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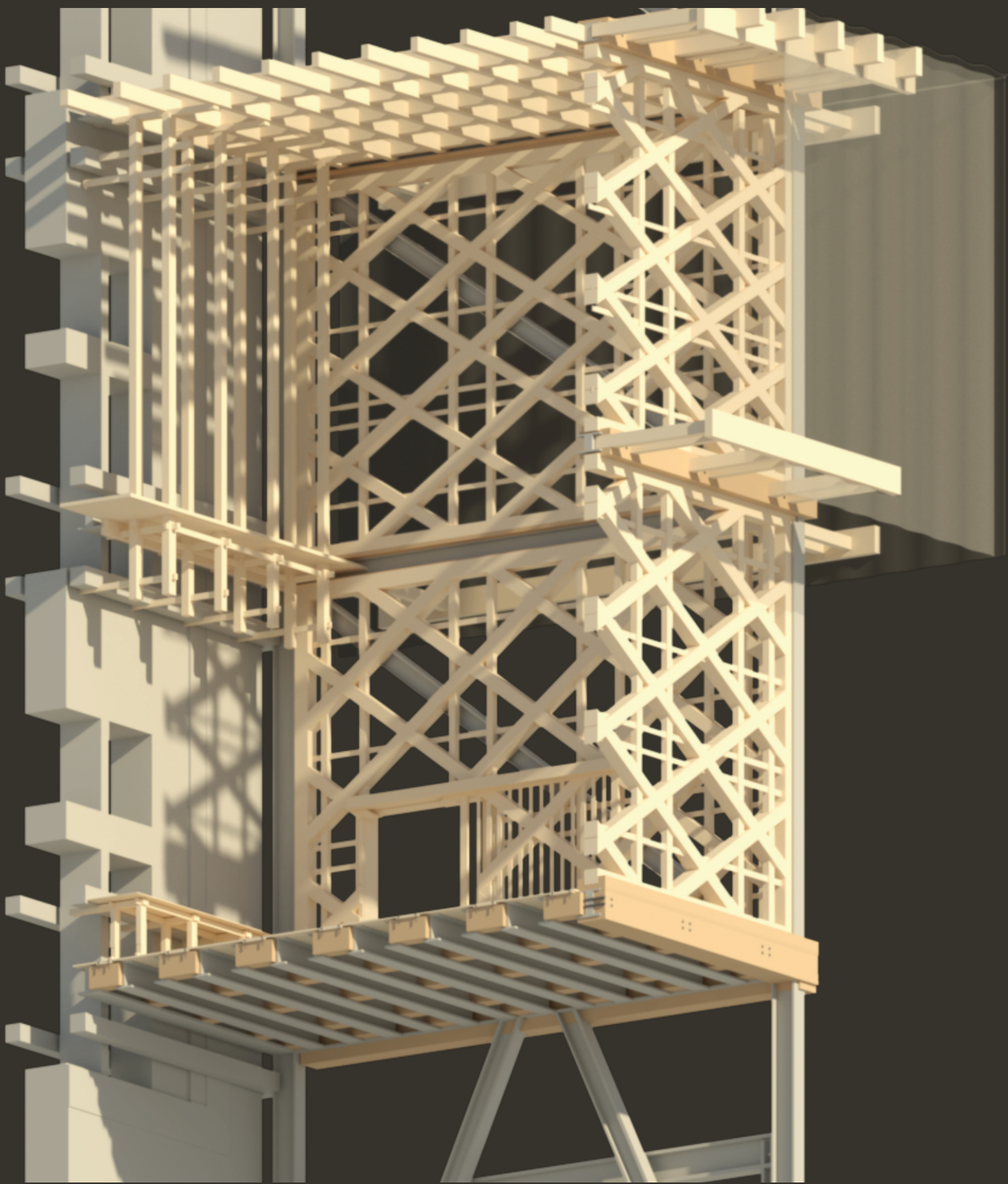
T A I S E I   H A Y A S H I

REGENERATING URBAN VOIDS INTO MA: EXPLORING ARCHITECTURAL METHODOLOGY USING KIGUMI STRUCTURE



2025

SCHOOL OF FUTURE ENVIRONMENTS

A THESIS SUBMITTED TO AUCKLAND UNIVERSITY OF TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARCHITECTURE (PROFESSIONAL)

Abstract

This research investigates the need for flexible and adaptive reuse strategies to transform underutilized spaces in urban environments. Through theoretical and conceptual analysis, it addresses how architecture can respond to the challenges of vacancy, decay, and heritage protection. The study focuses on the case of the St James Theatre in central Auckland—a heritage-listed building that has remained unused for years due to ongoing restoration delays. By examining this site, the research proposes a temporal, non-invasive architectural intervention using traditional Japanese construction techniques, particularly

Kigumi (木組み) joinery. These techniques are explored for their potential to create modular, reversible wooden structures that respect the heritage fabric while reactivating the space for public use. The investigation highlights how cross-cultural, craft-based approaches can inform sustainable, low impact adaptive reuse in contemporary urban contexts.

Chapter 1: Introduction

Chapter 2: Project Site

Chapter 3: Theoretical Framework

Chapter 4: Design Methodology

Chapter 5: Design Outcome

Chapter 6: Detail Design and Design Development

Chapter 7: Conclusion

Acknowledgements for Collaborations

I would like to use this page to express my sincere gratitude to all those who have supported and contributed to the development of this project.

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「皆様のご協力を心から感謝します。」

林 泰成

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due acknowledgment is made in the text.
I also declare that this work has not been submitted for any other degree or diploma at any other university or institution of higher learning.

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Signature: ________________________

Positionality Statement

Although I have tried to develop my project based on evidence drawn from academic journals and experimental processes, I cannot deny the possibility that my ideas and opinions have been shaped by personal bias — or what I call a kind of “virus” of subjectivity.

I was born in 2002 in Japan. I immigrated to Auckland, New Zealand, with my mother and younger brother in late 2012, just a few months before turning ten. Since then, I have spent my childhood, teenage years, and now postgraduate studies in this country.

It has now been almost thirteen years since I arrived in New Zealand, meaning I have lived here longer than I did in Japan. Even so, I still notice moments where language feels like a small hurdle, a quiet reminder of the two cultures I move between. It is less a struggle and more an ongoing adjustment — part of the experience of living across different places. Many people in similar circumstances share this feeling, navigating language, identity, and belonging in ways that can be both challenging and enriching.

Over time, however, I have come to recognize that being a “half-baked” bilingual and living between two cultures — Japanese and New Zealand — offers a unique position. Integrating Japanese ways of thinking into the New Zealand context has always felt natural to me. It became a kind of survival skill in academic settings where many of my peers seemed to effortlessly master the art of English. I knew I might never reach that same level of fluency, so I began to focus on finding the *gaps* — the spaces of meaning that emerge when you look through two cultural lenses at once.

It is within these gaps that I’ve found my most valuable insights. This in-between space informs my design thinking, my academic inquiry, and the way I approach spatial concepts such as *Ma*. Rather than seeing it as a limitation, I now understand them as opportunity to unleash the creativity.

Glossary: Terms and Definitions

My research engages with spatial concepts and construction methods rooted in my own cultural background, as well as architectural terminology that may not be familiar outside of the field. This section offers a brief explanation of key terms used throughout the thesis:

間（*Ma*）
A Japanese spatial concept that refers to the “in-between” or the interval between two elements. Ma is not just empty space, but a meaningful pause or void that shapes the experience of space and time. It often implies relationships, transitions, and timing in both physical and social contexts.

木組み（*Kigumi*）/組木（*Kumiki*）
Traditional Japanese joinery techniques used in timber construction. These methods involve interlocking wooden components without the use of nails or metal fasteners, relying instead on precise craftsmanship and knowledge of wood behaviour.

While Kigumi is often used for building construction, Kumiki refers to more of an artwork of wooden puzzles that are formed through interlocking woods.

Ishibadate（石場建て）
A traditional Japanese construction technique in which timber posts are placed on stone bases rather than being embedded or mechanically fixed. This creates a non-invasive connection that allows wood to move naturally with environmental changes. In this thesis, an adapted version of *Ishibadate* is used as a respectful method for attaching new timber structures to heritage fabric without damaging the existing walls.

Building Obsolescence
A term used to describe buildings that are no longer functional, desirable, or safe in their current state. This can be due to physical decay, outdated infrastructure, or changes in social and economic needs. Recognizing obsolescence is often the first step in considering whether a site should be preserved, adapted, or replaced.

Adaptive Reuse
A design approach that involves repurposing existing buildings for new uses while retaining their historic or structural elements. Adaptive reuse supports sustainability, cultural preservation, and efficient use of space in urban environments.

Temporal Adaptive Reuse
A short-term or interim form of adaptive reuse that activates a site during periods of vacancy or transition. Rather than waiting for long-term redevelopment, temporal adaptive reuse introduces lightweight, reversible, and community-serving interventions that restore activity, safety, and public engagement. In this thesis, temporal adaptive reuse bridges the period between the theatre’s current state and its future restoration.

Chapter 1: Introduction

1.1 Background and Context: Needs for Temporal Adaptation

Auckland City is currently undergoing a period of significant urban transformation. Major infrastructure projects, such as the pedestrianisation of Queen Street and the construction of new underground train stations are reshaping the city's core (Auckland Transport, 2025).

Yet, despite these advancements, many sites within central Auckland remain visibly underutilised, neglected, or abandoned.

The St James Theatre in Auckland is one such example. Once a vibrant cultural venue has remained fenced off and unused for over a decade. Despite multiple renovation proposals over the years, none have been successfully completed. Its physical decay and inaccessibility have created not just a logistical problem, but also a social and spatial issues as it became an empty void within the city that passively contributes to urban neglect.

This condition raises the need for architectural strategies that address the in-between states of buildings when building is neither going to be demolished or repurposed. Rather than waiting indefinitely for full restoration, how can we introduce thoughtful, low-impact interventions that re-engage the public and reframe perceptions of these unused heritage sites?

Temporal adaptation is one such strategy. It allows for temporary, reversible architectural solutions that bring life back to a site without altering its heritage fabric. This is particularly relevant in urban contexts where time, budget, or poor project management delay long-term development.

This research draws on Japanese architectural thinking to explore how temporality can be designed with intention and care. The traditional Japanese spatial concept of *Ma*—which emphasizes the interval, pause, or in-between—is used as a conceptual foundation for understanding the potential of vacant time and space. Traditional craft-based structural systems like *Kigumi* (timber joinery) are also explored as non-invasive, demountable building methods suited to temporal use on heritage facades.

Through these perspectives, the project proposes a temporary timber structure for the St James Theatre site—one that reconnects the building with the public, improves accessibility and safety, and occupies the unused period with architectural meaning rather than neglect.

1.2 Research Questions

- Can temporal adaptive reuse be an alternative option to revive underutilized spaces?
- How can indigenous construction technique and modern technologies be integrated in temporal adaptation of heritage architecture?

1.3 Research Aims and Objectives

Aim:

To explore how the integration of Japanese spatial and structural principles—particularly the concept of *Ma* (間), traditional joinery techniques (*Kigumi*), and place-based craftsmanship— can inform a temporary architectural intervention for the adaptive reuse of a disused heritage site in central Auckland.

Objectives:

- To explore Ma (the spatial concept of in-betweenness) as a theoretical lens for understanding and designing within the temporal gaps of architectural obsolescence.
- To investigate traditional Japanese joinery (*Kigumi*) as a non-invasive structural system that supports temporary, demountable architecture.
- To explore whether locally available materials can be used for Kigumi, considering cost, practicality, and cultural relevance.
- To examine how digital fabrication technologies (e.g. CNC and 3D scanning) can work in synergy with traditional joinery to enhance precision and feasibility in contemporary contexts.

Chapter 2: Project Site

2.1 Introduction to Project Site

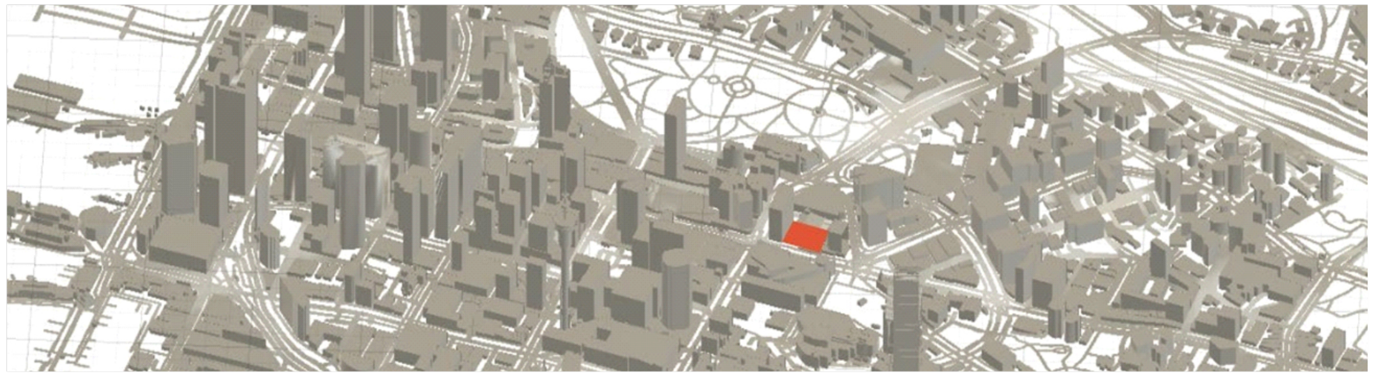


Figure 1. Locating Project Site in Auckland CBD.

St James Theatre was constructed in 1928 and designed by Henry Eli White (Heritage New Zealand, 2025).

The St James Theatre, listed as a Category 1 heritage building by Auckland Council, is the chosen site for this research project.

Once a thriving cultural venue now stands unoccupied and fenced off in the heart of Auckland's city centre. This long period of inactivity highlights the challenges of heritage restoration from its complexity of the project and huge amounts of budget needed to complete the project.

The theatre's current state makes it a meaningful example for exploring ideas of temporal adaptation, Ma (間), and craft-based, place-sensitive design. These key concepts guide the project's approach to reactivating the site without compromising its historical significance.

Figure 3. East Elevation of St James Theatre, facing Lornes Street.

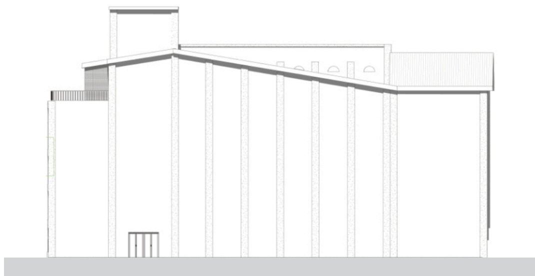


Figure 4. West Elevation of St James Theatre, facing Queens Street.

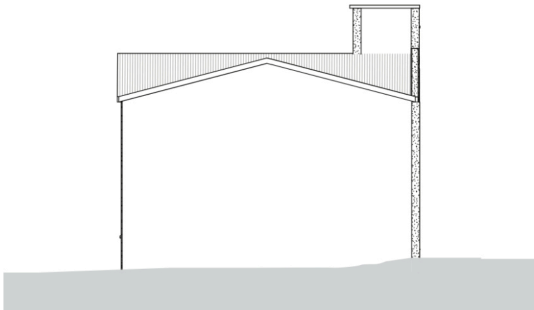


Figure 5. South Elevation of St James Theatre.

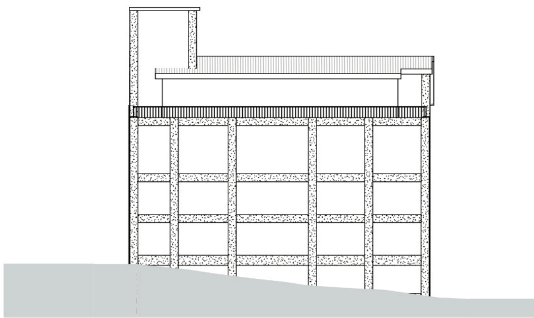


Figure 6. North Elevation of St James Theatre.

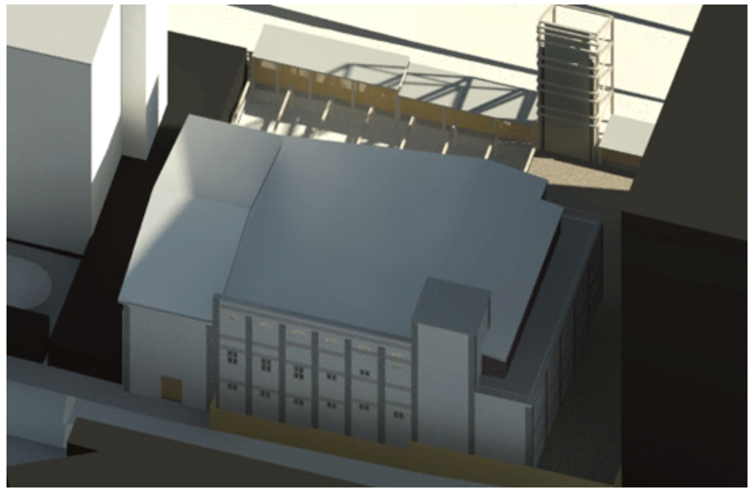
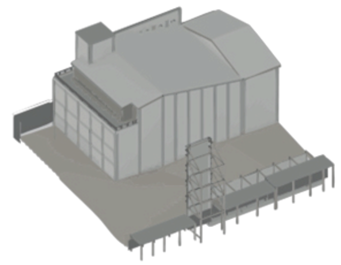


Figure 2. 3D Model of St James Theatre.

2.2 Site Location and context

PROJECT SITE : ST JAMES THEATRE -36.851486, 174.764816

St James Theatre is located in the heart of Auckland Central City, sitting on the main street, Queen Street with multiple bus stops next to the site.
Key locations of the city–such as Aotea Square, Auckland Central Library, Civic Theatre, Albert Park, and AUT buildings–are all within a 300-metre radius of the site.
Despite all of these full of thriving key features, it is left abandoned for more than decades. This prolonged state of abandonment not only diminishes the cultural presence of the St James Theatre but also interrupts the cohesion of the urban fabric. While the surrounding area has seen ongoing upgrades such as the City Rail Link development and public space enhancements the theatre remains a physical and symbolic void in the cityscape.



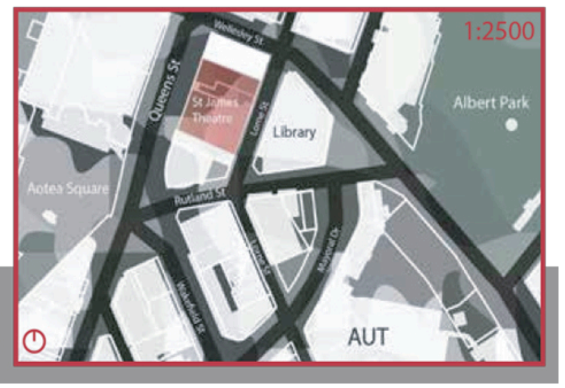


Figure 7. Map showing the Project site and the surrounding Area.

Figure 8. Photo of St James Theatre taken by Author (2025).

2.3 Historical Background and discussion of the heritage renovation

1928 — **Grand Opening**
St James Theatre opens, designed by architect Henry Eli White for John Fuller and Sons Limited. Used for both live theatre and cinema.

1953 — **Facade Renovation**
The Queens Street-facing facade is renovated for "modernisation".

1957 — **Site development**
Odeon Cinema constructed on site

1966 — Westend Cinema opened on site

1982 — Regent Cinema opened on site

2007 — **Closure After Fire**
A fire incident leads to the closure of the site

2010 — **St James Saviours Established**
A community group formed to restore the theatre

2014 — **Restoration & Apartment Development Announced**
Plan revealed to restore theatre alongside a 307-apartment tower, sharing amenities like elevators and toilets.

2015 — **Pre-Sales Success & Demolition**
Enough apartments are pre-sold to secure development funding. Non-heritage buildings on the site are demolished. Auckland Council promises to found $15 million to the theatre.

2016 — **Project put "on-hold"**
Apartment development halted due to rising construction costs, delaying theatre restoration.

2017 — **Restoration Efforts Suspended**
Preliminary restoration (earthquake strengthening, building analysis) began but stopped when the apartment project paused.

2020 — **$300 Million Proposal Submitted — Unsuccessful**
Theatre owner and Auckland Notable Trust re-propose a combined theatre restoration + apartment development plan. Government declines funding, and the plan does not proceed.

2022 — **Project Decoupled**
The apartment and theatre projects are formally separated so the theatre restoration can progress on its own merit.

2025 — **Council and government reconfirms funding**
Auckland Council reconfirms $15 million, matched by $15 million from the Ministry for Culture and Heritage. Total of $30 million in public funding secured for the theatre only. Restoration to proceed as a standalone heritage project.

18 Years

St. James Theatre

Figure 9. History of St James Theatre from 1928 to

Summary of financial and legal challenge of the site

As shown in the figure 5, the 2007 fire incident was a major turning point for the St James Theatre, marking the beginning of a long period of uncertainty.

Since then, the site has experienced multiple suspensions and changes in renovation plans, reflecting the complexity inherent in heritage restoration projects. While the Covid-19 pandemic contributed to delays, the core issue has remained a persistent lack of funding.

By early 2025, the Auckland Notable Properties Trust had already invested approximately NZD 15 million of private funds into preliminary restoration work, such as structural assessment and stabilization. However, no public funds from the council or government (also pledged at NZD 15 million each) have yet been released, as construction milestones have not been met (Morning Report, 2025).

In 2021, Arts Minister Kiritapu Allan noted that the cost of restoration could significantly exceed the initial estimates—rising from NZD 60–70 million to up to NZD 100 million. A key challenge has been the extended project duration, which has driven rising labour costs due to inflation, skilled labour shortages, and market instability (Gibson, 2021).

Auckland Mayor Wayne Brown recently warned that unless work commences soon, the theatre could be lost entirely, either through further decay or demolition (Orsman, 2023).

These delays are not just financial burdens; they pose existential threats to the building's heritage. The stop-start nature of the project has necessitated rehiring or retraining contractors, adapting to evolving regulations, and navigating shifting site conditions—all contributing to spiralling costs and increased risk.

In late 2025, the owner of St James Theatre managed to collect enough fundings to restart the renovation procedures for the ground floor of the building which is aimed to be completed by end of 2028. However, the full restoration of the theatre is still yet to be known (Wilson, 2025).

Chapter 3: Theoretical Framework

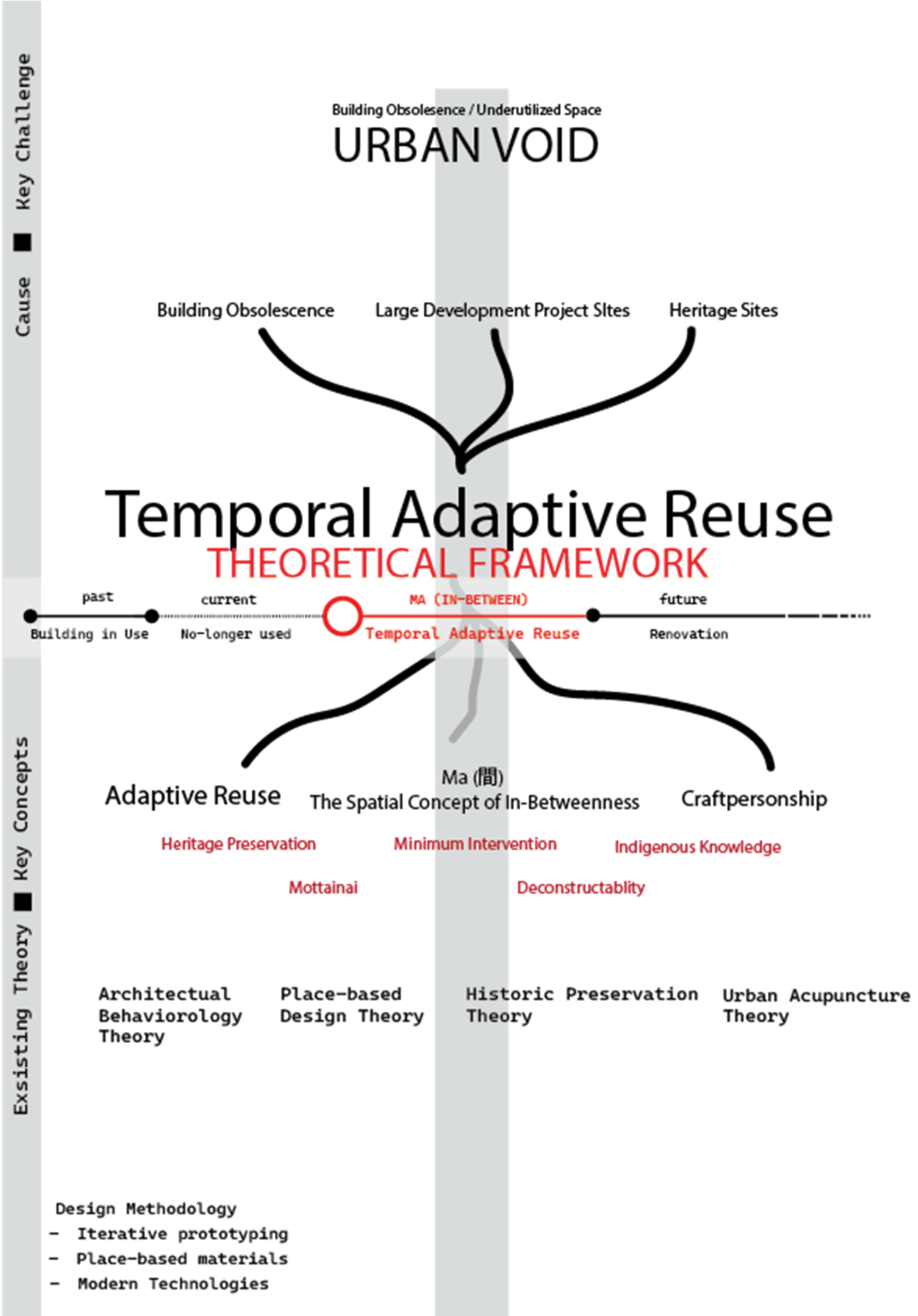


Figure 1o. Theoretical Frame Diagram.

3.1 Introduction to Theoretical Framework

To contextualize my research approach, I have developed a theoretical framework that grounds my design thinking and methodology.

This section discusses the key issue of building obsolescence within the urban fabric and explores the challenges of adaptive reuse in heritage buildings by reflecting on *"Needs for Building Renovation"* by Manuela Grecchi (2022), leading into the concept of temporal adaptive reuse as an alternative solution toward these issues.

3.2 Relevance of temporal adaptive reuse

This framework, which I refer to as 'Temporal Adaptive Reuse,' explores how temporary architectural interventions can regenerate underutilized heritage spaces without compromising their cultural or historical integrity.

It is a theoretical concept developed from the recognition that many urban spaces become underutilized, essentially turning into urban voids due to layers of historical, economic, and social complexity. Rather than relying on permanent, large-scale redevelopment, this framework proposes lightweight, temporal interventions as a regenerative strategy to re-activate these spaces in meaningful, community-responsive ways.

Temporal adaptive reuse is particularly relevant to projects with complicated constraints, such as heritage renovations, community-led developments, or stalled large-scale projects. These sites often face barriers including historical preservation regulations, diverse stakeholder involvement, and significant financial limitations. In this context, temporary, low-impact adaptations can act as catalysts, offering spatial, social, or ecological regeneration without the full burden of traditional construction processes.

This chapter traces the development of the idea of *temporal adaptive reuse*, emerging from an awareness of the problem of *urban voids* and a recognition of both the potential and the limitations of conventional adaptive reuse approaches in heritage contexts. It further explores how the Japanese spatial concept of *Ma* can inform this methodology, framing adaptive reuse as a temporal dialogue between what is preserved and what is newly introduced.

3.3 Significance of Study in Urban Environment, Locating "Urban Void"

Cities are constantly evolving, and with this evolution comes a recurring question: what happens to buildings that no longer meet the needs of their time? Many of these structures, once central to urban life, gradually become neglected or underutilized — a condition that Manuela Grecchi (2022) describes as building obsolescence.

Building Obsolescence

Every building inevitably reaches the end of its intended lifecycle at some point, whether due to functional inadequacy, outdated technical infrastructure, economic pressures, or physical deterioration. Grecchi (2022) identifies four primary causes of building obsolescence:

Physical deterioration
Functional inadequacy
Technical shortcomings
Economic inefficiency

Understanding these conditions is critical for developing successful adaptive reuse strategies. Without careful building analysis and appropriate intervention, reuse attempts risk failure, potentially leading to unnecessary demolition and the loss of material resources, cultural value, and historical continuity.

This condition of abandonment not only represents a missed opportunity for economic revitalization and community engagement but also contributes to the formation of "urban voids" — underutilized or disconnected spaces that interrupt spatial continuity and weaken the social and infrastructural relationships within the urban fabric. These voids can also contribute to perceptions of neglect and conditions of unsafety, gradually eroding the quality of urban life.

