACADE TO FACADE All tea houses emphasize the horizontal connection between opposite facades, creating a meaningful relationship between interior and exterior space. Furthermore, the interior space serves as a flexible "inbetween-space", with a purpose affected by its relationship to both nature and the internal spatial relationships.
CONNECTION WITH NATURAL SYSTEMS The initial purpose of the tea houses was to exist as a space to feel the effects of nature and the changing seasons, serving as viewing platforms of the entire garden. All facades can be opened to let nature in to the buildings.	PERSPECTIVE THROUGH FRAMING By framing large-scale landscapes rather than specific natural features the relationship between building and nature becomes expansive. This puts the architecture in perspective, and small interior spaces appear larger as the framing of the landscape affects the perception of interior space. The openness and connection between facades also frame the landscape by layering spaces between nature and user.
MATERIAL CONNECTION WITH NATURE Natural materials are clearly displayed as in other vernacular examples. Timber, stone, straw, clay and paper are mainly used. The sparse ornamentation puts an emphasis on the materials themselves.	

6. D.T. SUZUKI MUSEUM

NATURAL FEATURES DIRECTING AND INVITING CONTEMPLATION

REFERENCE TYPE: Contemporary
LOCATION: Kanazawa
ARCHITECT: Yoshio Taniguchi
YEAR: 2011
TYPOLOGY: Museum

Museum dedicated to the late influential buddhist philosopher D.T. Suzuki. The building is designed as a contemplative walk through interior and exterior spaces as they open up to one another. The final room is a large hall for visitors to "sit and contemplate".



The "contemplation hall" at the end of the museum journey. The courtyard is framed in each direction, creating moments to reflect upon one's surroundings.



Walkway following the facade to the "contemplation hall", creating long sight lines yet offering no inclination of what is around the corner.

MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
VISUAL CONNECTION TO NATURE There is a connection to vegetation, water and reflected light, all of which the main volumes are built to navigate between. It enables one to wander through "nature".	DESIGNING SPACE FOR CONTEMPLATION Taking in the space, and feeling the effects of nature becomes more apparent if there are spaces designed for it. This relates closely to the idea of designing spaces with flexible functions, as they serve a purpose even when left empty. Spaces designed for contemplation enhance the effects of the surroundings, as they become the conscious focal point.
REFUGE The building acts as physical refuge from the city by interaction with natural elements. It also acts as mental refuge by deliberate framing of the calmness of nature, and by opening up to areas for contemplation.	CLEAN MATERIALS AS A METHOD FOR ENHANCING NATURAL FEATURES Plaster, reflective sheet metals and concrete are the main materials used in the museum. This creates a great contrast to nature but at the same time frames the entire landscape by making the architecture less salient. Nature is reflected onto the clean materials in the form of shadows from the trees on the plaster and concrete, and the movement of water reflected in the metal ceilings.
PROSPECT The narrow walkways along facades and inbetween volumes hint at what is coming next in the journey throughout the museum without making it obvious.	
AWE Certain rooms create awe as they open themselves up vertically or create other unexpected spatial relationships.	

7

KENNIN-JI HOJO

DIRECTLY INFLUENCING THE INTERIOR THROUGH THE EXTERIOR

REFERENCE TYPE: Vernacular
LOCATION: Kyoto
ARCHITECT: Unknown carpenters
YEAR: 1599
TYPOLOGY: Abbots residence

An abbots residence in central Kyoto, designed around multiple courtyards, engawas and larger terraces. All exterior spaces are activated and serve as influential set pieces which the interiors are designed around. An example of a vernacular public space.



Large engawa curving around a corner, overlooking one of the rock gardens. Both nature and other buildings are framed between the large roof and terrace.



Engawa along the facades of a courtyard. This outer layer of structure and space diffuses the borders between interior space and the nature.

MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
<p>VISUAL CONNECTION TO NATURE Engawa follow the entire facade of the labyrinthian building, working as an instant point of communication between interior and exterior spaces, harmonizing with nature. These in turn form courtyards which frame natural features and brings light into the darker centres.</p>	<p>FRAMING NATURE FOR ORIENTATION Most engawa create long sight lines with framed nature, and interior spaces are all placed around natural features such as gardens and courtyards, creating immediatly identifiable spaces characterized by their exterior connection.</p>
<p>AWE Kennin-Ji Hojo is a rare example of a vernacular building designed for a public function. Therefore the scale is comparatively large, and large-scale design gestures creates architecture which is similarly proportional to the surrounding tall trees. This allows the nature implementation to be very effectful, as both building and nature feel closer together, and the visitor becomes a secondary actor to both building and nature.</p>	<p>NATURE IMPLEMENTATION AT DIFFERENT SCALES The Japanese vernacular spaces and structures are showcased here at two scales, each interacting with nature of similar scale. This demonstrates how to design spaces which complement nature through adhering to its proportions, and applying suitable funcitons to these spaces of different sizes.</p>

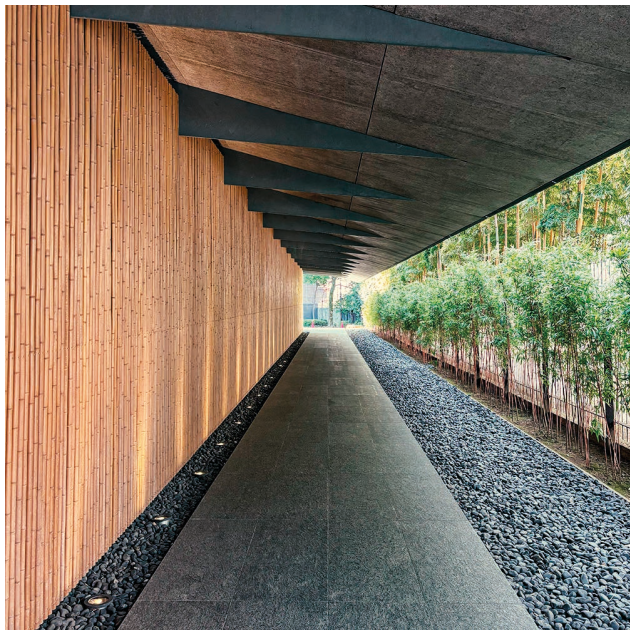
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NEZU MUSEUM

CONTEMPORARY MATERIALITY AND VERNACULAR SPACES

REFERENCE TYPE: Contemporary
LOCATION: Tokyo
ARCHITECT: Kengo Kuma & Associates
YEAR: 2009
TYPOLOGY: Museum

Museum dedicated to Japanese art and traditional craftsmanship. The main building serves as a barrier between the urban environment and the large garden. Traditional materials are featured in order to pay homage to the Japanese heritage.



Initial exterior walkway leading to the entrance, sheltering the user from the urban scale. The long walk along the bamboo wall builds anticipation.



Main museum hall, adjacent to the garden. Natural materials are used to guide the eye outwards, where the use of timber is continous to bring nature in.

MAIN BIOPHILIC PATTERNS	LESSONS AND APPLICATIONS
<p>REFUGE The museum is in a dense urban setting, which is ignored by layers of closed walls and bamboo which obscures the city from the museum. The museum instead opens up to the garden on the other side.</p>	<p>NATURAL MATERIALS AS A TOOL FOR ORIENTATION AND EXPLORATION The use of timber and bamboo adds value to every facet of the functionality of the museum. Strategic usage guides the visitor, and draws attention to the right places. Timber extends outwards into the surrounding, or inwards towards otherwise obscured interior spaces. Following the natural materials creates a rewarding exploration.</p>
<p>PROSPECT The orientation is dictated by the use of natural materials, and openings are strategic in order to guide the used through the building into nature.</p>	
<p>MATERIAL CONNECTION Despite the building mainly being a steel- and concrete structure, using timber and bamboo in strategic places creates an immediate response and connection to nature. The importance of natural materials, despite being superficial in this case, is clear as it complements the function and exploration of the museum.</p>	<p>VERNACULAR PHILOSOPHIES TRANSLATED INTO CONTEMPORARY FUNCTIONS Nezu Museum is influenced by vernacular form in many ways, such as how materiality influences spatial allocation and direction. The function differs greatly as the museum needs large spaces and grand gestures, whilst maintaining the small scale atmosphere of the linked Japanese vernacular spaces.</p>

QUALITATIVE FINDINGS FROM CASE STUDIES ACROSS JAPAN

SUMMARIZING THE DISCOVERIES, IMPRESSIONS AND APPLICATIONS

IMPRESSIONS OF JAPANESE ARCHITECTURE

Through case studies of both vernacular and contemporary Japanese architecture several deductions have been made regarding firstly if, and secondly how these buildings utilize particular strategies to intentionally or unintentionally yet intrinsically achieve biophilic design goals. Although this thesis emphasizes the relation between nature, building and user found in the vernacular, analyzing particular contemporary projects also sheds some light on how traditional techniques and philosophies have already been translated, thus enabling further discussion on the contemporary relevance of traditional methods.

The chosen case studies all share some broad characteristics which are difficult to quantify and will therefore be disclosed purely qualitatively through subjective analysis. Japanese architecture is both slow and contemplative, encouraging the user to wander, or stop and feel the “place”. This is done in a few different ways. The flexibility of the vernacular building allows for a non-directed journey through its many modular rooms where the infinite, layered and labyrinthian nature of the building creates a great sense of journey around natural vistas, whereas contemporary projects instead create deliberate direction for the user with specific framing of the landscape or other intended points of interest. However, both these approaches share the common goal of enabling the user of the space to feel a sense of place in relation to a larger scale, through both building and nature as one unit. The contrast between building and nature also strengthens their relationship and individual importance in their symbiosis. Whether a person is in architecture-adjacent nature or in the architecture itself, the same preconceptions and goals apply - providing a place for both refuge and respite in equal measures, strengthened by the presence of nature.

One of the most prominent methods for nature implementation, emphasized through the case studies of the vernacular architecture, is a lack of borders which creates a gradient between interior and exterior. A particular strategy for achieving this gradience is the use of layers. Multiple layers between exterior and interior create a gradience of both space and function. In a vernacular Japanese residence, the layers consist of homogeneous spaces stacked either linearly or diagonally, with slidable partitions that can either separate or open up a sequence of rooms.

