Strategic Report and Applied Technical Studies

A fragile architecture

University of Westminster
Module 4ARC717 and 4ARC719

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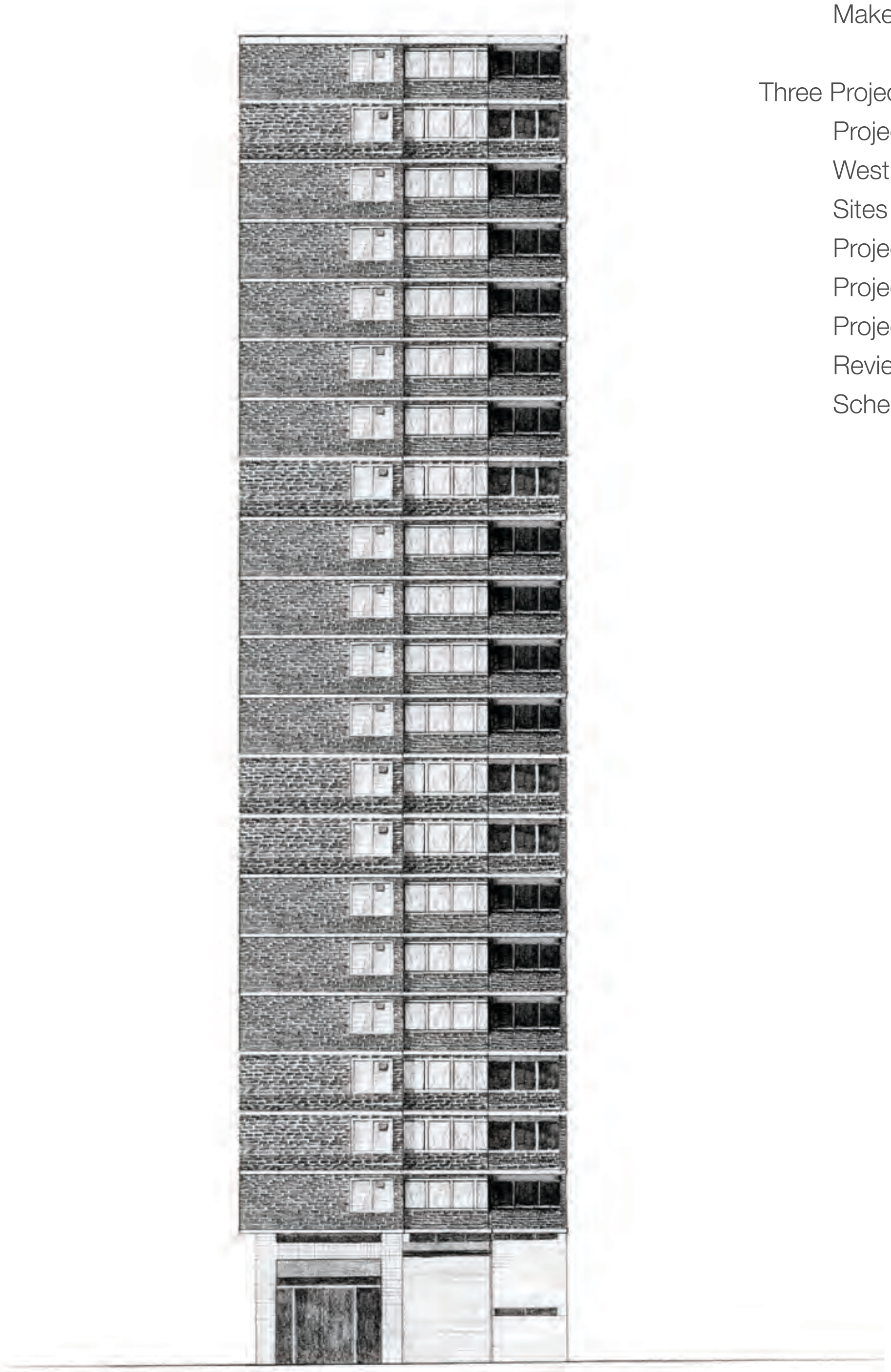
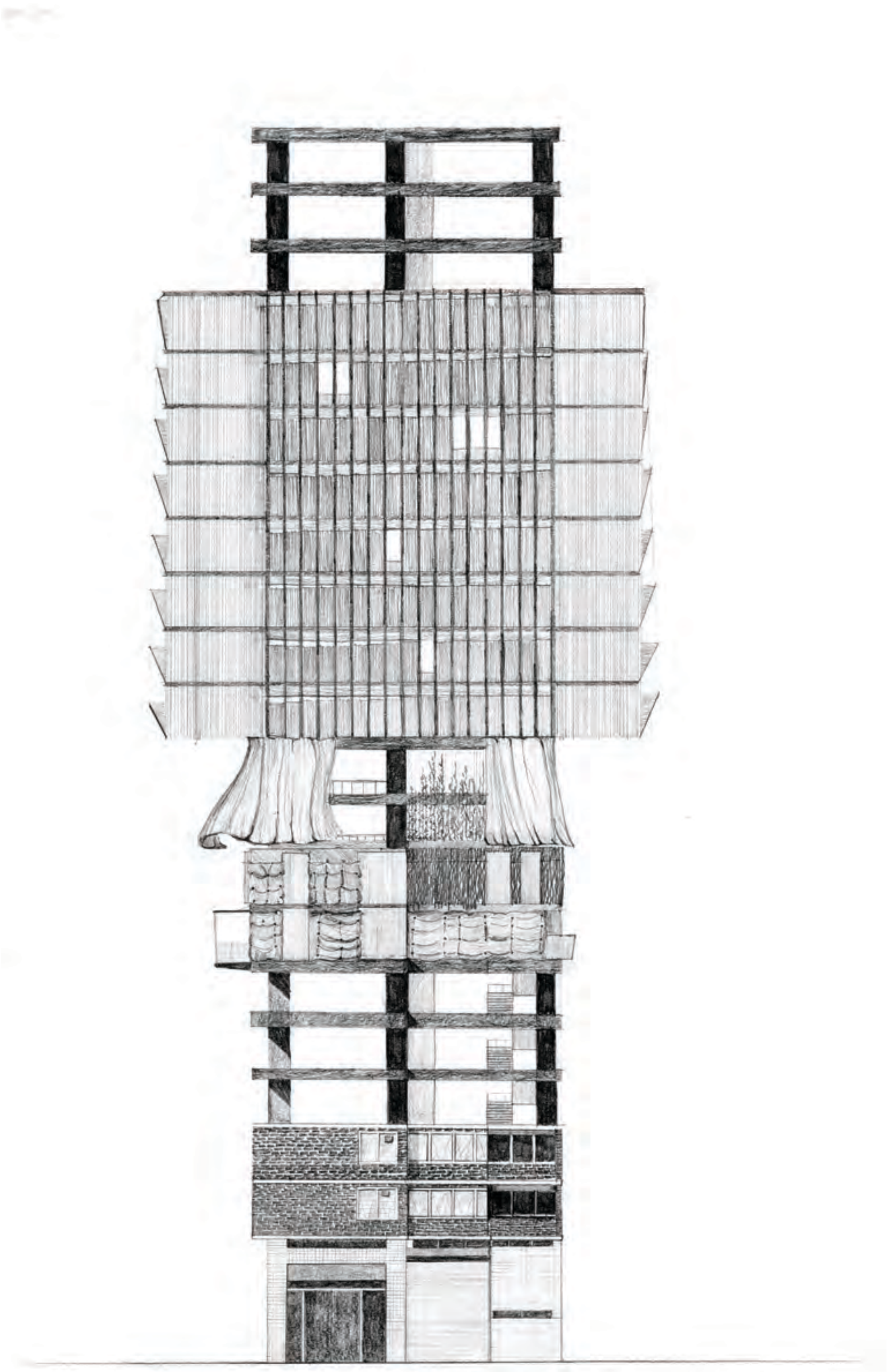


An early sketch of one of the existing Kipling Estate towers



The first sketch concept proposal for the modification of the Kipling Towers

1. Introduction

Design Studio Brief

Design studio 17 led by William Firebrace and Gabby Shawcross is interested in architecture based on time. The studio considers how the use of film techniques can help to consider an architecture that observes and responds to time, and is responsive to the effects of change, unpredictability and chance.

The site of the investigations and designs is West Bermondsey in South London. Located south of the Thames, high spec office developments and the London Bridge train lines, the area is typified by post war housing, mixed with more recent yuppie developments, abandoned warehouses, and large new office developments. This mix of wealth and poverty, and the effects on the urban form are explored in the introduction to the strategic report.

My main interest through the year, forming the thesis of investigation and interest was an architecture of fragility, and maintenance. All three studio projects were interested in the qualities associated with an architecture that is not robust; an architecture that is fragile and delicate; an architecture that changes with time; an architecture in which the effects of time are manifested in the appearance and form of the architecture itself.

Some thoughts by others on fragility and robustness in contemporary architecture

> The experience of a building depends on the way it is managed as well as how it is designed. - Whether it is authoritarian or democratic is not dependent on form or space alone.

Foucault, M. *Discipline and Punish* p372

> Architecture is expected to be solid, stable and reassuring - physically, socially and psychologically. Bound to each other, the architectural and the material are considered inseparable.

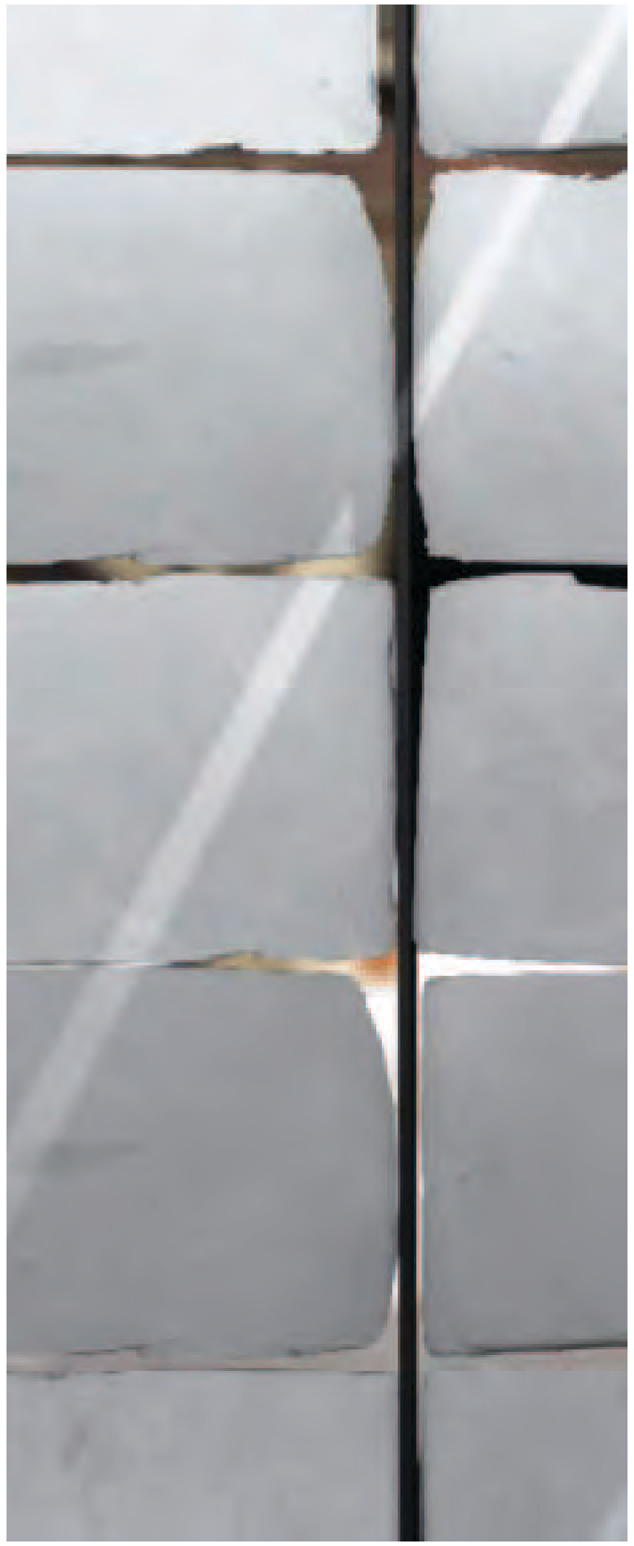
Hill, J. Immaterial Architecture p.2

> Architecture's task to provide us with our domicile in space is recognised by most architects, but its second task in mediating our relation with the frighteningly ephemeral dimension of time is usually disregarded.

Juhani Pallasmaa Hapticity and Time - Notes on Fragile Architecture

> The inevitable processes of ageing, weathering and wear are not usually considered conscious and positive elements in design. Consequently our buildings have become vulnerable to the effect of time, the revenge of time.

ibid,



Still from the film "A Waiting Room for Bermondsey" Fragile Plaster Panels

Makeshift, fragile architecture in Japanese culture

My interest in an architecture of fragility, came from my research into the architecture of Japan, and the culture from which it arose.

Many readings of the difference between Japanese and Western architecture are possible, and the cultural differences and remove of Japan and Japanese culture presents a challenge to the Western gaze. Despite its allure, this has, in the past, given rise to specious conclusions and assumptions that have not helped the Western world's understanding of the Japanese built environment, and which may have impeded its ability to appreciate the varied and impressive nature of Japanese architectural forms and practice. I would like to focus on a theme that some Western theorists have recognized, of the impermanent and imperfect, and the qualities of the ritualistic in Japanese architecture

> *"Tokyo is "makeshift and confused, a freak weed sprung from a crack in history, and drenched by a fertiliser that makes it monstrous but not mighty, immense but immoral, over-grown and uncivilized."*

Playwright Hal Porter's description of Tokyo from his short story The Actors: An image of the new Japan (quoted in Guy, S, 2010)

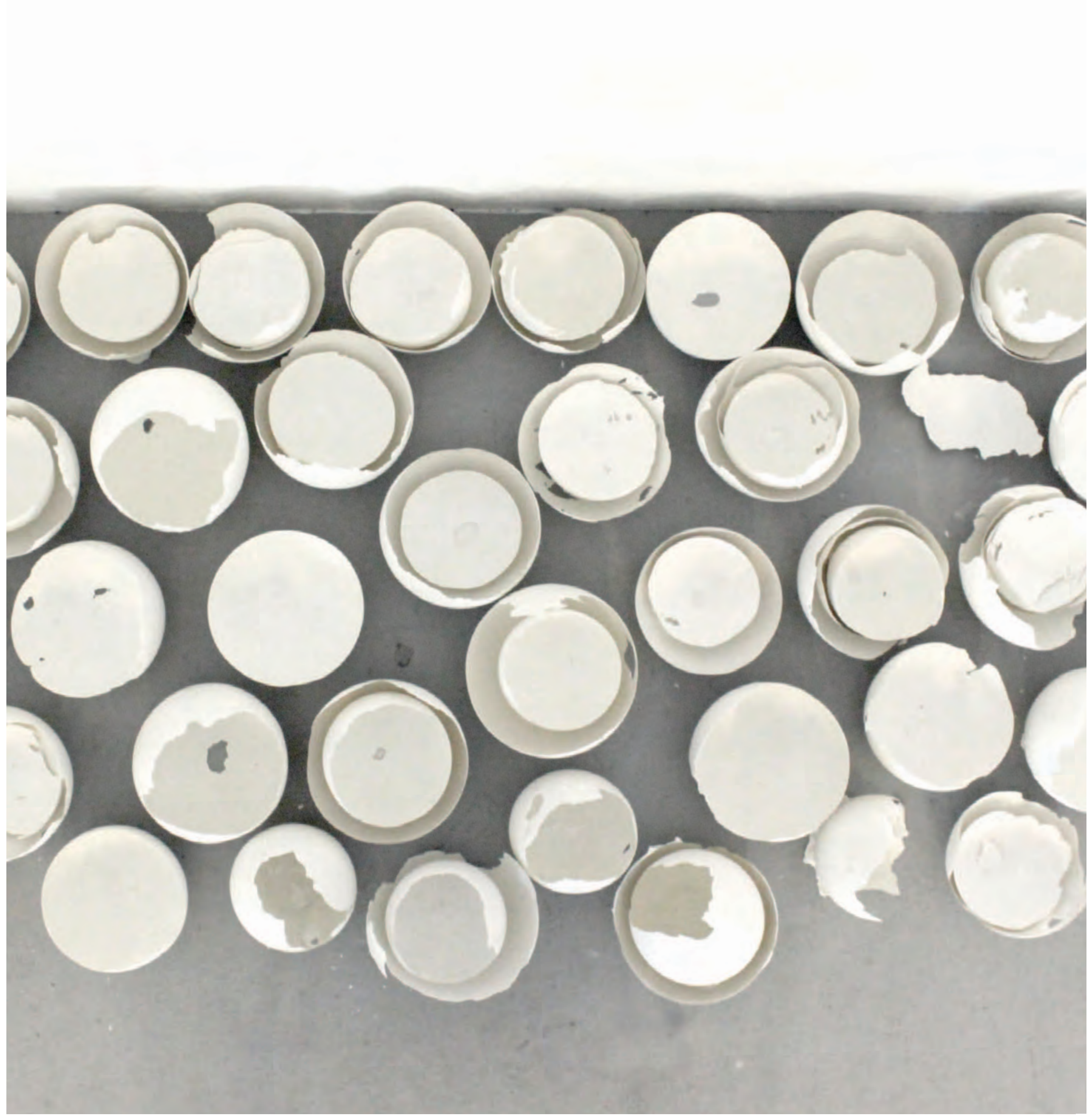
As exposed by playwright above the word 'makeshift' has negative connotations when considered from a western mindset. Sarah Chaplin describes it as "*something inherently less than fit for purpose, approximate, something that has an expediency in relation to the ideal solution that is desired*" in her essay Makeshift: Some Reflections on Japanese Design Sensibility. (Chaplin, S 2005 p79)

Chaplin puts forward a "*rereading of makeshift that establishes a different perception of the term, one less defined by its limitations and better able to capture all of the positive qualities associated with the temporary, the impermanent, the imperfect, the irregular, the perishable*." (Chaplin, S 2005 p79). Chaplin's essay stands in opposition to the western definition of makeshift as less than fit for purpose, something that is assembled quickly in place of something more suitable for what is required. Chaplin uses six examples of Japanese design sensibility in architecture, literature, diet, product design, graphics and urbanism to explain her idea of the Makeshift in Japanese design. Whilst this reading of Japanese architecture must be seen from the Western perspective from which it is written, the scope, and contextual nature of the essay reflects a greater contextual depth of thinking from the author.

I believe that the West can learn from Japanese architecture, particularly the architecture that has been developed in the past 20 years, during the collapse of the asset price bubble, which our own economic culture may mirror in the coming years. Japanese architects who have been in practice through the slow inexorable decline of the bubble economy have developed approaches to architecture that responds to the city in economic recession. By understanding the methods of contemporary Japanese architects, and being able to look beyond the pure aestheticism and eccentricities of their realisation, architects in the West can begin to change their methods to suit the changing social and economic worlds that they inhabit.

My dissertation explores a number of these approaches, and the design work presented here explores an architecture derived from my studies, a makeshift, fragile architecture.

It is said that owning an old Japanese house is like bringing up a child. You have to constantly buy new clothing for it. You must replace tatami mats, repaper sliding doors, restore rotten timbers on the verandahs – you can never leave the house unattended.



Quotation from Lost Japan by Alex Kerr (1996) Image Waiting shells from the project A Temporary Room for Westminster

Three Projects for a fragile, maintained architecture

Project 1 A Temporary Room for Westminster

The first project of the year involved the production of an intervention on the University of Westminster campus that fulfilled a purpose that wasn't currently provided for, or responded to a particular social issue that was manifested on campus.

My response was a Temporary Room for Westminster
(from the portfolio):
The Westminster campus is degrading. It is deteriorating, it is decaying. The robust materials of which it is constructed are disintegrating, crumbling. The building will not last forever. In fact, the building barely lasted 40 years before being extensively remodelled, and reinvigorated.
This project imagines an even more fragile architecture, and explores the qualities associated with this. By exploring fragile materials, and fragile buildings, we can make an architecture that responds better to its environment, informed by the way its appearance and form will change.

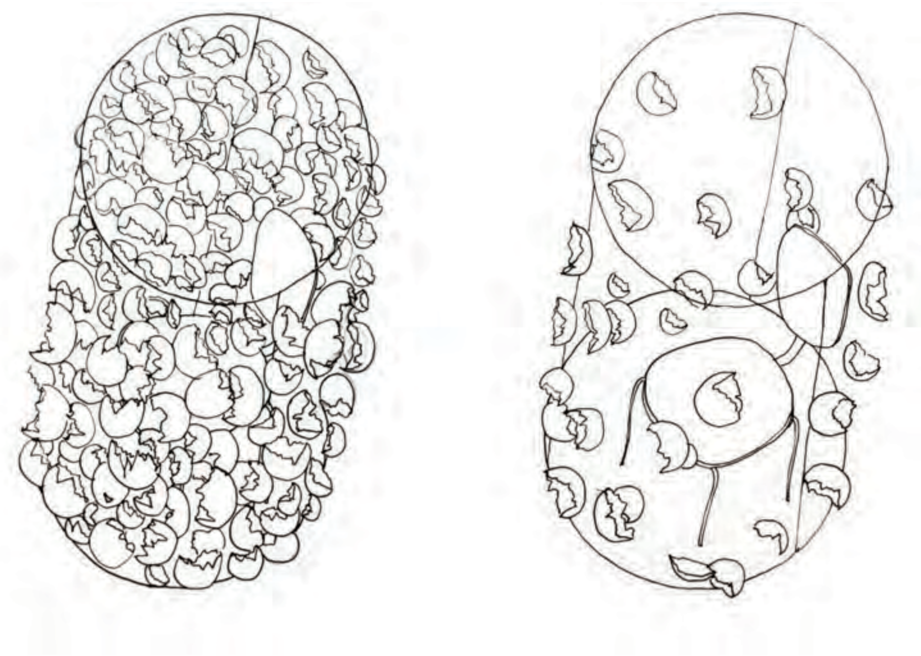
My proposal seeks an architecture that is "*able to capture all of the positive qualities associated with the temporary, the impermanent, the imperfect, the irregular, the perishable.*" *An architecture that is "fleeting yet potent, conditioned by aesthetic values that favour its necessary transitoriness*." [1]

The resulting architectural proposal was a small 'room', formed from a thin steel structure comprising two ring beams, and three columns, inside which an individual could sit. This structure was then clad in extremely delicate hanging elements, made of plaster, formed around balloons. These extremely fragile, delicate forms retain a significant materiality.

The development and construction of the temporary room is explored further in the technical report.

See Film 1 on the attached DVD

1 Chaplin, S. in "Makeshift: Some reflections on Japanese Design Sensibility"



Closing from the first film
a fragile, temporal room

West Bermondsey

Bermondsey: A changing neighbourhood
51° 29' 54.96" N, 0° 4' 32.52" W

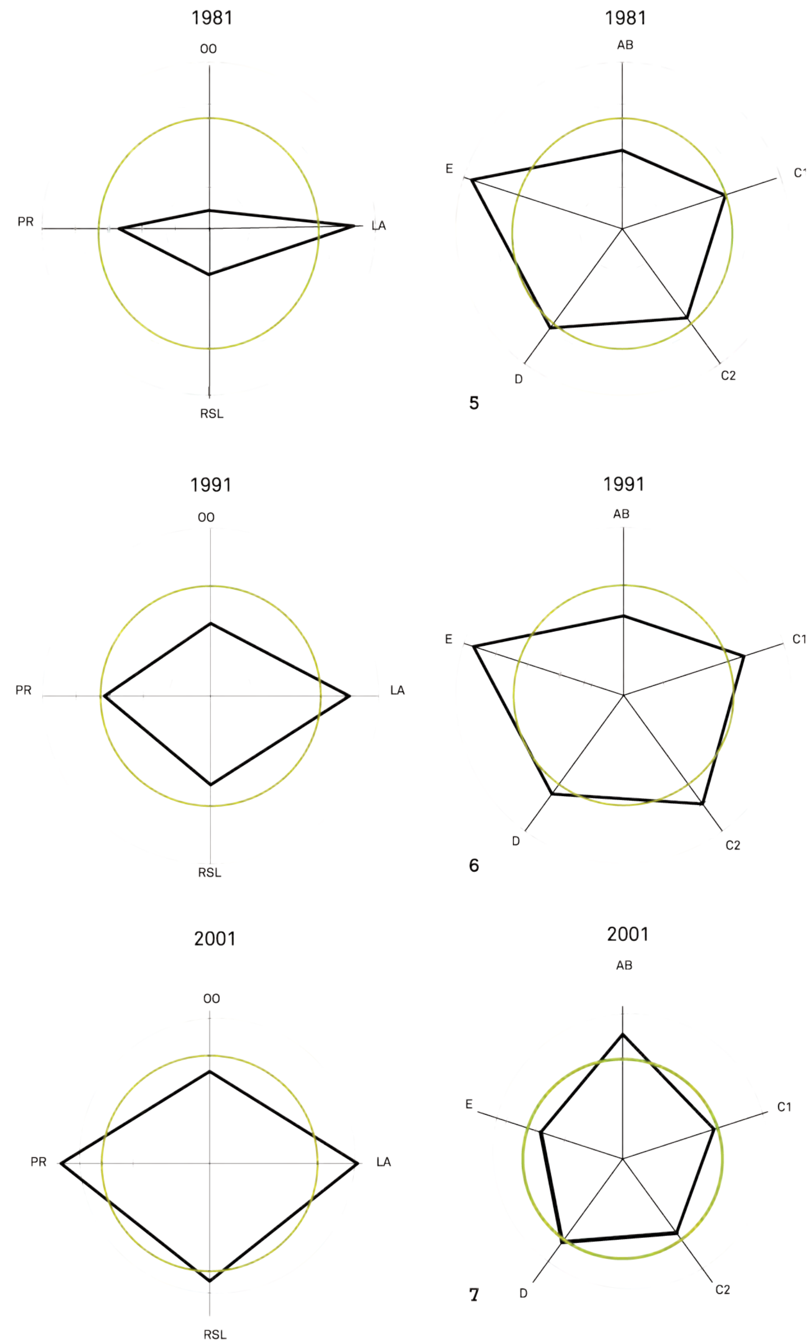
The character of Southwark, and Bermondsey in particular has changed enormously over the past few decades; once located visually by the brutalist presence of Guy's Hospital, apparently the world's tallest hospital, it is now marked by Shard London Bridge, for the moment at least, the tallest building in the European Union. These two buildings accurately reflect the social changes to the area, as well as the changing architectural and urban character of Bermondsey. The welfare statism defined by Guy's is reflected in Bermondsey's social tenure, with 39 000 rented and 16 700 leasehold homes under ownership of the council with a waiting list of 19000, representing London's biggest council housing landlord. [1] Alongside this, Irvine Sellar's Shard was approved in 2003 by the then home secretary John Prescott, at the height of the financial bubble of the 2000s, representing London's overbearing and somewhat disturbing obsession with international finance. It is not since the completion of Old St Paul's Cathedral in 1314 that London could boast "*anywhere's* (the world's, Europe's) tallest *anything*".

The social and environmental changes in Bermondsey, in the London Borough of Southwark in London, are stark, and are a microcosm of the changes to the urban and social fabric of London since 1997. Southwark is a complex urban landscape "*shaped by the river, marshy ground, bridges, viaducts and multifarious activities deemed unsuitable for the city*"[2] and the small scale street scenes that dominate ones impression of Southwark are interspersed with large scale modernist housing, and surprisingly successful urban regeneration schemes since 1997 (though as has been noted, "*if you couldn't make urban regeneration work here, you couldn't make it work anywhere*"). The decline of the industries on which Southwark relied caused by the political decisions of the 1980s and the deregulation of the City on the opposite bank of the Thames brought about 'development opportunities' in the area, although the regeneration of the Thames bank and the gentrification of the high street has done little to replace the opportunities provided by the old industries that were lost.

Bermondsey's social tenure is therefore enormously mixed, a deprived neighbourhood in zone 1 occupied by both Bermondsey's original working class residents, and wealthy professional newcomers. This has resulted in the reversal of the declining neighbourhood, with the newcomers breaking "the previous patter of employment (based around factories) [living] in close proximity to the long-term inhabitants placing the two groups in potential conflict".

1 Salman, S. (2012) The Guardian.co.uk *Southwark's housing commission to propose 30-year strategy for borough* http://www.guardian.co.uk/housing-network/2012/mar/09/southwark-housing-commission-strategy

2 Jones, A. (2012) Blogpost *Bankside, Borough & Bermondsey* http://www.jonestheplanner.co.uk/2012/02/bankside-borough-bermondsey.html



Above left: Housing tenure in West Bermondsey relative to Southwark

Above right: Socio-economic groups in West Bermondsey relative to Southwark (Source: The Inhabitant)

The diagrams on the left show the changing residential mix of Bermondsey, and the changes in the socio-economic make up of the area. The diagrams show how the changes to the social and economic make up of the area, as well as the occupations that the residents hold reflect the circumstantial evidence, and the changing appearance of the urban fabric.

This document seeks to explore the tensions inherent in the social mix of Bermondsey, with reference to the associated project proposals, to explore a potential strategic direction for achieving, and making the most of the project as a whole.

The main interest of this report is the opening discussion on maintenance in architecture, and how this can change the opportunities and livelihoods of those who live and use buildings.

Sites in Bermondsey

Bermondsey is a tightly packed part of Southwark, and following the redevelopment and construction schemes following the Second World War, few large sites remain within the area. Unfortunately, alongside this, Southwark, London and the UK is facing a housing crisis, and Bermondsey needs to adapt it's urban grain to allow more people to live within its boundaries.

On this basis, it seems that my approach to the site should be to avoid reducing the density of the urban grain, and avoiding the removal of dwellings. There are a limited number of large sites in Bermondsey on which to work, and the green space that is available it seems should be maintained. There is however a case for analysing this green space, and where it is shown to be underused, or inefficient, an approach to improving amenity space should be encouraged.

The map on the right shows the proposed project sites.

Beckett House is the site of project 2, and the Kipling Estate is the site of the main project, on which these studies are set.

Figure Ground drawing of the West Bermondsey Area highlighting the project sites

Project 2 A Waiting Room for Bermondsey

Beckett House, and the UK Border Agency

The UK Border Agency, (UKBA) is housed in a concrete fortress, Beckett House on St Thomas Street. The building is one of London's two main offices for the UK Border Agency. Part of a development that included a tower by Richard Seifert (though it seems the Beckett House itself was not designed by the architect) the building was completed around 1967. The building appears as a fortification.

Those seeking asylum in the UK must report regularly to Beckett House, or one of 3 other reporting centres around the country regularly, for interviews and regular reporting. Financial support or accommodation can be applied for through the UKBA, and is provided on a 'no choice' basis outside London and the South East. The people who must report to the centre travel large distances, to arrive early in the morning, and wait outside the building until their appointment sometimes in the rain and the cold. The material and form of the Agency building does not allow it to support or express the fragility of the human experience of those who must visit regularly.