Within this research, the term "urban void" refers not simply to physically empty land, but to spaces that have become socially, culturally, or functionally disconnected from their surrounding environment. Although such sites remain physically present within the city, they often exist in a suspended condition between past identity and future uncertainty.

The obsolescence of the St James Theatre began primarily as a condition of physical deterioration following the 2007 fire, which resulted in water damage, structural degradation, and the closure of significant portions of the building due to safety concerns. Over time, this physical decline contributed to economic obsolescence, as the increasing cost of restoration outweighed immediate commercial viability. Without sufficient investment or a feasible reuse strategy, the theatre gradually transformed from a significant cultural landmark into an urban void within Auckland's city centre.

Negative effect of building obsolescence toward public safety

The qualitative study examined by the U.S. Forest Service's Northern Research Station highlights how neglected properties and neighbourhood environmental conditions affect residents' health, safety, and community life (Roude et al., 2024). The study found that neglected buildings and poor neighbourhoods' conditions negatively impact residents' physical and mental health, contribute to crime and violence, and weaken community bonds. Ultimately, the research highlights how the physical decline of neighbourhoods can trigger a harmful cycle, reduce safety and cohesion, but also reveal a potential for restoration and engagement to reverse these effects.

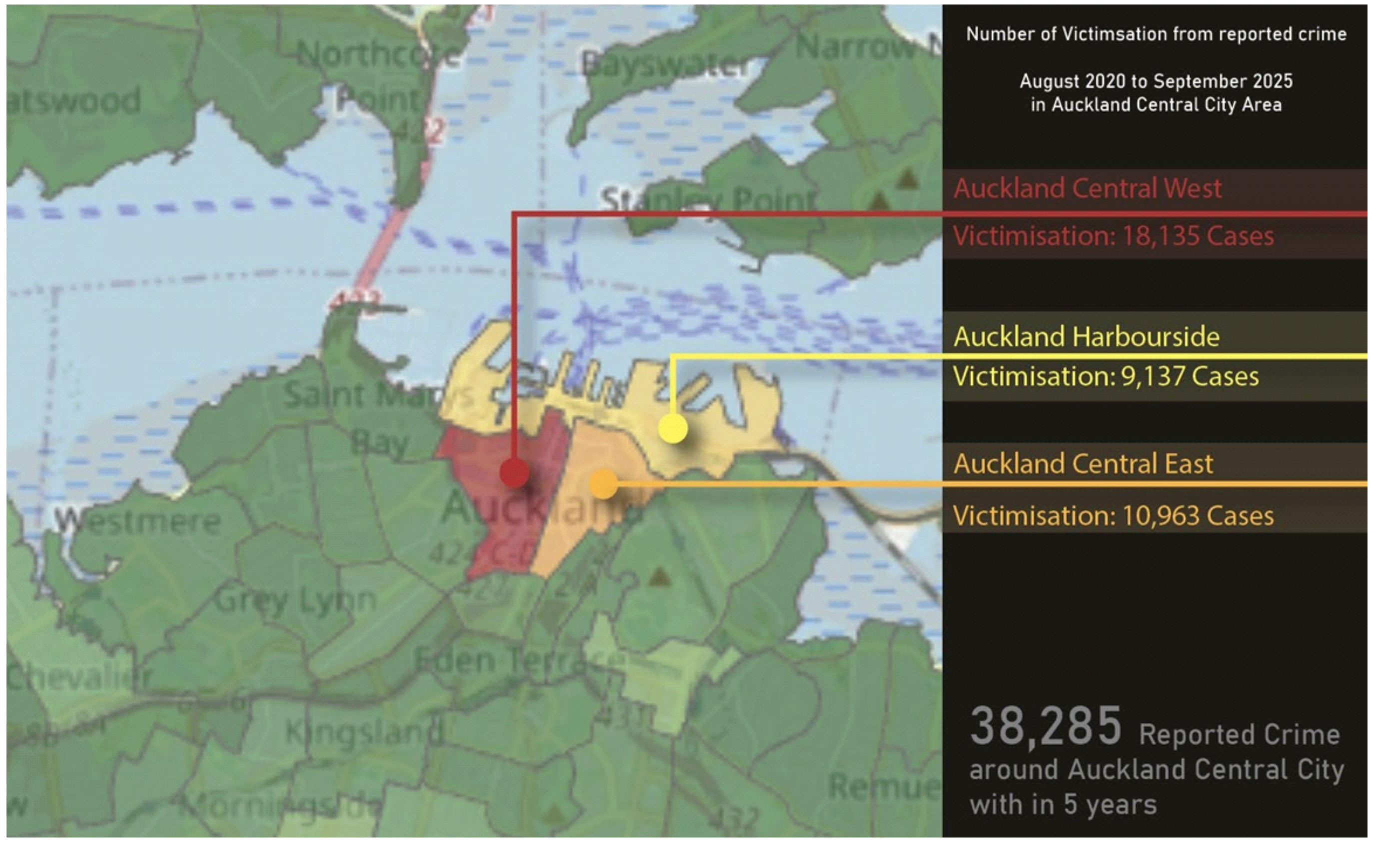


Figure 11. Map of Auckland City showing victimisation rates based on data from the New Zealand Police Crime Snapshot (New Zealand Police, 2025).

I am particularly concerned about the safety issues associated with building obsolescence, especially as I currently live in Auckland's Central City — an area that consistently records the highest annual crime rates in the Auckland region.

Figure 11 presents a map illustrating the distribution of crime rates across Auckland, sourced from the New Zealand Police website (New Zealand Police, 2025). The map clearly indicates that the Auckland City Centre, which includes the St James Theatre site, experiences significantly higher crime incidents compared to other areas.

While I cannot conclusively prove this correlation within the scope of my limited research, it is plausible that building obsolescence and the lack of active public engagement contribute to the social vulnerability observed in this area. In the case of the St James Theatre, visible signs of neglect—such as graffiti, unlawful entry, and the presence of homeless individuals—reflect the site's deteriorating relationship with its surrounding community.

This condition is the result of long-term neglect, and, as shown in Figure 14, it is ironically evident that the scaffolding and steel support structures that are left behind after the termination of previous construction efforts have become a framework for graffiti, enabling people to reach higher surfaces like an improvised canvas.

These conditions highlight the urgent need for architectural and urban regeneration strategies that enhance safety, restore accessibility, and rebuild the connection between heritage spaces and the public realm.

At present, the St James Theatre functions as little more than a barrier wall, obstructing both visibility and interaction between the public and the street. The building, once a vibrant cultural landmark, now stands as a symbol of disconnection between heritage architecture and the everyday life of the city.

Figure 12. Photo of construction site in St James Theatre Site (2025).

Figure 13. Photo of flooded site of St James Theatre (2025).

Figure 14. Photo of St James Theatre Site from Queens Street(2025).

3.4 Demolition, Adaptive Reuse & Renovation

It is inevitable that shifts in lifestyle, economic conditions, and social trends will occur over time. These changes, rather than the physical condition of a structure, are what typically render a building obsolete. Instead of demolishing a building that still holds structural integrity and latent potential, adapting it to serve new purposes is a more elegant, efficient, and meaningful response.

Adaptive reuse is preferable to demolition from environmental aspect, as demolished buildings contribute significantly to global waste, approximately one-third of all waste worldwide (Grecchi, 2022). These global figures can often feel abstract, but localized data helps to ground this reality. For example, according to BRANZ, construction and demolition waste accounts for 40– 50% of New Zealand's total landfill waste, with each newly constructed home generating around four tonnes of waste. Most of this is avoidable through better planning and waste separation (BRANZ, 2023).

With these given statistics, the adaptive reuse or renovation could be said as more sustainable solution through using the resources that are available.

If the building was left unused due to building obsolescence influenced other than physical obsolescence, renovation or adaptive reuse may be easily accomplished with minimum changes. The modern buildings with a durable structure could last for a very long time, specially building structures with steel or high-quality Reinforced concrete structures which could last for century with proper maintenance. In these cases, choosing to adaptive reuse is cost efficient with less new materials needed with lower labour cost and construction time rather than choosing to demolish and constructing brand new buildings.

One successful adaptive reuse precedent located within Auckland's Wynyard Quarter is Silo 6, a former industrial cement silo transformed into a temporary public cinema and event space as part of the waterfront revitalisation strategy (Auckland Urban Development Office, n.d.).

The project preserves the raw industrial character of the structure while transforming it into a civic space that fosters public engagement with the arts. By inserting minimal architectural interventions and preserving the exposed concrete interior, the adaptive reuse highlights the building's historical function while accommodating new cultural uses. It stands as a local example of how industrial heritage can be thoughtfully reimagined for community enrichment and public activation.

However, complexity of the renovation process is generally more difficult than for a new building in terms of decision-making, planning and execution and the revitalization of historic building gets even more complex due to multiple factors.

"Building renovation and adaptive reuse are topics that require important evaluation before a project can begin. As said before, the process can be complex and a multidisciplinary approach and structured support for decision-making are essential to combine all possible implications and consequences at different levels." (Grecchi, 2022, p.8)

3.5 Adaptive Reuse of Heritage Buildings

Adaptive reuse holds particular importance for heritage structures. Beyond its contribution to material conservation and energy efficiency, it allows culturally significant buildings to retain their identity while acquiring new functions that carry their meaning forward into the future. However, successful adaptive reuse also demands sensitivity and careful judgement, as each building presents unique historical, structural, and regulatory challenges.

When working with existing architecture, the most critical design consideration lies in defining the relationship between the old and the new. In *Rereadings: Interior Architecture and the Design Principles of Remodelling Existing Buildings* (Brooker & Stone, 2004), authors identify three strategies of adaptive reuse based on the level of integration between existing and new elements:

- *Installation – placing new elements onto or within the existing building without physical alteration, allowing for complete reversibility.*
- *Insertion – introducing a new, independent volume that is carefully fitted within the existing framework, maintaining spatial distinction while achieving cohesion.*
- *Intervention – the most integrated approach, involving significant transformation of the existing fabric through additions or alterations, creating a symbiotic relationship between old and new.*

These strategies provide a useful lens for understanding how new architecture can engage with heritage fabric while maintaining authenticity and legibility, The consideration toward these 3 different approaches has informed the form of design outcomes in Chapter 5.

Heritage Regulation and the St James Theatre Context

In New Zealand, heritage regulation plays a decisive role in shaping what forms of adaptive reuse are possible. As of 2025, there are 167 Category 1 heritage buildings in the Auckland region, and St James Theatre is among them (Bade, 2024).
Under the Auckland Unitary Plan's Historic Heritage Overlay (D17), the total demolition or destruction of primary heritage features must be avoided (Auckland Council, 2021). This policy safeguards historically significant architecture from unconsidered demolition but simultaneously introduces complexities that can limit both the pace and type of intervention permitted.

Auckland Mayor Wayne Brown has expressed growing concern over the prolonged inaction surrounding the theatre's restoration. In a 2024 *New Zealand Herald* article, he warned that the building could face demolition if restoration did not begin soon, describing it as "just sitting there decaying" (Orsman, 2023). His comments capture the tension between preservation and practicality, where political uncertainty, financial strain, and strict regulatory frameworks risk transforming heritage protection into heritage paralysis.

For St James Theatre, this tension has resulted in a prolonged urban void in Auckland's central city. The combination of exceptionally high heritage value and the immense cost of restoration have rendered the site inaccessible and underused. While the need for activation and public engagement is evident, legal restrictions under the Category 1 listing constrain any major physical alteration.
However, within these limitations lie opportunities. The Unitary Plan (D17) allows for temporary, reversible, and non-invasive interventions, such as freestanding structures, exhibits, or installations—provided that adverse effects on heritage values are avoided, remedied, or mitigated. This creates a space for what may be termed temporal adaptive reuse: short-term, lightweight interventions that reactivate dormant heritage sites without compromising their long-term integrity.

Application to the St James Theatre ~ leading to temporal adaptive reuse

Within this regulatory and cultural framework, my proposed Kigumi-based timber intervention operates as a temporary, reversible structure that can coexist with ongoing conservation efforts. By adopting a craft-based yet adaptable system, the design respects the theatre's historic fabric while addressing contemporary urban needs for safety, accessibility, and activation. This approach exemplifies how heritage policy and design innovation can work together, balancing protection with transformation and demonstrating that adaptive reuse is not limited to permanent alterations but can also manifest through temporal architectures that reconnect the public with their cultural heritage.

3.6 Ma as a Practical Design Tool in Temporal Adaptive Reuse

As an individual who grew up in Japan, I was frequently exposed to the concept of Ma not as a formal academic theory, but as an everyday sensibility embedded within ordinary life and spatial experience. It existed naturally within the way people understood timing, relationships, movement, and space.

To contextualize this concept within architectural research, I examined *Ma Theory and the Creative Management of Innovation* by Kodama (2017), where Ma is discussed through multiple spatial, temporal, and social interpretations, alongside *Ma: The Design of Japanese Architecture* by Kamishiro(1999), which explores the origins and architectural significance of Ma within traditional Japanese spatial design.

Through analysing these interpretations of Ma, I identified two primary conceptual takeaways that became important to this research. The first relates to its philosophy of in-betweenness within decision-making and spatial negotiation. In situations where opposing conditions create tension or restrict progress, Ma suggests the possibility of negotiating an intermediate condition rather than pursuing absolute resolution toward one side. Rather than forcing singular outcomes, this way of thinking values balance, transition, coexistence, and awareness of relationships between conditions.

Within architectural practice, this interpretation encourages the development of context-sensitive interventions that exist between permanence and temporality, preservation and transformation, or tradition and innovation. This becomes particularly relevant within adaptive reuse projects, where new architectural interventions must carefully negotiate their relationship with existing structures and cultural heritage.

While Ma has often been described as a temporal or emotional interval within Japanese aesthetics (Kodama, 2017), within this research it is also understood as a practical architectural design tool that harmonizes the relationship between preserved and inserted elements.

When designing within dense urban environments, Ma allows the architect to introduce subtle layers of breathing space, transition, and rhythm into the fabric of the city. Rather than competing with existing built form, Ma offers a strategy for negotiating the boundaries between what is retained and what is newly introduced.

In traditional Japanese architecture, spatial definition often emerged through relationships between structural elements rather than through enclosed walls (Kodama, 2017). The placement of a single pillar established an origin point, while the positioning of a second pillar generated a measured interval between the two. This relational distance became Ma (Kamishiro, 1999).

The essence of traditional Japanese construction therefore lies not in the creation of enclosure, but in the formation of relationships between pillars, beams, joinery, light, shadow, movement, and human occupation. Space was shaped through intervals and rhythm rather than through separation alone.

Within this research, Kigumi joinery becomes not only a structural method, but also a spatial instrument for producing Ma through repetition, rhythm, material tactility, and the measured relationships between timber elements.

This way of thinking aligns closely with adaptive reuse, as it encourages a respectful and lightweight form of intervention that does not conceal or dominate the existing heritage fabric. Instead of imposing an entirely new identity onto the site, it allows the existing and the inserted architecture to coexist through balance and restraint.

In the context of temporal adaptive reuse, the existing heritage building can be understood as the "first pillar" — the origin point from which new spatial relationships are measured. The architectural intervention then becomes the careful placement of the "second pillar," defined not through dominance, but through awareness and negotiation. The interval formed between the heritage structure and the contemporary insertion becomes Ma: a spatial and temporal dialogue between permanence and impermanence, memory and transformation.

In this way, adaptive reuse is not simply a technical operation, but an act of re-measuring the rhythm of the city. The architect's role becomes one of sensing appropriate distance, proportion, tension, and balance between what remains and what is newly introduced, crafting a new Ma that renews meaning without erasing memory.

Figure 15. Author's interpretation of the Roppon-Kumiki structure developed during a 2023 design investigation and informed by Nagao (2017).

Precedent 1: Proposal of Utilization of Kumiki for New Forms of Wooden Architecture

This student project by Kanetaka Nagao (2017) explores how a form of traditional Japanese joinery, called Roppon-Kumiki can be reimagined for contemporary modular wooden architecture. The design was proposed for Koganecho, a district in Yokohama known for its fragmented urban fabric and underutilized spaces.

Nagao observed a number of unused lands across the area in the town and proposed a modular timber structure system that could be easily assembled, disassembled, and adapted to fit different spatial conditions. In this specific project, his design outcomes were placed alongside the underbridge of the train railway next to the Ooka River.

In Nagao's project, three variations of architectural typologies based on the *Roppon-Kumiki* system were proposed: a retail space, an atelier space, and a studio space. Each space was formed through a series of *Roppon-Kumiki* structures, which were then enclosed using secondary elements such as walls, windows, and floors. These elements were inserted into the structural "grid" created by each *Kumiki* cell through a sliding assembly method.

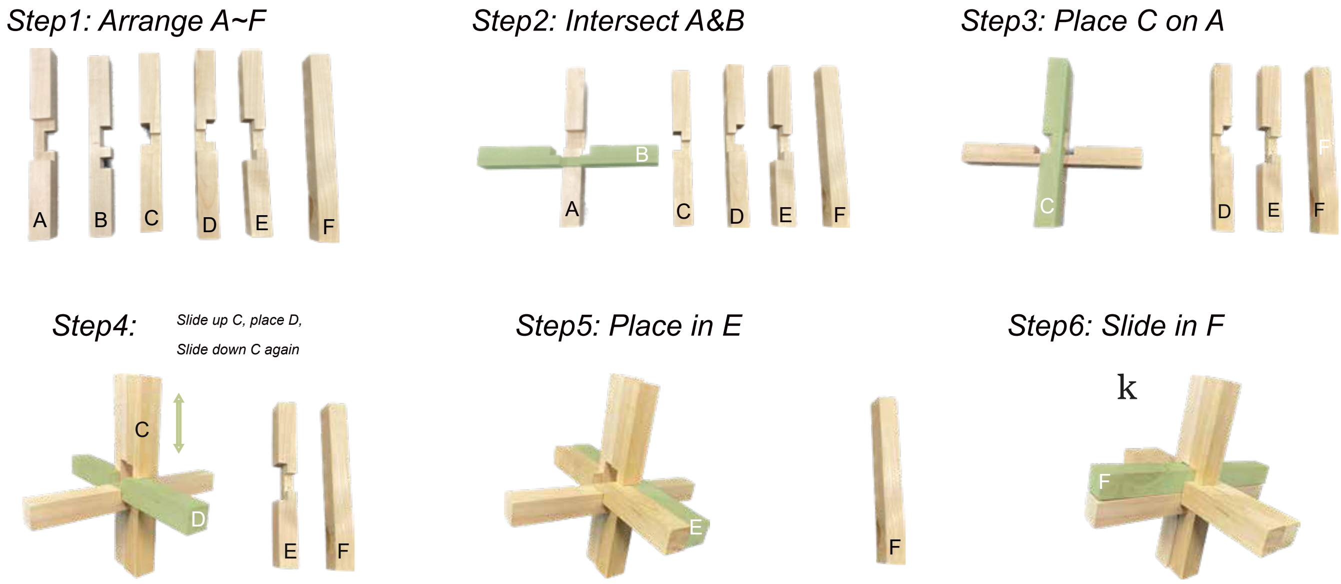


Figure 16. Assembly sequence of the Roppon-Kumiki system developed by the author during a 2023 design investigation and informed by Nagao (2017).

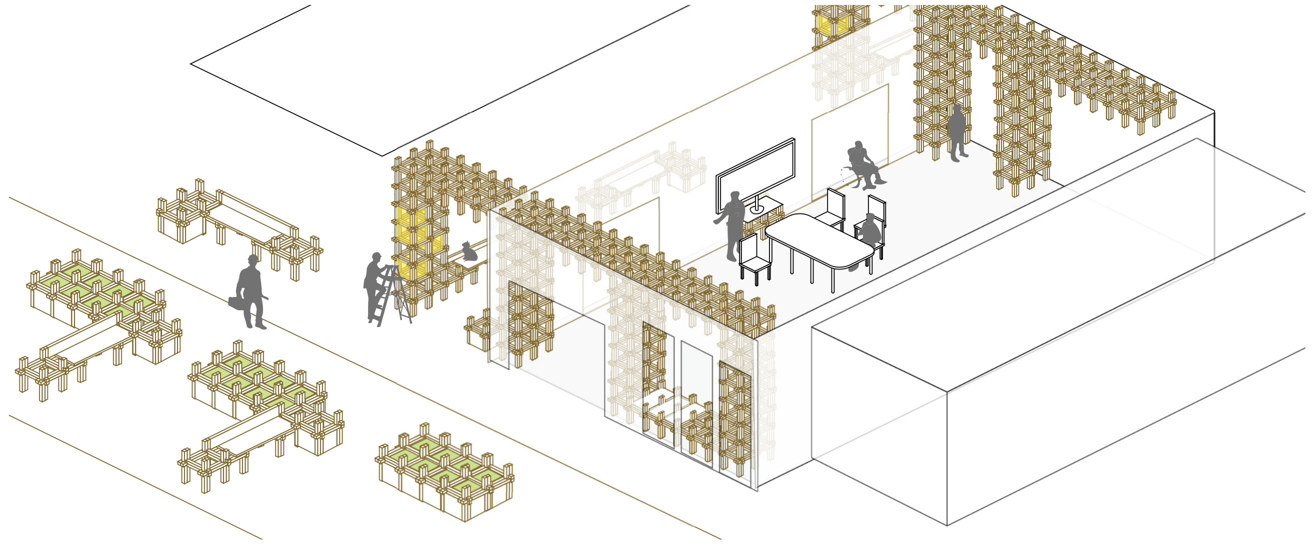


Figure 17. Author's analytical reconstruction of the spatial configuration of the Roppon-Kumiki system developed during a 2023 design investigation and informed by Nagao (2017).

The scale of each modular Roppon-Kumiki structures was designed to be approximately 450mm by 450mm, making it feasible to be used for multiple human scale uses such as a comfortable seat, bookshelves, tables.

The use of *Kumiki* allowed the structure to be built without nails or adhesives, making it highly flexible and reversible that is an important quality for temporary urban interventions.

This precedent strongly relates to the goals of this research. It demonstrates how traditional craft techniques can inform contemporary, site-responsive architectural strategies. Furthermore, Nagao's urban acupuncture-like and minimalistic approach toward the regeneration of underutilized spaces presents a valuable strategy for introducing lightweight architectural interventions that sensitively respond to existing urban conditions.

Chapter 4: Design Methodology 1~ Craftmanship and

4.1 Introduction to Design Methodology

This section explains how the concept of craftsmanship has shaped my design methodology, particularly through the exploration of *Kigumi* joinery and the behavioural qualities of timber. These explorations provide the conceptual and technical foundation for the design decisions presented in the following chapter, where the outcomes are contextualised through a critical discussion of Sou Fujimoto's *Great Ring* (2025) and through reflecting on the concept of "Timber Behaviorology" that is proposed by Japanese architecture firm, Atelier Bow Wow.

4.2 Craftsmanship Thinking

My understanding of what it means to be an architect is rooted in the figure of the maker — not merely a designer who produces drawings, but someone who possesses an intimate understanding of how buildings come into being. This perspective is strongly influenced by growing up in Japan, where craftsmanship is deeply woven into cultural life. Whether in pottery, calligraphy, or the work of the *daiku-san* — the traditional master carpenter — craftsmanship is understood as the unity of thought and making.

Historically, the *daiku* occupied a central position in Japanese architectural production.

As Nuijsink and Kaijima discuss in journal article of "Timber Behaviorology" (2021), for centuries carpenters were responsible for designing and constructing wooden houses, passing down skills and knowledge through generations. Their expertise was not limited to joinery or assembly, as they embodied a holistic approach, designing building components, overseeing construction, and shaping the spatial logic of timber architecture.

Even as architectural professionalisation in the twentieth century shifted design authority towards academically trained architects, the legacy of the *daiku* continues to inform contemporary practices and structural experimentation.

This lineage of craftsmanship provides the methodological grounding for my project.

In traditional Japanese building culture, making is an iterative dialogue between material, technique, and spatial intention. Craftsmanship is defined not only by precision but by a sensitivity to the natural behaviour of materials — especially wood, whose grain, moisture, and flexibility shape the possibilities of construction. Following this philosophy, I approached my design process through direct, hands-on experimentation through making joinery, examining timber behaviours, and developing structural logics through model-making and prototyping.

Through this method, design emerges from the act of making. Rather than imposing a form onto the material, the material itself becomes a generative agent, revealing constraints, potentials, and spatial rhythms that inform the architectural outcome. This craftsmanship-driven methodology becomes the bridge between the conceptual foundation of my thesis and the development of the Torii Pathway structure, ultimately shaping the design strategies examined in the Chapter 5: Design Outcome.

4.3 Relevance of Kigumi and challenge of wooden architecture

As a primary methodology for developing the design of temporal adaptive reuse, I explored timber structures formed through *Kigumi* joinery. For me as a Japanese designer, *Kigumi* is more than a construction technique — it embodies cultural knowledge and values of craftsmanship. Rooted in centuries of making, *Kigumi* reflects an attitude of respect toward material, precision in assembly, and adaptability through non-invasive connections. These qualities resonate strongly with the principles of temporal adaptive reuse, where architectural interventions must be reversible, sensitive to the existing fabric, and capable of transformation over time.

In the article, "Challenge of wood architecture" by Professor Pekka Heikkinen (Heikkinen, 2018) in Aalto University, he discusses the challenges and opportunities for wood as building material.

Relevance

Wood is arguably one of the most popular sustainable building materials today, due to its global accessibility, renewable plant-based nature, and ability to sequester carbon. Historically, timber construction was the foundation of traditional architecture in many cultures across the world. However, with the rise of industrialization, the architectural trend shifted toward concrete and steel structures to support mass production and urban growth. Now, we're seeing a global movement that is both a return and a progression—a shift forward—toward utilizing and innovating with timber structures once again. This revival is driven not only by sustainability goals but also by a renewed interest in local building traditions, circular design, and low-carbon construction methods.

Challenges

However, with the rise of what's often called sustainable design, there has also emerged a critical term known as greenwashing. Greenwashing refers to the practice where projects or products are marketed as environmentally friendly or sustainable, but, when scrutinized from various perspectives—such as long-term ecological impact, material sourcing, or energy efficiency—they fall short of genuine sustainability. In architecture, this can mean using timber without understanding its lifecycle, ignoring the social context of material sourcing, or failing to consider the true environmental cost of mass timber production.

Even in countries like Japan, where traditional wooden architecture is deeply valued, contemporary applications of timber are not without their challenges. A notable example is the recent criticism of public buildings designed by Kengo Kuma, whose expressive use of timber has garnered global attention. One example that highlights the challenges associated with exposed timber architecture is the Nakagawa-machi Bato Hiroshige Museum designed by Kengo Kuma & Associates. Although the project became widely recognised for its atmospheric use of timber louvers and delicate material expression, reports later emerged regarding the deterioration of exterior wooden elements and roofing components, resulting in large-scale repair and replacement works estimated at approximately 250–300 million yen (Fuji News Network, 2024).

This case highlights the risks of applying timber in large-scale public architecture without sufficient consideration of long-term weathering, detailing, and maintenance strategies. It raises the question of whether contemporary timber design is sometimes driven more by aesthetics than by an understanding of wood's behavioural and climatic sensitivities.

As Heikkinen (2018) argues, *"wood is not a perfect material"*—its successful use in architecture depends on a deep understanding of its unique characteristics. This idea became very tangible for me through my iterative process of making *Kigumi* structures by hand. Working with different timber types revealed how dramatically the physical qualities of wood affect both the making and the structural behaviour of components.

For instance, scrap pine timber, being light and soft, was easy to carve and shape, making it ideal for quick prototyping. However, it lacked the strength and resilience needed for tight-fitting joints and was prone to breaking under pressure. On the other hand, Jarrah—a dense, high strength hardwood—proved extremely durable and pressure-resistant, yet was far more laborious to cut, carve, and modify. It required more physical effort and time but offered superior structural stability.

This experience emphasized to me that timber design cannot be separated from timber making. The character of the wood directly informs not just aesthetics and structure, but also the craft and energy embedded in the building process. Understanding the nuances of timber through embodied practice supports a more holistic and grounded design approach, which aligns closely with the ethos of *Timber Behaviorology*.

4.4 Exploring Materials and techniques through making

Craftsmanship is often deeply rooted in the local environment, culture, and way of life. The materials used in traditional craftsmanship are typically those that are readily available or naturally sourced from the surrounding landscape. Techniques evolve in response to the properties and limitations of these materials, making traditional craftsmanship inherently site appropriate.