Since the rooms are horizontally stacked, the interior communication occurs through these layered spaces, each of which are connected to the exterior and relate to daylight and exterior functions in a dynamic way in addition to creating long sightlines. The final layer between interior and exterior in the Japanese vernacular is often the main communication route, either a larger veranda or covered engawa which further diffuses the borders between interior and exterior by adding dynamic buidling elements affected by natural processes. The engawa also acts as a material connection by having the timber structure extend and become a part of the outermost layer of the facade. The usage of layers, the gradient relationship between them, and the way they relate to both function and structure create a sense of depth and transparency that can stretch through an entire structure and create meetings between interior functions and exterior atmosphere.

In terms of the Japanese vernacular, the innate sense of infinity comes from a few different design methods. As mentioned, the flexible layered space creates a lack of orientable interior communication adding to the sense of infinity through deliberate flexibility and structural variability. The concept of an infinite space also goes hand in hand with the gradient borders between the spaces, as even the most direct separation, between inside and outside, attains a non-specific almost democratic function as an equal communication space between every room. Each room is connected both physically visually, and creates a loop, enhancing the a sense of infinity - a concept clearly readable in the vernacular which has been redefined in the contemporary examples. Endlessness also comes from the lack of defined function through the absence of furniture, creating an “emptiness”. This emptiness adds to the simplicity of the building, further enhancing the contrast - and therefore relationship - to the surrounding nature.

Much of what has already been researched and described as motivations behind why nature implementation is important both as existing conditions for the architecture of Japan, as well as its importance for the future of sustainable practices, are apparent and manifested differently in each case study. What makes the studies valuable for the continuation of this thesis and the future design process is collecting and evaluating the findings in seach of specific encompassing strategies for applying this vast precedent on contemporary architecture.

BIOPHILIC TENDENCIES OF CASE STUDIES

In relation to specific biophilic design patterns and their goals, the architecture of Japan demonstrates a clear intuitive bias towards a specific few, and unsurprisingly broadly applicable, patterns. One could argue that these patterns are designed to be universal, but the manner in which the case studies demonstrate their biophilic tendencies are all uniquely pertinent and designed with certain objectives which transcend the ambiguity of biophilic design, thus concretizing them. This in turn helps answer the thesis question of how Japanese architecture can be used as a creative asset for innovating upon and enriching contemporary biophilic architectural design.

The frequence of biophilic patterns, as found in figure B, show that only a handful of the patterns presented by Browning & Ryan (2020) are prominent, and sheds light on the specifics of how the Japanese architecture has utilized biophilic tendencies. While only a handful of patterns are immediatly recognizeably, the strength of the Japanese way of implementing nature into architecture comes from the combination and interplay between the patterns, which adheres to how Browning and Ryan (2020) argue for how the most effective biophilic design experiences are created, where emphasizing a few patterns, and applying secondary patterns as enhancements, lead to the most rewarding biophilic architecture.

CASES INFORMING THE FRAMEWORK

By identifying specific strategies in the case studies, along with the pre-existing understanding through the prior background and theory, a framework of concepts on how to exemplify the Japanese precedent through “research by design” can be created. The findings from the case studies will inform the framework by evaluating if there are common strategies for how the Japanese architecture achieves biophilic design, based on the frequency of patterns. The framework will also take into account the general lessons and applications from the case studies, and attempting to combine both the specific and general biophilic strategies into a coherent and usable framework which will dictate the final design.

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Figure B, Frequence of Biophilic Patterns in Case Studies

VI. FRAMEWORK

ACHIEVING BIOPHILIC DESIGN GOALS
THROUGH JAPANESE STRATEGIES

From the previous theory, analysis of case studies both old and new, and overall impressions of vernacular Japanese architecture, a framework has been iteratively designed alongside the design process of the final project. Creating the framework is the final step in the translation of the Japanese vernacular, creating a set of tangible contemporary design tools for using lessons from Japanese architecture in new contexts.

Six tools have been designed based on what qualities the Japanese vernacular uniquely achieves, and which of these characteristics directly contribute to the goals of biophilic design. From the case studies, the frequency of the biophilic patterns exemplified two important lessons - Japanese architecture achieves biophilic design both intentionally and unintentionally, through concrete physical manifestations as well as through broader design philosophy. For instance, biophilic patterns such as material connection, connection with natural systems and dynamic and diffuse light are direct effects on the physical characteristics of the Japanese architecture, while patterns such as prospect, mystery, refuge and awe are achieved by the larger relation architecture has to itself and nature, and the subjective change in perception. Both of these scales of nature incorporation were important to include in the framework, leading to deducing specific strategies that deal with space and material, as well as more philosophically influenced ideas based on perception of space rather than the direct characteristics of the space itself.

From case studies to framework, the subjectiveness of the thesis discussion is resumed and further deepened, as the tools presented are based on qualitative analysis and collection of data, and impressions from experiencing the Japanese vernacular first-hand.

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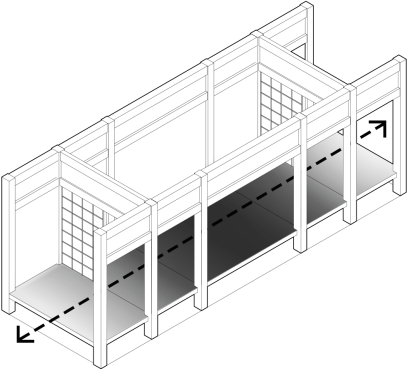
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DELIBERATELY EMPTY SPACES ALLOW FOR FLEXIBLE USES AND PUTS FOCUS ON THE HARMONY BETWEEN ARCHITECTURE AND NATURE 48

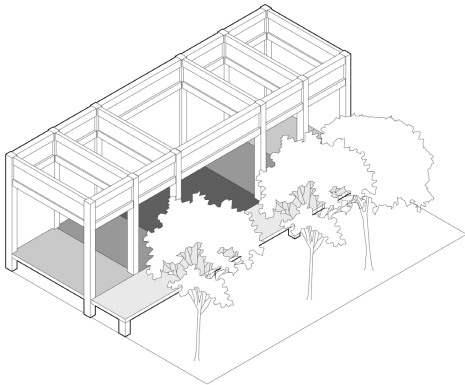
1. GRADIENCE

TRANSPARENCY, DEPTH, SIGHTLINES AND CONTINUITY THROUGH DIFFERENT SPACES

	<p>BIOPHILIC PURPOSE VISUAL CONNECTION TO NATURE <i>A gradience of spaces with different natural visibility creates orientation.</i></p> <p>MATERIAL CONNECTION <i>Materials can likewise create orientation and a gradience of complexity and openness between architecture and nature.</i></p>	<p>APPLICATION Connecting interior to exterior through spatial sequences, having exterior natural environments interact with each other through the building.</p>
	<p>REFERENCES ZUISHO-JI TEMPLE CLOISTER</p> <p>EDO RESIDENCES</p> <p>KATSURA TEA HOUSES</p>	

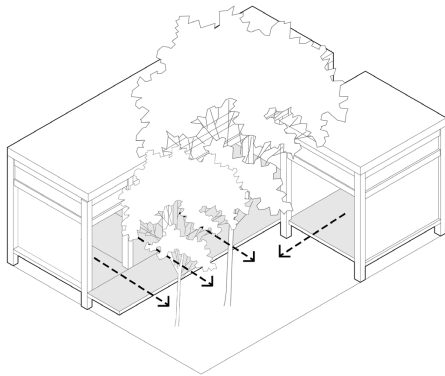
2. LAYERS

STRUCTURAL AND FUNCTIONAL LAYERS, WITH NATURE AND SITE BEING THE OUTERMOST LAYER AFFECTING THE INTERIOR

	<p>BIOPHILIC PURPOSE VISUAL CONNECTION TO NATURE <i>Nature acting as the outermost layer of the building, affecting interiors.</i></p> <p>MATERIAL CONNECTION <i>Layers of structure and materiality create orientable spaces.</i></p> <p>DYNAMIC AND DIFFUSE LIGHT <i>Layers of the building are each affected dynamically by daylight through their spatial relation.</i></p>	<p>APPLICATION Layers may be used to create spaces which are dynamically affected by both the outermost exterior nature and by other interior functions, thereby diffusing the borders between interior and exterior. Structural layers may also be used as orientation.</p>
	<p>REFERENCES EDO RESIDENCES</p> <p>21st CENTURY MUSEUM</p> <p>KATSURA TEA HOUSES</p>	

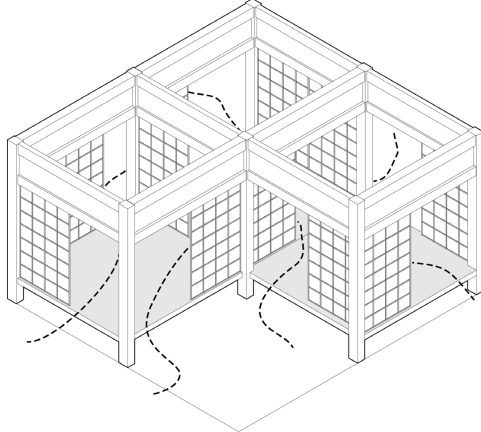
3. FRAMING

FRAMING THE LANDSCAPE AND CREATING A SENSE OF DIRECTION - A JOURNEY THROUGHOUT THE NON-LINEAR BUILDING

	<p>BIOPHILIC PURPOSE VISUAL CONNECTION TO NATURE <i>Framing puts nature in focus through the building interior.</i></p> <p>NON-VISUAL CONNECTION TO NATURE <i>By creating strategic views nature is emphasized.</i></p> <p>DYNAMIC AND DIFFUSE LIGHT <i>Openings in certain direction allows light to frame interior spaces.</i></p>	<p>APPLICATION Strategic openings, or lack of, can create interior spaces which benefit from direct contact with specific natural elements. Furthermore, the orientation and placement of building volumes can create new relationships with the landscape by framing it on a larger scale.</p>
	<p>REFERENCES NANZEN-JI HOJO</p> <p>KATSURA TEA HOUSES</p> <p>KENNIN-JI HOJO</p>	