The project proposal is for a fragile waiting room located next to the offices, in the location that people queue waiting for their appointment. The proposal provides a sheltered seating area, and an interface between the street and the waiting room, of which the architecture breaks down at varying rates. The proposals provides functioning covered waiting space, and an ephemeral symbolic interface between the waiting area for those seeking asylum, and the general public on the street.

The new proposal clings to the institutional mass of the existing structure, evoking the duality of the legislative reality of the asylum process, and the fragility of the human experience..

The Waiting Room for Bermondsey represented the first of my exploration of the benefits and uses of an architecture of fragility.

The project is explored in detail in the associated technical report.

See Film 2 on the attached DVD

Beckett House

Project 3 - A Thatched Architecture

Site : The Kipling Estate, Weston Street, Bermondsey

The Kipling Estate in Bermondsey was completed in 1965 by the London County Council (LCC) architects department for the LCC.[1] Each tower contains 78 flats including 19 1 bed flats, 58 2 bed flats and 1 3 bed flat. Though the estate itself appears to be unpublished at the time, the buildings are based on a model designed by the LCC Architects department for the Alton East development in Roehampton, in South West London.[2]

> In 1951, the introduction of point blocks at Portsmouth Road (Alton East) in Roehampton heralded the beginning of the new housing architecture of the LCC, their slim shape and square outline instantly consigning to history the previous years eight and eleven storey complicated T-Shaped designs at the nearby Princes Way site. [...] Naturally the LCC remained faithful to the type it had pioneered, and, by 1965, had built over a hundred of these slender multi-storey point blocks.[3]

The structure of the blocks is a prefabricated concrete frame, with internal concrete structural walls, and brick infill panels. A detailed structural diagram can be found in the technical report.

A full detailed survey of condition, and spatial survey of the existing buildings would be undertaken prior to detailed design work taking place.

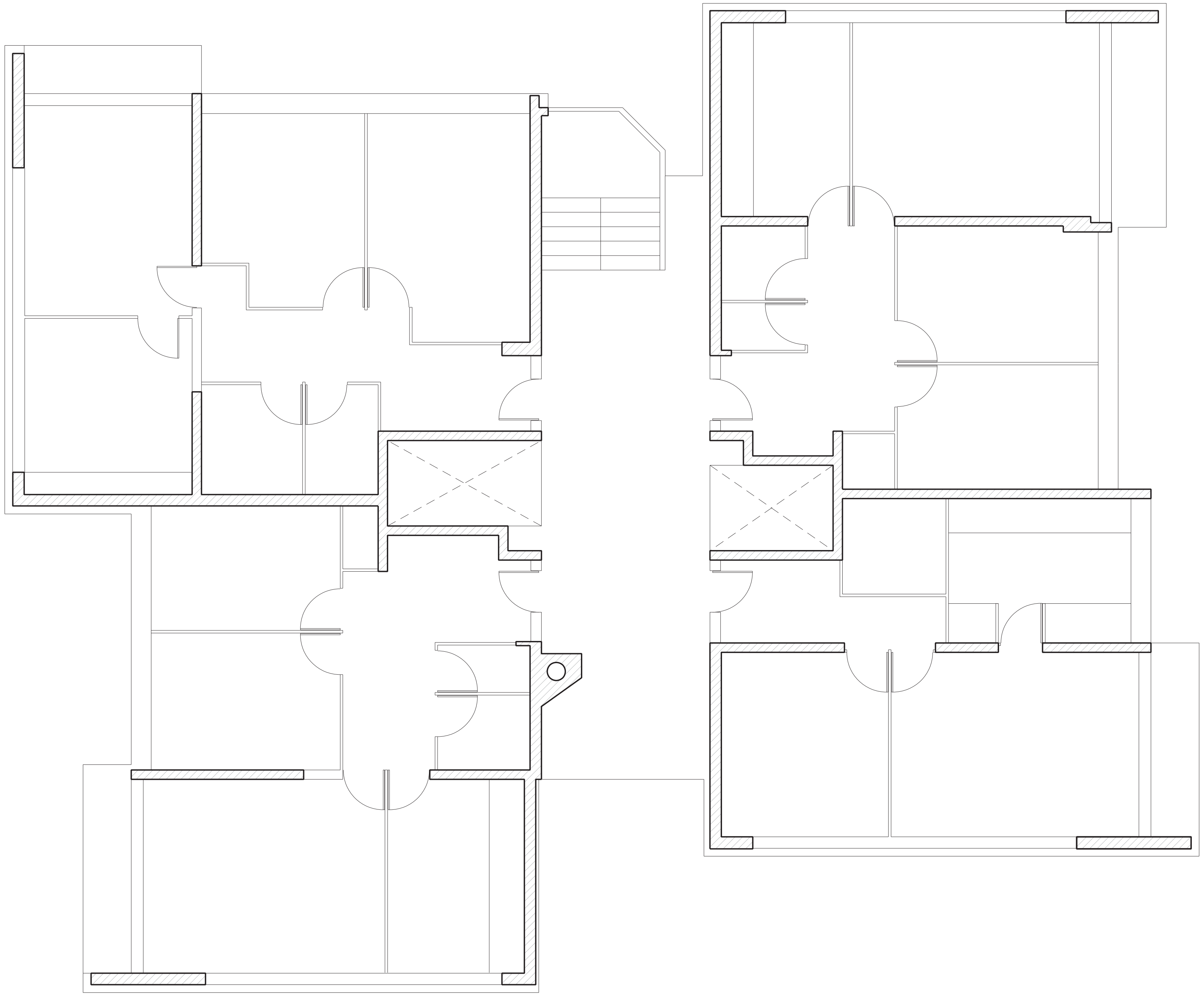
LCC Point Block at Alton East, Roehampton

The Kipling Estate. Burwash House and Simla House

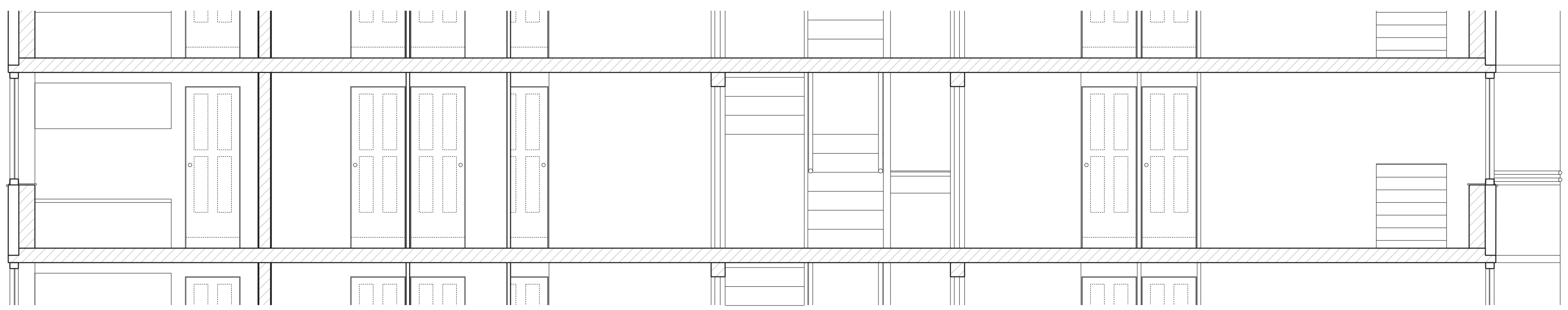
1 Most references for the information related to the estates come from the GLC's records which are stored at the London Metropolitan Archives, on Northampton Road. The case file for the buildings can be found under the reference GLC/AR/BR/10/BE/H/0054/BA. The information available includes part of the job file of the architects department, as well as a series of drawings (incomplete) of the scheme. Notably there are some plans elevations, though there are no sections, and not all of the plans (including the ground floors) are manifested. Thus some of the information contained in this project is extrapolated from the information I have, as well as numerous site visits to the towers, and exploring the buildings.

2 Glendinning, M. Muthesius, S. (1994) *Tower block : modern public housing in England, Scotland, Wales, and Northern Ireland* New Haven, Yale University Press p 56. referencing Architects Journal AR 8-1959, p26.

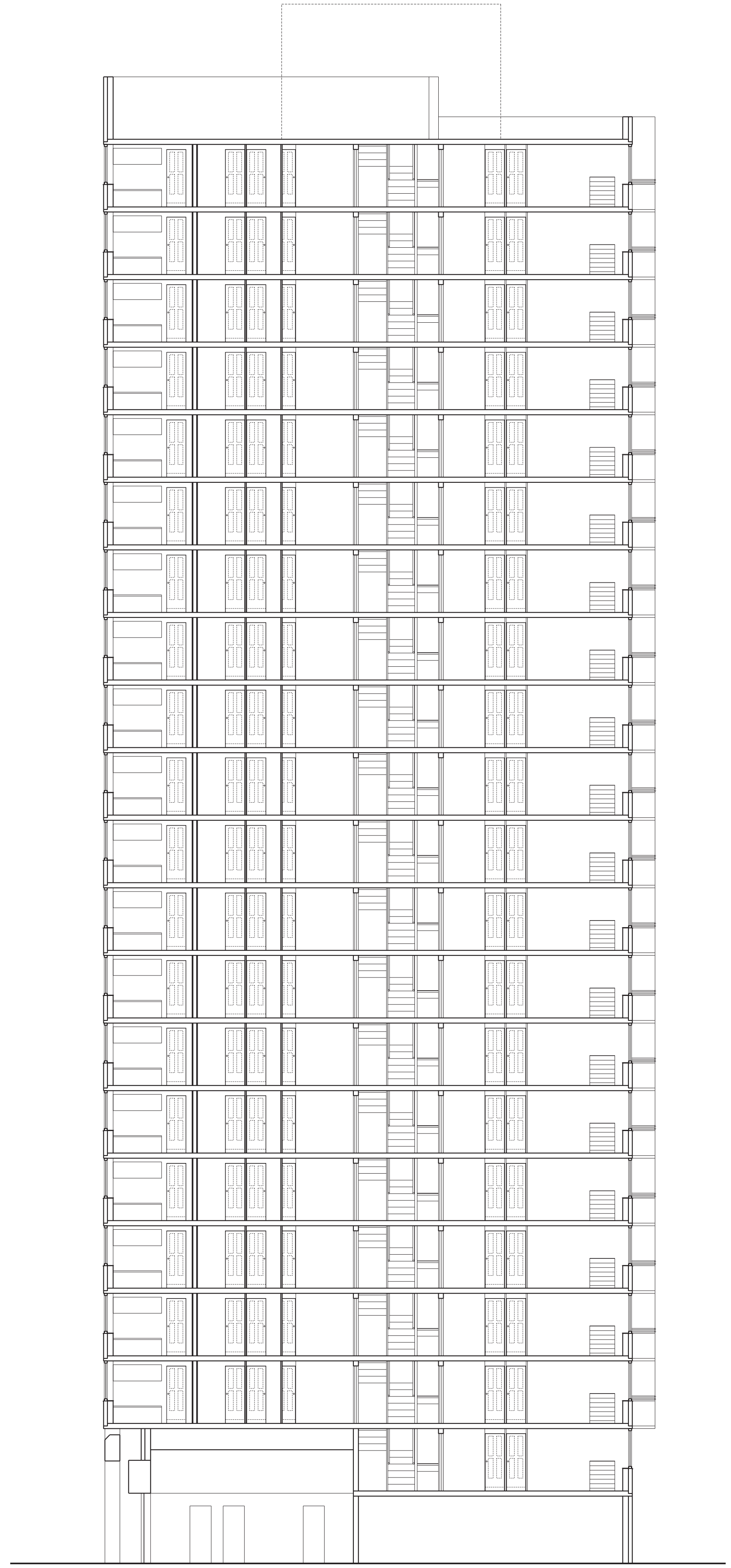
3 *ibid*.(pp 56 - 58)



Typical Residential Plan Scale 1:50



Existing Section AA (detail) Scale 1:50



Existing Section AA Scale 1:250

Project 3 A Thatched Architecture - a proposal for a maintained approach to redeveloping London's existing tower blocks.

The third and final project for the thesis explores a conceptual and pragmatic approach to reworking London's existing postwar tower blocks. The proposal was developed over the course of the year from my studies into an architecture of fragility, alongside thorough research into the social and economic context of West Bermondsey. Whilst the architectural proposal does not seek to solve Bermondsey's housing crisis and the social and economic problems of its residents, it hopes to suggest an approach to architecture that can begin to alleviate some of the perceived problems of the architecture.

The proposals seek to achieve a fragile, maintained architecture which promotes a skilled method of construction and restores a skilled trade South London.

The project proposal is for a building that facilitates the modification of the existing towers, over time. The project allows for a phased redevelopment of the existing towers, providing on site temporary accommodation for families displaced by the construction process. The existing towers will be extended laterally, on a new structure, to increase the living space of the existing flats, and provide private outdoor amenity space for each.

Alongside this, a school of Master Thatching is proposed, which will teach local residents a skilled, traditional construction method, the resources and students for which will be used to apply and maintain a new thatched facade for the existing towers. Local people who are in need of work will be able to gain skills, and maintain the existing built environment.

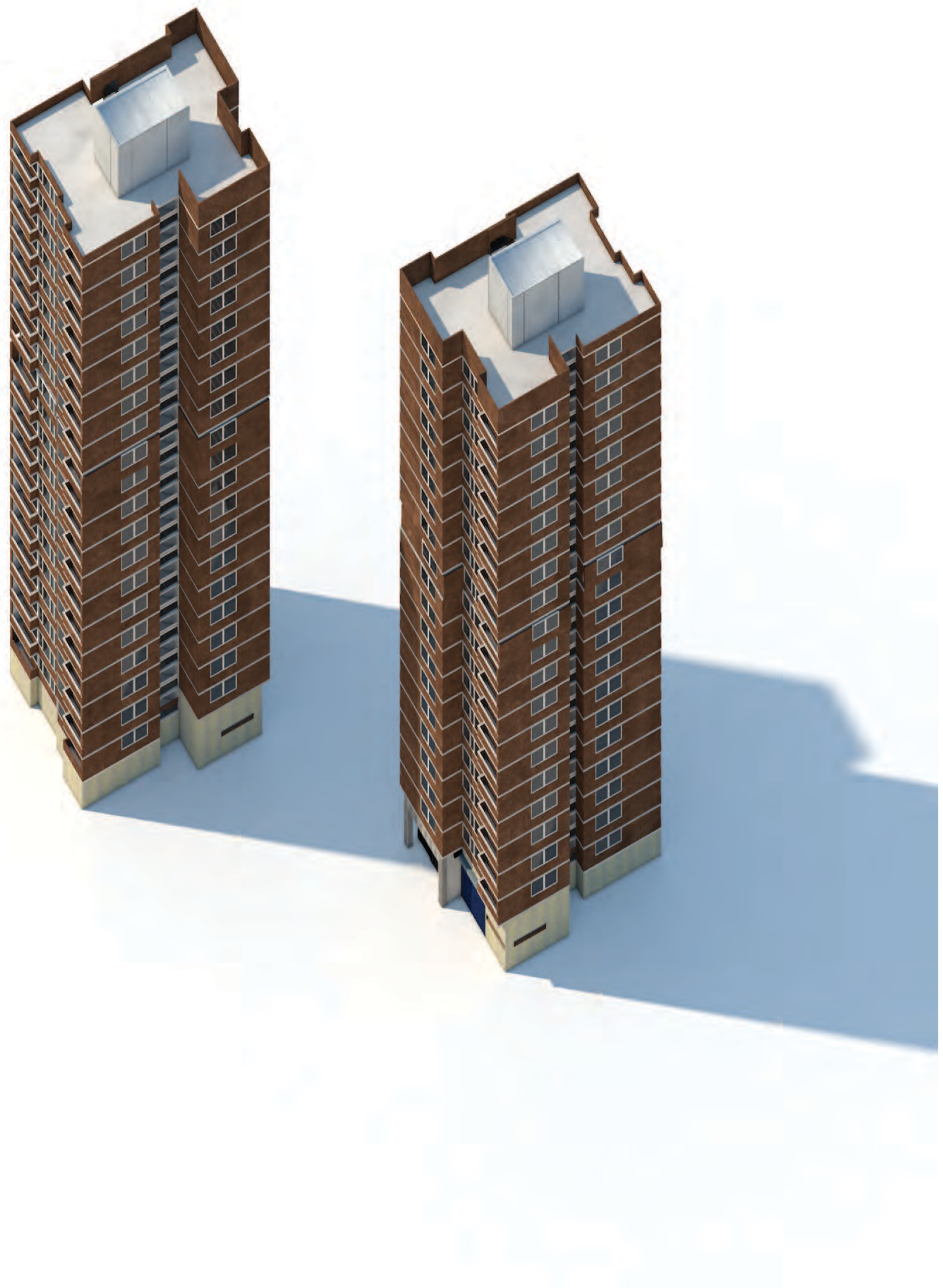
Finally, a constructed wetland of reeds will provide the materials required for the new thatching industry in Bermondsey, as well as filtering and cleaning effluent from the towers before it is disposed of in the Thames, as well as creating a pleasant, diverse functional landscape around the estate, in the location of an underused outdoor amenity space.

Project Brief

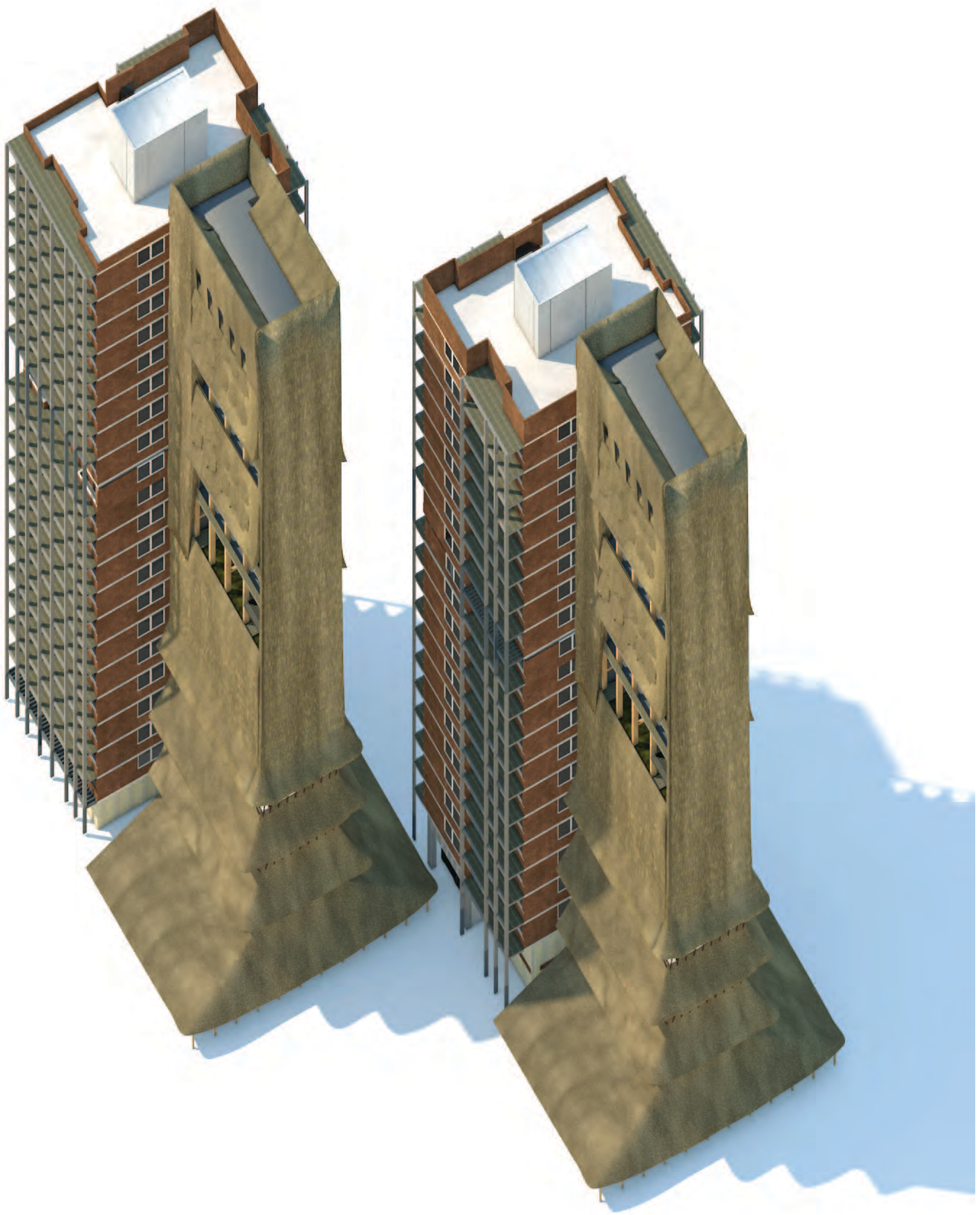
The project has four main programmatic elements:

— Workshops/classrooms for the proposed
— School of Master Thatching;
— Storage for harvested reeds;
— Public gardens for the residents at ground level and within the building;
— New homes for temporary accommodation and new residents;
— Communal spaces for residents meetings and events.

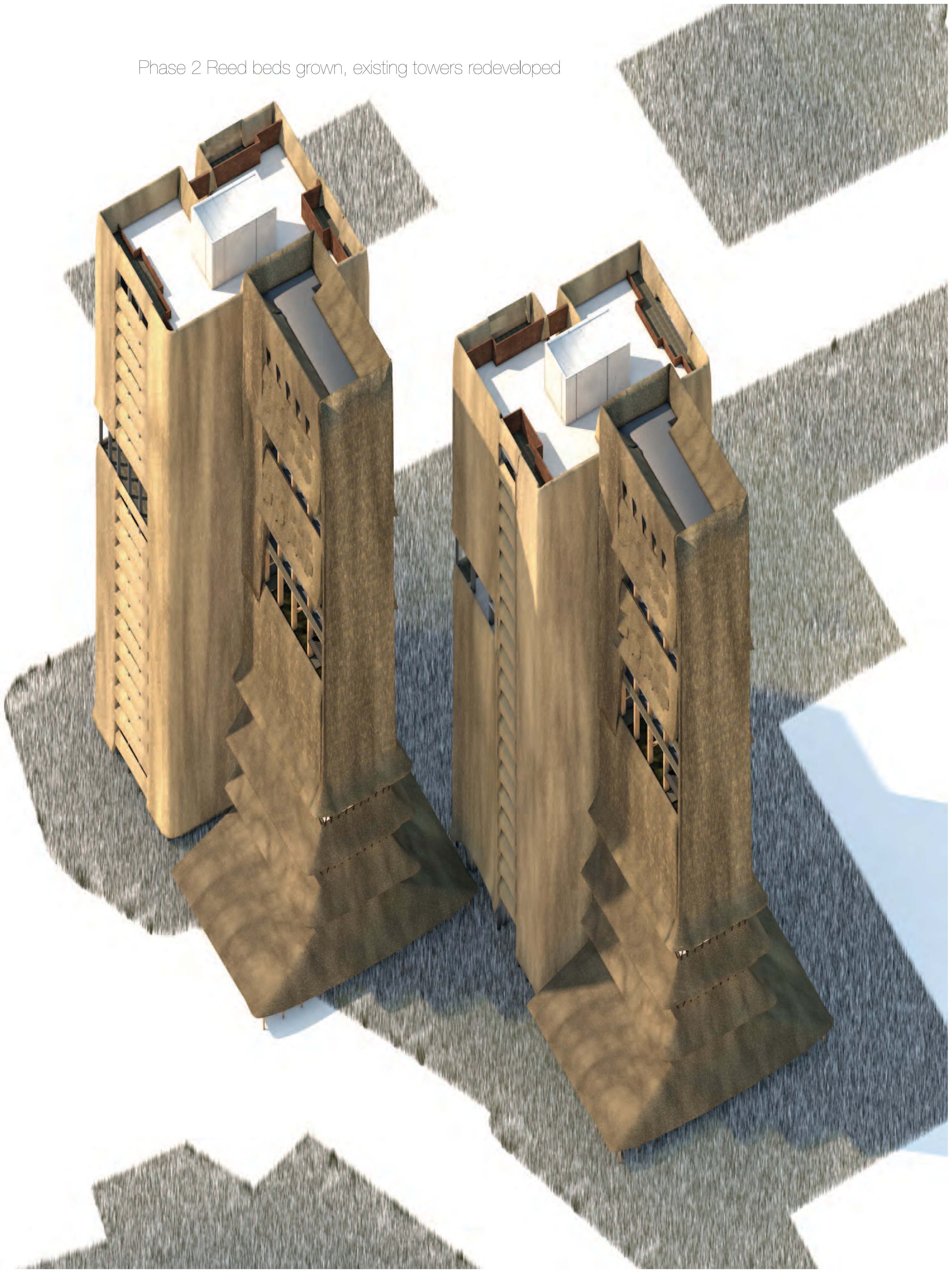
The Existing Towers



Phase 1 - Backpack Towers Constructed



Phase 2 Reed beds grown, existing towers redeveloped



Review of Design Development

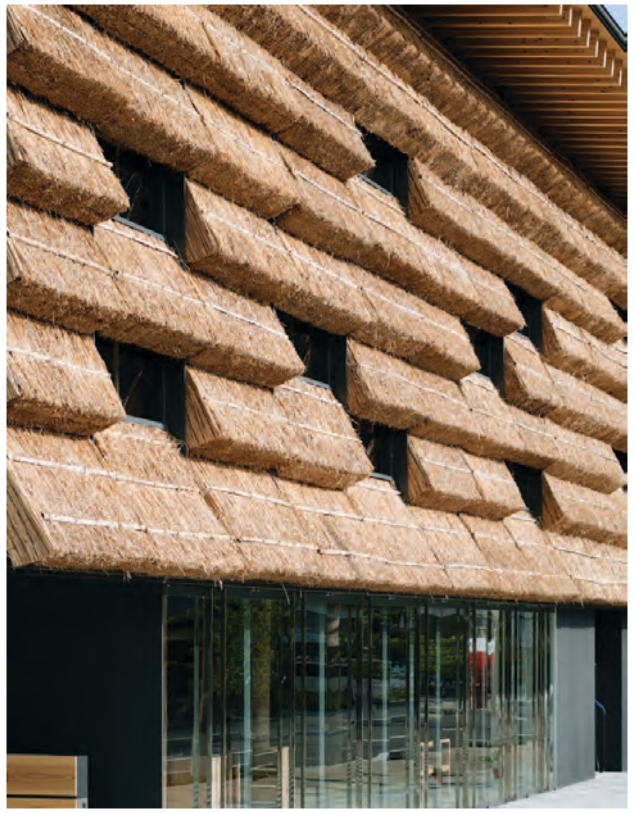
The proposals changed significantly throughout the project, and I have included on these sheets a few images of the evolving scheme.

Initially I was interested in an architecture of ongoing construction – as opposed to ongoing maintenance – The building would be undergoing continuous construction, testing new fragile materials, and exploring the qualities of a fragile architecture. The aesthetic of the architecture would be defined by construction processes, and I began to explore palettes of scaffolding, dust wrapping and temporary stairs. Onto this, I planned to apply a temporary material architecture, formed of materials that decayed, broke down, weathered and changed. As I developed these proposals, it became increasingly clear that the benefits of a quickly decaying material architecture were not great in number, and the benefits of living on a permanent building site, few. The aesthetic was beginning to overtake the conceptual benefit of the material choices, so I began to consider different approaches, looking into vernacular techniques to develop my fragile architecture.

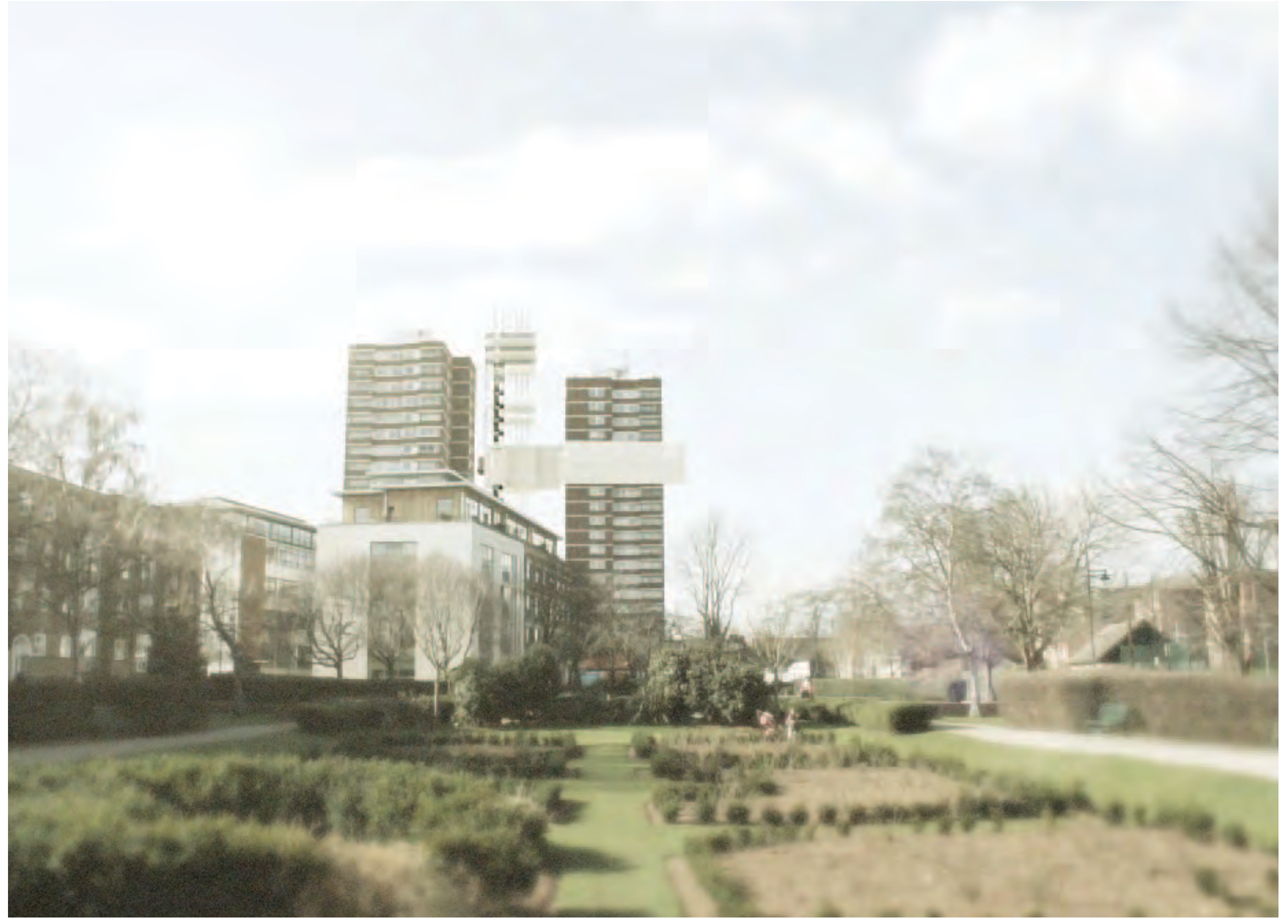
I had considered thatching parts of the towers throughout the project, but had not applied my thinking holistically to the design. As I considered, and explored the possibility of thatching the tower blocks, both in technical feasibility, and functional performance, I began to consider ways in which the thatch could inform the whole design, requiring spaces, materials ,and equipment to be feasible.