In the context of my project based in New Zealand, it was therefore essential to consider the materials that would best align with the local environment and cultural context. This exploration was carried out through handcrafting a series of tectonic models, allowing me to engage directly with different types of timber and joinery. Through this process, I was able to make

Figure 18. Photo of seires of hand tools used by Author to explore Kigumi making. (2025)

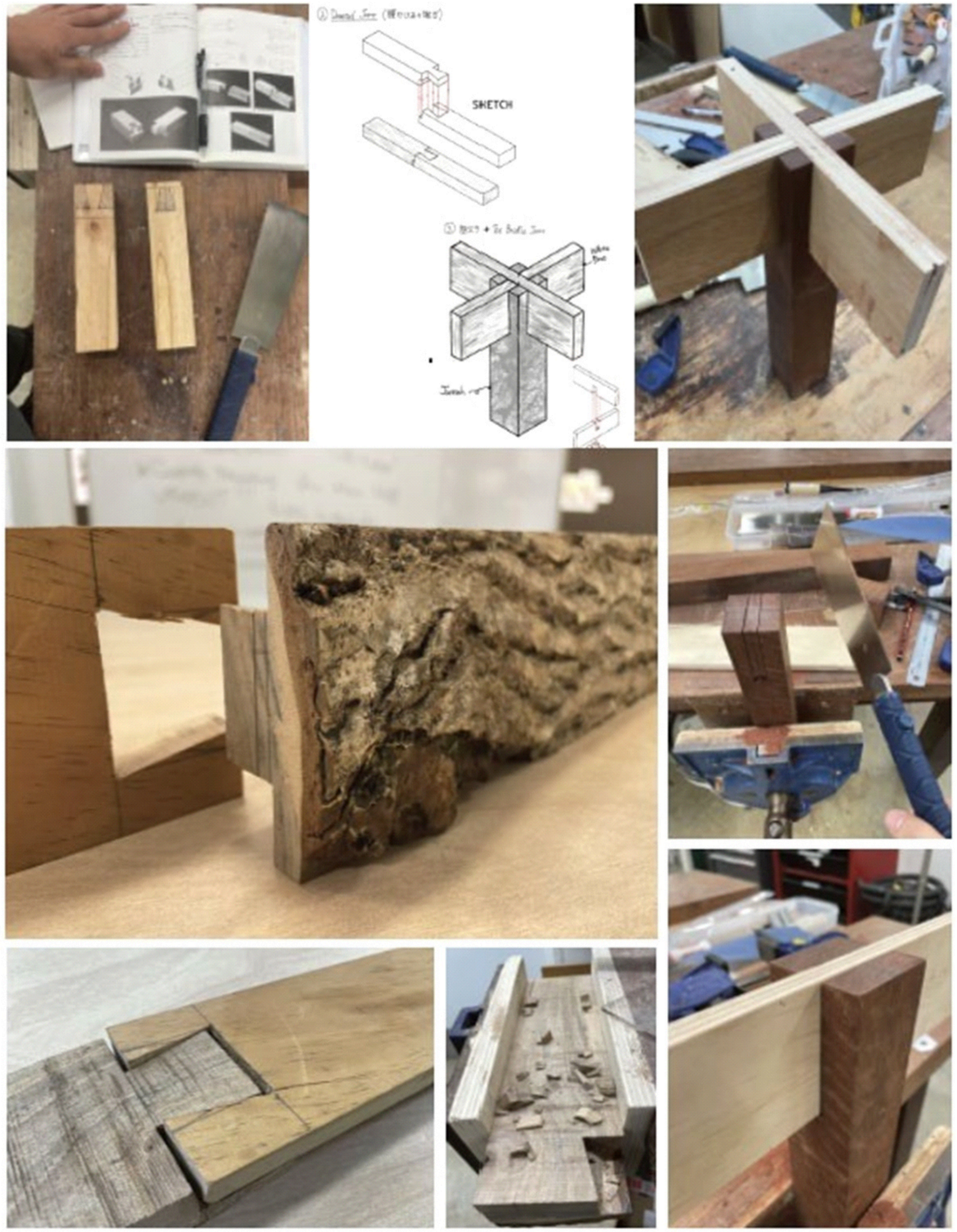


Figure 19. Photo of Series of Kigumi Joinery made by Author. (2025)

Figure 20. Night view of the Grand Ring at Expo 2025 Osaka.
Photograph by Ibamoto (2025), licensed under CC BY-SA 4.0.

4.5 Reflecting on uses of Kigumi Joinery

As the possibility and adaptability of timber construction evolve through the integration of modern technology, *Kigumi* joinery is being reinterpreted and applied in contemporary architecture. One recent project that thoughtfully integrates *Kigumi* techniques, craftsmanship, and local materials is the Oo-Yane Ring (*Great Roof Ring*) at Expo 2025 in Osaka, designed by Japanese architect Sou Fujimoto in collaboration with TOHATA Architects & Engineers and Azusa Sekkei Company (2025).
This monumental two-kilometre-long timber structure serves as a temporary pavilion for Japan's World Expo and embodies a harmonious fusion of tradition and innovation (Japan Association for the 2025 World Exposition [JAWE], 2025).

Design Vision and Significance

Expo 2025 Osaka, themed *"Designing Future Society for Our Lives,"* is a major international exhibition that unites 158 countries through a wide range of pavilions and cultural programs. Running from 13 April to 13 October 2025, the six-month event presents visionary proposals for shaping a better global future (JAWE, 2025).
Appointed as the site's design producer, Fujimoto viewed the Expo as an opportunity to address a long-standing issue within Japan's construction industry — the limited integration of modern timber systems despite the nation's rich tradition of wooden architecture. The *Oo-Yane Ring* thus reintroduces traditional techniques within a contemporary context, communicating their cultural and architectural value to a global audience.

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Figure 21. Joint connection types and structural performance comparison. Adapted and translated from GBRC (2020).

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Figure 22. Comparison between traditional and developed rigid timber joints under seismic loading. Adapted and translated from GBRC (2020).

Structure and Function

The *Oo-Yane Ring* (or *Grand Ring*) encircles the main exhibition zone, standing 22 metres tall and stretching 2 kilometres in length. Functioning as a central circulation route, it provides shelter and orientation for visitors across the site.
The structure has been officially recognised by Guinness World Records as the *largest wooden structure in the world*, marking a milestone in contemporary architecture (Dogan, 2025).

Materiality and Craftsmanship

The *Oo-Yane Ring* was constructed using the traditional Japanese joinery method known as *Kigumi* — a technique that requires the precise handcrafting of timber components that interlock without nails or screws. One of the key joint types used is the Nuki joint, historically seen in iconic structures such as Kyoto's *Kiyomizu-Dera Temple shown in figure 42*. This involves inserting a horizontal beam through a carefully carved hole in a vertical column and tightening it with a wooden wedge, producing a secure, flexible connection (Dogan, 2025).
To meet modern seismic and structural requirements, the design team incorporated advanced fabrication technologies such as CNC milling and steel reinforcements within key column joints. This hybrid approach improved construction efficiency while allowing the structure to be fully disassembled and reused,

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Figure 23. Structural arrangement of low-rigidity, standard, and high-strength joint types within a sloped timber frame system. Adapted and translated from GBRC (2020).

Sourcing and Sustainability

Fujimoto also emphasised local material use. Approximately 68 percent of the LVL timber — mainly Japanese cedar and cypress — was sourced domestically from regions including Fukushima, Kumamoto, and Kagoshima, with the remaining 32 percent being imported Scots pine (Fujimoto, 2025).
By combining traditional craftsmanship with modern engineering, the *Oo-Yane Ring* stands as a powerful architectural statement that honours Japan's heritage while setting a new precedent for sustainable, large-scale timber construction.

Reflection on My Project

Although the scale of the *Oo-Yane Ring* differs significantly from my own exploration of *Kigumi* structures at the St James Theatre, both projects share a similar design philosophy — using temporal architecture to integrate indigenous knowledge and craftsmanship within contemporary contexts.
I see particular value in the use of Nuki-style joints within New Zealand's humid climate, as their mechanical connections allow for natural timber expansion and contraction, avoiding stress or damage often caused by metal fasteners.

4.6 Discussion of Material Use for My Project

Figure 24. Series of Material samples from AUT. (2025).

While Laminated Veneer Lumber (LVL) 0ffers advantages such as dimensional stability, strength, and predictability, its engineered nature represents a shift toward industrial precision and material standardisation.
These qualities make LVL ideal for large-scale prefabrication and efficient construction; however, they risk diminishing the tactile and cultural depth that natural timber provides.

In the context of this project — which explores the relationship between *Ma (*間*)* and the act of rebuilding within a heritage fabric — natural timber offers a more meaningful material language. Unlike LVL's uniformity, each piece of solid wood carries unique grain patterns, imperfections, and the potential to age gracefully. These characteristics embody the Japanese concept of *wabi-sabi* and resonate with the temporal, living character of the St James façade. Although the variation and unpredictability of natural timber may be viewed as limitations,

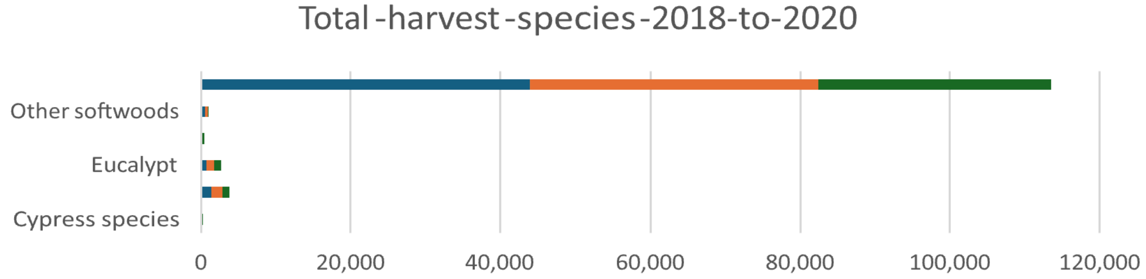
I interpret them as expressions of material individuality and craft, echoing the irregular rhythm of the existing structure revealed through 3D scanning, which will be further discussed in Chapter 6.

Furthermore, using locally sourced species such as *Lawson Cypress* supports a low-impact, regenerative design approach aligned with the project's emphasis on reversibility and environmental reciprocity. By choosing natural timber, the intervention positions itself not as an industrial insertion, but as a sensitive continuation of the building's material memory — a structure that breathes, weathers, and ages alongside the heritage it touches.

Material Opportunities in the New Zealand Context

The decision to avoid LVL timber and instead employ natural wood led to the next consideration: determining which species would be most appropriate for this project.
The ideal timber for *Kigumi* joinery is high-quality *Hinoki Cypress*; however, it is not easily accessible in New Zealand and is costly to import from Japan. To reduce the carbon emissions associated with long-distance transport, I focused on exploring locally available materials suitable for *Kigumi* construction in the Auckland context.

Considering Native Timbers in New Zealand



	Cypress species	Douglas-fir	Eucalypt	Other hardwoods	Other softwoods	Pine
2018	68	1,430	784	18	578	44,017
2019	39	1,451	1,002	184	337	38,409
2020	30	1,007	968	9	151	31,088

■ 2018 ■ 2019 ■ 2020

Table 1. Total Harvest Species in New Zealand, from 2018 to 2020, by Author(2025).

Initially, I considered using native timbers, as doing so would align with the philosophy of local craftsmanship and enhance the cultural significance of the project. However, I soon found that native species such as Kauri and Rimu were prohibitively expensive compared to plantation species such as pine.

The data presented in *Table 1: Total Harvest Species from 2018 to 2020* highlights New Zealand's heavy reliance on pine for its rapid growth and cost-efficiency, while strict regulations protect native timbers from over-harvesting, keeping their prices high and availability low.

To source affordable materials, I explored salvaged timber. Through Facebook Marketplace, I was able to collect discarded timber from private sellers, and I also visited a local salvage yard in New Lynn in search of structural-grade timbers. However, most of the available stock consisted of exterior cladding or flooring, which lacked the required thickness for structural applications. Price was another limitation, as many salvaged pieces remained costly.

Interestingly, I discovered a range of salvaged wooden doors, many made from native timbers and priced more affordably than other salvaged wood. I considered whether these could be disassembled and repurposed as structural components.
Through informal discussions with an experienced builder familiar with both Japanese and New Zealand construction practices, I gained a clearer understanding of the structural limitations associated with repurposing salvaged timber doors for load-bearing applications.

He explained that:

- Indoor doors are often hollow-core or laminated, lacking solid mass throughout.
- Even solid doors are typically too thin or narrow for reliable beams, columns, or joints.
- Age, hinge and lock cut-outs, or interior humidity may further weaken the timber.

Thus, while these doors carry aesthetic and cultural value, their structural limitations make them better suited for non-load-bearing applications, such as infill panels, decorative screens, or furniture, rather than for *Kigumi* joints or main structural frames.

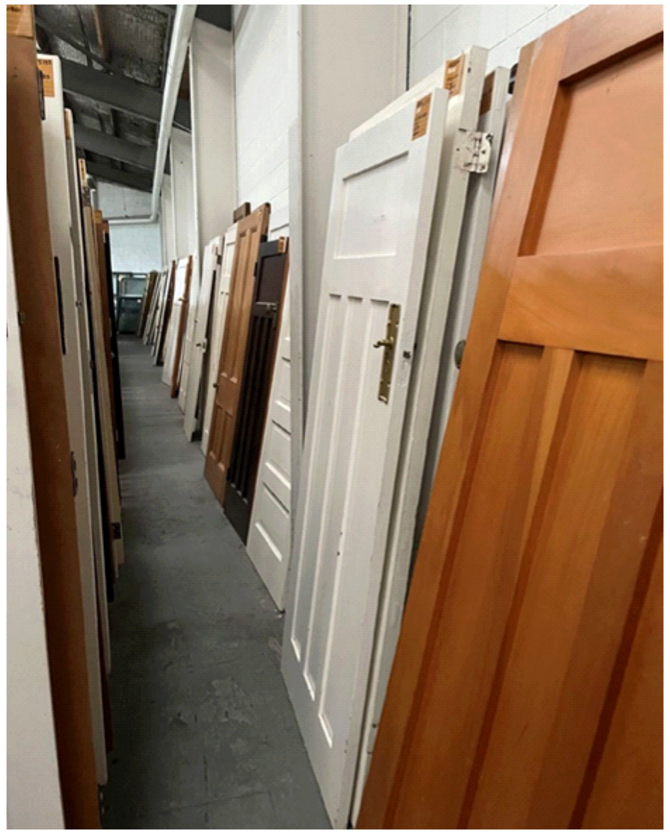


Figure 25. Series of second hand doors made by New Zealand native trees. 2025.

Although these timbers are not suitable for *kigumi* joinery or primary structural elements, discovering that various New Zealand native species being available as salvaged flooring and decking boards could be purchased at a relatively low cost was an important insight gained from the visit to the reclaimed materials shop.

This finding was later integrated into the Section 5: Design Outcome, where the salvaged native timber was used as material for the decking and walkway surfaces.

Figure 26. Series of salvaged New Zealand native timbers. 2025.

Figure 27. Rendered Image of Design Outcomes from Bird's Eye-view. 2025

Chapter 5: Design Outcome

5.1 Introduction to Design Outcome

Auckland's central city is rich in civic squares and commercial spaces, yet I argue that contemporary urban environments often lack spaces that encourage stillness and reflection, and therefore the project investigates how lightweight architectural interventions may introduce moments of pause within highly active urban conditions.

I sense a profound need for public spaces that evoke reflection and stillness — moments of pause within the daily rhythm of the city — that allow people to rediscover *Ma* in their lives. In a fast-paced urban environment like Auckland, such spaces can offer a quiet counterbalance to constant motion, nurturing awareness, empathy, and connection between individuals and their surroundings.

Within this dense and fast-paced environment, opportunities to pause, "to simply *be*" have become increasingly rare. This absence of contemplative space reflects a broader urban condition: the city's rhythm is continuous, leaving no *Ma*, no interval for reflection or awareness. My project responds to this void by transforming the disused St James Theatre site into a contemplative public space — a temporal intervention that invites stillness within the city's daily flow. Through traditional Japanese joinery (Kigumi) and adaptive reuse, the project reimagines the role of public space as a site of reconnection — between people, place, and time.

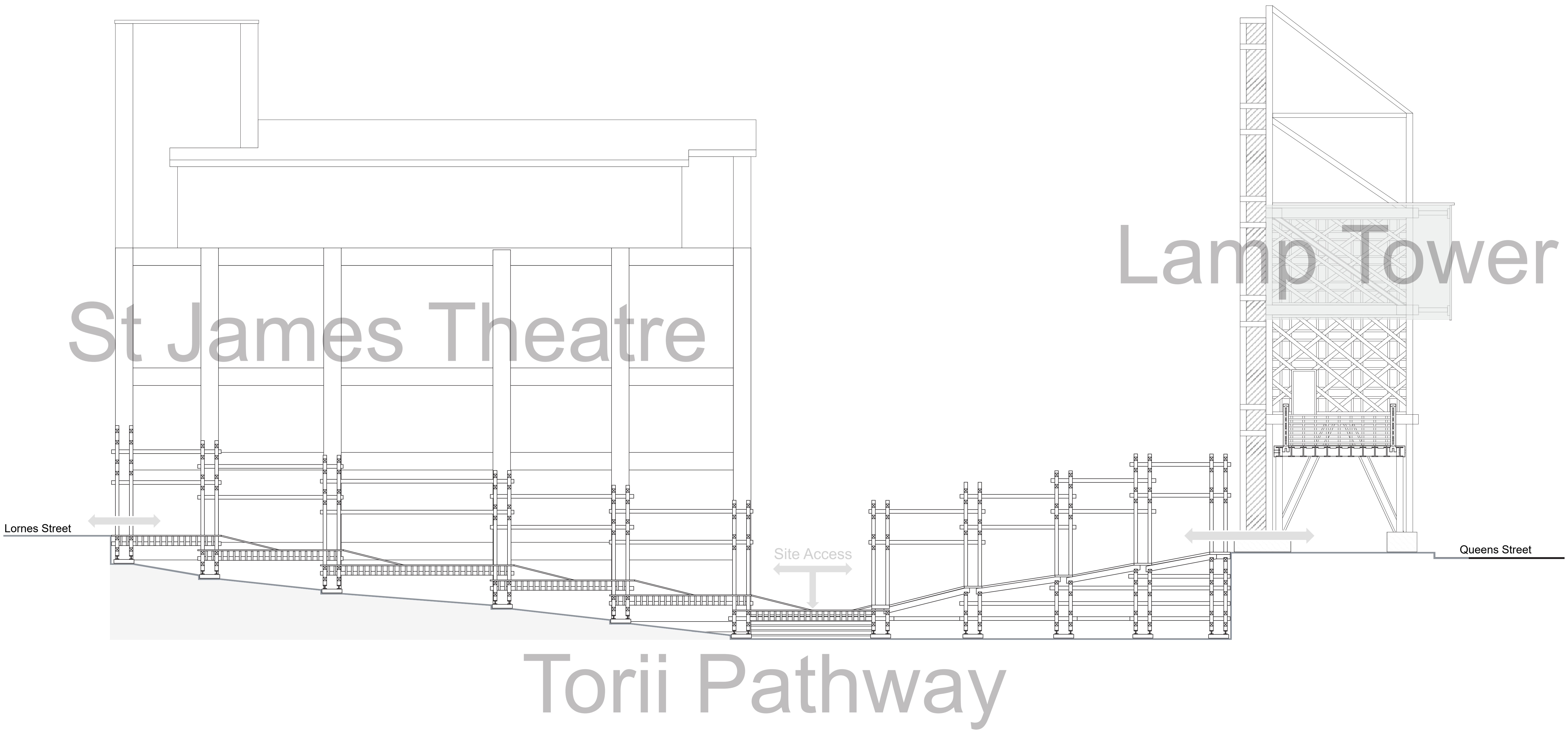


Figure 28. 1:50 Detail Section image, showing the Torii Pathway and Lamp Tower in Project Site. 2025

5.2 Project Stages

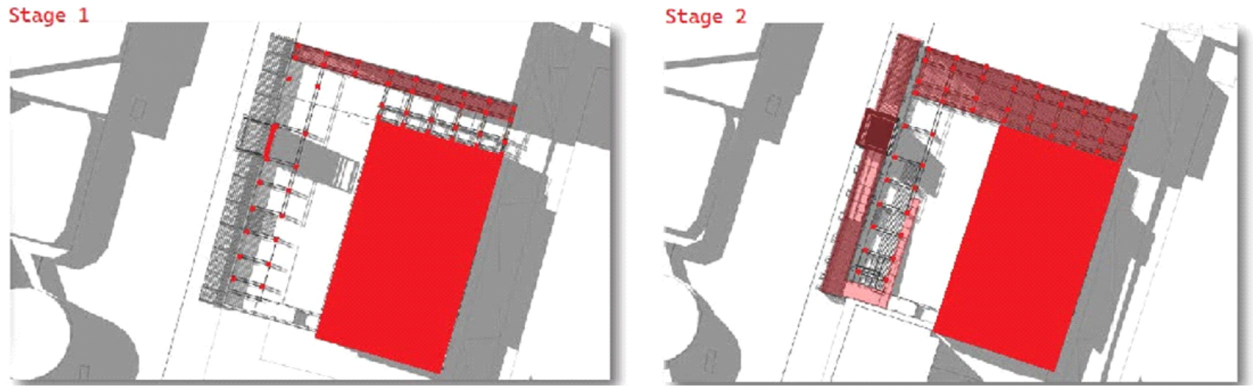


Figure 29. Diagram showing Stage 1 and Stage 2 of the project. 2025

This chapter outlines the two main stages of the project, developed in response to the ongoing renovation of the *St James Theatre*. The division of the project into distinct stages acknowledges both the current construction realities and the potential for future adaptive interventions once the heritage restoration is complete. Each stage represents a different level of architectural engagement — the first operating as a *temporary intervention* that coexists with the theatre's renovation process, and the second as a *long-term adaptive transformation* that extends the building's role in the urban fabric. Through this phased approach, the project is positioned not as a singular design solution, but as an evolving framework that adapts to the temporal conditions of the site and the city.

Stage 1 — Transitional Pathway Construction

The first stage involves constructing a temporary pathway connecting Queen Street and Lorne Street to re-establish pedestrian flow through the site. This pathway, along with the newly designed timber structure, is conceived in response to the site's current condition and the ongoing renovation process of the *St James Theatre*. The intervention functions as both a circulation route and a spatial framework that defines a temporary form of *Ma* — an interval between construction and use, between the city and the heritage building. By activating the site during its dormant renovation period, Stage 1 introduces a sense of openness and accessibility, transforming a restricted construction zone into a living public space.

Stage 2 — Post-Renovation Integration

The second stage will complete the pathway as a permanent urban connection, extending access not only between Queen Street and Lorne Street but also to the lower ground levels of the site. This phase reimagines the existing steel structure on the Queen Street side as both an exhibition platform and a visual landmark for the precinct. In doing so, Stage 2 reinforces the relationship between the restored theatre and the surrounding urban fabric, allowing the site to evolve from a transitional corridor into a permanent civic space. The architectural intention is to preserve the spirit of *Ma* established in Stage 1—maintaining a sense of openness, rhythm, and dialogue between the historic and the contemporary.

5.3 Design outcome 1: Torii Walkway

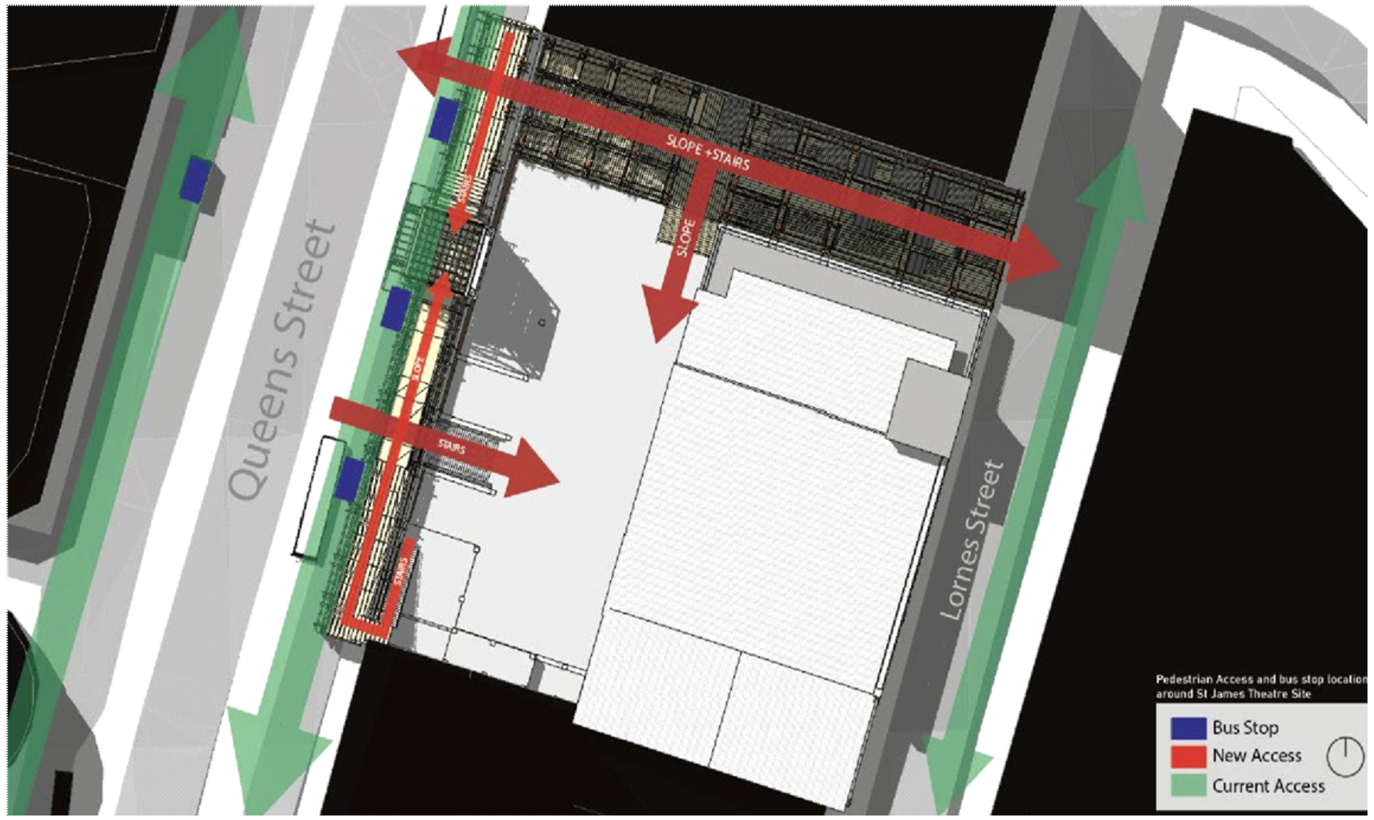


Figure 30. Accesibility Map on the project site and the surrounding streets. 2025

The current St James Theatre remains closed to the public, forming a physical and visual barrier between Queen Street and Lorne Street. Once a key cultural link in the city's urban fabric, its closure has disrupted pedestrian movement and diminished the vitality of the surrounding precinct. The blockage of this connection restricts foot traffic along Lorne Street, especially during evening hours, creating an atmosphere of isolation and unsafety. In response, the proposal introduces a Torii Walkway, a symbolic and spatial intervention that reopens this lost threshold. Inspired by the Japanese Torii gate, which traditionally marks the passage from the mundane to the sacred, the walkway redefines the route as a contemplative transition between two urban conditions: the commercial intensity of Queen Street and the quieter, cultural realm of Lorne Street. Rather than simply restoring access, it reimagines movement itself as an act of reflection — a moment of *Ma*, where the pace of the city softens and awareness of place deepens.

The Trii Pathway is designed to create a pedestrian link between Lorne Street and Queen Street, directly connecting the St James Theatre site—a key arrival point served by multiple bus stops on Queen Street—with Lorne Street (shown in figure, 30), which faces the Auckland Central Library and provides access to AUT University.

By establishing this connection, the pathway enhances walkability and fosters a smoother flow between cultural, educational, and civic zones in the city centre.