4. VARIABILITY

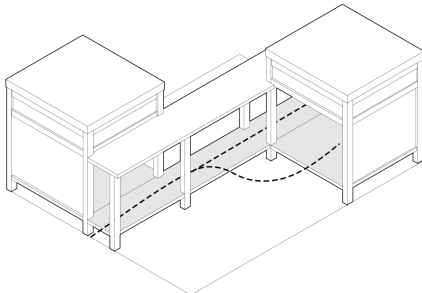
STRUCTURAL MODULARITY AND FLEXIBILITY, LETTING NATURE AFFECT THE INTERIOR AND VICE VERSA WITH FLEXIBLE OPENINGS AND FUNCTIONS

	<p>BIOPHILIC PURPOSE VISUAL CONNECTION TO NATURE <i>Flexibility allows for natural access to be variable depending on function.</i></p> <p>DYNAMIC AND DIFFUSE LIGHT <i>Variable openings allows for manipulation of daylight</i></p> <p>CONNECTION WITH NATURAL SYSTEMS <i>Systems such as wind and heat become a dynamic component.</i></p>	<p>APPLICATION Variability can be used as a tool for having natural systems and light dynamically affect the interior. It can also be used to divide or open up spaces depending on function and purpose, having smaller spaces flow into larger one and larger spaces affecting smaller rooms.</p>
	<p>REFERENCES EDO RESIDENCES</p> <p>KATSURA TEA HOUSES</p> <p>KENNIN-JI HOJO</p>	

5.

EXPLORATION

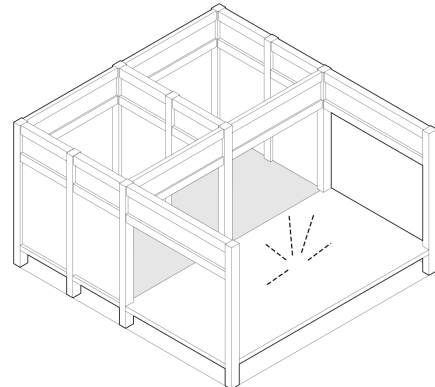
PROSPECT OF EXPLORATION OF BOTH BUILDING AND LANDSCAPE IN UNISON,
BUILDING ANTICIPATION AND SUBVERTING EXPECTATIONS

	BIOPHILIC PURPOSE PROSPECT <i>Building anticipation through sightlines between three-dimensional space.</i>	APPLICATION Nature and building can work in unison to defy the expectations of both building and its relation to nature by strategic openings, deliberate traversal and journeying through the building and nature as one. The prospect of exploration is based on both the anticipation of what can be sensed ahead, but also on the mystery which that entails. Subverting these expectations is a tool that can change the perception of the space, creating a sense of awe and imitating the exploration of nature.
	MYSTERY <i>Deliberately obscuring or hinting at distant spaces builds suspense.</i>	
	AWE <i>Subverting expectations through varying scale and unexpected nature implementation.</i>	
	REFERENCES KENNIN-JI HOJO NANZEN-JI HOJO NEZU MUSEUM	

6.

EMPTINESS

DELIBERATELY EMPTY SPACES ALLOW FOR FLEXIBLE USES AND PUTS FOCUS ON THE HARMONY BETWEEN ARCHITECTURE AND NATURE

	BIOPHILIC PURPOSE VISUAL CONNECTION TO NATURE <i>Empty spaces allow for nature to permeate the space, making it a focal point of the empty space.</i>	APPLICATION Designing open spaces which are deliberately empty creates opportunity for flexible use, and for adjacent spaces as well as nature to dynamically affect it.
	AWE <i>Large spaces can defy expectations through relating to distant points of interest or adjacent spaces which contrast the emptiness.</i>	
	REFERENCES D.T. SUZUKI MUSEUM 21st CENTURY MUSEUM EDO RESIDENCES	

FROM TRADITION TO INNOVATION

RECONTEXTUALIZING JAPANESE VERNACULAR ARCHITECTURE TO A DESIGN PROJECT IN A GLOBAL CONTEXT

Reinterpreting vernacular architecture in an age of contemporary design, for contemporary needs that serve modern people is an established practice. Local materiality, environmental awareness and responsibility are important steps for future sustainability, as demonstrated in vernacular architecture regardless of origin. However, finding qualitative relevance beyond this has further potential, such as the exploration of how people interact with nature via architecture as oppose to why they should. In this thesis the Japanese vernacular has been recontextualized through the contemporary architectural theory and methodology of biophilic design in order to find the essence of what makes the Japanese vernacular architecture relevant for contemporary architecture and future sustainable endeavors, regardless of local context. Similarly to how materiality, responsibility and local consciousness are values of the vernacular which are locally dependent yet offer globally applicable lessons, the way in which this thesis recontextualizes the Japanese traditional architecture through modern practices similarly offers globally applicable strategies and opportunities.

What this framework intends is to be a point of departure for concretizing the Japanese vernacular and its relevance, showcasing ways that the Japanese architecture adheres to nature, thus building upon sustainable design strategies. While the framework has been designed as an exploration of the biophilic global relevance of the Japanese vernacular, the context in which it is applied should be addressed as the general ideas of adhering to local conditions and being responsive to surroundings remain universally relevant. When applying the Japanese vernacular to the Swedish context however, the same principles would adhere as if it were translated to any other cultural landscape. Since the lessons from the theoretical analysis and case studies results in a framework for Japanese strategies of nature implementation, it should not be changed nor adapted to adhere strictly to a new context. This would ignore the aspect of showcasing these principles as universal lessons and the translation from local to global which the thesis demonstrates. Instead, finding innovation through this framework, while respecting the local conditions can instead be dependent on factors such as local needs, building typology, and adapting the framework to the local resources available.

VII.

FINAL DESIGN

Exemplifying the framework through
a contemporary design project

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PROJECT MOTIVATION

The thesis design project will explore the main themes of Japanese vernacular design methods and its relationship to contemporary biophilic design strategies. This will be done with the main research questions in mind, and by following the process of establishing a broad theoretical basis by studying literature and case studies, which will inform an iterative design process of a new framework for adapting Japanese vernacular ideas for biophilic design purposes, manifested into a final design project exemplifying innovative solutions.

By placing the building in an urban green setting the potential of biophilic strategies can be investigated to a better degree compared to a more rural setting, as the challenges as well as the possibilities of these strategies can become clearer given a less obvious connection to nature, as well as create an opportunity for more people to interact with the building in every day life.

DESIGN PROPOSAL

The final design project is envisioned as a multi-purpose building that will serve the people of Gothenburg in two ways.

EXHIBIT

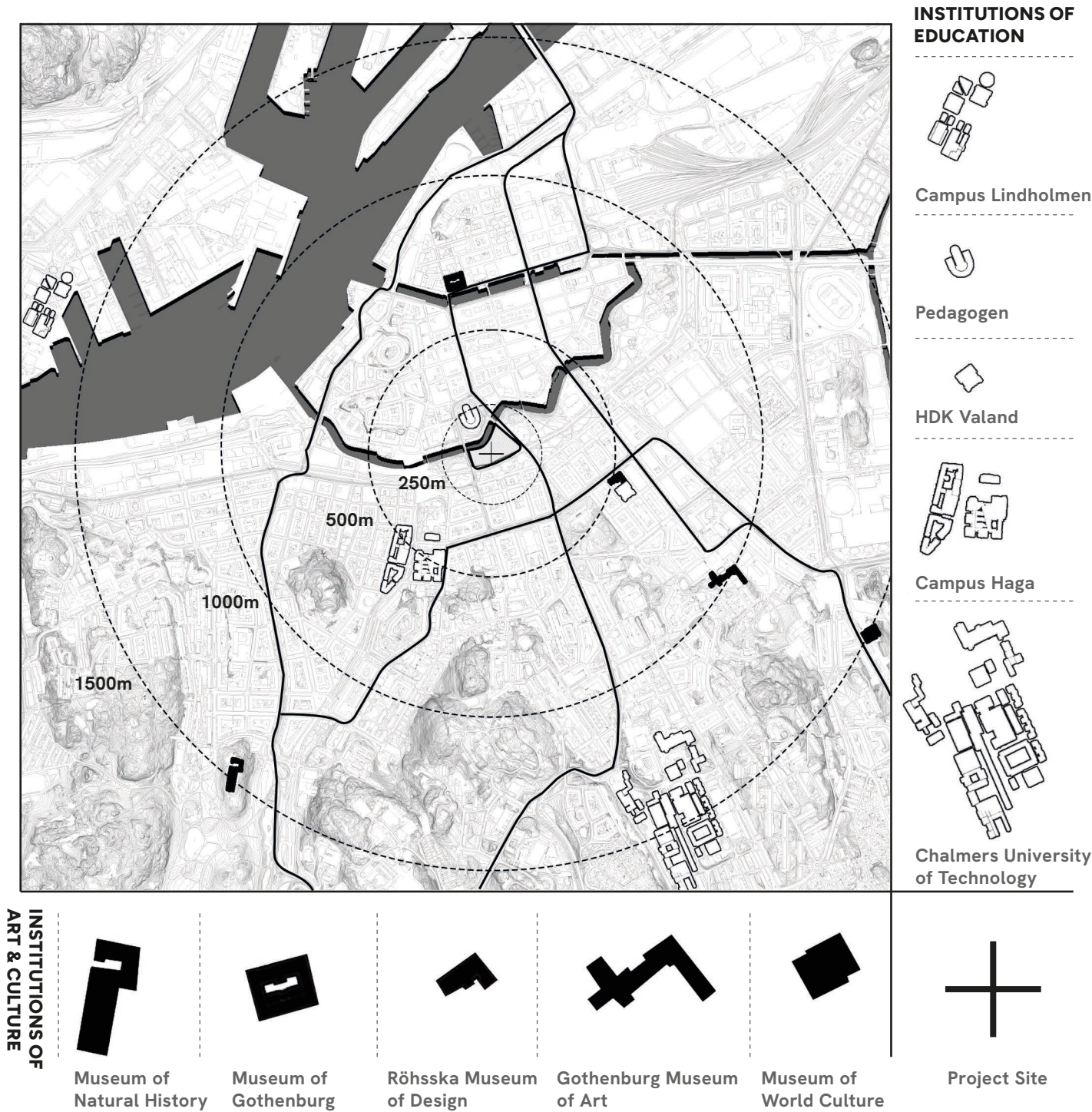
The exhibit spaces of the building will explore how vernacular Japanese methods can create a functional and atmospheric place with a contemporary function. By creating a space with a larger circulation of people the way in which a crowd benefits from the presence of nature can also be investigated. Aspects such as materiality and daylight play big roles in how a space is experienced, and a public typology such as an exhibit space also creates the opportunity to see how these aspects which are deeply rooted in both the Japanese vernacular and biophilic strategies can create a suitable environment for the purpose of interaction between people and the exhibit.