Approach

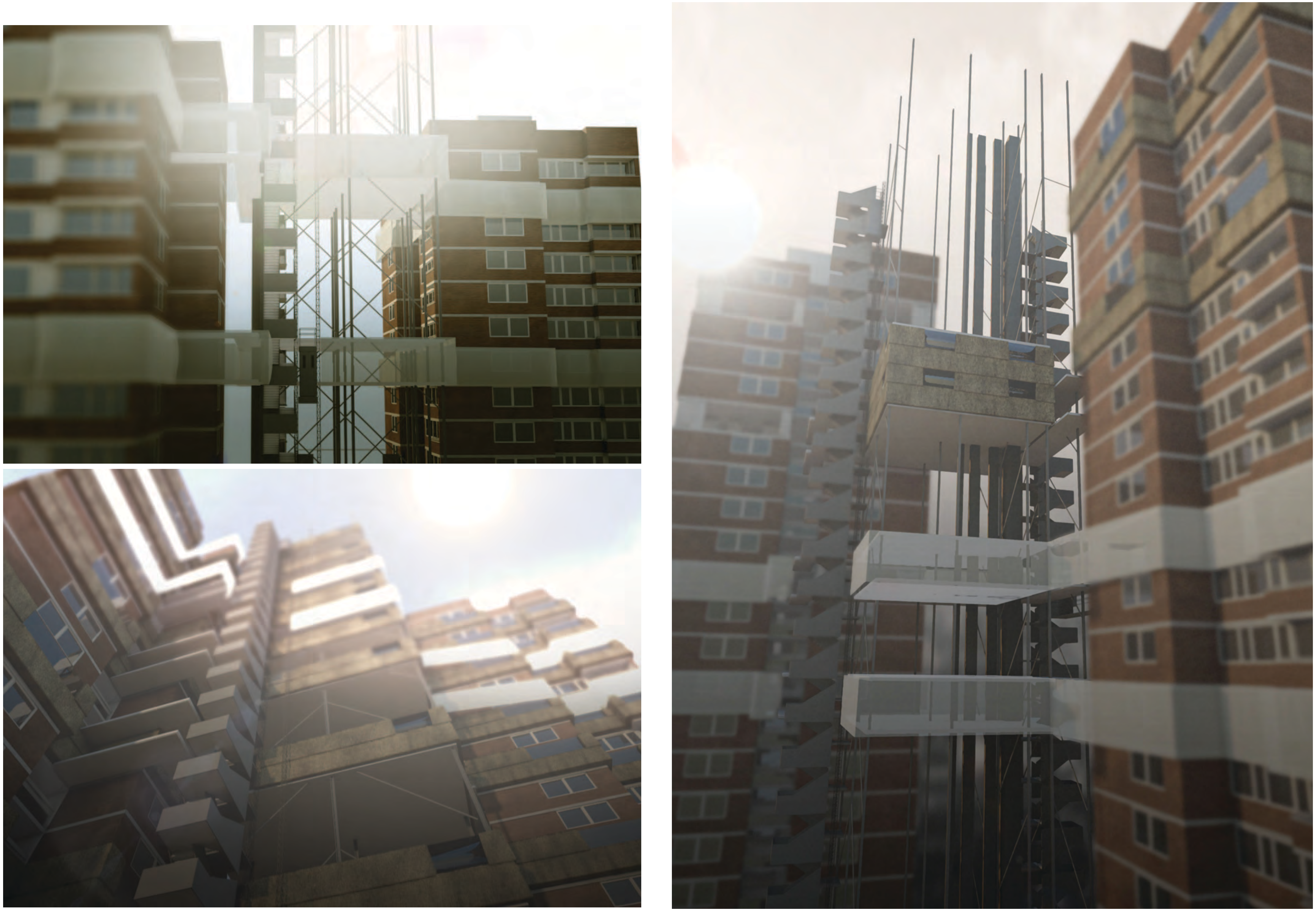
The approach to the design is a fragile architecture that changes and weathers with time, built of a palette of materials that is in part robust or fragile according to its requirement. Structure is robust, cladding is fragile. This promotes a maintained architecture that is looked after and cared for through its useful life.



Kengo Kuma's community market, in Yusuhara, Japan uses a thatched module to restore a skilled trade in the town in which it is built, and fit with the site context in which it is set. Kuma's use of thatch in a modern building provided some evidence that the use of thatch on a modern building was appropriate and possible.

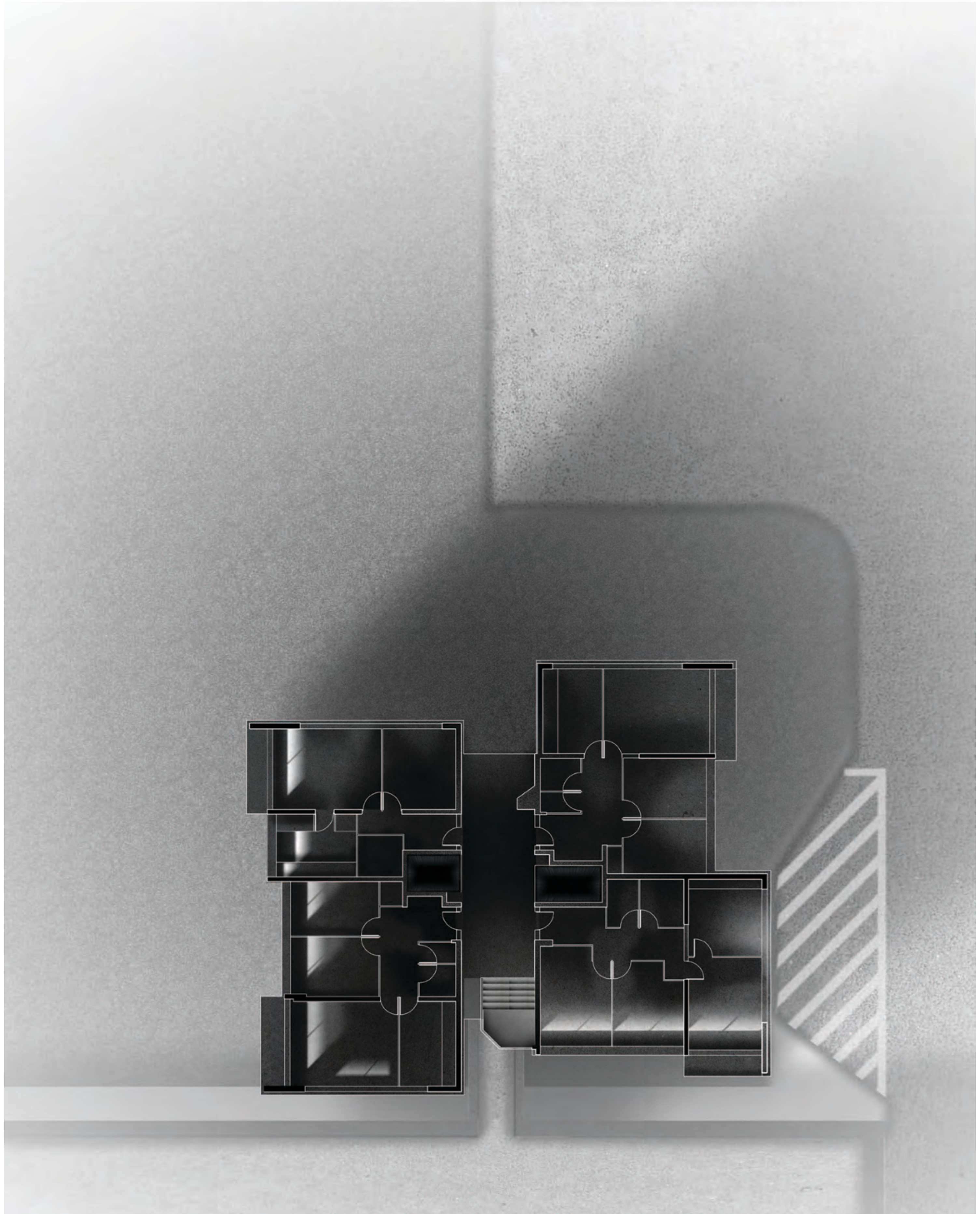


An architecture of ongoing construction – A building third tower that rebuilds the existing towers

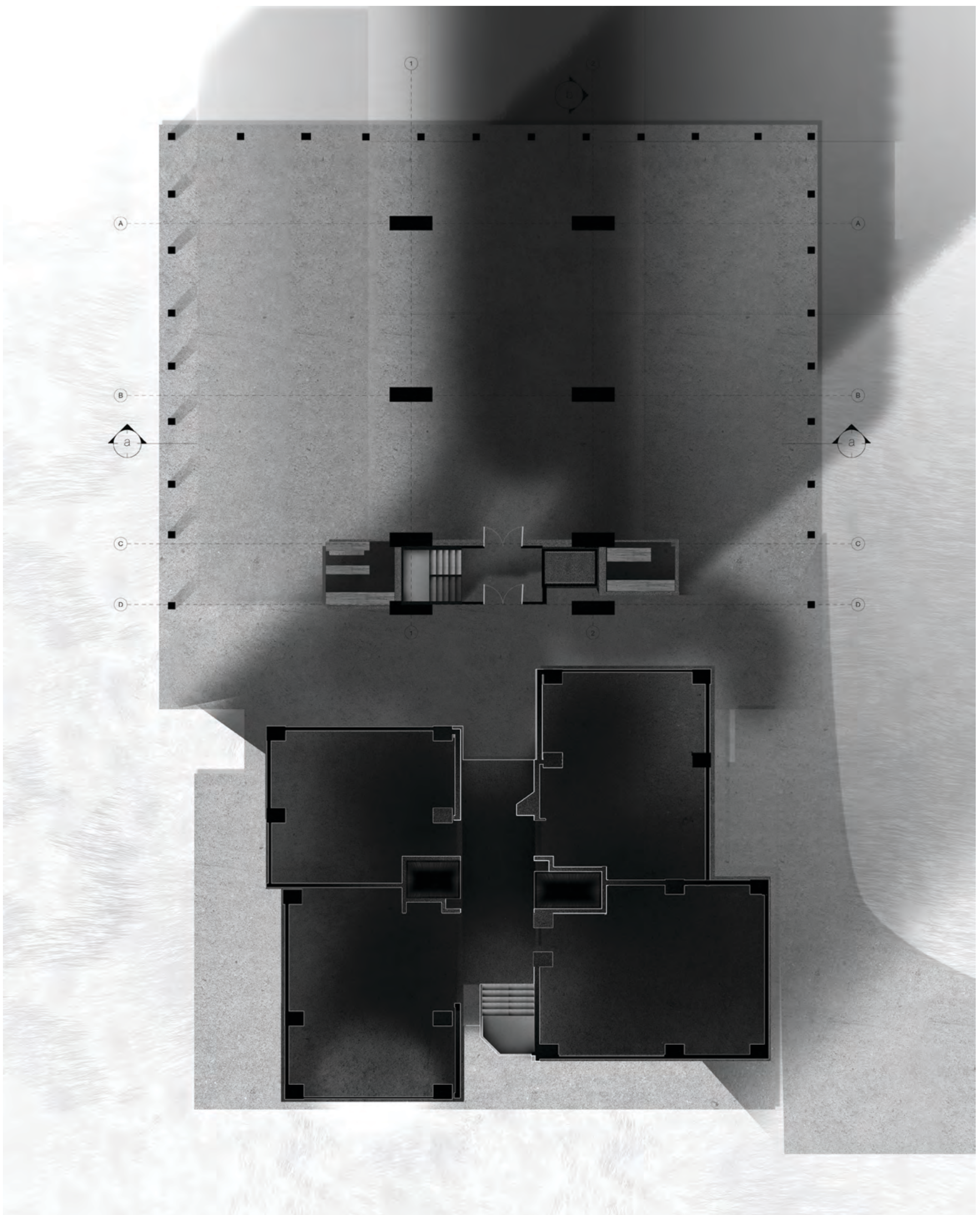


A thatched architecture of ongoing construction. The middle phase of the design process proposed elements of my ongoing thinking of an architecture of construction, as well as a thatched proposal for the Kipling Towers.

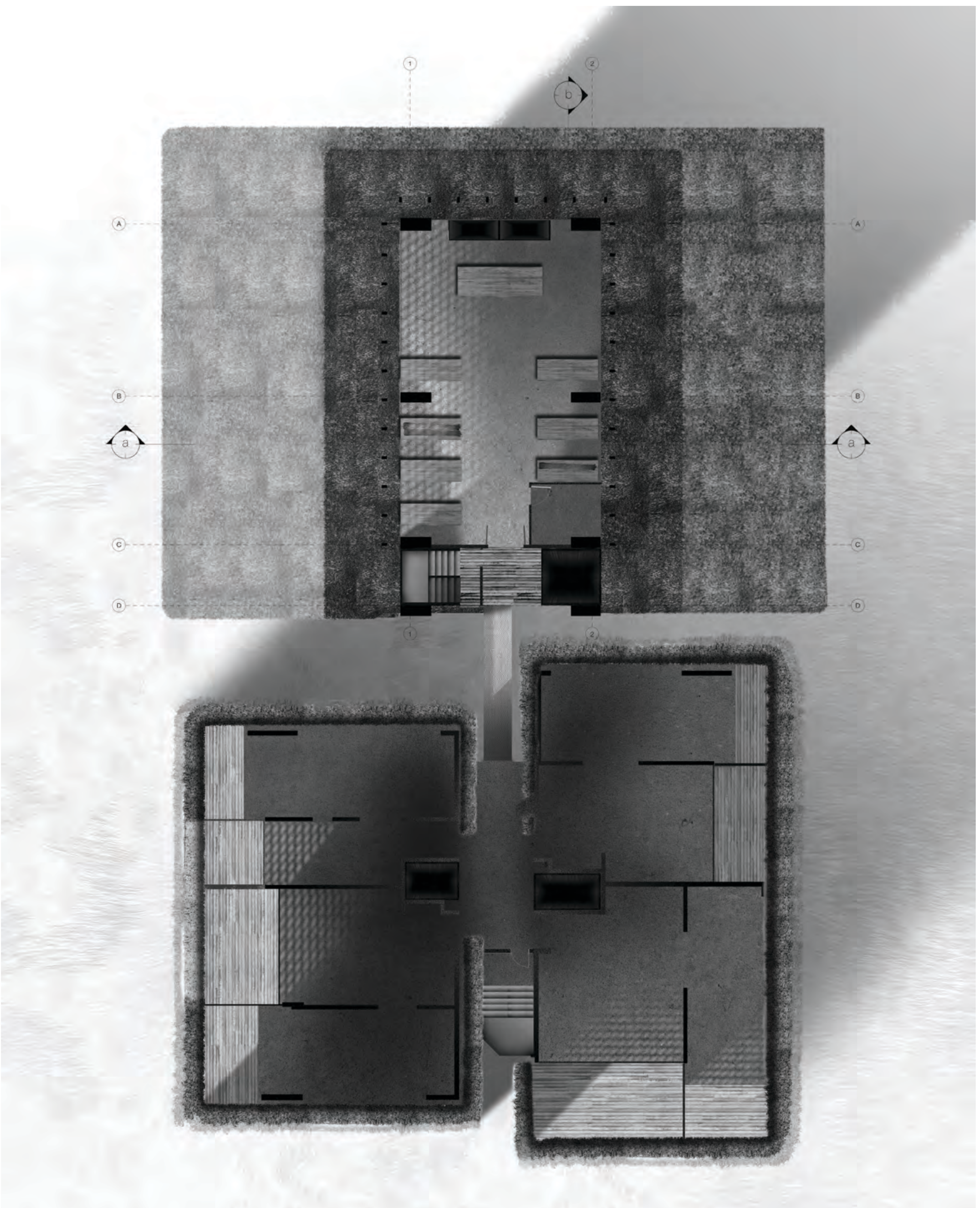
Following pages: Schematic Drawings for the proposals analysed in these reports



Existing typical residential floor

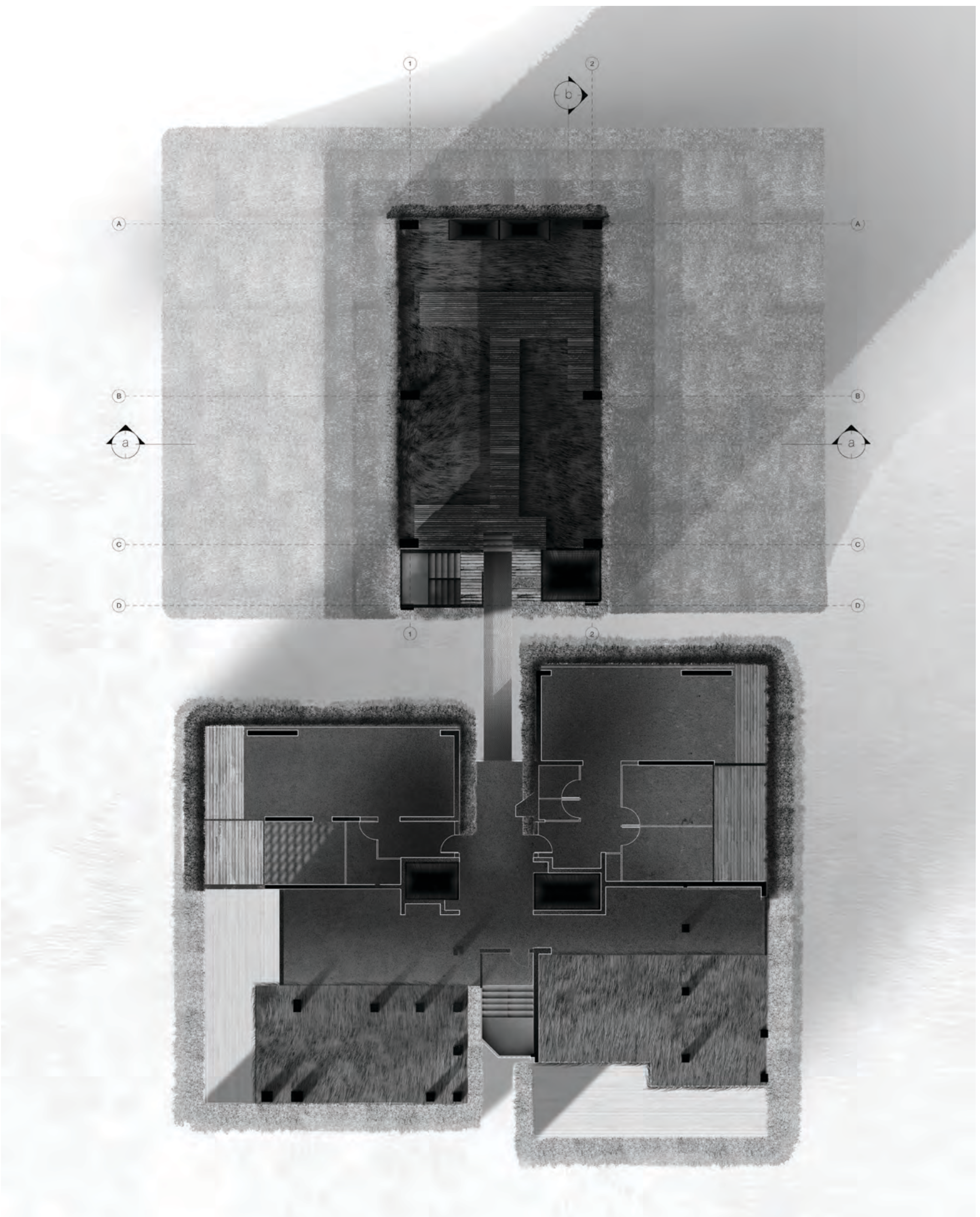


Ground Floor Plan
Tools and Trades

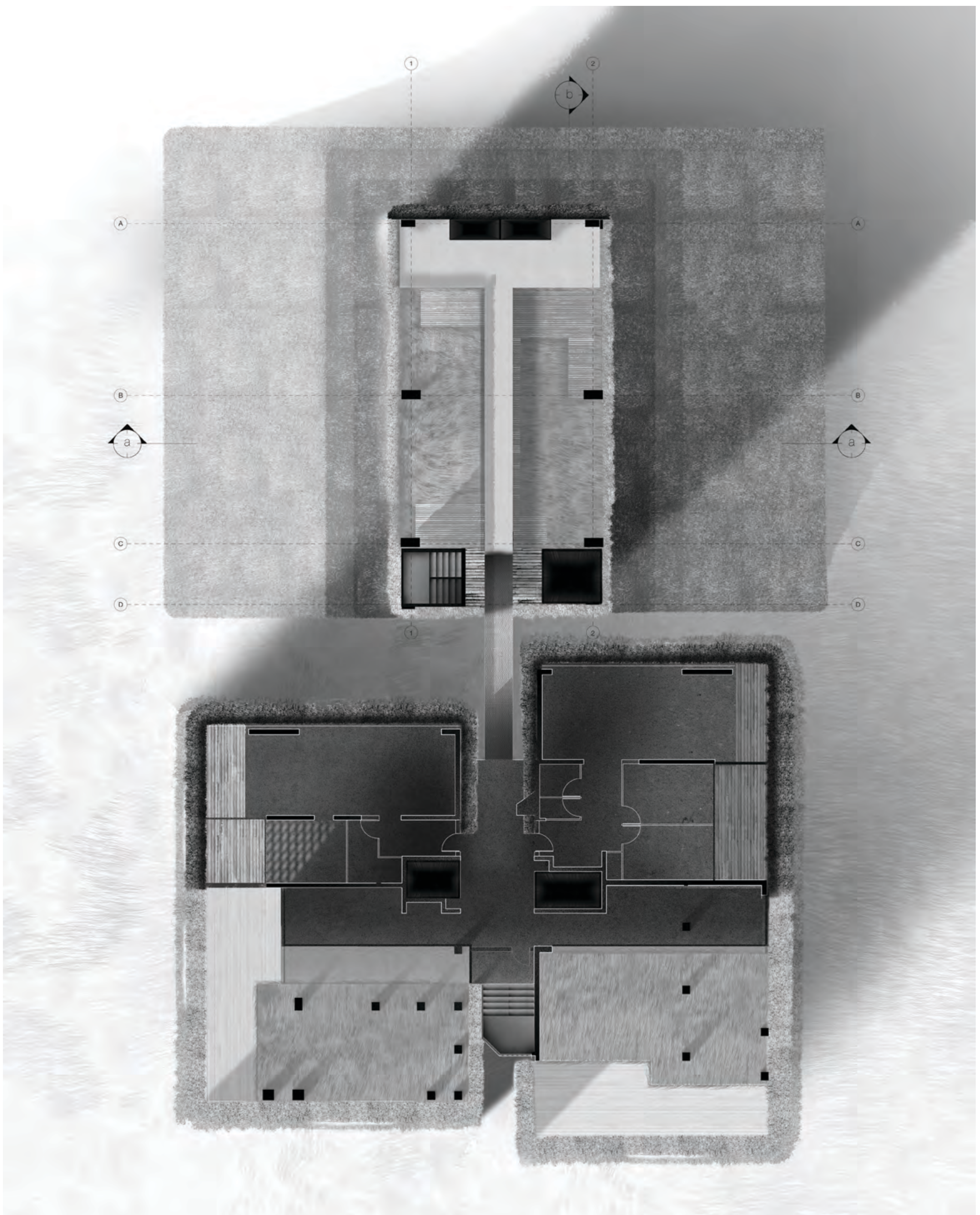


First Floor Plan
Workshops + Classrooms

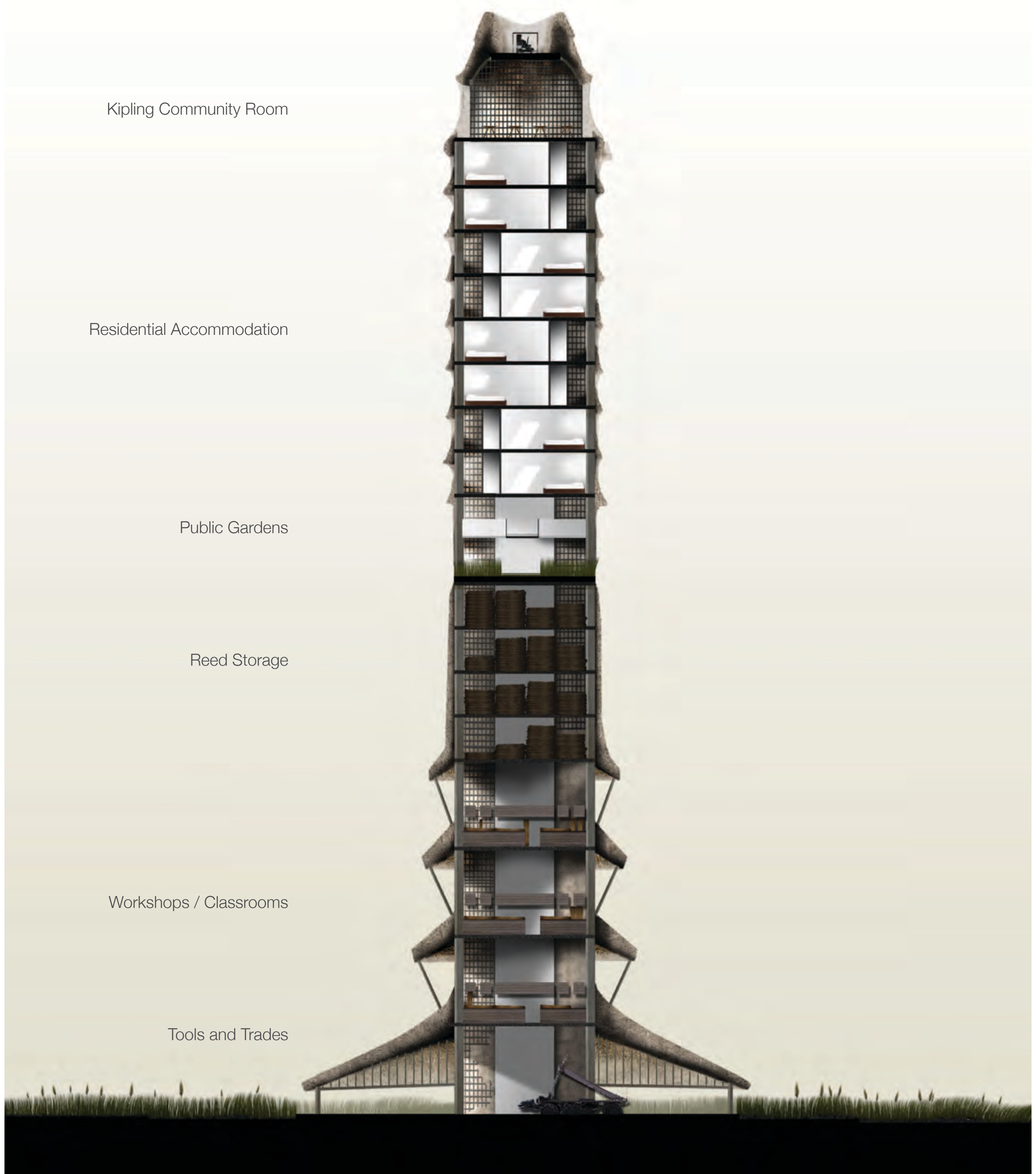
Typical Residential Floor



Public Garden Plan
Lower Level



Public Garden Plan
Upper Level



Section AA
backpack tower

Section BB
Backpack and existing towers

2.
Strategic Report Legislative Framework

The project will be subject to local, regional and national planning policies, all of which will have an effect on the design and realisation of the building.

National Planning Policy

National Planning policy in England and Wales is currently undergoing significant change. Planning policy is under the direction of the Secretary of State for Communities and Local Government. The Localism Act which received Royal Assent in November 2011 makes significant changes to the way in which the planning system operates, and has had an effect on planning applications in the UK. [1] In principle, the Act is supposed to simplify planning policy in the UK, and shift decisions into the hands of local government and communities, in the name of "localism". Whether this has been achieved, or is likely to be achieved by the bill is being debated, with the Communities Department Select Committee stating that the reforms are confused, and "the desire to deliver localism is neither supported consistently across Whitehall nor implemented coherently by each government department."[2]

The important sections of the Act which may have an influence on this project are the following:

Part 5 of the Act is related to communities gaining some powers to take bid for privately owned public amenities such as pubs, shops and some open areas in the event that they are put up for sale.

Part 6 is related to planning, and crucially abolishes the primary legislation that set up Regional Strategies. The regional strategies were designed to build three million homes by 2020.

Part 8 deals specifically with London, and abolishes the London Development Agency. The bill makes the Mayor of London responsible for managing EU funding, and the local authorities will have more control over planning decisions, with the mayor's control limited to major planning decisions.

Southwark specifically has been chosen by the Government as one of the "neighbourhood planning front runner authorities", the purpose of which is "to test out the principles of neighbourhood planning as set out in the government's Localism Bill."[3] The Bermondsey / London Bridge area will test the principles of the Localism bill, allowing local groups produce neighbourhood plans,

Southwark Borough Council identifies that "a range of development is expected to take place in Bankside, Borough and London Bridge, particularly new housing and business space."

The West Bermondsey Neighbourhood will be a test of the policies, and the active neighbourhood groups a test of whether the bill truly delivers the 'localism' that it seeks to.

1 Planning applications were down 22% Between March 2010-2011. Source: Gardiner, J. (2011) *The coalition's confusion over planning* New Statesman, The Staggers. Available at http://www.newstatesman.com/blogs/the-staggers/2011/03/planning-growth-homes-localism

2 Gardiner, J. (2011) *Localism policies slated by MPs* Building Magazine. Available online at http://www.building.co.uk/news/sectors/housing/localism-policies-slated-by-mps/5019663.article

3 Bankside, Borough and London Bridge SPD. Soutwark.gov.uk

Regional Planning Policies

The London Plan, published in July 2011, updated the previous document published in 2004, in line with the Government's recommendations. The new document addresses housing, and emphasizes quality and space, providing specific internal flat space standards, as well as guidance on improving the public open spaces.

Policy 3.1 *Ensuring Equal Life Chances for All* deals with strategic uses in London and opportunities for Londoners:

> **Strategic**
> A The Mayor is committed to ensuring equal life chances for all Londoners. Meeting the needs and expanding opportunities for all Londoners – and where appropriate, addressing the barriers to meeting the needs of particular groups and communities – is key to tackling the huge issue of inequality across London.
>
> **Planning decisions**
> Development proposals should protect and enhance facilities and services that meet the needs of particular groups and communities. Proposals involving loss of these facilities without adequate justification or provision for replacement should be resisted.

My proposals seek to provide housing, workspaces for small businesses, and a new semi-skilled trade for some residents. The proposals seek to improve the life chances of all residents by providing cheap work spaces for skilled workers, providing training for unskilled residents and decent larger homes for the existing and new residents of the Kipling Estate.

Space Standards

The document sets out the importance of space standards in new housing developments. The Kipling estate, though built before the introduction of the Parker Morris Space Standards would likely have been adopted by the LCC prior to their mandatory application in 1969. The Parker Morris Standards were set out in the then Ministry of Housing's *Design Bulletin 6 - Space in the Home*. The majority of the flats in the Kipling Towers are one bed apartments for two people, and two bed apartments for three or four people, which would require space standards according to *Space in the Home* of $49m^2$ and $62.3m^2$ or $76m^2$ respectively. The actual measured area of the flats is $52m^2$ and $67m^2$ or $72m^2$ respectively.