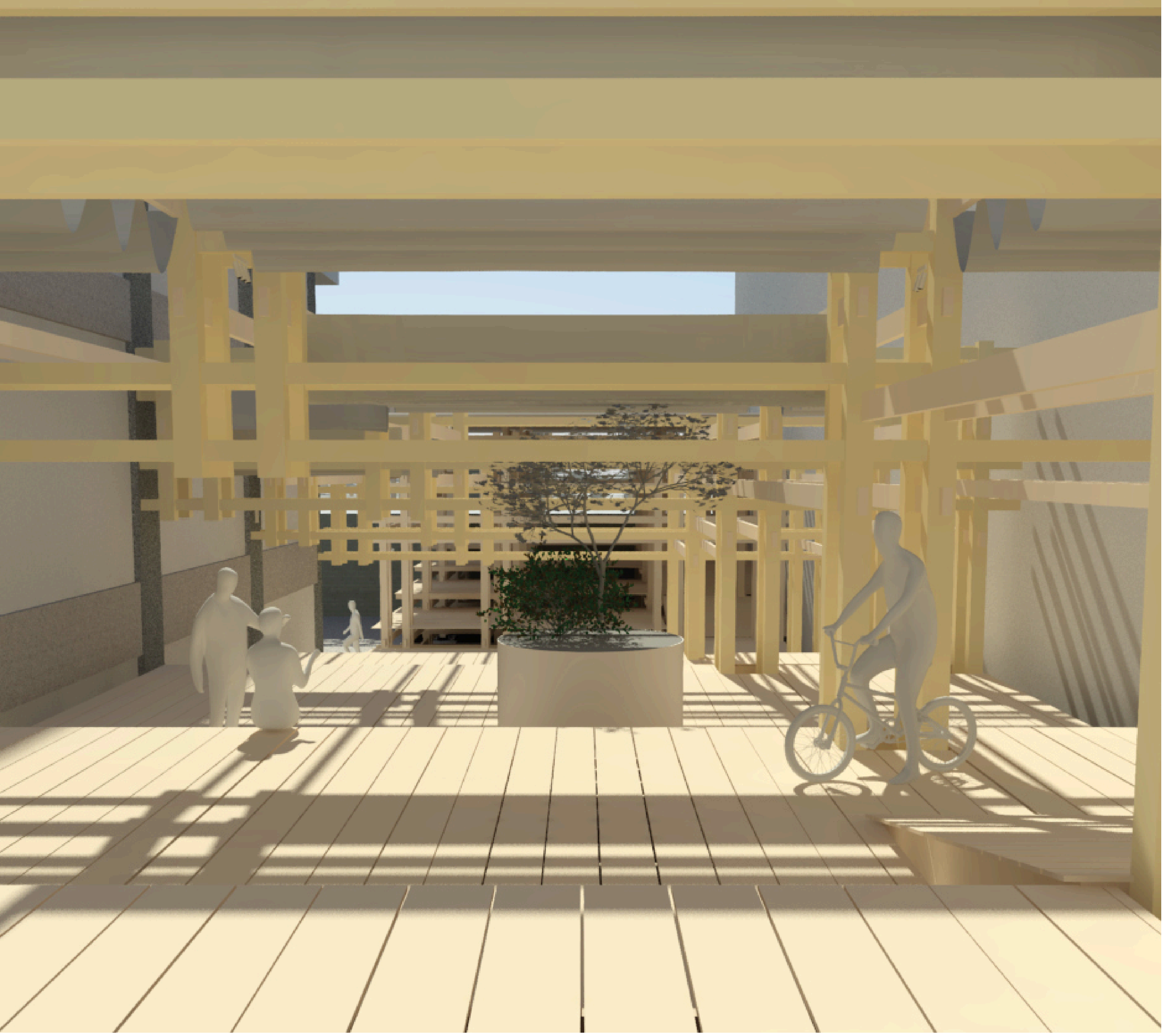


Figure 31. Rendered perspective image of Torii Pathway. 2025

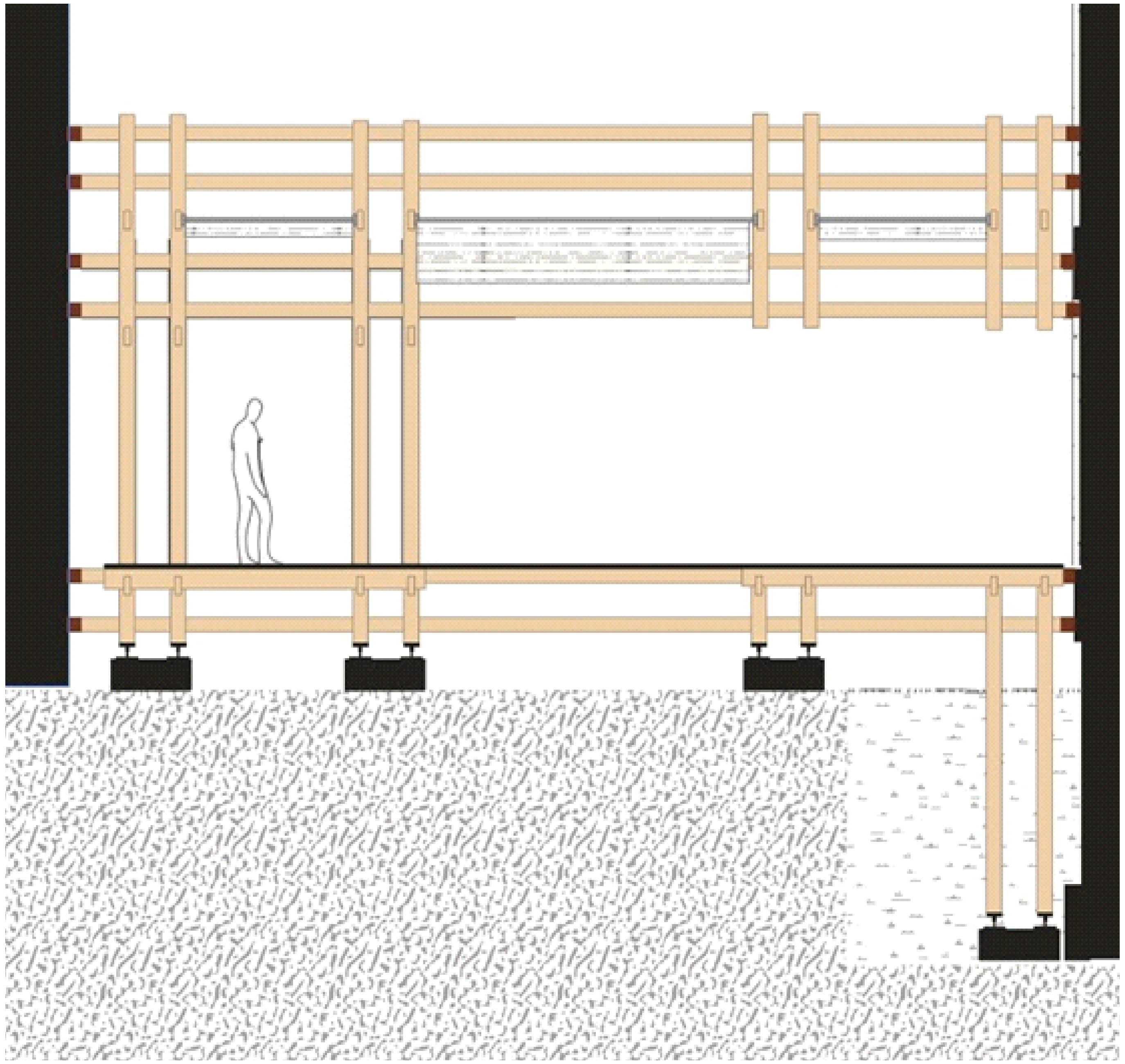


Figure 32. 1:50 Section drawing of Torii Pathway. 2025

Form of modular structure

The final design of the modular Torii Pathway was developed to maximise spatial experience while minimising the number of structural elements, creating a sense of lightness and preserving visual connections to the surrounding environment.The structure physically embodies the concept of Ma. As discussed in Section 3.6, this concept is expressed by treating the St James Theatre as the first pillar—the origin point from which space expands and rhythm unfolds. Each subsequent timber frame continues this spatial dialogue, extending the theatre's presence into the public realm and creating a sequence of thresholds that invite movement, pause, and reflection.

The height of the modular structure, measured from the footing to the top, is 6 metres, except for the modules forming the sloped section along the Queen Street frontage, which are slightly taller to maintain an accessible gradient. This dimension was determined with consideration for timber transportation, handling efficiency, and material availability. It also aligns with standard timber manufacturing lengths, as many suppliers—including the manufacturer from whom timber was sourced for the prototype models—produce and sell timber in lengths of 2.4 m, 4.8 m, and 6 m. Designing within these standard dimensions helped minimise material waste and improve efficiency throughout the construction process.

This form, which achieves maximum spatial openness with minimal material use, became possible through the application of the Ishibadate technique. By anchoring the timber structure to the existing masonry surface, the design reduces the need for substantial foundations while preserving reversibility and respecting the heritage fabric. In doing so, it aligns closely with the principles of temporal adaptive reuse.

Figure 33. Photo of Pedestrian walkway on Queens Street next the Project Site. 2025

Figure 34. Senbon Torii pathway at Fushimi Inari Shrine, Kyoto.

Concept Design:

In traditional Japanese architecture, pillars are considered the key elements that define space. This is because Japanese buildings were traditionally constructed by first setting the pillars, unlike in Western architecture, where space is formed by enclosing walls. Interestingly, the interval or measurement between these pillars is referred to as *Ma* (Kamishiro, 1999).

These two ideas — the notion of transition between spaces and the role of the pillar in creating spatial rhythm — resonated deeply with my experience of walking through the steelstructured walkway on the St James site. It recalled the sensation of passing through the *Torii* pathways I encountered in Japan, where a sequence of pillars frames movement, light, and time, allowing the experience of *Ma* to unfold through the act of walking.

Figure 35. 1:100 concept model of Torii Pathway. 2025

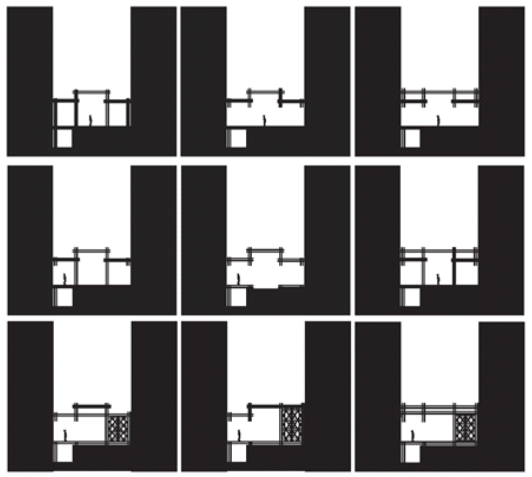


Figure 36. Form variations of Torii Pathway Structure. 2025

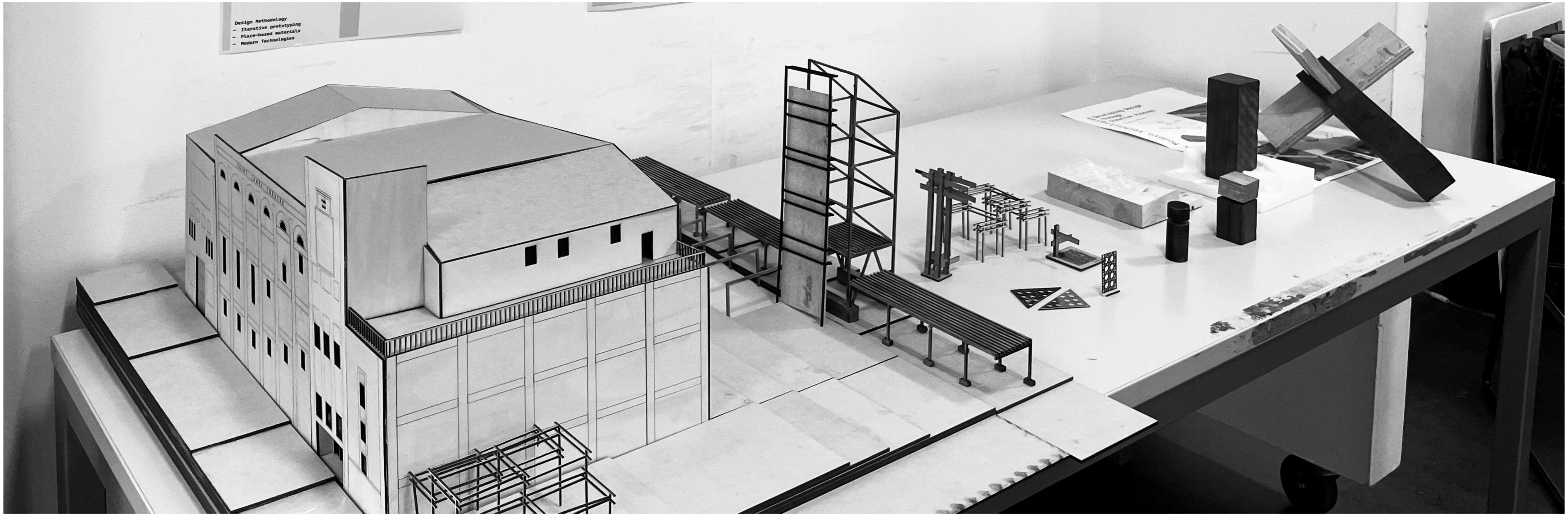


Figure 37. 1:100 model of the site and various hand-made models. 2025

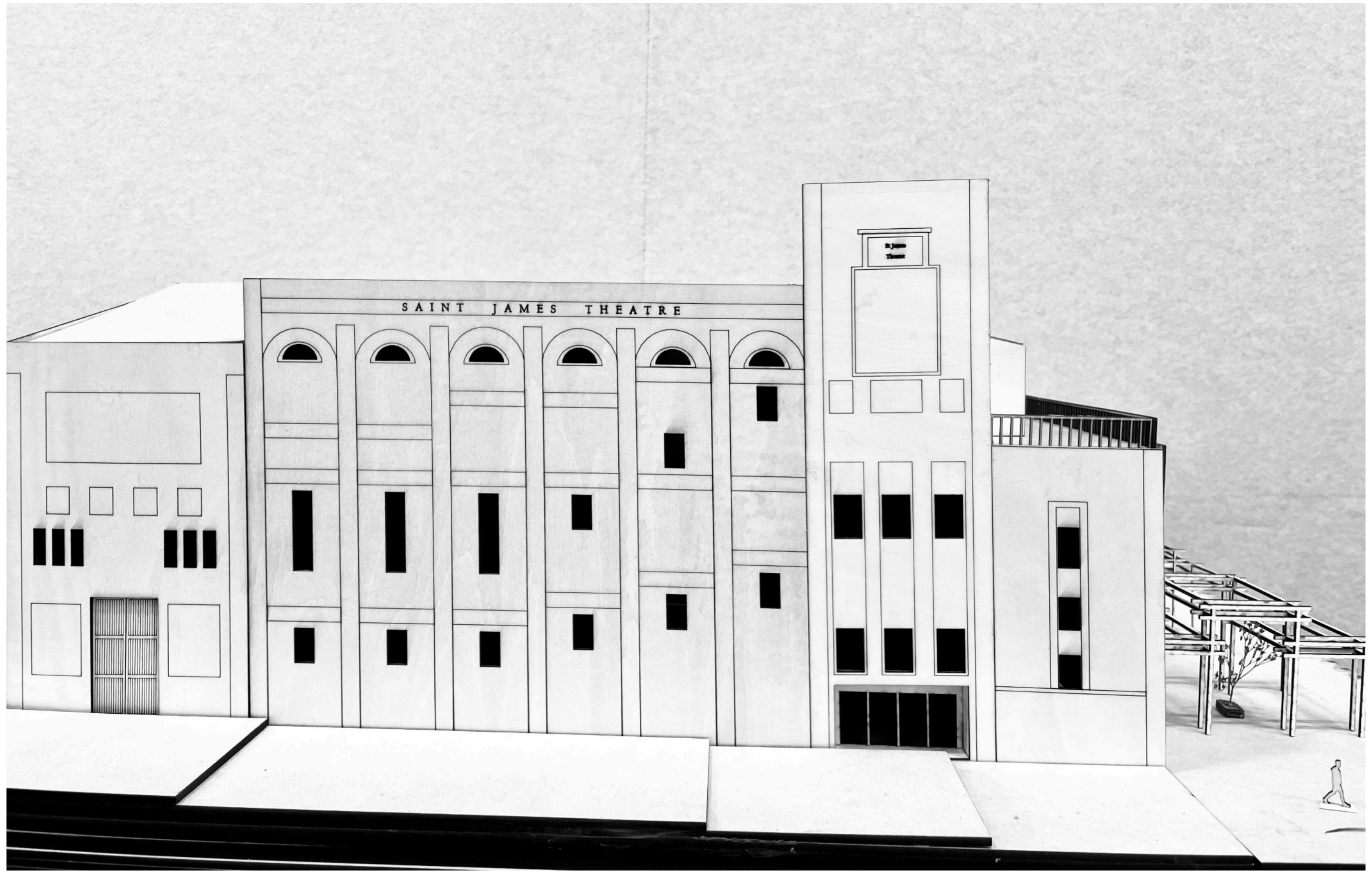


Figure 38. 1:100 model of St James Theatre. 2025

Figure 39.
Non-Scale Concept model of Torii Pathway Structure with shelter. 2025

Figure 40.
1:100 Concept model of Torii Pathway Structure. 2025

Figure 41.
Non-Scale model of possible formation of kigumi structure. 2025

A series of 1:100 physical models were developed to explore the spatial relationship between the proposed Kigumi intervention and the existing St James Theatre site. Through iterative placement and testing of the Torii Walkway and associated timber structures within the site model, the study examined questions of scale, visibility, circulation, and the spatial interval between existing and proposed elements. This process allowed design decisions to emerge through making, reflecting the craftsmanship-based methodology discussed in Chapter 4.

Relevance and practical thinking of Nuki-joint structure for my design

Figure 42. Kiyomizu-dera Temple, Kyoto. Photograph by Yannis Chen (2024).

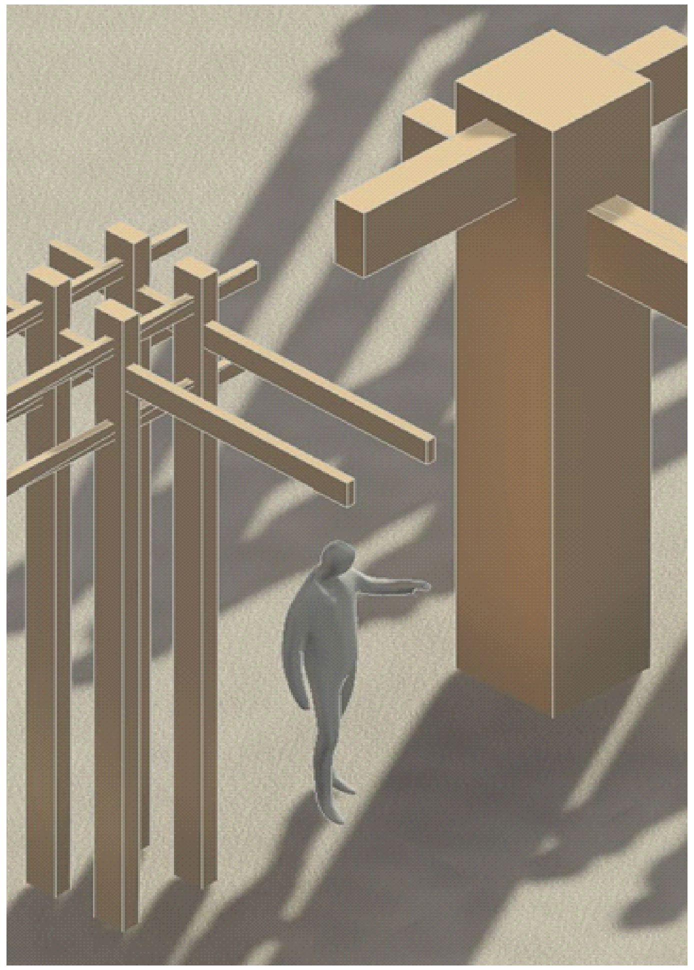


Figure 43. Comparison of heavy and lightweight Nuki structural systems.

The main structure that composes the Torii Pathway is made by light wooden elements that inter cross each other by taking in the system of Nuki-structure which is one of commonly used Kigumi joinery technique in Japan.

The *Nuki* structure can be observed in many historical temples and shrines across Japan, serving as a fundamental supporting frame within traditional timber architecture. A particularly notable example is the Kiyomizu-Dera Temple in Kyoto, where the remarkable exposed timber framework showcases the precision and strength of this joinery system.

The essence of the *Nuki* lies in its simplicity. Its mechanism is straightforward: a horizontal beam (*nuki*) passes through a mortised hole in the vertical pillar (*hashira*), and the joint is then tightened using a small tapered wooden wedge called a *kusabi*.

Like many other *kigumi* systems, the *Nuki* structure requires no nails or screws, relying solely on the compression and flexibility of timber components. This approach not only expresses aesthetic and structural purity but also responds to Japan's humid climate, allowing the wood to naturally expand and contract without being constrained by metal fasteners.

In this project, the traditional form of the *Nuki* structure has been adapted to meet the specific requirements of creating a lightweight timber framework that interfaces with a heritage building. This adaptation draws on contemporary interpretations of joinery and structural articulation observed in Sou Fujimoto's *Great Ring*, as discussed in Chapter 4.5. It is also informed by my own experimental application of the *Ishibadate* technique, which is examined in detail in Chapter 6.

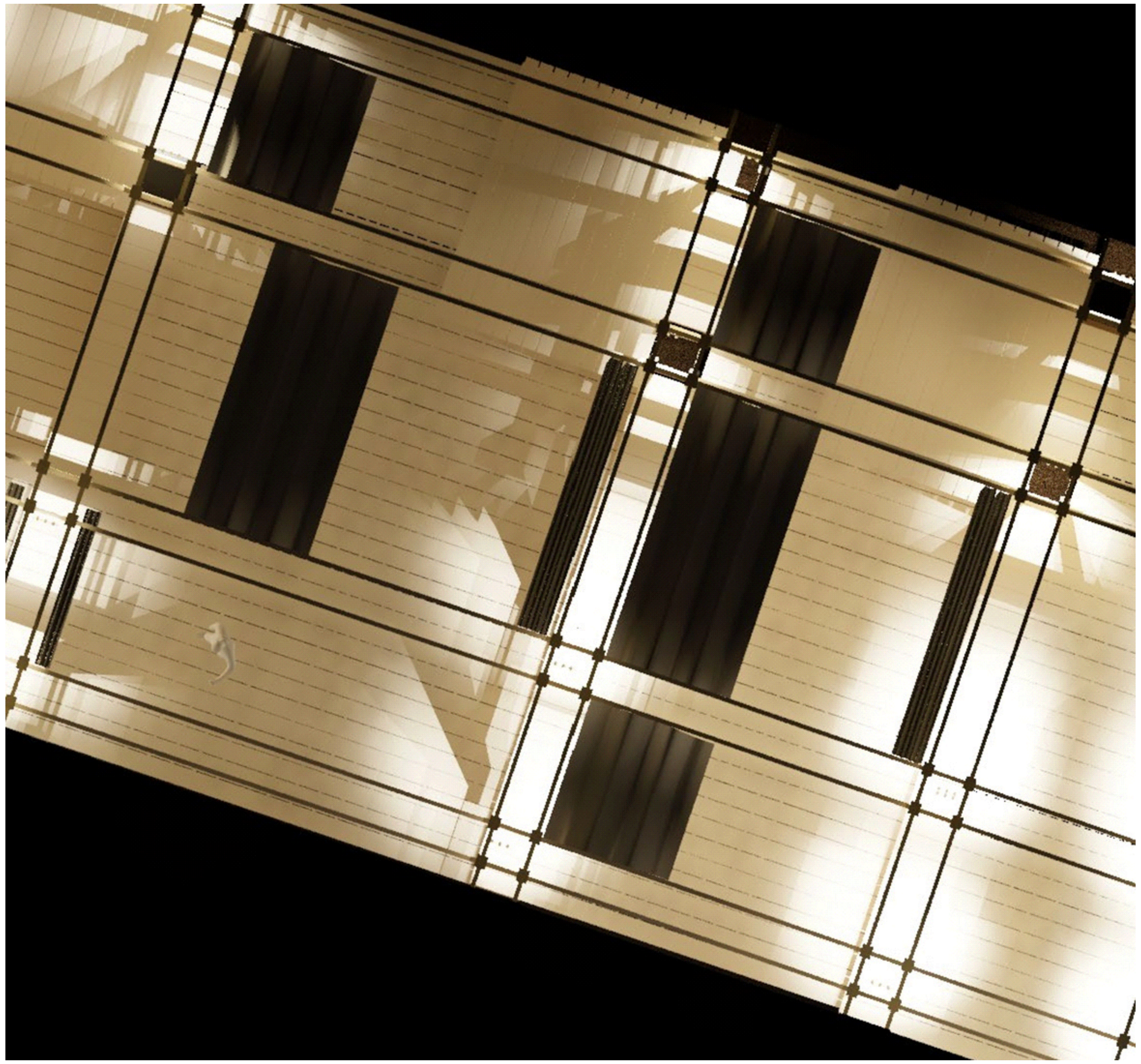


Figure 44. Figure XX. Night-time rendering of the Torii Pathway, demonstrating how light, structure, and movement contribute to the formation of space.

More than a pathway

The Torii Pathway is conceived as a continuous modular structure composed of repetitive timber frames, forming a rhythmic sequence of *Ma* — spatial intervals created by the pillars.

This modular rhythm generates a series of intermediate zones that blur the boundary between movement and gathering. Within these in-between spaces, diverse community activities can unfold, such as small markets, street performances, or informal resting areas. Each module functions as both a spatial frame and a temporal marker, allowing people to sense the gradual transition of light, sound, and interaction as they move through the walkway.

In doing so, the structure not only reconnects Queen Street and Lorne Street physically but also reintroduces *Ma* — moments of pause and engagement — into the everyday rhythm of the city. The walkway becomes a living, adaptable stage for community encounters, fostering both social activation and contemplative stillness within the dense urban fabric of Auckland.

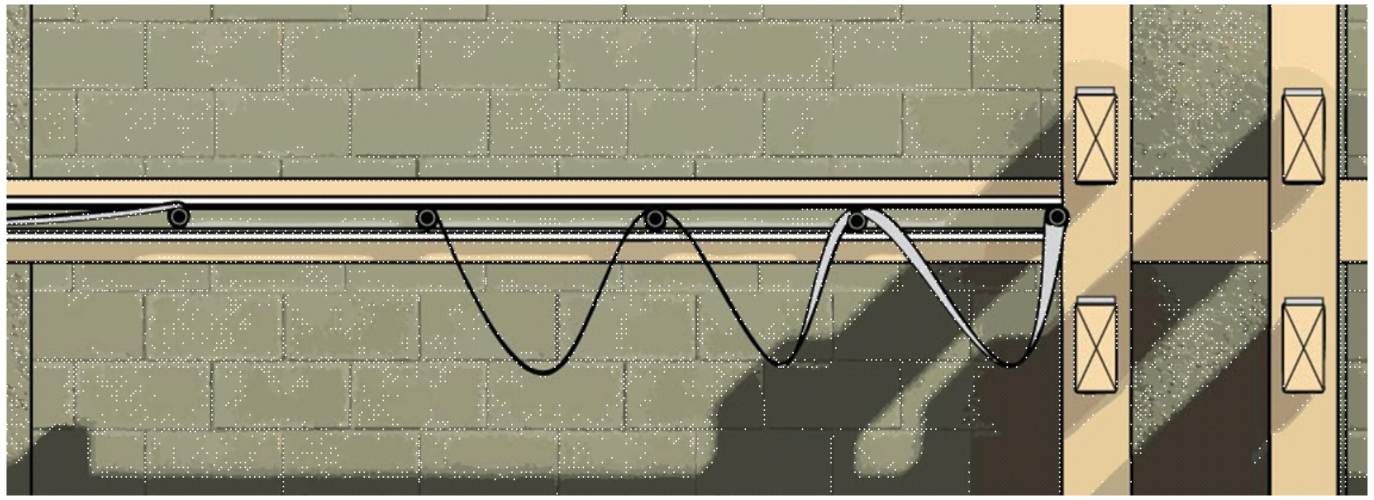


Figure 45. Canopy system installed in the Kigumi Structure.

The *Torii* structure is equipped with an adjustable canopy system that allows users to create shading and adapt the space to their needs. This flexibility encourages personal engagement with the structure, transforming it from a static passageway into a dynamic, responsive environment. The lightweight PVC fabric moves gently with the wind, casting shifting patterns of light and shadow that change throughout the day. These subtle variations produce a continuous sense of transformation, allowing users to experience the walkway as a living expression of *Ma* — an interplay between time, movement, and atmosphere.