The extents of the relevance of the Japanese vernacular can be thoroughly explored by designing a building with two distinct functions - larger public exhibiton spaces and a smaller more intimate student spaces. These two functions can display different aspects of the vernacular architecture, spatially, tectonically and atmospherically.

STUDY

A study space or student hub would greatly complement the exhibit space, as it both offers a more intimate closed function to the building, as well as populates it when there are no exhibits. The exhibit spaces themselves also synergizes well with the educational purpose, as they can serve as lecture halls and be used for student presentations and student exhibitions. By designing more closed functions another type of spatial thinking tied to the Japanese vernacular can be investigated, as well as the potential for biophilic design as a way to enhance focus and promote mental well-being.

PROPOSED SITE



Kungsparken in central Gothenburg serves as an ideal site to explore the thesis questions in accordance with the proposed functions of the building. Three main factors affected the choice of site:

1. NATURAL ENVIRONMENT IN AN URBAN SETTING

The builing needs access to nature, preferably in a setting in which the building and nature can complement each other in order to explore the potential of the biophilic design strategies.

2. PROXIMITY TO INSTITUTIONS OF ART & CULTURE

As the main public function of the building is an exhibit space, the site would preferably be close to actors which may want to use the space for new and/or temporary exhibits.

3. PROXIMITY TO INSTITUTIONS OF HIGHER EDUCATION

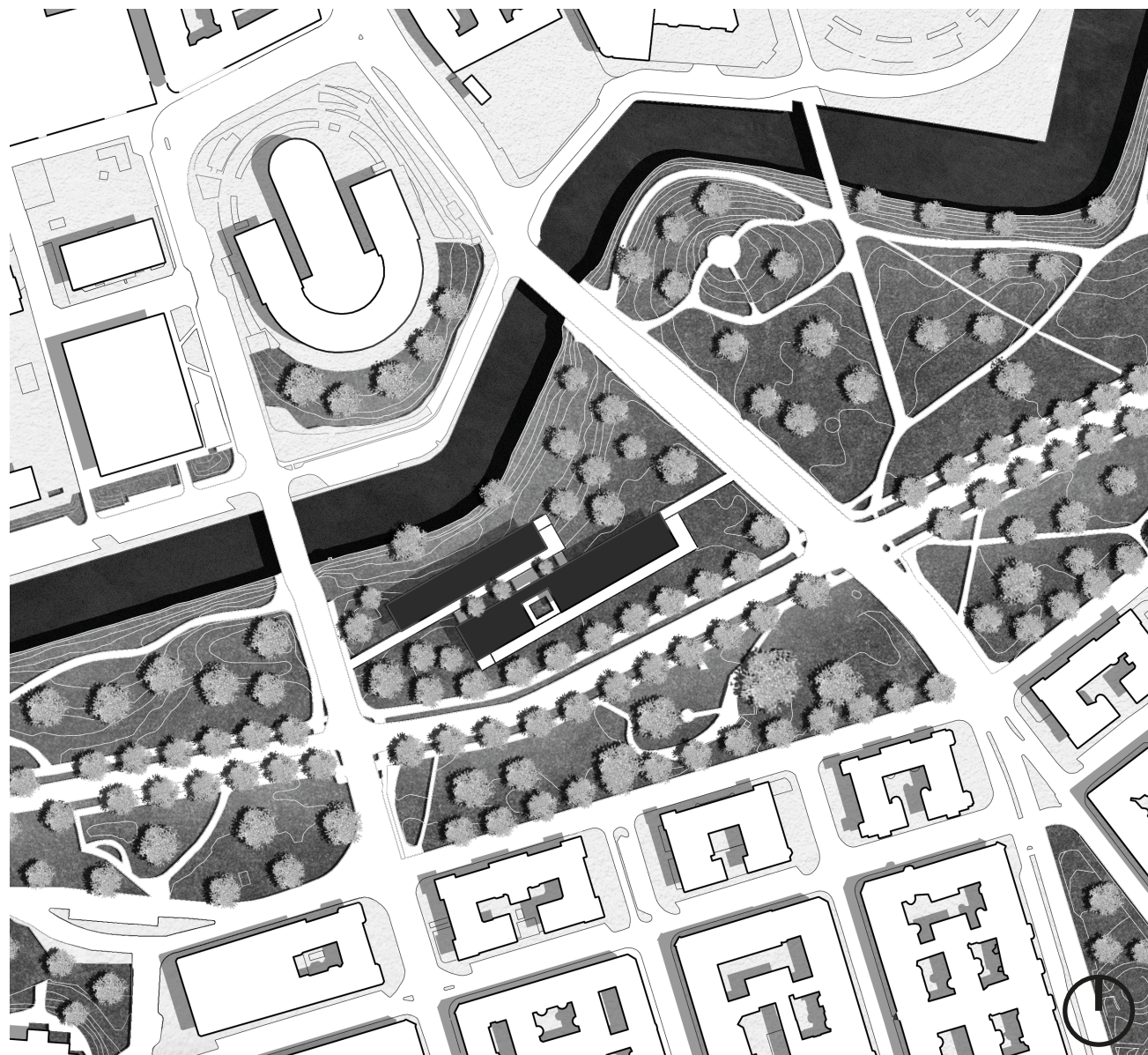
The secondary function of a student hub and study space would benefit from being easily accessible for the students in the city, and the many university campuses throughout.



FINAL DESIGN:

KUNGSPARKEN STUDENT ACTIVITY HUB AND EXHIBITION CENTER

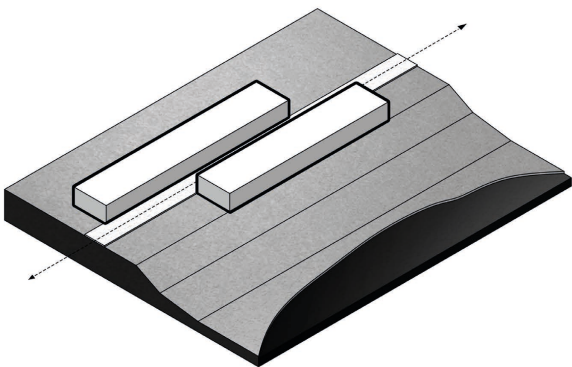
The final design and prototype of the framework manifests itself into a multi-layered complex consisting of four offset volumes making up to separate buildings, with each floor having a different relation to the sloped park and surrounding nature. Part of the complex is obscured by being imbedded into the landscape, subverting expectations depending on how the site is approached. The relation between the volumes enhances the prospect of exploration, framing the journey through and inbetween the two buildings as a journey through the nature on site. By designing with the thesis framework, the final design exemplifies how architecture and nature work in unison to create a harmonious experience where the synergy between the two creates opportunity for community activity, productiveness and respite.



SITE PLAN

SCALE 1:2000 (A3)

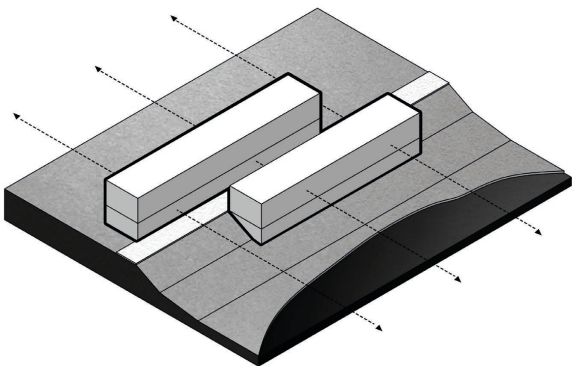
The final design is placed within Kungsparken, part of the larger Bältspännareparken which stretches along the Gothenburg moat, connecting several central city hubs. The long horizontal profile of the design follows the length of the park, creating a walkway through the intermediate space between the buildings. By walking inbetween the buildings and following the walkway, the architecture frames the landscape through the building, and highlights characteristics of the site such as specific trees, the slope towards the moat and the general traversal throughout the entire urban context.



STAGE 1

VOLUMES FRAMING WALKWAY

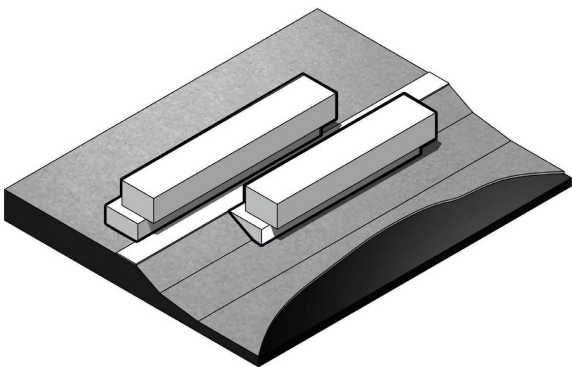
Two volumes that follow the direction of the site, places in order to obscure the buildings from certain angles depending on how the site is approached. The offset of the volumes allows nature to be framed within the negative spaces while creating views in each direction for both buildings.



STAGE 2

VERTICAL DEPTH FROM SITE

A top floor, as well as souterrain floor is added, creating a vertical connection and opportunities for diverse framing of the site. The direction from urban context to the water is emphasized as the buildings and their program follows the sloped site.