The London Plan (2011) claims to require around a 10% improvement on the Parker Morris Space Standards, though the reality is 50m² and 61 or 70m² according to the same requirements as the Parker Morris Standards.

It is my opinion that whilst the space standards are a significant improvement on the unregulated housing blocks of the 1990s and 2000s, they do not provide adequate space for day to day life. My proposal therefore seeks to extend the living space of the existing flats, and provide a large balcony, and flats that are significantly larger than required in the new building.

The proposal provides the following areas:

1 bed two person Existing towers: 58m²
2 bed three person Existing towers: 74 m²
2 bed four person Existing towers: 78 - 80m²
2 bed four person proposed towers: 87 m²

The proposed towers provide a greater opportunity to design larger flats, and this is reflected in the design.

Further design guidance on space standards is set out in a supplementary planning document published by Southwark, which will be covered in the local planning policy section.

Open Spaces

One of the London Plan's primary objectives is to accommodate growth "within its boundaries without encroaching on open spaces". My proposals seek to change the character of some of the open spaces around the buildings, and improve them so that they are used in a productive and interesting manner.

High rise development has traditionally been built with open green space around it, to retain the density of a site, whilst maintaining accessible public amenity space around it for use by the residents. The success of this is varied in different locations. The architectural model of Roehampton in Alton East, on which the Kipling Towers are based, is a series of point and slab blocks in a parkland setting with trees. The open space provided here is suitable for use by the residents, and has the feel of a public park. In Bermondsey on the other hand, the amenity space around the towers is constrained, and the open space dull and lifeless. The area given is not large enough for the flats and the result is that it is underutilised.

The proposals seek to put the space to better use, maintaining it as outdoor amenity space, but changing its specific function to be productive. The negative effect of building a small footprint extension on some of the amenity space around the buildings is offset by the significant increase in the amount of outdoor space provided by the extension of the balconies for each flat, and the provision of decent private amenity space.

Central Activities Zone

The West Bermondsey neighbourhood is within the Central Activities Zone (CAZ). Within this the neighbourhood is recognised as an opportunity area (within the London Bridge and Bankside Opportunity Area.

Local Planning Policy

The London Bridge and Bermondsey area is covered by the Southwark Plan, and the Southwark Core Strategy, as well as a number of Supplementary Planning Documents (SPDs) and the Opportunity Area Planning Framework.

The Southwark Plan, prepared alongside the London Plan "sets out a vision for Southwark, and explains how this vision will be achieved." Key to the Southwark plan, in relation to my development, is policy 5, Regeneration and Creating Employment:

> Developments should, where appropriate, contribute towards strong, diverse long term economic growth, facilitate regeneration, and increase the number and range of employment opportunities available within Southwark.

Also key is policy 11, Amenity and environmental quality which states:

> Developments should, where appropriate, contribute towards strong, diverse long term economic growth, facilitate regeneration, and increase the number and range of employment opportunities available within Southwark.

The SPDs are arranged in a document that sets out the overall plan and detailed guidance on how development in Bankside, Borough and London

Bridge should occur. The southern border of the area covered by the document in the West Bermondsey area is Long Lane, and thus the Kipling estate is fully within the area. This area is defined in the document as Bermondsey Village, to be "a vibrant and historic quarter centred around Bermondsey Street. **As well as housing, there will be a mix of commercial uses** providing cultural space, **small business space, light industry**, independent shops, restaurants cafes, pubs and bars."[4]

The range of uses provided by my project provide a number of the uses defined in the document, bringing a light industry to Bermondsey, as well as providing some new housing, and spaces for small businesses to set up.

Heights and Tall buildings: The document calls for development that is "in keeping with the predominant building height in the surrounding area", and with the proximity to the Kipling Estate Towers, the Shard and Guys Hospital, it is appropriate to construct additional towers immediately adjacent and attached to the existing towers.

A number of Supplementary Planning Guidance (SPD) documents are provided by Southwark Council to supplement and explain the core strategy provided by Southwark. Evidence of compliance would be provided in a design and access statement submitted as part of the planning application. The guidance documents include the following:

Residential Design Standards
Affordable Housing
Sustainable Design and Construction
Sustainable Transport
Design and Access Statements
Heritage and Conservation

The residential design standards cover all new dwellings, and expand upon the London Plan, providing guidance on density, residential amenity and space standards, as well as sunlight and daylight, internal layout and other detailed design considerations.

The space standards reflect the requirements of the London Plan, although the SPD clarifies the average size requirement for homes based on bedroom numbers as well as the number of residents, ie the document states that 2 bed flats for which the number of residents is unknown (two or three), the minimum area is 66 m^2, the average of 61 and 70 m^2. As shown previously, the proposed flats in this scheme easily comply with the regulations.

The guidance also advises on amenity space, both public and private. The existing public amenity space well exceeds the requirements, and the changes to this improve its quality, by providing a range of types of outdoor space in the area. Private outdoor space, which is only required for flats with 3 beds or more is exceeded by my proposals, providing private amenity space for all homes.

Heritage and Conservation

The Kipling estate lies just outside the Bermondsey Street Conservation Area. The existing buildings are not listed, though they are in close proximity to a number of listed buildings . This would be taken into account when preparing the planning application. The Heritage and Conservation SPD is to be prepared, following consultation, and replaces the archaeology and heritage and conservation guidance from 2002.

Sustainable Design and Construction

The Sustainable Design and Construction SPD provides information on new development, which is to be designed and built to have a positive impact on the environment. The long term sustainability, and construction method of the project has been considered from the outset, and defines the technical ethos of the scheme. Some information however in the document would influence the detailed design of the building.

Tall Buildings

London is subject to controls on view corridors to various landmarks within the city, highlighted on the map on the right. These must be considered when designing a building within these corridors. My scheme proposes additional towers within the view corridor. The site is located by the green circle on the right. The red cone that the site is within is the view corridor from Kenwood house in Hampstead Heath.

Whilst the design of the building would need to be considered with the view corridor in mind, the proposals for the new towers are within the silhouette of the existing Kipling estate towers directly to the south. This implies that there would be no worsening of the quality of the view from Kenwood House by the imposition of my proposals on the site.[5]

4 Revitalise[1] Bankside, Borough and London Bridge, February 2010. p19

5 Image source: Hayes Davidson. Available at http://www.hayesdavidson.com/LaL/lvmf2009flashmap/

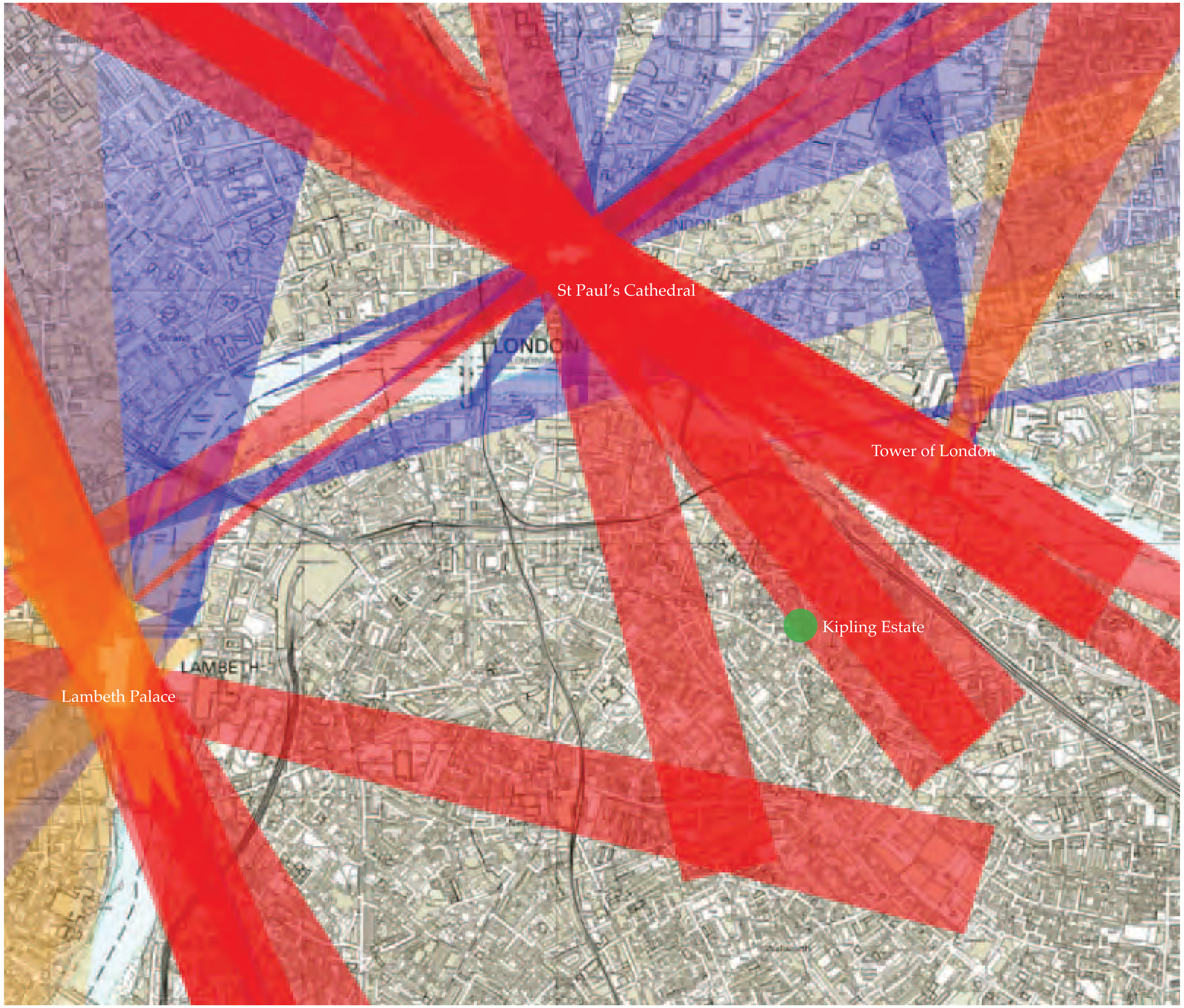
View Corridors information taken from Supplementary Planning Guidance Document *London View Management Framework*, supplementary to the London Plan. Available at http://www.london.gov.uk/sites/default/files/LVMF%20March%202012%20part%201.pdf Published March 2012

Conclusion

There is a great deal to contend with, within national, regional and local planning policy, and whilst the Localism Act has reduced the quantity of legislation at the national level, it remains to be seen whether this will reduce the bureaucratic and undemocratic nature of planning at a local level. At this stage it appears that the complexities of the old planning system have been replaced by planning policy that is not even understood by those working in the industry. Whilst localism and devolved powers to local groups is to be applauded in principle, the details of the Localism act may turn out to be in conflict with wider government policy related to economic growth. This will have a significant effect on how the Act is interpreted by all parties.

This project has been conceived during a period when planning policy has been undergoing upheaval, and this has obfuscated somewhat the ability of the designer to discuss the current regulation. This has also clearly had an effect in the real world, where, as mentioned previously, planning application numbers are significantly reduced in the past couple of years.

Planning policy has an enormous effect on the way people live in cities, and it remains to be seen what the long term consequences of last years policies will be.



The Building Regulations

Introduction

The building regulations are statutory for most buildings constructed in England and Wales, and ensure that legislation in the Building Act is complied with. The building regulations are covered by a set of 14 Approved Documents, which state the legislation, and provide a means by which the regulations can be satisfied. Whilst it is not necessary to comply with the means suggested by the approved documents in order to satisfy the regulations, as they do not seek to stifle design, it is considerably more complicated to attempt to satisfy the regulations by other means, thus the approved documents largely form the basis for the design of buildings.

The approved documents comprise the following:

- Part A: Structure
- Part B: Fire Safety
- Part C: Site Preparation and resistance to contaminants and moisture
- Part D: Toxic Substances
- Part E: Resistance to the passage of sound
- Part F: Ventilation
- Part G: Hygiene
- Part H: Drainage and waste disposal
- Part J: Combustion appliances and fuel storage systems
- Part K: Protection from falling, collision and impact
- Part L: Conservation of fuel and power
- Part M: Access to and use of buildings
- Part N: Glazing - safety in relation to impact opening and cleaning
- Part P: Electrical Safety - Dwellings

Building control would be consulted at an early stage in the design process to ensure compliance with the regulations. A building control officer can be from the local authority, or any number of organisations approved by the secretary of state. Whilst frequently local authority building control inspectors are appointed to oversee building work (for which a fee is required) it is possible to use a building control officer independent of the council.

The Dorset Model

For the purposes of this project, I will suggest employing a building control officer from the Dorset Building Control Technical Committee. Whilst this may seem a peculiar choice, the reason for this is that Building Control in Dorset produced a document known as the **Dorset Model** that is specific to thatched buildings. The Dorset model is based on extensive discussion between the fire authorities and thatching services in Dorset. A committee was set up to produce a design guide for thatchers and architects. Compliance with the Dorset Model reduces insurance premiums on buildings insurance, and is mentioned in Approved Document B (Appendix G sub-paragraph B4) as a way of complying with the legislation. Dorset building control will therefore be in a unique position to advise on the application of the building regulations in this project.

For the purposes of this document, I will look into Part B (including the recommendations of the Dorset Model) , Part K and Part M.

The building regulations tend to be split between approved documents for dwelling houses, and buildings other than dwelling houses.

Fire Safety and the Dorset Model

Part B of the UK building regulations is organised into 5 main sections in each document: Internal fire spread (linings), internal fire spread (structure), External Fire Spread, and Access and Facilities for the fire service.

I will analyse escape distances on each of the types of use, but will generally apply the Dorset model to the analysis of the residential uses in the new and existing buildings.

The main issue related to the project is the combustibility of the thatch. The technical report attached to this document analyses the technical approach to the design of thatch to minimise problems of fire, which the Dorset Model has recommendations. A fire engineer would be recommended to the client at an early stage in the design to advise on the project. The benefits of a fire engineer is an in depth understanding of the regulations. As mentioned the recommendations in the approved documents only suggest a method of achieving the requirements of the legislation, and a good fire engineer can suggest innovative ways of approaching the design of the building, and can discuss the approaches with building control to come up with a bespoke solution.

A significant issue related to the fire safety of the proposals is the retrofitting of appropriate fire safety details to the existing structure. A full survey would identify the locations that fire could compromise, but it is likely that the services within the building would not include appropriate firestopping, and the spread of fire within the internal linings could be fairly rapid in the event of a major fire. The limited head room (2705 floor to floor) within the existing flats causes numerous problems for refurbishment, including fire protection between compartments, as well as acoustic and thermal insulation between flats. The performance of the existing building would be analysed to assess the extent of additional coverings and protection that would be required to the existing structure. It is likely that a sprinkler system would be appropriate to be fitted throughout the entire scheme, to mitigate problems caused by the choice of construction material, and the performance of the existing building.

For the purposes of calculating escape widths of stairs and corridors, an assumed total of 250 people per tower pair would be used. This is based on the assumption of 217 people in the existing towers, + 25 people in the new residences. The school has a separated escape route, and it is assumed that the escape route for the residential elements of the plan is through the existing provision (which would be upgraded to cope with the legislation.

The Dorset model has six requirements, which can be modified through discussion with Building Control:

> *A. Rafters are to be overdrawn with a minimum 30 minute fire barrier (integrity and insulation) and this barrier should also be water resisting. 50 x 25 battens are recommended on a micro-porous boarding to allow the thatch to breathe. The use of a flexible material or cavity foam as a fire resisting barrier is not considered acceptable for the purposes of the Dorset Model.*
>
> *B. The chimney, including the pot, should terminate at least 1.8m above the height of the ridge. Due to the risk of condensation forming as hot gases cool, the chimney pots should be limited to a maximum height of 600mm.*
>
> *C. A domestic mains and battery powered, interlinked smoke alarm system will be required with one smoke alarm fitted in the roof void.*
>
> *The system should generally be in accordance with that specified in Approved Document B to B.S. 5839 Pt. 6: 2004*
>
> *D. A terrace may not consist of more than three thatched dwellings together.*
>
> *E. The use of intumescent mastic is required to help seal the fire barrier along all its junctions.*
>
> *F. The written comments of the adjoining property owner may be requested by the local authority for consideration.*[1]

1 Source: The Dorset Model (2009) Thatched Buildings New properties and extensions Dorset Building Control Technical Committee

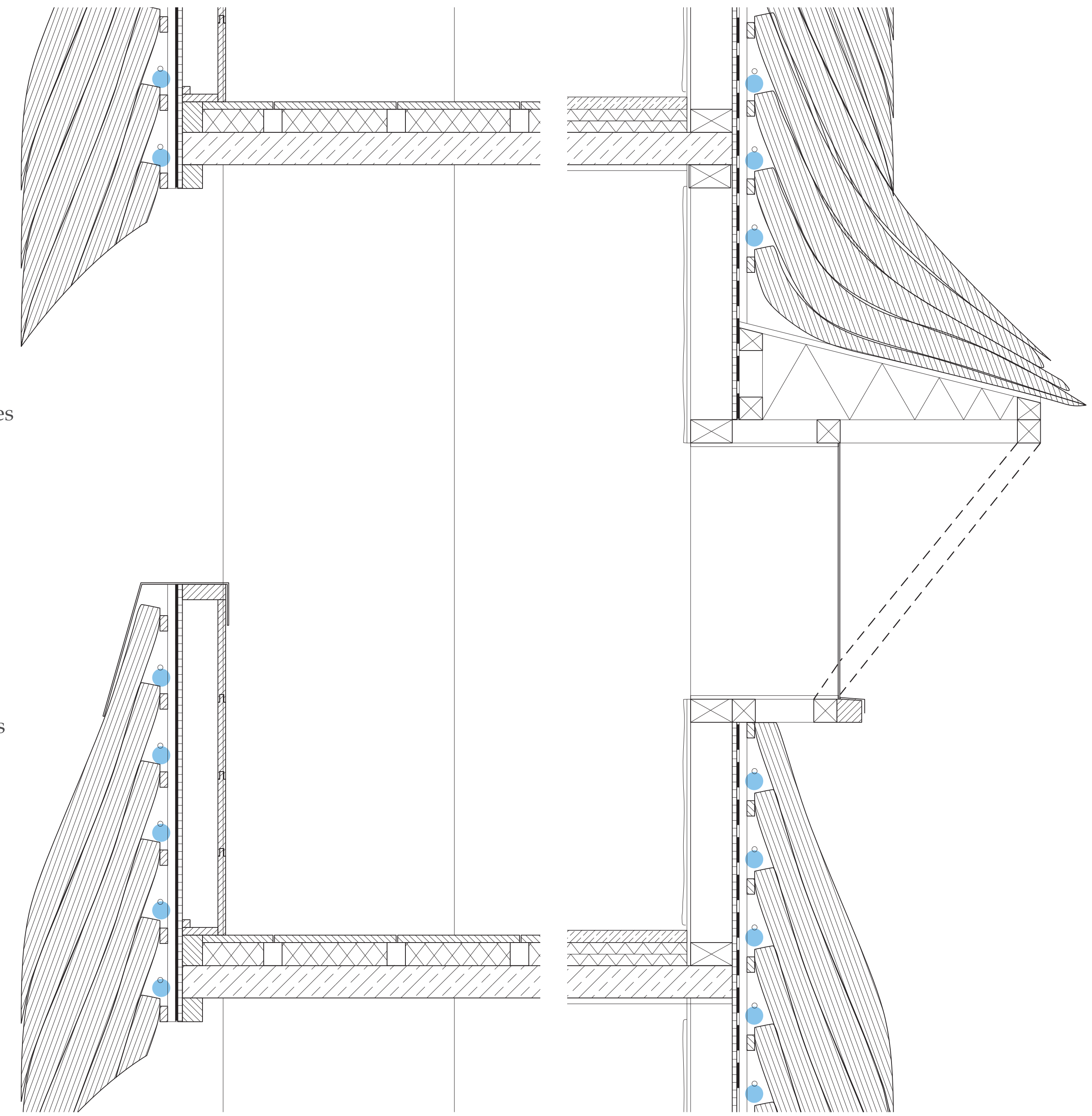
These requirements largely relate to the construction of the building though requirement D would require careful discussion with Building Control to come up with an acceptable solution. Significant fire protection within the wall buildup, between the thatch and the internal space of the building may help to mitigate this risk, as well as a sprinkler system within the wall construction to reduce the spread of fire on the facade. Though a significant issue in the design of the building, I think it likely that a bespoke solution would be achievable through discussion with the fire services and the building control officer.

The sprinkler system, highlighted in blue on the adjacent drawing, is fed from a reservoir on the roof, and uses rainwater, topped up by the mains. The sprinkler system is activated by a smoke and heat sensor in the cavity behind the thatch, and water is fed directly to the area of the thatch that is on fire.

Changes to the plan of the existing building

The existing building does not in its current form comply with the regulations, and a number of changes would be required for the building to comply. These changes would form part of the modifications to the existing buildings.

The main change to the plan would be a requirement for the escape stair to be enclosed, so as to be fire protected. This could be achieved with



Section through new tower, residential level a fire rated wall construction, and a self closing fire rated door to create a fire lobby. Further to this, the stair, which is currently and external stair would be enclosed on the outside wall, to avoid the spread of fire.

Fire rated doors would replace the existing door leaves in the entrances to the flats, and the existing flats would be retrofitted to ensure that the existing services were firestopped between flats, and adequate protection was in place to stop the spread of fire from one dwelling to the next.

Testing the performance of the thatch in a fire

The most important issue related to the performance of the building in a fire is understanding how the thatch would behave. In order to understand this, I propose that before further design work was carried out, a large scale mock-up of a thatch panel would be built, and set on fire to see how it performed. This could act as a case study for discussions with the fire services, and building control. My hunch is that the result would not be as catastrophic as expected, and that the material would smoulder slowly, and be controllable by the sprinkler system, rather than catching aflame. A large scale mock-up, built on site could test this, and would be the next stage in the detailed design process.

Inclusion and Access - Part M and Lifetime Homes

Regulation related to access and inclusion is based on the Disability Discrimination Act (DDA) (1995) which made it illegal to discriminate against disabled people with regards to employment, education, mobility and transportation, as well as access to goods and services. The Equality Act (2010) builds upon the DDA to ban the unfair treatment of certain groups to promote equal opportunities. Part M of the Approved Documents refers to the requirement in the DDA *to make reasonable adjustments to physical features of promises in certain circumstances.* The requirement in the legislation states that "*Reasonable provision shall be made for people to gain access to and use buildings and facilities, and requires sanitary conveniences to be designed appropriately for disabled people to use them.*" Further to the regulations, the document highlights a number of British Standards that provide guidance on good practice in the design of buildings. The overall design of the building has been developed with the principles set out in Part M in mind, and the detailed design of the buildings considers the design of key elements of the building, including provision of appropriate guards and handrails, provision of accessible sanitary facilities and appropriate areas for people using wheelchairs and those of limited mobility to use and access.

Lifetime Homes is a set of 16 standard criteria for the design of accessible and adaptable homes. Not all of the criteria will apply to the design of the building, including those related to car parking and in-flat stair lifts and these will be ignored. Otherwise, the homes will comply with lifetime homes standards.

Whilst parking in its current form has been removed from the scheme given the PTAL level of the site [2], a number of disabled accessible spaces will remain. From the car park there is level access to the base of both towers, and an accessible lift within the existing and proposed towers. From here, level access is provided into each dwelling.

All corridors within the public areas of the proposal will be at least 1500mm wide. This allows a wide enough route for emergency egress in the case of fire, and provision for wheelchair access.

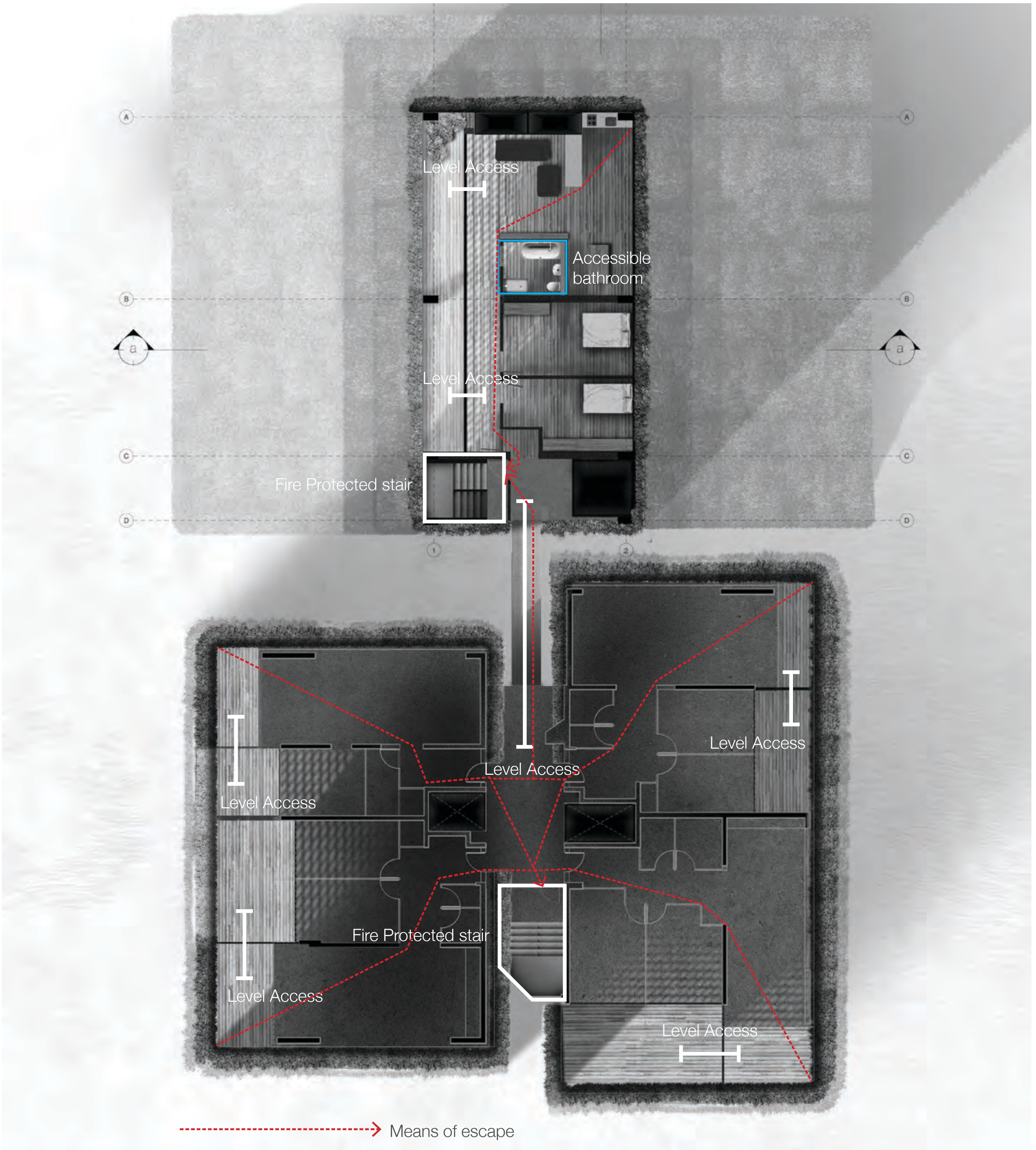
Sanitary facilities in all new flats will be large enough to allow a disabled toilet to be fitted.

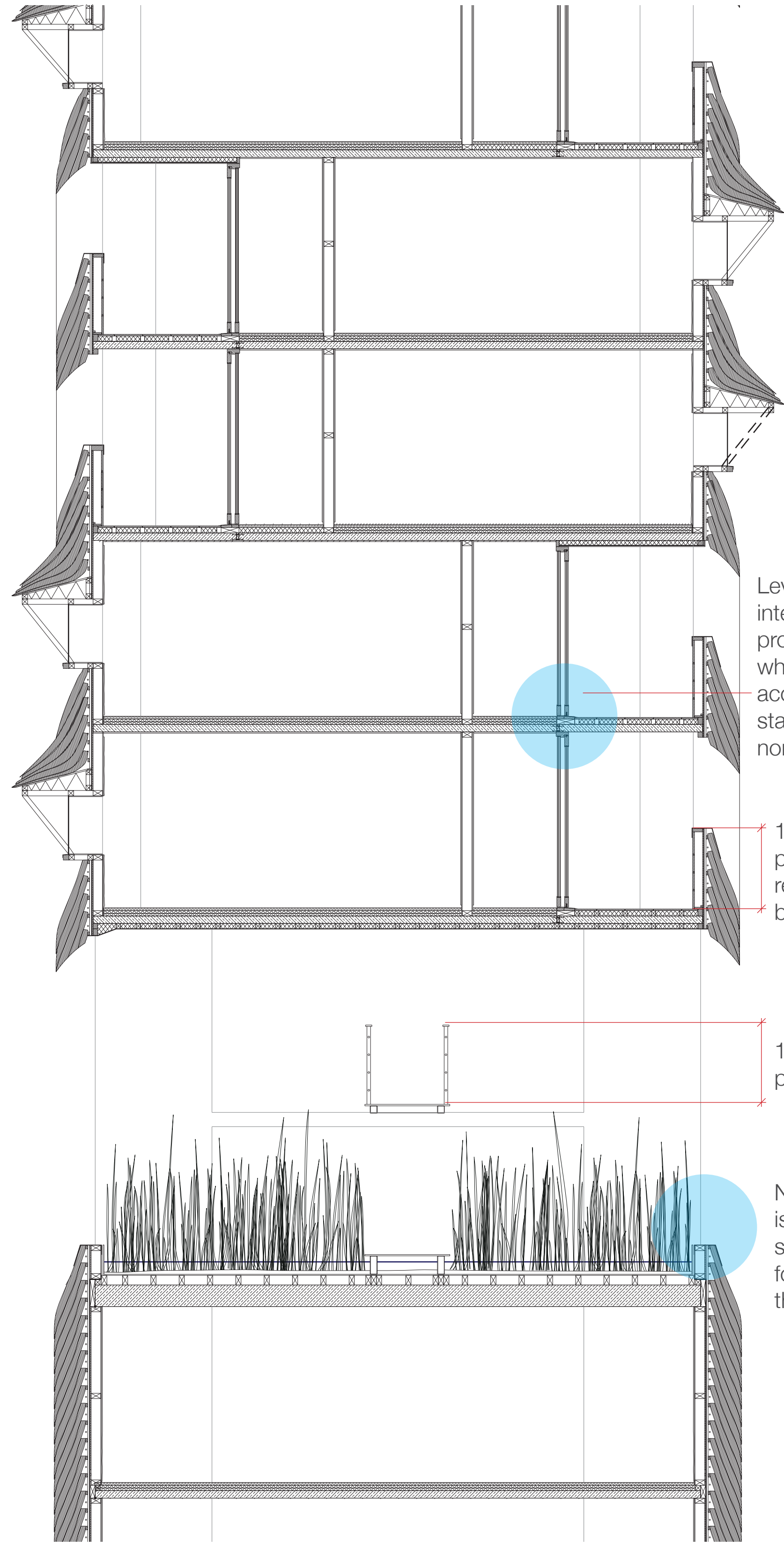
Protection from Falling. Part K

The building is made up of a series of interconnected parts, sometimes via bridges, as well as internal and external stairs, as high as 60m from the ground. It is important therefore to consider the risk of falling from the building, and the regulations have a clear set of guidelines to protect building users and the public from falling. Generally, all balconies, windows and walkways will be protected by a 1100mm guard rail. The exception to this is the lower garden level. I would argue that given that the water garden is inaccessible due to being filled with mud and water, the public will not be able to leave the decked walkway, and walk in the reeds. I have decided to do this to maximise the size of the break between the upper and lower elevations of the building. A mansafe fall arrest system will be provided for those working on the gardens. This would need to be discussed with building control at the earliest opportunity to ensure compliance with the regulations.