Safe, beautiful pathway at Night

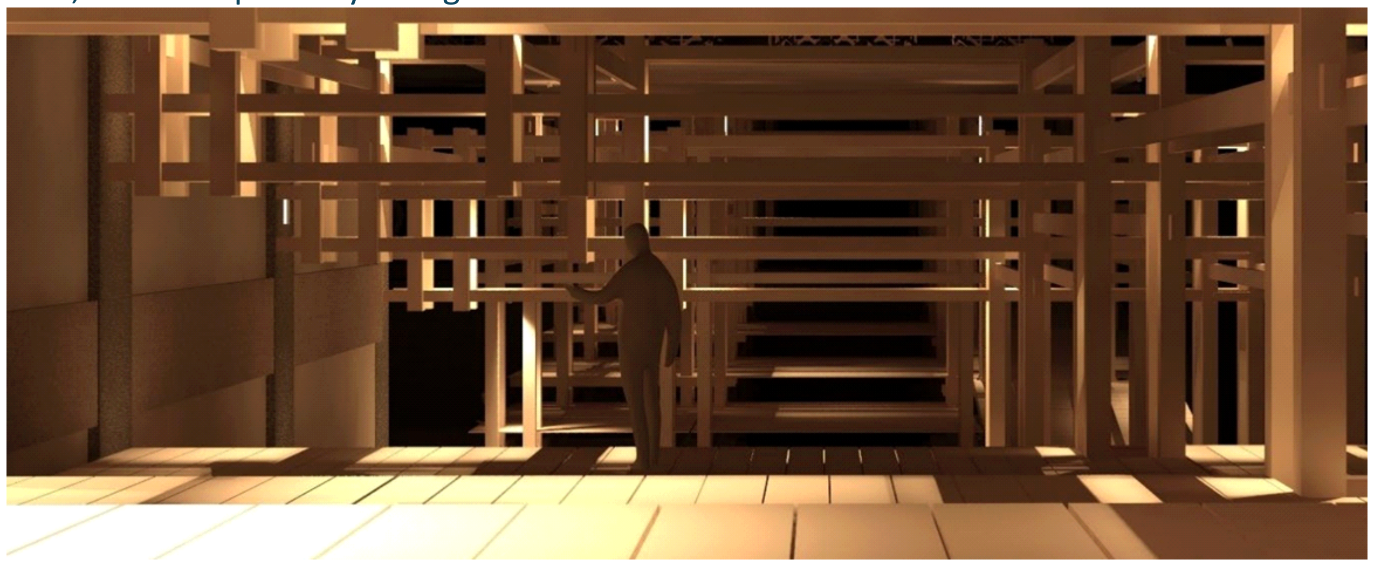


Figure 46. Night View of Torii Pathway

Auckland's central city consistently ranks among the areas with the highest crime rates in the region. As discussed in Chapter 3.3, prolonged absence of people and a diminished sense of public ownership around the St James Theatre site have contributed to increasing incidents of unlawful trespassing, both onto the grounds and into the theatre itself.

The proposed walkway directly responds to this issue by reintroducing activity, visibility, and passive surveillance into the area. At night, the structure will be illuminated to enhance safety and provide a comfortable, well-lit route for pedestrians, helping to deter undesirable behaviour and encourage continuous public presence.

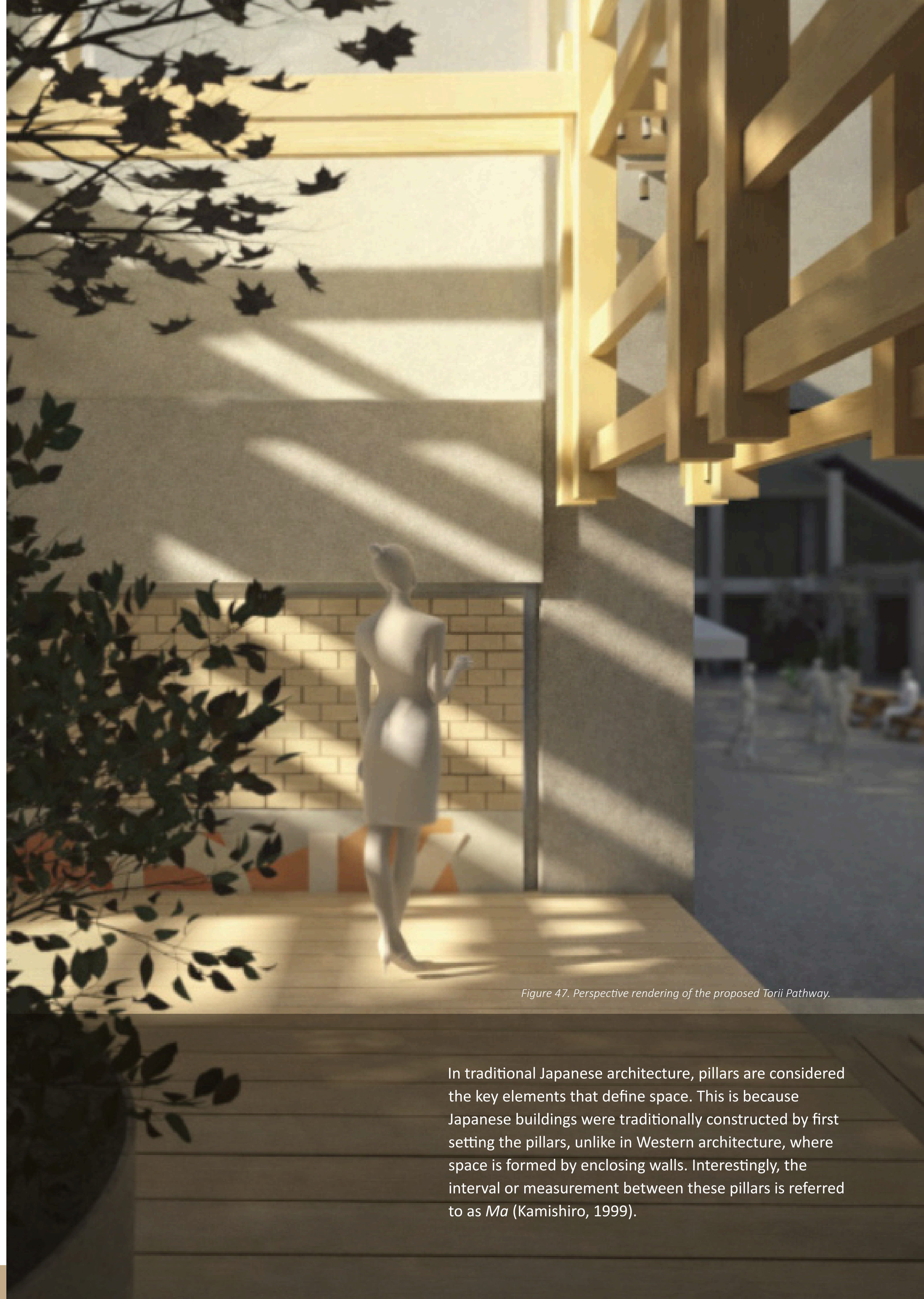


Figure 47. Perspective rendering of the proposed Torii Pathway.

In traditional Japanese architecture, pillars are considered the key elements that define space. This is because Japanese buildings were traditionally constructed by first setting the pillars, unlike in Western architecture, where space is formed by enclosing walls. Interestingly, the interval or measurement between these pillars is referred to as *Ma* (Kamishiro, 1999).

5.3 Design outcome 2: Lamp Tower

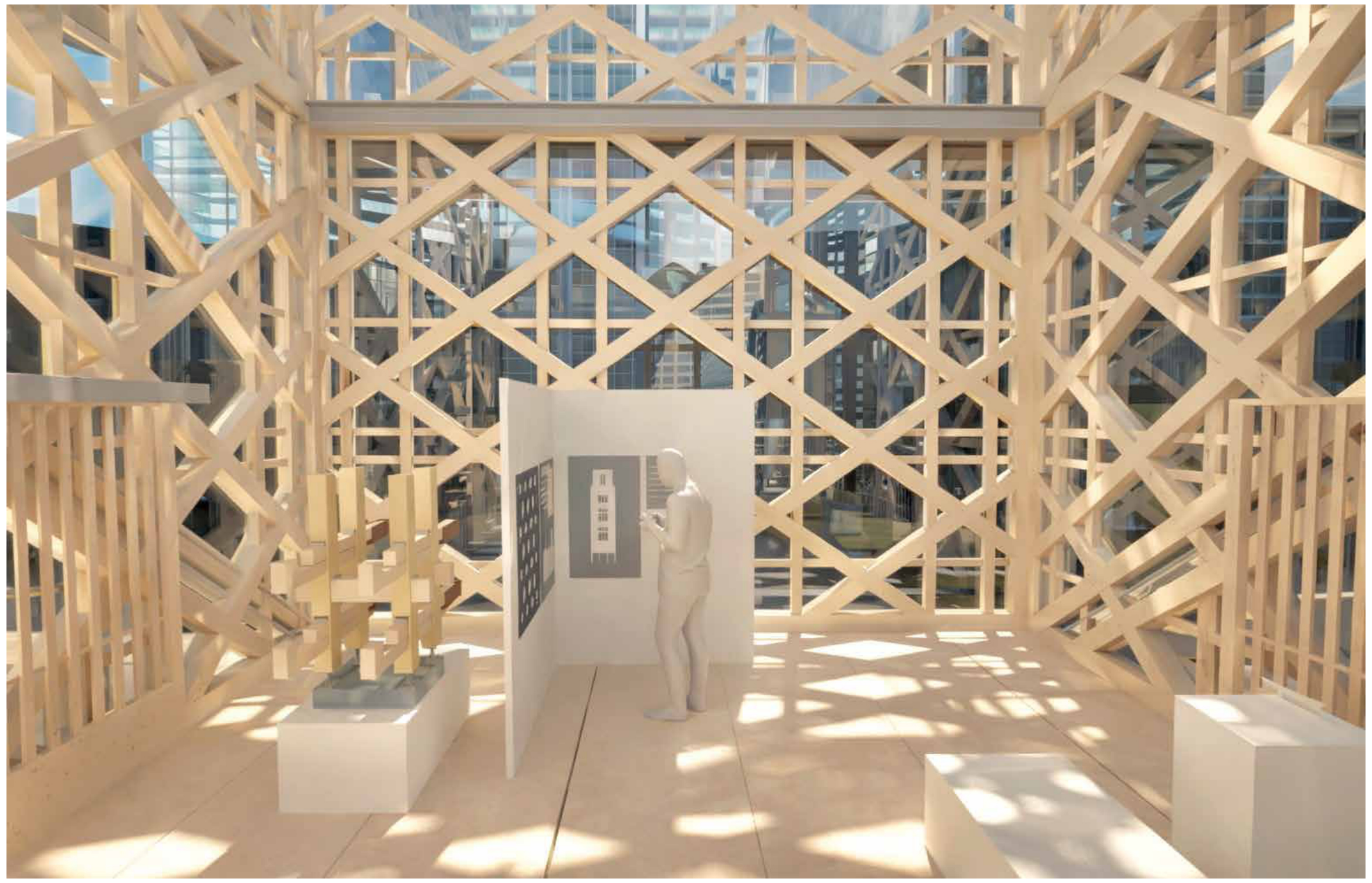


Figure 48. Perspective rendering of inside the Lamp-Tower.

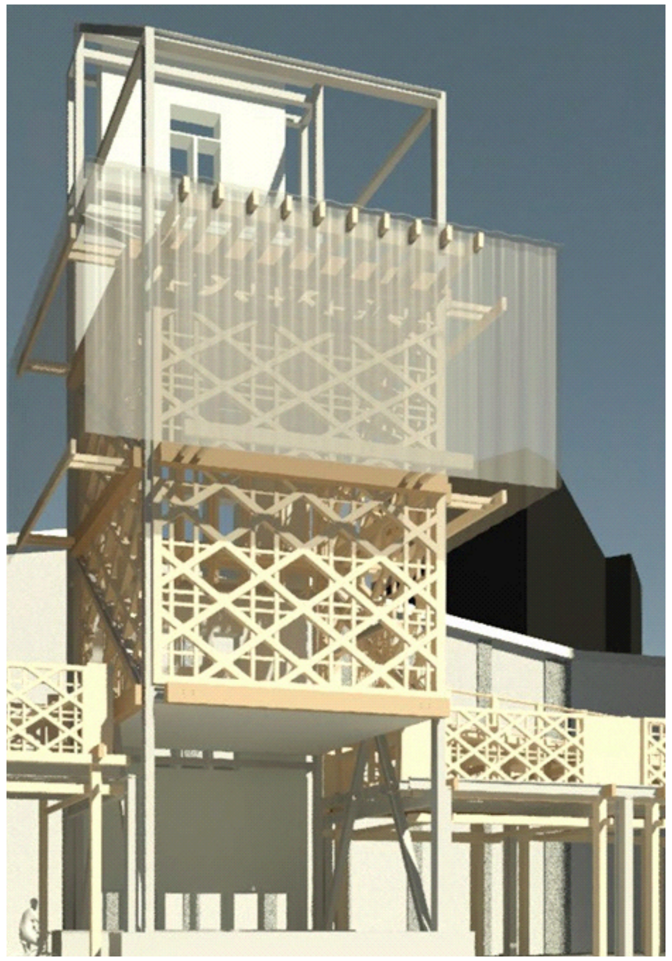


Figure 49. Perspective rendering of looking up at the Lamp-Tower from Queens Street.

Figure 50. Looking up at the steel structure supporting the heritage facade from Queens Street. 2025

Floor Plan (Scale: 1:100)

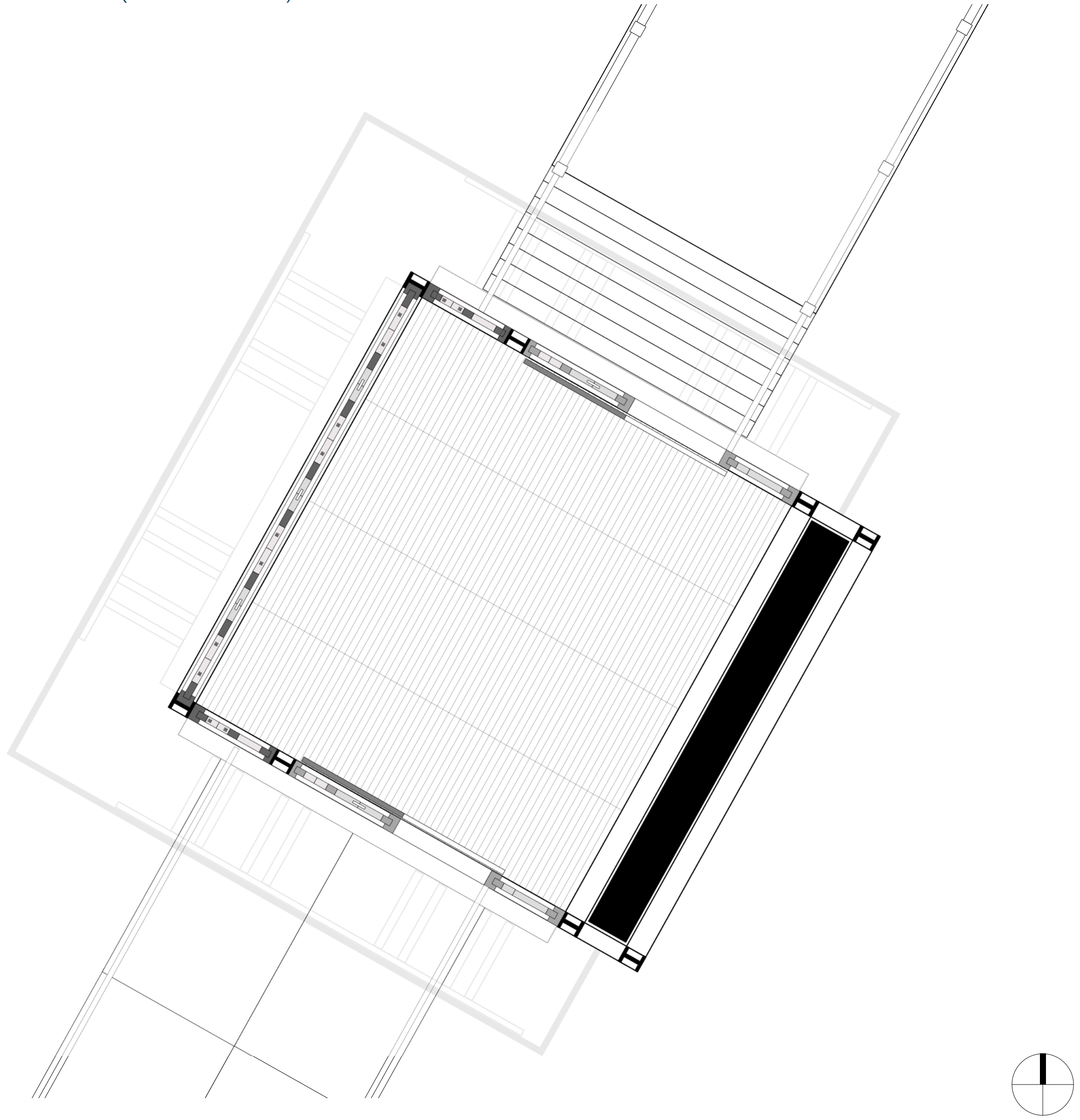


Figure 51. 1:100 Floor plan of Lamp Tower

The second design outcome on the site is a Lamp Tower, designed for stage 2 of the project. The form of tower is formed through interlocking the Kumiko structural element between the steel structure that is currently supporting the part of heritage façade St James Theatre.

This tower engages both the heritage façade of the St James Theatre that once served as the original entrance from Queen Street, and the contemporary steel structure that now supports it during the past renovation attempt period. Guided by the principles of temporal adaptive reuse, the *Kumiki* grid structure is introduced within this space to generate a sense of *Ma* — an interval of stillness and connection between the old and the new.

Kumiko Structure Assembly

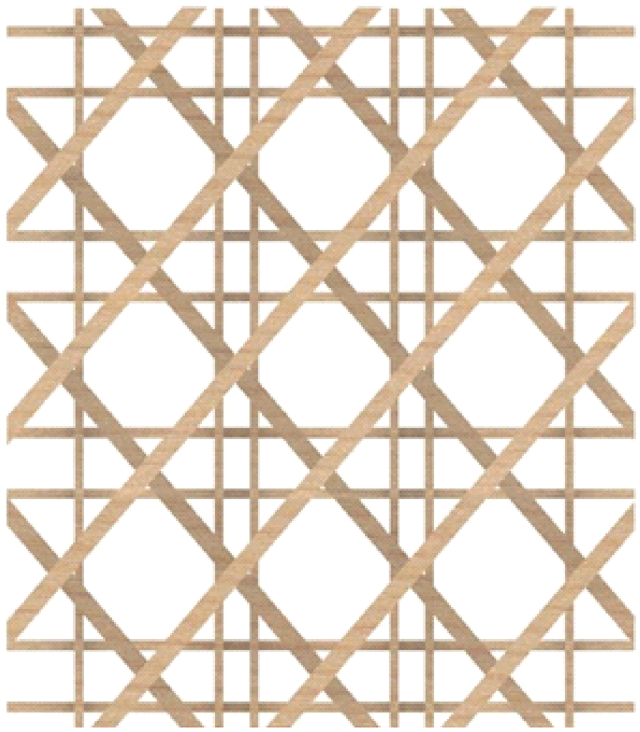


Figure 52. Kumiko Structure Pattern

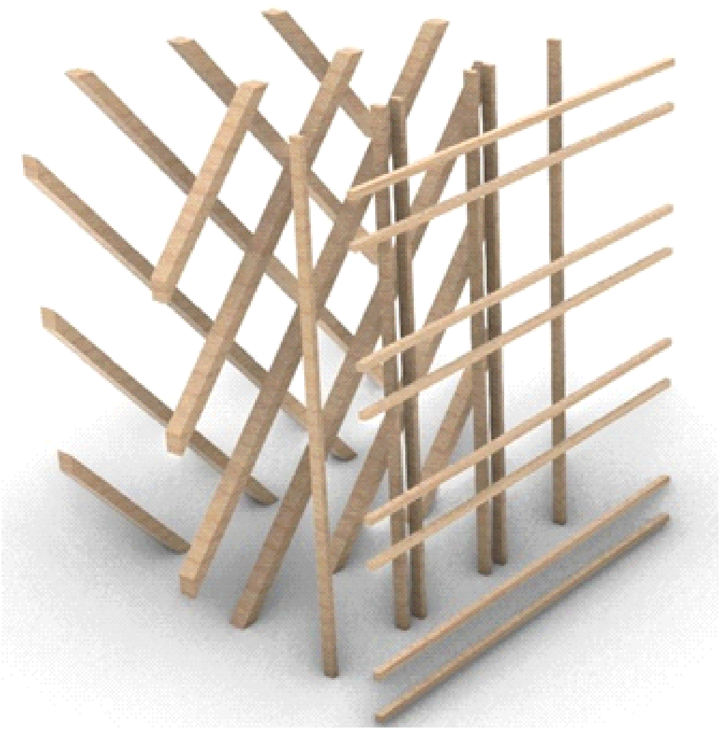
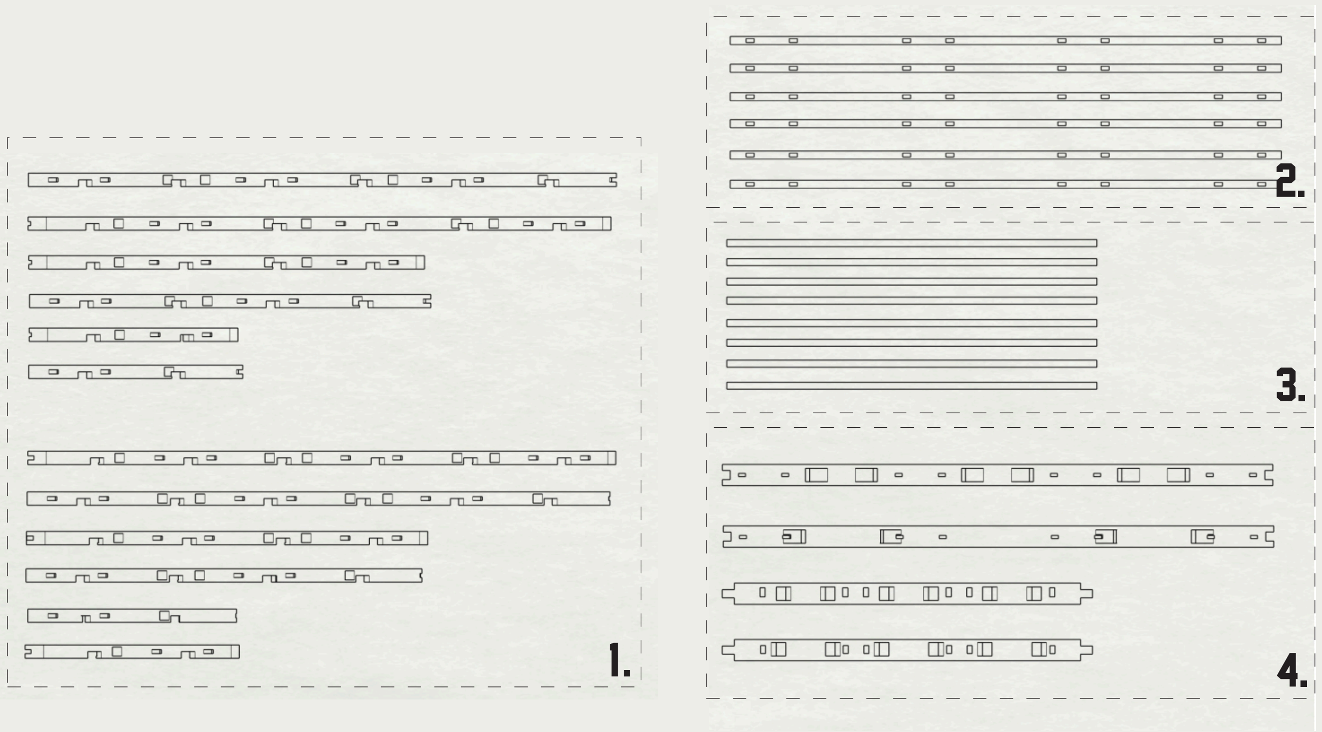


Figure 53. Kumiko Assembly Model Diagram



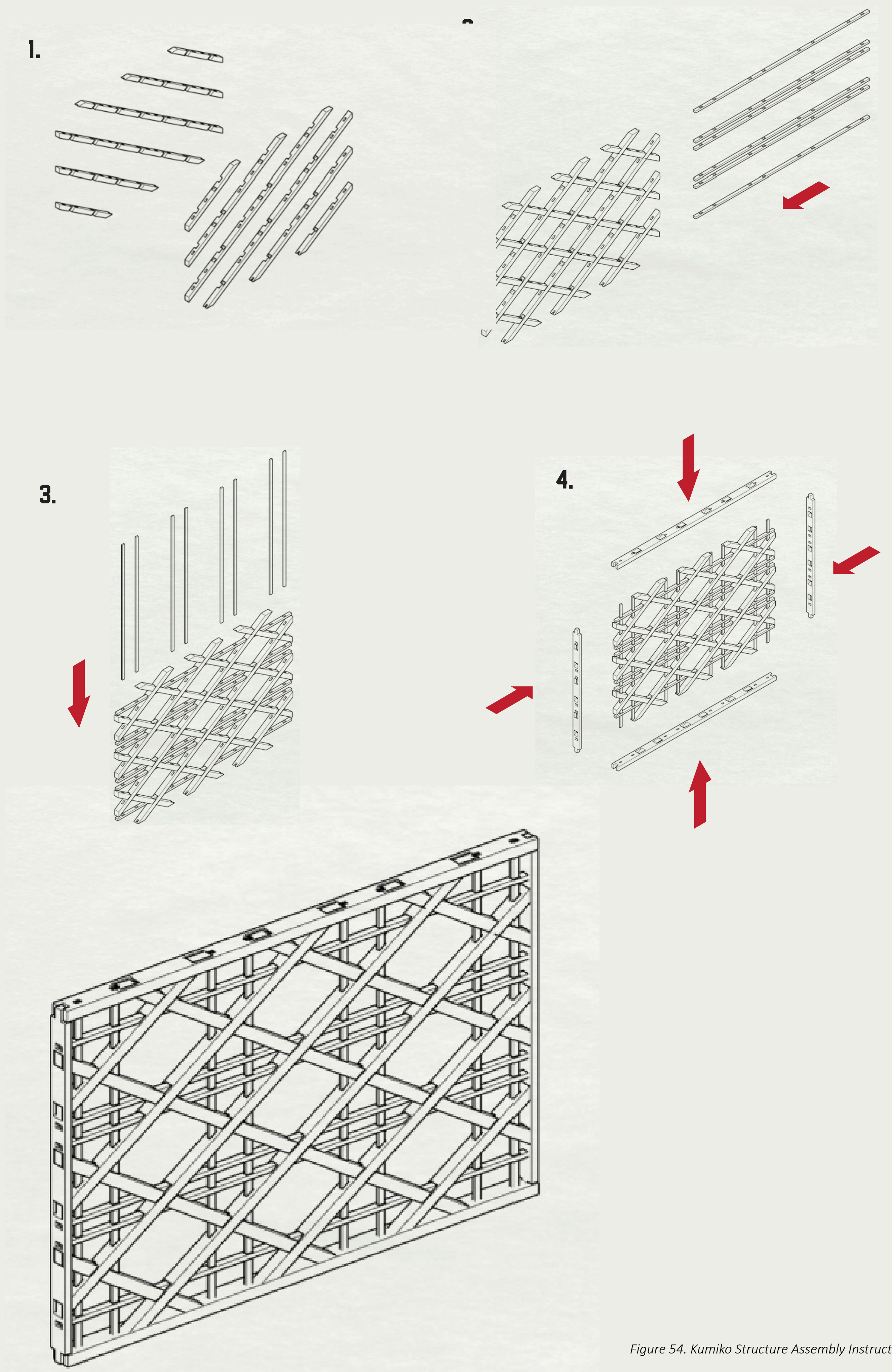


Figure 54. Kumiko Structure Assembly Instruction

Lighting up the future of heritage ~ The Lamp Tower

Figure 55. Top view rendering of the proposed Lamp Tower illuminated at night.

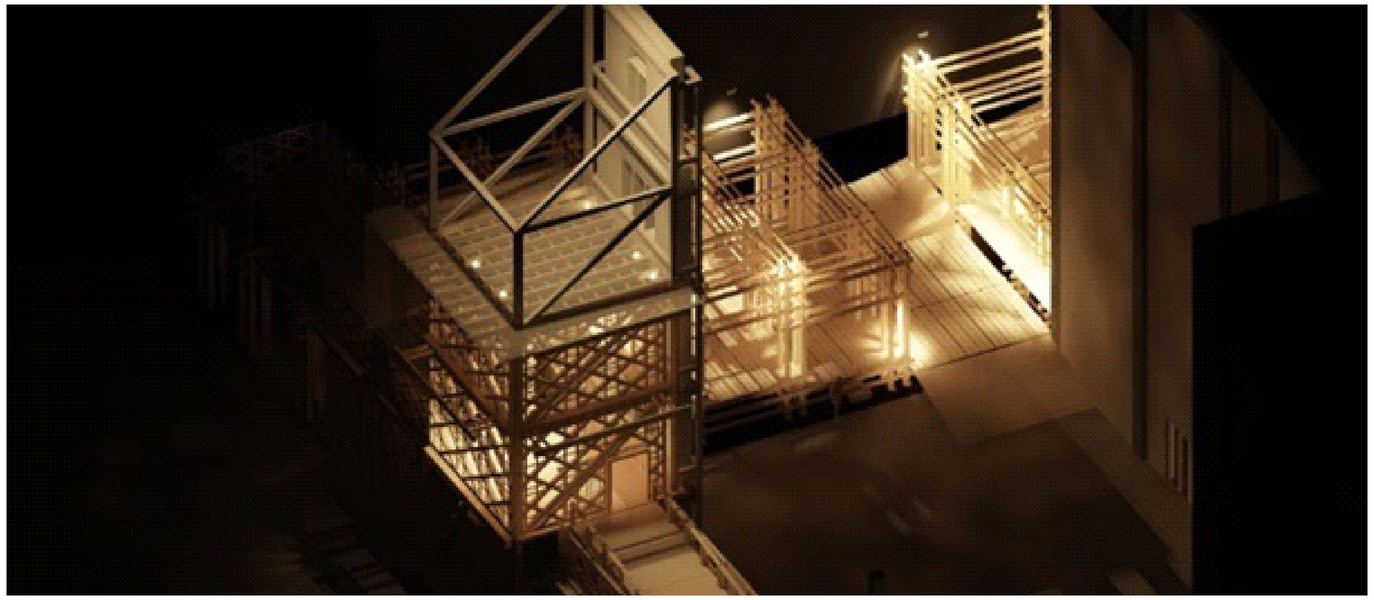


Figure 56. Bird's-eye view rendering of the proposed Lamp Tower illuminated at night.