STAGE 3

OFFSET FLOORS FOR OUTDOOR SHELTER AND ROOF ACCESS

Offsetting the top floors of each building creates shelter along the long axis, and allows the interior structure to extend to the exterior. Additionally, it makes the rooftops accessible, which serves as a large balcony of one building, and a continuation of the walkway on the other.

MASSING CONCEPT AND SITE RELATION

The general building massing is designed with the specifics of the site in mind, both in terms of existing nature and the topography of the landscape. By maintaining simple geometry, the interior can be designed for flexibility. Additionally the simple geometry is used to emphasize the lateral structural system and how it can be used to diffuse the border between interior and exterior. Offsetting and obscuring parts of the buildings builds anticipation, and subverts expectations as the entire site is explored or approached from different directions and areas of the surrounding environment.



FIRST FLOOR PLAN

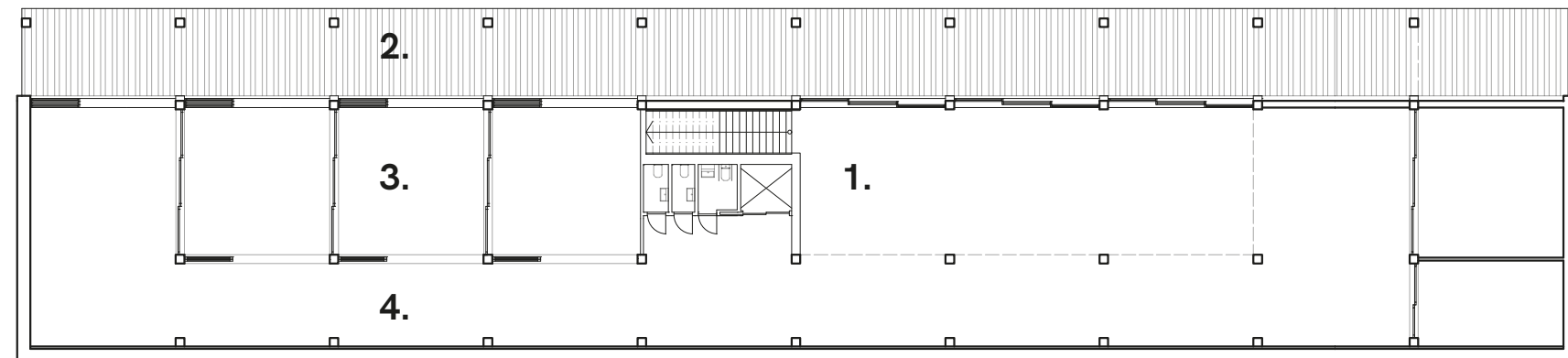
SCALE 1:400 (A3)

The first floor can be approached from either side of the walkway stretching along the park, as well as from the waterside to the north or urban landscape to the south. The two buildings meet at the ground level, where they each have different flexible functions. The main entrance southern building is through a courtyard preserving existing nature, and houses a café with natural framing on each side as well as flexible rooms for meeting of student activity which can open up to the walkway through sliding doors of transparent or translucent glass. The souther building accommodates the largest exhibition space which can be further opened up and extended to the eastern facade, or opened up to the north to allow the exterior walkway to become part of the space.

The entrance floor of northernmost building is its second floor in relation to the souterrain below, and houses several flexible study rooms which follow a long gallery which can be used to extend the student spaces or as a linear exhibition space. The exhibition spaces of both buildings relate to adjacent floors through vertical sightlines upwards in the southern building, or downwards in the northern building.

Movement between the interior and exterior has been prioritized, with opportunities to either open up the spaces entirely to the nature outside, or by making the exterior walkway part of the interior circulation.

1. Courtyard
2. Student activity
3. Large exhibition space
4. Connecting walkway
5. Flexible Gallery
6. View to second exhibition
7. Café

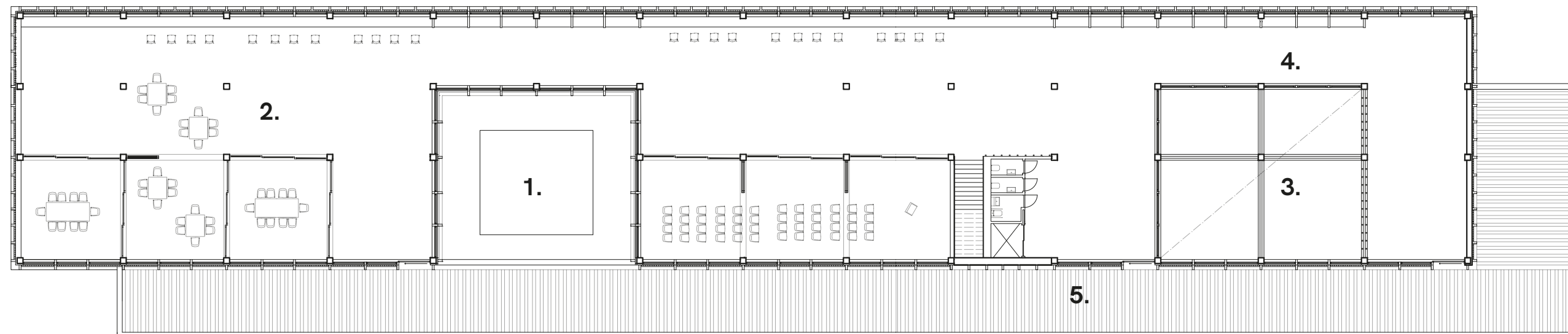


- 1. Second Exhibition Space
- 2. Lower Veranda
- 3. Flexible Student Spaces
- 4. Lower Gallery

0. 10. 20.

LOWER FLOOR PLAN

SCALE 1:300 (A3)

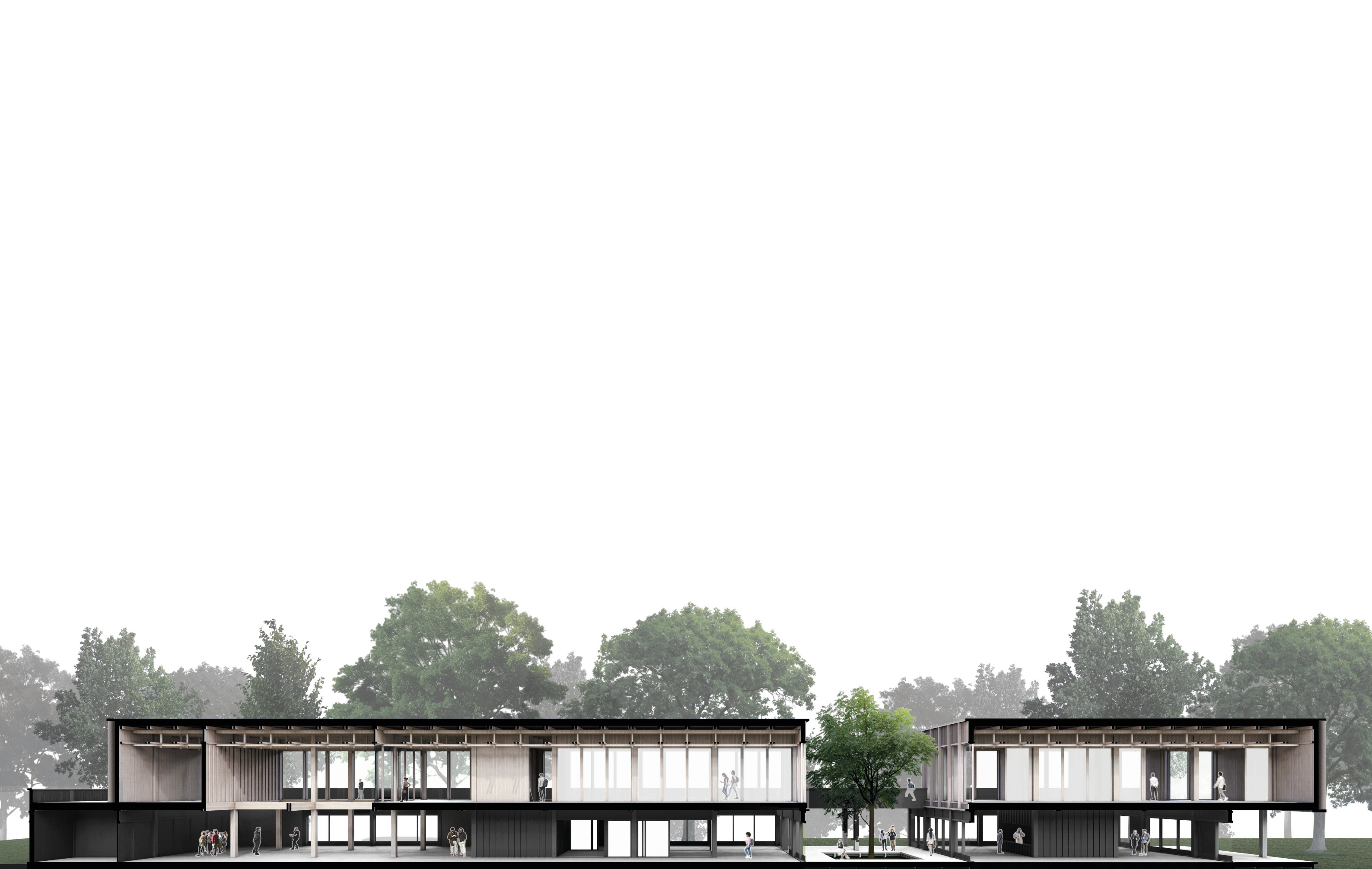


- 1. Courtyard
- 2. Expandable study spaces
- 3. View to large exhibition space
- 4. Second Floor Gallery
- 5. Circulation Balcony