The diagrams opposite show the locations of the comments I have discussed in this section of the report.

2 PTAL is the Public Transport Accessibility Level of the site. The Kipling Estate is level 6b, the maximum. Therefore it is extremely unlikely that new development would include any car spaces other than disabled provision.





Level access between interior and exterior is provided in the flats, which also have level access to the lifts. No stairs need to be used in normal use of the building

1100 mm guard provided for all residential external balconies

1100 mm guard for public spaces

No guard rail, as access is limited. A mansafe system will be provided for those working on the garden.

Health and Safety and Construction Design Management

Construction design management is an essential element of the design and construction process, and refers to the application of health and safety legislation to construction projects. The specific legislation is the Health and Safety Act (1974) and applies to all businesses, to self employed individuals and employees. The Construction Design Management (CDM) regulations (2007) set out the roles and responsibilities of all parties within the design and construction industry.

In 2010-2011 50 people were killed on UK building sites, and 2,298 seriously injured[1]. UK building sites are some of the safest in Europe. Our CDM legislation is based upon an EU directive produced to reduce the number of deaths and serious injuries in the workplace.

The immediate role of an architect is to notify the client about their responsibilities in relation to the act, and to advise on the appointment of a CDM coordinator, who will liaise with the design team and the client, and facilitate good communications between all parties and to coordinate all health and safety aspects of the project. The coordinator also maintains the health and safety file.

The application of health and safety goes beyond the construction phase, and the architect is required to design buildings that are safe to use, and to maintain, and this should be an essential part of the design project.

> *Key duties for designers on all construction projects include: checking that clients are aware of their duties under the CDM regs; avoiding foreseeable risks to the health and safety of anyone involved in the construction and future use of the building when undertaking design work; and co-ordinating their work with that of others to improve the way risks are managed and controlled.*[2]

No design work may take place (other than initial design work) until a CDM coordinator has been appointed, and the HSE notified of the project. All projects that are likely to take more than 30 days (or 500 person days) on site for a non-domestic client are notifiable to the HSE.

Other specific requirements for the architect to comply with CDM regulations beyond advising the client to appoint a CDM coordinator include a requirement that the fee proposal provided to the client includes enough time defined to complete their obligations under CDM.

The most recent case of an architect being fined under the CDM regulations following the death of a subcontractor maintaining a building resulted in a fine of £180 000 for negligence.

The architect through the construction process is required to — identify hazards related to the construction and maintenance of the building — try to mitigate the hazards as best as possible — file the list of hazards in the CDM file maintained by the CDM coordinator. Any hazards that cannot be mitigated in the design process should be forwarded to contractors and end users so that they can make suitable arrangements to manage the risk.

Project Specific Heath and Safety and CDM risks

The designers in a given project are *not required to warn about every risk and hazard in the design, such as obvious ones like working at height. The HSE suggest you only focus on significant and unusual risks.* [3] On this basis, I will identify the major risks associated with the project, and describe how they will be mitigated.

The main CDM risk associated with the project is related to the project is the construction of the new towers immediately adjacent to the existing buildings, and the phased demolition and reconstruction of the existing towers. Whilst it is not essential generally for the architect to provide the contractor with a construction program, where phased work is required, it would be helpful for the design team to work with the contractor to produce an appropriate method of working for the complex project. This type of project is possible, refurbishment and rebuilding work is often undertaken on buildings such as Universities where the occupants and users cannot be moved during the construction phase. It will require careful planning to ensure that the safety of workers and residents is maintained during the construction program. Demolition of existing buildings generally is associated with significant risks, but the partial phased demolition of the existing towers in this instance is of particular complexity.

Initially the construction of the new towers, and associated ground works would be completed, maintaining separation between works areas, and public areas on site. Following this, the construction of the prefabricated structural frame would be built to extend the existing towers, and a working goods lift installed in a location that has as little effect on the amenity of the residents as possible. From here, the residents would be relocated, two floors at a time to the temporary accommodation in the new tower and the works carried out in the existing building, starting from the base of the building, working upwards. The residents are relocated two floors at a time so that the impact on their lives due to the noise of the demolition and construction of the building is minimised. In addition, a thorough asbestos survey would be required before any demolition work took place, and quality of air

1 Source: HSE Website. Fatal injury statistics Available online at: http://www.hse.gov.uk/statistics/fatals.htm

2 RIBA Journal website. Available at http://www.ribajournal.com/index.php/feature/article/death_duty/

3 Meeting the Requirements of the CDM Regulations: 10 Tips for Architects Published by RIBA p9

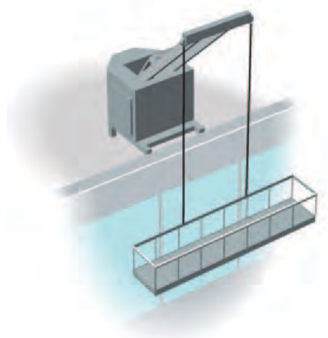
controlled on site in order to ensure that particulate from the demolition did not have an effect on the remaining residents in other floors of the building. It is likely that asbestos will be present in the Kipling Estate towers, and therefore careful removal and management of demolition will be required. Technical information related to the construction of the existing towers is included in the attached technical report.

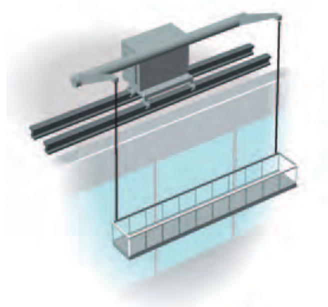
For the construction and redevelopment of the towers, a detailed construction/residential plan would be drawn up showing the phases of construction, and how the two elements are separated in order to maintain safety on site.

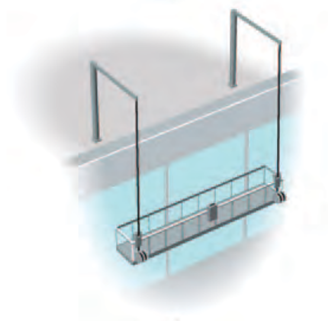
Overall the social importance of maintaining people in their homes whilst construction work goes on in the building around them must be balanced. It is my opinion that the interests of the project are better served by having a complex construction and demolition project rather than transfer of people en-masse from the towers to other sites in the borough. The issues related to this are explained in the introduction to this document. I believe that the technical issues related to maintaining people on the building site can be overcome, and that having as little effect on the lives of the residents will have a beneficial effect on the borough in the long term, socially and economically. This of course can only be proved by realising the project however.

Alongside the construction, the project proposal calls for ongoing maintenance of the building. This is integral to the design, and has been considered throughout the project. Earlier incarnations of the scheme imagined the third tower as a scaffolding rig that provided additional space for the residents of the towers whilst providing access to maintain the existing buildings. In later versions of the scheme, a deck was built around the outside of the thatched facade, providing working space for maintaining the thatch, as well as private outdoor amenity space for each of the dwellings. Whilst this provided a good place to work on the thatched facade, the floors compromised the visual quality of the thatched tower, and was an unacceptable addition to the facade.

The solution is found in the most common maintenance work undertaken on contemporary buildings: - window cleaning. There are a number of solutions that have been developed to allow towers in which window cleaning from the ground is not possible. Shown on the right are a number of potential window cleaning rig designs that are available. The various types of cleaning device vary in cost, and on the far right is the rig that is used on the Petronas towers in Malaysia to maintain the facades. The rig shown has a telescopic arm which allows the operator to clean the windows of a building in which the building has multiple setbacks. This type of rig could be used to maintain the thatched facades on each of the buildings, providing a working platform from which to remove, and replace the thatch. The system for maintaining the thatch, having harvested and stored the reeds in the building would be to move







the bundles from storage to the roof of the building through the goods lift. The thatcher would then load the cradle with tools and reed bundles, and lower themselves to the point at which they are working. From here they would be able to replace the thatch, returning to the roof to collect more bundles, controlling their height and lateral position from the cradle. At the lowest floor, where there is a pitched roof, the thatchers would be able to apply the traditional method of thatching , with ladders propped against the building. A fall safe system would be in place around the edges of the roof to stop the thatcher in the event of a fall.

Given that the stakeholder analysis identifies the master thatchers as member of the client body, and an adviser to the architect, it would be appropriate for their input to be sought at an early stage in the design process to discuss the best way to approach the maintenance strategy. In my own discussions with the Society of Master Thatchers, the general secretary agreed that whilst maintenance would need to be considered in the design of the buildings, it would be likely to be achievable using the method described above. Detailed information about the construction of the facade maintenance system is included in the attached technical report.

Project Stakeholders

UK Government
BIS (Department for Business Innovation and Skills)

City Wide Development (public investment)
Greater London Authority (GLA)

Local Government (public investment)
Southwark Council

Management Group
Leathermarket Joint Management Board

Bermondsey Neighbourhood Forum

Residents Group
Bermondsey Neighbourhood Forum

Private Trading Body
The National Society of Master Thatchers

Client Group

Design / implementation

A Construction works contractor

Project Manager

Lead Consultant

Architect

- Civil / Structural Engineer
- Mechanical and Services engineer
- Quantity Surveyor
- Planning Consultant
- Transport Consultant
- Ecology Consultant
- BREEAM Assessor
- CDM Coordinator
- Thatching Consultant

Project Management and implementation

Stakeholder Analysis

The arrangement of stakeholders for a project of this type is complex, and a variety of organisations and groups are involved in the management of the buildings, and residents. Stakeholders are organisations or individuals who have an interest in the project, the project program, or the impact on themselves or others of either. The nature of the stakeholders interest may be political, financial or ideological. The complexity of the stakeholder analysis is in part driven by the legislative framework that work on housing involves, coupled with private and public investment and advice.

The diagram opposite shows the project stakeholders. On the left, significant financial stakeholders, making up a client consortium. This group is formed to manage and appoint the design, production and implementation team on the right.

Department for Business Innovation and Skills (BIS)

Following the observed failure of austerity to 'kickstart' the economy, the government decides to shift its economic policy significantly, instead promoting investment and spending. BIS promotes investment in skills training for out of work young people, providing free training for a number of semi-skilled trades, with input from industry groups. Thatching is identified as a vernacular craft, and a school proposed to teach the craft. The funding for the thatching school would come directly from BIS.

The Greater London Authority

The GLA is the strategic authority for London, a permanent body that "provides continuity in the ongoing development" of London, while the London Assembly and Mayor of London are elected by Londoners. The London Development Agency (LDA) was formed as a functional body of the GLA with responsibility for helping the Mayor of London to support the growth of London's economy in line with the Mayor's Economic Development Strategy for the capital. The LDA was subsumed into the GLA in March 2012 after 12 years of existence, and the functions of the organisations "streamlined" into the GLA. West Bermondsey is listed in the London Plan as part of the Central activities zone, and as an opportunity area, for which some funding may be available.

London Borough of Southwark (LBS)

The Kipling estate was built for the London County Council (LCC), the government body for the Council of London until 1965, when it was replaced by the Greater London Council (GLC) who took on more than the inner London area that the LCC was responsible for. When the GLC was dissolved in 1986 by the local government act, its powers were devolved to the individual London Boroughs, including the LBS to whom the management and ownership of the buildings was transferred.

Leathermarket Joint Management Board (JMB)

The JMB is a resident managed housing association who manage various estates in the Southwark area on behalf of residents. The group emerged out of a neighbourhood forum by setting up a Tenant managed organisation (TMO) under the UK Government's Right to Manage legislation. At the time of setting up the TMO, a majority of residents were in favour of it being set up. Every five years this question is put to residents who vote on who they want to manage their buildings, in this instance either the Leathermarket JMB, or direct management by Southwark Council.

Residents Groups

The Kipling Tenants and Residents association (TRA) is the residents groups that represents the views of the local tenants and homeowners in the Kipling estate. The JMB reports regularly to the TRA.

National Society of Master Thatchers

The NSMT, established 1967, was a trade group that promoted the interests of thatchers in the United Kingdom. In 1998, the society changed its form to a limited company. Association with the company is through proposal and sponsorship, followed by peer review, to maintain the standard of craftsmanship of the members of the society.

It is proposed that the Society, observing a decline in the quality and number of thatching craftsmen and women in the UK, lobbies the government to fund the construction of a school of thatching in London. The government refers this to the GLA, who, with Southwark Council and guidance from the NSMT propose a school in Bermondsey, on the site of the Kipling Estate.

I have made contact with the Secretary of the Society, Andrew Raffle, who discussed the project with me. He seemed excited by the proposal, and was fully supportive of the technical possibility of the project.

The NSMT will have input into the design of the construction of the thatch at an early stage, and following the construction of the scheme, will be tasked with the maintenance and upkeep of the building, through their students. The upkeep will be part funded through the JMB, using funds provided by Southwark Council, and the Skills Funding Agency (through the Department for Business, Innovation and Skills).

Above: Thatched window detail showing cut ends of longstraw. Photograph taken during a visit to observe a thatcher at work in Kent

Construction Stakeholder Precedent: The King's Cross Construction Skills Centre

A key precedent for the implementation and ongoing construction of the project is the Construction Skills Centre in King;s Cross which was the first building completed in the 67 acre development. The building is an education and training centre, built on site which offers local people training, professional qualifications and employment opportunities on the development site. The Skills Centre was part of the section 106 agreement with Camden Council, and realised a commitment by the developer of the site to improve the opportunities for local residents, to work on the site. Alongside this, the Learning and Skills Council provided funding for NVQ Apprenticeships to be delivered, to allow those training to be able to take up jobs with the three main construction companies. The Learning and Skills Council has since been rebranded as the Skills Funding Agency.

The project proposal has no private developer for funding the construction of a skills centre on site, teaching a particular skill fundamental to the project is of relevance. The lack of a commercial private developer means that a Section 106 agreement would not be signed, so the funding would come directly from central government.[1]

However I visited the Construction Skills Centre to get a sense of what was provided by the developer, and how the building operated on a day to day basis, in order to inform the strategic brief of the project, and more accurately assess what kind of spaces would be required in my proposals.

Top Entrance to the semi permanent building photograph: James Kirk

Below: Interior of the Construction Skills Centre, Kings Cross

1 A section 106 agreement refers to section 106 of the Town and Country Planning Act (1990), and "allows a local planning authority (LPA) to enter into a legally-binding agreement or planning obligation with a landowner in association with the granting of planning permission. The obligation is termed a Section 106 Agreement." (source: Local Government Idea and development website.)
S 106 agreements ensure that commercial developments have an element of public provision, which ranges from a public open space, to the scale of a school or arts venue.

Design Team:

The architect is the lead consultant in the design team, and is appointed by the client group at an early stage. Given the nature of the project, and the complexity of the scheme, it is likely that the client group would seek to appoint a project manager to oversee the initial stages of the design. Whilst it is possible that the architect may fulfil this role, frequently separate project managers are appointed to perform this task. The project manager will fulfil the role of providing a link between the client consortium, and the design team, as well as ensuring that the broad targets and aims of the client are met. It is possible that the project manager may change during the course of the project, if a management contract, or construction management procurement route is selected, the client's contractor may take over this role after the initial design stages.

The **Architect** provides design and some project management services to the client consortium. In this design I would seek to advise on the employment of the other consultants, particularly the engineers. The architect provides design leadership to the client, and seeks to maintain the highest quality within the design from all other designers, at an appropriate cost.

The **civil engineers**, including **structural engineers** are of utmost importance to the project, and would be employed at an early stage in the design in order to advise on the construction of the new buildings and extensions to the existing buildings, as well as the structural complexities of dismantling the external walls of the existing towers.

As the architect, it is required to advise the client that a **CDM (construction design and management) coordinator** must be appointed at the start of a project. The CDM coordinator is of utmost importance in a project of this type which requires construction work to be ongoing whilst residents remain on site, and people remain in the building. The CDM coordinator is employed to advise the client on matters related to health and safety in all aspects of the design and construction of the building. The CDM coordinator would be invited to attend all design team meetings, and would be able to see all project related information.

A **quantity surveyor** would be employed at an early stage in the project in order to advise on cost, and would be provided with the developing design proposals to advise the client on project associated costs. In the event that a two stage tender process was undertaken, the employer's cost consultant would work with the contractor's cost consultant to draw up a schedule of costs.

A **planning consultant** may be requested by the client group to advise on planning issues. It is often possible for the architect to fulfil this role, though clients often like to employ a planning consultant, as they have may have significant experience dealing with individual planning officers, and a thorough knowledge of specific planning policies. Given the planning precedent in the area, and the possibility two streets away of building Western Europe's largest tower, directly in line with the view from Parliament Hill in Hampstead Heath to St Paul's Cathedral, it is assumed that planning a tall building for the site will not be an issue. The planning consultant would also advise on public consultation, which can contribute to the BREEAM rating of the building (discussed later).

A **transport consultant** may be employed to advise on the changes to the road layouts required for the proposal, including changing the use of part of the site to include a D1 use, as well as increasing the number of residential units on the site.

A **BREEAM assessor** may be required for the skills school aspect of the project, if the scheme is to achieve a BREEAM rating. Since Southwark Council currently expects private developers to achieve a BREEAM rating of excellent or higher, it is likely that this will be applied also to their own developments, and that an "excellent' rating will be required for the skills school. (See the following BREEAM section for an expanded explanation on this)

In order to achieve a BREEAM 'Excellent' rating, it is required to employ an **ecology consultant** to make an assessment of the design and realisation of the building, as the ecology credit related to this is obligatory to achieve an 'Excellent' rating.

Sustainability and a note on BREEAM

The building would likely be rated under a BREEAM Bespoke assessment type, as the skills school falls outside the scope of the other tailored schemes. I have experience working on a skills centre building in my work placement, and this was not able to be assessed under a BREEAM Education assessment type. Though BREEAM is likely to be required for this building, it will not be particularly helpful in assessing the environmental rating of the building.

The Building Research Institute was founded originally as a public body, established by the government, but is now a private institution funded by the building industry. Whilst the BRE maintains that it is independent of its funding streams, the reality is that the BRE is significantly influenced by the industry that it provides consultancy and research for. This means that the interests of the building industry are promoted, and the organisation may not provide impartial guidance on achieving sustainability in the construction industry.

The result is limited scope for novel approaches to sustainability, and a perverse system of ratings for materials (U-PVC windows are rated with a an A+ rating, with some timber windows rated lower) The innovation credits available significantly limit the scope of the ways in which innovative approaches to sustainability can be achieved. A passive, breathing, cold building envelope, made of thatch would struggle to achieve a particularly high rating with BREEAM.

Procurement

Introduction

Essential to understanding the way a building will be constructed and of equal importance to the way in which it is designed is the method of procurement that is used to engage all parties in a contract. Realising buildings is an inherently complex procedure, and there are numerous methods that have been designed to realise a wide variety of project types.

> *The objective of contract procurement is broadly to identify an appropriately skilled contractor and to secure an appointment on the basis of the right team, agreed costs, programme and appropriate transfer of risk.*

Rawlinson, S. (2006)[1]

This section of the report will explore methods of procurement that may be suited to a project of the type that I am designing, and will explore the options available, and their associated pros and cons. The choice of procurement type is vital at an early stage in the project as the result of choosing the wrong type can be exaggerated project costs, over-running timetables or a failure to realise the project at all.

1 Procurement: Two-stage tendering in Building, issue 19

Typically, clients choose builders with whom to form a contract (from here shortened to contractors) on the basis of cost alone. The assumption for this type of decision is that the project is controlled by a detailed strategy for construction and specification that the builder has costed appropriately. With a traditional procurement method, this is an acceptable way to contract construction work, but with more complex types of design processes, and working with existing buildings, choosing a contractor based on cost alone is problematic.

Procurement Strategy

The project contains two major elements (which are repeated for each individual tower): the redevelopment and modification of the existing towers, and the construction of the new 'backpack' tower that facilitates the changes. A third element, completed between the construction of the new towers and the redevelopment of the old is the landscape works to the site. The construction of the new tower is necessary before the work on the existing towers can be carried out, as the fundamental need for the new tower is to facilitate changes to the old tower whilst disrupting the existing residents as little as possible. The refurbishment of the existing towers would not start until the construction of the new tower is complete. The construction method can therefore be split into three parts: the construction of the new tower, the redevelopment of the existing towers, the maintenance of the project site.

The three primary issues for selecting a procurement strategy, which must be balanced are cost, quality and time. Alongside these issues, all parties must negotiate the amount of risk they are willing to accept. All of these issues are important to the client, although to differing degrees in different projects.

Cost

The cost of the project will be heavily scrutinised throughout the construction period, and a reason that tower blocks of this type have been built in a way that requires little maintenance is that the owner often does not have the funds or the security of future income to pay for it. Cost will always be a significant issue to public projects, and this is no exception. The project proposes that a maintenance schedule is essential to maintain the buildings as decent places to live, and provides an architecture that explicitly demands it, and that the method by which the building were designed and constructed is not fit for the purpose of providing decent homes.

Quality

For people to be able to operate to their potential, and for children to grow up caring about their environment, it is essential that people have a decent home. Quality is of utmost importance in a housing scheme to promote a feeling of care to those living in the homes.

Time

It is important that the construction program is clear to the residents, and that it is stuck to throughout the course of the project to reduce the impact that the works have on those living in the buildings.

Refurbishment of the existing tower adds further complexity to the project, and therefore additional risk to a standard new build project. Identifying the state of the existing building is essential to mitigating this risk, and significant investigations must be allowed for during the design stage to allow for this. Since the building is to remain partially occupied during the design and construction phases, this may pose problems to the delivery of the project, and the creation of an accurate costing of the design. Building condition issues can significantly disrupt a project if unexpected, and add significant costs to the contract.

Partnering

If the project was chosen to be taken as an exemplar project, and was seen to be a method that could be applied to other tower blocks in the borough, or even in London, as suggested, then some form of partnering agreement would be appropriate. Strategic partnering is a method that has been developed where multiple projects that are undertaken by a client over an extended period of time allow a client and contractor to develop long term commitments to a contract. "*The aim is to move the focus of attention away from getting the cheapest or quickest solution for a particular job, and towards a longer term understanding of the purposes of a project, and understanding from both parties about what each wants to get out of the project.*"[2]

2 Murdoch, J. Hughes, W. (2008) Construction

Possible Procurement methods

General Contracting

General contracting uses competitive tendering and essentially separates construction from design, so the contractor prices and builds what the designers draw. This form of contract is very common, and is often referred to as a traditional contract. Architects maintain an appreciation for general contracting as it allows them to maintain quality throughout the project, as they are on a level footing with the contractor, and provide information to the builder to realise the building. This makes this form of contract attractive to some clients also, as they can use their designers to reduce the power of the contractor to cheapen the project. A traditional contract is however suited to simpler projects than this, as it would be extremely difficult to accurately cost the refurbishment of the existing buildings from a tender package prepared by the designers - it would be extremely hard to quantify all the potential project costs associated with a project of this complexity.

Two Stage Tendering

A two stage tendering process is used to appoint a contractor early in the design process to allow them to have input into, and advise on the design at an early stage. A competitive process of tendering on some preliminary information, profits and overheads allows the employer to select a preferred contractor. The first stage may also include the competitive tendering of some work packages, together with lump sums for pre-construction services, design fees, risk margins for work that will not be tendered in the second stage.[3] The second stage is a negotiation between the contractor and the employer, in which the detailed design information is priced, and a cost negotiated. This type of tendering is a more open form of procurement method, and can result in lower costs for the employer, and less risk for all. In my experience in dealing with this type of contract however the negotiating position can be abused by the contractor, and on a project which is time sensitive, the contractor can maintain a stranglehold over the employer which can have a seriously damaging effect on the outcome of the project. It is essential that the employer can withdraw from the process at any time, which demands that the project is not time sensitive. It is also helpful to the client if they have a bargaining tool of a significant future workload.

Design and Build

A design and build contract lays the responsibility for the project at an early stage in the hands of the contractor. This has significant advantages for the client, in that cost and time are controlled, as it is in the responsibility of the contractor to complete the work. Unfortunately it is easy for the quality of a project to suffer in a design and build contract, as the contractor writes the production information for the project, and controls the specification. In order to get around this, designers like to provide as much information to the contractor, before contracts are signed, in order to control the quality of the project. Of course this has significant effects on the profitability of the designers. In some instances the original architect is novated to design the detailed information for the completion of the production information, however it is still hard for the architect to maintain quality in the project, as the contractor, rather than the client is their employer. The benefits of this type of contract are that the client has a single body to approach if a problem occurs in the construction or use of the building.

Management Contract

Management contracting is characterised by the client engaging a "management contractor to participate in a project at an early stage, contribute construction expertise to the design and manage the construction."[4] The management contractor is typically a builder or construction company who can bring construction expertise to the project at design stage, without being compromised by an interest in the construction of the project. - "The management contractor is not employed for the purposes of undertaking any of the works, but solely for managing the process."[5] All aspects of the construction of the building is subcontracted from the management contractor who is paid a fixed fee. A series of discrete work packages are produced by the design team, and these are delivered as separate contracts to the subcontractors. The benefits of a management contract to the contractor are clear - they have the same standing as the design team, and can reduce the cost of their business significantly by dispensing with their labour force and equipment, as well as significant reduction in the risk that they take on.[6] The benefits of a management contract to the project as a whole is that it brings the expertise of an experienced builder to the design of the project, which can be beneficial in a project whose requirements are complex. As long as the management contractor is not in cahoots with the works contractor, a management contract can reduce costs for the client. A management contract can also allow for a greater degree of change during the construction process, and this means that in a refurbishment project, the design team can modify and produce work packages as the detailed state of the existing building is revealed in the construction process.

Construction management is similar to the management contract process, however the main difference is that the employer contracts all of the individual trades separately, and this process is overseen by a project manager who advises on the process. This type of procurement method provides a great deal of control over the project to the client, although alongside this they take on all of the risk associated with the project also. This type of procurement method is suited primarily to highly experienced client bodies who have the time and expertise to manage all stages of the design and construction process.

Contracts: Law and Management fourth ed. Taylor & Francis Oxon.

3 Rawlinson, S. Procurement: Two Stage Tendering (2006) Building Issue 19

4 Murdoch, J. Hughes, W. (2008) p59

5 *ibid.* p59

6 *ibid.* p60

Term Contract

Social housing refurbishment is often undertaken on the basis of a term contract. This is based on a standing offer "where the contractor tenders for the maintenance work which may be required by the employer over a specified period. The acceptance of such a tender by the employer does not in itself create a binding contract. The employer is not bound to order any work, nor is the contractor prevented from withdrawing before the period is over"[7]

Thathing work taking place in Kent. I visited master thatcher John Kenward to observe the process of thatching. Photograph: james Kirk

7 ibid. p129

Selection of the appropriate procurement route

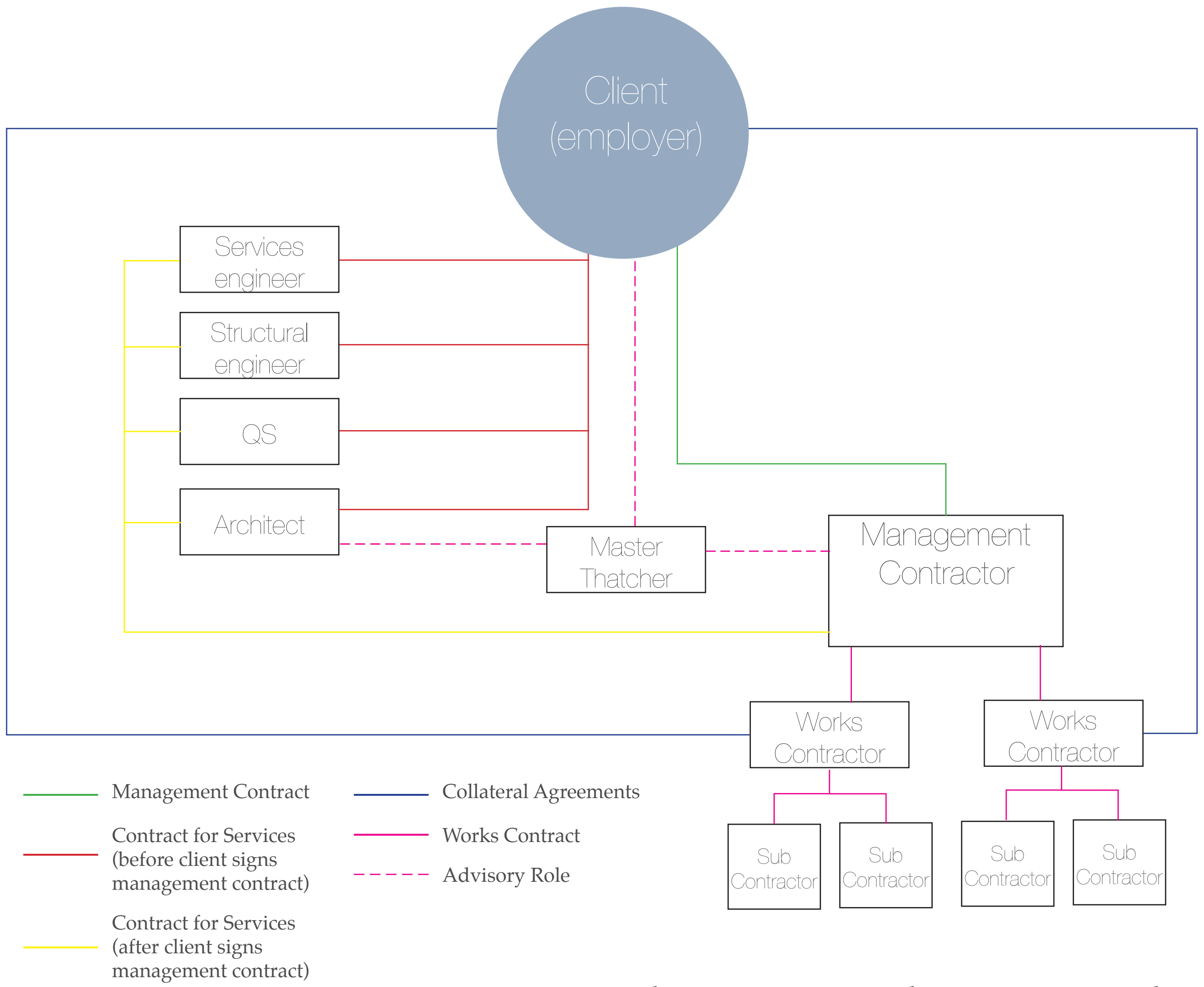
Architects typically like to select a traditional procurement method for the delivery of a building, and this is understandable as it leaves the construction of a building in the expert hands of the architect, to design all aspects of the project. For a project of this complexity, both strategic and technical however it may not be the most suitable method for the delivery of the building. It is certain that a degree of input into the peculiar type of thatched construction that is proposed would benefit from significant input from a master thatcher, and that the redevelopment of the existing concrete buildings would benefit significantly from the technical input of a builder who has worked on LCC point blocks from the 1960s previously. Since these building types are common, it is likely that this type of contractor will be able to be employed to feed their experience into the design process. The quality of the finished building is of utmost importance, to provide decent homes for people living in West Bermondsey, and therefore quality must be prioritised over cost and time to some degree.