Diffusion of light and shadows

The design of both the Lamp Tower and the open deck prioritise the user experience, which shifts throughout different times of the day. During daylight hours, the *Kumiko* inspired timber lattice and the polycarbonate outer skin diffuse natural light, producing soft illumination and subtle shadow patterns that enrich the spatial atmosphere. The natural scent and warm tactile qualities of Lawson cypress further enhance this daytime experience, creating a sense of comfort and material presence. At night, the tower and deck become gently illuminated, acting as a beacon that activates the site, improves visibility, and supports a safe and welcoming environment for pedestrians. This nighttime presence also helps attract visitors arriving in the city, encouraging them to experience the site as an inviting public threshold.

Figure 57. 1:100 Lamp Tower model demonstrating the illumination of the façade system.

Figure 58. View of the St James Theatre heritage façade and temporary steel support structure from Lorne Street, 2025.

Beyond its role as a visual landmark, the Lamp Tower is conceived as a flexible public exhibition space capable of accommodating heritage displays, student work, temporary art installations, and community events. By creating opportunities for public engagement and cultural interpretation, the structure contributes to the ongoing activation of the St James Theatre site while strengthening the relationship between the building and the wider community.

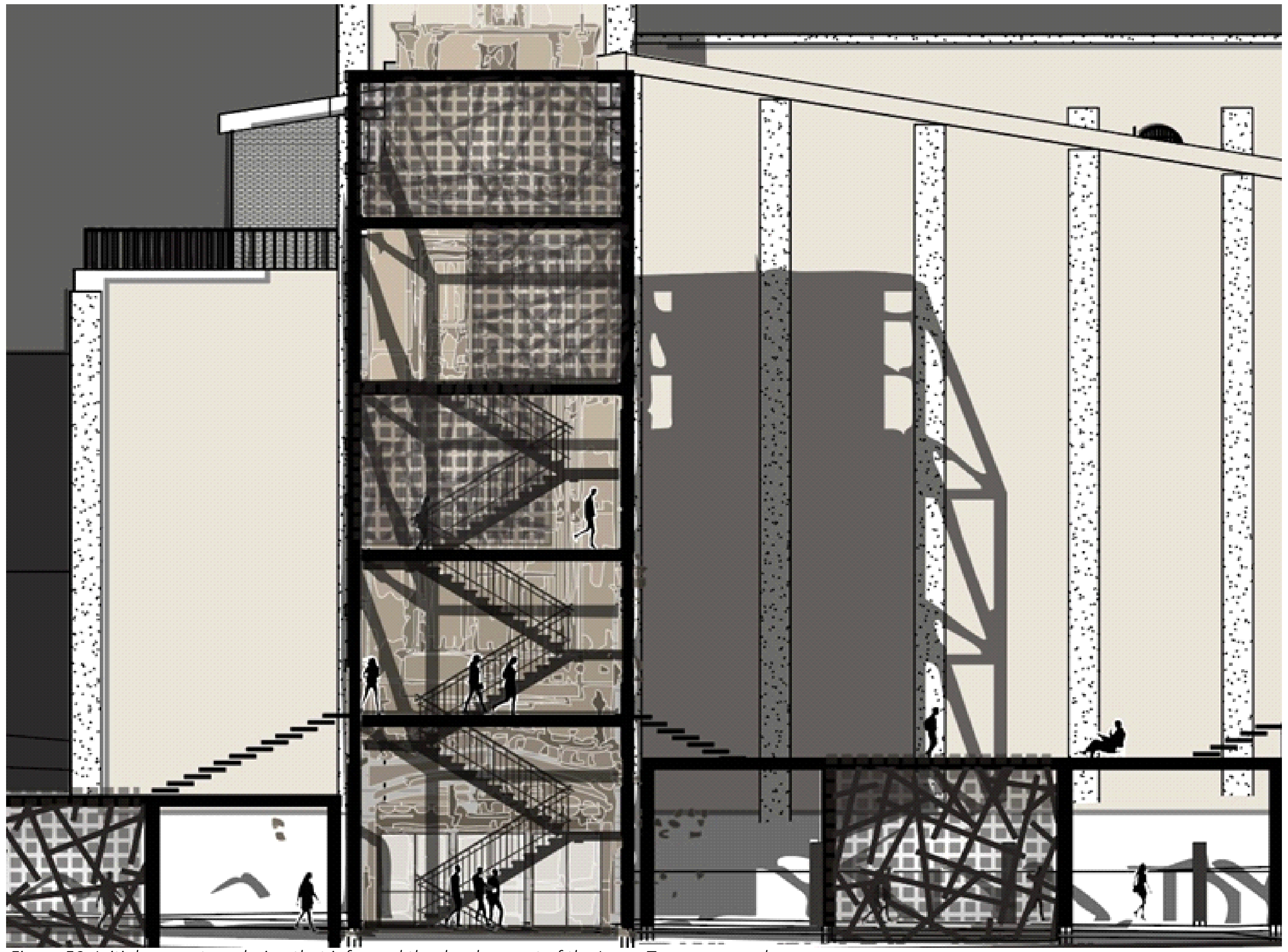


Figure 59. Initial concept rendering that informed the development of the Lamp Tower proposal.

Figure 60. 3D-printed lamp prototype incorporating a Kumiko-inspired structural pattern.

The initial concept for the Lamp Tower was carried through into the final design outcome. The primary intention was to make full use of the existing steel structure installed during the structural strengthening of the remaining heritage façade on the Queen Street side of the site. As illustrated in *Figure 59*, the Lamp Tower evolved from an exploration of how Kigumi elements could occupy and interact with the existing steel support structure.

Tower

Although it currently functions only as a supporting structural frame, I identified the potential for both the steel structure and the heritage façade to become an activated space for community engagement. By introducing an additional layer of *Kigumi* elements around them, the structure is transformed from a purely technical intervention into a spatial framework that invites occupation, interaction, and public presence.

As the name suggests, the design of tower is inspired by a Japanese traditional lamp, with an intention to light up the St James Theatre site along side with Torii Walkway.

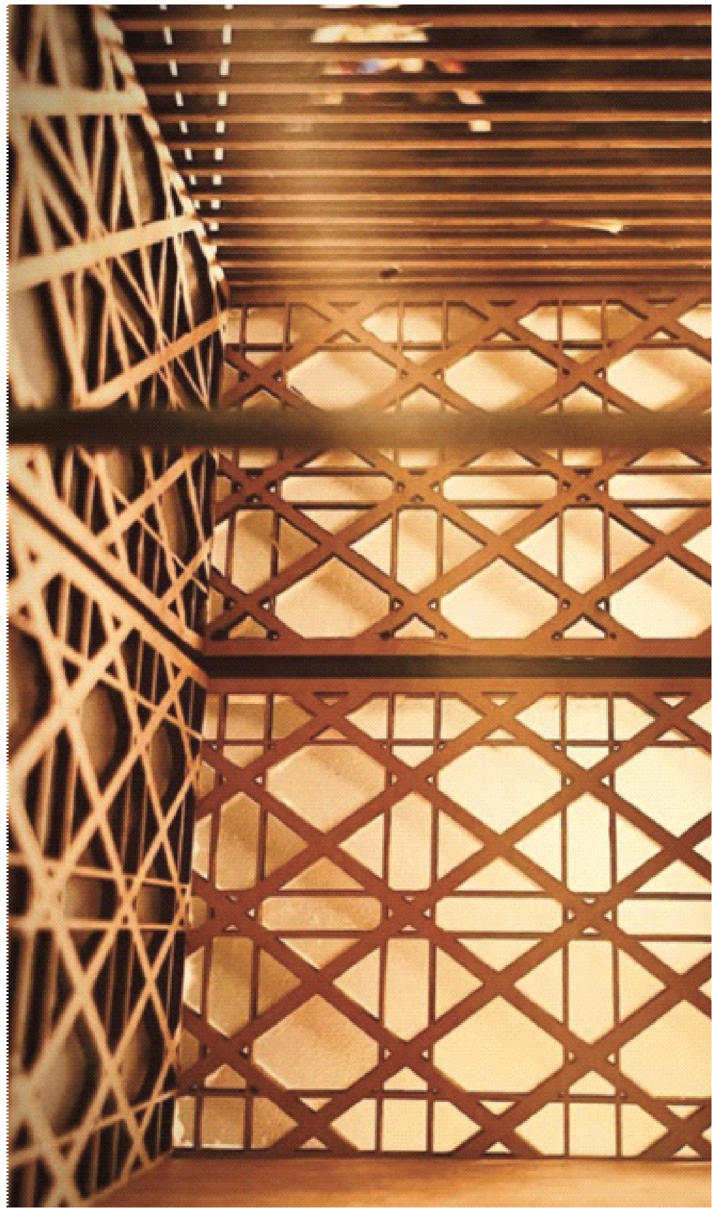


Figure 61. Interior view of the 1:100 Lamp Tower model.

Figure 62. Exterior view of the 1:100 Lamp Tower model.

Figure 63. 1:100 physical model testing the integration of a Kigumi structure with the existing steel framework to create an elevated deck.

Deck / Walkway

The existing steel walkway structure also holds the potential to be reinterpreted beyond its current utilitarian function. Its upper level could be transformed into an open deck where people can gather, rest, wait for buses, or use as a casual meeting point, thereby introducing new layers of public use and social interaction to the site.

The Materials used for decking board will be salvaged native New Zealand woods such as Rimu, Kauri, which will differ depending on availability of the wood. *Figure 63* illustrates a 1:100 scale model of the steel structure combined with the new interlocking *Kigumi* elements that form this elevated deck.

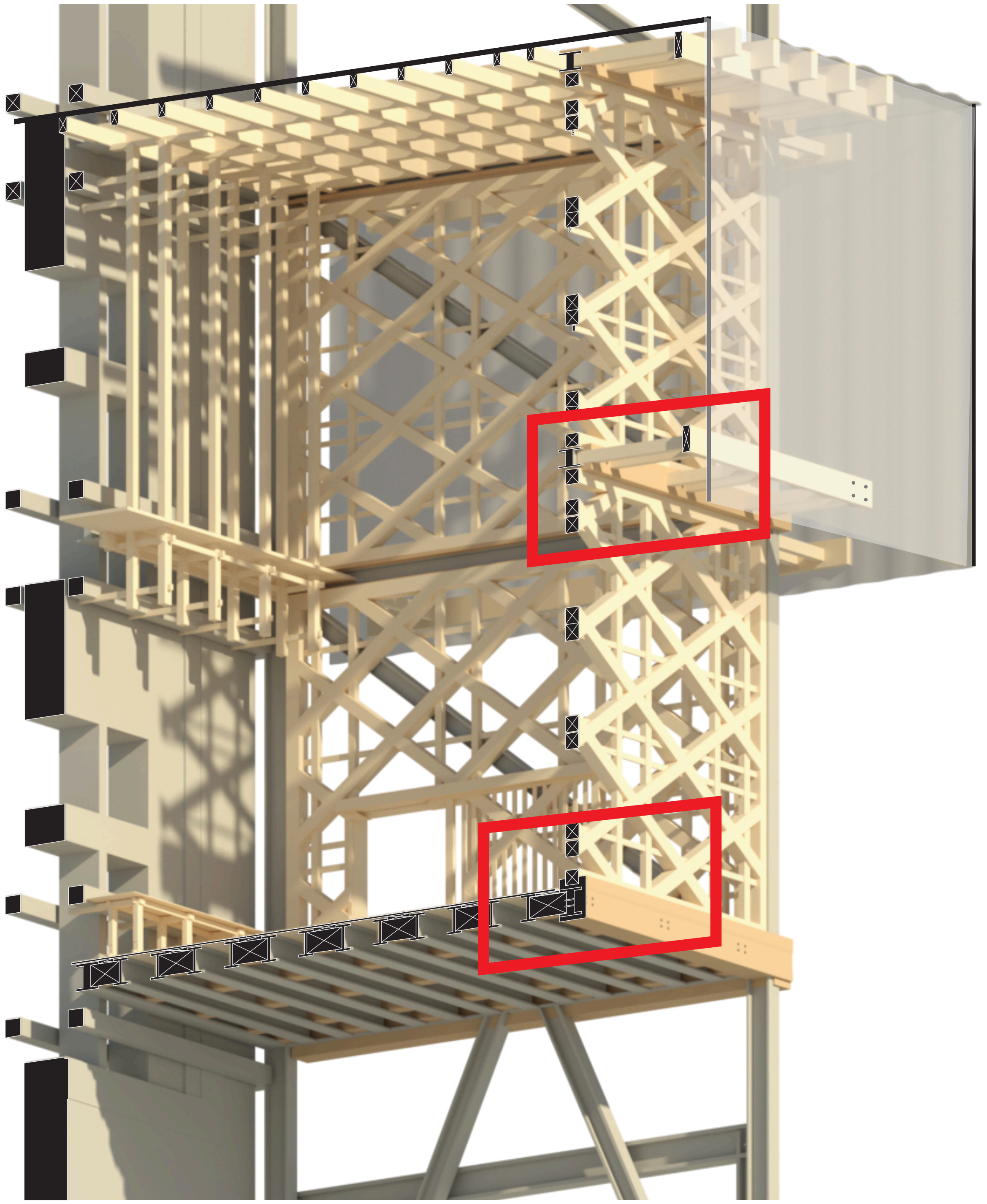
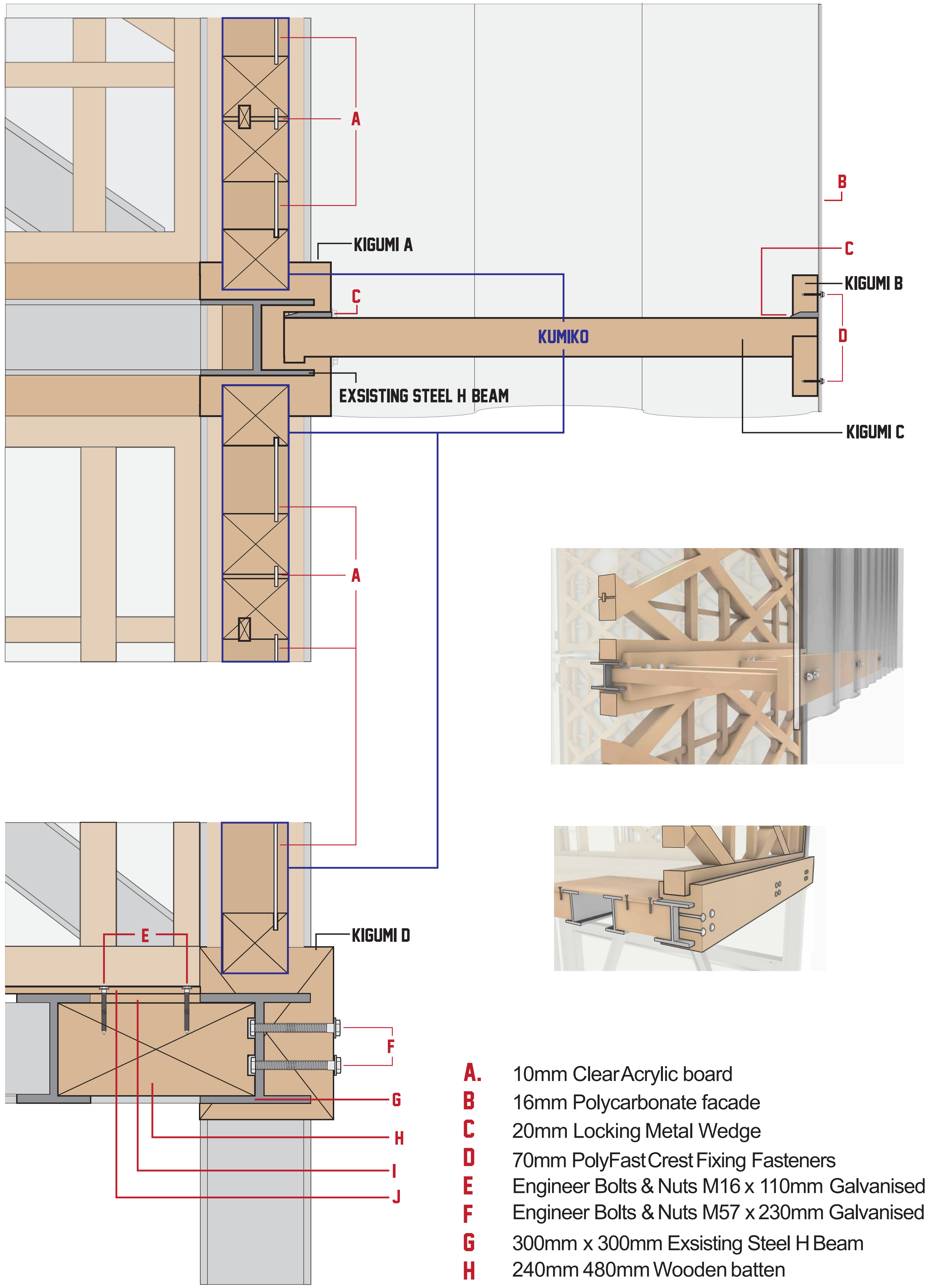


Figure 64. 1:20 Detailed sectional perspective drawing of the proposed Lamp Tower.

The Lamp Tower is formed through a layered assembly system composed of prefabricated timber components. As shown on *Figure 64*, the primary spatial enclosure is created by installing a series of Kumiko panels onto the existing steel structure, establishing a lightweight framework that remains visually connected to the heritage fabric. CNC-fabricated interface components allow the timber elements to be accurately attached to the irregular geometry of the existing structure, while maintaining the potential for future disassembly and reuse. A secondary polycarbonate layer acts as a translucent skin that filters natural light, softening the interior environment and creating changing patterns of light and shadow throughout the day. Together, these layers form a flexible exhibition space capable of accommodating heritage displays, artwork, and community installations while preserving a sense of openness and temporality.



A. 10mm Clear Acrylic board
B 16mm Polycarbonate facade
C 20mm Locking Metal Wedge
D 70mm PolyFast Crest Fixing Fasteners
E Engineer Bolts & Nuts M16 x 110mm Galvanised
F Engineer Bolts & Nuts M57 x 230mm Galvanised
G 300mm x 300mm Exsisting Steel H Beam
H 240mm 480mm Wooden batten
I 20mm x 300m Wooden batten
J 20mm x 140mm Wooden batten

Figure 65. St James Theatre heritage façade viewed from Lorne Street, 2025.

Figure 66. St James Theatre heritage façade viewed from Lorne Street, 2025.

5.5 Summary of Design Outcomes

Figure 67. Visualisation of the St James Theatre site following the completion of the proposed intervention.

The design interventions — the Torii Pathway, Lamp Tower, and open deck — collectively transform the St James Theatre site from an inaccessible void into an activated public space. By establishing a new pedestrian route between Queen Street and Lorne Street, the Torii Pathway improves safety, accessibility, and visibility while drawing people back into the site. The Lamp Tower and elevated deck introduce opportunities for gathering, resting, and informal social interaction, enhancing the site's presence both during the day and at night.

Together, these elements reframe the heritage façade not as a closed-off remnant but as a public-facing asset. They invite visitors to enter the site, support community events, and encourage continuous occupation — key factors in revitalising an area previously associated with neglect and trespassing. The outcome demonstrates how lightweight, craft-informed interventions can meaningfully impact urban well-being by improving safety, fostering community engagement, and reconnecting people with a historically significant place.

Chapter 6: Detailed Design and Design development

6.1 Introduction to Detailed Design and Design development

This section presents the detailed design and design development of two key outcomes — the *Torii Walkway* and the *Lamp Tower*. Both designs were shaped through a reflective process that responded to the existing site conditions, heritage context, and regulatory constraints. Together, they demonstrate how the theoretical and material explorations discussed in previous sections translate into built form, expressing the principles of temporal adaptive reuse through craftsmanship and structural experimentation.

6.2 Integration of modern technology ~ Development of Ishibadate Inspired Technique and Nuki-joint structure

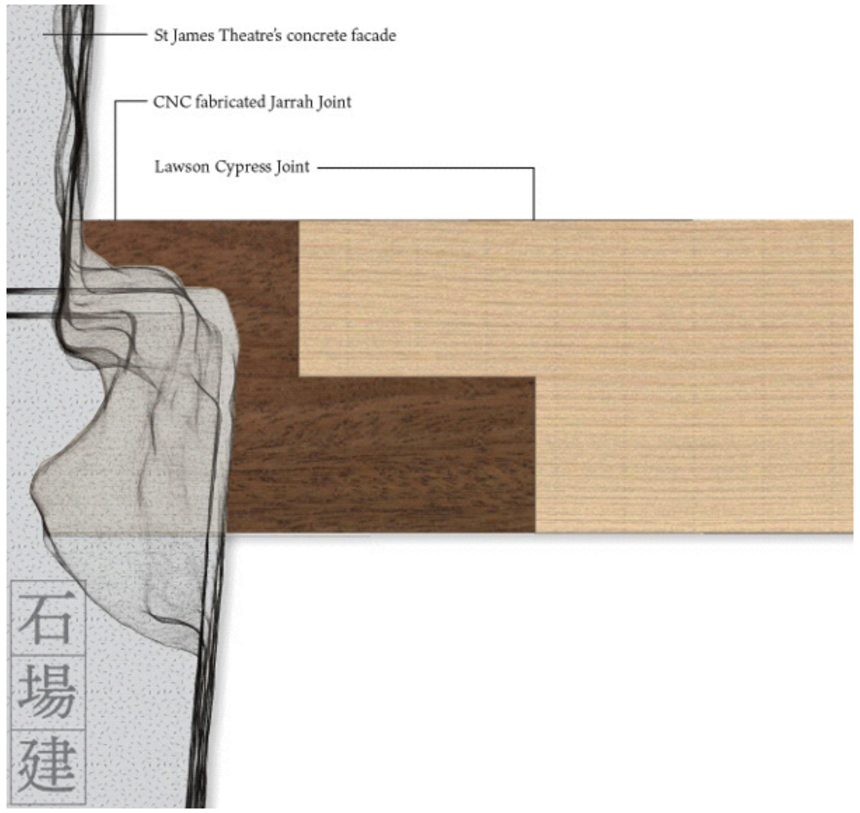


Figure 68. Conceptual application of an Ishibadate-inspired connection system onto a 3D-scanned section of the St James Theatre façade.

This project reinterprets the traditional Japanese Ishibadate technique to create
a non-invasive structural interface between a temporary wooden intervention and the heritage façade of the St James Theatre in Auckland.

Historically, Ishibadate technique involves placing a wooden column directly onto a natural stone footing. The base of the timber is hand-shaped to match the unique surface of the stone, ensuring a stable fit.
This technique reflects a deep sensitivity to material, site, and craft—creating structural integrity without relying on modern fasteners.

In this project, the principle of Ishibadate is adapted and applied not to the ground, but to the vertical surface of the theatre's façade. As shown on *Figure 68*, the intention is to connect a new timber structure to the existing heritage architecture without damaging it. To do this, the façade is first 3D scanned using photogrammetry tools, capturing its surface geometry in high detail. This data is then used to produce a digital model, which informs the CNC fabrication of timber components precisely shaped to fit the contours of the façade.

By transferring the Ishibadate logic to a vertical application, the intervention forms a careful and deliberate connection—supporting itself by form rather than force. This method enables the creation of a structure that is temporary, reversible, and materially honest, offering a respectful way to inhabit the space between old and new, tradition and innovation.

6.3 Exploring 3D Scan

Introduction

To acquire accurate 3D data essential for applying the Ishibadate technique through modern technologies, I explored a range of 3D scanning methods using different tools and software. This section discusses the process, findings, and challenges encountered throughout this exploration.

Initial testing with Lidar scan

The initial 3D scanning tests were conducted using a smartphone application called Kiri Engine. This app is compatible with smartphones equipped with LiDAR cameras; for this experiment, I used an iPhone 12 Pro.

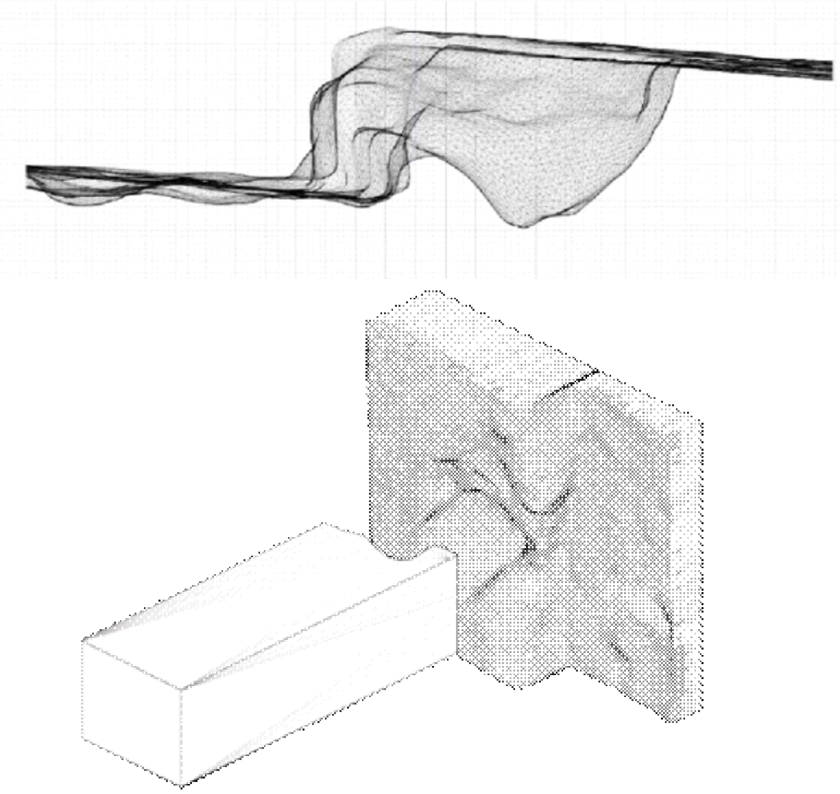


Figure 69. Transformation of 3D scan mesh data into an accurate digital model of the heritage façade.

Figure 69 shows a 3D-captured model imported into Fusion 360. The textured scan data was used to create an accurate 1:1 sectional model representing the façade condition of the St James Theatre, allowing detailed analysis of surface irregularities and potential connection points for the proposed timber intervention.

This digital model also served as a reference for the precise CNC fabrication of timber elements, ensuring that each component matched the exact curvature and geometry of the captured façade..

The 3D scanning process using KIRI Engine was completed efficiently despite having no prior experience with 3D scanning technologies.

This demonstrated the accessibility of contemporary photogrammetry workflows and highlighted their potential as practical tools for documenting existing heritage structures and supporting digitally assisted fabrication processes.

Figure 70. Tectonic model demonstrating the relationship between a CNC-milled Ishibadate-inspired timber connection and a 3D-printed façade model.

Figure 71. 3D scanning of the St James Theatre façade using the Creality Raptor X scanner. Photograph showing Lucky Singh conducting the scanning process.