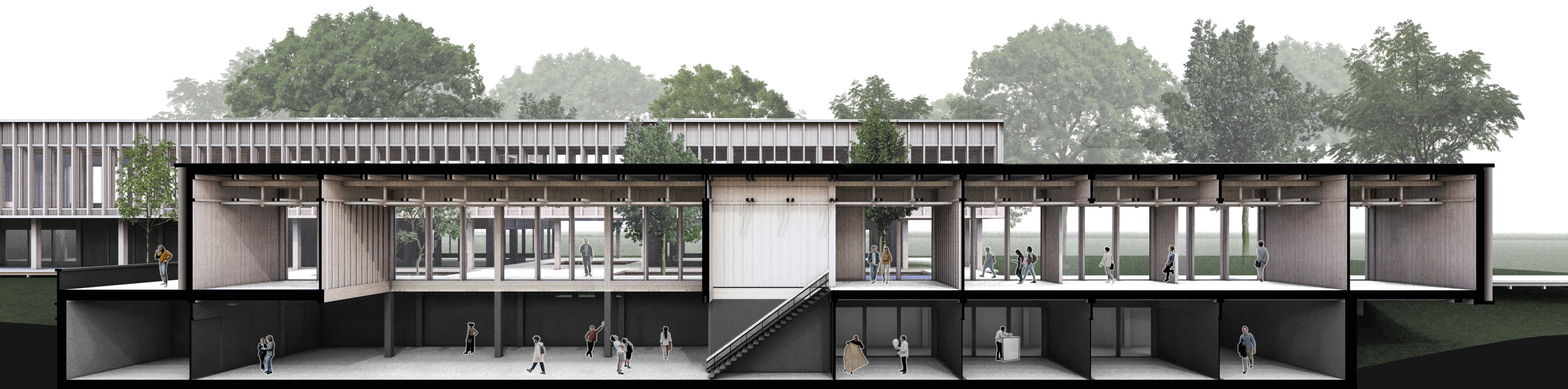
0. 10. 20.

SECOND FLOOR PLAN

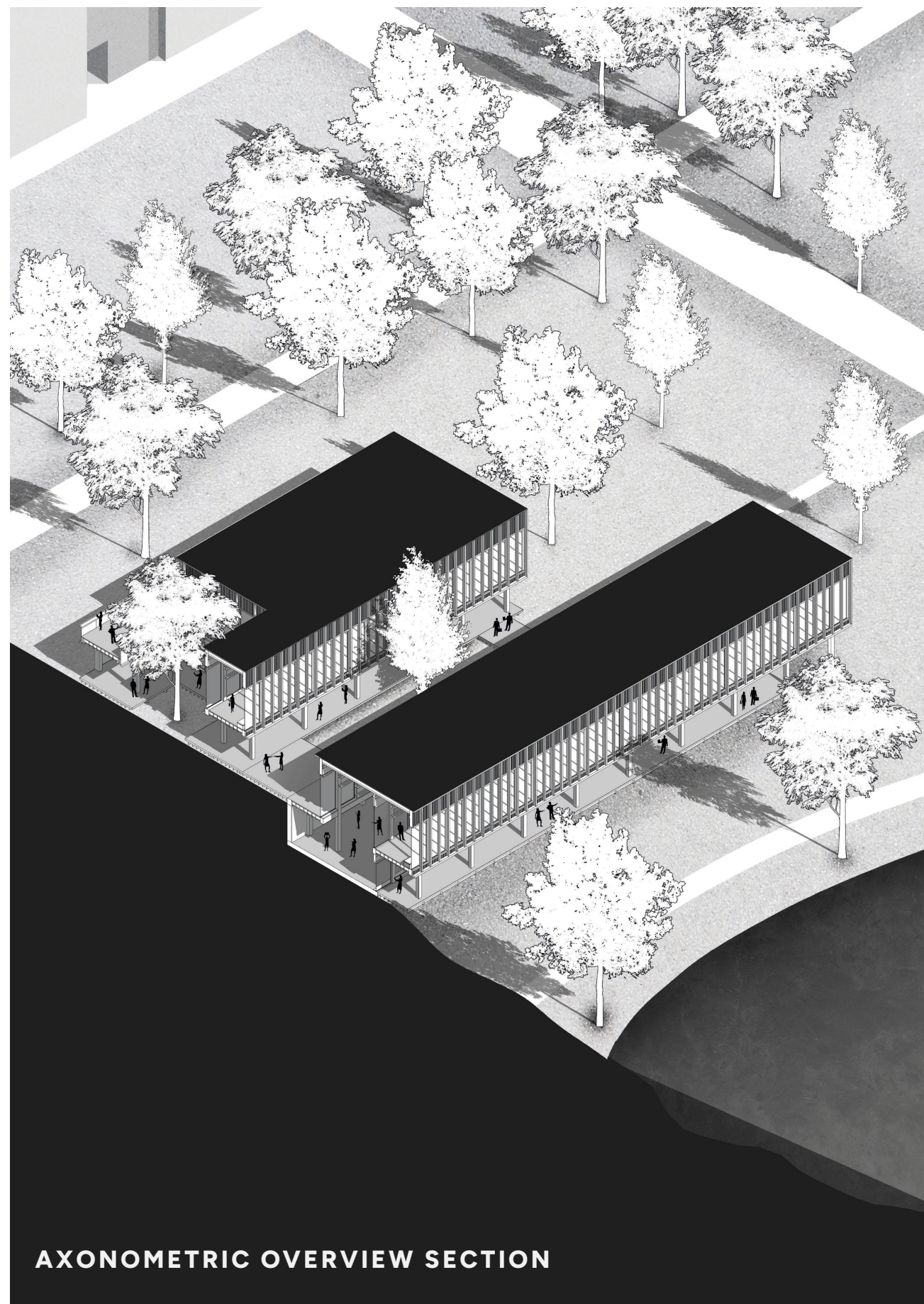
SCALE 1:300 (A3)



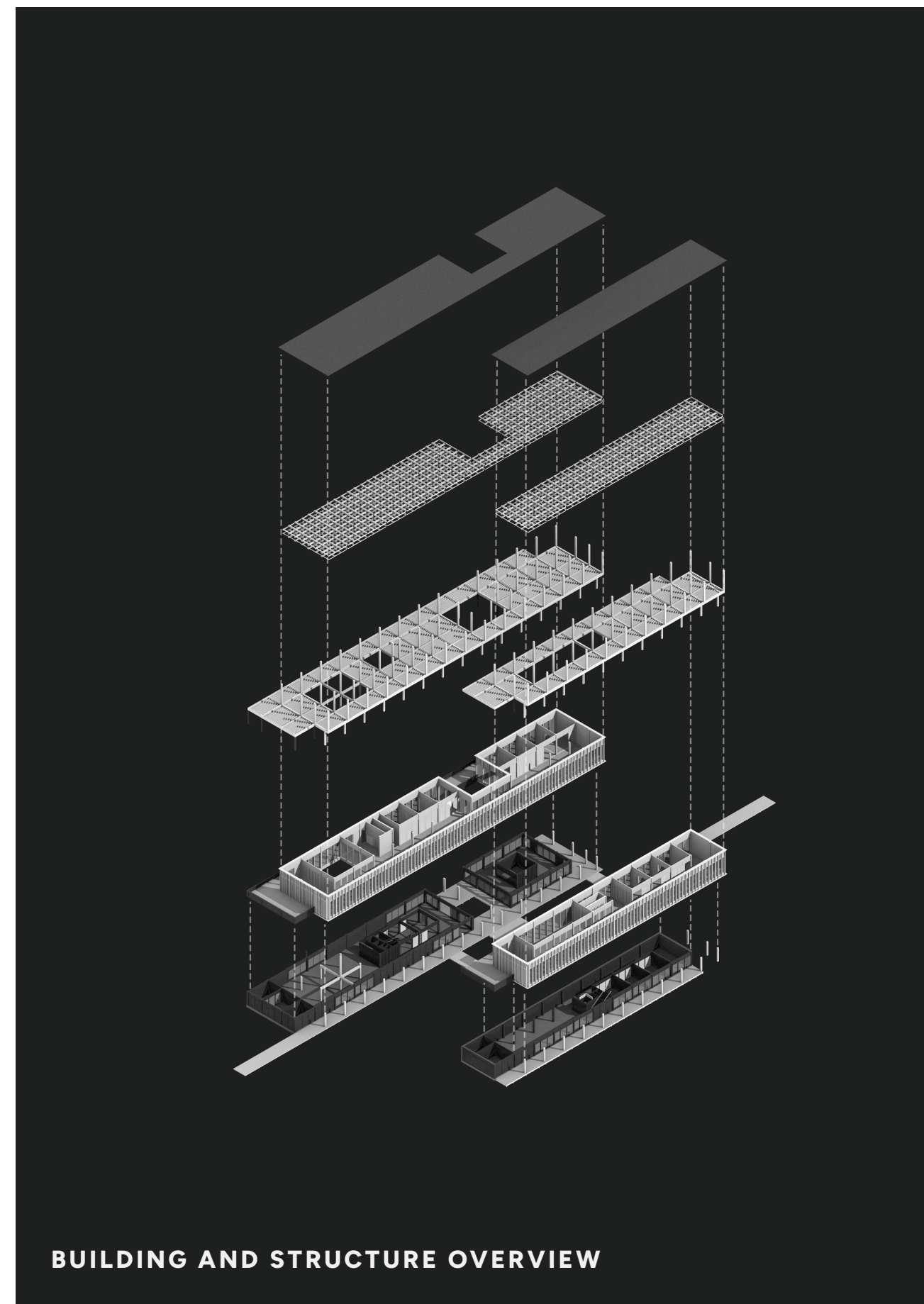
SECTION 1



SECTION 2



AXONOMETRIC OVERVIEW SECTION



BUILDING AND STRUCTURE OVERVIEW

FRAMEWORK IMPLEMENTATION



1. VERANDA APPORACH

The buildings are approached from the east covered by the second floor, opening up to the walkway.



2. MAIN ENTRANCE SPACE

The entrance to the first floor of the main building anticipates the second floor and the courtyard.



3. ENTRANCE COURTYARD

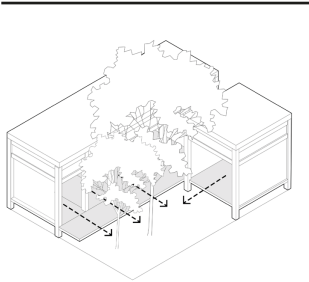
The courtyard offers views of nature and sightlines through the second floor and the second building.