It is for these reasons that a I see a management contract as the most suitable procurement strategy for the construction phases of this project. The maintenance aspect of the project would be most suited to a term contract however, after the project has been completed. The management contract allows the design team to hand over packages of information as the project develops, starting with the enabling works to allow the project to take place, followed by the detailed production information for the construction of the new towers. Finally the construction of the extended floor plans to the existing towers and the redevelopment of the existing structure can take place.

A two stage tender process was also considered for the delivery of the project, as has been used on projects of a similar nature completed in the past: The Angel Building, designed by AHMM and completed in 2010 used a two stage tender procurement route, in order that the expertise of the contractor was brought in at an early stage in the design process. The project was similar in that it provided an extended floor plan and new facade for an existing concrete frame, and the contractor brought on following the completion of Stage D of the design work. Ultimately however the two stage tender process in my experience allows a great deal of freedom for the contractor to control the quality and cost of a project, once they have been declared as the preferred bidder after stage one of the tendering process. There is little to control the contractor attempting to maximise profits, and bleed a client of their funds, if there is no history of cooperation between the client body and construction company, which we must assume is the case for this project.

Though the complexities and scope of the proposals make the use of a term contract unfeasible in the first instance, as the construction of the new building would require a greater degree of safeguards than the contract type allows for, there may be scope to use the term contract after the new buildings have been constructed, redeveloped, and the project complete. The maintenance of the buildings which will be required throughout their life would benefit from the properties of a term contract, between the employer, made up of the council or organisation that is managing the towers, and the school of thatching which would be regularly maintaining and remaking the thatch as required. This would allow the local community to benefit from the new industry that has been brought to Bermondsey, and the provision of skilled jobs for the local workforce.

Right: the organisational diagram for the contract chosen.



Choice of contract

Various bodies produce contracts that define the procurement methods listed above. These bodies include the Joint Contracts Tribunal (JCT), New Engineering Contract (NEC) and the Institute of Civil Engineering (ICE) amongst others. The contracts that these bodies produce sets out the articles of agreement and the procedures for undertaking construction work. The contracts that are provided by these bodies have been tested in court and are thought to be legally sound, though with a complex project of this nature, it is likely that some changes would be required to the type chosen.

The JCT is an industry standard that "is an affiliation of interest groups within the construction industry, which acts as a forum for discussing and determining the content of the clauses of the standard-form building contracts." In the mid 1990s the JCT was strongly criticised in the Latham Report for a number of issues related to its language, structure, and definitions, among other issues, and has since comprehensively reviewed and changed its contracts.

The JCT provides contracts for a number of different procurement routes, including those chosen above: The JCT MC 98 Management Contract and the JCT MTC 06 Measured Term Contract. These are the industry standard, and are the contracts on which others in the industry are measured. The management contract binds the chosen management contractor to the client by requiring a significant set of obligations of the contractor, as well as benefitting the design team by allowing changes to the design throughout the project process.

Managing Risk in management contracting

The management of risk is of utmost importance to the procurement route, and the success of the realisation of a project can be severely affected by how the risk is managed. A management contract is suited to a project in which there is a high degree of risk, and the procurement route limits the main contractor's exposure to risk. Though this may seem an odd way to approach the procurement of the building from the point of view of the design team or client group, where risk is transferred from one party to another, (in this instance, from the employer to the management contractor) a financial adjustment is made to balance it. Thus the employer takes on the risk of the project, but in doing so reduces their costs for the project as a whole, as there is a limited premium on the price for excessive risk to be absorbed.[8]

According to Murdoch and Hughes, (2008) "in the early days of management contracting, the intention was indeed to create a 'no-risk' contract for the contractor. This was seen as the best way to encourage the contractor to act as a professional consultant". In more recent times however, employers have sought to transfer some risk back to their management contractors. "The main risks involved were those associated with responsibility for works contractors, time overruns, defects maintenance, preliminaries and design".[9] In this project, I would seek to advise the client to maintain more of the risks associated with the project, in order to avoid a strained relationship between the management contractor and employer, or sub-contractors.

Conclusions

Though none of the procurement routes are perfect, all rely on some degree of goodwill between all parties, and cannot remove the problems associated with a litigious builder, some methods have clear advantages over others for a project of this type. It has been helpful in developing the design strategy of the scheme to understand how the building would be procured, and the possibility of specialist input into the design. One has to assume however for a project of this type that all parties are acting in good faith, with a view to an ongoing professional relationship between themselves, otherwise the process of procuring building projects can become paralysed by the process itself

8 Murdoch, J. Hughes, W. (2008) p65

9 *ibid.* p65

Design and construction phasing

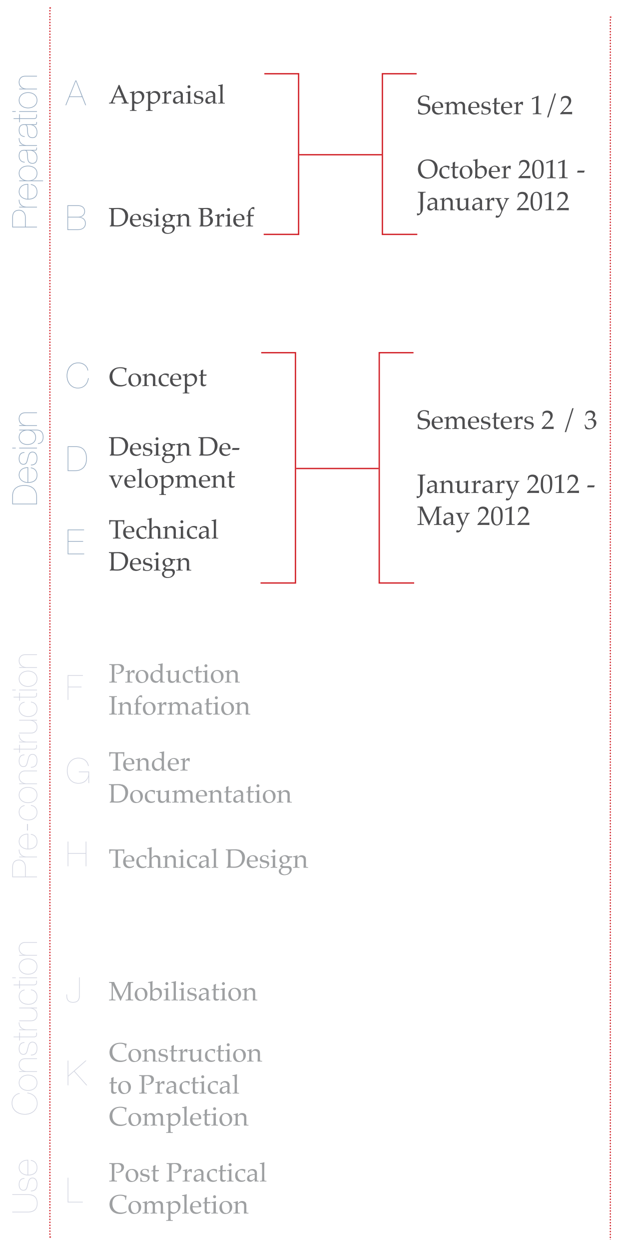
The work presented in this document, both in terms of the applied technical report, and the schematic design constitutes (in a real life project) the early stages of the RIBA Plan of Work.

The Plan of Work, a document produced by the RIBA "organises the process of managing and designing building projects and administering building contracts into a number of key Work Stages."[1]

These work stages are shown on the right, with the approximate project work completed to May 2012.

Project work is split into 5 main categories, and as the diagram shows, the work completed to this point includes work that would be delivered up to Stage E. I would suggest that my work on Stages C - E has not been completed, as the technical information provided in the attached technical report strategises some elements of the technical information, including the structure and energy strategy. To achieve Stage E, these elements should be understood in detail.

1 RIBA Plan of Work. Available from the RIBA website at http://www.architecture.com/Files/RIBAProfessionalServices/Practice/OutlinePlanofWork(revised).pdf Description from pedr.co.uk - RIBA Plan of Work.



It is worth noting the importance of defining the work stages in advance of signing contracts, referencing particularly the content of the submissions for each workstage.

On a previous project I worked on, when completing Stage D work for a client to pass to a contractor on a design and build two stage tender contract, the work package that was to be handed to the contractor defined the workstages, but did not define their content. A number of different bodies, including the Institute of Civil Engineers and the Royal Institution of Chartered Surveyors produce Plans of Work, both of which are based on the RIBA document. In the case of the project, the contractor claimed that Stage D demanded a set of calculations for the building, whilst the Structural engineer pointed out that the ICE plan of works did require these calculations, but the RIBA plan of works did not mention them. The client subsequently withheld payment to the engineer until calculations were provided.

Though the plan of works defines the general stages of work for a construction project, it does not provide an infallible list of requirements for each party, for all available types of contract, and therefore cannot be relied on in a contract. — The detailed content of the work package must be agreed in advance between the client and designers in advance.

After completing Stage E, the design team (now under the guidance of the management contractor) would begin to prepare the production information. This is the package that provides all necessary information for a full set of drawings for construction to be worked up. Materials would be discussed with the client for approval.

Following completion of the production information, the design team, coordinated by the architect under the management contractor would produce a full set of drawings and specifications to allow the building to be tendered and priced by contractors, and subsequently built based on this information.

All packages of information, (including stages C - E work) would require input from others, including engineers, cost consultants and building control. Until a coordinated and accurate set of information has been provided, these stages could not be considered complete. The timeline shown left is only intended to give a sense of the stages of work that my work up to this point would have been working towards.

Finance, cost and value and risk

Finance

The project to thatch the Kipling Estate towers, add new functions in separate towers, and to remake the landscape around the buildings would require significant financial investment. The project proposals would also demand political will, and an ideology that would be unlikely to be undertaken by the current national and local government, or their opposition. My proposals, whilst feasible in principle, propose an approach to redeveloping London's mid 20th century architecture in opposition to the simple recladding approaches that surround us today. Significant funding for housing projects from the public purse has not happened for a number of decades, and a different approach to public housing and urban investment would be required to realise the scheme.

Having said this it is interesting to analyse the mechanisms and methods by which a scheme of this type could be realised. The stakeholder analysis outlines the groups and organisations that form the client body, which is formed from both public and private interests. Though recent precedent suggests that private investment would deliver the project, underwritten by public investment, in this instance I believe that public funding would be a more appropriate method for delivering the scheme.

I my past experience, I have worked on a project that has involved a client group made up of both public and private interests, and whilst this particular project proved problematic on a day to day basis in terms of the relationship between the client groups, in the long run the project was successful due to a defined client agreement that set out exactly each party's duties from the earliest stage in the project.

In this project, the outcomes of the project are simpler to define, as are the roles of the stakeholders which can be separated into clients and end users. The client would be the organisation(s) that paid for the scheme, and the end users would be made up of the groups of people who would use the building. Whilst the architect would be required to design based on the requirements of both groups, a single point of contact within the client group (likely to be a directly employed project manager) would deal with the architect and the rest of the design team on a day to day basis.

Though the architect may have some influence on the financing of the project, by defining and developing the brief to ensure that potential unnecessary costs could be mitigated from the outset of the project, the financing would largely be a client issue. From the outset of the project a quantity surveyor should be employed to maintain a cost plan to ensure that the design remained within the clients' budget. In order to allocate funding to the project, it is possible that an application for funding would be required, which the architect could help to draft.
In its current form, government on a national level is not set up to fund the construction of housing nationally, and to achieve this, a program of building would be required, with appropriate funding, from the government department currently called the Department for Communities and Local Government. The funding for the scheme would be likely to come from the council, fed by funds from the Treasury. For the purposes of this project, I will assume that the project is an exemplar project, from a newly formed government committed to spending on public housing.

I have disregarded the possibility of a public/private agreement to finance the project, for the reason that whilst the project may have the possibility of responding to the requirements of a commercial client seeking value for money from their investment, or a public client seeking both value for money, and quality of outcome for the residents and users, the project is unlikely to satisfy both parties. This approach was the basis of PFI and PPP approaches to financing construction work, the results of which have been widely criticised. The public purse being exploited for private gain, and the discrepancy between the interests (of either the public or the individual) being two major criticisms of the methods.

A long term investment, of a phased scheme such as this, providing a public service, and delivering public investment (in skills, training and decent homes) is best provided served by a public institution, which can provide greater reliability of assurance of realisation. A private company, subject to the fluctuation of the market, the will of shareholders and inherent self interest would be unlikely to wish to deliver a project of this type.

It is for these reasons that I propose that the project would be funded publicly, to invest in the residents of Bermondsey to provide decent housing and varied opportunities for all.

Project Risks, Cost and Value

There is an interesting lesson to be learned here with regard to the preservation of traditional industries. Thatch is not inherently expensive. Traditionally, every village had a thatch field, and the villagers harvested thatch in winter as a regular part of the agricultural cycle. [...] The materials were plentiful and did not have to be specially ordered; the thatcher had work year-round, so he did not need to charge high rates. When the demand for thatching dropped however, a vicious circle set in; the price of humble materials like thatch [...] skyrocketed, and as it did so, fewer people wanted or were able to go to the expense. The irony is that thatching did not die out because it is expensive - it is expensive because thatching died out.[1]

The project proposes a new industry, based on a vernacular traditional construction method,

1 Kerr, A. *Lost Japan* Lonely Planet Publications. p108

proposed to create a new industry for London. The quotation above highlights the problems associated with vernacular building methods in Japan, which applies equally in the UK. My project hopes to deal with these issues by reestablishing thatch as a common method of construction, and providing the raw material on site.

The project costs associated with the scheme would be quantifiable to provide a preliminary figure based on the information provided by the architect at this stage, although this would require input from a specialist and would not be particularly enlightening strategically of the project. — The scheme does not propose absurd or unquantifiable technologies or approaches to construction. Highlighting the significant issues and unique costs associated with the scheme, and comparing them to equivalent projects is possible and enlightening however.

Major cost effectors and unknowns

The main immediate cost implication, and unknown of the project is the existing buildings. Major survey work to assess the state of the towers as they stand, analysing both the condition, and suitability for the construction method proposed would help to eliminate the uncertainty of this element of the proposal, and this would be essential at an early stage in order to test the suitability and feasibility of the scheme. Further issues related to the construction on and around existing buildings that could lead to unforseen costs may be caused by existing utilities, archaeological findings, ordnance discovered on site, which could lead to indefinite delay which has significant cost implications for the project. It must be highlighted in strong terms that the most serious risk associated with the project is the state and condition of the existing towers, and full analysis and surveying would be required before any design work should begin.

Modification of existing utilities require approval and agreement from the companies that own them before work can start on site, and significant changes to electrical supply and the disposal of waste and water would be necessary for a project of this kind. Electrical substations frequently cause significant delays to large scale projects, as the companies that own them are loathe to modify or move their existing infrastructure. Flooding the site to establish the reed beds would require movement of the existing sub station, and investigating this at an early stage could avoid unexpected project costs later.

The use of thatch as a facade material is unprecedented, and to remove risk associated with its use, a series of mock-up panels would be created and deployed on the site to test for a number of factors, including fire, environmental performance, and decay. As this is a traditional material, used in a novel way, significant expertise is available to advise on the construction methods chosen.

The project would carry significant risk related to the planning process, despite the project being proposed and funded publicly. The project could be delayed indefinitely navigating the planning and appeals process, and though consultants could be employed to navigate the client through this process, significant cost would be associated with their employment, as well as the costs associated with the risk of not achieving planning permission. The addition of new use types on the site, and construction on what is currently public amenity space would be likely to be contentious issues, and require strong arguments to overcome them.

Timescales

The project is essentially an ongoing construction process, which would be split into phases of construction and maintenance. The phasing plan on the following page describes the process and order of construction, redevelopment and refurbishment. The construction process has been designed so that the timescale of the construction period can be as drawn out as is required by the budget. Buildings can be completed, and fully operational without requiring the rest of the project to be complete. The benefit of this is that costs can be managed, and funding built up over a longer period, rather than requiring a lump sum at the beginning of the project.

Future Proofing and operating costs

In order to reduce the long term costs of operating the buildings, future proofing of the construction and adaptability of the building envelope and layout has been considered. One of the most important drivers of the design has been the provision of an affordable method of maintaining the existing towers. The cost associated with this would be defined by the operating costs of maintaining the reed beds, and the cost of thatching. This has been considered from the outset, and though thatching is now considered an expensive vernacular construction method, the cost would be significantly reduced by the use of skilled apprentices being trained in the thatching school, and the growth of the reeds as a construction material on site. As a very rough guide, a cost per square metre of around £100 - 120 of finished roof area. This figure could be considered to be reduced due to the workforce and materials that are provided by the project however.

I believe that thatching could be an affordable and efficient way of cladding a building, with appropriate research into the techniques, and a schedule of maintenance to ensure that it is not neglected. I believe that the whole life cost of a thatched building could be comparable with a building with a robust, efficient high performing sealed skin.

Estimation of costs

The project procurement and construction process would benefit from estimates of cost at every significant stage. A cost estimator, a role likely to be undertaken by a quantity surveyor would provide an estimate of cost at all significant stages during the design, construction and commissioning process. Where options are being considered during the design and construction process, the cost implications should be considered of equal importance with any other factors.

One paradox of construction project management is that the earlier a decision has to be made, the more difficult the task of estimating the cost implications. [...] Another paradox of construction project management is that the most important decisions are taken earliest - when the cost estimates are the most difficult to obtain.[2]

Estimating the cost at an early stage of the project would involve broad brush approaches to cost, using precedent. As the project is developed, cost certainty is increased. The input of the management contractor into the cost estimation, would be invaluable for a project of this type, and the contractor could be selected for their expertise and experience in dealing with existing concrete structures.

Area of Existing buildings: 42 floors @ 340 sqm: = 14 280 sqm
Area of extension to existing buildings: 40 floors @ 85 sqm = 3400 sqm

Area of proposed buildings:
Residential: 16 flats at 150 sqm : 2400 sqm
Communal: 150sqm
Workshops and classrooms: 1800 sqm
Store: 8 floors @ 150 sqm: 1200 sqm
Total: 5550 sqm

2 Barnes, M. (1994) *Spon's Budget Estimating Handbook* Second Edition Cornwall: T.J. Press Ltd.

Area of landscaping:
On site: 6560
(off site landscaping makes up 12500 + 4000 + 1720 + 600 sqm = 18, 820 sqm.)
Areas and quantities of reed beds required for the project are analysed in the technical report attached.

Cost Case Study: Barking Skills Centre

I was heavily involved in the initial design, and subsequent detailed design stages of the Barking Skills Centre shown on the right. The project was complex, with a number of stakeholders, and was funded by the London Borough of Barking and Dagenham for Barking College.

The brief included general teaching spaces, workshops, refectory and (teaching) restaurant space, and IT suites.

The project was to be constructed on the basis of a two stage tender design and build contract, and the process of costing the building was acrimonius. The project was complicated by the fact that the quantity surveyor confused the project cost and the construction cost when negotiating with the contractor. This lead to around £2 million in cost engineering of the building having to be undertaken, and the quantity surveyor losing his job.

The project was a high performing building, achieving a BREEAM rating of Excellent, with a gross internal floor area of around 5000 sqm. The estimated construction cost was to be around £12 million, eventually value engineered to £10 million. For the purposes of this document, I will consider the original cost estimate, since the value engineered figure seriously compromised the quality of the building. The lower figure represents a low estimate for the construction of the building.

Skills Centre:
Project cost estimate: around £2400/sqm
Lower cost estimate (with compromised build quality) : around £2000 / sqm

The above figure I would use to work out the approximate cost of the building, though the construction method, structure, and height of the proposals would have an impact on this figure.

Estimated costs for building elements: (based on figures in Spon's Budget Estimating Handbook and case study)
New 'backpack towers' cost/sqm: £2400 / sqm
Existing buildings refurbishment: £1000 / sqm
Extension to existing buildings: £1500 / sqm
Reed Beds: £180 / sqm

Value

Cost and Value

Value is a related, but separate issue to cost. Throughout a building project, analysis, maintenance, time an energy are put into *cost* and *price* by those involved, but too often *value* can be left to one or two parties.

> *Fundamentally, value is the* worth *or* desirability *of something. [...] Value goes beyond cost, and includes matters other than simple monetary and price measures. The management of value therefore requires some articulation of an agreement with the concept of value, and this is where life gets complicated.* [1]

The value associated with a project must consider the whole life cost of a building, as well as, in this case the whole life cost of the cladding and other materials that make up the fragile maintained architecture. In assessing the value of a building, one must consider how well it performs to its stated role, and how long it can perform this role. The value of the project can be considered on a number of bases: is it a pleasant place to live and work, is it energy efficient, *does it encourage ongoing maintenance to maintain its value.* Methods of measuring the quality of a building have been proposed, such as the use of Design Quality Indicators (DQIs) which may be an appropriate way of measuring the quality of a project. Though the DQIs may be rather a blunt tool with which to approach the success of such a peculiar project, the mechanisms that are in place would be a good place to start.

1 Walker, P. Greenwood, D. *Risk and Value Management* in the series *Construction Companion* ed. Chappell, D. London: RIBA Enterprises p 7 | 1

Measuring Value

Value is an inherently difficult notion to quantify, and is more difficult to assess than cost. Seen as an approach to the redevelopment of London's tower blocks, the project would have consequences and benefits to London's urban environment that would be hard to quantify. This is partly why a publicly funded approach would be appropriate for an architecture of this type : - a design for the common good. Architecture, urbanism and design cannot always be measured in terms of its cost, or even value for money, but should also be considered in the way that they contribute socially, urbanistically and economically to the wellbeing of the city and its inhabitants.

The role of the designer

In addition to the civic value of a project, the designers and client body can separately bring value to a construction project. The architect in particular has a role and responsibility to consider many different values related to a project. The architect may be able to bring civic value by the way a project is conceived and designed, and is uniquely in a position in many projects to analyse the brief, and discuss the potential for developing and enhancing the content of the brief. In this instance, as the architect, I have tried to consider the maintenance of the building throughout the design process, as a way of bringing value to the process of refurbishing the towers. In addition, by thinking holistically about the project, the architect is in a position to consider how different elements of the program can complement each other. In this scheme, considering the remaking the public amenity space around the buildings and the external materiality of the facades allowed me to come up with a solution in which the amenity space could become functional, and provide material for the construction process.

Throughout the design process the architect and the rest of the design team can bring value to the project by considering nonstandard solutions to the problem solving required on a construction project, from major decisions such as those described above, to the everyday problem solving required on a construction project.

Value engineering and Management

> *In the 1940s Lawrence Miles, an engineer employed by GEC [The US General Electric Company], developed a technique that he called* value analysis. *This involved focusing on the function that a product performed and finding an alternative way of performing this function, as opposed to finding an alternative product. This is fundamentally what value management is about. It is not about substituting machines, or using alternative products, or eliminating functions, but rather about analysing what it is you wish to do and finding the most efficient way of doing it — the way that adds most value.*[2]

Value management is an essential (and valuable) tool in the process of a building project, though many designers approach it with some trepidation. *Value* engineering/management should be understood as a different to *cost* engineering/management. Processes of value engineering as identified in the quotation above should be considered throughout the building project, and can be an important tool to the designer. Take for example the facade system proposed for the scheme, which is steel and timber. A value managed decision should be considered by all involved including the builder, designers and client to arrive at the most appropriate solution for the structure of the tower. By making the facade from thatch certain values are attained including ecological impact, quality of air and biodiversity. If however the thatch were substituted for plastic panels, certain other values would be gained such as longevity to the detriment of other values.

Architects can sometimes perceive value management or engineering as a threat to the quality of the architectural expression and the profession. Handled badly, alongside a misunderstanding of the difference between cost and value it can be, but handled properly it should add value to the project. In terms of thatching tower blocks, significant value analysis would rightly be undertaken in order to assess the value that is brought to the residents and users of the building.

2 Walker, P. Greenwood, D. *Risk and Value Management* in the series *Construction Companion* ed. Chappell, D. London: RIBA Enterprises p 61-62 | 5

To conclude

The project to thatch tower blocks in south London was conceived from a interest in the potential of the ephemeral in architecture; its value and application to an architectural problem, and how architecture can begin to respond to social factors that define a site. The result has been an unpredictable (and at times ill-defined) design process and proposal that, I hope, makes the viewer smile, as well as provoking thought about the regeneration and redevelopment of London's postwar housing. Throughout the report, I have tried to draw conclusions about each topic in detail, and refer to personal experience to illuminate them.

The project is a reaction against the recladding of London in plastic or terracotta panels, and begins to propose an architecture that by its nature is maintained. It is my proposal that by creating an architecture that *requires* maintenance, investment and constant care, that some of the problems typically associated with tower blocks can be overcome. The project is a reaction against the *laissez-faire* attitude toward Britain's inner city public housing that has come to define the past few decades, despite the increasing wealth of the cities themselves, particularly London.

It should be repeated at this point that a building project of this type, in the current political climate is effectively impossible, and considerable political will would be required to change this. This report however attempts to begin to illuminate the routes by which a project of this sort would be achieved within the current systems and regulations. This task is therefore challenging, as these systems that define how a project can be achieved are not set up for a project of this type, and this has made me seriously consider the implications of realising the proposals.

The project is fundamentally strategic in its approach, and the design effectively sets up a method by which London's high rise housing can be improved. This is down in a large part to the construction methods that defined the era during which the LCC built much of its public housing. A simple approach to construction, in robust materials allows me as a designer to consider the existing buildings as a canvas on which to apply a new architecture. The model that I have developed for the Kipling estate in Bermondsey could be rolled out across many parts of London. Having worked on this project, my eye has become well trained at spotting old LCC blocks which could be thatched, around London. Researching this report has allowed me to consider how timescale and financing would effect the proposals, and has resulted in a scheme in which each of the various elements, including the new towers, changes to the existing towers, and landscape proposals can be realised without requiring any of the other elements of the design. This means that the proposals can be realised over a long period of time, as and when finance is available for the construction and design work to take place. It is my hope that in the future, considerable investment could be available to build and refurbish public housing, as happened in the 1950s and 1960s.

The project also relies somewhat on the existing buildings being in the hands of a public body, in order to make wholesale change to them. As it exists now, a large number of private tenants own flats, and a considerable cost implication could arise to buy them out, or subsidise the changes for them. Private tenants do not like outrageous service charges for modifications to the flats that they own, and many may simply not be able to afford it. Mechanisms are of course in place to allow major redevelopment of existing housing, with mixed occupancy, but the risks associated with this are usually taken on by private developers who buy a site or building with the intention of making a profit from the redevelopment. The phasing proposed would allow the financer of the project to being work without requiring full acquisition of the existing towers.

The key technical and logistical problem of the project is the application and maintenance of the thatch on the building, and the use of thatch as a wall material, to insulate and protect the interior. I have been lucky enough to discuss the proposals with the general secretary of the National Society of Master Thatchers, who agreed that the proposals were achievable with the vernacular technology, and a traditional approach to construction would be the best way to achieve the proposals. The detailed technical and strategic method of construction and maintenance is covered in the technical report.

It is worth reflecting on the design work, and the approach to the proposals and brief that resulted in the architecture presented. A significant interest in ephemerality in materials for architecture has been developed over the year, and the proposals represent the culmination of this thought for my part 2 thesis. However, this is an interest that I hope to carry forward in the future. I think that the fragile approach that I have been researching could have considered sustainable design more thoroughly throughout, and considered how fragile materials can result in a sustainable method of building. The thatch began to explore this, but I feel that there is a large field of research that could be undertaken in relation to this. Japanese culture gives some clues, and their interest in *the impermanent, the imperfect, the irregular, the perishable* revealed in their construction methods, and cultural forms, from paper screens to disposable bamboo chopsticks reveals a fascinating approach to material culture, in opposition to Western cultures' promotion of the robust.

The consideration of all of the topics covered in this strategic report has had an effect on the way that I have prepared my design work, and this has highlighted the importance of each decision and strategy in relation to the project as a whole. Many of these issues are as important to realising a good design as the design process itself. The importance of a good design team, a builder operating in good faith, and an active and passionate client are surely of utmost importance too, to achieve good architecture.

The proposals in April

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The buildings reflected in the wetlands around

3. Applied Technical Report

Part 1 - A fragile approach to materials

Part 2 - Thatching London's Towers

Part 1 - A fragile approach to materials - A palette for a fragile architecture

The thesis that I have developed over the past year has been interested in an architecture that is not robust. An architecture that changes with time. A material architecture that is changed by those who use it, as it changes around them.

I have called this a fragile architecture.

Over the course of the year I have investigated a number of fragile materials. Materials that have different types of fragility, and change differently with time. Some of these materials have been successful, others have not. Some materials have become part of my project work, others have been investigated, and subsequently discarded.

The technical study is the appropriate place for these material investigations to be recorded and presented.

Plaster Shells and a temporary room for Westminster

The first project investigated a possible architecture that lasts barely a day, and explored the qualities of the ephemeral nature of an architecture of this type.

I began by attempting to produce the most fragile material that I was able, a material that barely held its own weight (or sometimes didn't). A material that would be affected by the slightest change to it's physical environment, and would be destroyed with the slightest force.

Plaster allowed me to explore this material architecture, and I began to investigate methods of making it as thin as possible.

I prepared plaster of paris in a small bowl, with a limited quantity of plaster, and dipped inflated balloons into the plaster. With some testing, and around 20% of the balloons bursting before the plaster had dried. I produced around 360 plaster shells for the fragile rooms, two of which were manufactured.

The most successful method I found to coat the balloons in a thickness of plaster that would not break when the balloon was deflated, was to allow the plaster to set for around a minute before inserting the base of the balloon into it. These were then hung to dry before an hour, before slowly deflating the balloon, leaving the delicate plaster shell.

In my initial tests the plaster was too thin, and did not survive the deflation of the balloons.

I subsequently modified my methods to achieve extremely delicate plaster casts of the balloons.

Some details of the delicate materials

Some testing and discussion during a tutorial about the fragility of the plaster shells.