Advanced 3D Scan with Creality Raptor X

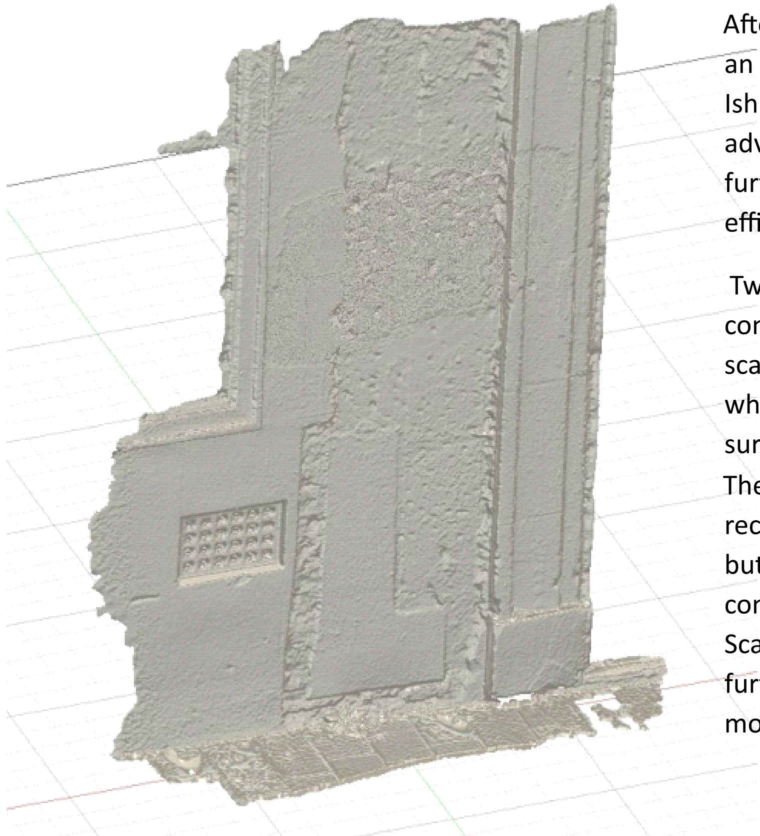


Figure 72. 3D model of the St James Theatre façade generated from Raptor X scan data.

After recognizing the potential of 3D scanning as an effective method for implementing the Ishibadate technique, I arranged access to an advanced 3D scanner, the Creality Raptor X, to further explore the possibilities of achieving more efficient and accurate data capture.

Two different types of scanning were conducted using the Creality Raptor X. The first scan employed the blue light / blue laser mode, which enabled the capture of high-definition surface details suitable for precise modelling. The second scan utilised the infrared mode to record a larger surface area with lower resolution but broader coverage. After both scans were completed, the datasets were merged in Creality Scan 4 and exported as an OBJ file, allowing further refinement and editing in other 3D modelling software.

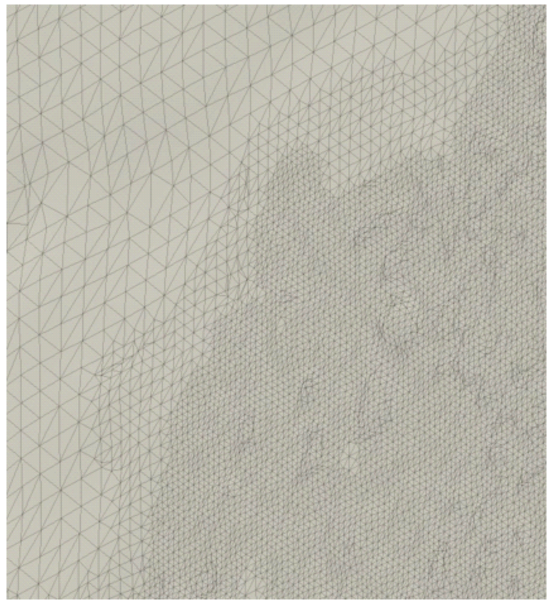


Figure 73. Detailed comparison between blue-light scanning and fast infrared scanning within the captured façade model.

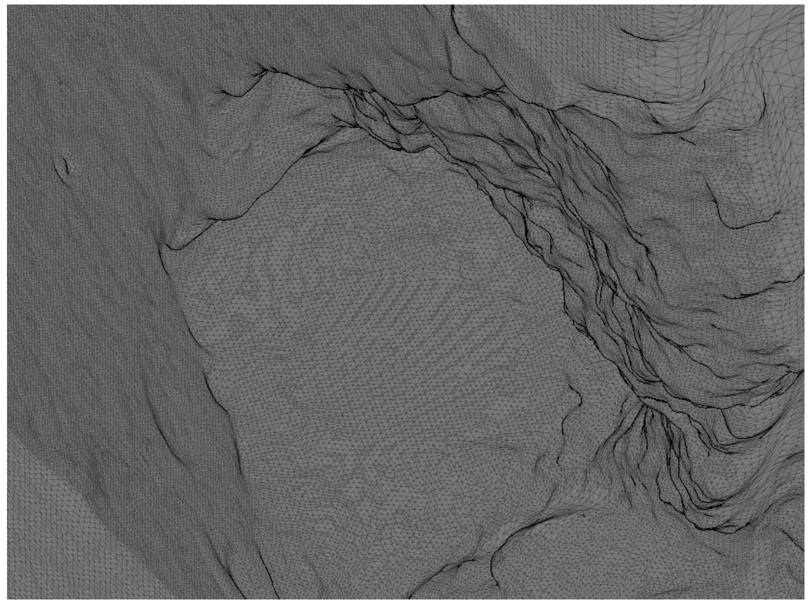


Figure 74. Alternative view of the 3D-scanned heritage façade model.

Figure 75. 3D model of the St James Theatre façade generated using RealityScan.

Rapid photogrammetry Scan 3D Scan using Drone and camera

This particular method was not something that I initially planned to do, but it was used as an alternative solution to conduct a 3D scan is a scenario when Raptor X was not usable. After gaining a formal permission from site owner for me and two other technicians from AUT, Lucky Sign and Mark Rous to conduct site research, we took two Raptor X 3D scanner to scan as much surface area during the duration of 3 hours.

However, upon arriving at the site, we discovered that the actual conditions were quite different from what we had anticipated. A large water pond had formed near the façade, which was not visible from outside the barriers surrounding the site. At the time, we were unaware that this area had been designated as a floodplain, which later explained the accumulation of water. Due to this unforeseen situation, it became impossible to approach the façade directly, as doing so would have risked damaging the 3D scanner and posed potential safety hazards within the active construction site.

As an alternative approach, we decided to capture multiple photographs of the façade from various angles and positions. These images were later merged using a photogrammetry software called Reality Scan to generate a 3D model. In addition to using a conventional high resolution camera, I also employed a drone to photograph areas that were too high to capture from the ground. By taking these strategies, we successfully managed to create a 3D models.

Figure 76. DJI Mavic Air 2 drone used to capture aerial photographs for photogrammetric modelling.

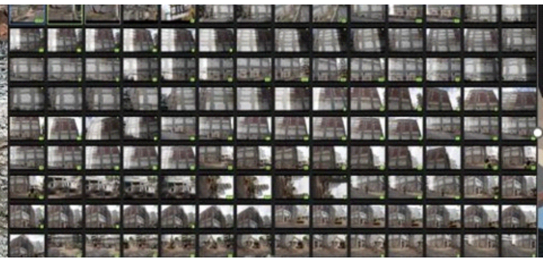


Figure 77. Series of aerial photographs captured for RealityScan photogrammetric processing.

Figure 78. 3D model generated from aerial photographs using RealityScan.

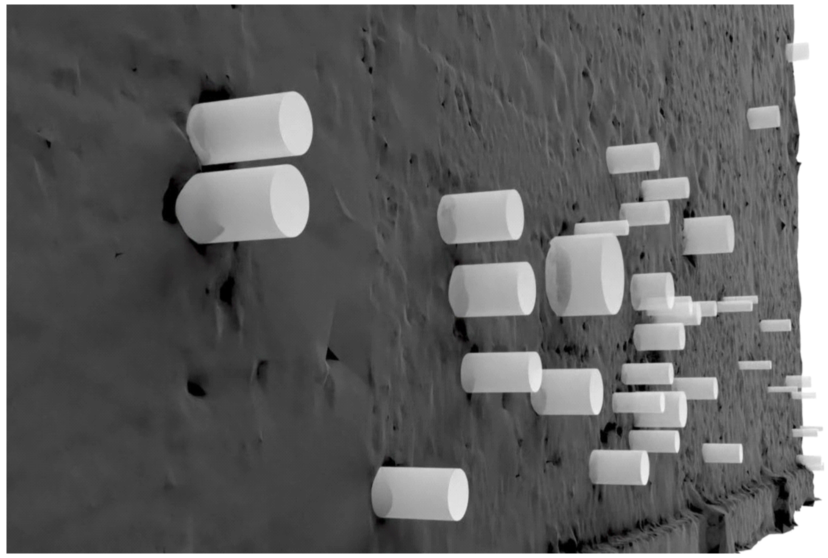


Figure 79. Digital model highlighting areas of deterioration identified within the heritage façade.

The 3D model generated in Reality Capture was imported into Rhino for analysis, allowing me to examine the patterns and locations of façade deterioration in greater detail.

Figure 79 shows a 3D-printed model of the St James Theatre façade, which was created using the textured model obtained from the photogrammetry-based 3D scanning process. The white light projections on the model highlight the areas of significant surface damage, as identified through the 3D scan analysis.

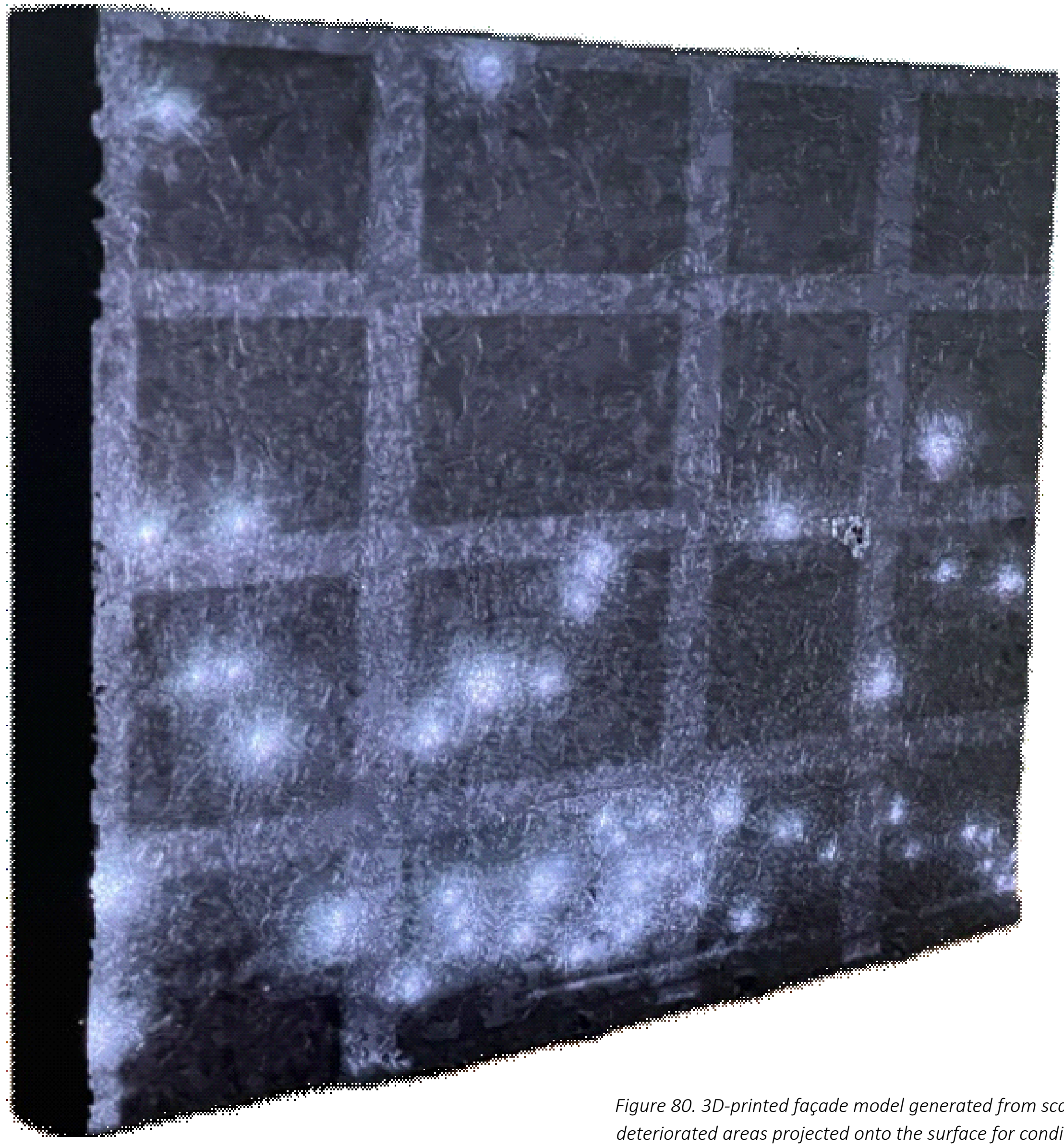


Figure 80. 3D-printed façade model generated from scan data, with deteriorated areas projected onto the surface for condition analysis.

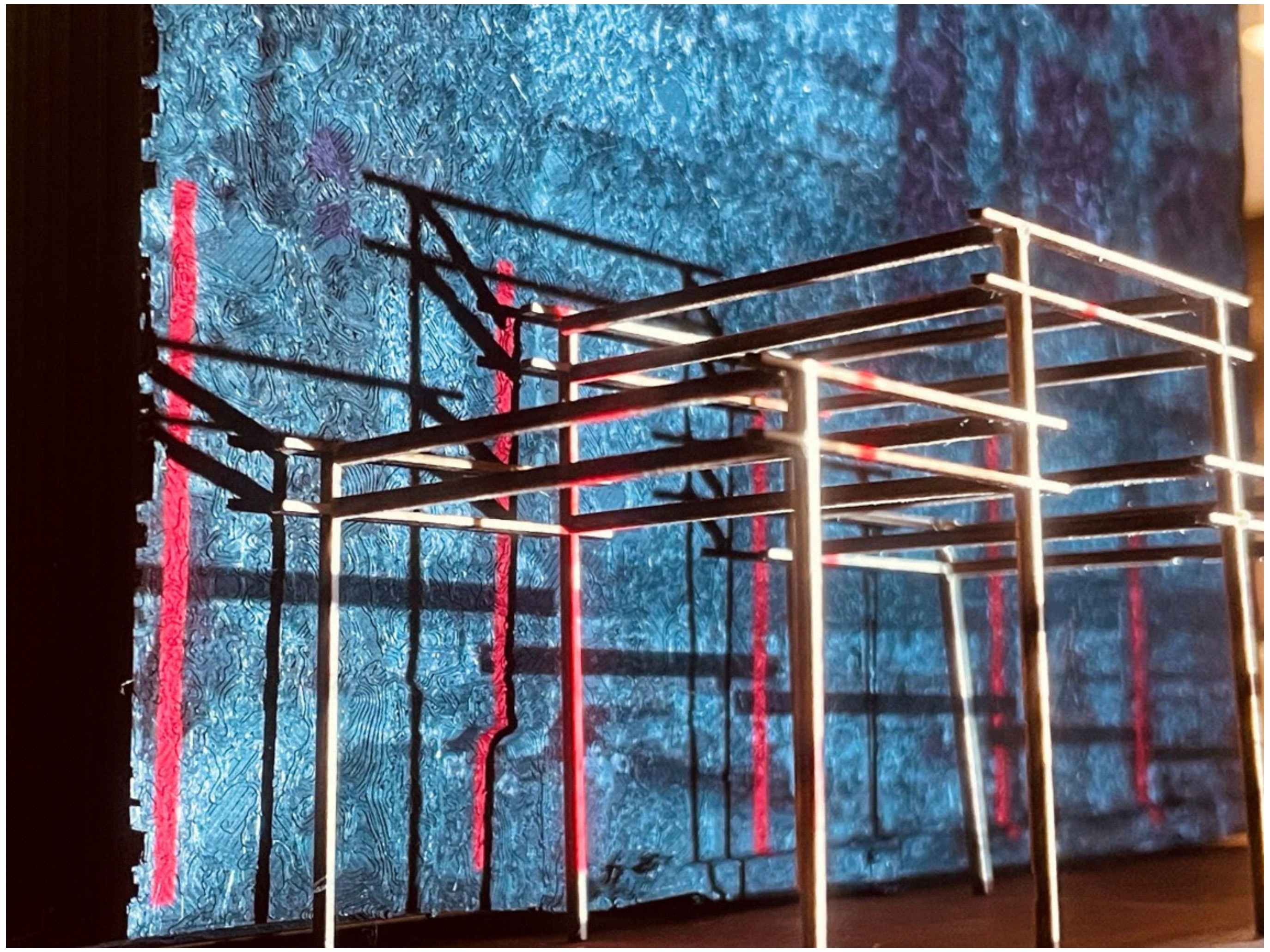


Figure 81. 3D-printed heritage façade model and Kigumi structural model used to explore the relationship between the existing building and the proposed intervention.

I conducted three different types of 3D scan for this research.

- Easy, quick 3D Scan with smartphone application
- Advanced 3D Scan using professional level 3D scanner
- Rapid photogrammetric scan using drone and camera

Through these experiments, I found that the most practical approach for applying the Ishibadate technique is to begin with photogrammetric scanning to gain an overall understanding of the building's condition, followed by a high-precision scan using the Creality Raptor X to capture detailed data in the specific areas where the Ishibadate system will be implemented.

6.4 Further Development of Ishibadate system

Because each end of the Ishibadate beam is custom fitted to a specific position along the façade in this application of the *Ishibadate* technique, it must be installed with precise alignment to its designated location. The tolerance during attachment must be minimized to ensure that the beam interfaces accurately with both the existing façade geometry and the structural rhythm of the new timber system.

Despite the availability of advanced 3D scanning technologies and highly precise CNC fabrication methods, achieving perfect alignment between timber columns and their foundations remains a challenge in real construction practice — particularly when working with natural wood. Variations in moisture content, grain orientation, and site conditions introduce subtle discrepancies that cannot be fully predicted or eliminated through digital processes alone.

Traditional Japanese carpenters addressed such irregularities intuitively through their craftsmanship and deep understanding of the natural behaviour of materials. Each component was carefully adjusted and fitted to its counterpart with remarkable precision, achieved not through mechanical measurement but through sensory awareness and experience. However, in the contemporary New Zealand construction context, this level of craftsmanship is rarely encountered on site. The building process today is largely dependent on modular, mass-produced industrial components that are designed for efficiency and rapid assembly. While this approach achieves high dimensional accuracy, it often lacks the adaptive precision and sensitivity to material variation that characterised traditional construction methods which does not fit well with precise Kigumi joinery techniques.

This thinking has led me to develop more adjustable structure that can work flexible on the site without difficulty.

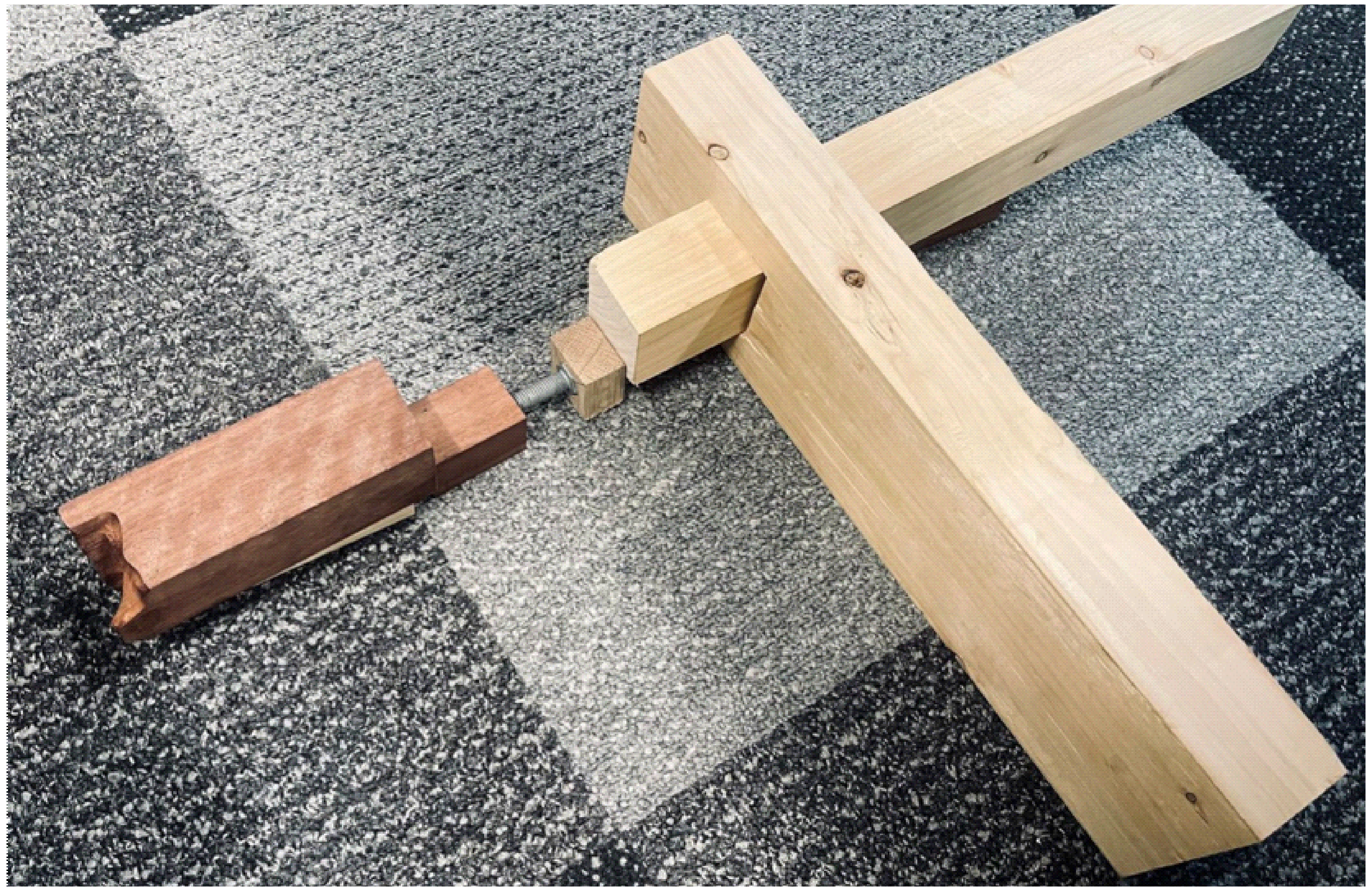


Figure 82. Prototype of the adjustable Nuki joint system.

6.5 Development of Adjustable Joint system

To minimise the tolerance and the gap between the new timber structure of Torii walkway and the existing façade while still using natural timber instead of engineered LVL timber, I developed an adjustable joint system.

This system was designed in response to the inherent irregularities of both the site conditions and the material itself. Each beam end was custom fabricated to match a specific position along the façade, but because both the existing masonry surface and the natural timber vary in dimension and alignment, precise on-site adjustment became essential. As shown on *Figure 83,* he adjustable joint enables fine calibration during installation, allowing the beam to extend or retract manually by up to 100 mm along the X-axis from its original length.

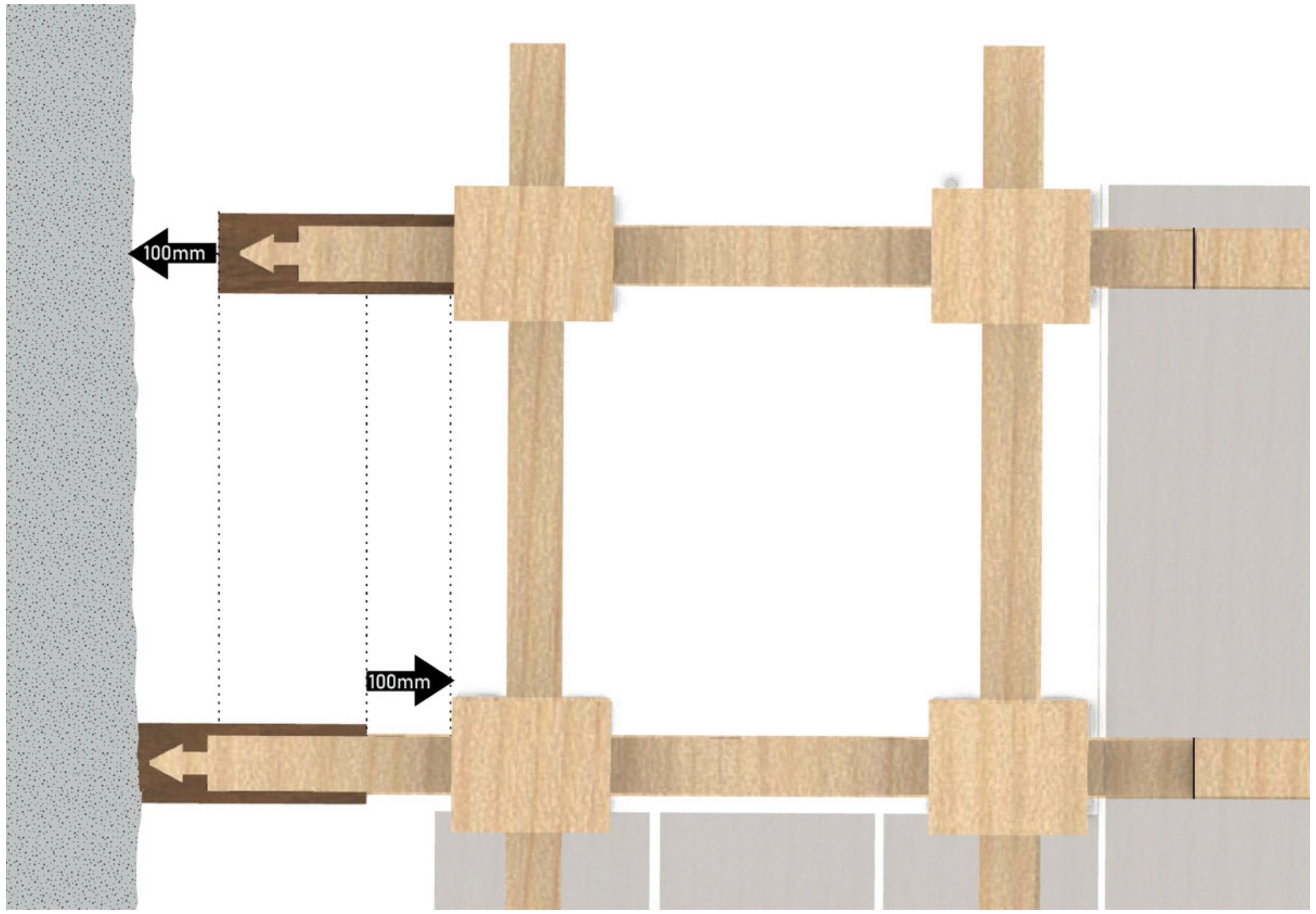


Figure 83. Refined mechanism of the adjustable Nuki joint system.

This approach not only enables precise fitting between new and existing elements but also reduces material waste by allowing small discrepancies to be corrected on site rather than requiring re-fabrication. As a result, the system bridges the precision of digital fabrication with the adaptability of traditional craftsmanship, embodying a construction logic that is both efficient and responsive to the material and spatial conditions of real construction.

Detailed Mechanism of Adjustable Nuki-joint Structure

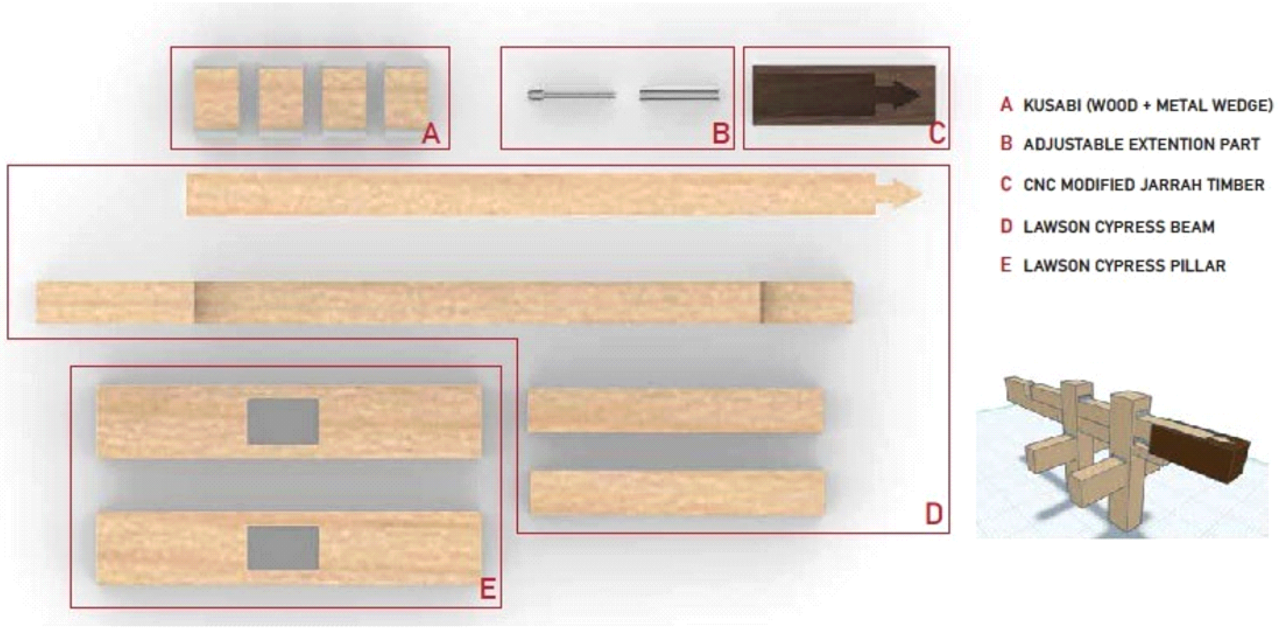


Figure 84. Components required for the assembly of the adjustable Nuki joint system.