4. OPEN WORKSPACE

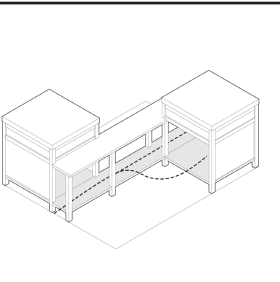
Flexible workspaces open up to facades on three sides, allowing functions to flow into the large space.

FRAMEWORK APPLICATION



FRAMING

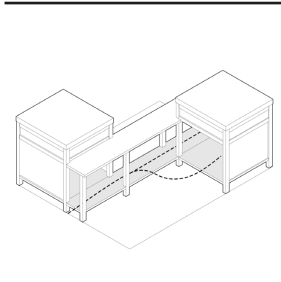
The linear journey is framed between the two structures and under the covered veranda.



EXPLORATION

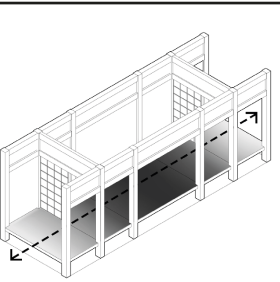
Anticipation is built as the space between the building presents itself, with many possible directions.

FRAMEWORK APPLICATION



EXPLORATION

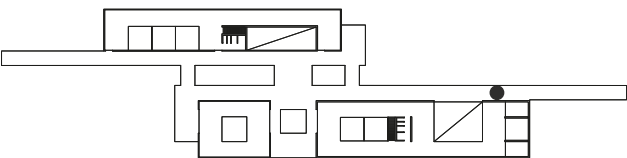
Anticipation is built through sensing the spaces of the main building, from the structure second floor structure to the transparent spaces on the bottom floor.



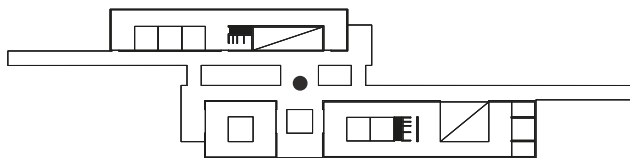
GRADIENCE

The gradience between nature and building is showcased through transparent spaces and sightliens from facade to facade, on both first and second floor.

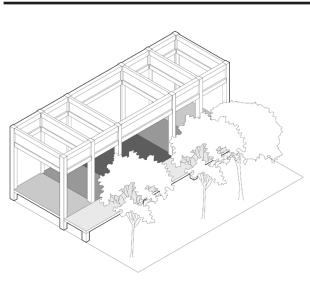
ORIENTATION



ORIENTATION

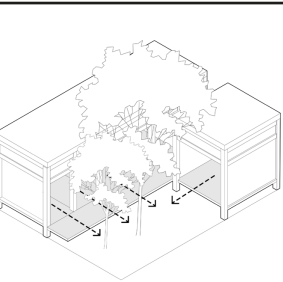


FRAMEWORK APPLICATION



LAYERS

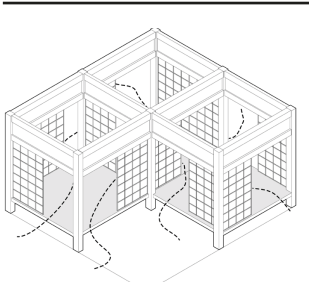
Many layers to both buildings are visible through each other, and between the floors.



FRAMING

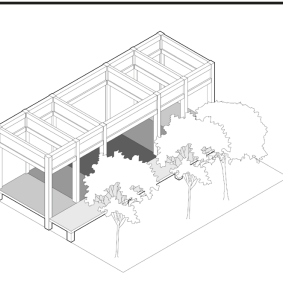
Nature is framed both within the courtyard and the preserved tree and through the meeting between the two buildings.

FRAMEWORK APPLICATION



VARIABILITY

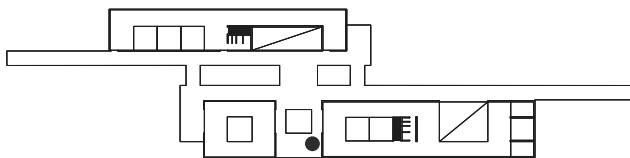
The flexible rooms may open to create a larger space for a variety of fuctions.



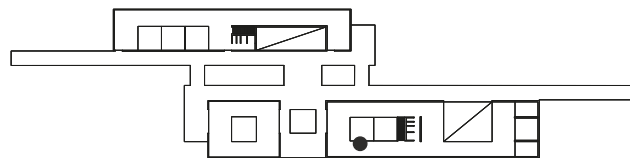
LAYERS

As the workspaces are places centrally, they create an additional layer, and can meet nature on either side.

ORIENTATION



ORIENTATION





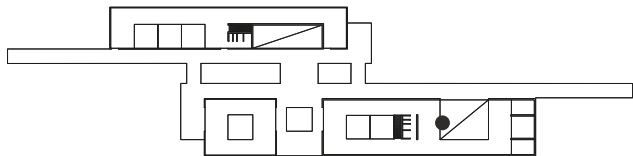
5. FIRST EXHIBITION SPACE

The largest exhibition spaces has contact with the site and the second floor of the main building.

FRAMEWORK APPLICATION

<p>EXPLORATION</p> <p>The second floor gallery and balcony are visible through the upper windows, creating anticipation.</p>	<p>EMPTINESS</p> <p>The empty space allows light and nature to permeate the space, and creates a place for respite. It also allows for multiple purposes.</p>
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ORIENTATION



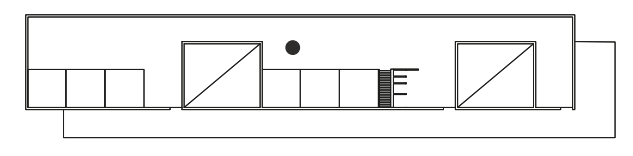
6. SECOND FLOOR GALLERY

The gallery housing study spaces meets the courtyard and offers long views over the site and the city.

FRAMEWORK APPLICATION

<p>VARIABILITY</p> <p>The variation in sizes of the open and closeable spaces allows for multiple adaptable functions.</p>	<p>FRAMING</p> <p>Both the courtyard and park is framed on either side of the thin volume, with the height used as an advantage for creating longer views.</p>
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ORIENTATION



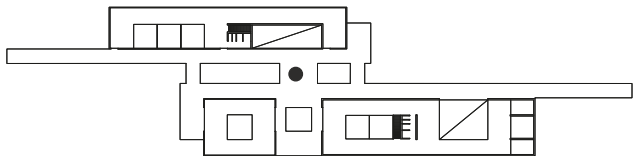
7. CONNECTING WALKWAY

The walkway weaves in existing nature as it is traversed, connecting the two buildings and diffusing borders.

FRAMEWORK APPLICATION

<p>FRAMING</p> <p>The veranda frames both nature and the journey throughout the buildings.</p>	<p>LAYERS</p> <p>Nature acts as an intermediate layer between the two buildings.</p>
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ORIENTATION



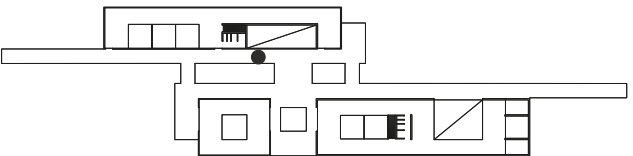
8. LAYERED SIGHTLINE

From the walkway both floors of the second building can be viewed, in addition to seeing the lower park.

FRAMEWORK APPLICATION

<p>EXPLORATION</p> <p>The view through the second exhibit space subverts expectations, as the lower floor is not visible from the entry point.</p>	<p>GRADIENT</p> <p>The transparency and continuity of nature through the space creates a gradient between architecture and nature.</p>
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ORIENTATION





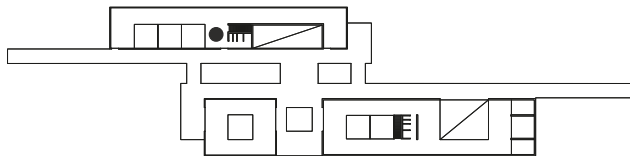
9. SECOND BUILDING ENTRANCE

The entrance to the second building is elevated as a second floor, offering views of the park's nature.

FRAMEWORK APPLICATION

<p>EXPLORATION</p> <p>Prospect of exploration is generated in each direction, with views of the park to the north, the exhibition space downstairs, second gallery to the west and the building to the south.</p>	<p>LAYERS</p> <p>Nature acts as an outermost layer on the north and south sides, and structural layers orient the user in the other directions.</p>

ORIENTATION



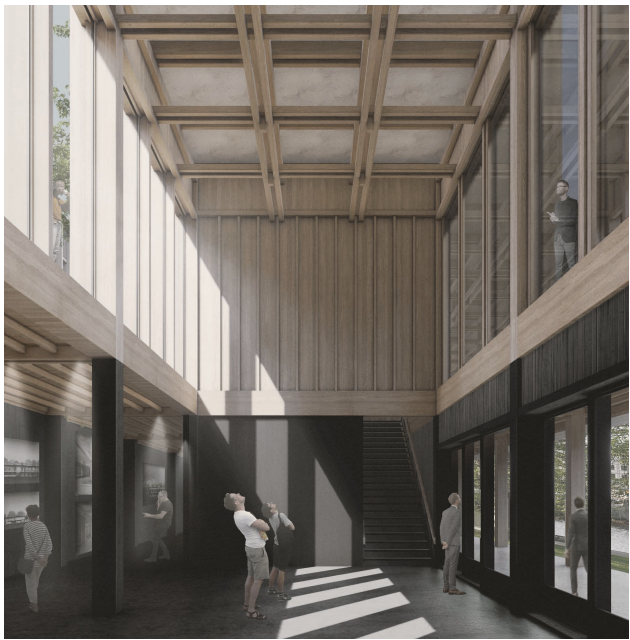
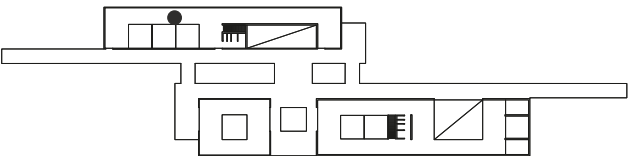
10. FLEXIBLE GALLERY

The gallery offers flexible functions of study, workspace or exhibition along the parkside facade.