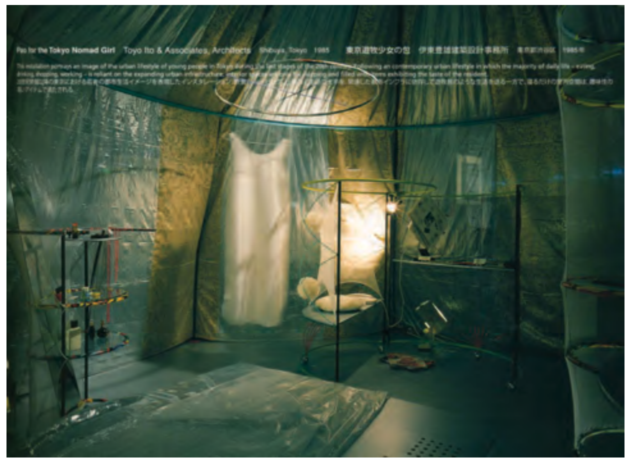
See Film 1 on the attached DVD

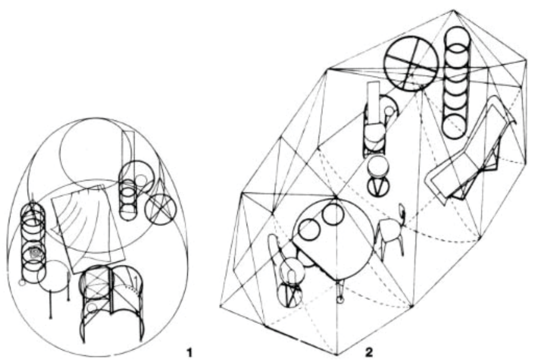
The plaster shells were used to construct a small room on the University of Westminster Campus. The plan and elevation are shown adjacent.

The domes are hung on a weak metal structural skeleton that encloses a chair. The walls of the room are made of the domes which individually are hung on threads..

Over the course of a number of hours within a single day, the room's exterior skin breaks down unpredictably, representing the process of disintegration of the surrounding architecture.

Below: Pao for Tokyo Nomad Girl. Toyo Ito



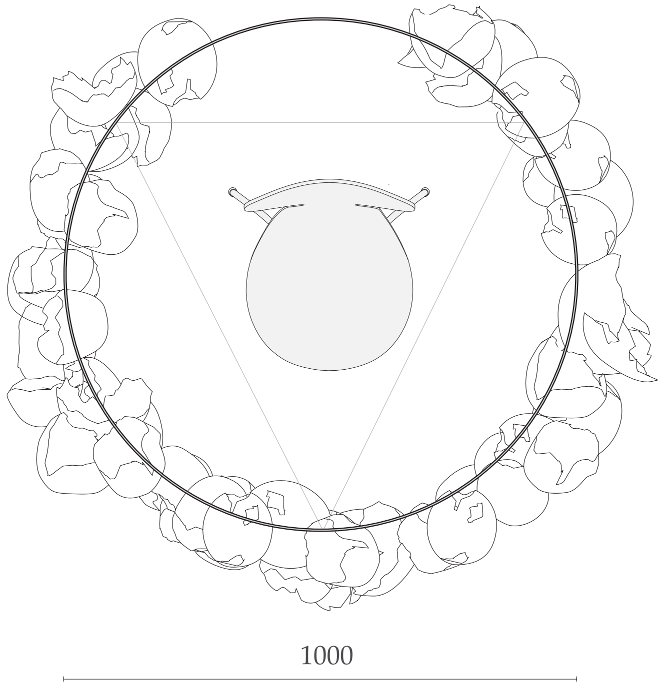


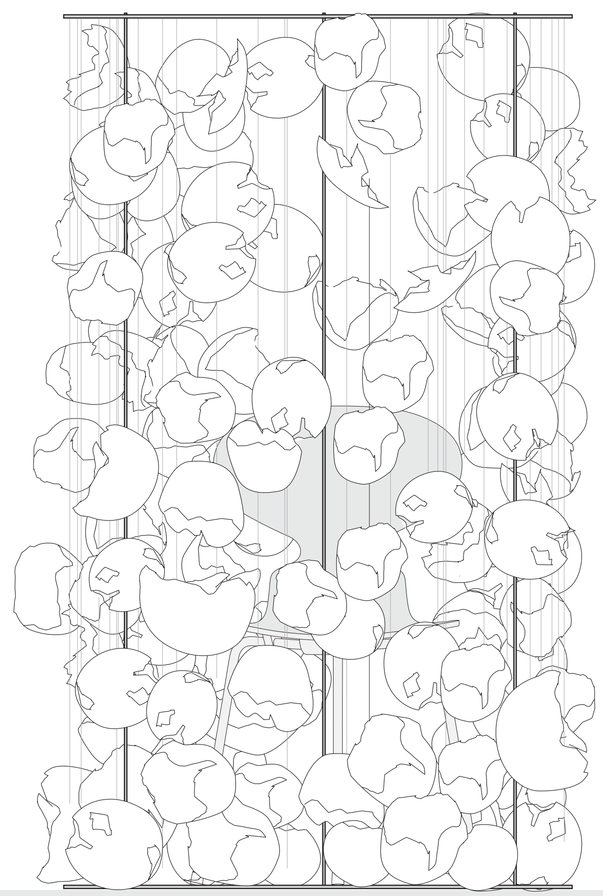
In his project, Pao for Tokyo Nomad Girl, Toyo Ito explored the notion of an ephemeral architecture suitable for a young girl living in Tokyo at the end of the 20th Century. This work contributed to the consideration of the aesthetic of my proposal, as well as the theoretical consideration. Ito's project reduced the requirements and possessions of the young girl to a minimal set of furniture which could be easily transported around the city, using the infrastructure of the rest of the city for use in daily life. This reduced, makeshift architecture provided a freedom to the user to benefit from the qualities of the city at the end of the 20th Century.

Conclusion: The qualities learned from the fragile room

My explorations with the fragile material architecture, which are recorded in time-lapse frames opposite and attached film allowed me to begin to experiment with a fragile architecture. The room was ephemeral and was gone in a period of four hours, leaving a trace behind on the floor.

The room created a pleasant internal environment, with a high quality acoustic provided by the domes knocking together, and a sense of reducing privacy over time. The material most importantly was unpredictable, and therefore extremely hard to study and measure. This was a property of the other fragile materials that I investigated; they were unpredictable, and their unpredictability contributed strongly to their aesthetic and enjoyment.

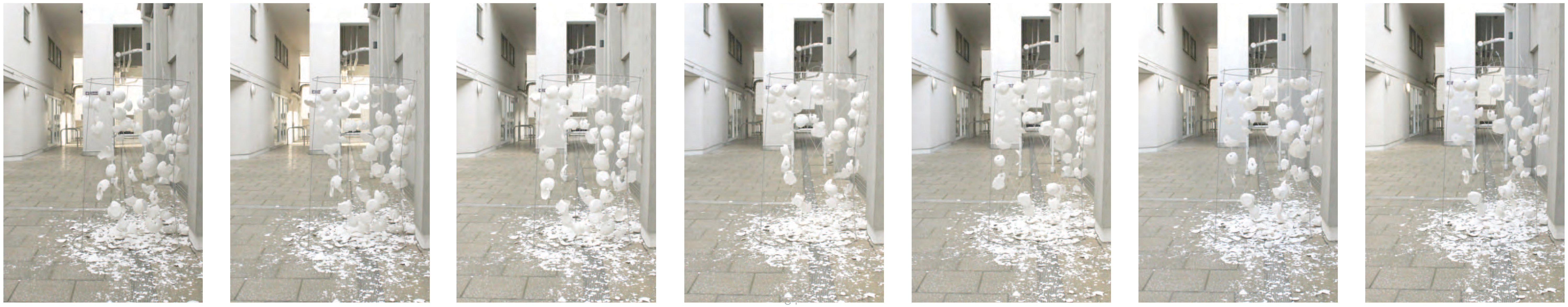




Plan and elevation of the temporary room

13:50 pm

15:00 pm



16:10 pm

17:10 pm

Plaster Panels and a Waiting Room for Bermondsey
See Film 2

The next project was on site in West Bermondsey. The studio was presented with 5 sites in the local area, and we were tasked with responding to one of them in a similar manner to the previous project, developing our thesis interest.

I began to consider at this point how a fragile material architecture could inform an emerging brief, and generate an architecture that benefited from its fragile materiality.

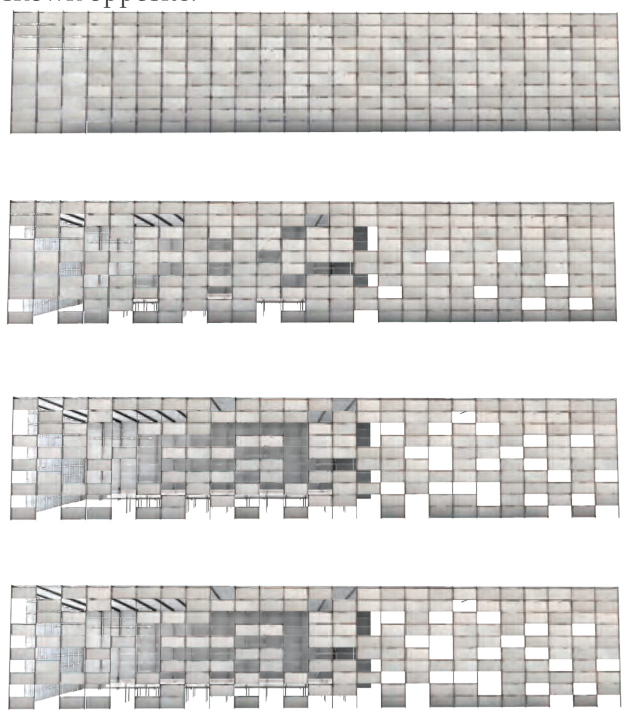
My proposal was for a waiting area for people seeking asylum, and was located adjacent to the UK Border Agency Headquarters on St Thomas Street. The existing building is built from in-situ concrete, and is extremely foreboding in it's appearance. The robustness of the building seems to evoke the bureaucracy of its internal workings, and promote a sense that those seeking asylum are negotiating a fortress. The building does not promote sympathetic human interaction, and the material and form of the Agency building does not allow it to support or express the fragility of the human experience of those who must visit regularly to register and check in.

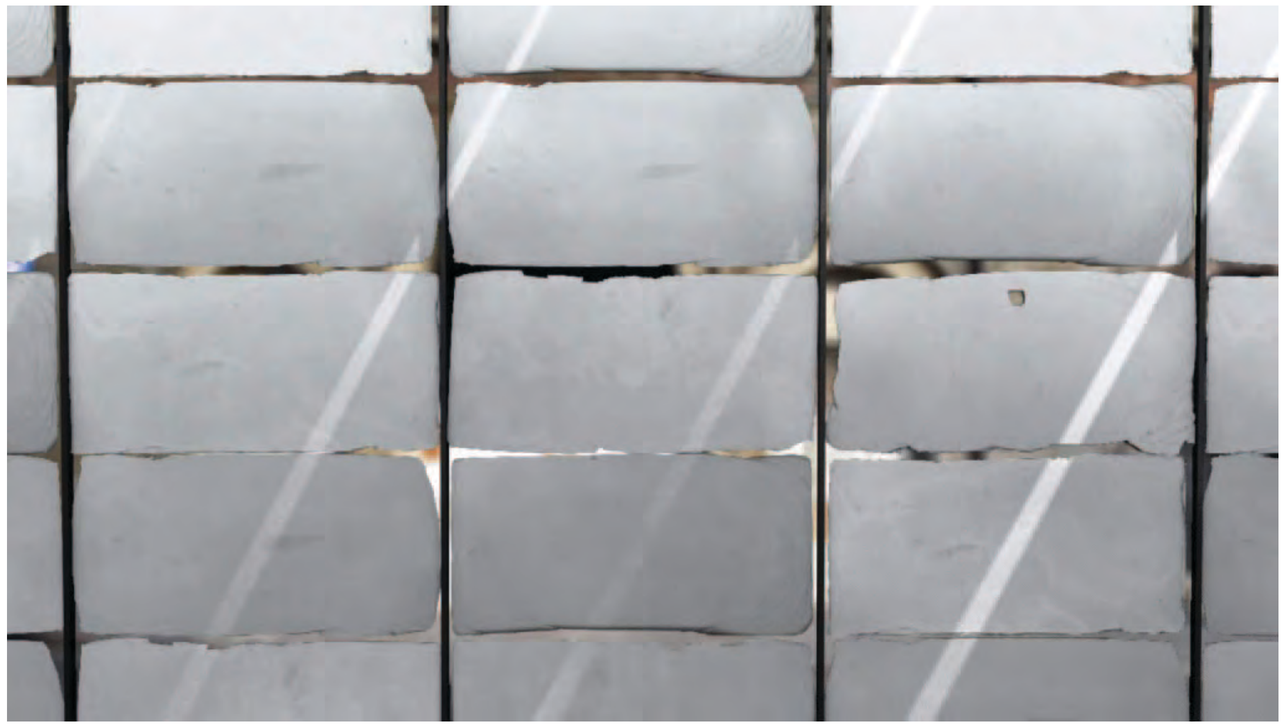
My proposal provided a shelter and seating area for those waiting and queueing outside the building (shown right) and acts as an interface between the waiting room and the street. The proposal clings to the institutional mass of the existing structure, evoking the duality of the legislative reality of the asylum process, and the fragility of the human experience. Enclosing people for a short period, it is designed with aesthetic values that favour its necessary transitoriness.

I began to explore the plaster as a modular building material, and investigated ways in which it could be applied to a facade, to enclose a space.

The panels were formed in a cardboard formwork tray, and were manufactured at varying thicknesses. This low-tech approach allowed me to control the thickness of the material.

I made a series of panels at varying thicknesses, shown opposite.





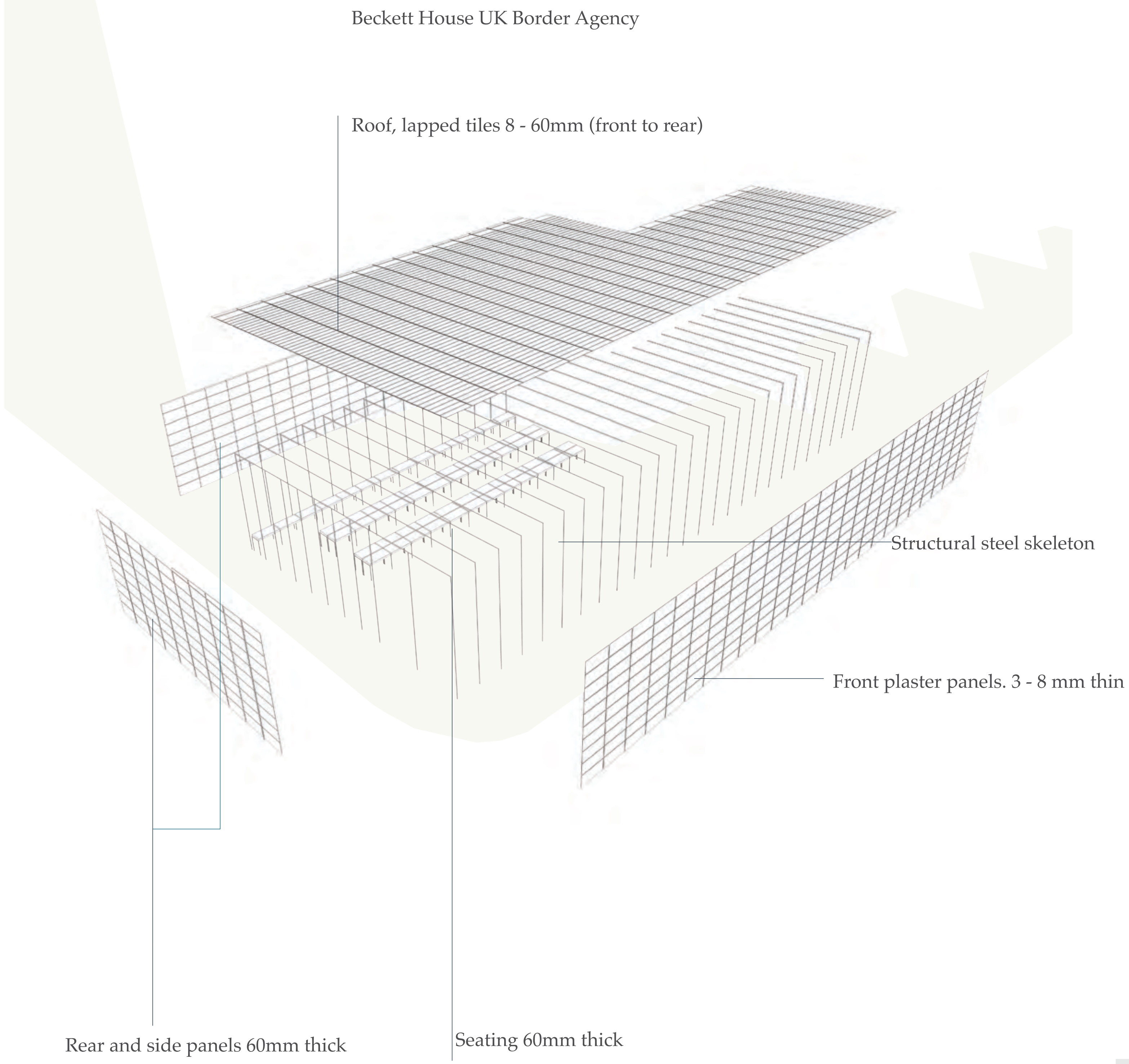
Plaster panels of varying thicknesses were produced to test the limits of the material in this form. Some panels broke whilst being removed from their moulds. Others could survive being dropped to the floor

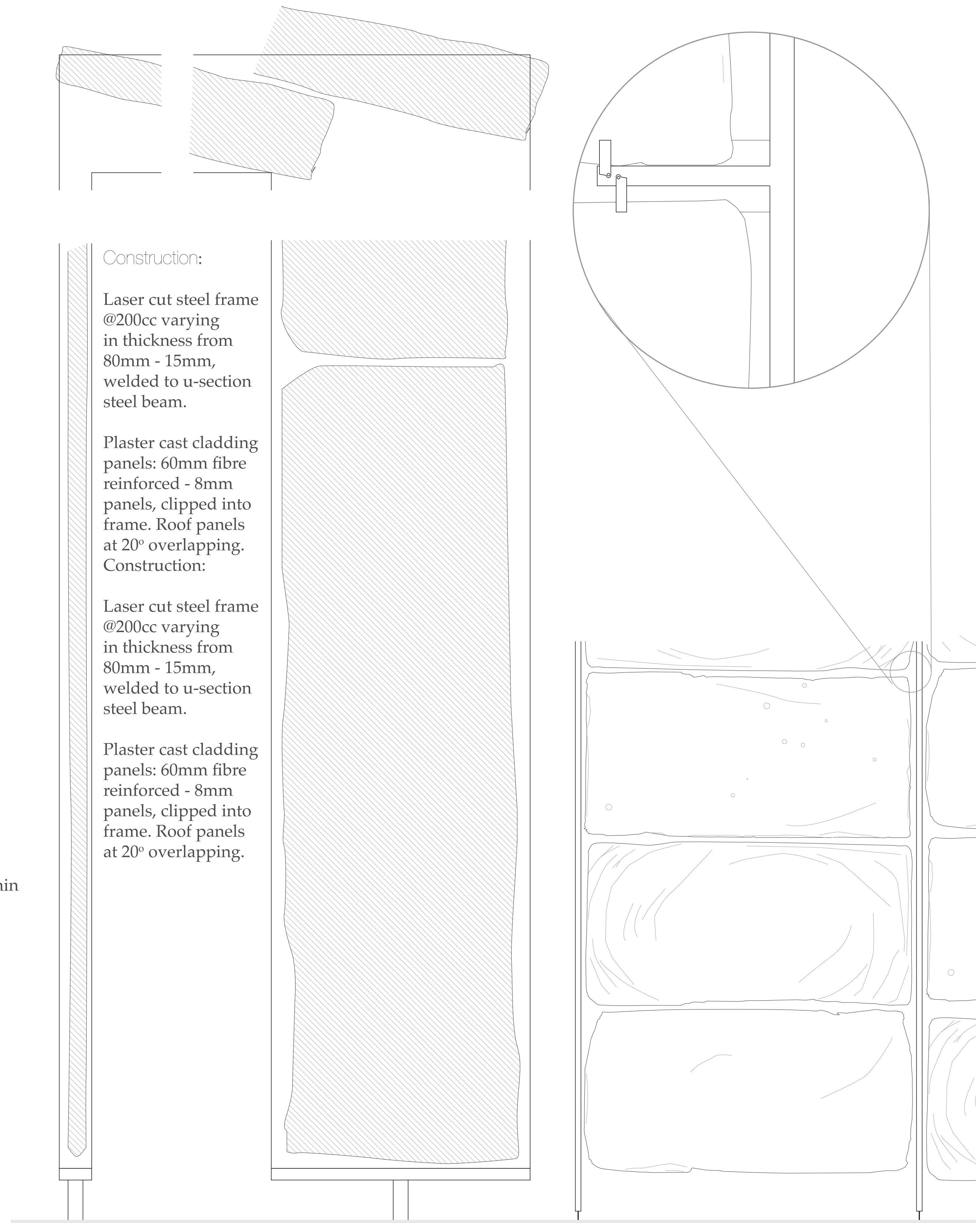
1

2

3 Testing the way the broken plaster behaves on the pavement

Exploded Schematic of the waiting room





Detail Section. Scale 1:1

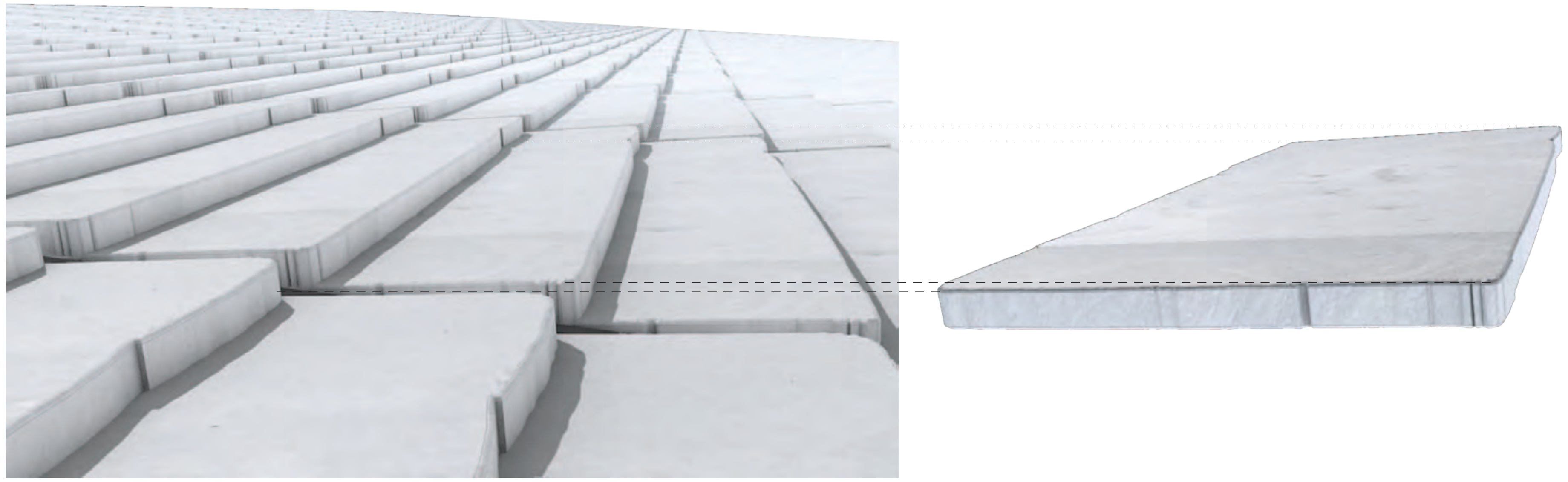
Elevation detail

Construction and arrangement of the waiting room

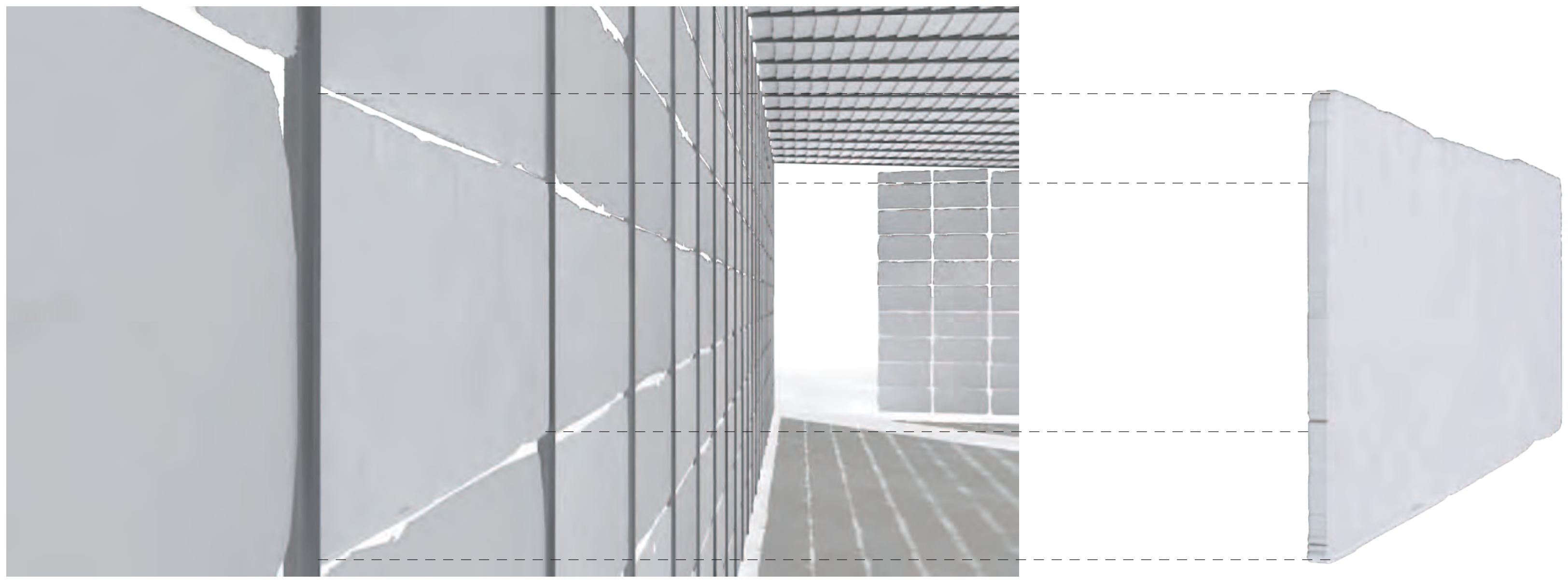
Shown here is the construction and arrangement of the waiting room, showing the change in material thickness of the panels, and the way in which the panels are hung.

The method allows the panels to be replaced as they are destroyed.

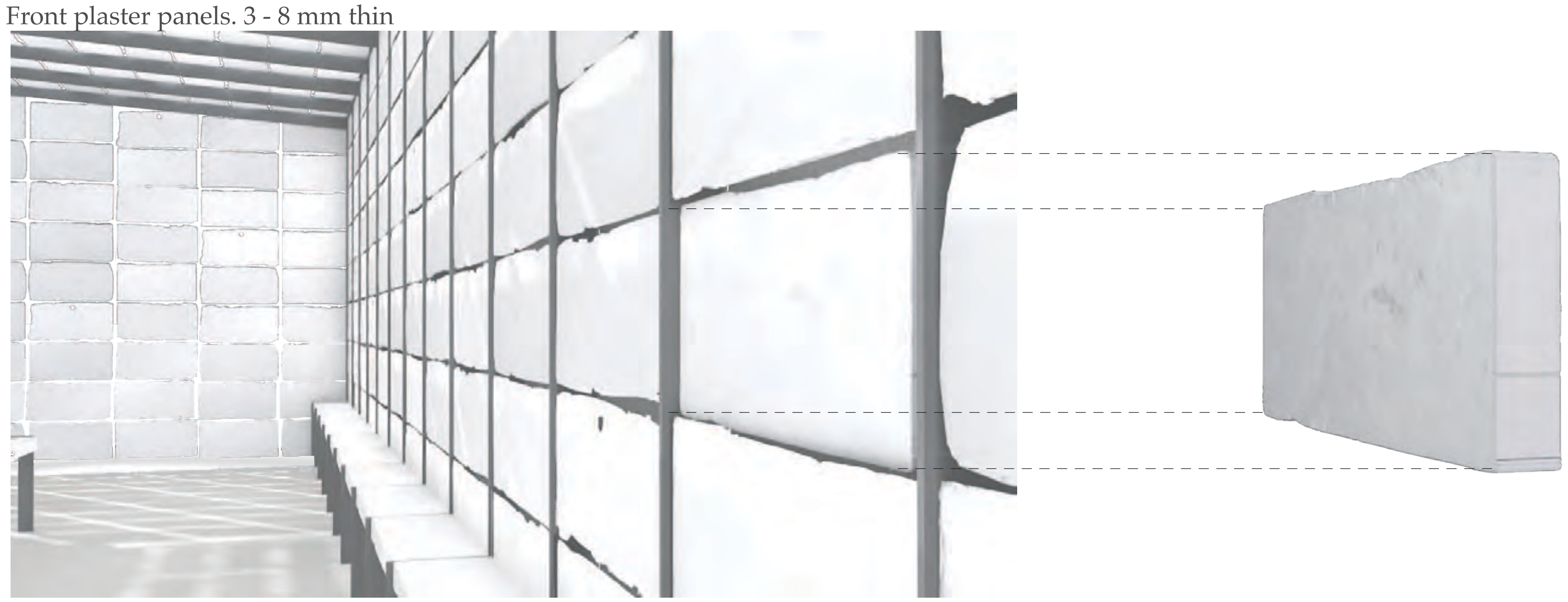
Again with this project, I found that one of the main qualities and properties of the material was the unpredictability of the fragile material. Whilst this produced an ephemeral and interesting architecture, it is difficult to apply this type of thinking to an everyday architecture. — In order to develop a functional interesting fragile architecture, a different approach is required. An approach that maintains the qualities of change and ephemerality associated with my material tests up to this point, but has a greater amount of predictability.



Roof detail. Lapped panels thickness 8 - 60mm (front to rear)



Front plaster panels. 3 - 8 mm thin



Rear and side and bench panels 60mm thick

Other fragile materials:

During my investigations into an architecture of material fragility, I explored and investigated materials that were not used in the final scheme. I will present them as part of the technical report to document my investigations.