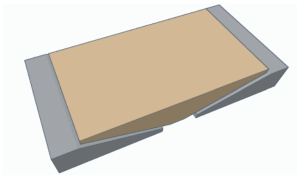


Figure 85. Kusabi prototype inspired by the wedge connection system used in the Oo-Yane Ring structure.

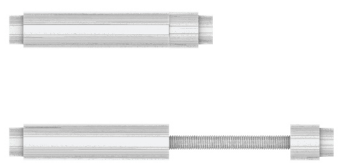


Figure 86. Adjustable extension component of the Nuki joint system.

Figure 87. Prototype of adjustable extension component of the Nuki joint system.

Part A is a Kusabi (wedge), which acts as the tightening component within the Nuki joint system. It consists of a timber wedge and two metal wedges that apply opposing pressure to secure the joint, enhancing the structural stability, durability, and long-term performance of the assembly.

Part B functions as the core adjustable element of the system — a manually operated extension mechanism that allows the beam length to be precisely adjusted, enabling accurate attachment to the existing façade.

Part C is a CNC-milled Jarrah timber component that connects to Part B through a Kigumi joinery technique.

Parts D and E are assembled to create the primary structural framework, forming the intersection between the beams and columns.

Figure 89 shows assembly of these parts forming the adjustable nuki-joint structures used for Torii Pathway.

Figure 88. Final Torii Pathway structure developed with the adjustable Nuki joint system.

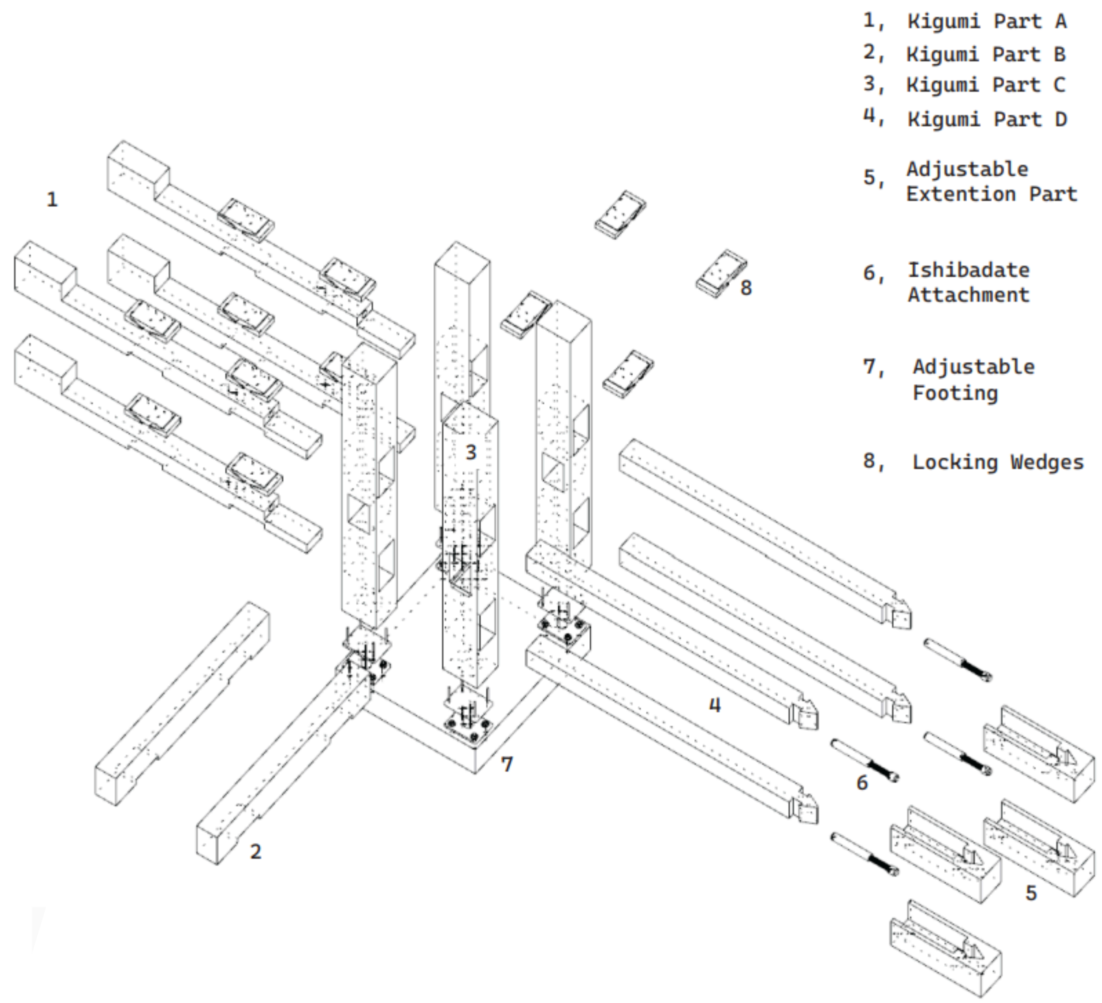


Figure 89. Assembly process showing the integration of individual components within the adjustable Nuki joint system.

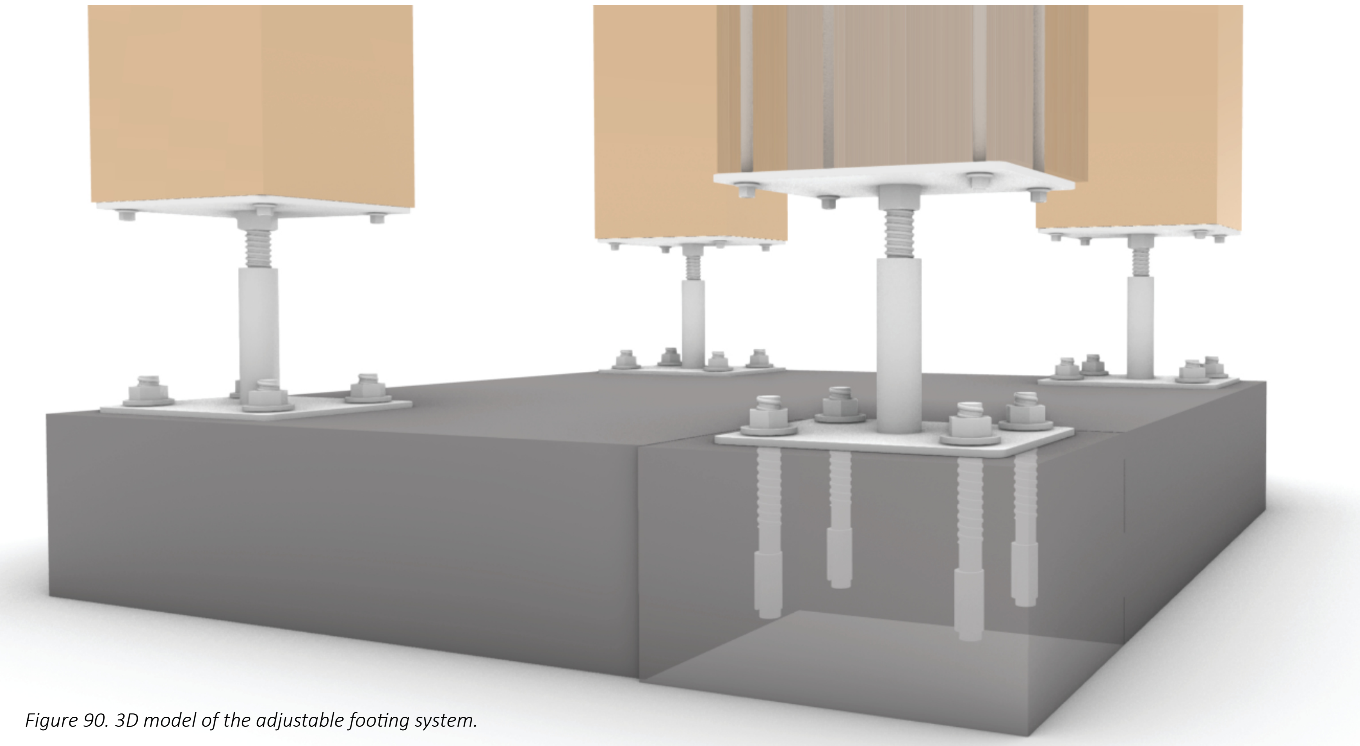


Figure 90. 3D model of the adjustable footing system.

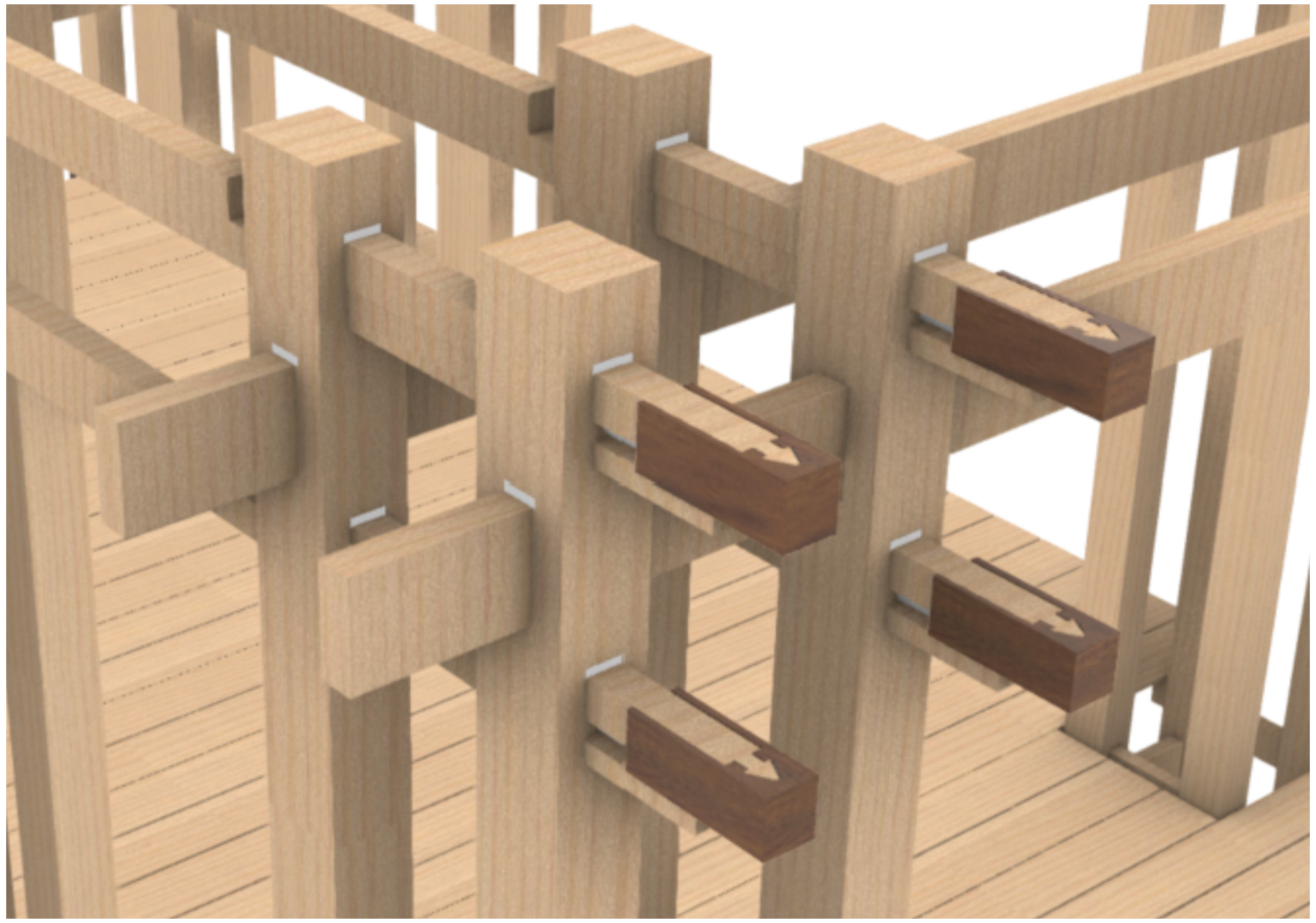
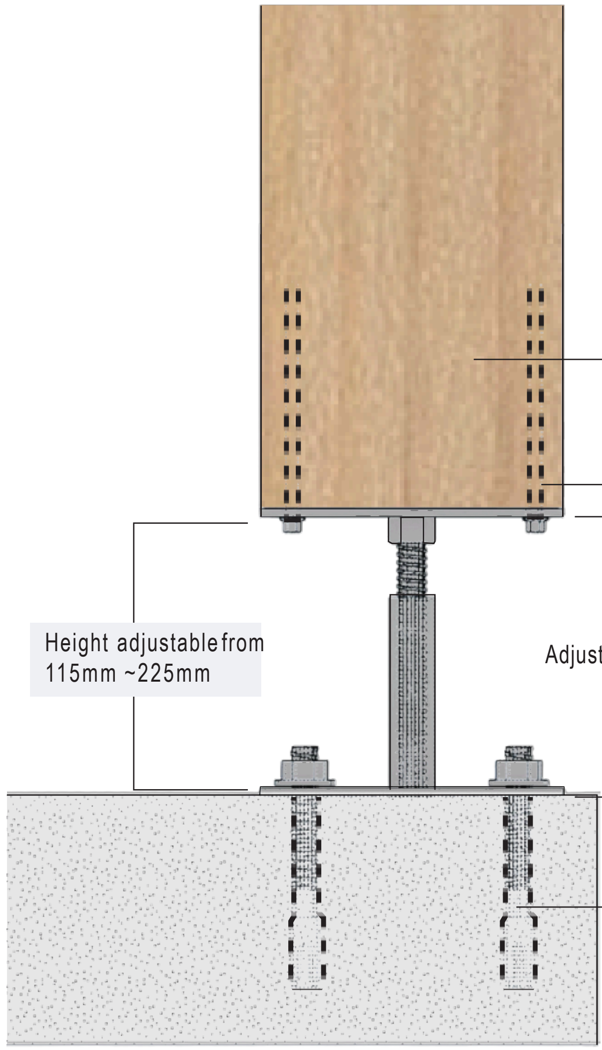


Figure 92. 3D model of the adjustable Nuki joint system.

While the adjustable *nuki* joint provides horizontal (x-axis) adjustment, the adjustable footing introduces vertical (y-axis) calibration, offering an additional layer of flexibility. Together, these mechanisms enable more precise alignment and support a more accurate attachment of the Ishibadate beam end.



Scale - 1:1

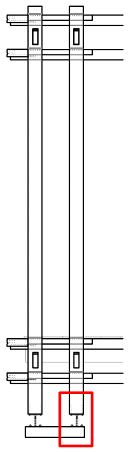


Figure 91. 1:1 detail drawing of the adjustable footing system.

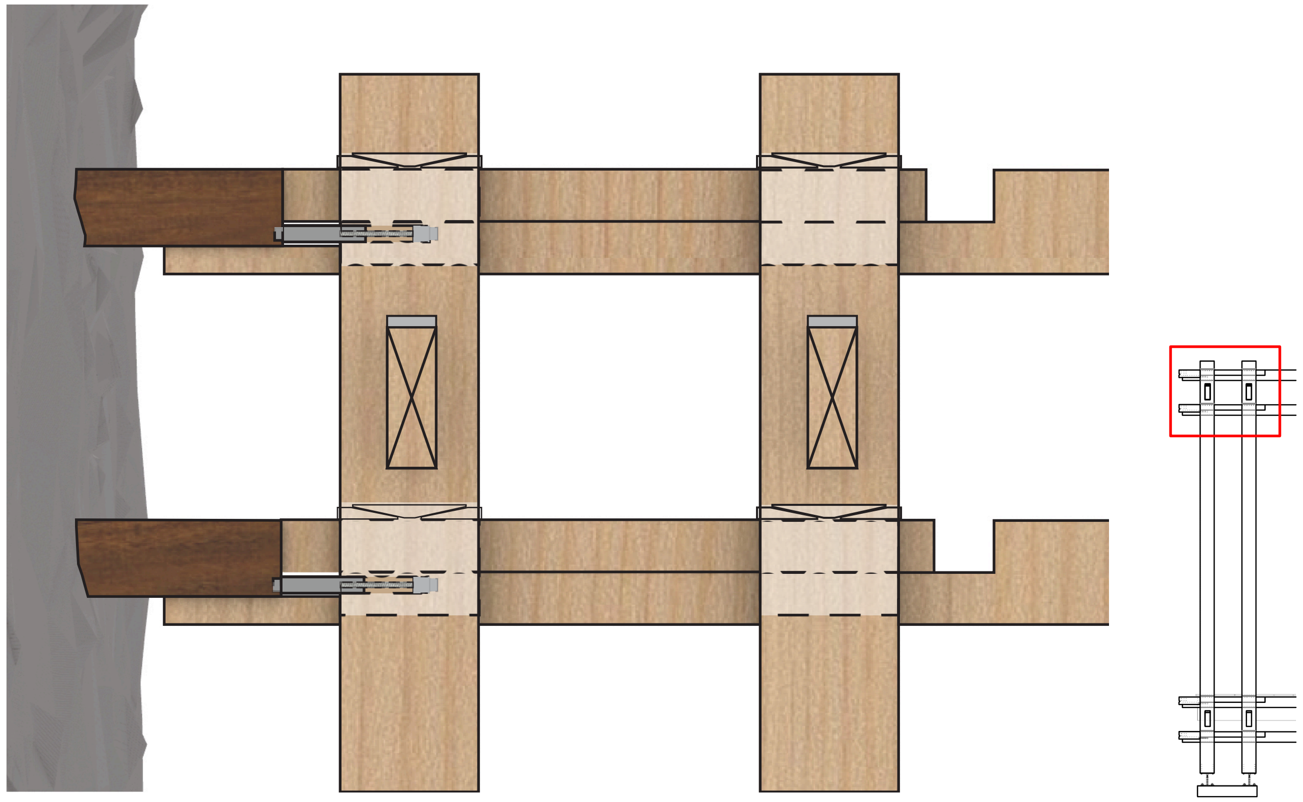


Figure 93. 1:1 detail drawing of the adjustable Nuki joint system.

6.6 Patina and Wabi-sabi, further use of Ishibadate technique and Kigumi Structure

The *Ishibadate* technique not only addresses the practical and legal challenges of attaching new timber structures to a heritage wall but also preserves the existing surface texture of the historic fabric. By avoiding invasive fixings, the weathered concrete of the St James Theatre remains visible rather than concealed—allowing its patina to be understood as a record of time rather than a flaw. Through the aesthetics of *wabi-sabi*, such irregularities, stains, and traces of age are appreciated as part of the architecture's quiet beauty and ongoing material life.

In this sense, the approach resonates with the philosophy of *kintsugi*, which highlights cracks in ceramics to honour their history. Similarly, Ishibadate becomes a method of celebrating imperfection and accumulated memory, acknowledging the heritage façade without erasing its ageing surfaces.

Looking beyond Stage 2 of this project, this interpretation opens further opportunities for expanded application. After the dismantling of the modular *kigumi* structure, the timber components could be recombined with fragments of removed heritage concrete through a more experimental use of the Ishibadate system. These hybrid materials could be transformed into furniture, public seating, landscape elements, or small monuments—allowing the theatre's material identity to continue in new contexts once the temporary interventions are removed.

Positioning this as a post–Stage 2 development highlights a longer-term vision for the project: one that supports cyclical material reuse, extends the life of heritage elements, and encourages new forms of public engagement. Instead of preserving the theatre only in its original form, its material memory evolves, reflecting a deeper approach to heritage that embraces time, impermanence, and material transformation.

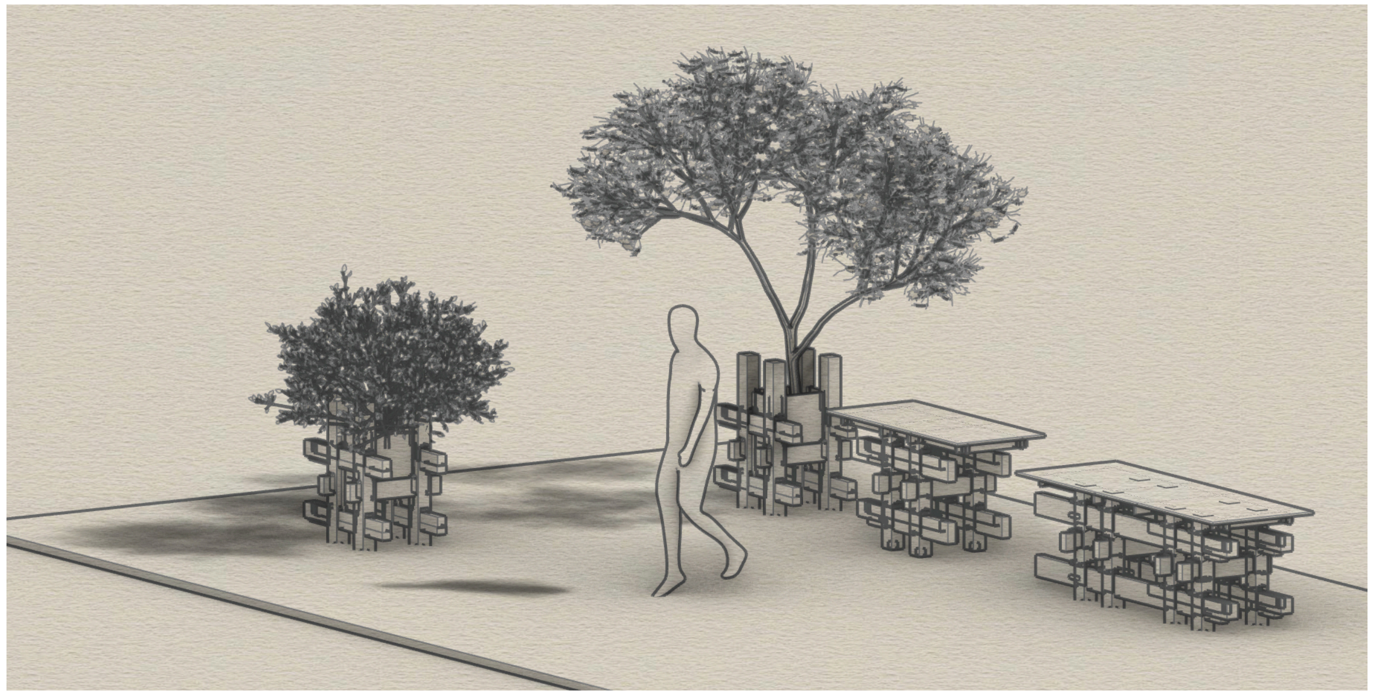


Figure 94. Reuse of Kigumi structural components as furniture following the end of the intervention's service life.

Chapter 7: Conclusion

7.1 Introduction

Throughout the research process, continuous experimentation and testing offered me numerous insights — not only in terms of architectural understanding, but also in terms of personal growth and reflection.

7.2 Key Findings

Design Process: Material-First Approach

After establishing the theoretical framework for my project, I shifted my focus toward material exploration and the study of traditional construction techniques. This represented a new direction for me, as in most of my previous projects at AUT, the design process typically began with concept generation, site analysis, and spatial development, with material exploration occurring only in the later stages.

Following a brief site analysis, I focused exclusively on Japanese joinery techniques and material experimentation, which allowed me to formulate a new set of conceptual and practical "tools" — strategies that provided unique yet effective ways to adapt to the specific conditions of the site. This decision was inspired by insights gained from studying traditional craftsmanship, particularly the understanding that joinery systems such as Kigumi were originally developed to respond to local site conditions using the limited materials available within the surrounding environment.

Engaging in hands-on making by physically constructing Kigumi joints offered a deeper understanding of these structures, not only from a designer's point of view but also from the perspective of the craftspeople and builders who would assemble them in real life. It was also highly valuable to receive feedback and advice from woodworking technicians and professional builders, especially regarding material selection, structural integrity, and fabrication techniques.

In today's globalized economy, it might seem easy for an architect to suggest using imported materials from Japan to ensure high-quality timber. However, such an approach presents several issues, including a higher carbon footprint from transportation, increased labour costs, and overall reduced sustainability. Instead, this project advocates for a locally grounded approach — applying Japanese joinery logic to New Zealand timbers and contexts, bridging traditional knowledge with local materials and craftsmanship.

Integration of Modern Technology for design and making

I have always carried a sense of wonder and curiosity toward modern technologies and tools that expand the possibilities of design thinking and methodology. As a student in 2025, I am fortunate to have access to equipment and digital fabrication tools that, only a few decades ago, were available exclusively for industrial use. The rapid advancement of these technologies offers an incredible opportunity for us as designers to experiment, innovate, and bridge the gap between traditional craftsmanship and contemporary digital processes.

However, although these technologies have become more accessible, it was also challenging to understand their appropriate applications, which is something I could only achieve through ongoing experimentation and hands-on testing. For example, the 3D scan methods that I used each had some difficulties, even with the advanced Raptor X 3D scanner.

Tools like 3D scanners, CNC machines, laser cutters, and 3D printers can execute tasks with extreme precision. However, true design quality still depends on a craftsman's philosophy — a sensitivity to material, patience in process, and respect for detail that technology alone cannot replace.

There is also significant potential for the proposed techniques to be executed far more efficiently in the future as construction technologies evolve and become more widely accessible.

間 (Ma)

This research began with the intention of revitalising an underused heritage site and reopening it to the public—restoring its relationship with the local community and reviving the sense of care and connection the neighbourhood once held. Throughout this process, the Japanese spatial concept of *ma* has served as a central lens, shaping the theoretical framework, the design methodology, and ultimately the architectural outcomes.

According to Ma*: The design of Japanese Architecture (*間・日本建築の意匠*) by Yuichiro Kamishiro (1999)*, M*a* carries three interrelated meanings: the interval between pillars, a unit of spatial width, and the idea of a room or enclosed space (Kojiro, 2010).

These interpretations resonate directly with the design outcomes of this project. The Torii Pathway embodies *Ma* as the interval between pillars; the sequencing and spacing of its timber frames form a rhythmic spatial experience that guides movement and reconnects Queen Street and Lorne Street. The Lamp Tower expresses *ma* as an enclosed space, creating a small moment of interiority and pause within the site through its translucent timber lattice. Together, these structures activate the wider heritage grounds as a larger field of *ma*, transforming the site into a public "room" where gathering, circulation, and community events can occur.

In this way, the interventions are not disconnected additions, but physical manifestations of *Ma*—forms anchored respectfully to the heritage façade through the Ishibadate joint, symbolically and structurally linking the old and the new. The idea of temporal adaptive reuse itself also operates as a form of *ma*, bridging the period of vacancy and the anticipated future restoration of the St James Theatre (Kojiro, 2010).

My design approach, values, and cultural perspectives which are shaped by lived experiences across Japan and Aotearoa New Zealand also embody *Ma*, occupying an in-between space that negotiates two traditions of making, material thinking, and architectural meaning.

Through this research, my understanding of *ma* has grown beyond viewing it as a measure of physical distance or a spatial interval. It has come to represent a philosophy of relationship and transition: a way of thinking that connects time, place, material, and people (Kamishiro, 1999). In the context of this project, *ma* becomes a guiding principle for imagining how architecture can respectfully bridge the past and the future, transforming a neglected site into a space of care, continuity, and renewed community engagement.

7.3 Future Exploration ~ Future opportunity of application of Ishibadate technique on heritage building

I believe that the Ishibadate-inspired technique developed in this research holds significant potential for further exploration. Future studies could expand its applications while also improving the efficiency and precision of the procedures compared to the approach taken in this project.

In my design outcomes, the architectural forms were derived from traditional Kigumi joinery systems, combined with insights from modern architectural practices. These forms act as extensions of the heritage structure, carefully connected through the Ishibadate technique, symbolizing a respectful dialogue between the old and the new.

My intention was to utilize these traditional techniques to create spatial experiences that would not have been possible through conventional construction methods. While the resulting forms maintained a certain simplicity, they demonstrated the constructive and conceptual potential of this hybrid approach.

For future research, I suggest exploring structural optimization and computational design methods to generate more organic and complex forms that take full advantage of the Ishibadate system's adaptability. Through digital simulation and fabrication testing, this approach could lead to new structural typologies that merge craft-based logic with advanced structural integrity.

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