FRAMEWORK APPLICATION

<p>VARIABILITY</p> <p>The flexible spaces can open up to the gallery to create a variation in size, and the gallery itself can be used as both study space and a more intimate exhibition space.</p>	<p>FRAMING</p> <p>Nature is framed to the north and south, with emphasis on the south as the height over the park allows for close connection to the trees.</p>

ORIENTATION



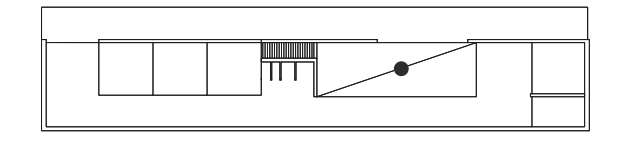
11. LOWER EXHIBITION SPACE

The lower exhibition space has contact with ground level on two sides, at different elevations

FRAMEWORK APPLICATION

<p>EMPTINESS</p> <p>The lower exhibit space utilizes emptiness to let nature into the space.</p>	<p>LAYERS</p> <p>Structural layers orient the user, and creates upwards direction to both the veranda and flexible gallery.</p>

ORIENTATION



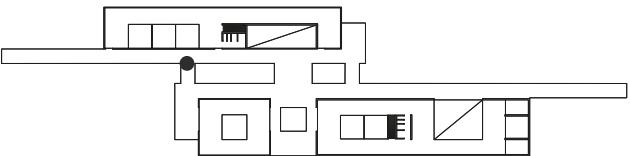
12. COVERED CAFÉ VERANDA

The two offset volumes frames the landscape and offers shelter, creating a space within nature.

FRAMEWORK APPLICATION

<p>GRADIENCE</p> <p>By extending interior structures a space which diffuses the border between inside and outside is created, demonstrating a gradient relationship between interior and exterior.</p>	<p>FRAMING</p> <p>The landscape is framed through and under the second floor volume.</p>

ORIENTATION



VIII.

DISCUSSION

*Findings, contributions, evaluation
and concluding thoughts*

PROCESS

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CASE STUDIES AND FRAMEWORK

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FINAL DESIGN PROJECT

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THEORETICAL CONTRIBUTION

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THESIS QUESTIONS

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CONCLUSION

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This thesis has investigated the relationship between Japanese architecture and biophilic design, specifically exploring how vernacular Japanese architecture incorporates nature and nature-like experiences into the built environment, with the goal of learning from this precedent and creating a new framework for using vernacular design principles as a creative asset in contemporary architecture. The research resulted in a design project of a public student activity hub and exhibition center, where the framework created as a result of the thesis research was applied to showcase the relevance of Japanese vernacular strategies for promoting biophilic architecture.

PROCESS

The thesis, initially, relies heavily on theory to create a setting and find relevance in the topic, combining two separate architectural subjects which have many similarities and common goals. Creating this broad foundation was important in order to clarify the synergy between Japanese and biophilic architecture. With such a broad theoretical span, finding a method for grounding the thesis in a practical application became of great importance. With the combined research of Japanese and biophilic design as a theoretical point of departure, using the Japanese vernacular as a model system for achieving biophilic goals was chosen as a strategy early on. Concretizing the lessons through a model system, in this case as a framework based on theory and case studies, would not have become an evident solution without another key theoretical aspect: the act of translating vernacular architecture. Without the references of Rapoport (2006), Tsukamoto (2017) the importance of deriving the appropriate lessons from the vernacular and finding a suitable approach for contemporary implementation would have been more difficult. Another theoretical source which held great importance for the thesis was Browning and Ryan (2020) who on one hand present an immense theoretical approach for biophilic design, but also exemplified the correct use of such a framework, which affected how the final framework of this thesis came to be, and was subsequently used in the design.

CASE STUDIES AND FRAMEWORK

When the theory and method had been developed, and the foundation was created for where the thesis was heading there was one major part left in order to ascertain the biophilic relevance of the Japanese vernacular, namely studying the vernacular architecture. This could have been done through reading and studying drawings and images, but

fortunately the opportunity arose to do the case studies in person by going on a study trip to Japan. As a previous exchange student in Tokyo, an overall influential and impressionable period which made me want to undertake this research in the first place, I already knew of several examples which would serve as great case studies. Upon visiting my old university and speaking to students there, more examples were provided which dictated my two week study trip. In the end eight buildings were showcased as case studies in the thesis, all which provide different lessons and biophilic qualities when analyzed through a biophilic design framework. Over 20 buildings were visited as potential case studies, but the chosen eight creates a diverse selection of traditional and contemporary projects, successfully showcasing vernacular architecture and how similar approaches are used today. The final framework exemplifies the case studies through their biophilic achievements, and if other case studies were used there could have been a different variety of tools created. However, since the goal of the framework is to work as a model system for general lessons of the vernacular, concretized through specific biophilic strategies, the overall goal of the framework might not have changed. Overall, the tools of the framework succeed in deriving general lessons from the Japanese vernacular, each with specific goals and applications. The way that the framework is used in practice will however be harder to judge, as the general nature of it opens to many possible outcomes which are dependent on building typology, size and function. The final thesis project as a showcase and prototype of these strategies is appropriate for its purpose, but the framework would need to be tested and further developed through prototyping a variation of other typologies to find out if the tools are as generally applicable outside of their original context as they are intended to be.

FINAL DESIGN PROJECT

The final design project was used as an exploration and prototype of the framework, attempting to create meaningful interactions between architecture, nature, and people. When using the framework as the main creative instrument, the flexibility and interpretiveness of it became clear. This, in turn, meant that the building could take on a large variety of shapes and functions. As a public building the final project serves its purpose, and it showcases different ways to use the thesis framework as a tool for creating nature-immersive spaces as a contemporary translation of the Japanese vernacular. The result succeeds in some ways but also raises questions. Since many of the vernacular case studies which informed the framework consists

of smaller scale buildings, often residential, translating design principles from them to a larger scale created unexpected results. For instance, the flexible spaces became rather large, as they serve a public purpose, with flexibility for functions which include a large amount of people compared to the smaller scale buildings which inspired it. Balancing the intimacy of the Japanese vernacular with the contemporary large-scale function of exhibit- and study spaces was one of the major challenges of the design phase. This insight proved useful however when iterating upon the framework through the design process, as values such as intimacy were disregarded for the general model system the framework is intended to be and would create issues if expected to be used in a public project. In the end, the smaller scale interactions came from allowing communication spaces to serve a variety of purposes and manifesting the layered nature of the Japanese vernacular through spaces of different scales. Designing on a smaller scale led to more meaningful interaction with nature, whilst grander gestures could be distracting from the intended experience. However, by keeping the space simple with emptiness and dynamic variability as an emphasis, the spaces could change according to purpose, redefining the spatial relationships between building and nature.

THEORETICAL CONTRIBUTION

The theoretical focus of the thesis, recontextualizing the Japanese vernacular through biophilic design, with the purpose of finding new contemporary relevance of a traditional form of architecture, necessitates a direct comparison of the goals between the two theoretical points of view. The Japanese vernacular holds great potential for achieving contemporary biophilic design goals, which upon further reflection and evaluation of the result leads to some interesting conclusions. For instance, the six design tools which make up the thesis framework are based on comparing biophilic patterns with findings from the case studies, but the tools themselves manifest ideas which are already appreciated in the Japanese vernacular regardless of its potential biophilic purpose. Layers, emptiness and framing are examples of tools which consist of characteristics that are largely recognized as unique qualities of the Japanese vernacular. This could be evidence of the innate biophilic relevance of the Japanese vernacular, as even when searching for specific new strategies inspired by tradition, its inherent and obvious qualities become the most relevant. Several sources used in this thesis discuss the qualities of the framework in the context of simply appreciating and describing the functions

of the traditional architecture. With the thesis framework these qualities can be recontextualized as relevant for contemporary inspiration, innovation and use through biophilic design.

THESIS QUESTIONS

Continuously relating the thesis contents, its exploration of the subject matter and the interpretation of both biophilic and Japanese architecture to the thesis questions proved to be both a detriment and a beneficial tool for the research and thesis narrative. The hierarchy of the thesis questions became more important as the thesis progressed, with the main focus becoming clearer by focusing on how the Japanese vernacular could be a creative asset for innovating upon contemporary biophilic design. Ultimately the thesis provides insight on this, but a conclusive answer is difficult to produce due to the subjectivity of the translation and recontextualisation process. Yes, it can be a source of inspiration for future sustainable practice, providing unique benefits for spatial, structural and atmospheric value, but the manifestation of it can take many forms. Working with the framework concretised the path to utilize the Japanese vernacular for the goal of the thesis question whilst maintaining the essence of the Japanese architecture, but local conditions, typologies and the architect themselves provide additional layers which greatly affect the physical result of what this thesis has explored. What the translation of a vernacular style to a new context actually means follows a similar line of reasoning, as it is dependent on many exterior factors, meaning that finding and expressing the core philosophy of the translated vernacular becomes most important.

CONCLUSION

The subjectivity of the process, from case studies to the design of the framework demonstrates that there is a lot of room for different types of interpretation and translations of the vernacular. It also showcases that the breadth of the synergy between the two subjects explored is vast enough where this thesis has only scratched the surface of possible fields of research. The thesis achieved what it set out to do in following its linear methodology by first studying existing theory followed by the Japanese vernacular through case studies, recontextualizing its potential relevance through biophilic design, and using these lessons as a source of inspiration in a contemporary architectural project. Along the way many opportunities for further research and discussion presented themselves bringing with it great potential for future studies not only of the Japanese vernacular, but in reframing vernacular architecture as a useful asset for creativity and innovation.

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PHOTOGRAPHS AND IMAGES

All photographs and images were taken or created by the author of this thesis.

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