Shou-Sugi Ban

Japanese Charred Cedar

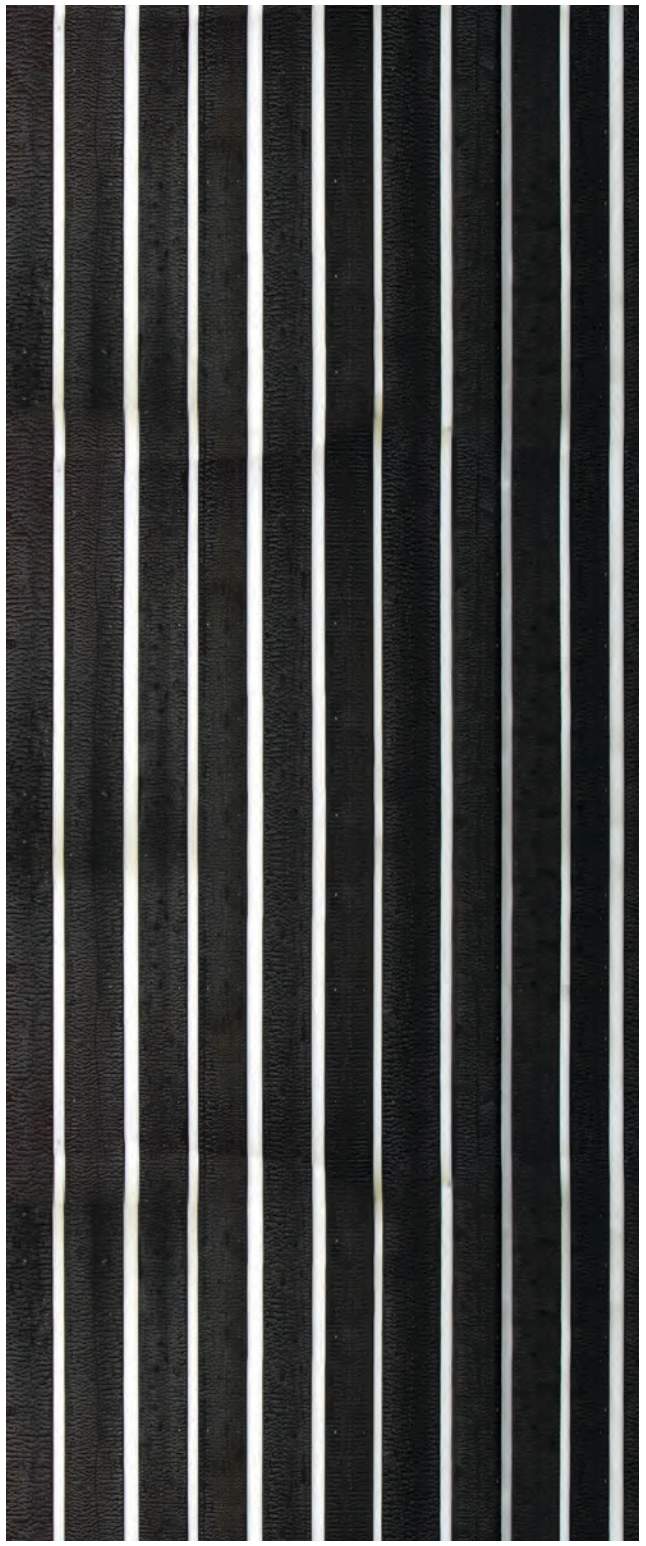
Shou-Sugi Ban is a Japanese technique of charring cedar boards for use as an external cladding material. The result is a material that will last around 80 years, during which time the charred exterior will protect the wood from rain, insects, fire and rot.

Charred cedar has gained popularity in recent times, following its use on a number of schemes by Terunobu Fujimori, a Japanese architect and architectural historian whose unique work explores traditional craftsmens' techniques, and is steeped in a knowledge of Western and Japanese architectural history.

Fujimori showed how he creates his charred cedar to Dwell Magazine, who published a slide show, based on his investigations into the history of the material. It is this slideshow that I have used to inform my investigations into the material.[1]

Above: Experimenting with techniques to produce shou-sugi ban

1 http://www.dwell.com/slideshows/terunobu-fujimori-profile.html Shou-sugi ban starts at slide 11.



Composite of the material made from my test panels

A detail of Fujimori's use of charred cedar for a small Tea House for the V&A in London

Japanese burnt cedar has the qualities of a fragile material, in the way that the material performs, and the process by which it is achieved. It is a low tech material in which the fragility of its form reflects the necessity for its robustness. - The parts that need to be robust are, and those that can have a more fragile state are more delicate. The external weathering surface of the burnt cedar is extremely brittle and friable, yet due to its nature, it is protected from insects and physical weathering such as rain, which runs off the surface in beads. The rear of the wood, which fixes to the supporting structure is robust, sturdy, and protected from the elements by the more ephemeral external surface. Despite all this, it is a weathering material that requires replacement after around 80 years.

Having explored this material, I decided to not use it in the final building for a number of reasons:

Part of my brief requirements were to provide an industry for Bermondsey. It seemed important that the industry that was being brought back to the city was one that could have existed before. A traditional British skilled trade for which the number of craftsmen still able to perform was reduced. Such a Japanese material did not seem to fit with this logic.

The process of making the burnt cedar, whilst inherently fragile, produces a rather robust material. In attempting to create an architecture that required maintenance, I had stumbled on a robust material that could withstand the effects of time as well as the materials that I was replacing. It was fascinating to explore the burnt cedar as a material, but it was not suitable in for the theoretical positioning of the project.

Far left: A composite of shou-sugi ban showing timber panels with plaster infill. The plaster acts as a breathable barrier, and weathers with the timber

Conclusions

The material tests that I undertook throughout the year informed the direction of my final project, and contributed directly to the way in which the decisions were made about material choices, and understanding how an unpredictable, fragile material architecture will behave, and how it can be made useful. The application of fragile materials to elements that do not require a robust physicality, and the use of robust materials in those areas that require them, as developed from the first and second projects were applied to the final design. - A concrete frame was wrapped in a timber secondary structure with a fragile thatched facade. This architectural logic has implications for the way I will design in future, and these material tests have been extremely helpful in developing my architecture.

Part 2
The Life of a Reed:
From planting to composting
A technical study

This section of the technical study will explore the project proposals through the narrative of the life of a reed plant, from planting, through harvesting, use, maintenance, removal and composting; a whole life study that presents the project as a system, though the system is neither looped, nor closed - materials outside the system are required to allow it to take place, and as with the architecture, the system needs maintenance and care, reflecting its inherent fragility.

Currently around 80% - 90% of reed used in thatching in the UK is bought from abroad. English reed however has notable advantages than the reeds that are typically imported from southern Europe. English reeds tend to be stronger due to their required robustness from growing in the windswept landscape, and due to the cooler temperatures found in the UK, the reed is more tapered, making it "more suitable for the rounded curves of English thatch" (source: Norfolk Reedcutters Association. http://www.norfolkreed.co.uk/pages/thatch.htm)

Reed bed water treatment systems work by transferring oxygen from its leaves down through its stem, speta and rhizomes, out via its root system, into the rhizosphere. Due to the transfer of oxygen through the plant, a large number of micro organisms live in the rhizosphere, including aerobic, anaerobic and anoxic organisms that feed on the materials suspended in the water around them. Waste water that is fed through the root system can be treated by the micro-organisms, and the water cleaned and processed. Natural filters of this kind are being increasingly used by water treatment companies and individuals, as a natural way to process the water that returns to them from human consumption.

The function of the reed beds in the scheme are threefold:

- To provide thatching material for the ongoing maintenance of the Kipling estate towers
- To modify the landscape to make use of the underused amenity space, and provide a pleasant landscape for the residents to inhabit.
- To filter the water entering the river system so as to avoid damaging the health of the Thames and those living around it.

An Urban Mesocosm

A landscape of water treatment and construction materials

"Ecological engineering is an emerging field capable of addressing a broad range of issues. It will influence the future of waste treatment, environmental restoration and remediation, food production, fuel generation, architecture and the design of human settlements. Ecology is the long-term intellectual foundation for the development of new technologies to support society."

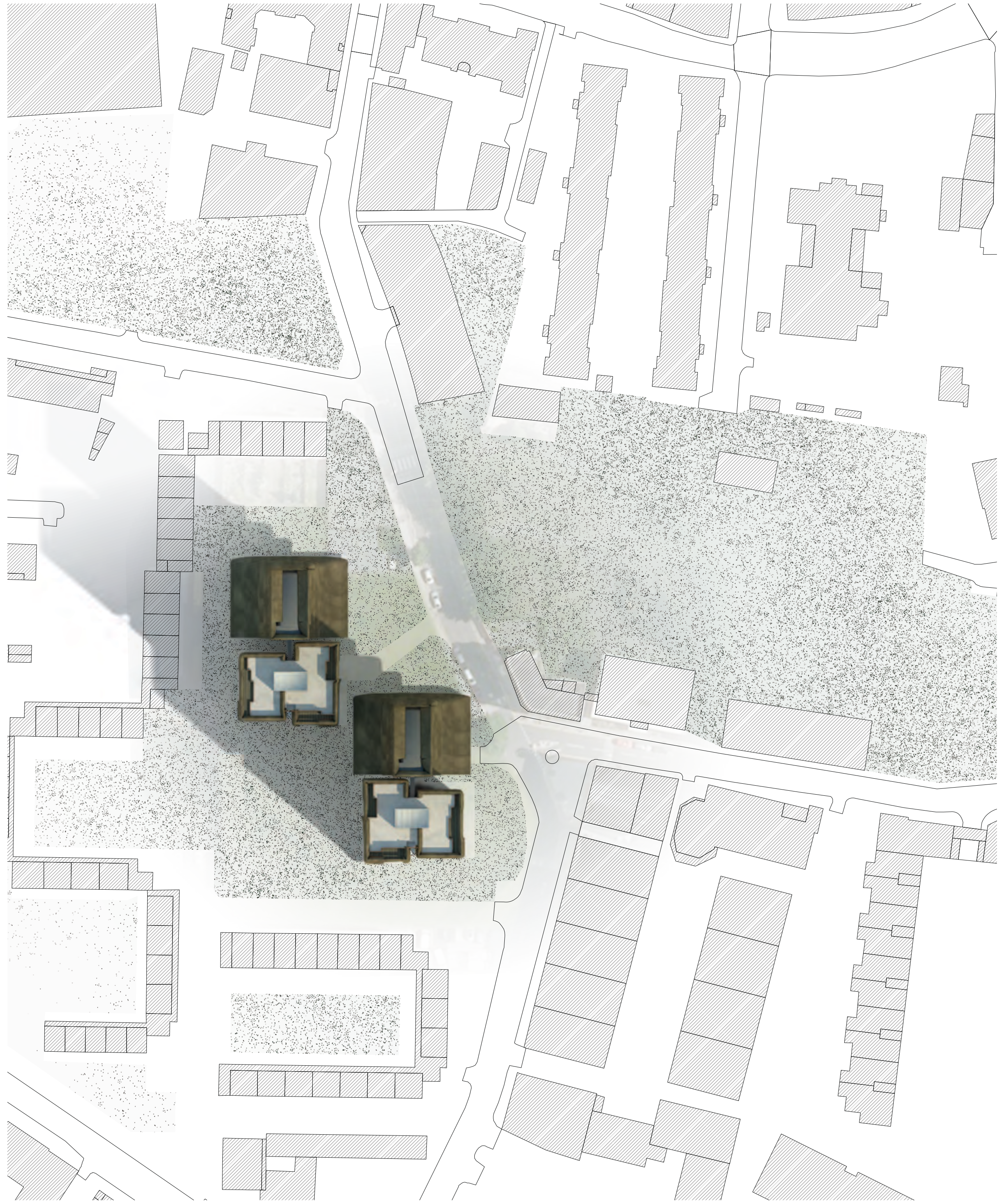
Todd, J. Josephson, B. (1995) Introduction to *The design of living technologies for waste treatment*.[1]

Todd and Josephson highlight twelve key principles for the design of living technologies in their article, introduced above. Based on their findings collected from data from a living machine treating sewage and the mixed waste stream of an industrial city in New England over a five year period Their academic experience of living machines however is based on several decades of research, producing food, treating waste and generating fuel, as well as completing all of these functions simultaneously. Much of their work, they highlight has been discovered through trial and error.

The twelve principles:

- Mineral Diversity
- Nutrient reservoirs
- Steep Gradients
- High Exchange rates
- Periodic and random pulsed exchanges
- Cellular design
- Minimum number of subecosystems
- Microbial Communities
- Solar based photosynthetic foundations
- Animal diversity
- Biological exchanges beyond the mesocosm
- Misocosm, mesocosms, macrocosm relationships

The living systems explored in great detail in the article relate to controlled, closed living systems, or mesocosms: - test environments in which environmental factors can be realistically manipulated.
My proposal for Bermondsey is proposed as a functioning water treatment system, but equally important to the design of the environment is the quality of the outdoor spaces that are produced. This is essential because the living system replaces the existing outdoor amenity space, and adjacent local parks to the towers. The design of the proposals must therefore balance these requirements.
The twelve principles highlighted in the paper, some of which will be easier to implement than others, remain relevant, and will inform the design of the site.
The wetlands form the first stage of a multi-part treatment process. Their effect is primarily to release cleaned water into the river system, free from coliforms and other post consumption pollutants.



Site plan showing areas of proposed reed bed planting in green

1 Todd, J. Josephson, B. (1995) *The design of living technologies for waste treatment* in Ecological Engineering 6 (1996) ppfe109-136

1. Growing the thatch
Constructing the wetland

The design of the reed beds is based on a modified vertical freewater flow constructed wetland, providing a series of terraced reed beds through the site, fed grey and black water from a dedicated septic tank in the base of each of the towers. Shown below is a sectional detail of the site.

Preparing the site

The design of the wetlands would require some ground works to take place on site before the reeds could be planted, and the wetland could become operational.

Some excavation and grading would be necessary in order to provide a series of sloping terraces for the different levels on which the filtration occurs. Where possible, material excavated would be applied elsewhere on the site to create a variation in levels, and to avoid landfilling excavated materials. One of the 12 principles highlighted in the previous section is steep gradients. The document explains that: *Steep gradients are used to increase the diversity of internal processes and the multiplicity of pathways within a living machine. By steep gradient we mean an abrupt or rapid change."*[1] This implies that a series of terraced levels, with different properties would be appropriate for the processing of water on the site.

Further a number of areas (such as highlighted at f in the diagram below) would be excavated deeper than their surroundings, in order to provide a variety of plant life in wetland: "*Scrapes, dykes and pools within the reedbed create sheltered areas of open water where more secretive wildlife prefer to feed including birds such as bittern and water rail*"[2]. This has the advantage also of providing an interesting landscape variety on the site. The technical benefits of a variety of species are described in the 12 principles: "*Employing plant diversity can produce living technologies that require less energy, aeration and chemical management.* [...] *There is economic potential in plants from living machines. Flowers, medical herbs and trees used in rhizofiltration in a waste treatment facility can subsequently be sold as byproducts.*" [3]

Growing the wetland

Having prepared the site for the wetlands, the plants need time to develop, and require some time to grow before they can successfully treat effluent. The reeds will be planted using a pre-planted coir fibre roll. The roll which rots away after planting allows a uniform distribution of reeds through the site. In the period that the rhizomes develop, and the plants fill the site, animal species would be introduced into the system. Snails are an important part of the system, as they allow the water to be monitored: if snails leave the water system, and emerge on the stalks of the plants, Todd and Josephson identify that the water has become too polluted. The authors identify the following as helpful for the ecosystem: "*Bivalves, algivorous fish, zooplankton, protists, rotifers, insect larvae, sponges and others are in this functional category*".[4] Further to this, fish play an important role in the ecosystem, and can be introduced at the lower ends of the site, where the water has been cleaned somewhat. Though the animals identified in the paper are based on the North American continent, many of the species identified have counterparts, or else are found themselves on the British Isles.

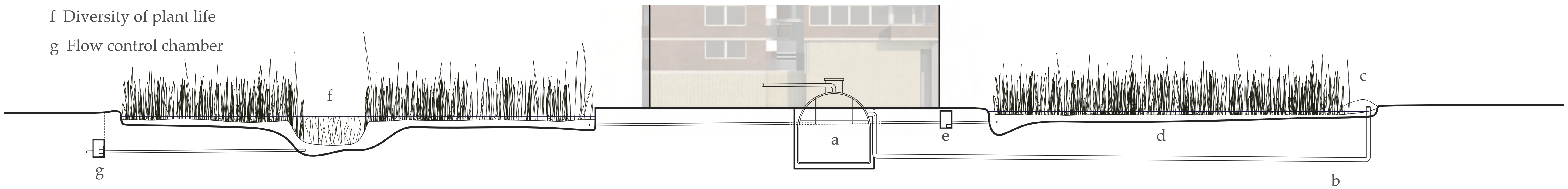
Feeding water to the wetland

Having constructed the wetland site, and allowed time for the ecosystem to develop, effluent water can be begun to be fed into the system.
Two separate systems would be implemented for the water: a grey water system from showers, sinks and washing machines, which will be fed directly into the wetland, and black water from toilets that will be processed for three days in a septic tank in the base of the towers, before being fed into the wetland in a protected inaccessible area. The benefit of this is that the black water can be controlled, and the grey water can provide pulsed random input into the wetland system, that is beneficial to the productivity of the system:
"*Direct reaction of organisms to environmental change is most useful if the environment is being altered in an unpredictable way... One can say that the ecosystem has "learned" the changes in the environment, so that before it takes place, the ecosystem is prepared for it, as it happens with yearly rhythms. Thus the impact of the change, and the new information, are much less.*"[5]

1 Todd, J. Josephson, B. (1995) p113
2 London Biodiversity Partnership (2007) *Reedbed Conservation in London*
3 *ibid*. p117-118
4 ibid. p118-119
5 Margalef , R. (1968) *Perspectives in Ecological Theory*. University of Chicago Press, Chicago.

Key:

- a Septic tank
- b Pumping station
- c Pea gravel filter
- d Vertical reed bed
- e Pumping station
- f Diversity of plant life
- g Flow control chamber



Site Visit: A constructed Wetland in Walthamstow Marshes, North London
51° 34' 14.18" N, 0° 2' 59.5" W

Calculating the volume of effluent water produced and the corresponding area of wetland required

Assumptions and site details:

There are 59x2 bed flats containing 3 people, and 20x1 bed flats containing 2 people. This is a high estimate of the number of residents, in order not to undersize the volume of water produced, and thus undersize the required equipment.

Average London water consumption is 492 litres and 328 litres respectively for the flat types above. Given the flats do not contain baths or dishwashers, I have calculated average water output as 400 litres and 260 litres respectively.

The estate houses 434 residents.

Total output of water per day:
400 litres x 59 flats = 23600 litres
+
260 litres x 20 flats = 5200 litres
= 28800 litres per day, per tower.
x2

= 57600 litres of water produced per day by both towers.[6]

6 Source of water usage: Thames Water, Water usage calculator. Available at: http://bit.ly/lIJlKA

Volume of septic tanks

Assumptions:
Each person in their flat flushes the toilet 3 times per day on average.
10 litres of water per flush
No of people in both towers: 434

Total Volume of black water: 13020 litres = 13.02 cubic metres

Assuming some variance of volume, size of tank for residential towers: 16000 litres or 16 cubic metres.

Providing the same volume for the additional proposed towers on the site: 32000 litres or **32 cubic metres**.

In order to store effluent for 3 days, to allow 3 days separation time, this volume is tripled:

96 cubic metres volume required @ 1 tank per building (divide by 2)

Each Septic tank is sized at 48 cubic metres

Dimensions of septic tank required: 3.6m x 3.6m x 3.6m

Area of wetland required to process effluent water

Assumptions:

Wastewater residence time in the reed bed: 7 days
Between 1 and 2 square metres of reed bed required per person.[7] The requirement reduces the more people there is. Assumption 1.5 m^2.

This requires an area of **651** m^2 for existing residential use

Alternatively, it can be calculated on the basis of water output.
Assumptions: 1 - 1.5 square foot of reed bed per gallon output. (0.04 m^2 per 4.55 litres = 0.008 m^2 per litre) Range: 0.008 m^2 per litre - 0.018 m^2 per litre.
Area required for residential effluent:
Range from : 460 m^2 metres of reed - 1013 m^2.
Assuming the upper figure, and doubling this to include the new proposed towers:
2026 m^2 **water reed required**

The total adjacent amenity site area is 6560 m^2
As required to maximise the use of the reed bed filtration, adjacent flats within the Kipling Estate (besides the towers) can be retrofitted to make use of the facility.

7 Source: Centre for Alternative Technology. Available at http://info.cat.org.uk/questions/water-and-sewage/do-you-have-further-technical-advice-building-reed-beds Accessed April 2012

The removal of contaminants from the water system

A range of physical, chemical and biological systems remove contaminants from the water that is filtered through the reed beds, as the water passes through the gravel medium, and root system (the rhizosphere) of the plants. A narrow area of oxygen around each root follicle in the wetland allows micro-organisms to establish themselves around the roots which "facilitate the decomposition of organic matter".[8] Nitrogen is released into the atmosphere through processes of nitrification denitrification,[9] and metals present in the water are taken up by the plant roots, heavy particulate in the water is filtered by the growing medium.[10]

These processes combine to filter and clean water, removing the effluent of everyday life, from coliform bacteria found in sewage, to ammonia and other forms of nitrogen, as well as metals and larger particulates. From here, the water can be disposed of into the water courses or surface drains.

8 Hammer, D.A., ed. (1989). *Constructed wetlands for wastewater treatment.* Chelsea, Michigan: Lewis publishers
9 Nitrification and denitrification are integral parts of the nitrogen cycle which allow plants and animals to thrive in the soil.
10 Hammer, D.A., ed. (1989).

An Aquaculture and ecosystem

The common reed, *phragmites australis* is the main species of aquatic plant that will be grown in the wetlands. Phragmites can form extensive strands, along their root, and can be invasive, if not controlled by grazing or harvesting. The proposed reed beds would need to be harvested and controlled, in order to maintain other types of plants within the wetland, though some other types of tall plants such as iris, bullrush and other tall grasses will live alongside common reeds.

These plants are able to provide a habitat for some wildlife, including otter, beavers, many types of mice shrew, and birds. Though the area proposed may be too small to allow larger birds such as great bittern, and heron to live and nest they have begun to be found in central London over recent years. Smaller birds including some warblers, rail and reed bunting are likely to live in the new habitats created. Alongside these larger animals, fish, some reptiles such as frogs, toads and newt may be introduced, and many invertebrates will live in the waters around the roots.

This range of wildlife is essential to both providing an attractive landscape around the towers, and allowing for the survival and long term success of the beds.

The growing of reeds in the underutilised amenity space around the buildings (which is analysed in the attached strategic report) has the advantage of providing local materials for the construction and maintenance of the project. The workforce that undertakes the maintenance of the buildings is local, and the skills that are required are promoted in the workshops and school of master thatching in the lower portions of the building. These factors are important as the project is providing an environmentally and socially sustainable program in which the labour and materials can be provided locally.

2. Using the Thatch Traditional Thatching and the use of Water Reed

The use of thatch as a cladding material for buildings can be found throughout cultures all over the world from Europe, the middle East, Japan and China and South East Asia to South American countries. Thatch in its various forms is the most common roofing material in the world and can be made from a large number of natural materials. The practice in the UK typically uses straw, reed, heather or bracken, with hazel spars to hold the thatch in place. Increasingly steel is being used to fix the thatch to the roof, and water reed is being used most commonly as the material. This is due to its abundance, and cost. Numerous local authorities provide guidance on the appropriate materials that should be used to rethatch listed thatched buildings, and there is significant debate about the use of materials other than wheat being used in England, particularly in the south.

The reality is that the use of materials for thatch historically has been based upon the agricultural history of a place, and the material that was available at the time. Thus, water reed was generally used in Norfolk to thatch houses, from the Iron age to the 20th century, and the southern counties including Hampshire and Dorset used cereal crops which grew readily, and were used as foodstuffs. –

> *Thatching materials varied according to availability: straw from inland cereal crops, reed in coastal areas and river valleys, and heather in the New Forest heathlands.*[1]

The introduction in 1796 of the mechanical threshing machine changed the rural landscape significantly, and the thatching cultured changed and adapted alongside this.

> *The use of the thresher brought the term "long straw" into widespread use. It refers to the longest straw left at the rear of the thresher, for use as thatch. The straw produced by threshing was clean, of uniform quality, largely uncrushed and sufficient to establish the long-straw style as the dominant type used throughout the century in all southern counties outside the West Country.*[2]

The history of using thatch is therefore based upon the agricultural use that it serves, and my use of materials will maintain this. Though longstraw is now widely considered the most historically familiar material for thatching (which is likely true on the remaining thatched houses in the UK) the use of water reed is fulfilling a dual function; filtering water to contribute to the health and wellbeing of London's residents, and the Thames, as well as providing a construction material for use in a new industry.

1 *Thatch in Hampshire - Sustaining A Tradition* Pub. Hampshire County Council p5

2 *ibid.*

Material for thatching is often no longer grown in the UK, and the most common material, water reed (which will be used on this project) invariably comes from abroad.

> *Today some straw is grown for thatching as a specialist crop in the New Forest and Test Valley but the majority is brought in from other counties such as Devon, while most of the water reed is brought in from Turkey, Hungary, France and, in the case of Veldt Grass, from as far afield as South Africa.* [3]

Of course the use of materials from thousands of miles away increases the environmental impact of thatch, and this has to be addressed in a tradition of thatching is to be restored in London. The water reed tradition originated in Norfolk, where reed beds were once extensive. Whilst it is unlikely that the Bermondsey site will be able to provide all of the material required for thatching, it is proposed that the scheme will increase the use of thatch in London, and the UK, and the reed beds which once served the communities can be restored.
The revival of local and regional cultivation and sourcing of straw, reed beds and woodland products for use in thatching offers benefits in reducing transport cost (environmentally and economically, improving biodiversity, saving wildlife habitats and landscapes, and strengthening the rural and urban economies.

3 *ibid.* p8

Thatch is common to a great variety of cultures around the world, and variants are found on almost all continents.

English Thatch

Normandy Thatch

Peruvian Thatch

It is an efficient, cheap and common roofing material, and comes in many forms.

Indonesian and Malay Thatch

Japanese Thatch - The Ise Shrine

Japanese Thatch - Katsura Imperial Villa Gateway

Visiting a thatcher at work

In order to improve my understanding of the process and method of thatching I contacted a master thatcher in Kent, and arranged to visit his site to observe, and record him working.

John Kenward is a master thatcher whose family has been thatching for six generations. I visited him working on a building that had been thatched and rethatched by his father and grandfather before him.

The roof was a longstraw roof, once a common type of thatching, but now in decline as other materials are more resistant to wind and rain and cheaper.

The straw roof was almost complete, and John was applying the ridge when I visited. John applied the thatch with a modified traditional method, and took me through most of the tools and techniques that he used to apply the new thatch.

The thatch was stripped back to the rafters, and new straw applied. After these images were taken, a mesh covering was to be applied to the whole roof, and the ridge completed.

Visible signs of growth can be seen in some of the images on these pages; above right, the green grass in the thatch is the germinating wheat seeds sprouting, and growing due to the unusually wet April during which the thatch was applied.

Above: Window detail, showing the treatment and overhang of the thatch. Top left is the new ridge being applied, and green shoots can be seen emerging from the surface.

Above: Butt ends of the longstraw around the window reveal

Above: Hazel Spars

Glossary of thatching terms

Verge: The finished edge of the thatch overhanging the gable.

Hooks: Iron rods of various length between 200 - 300mm The hooks pin the hazel sways to the rafters.

Leggett: A wooden tool used to push the reed or straw into position on the roof. (John's leggett shown below.)

Liggers: Long split rods around 1.5m in length, pegged down by spars to secure the exterior coat of thatch.

Spars: Split hazel or willow sticks, sharpened and twisted and used as staples to secure new thatch to existing coats, and to secure liggers on ridges.

Sways: Split or round rods of hazel, willow or steel used with spars or iron crooks to secure thatch over coats or to rafters.

Above: John thatching the ridge

Above: Thatching materials

Above: Discarded straw to backfill the new thatch

Harvesting and using the reeds

Rotational Cutting

Having established the reedbed in Bermondsey, after 3-4 years of growth, it will require maintenance and cutting. After allowing the plant to develop for the first 3-4 years, the reed bed can be cut for thatch on approximately 1-2 year rotations, though to maintain the success of the filtration system, and to allow wildlife to settle, it may be cut on a 3-4 year rotation. This means that around 25-30% of the extent of the beds are cut each year. Given the limited area of cutting required on site this could be done by hand or by a small machine, in the late autumn or winter, to allow the wildlife to recolonise other areas of the beds. [11]

Right: Rotation of the reed beds on site. The site is arranged in 4 parts, which can be cut in rotation.

Shown on the facing page is the process for harvesting and preparing the reeds for storage.[12]

The technology for harvesting reeds is relatively low tech; essentially the reeds can be cut by hand, or using a small harvester. The cut reeds are quickly bundled and stored in order to avoid them getting damp and rotting on the ground.

11 London Biodiversity Partnership (2007) *Reedbed Conservation in London*
12 Images source for reed harvesting: Hiss Reet available online at http://www.hiss-reet.com/knowledge/reed-harvest.html

Winter Reed. The canes have dried out, and lost their leaves, making them easier to harvest.

Reeds are stacked in dry areas as they are cut before being bundled.

A large scale harvester produces bundles of reeds.

Reeds are bundled on site of canes around 1.2m, maintaining a flat base, and removing remaining leaves.

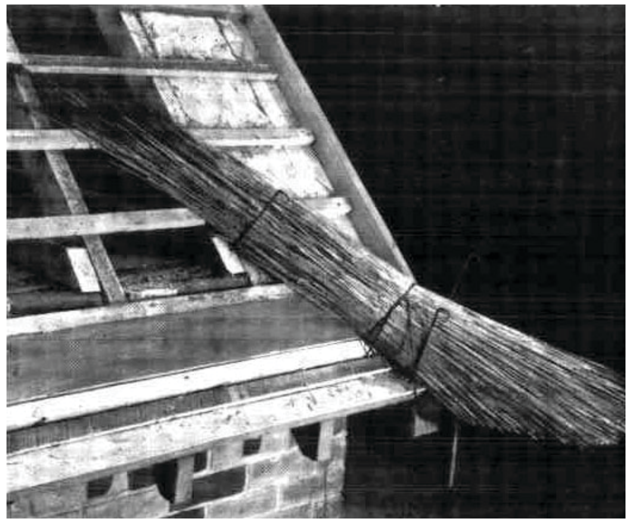
Thatching methods and techniques

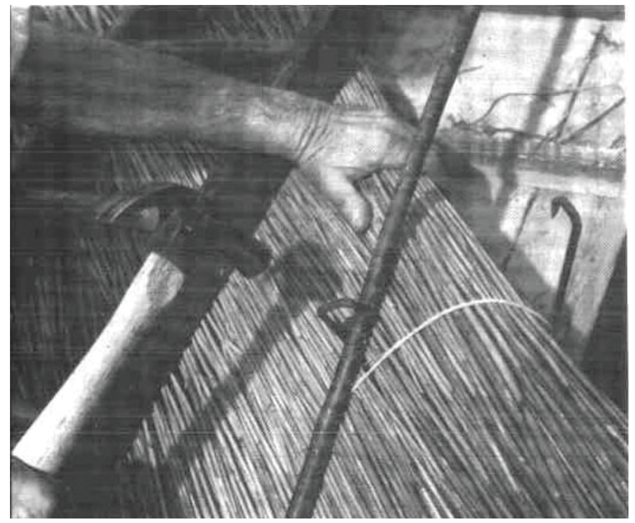
The methods of thatching for different types of material vary, and as a craft, the complexities of thatching any building are great, and require a different approach for each project.

The Thatcher's Craft, published by the Rural Development Commission, last published in 1988 contains a detailed step by step guide to thatching with all types of materials, including water reed. The book is available online at http://www.hct.ac.uk/Downloads/cp_thatch.html and is worth reading. I have included a selection of the process images on these pages to give a sense of the general thatching technique undertaken by master thatchers.

This page: Cutting and bundling the reed.
Applying the first reed bundles to the roof.
Arranging the ends and back filling.
Applying the brow-course.

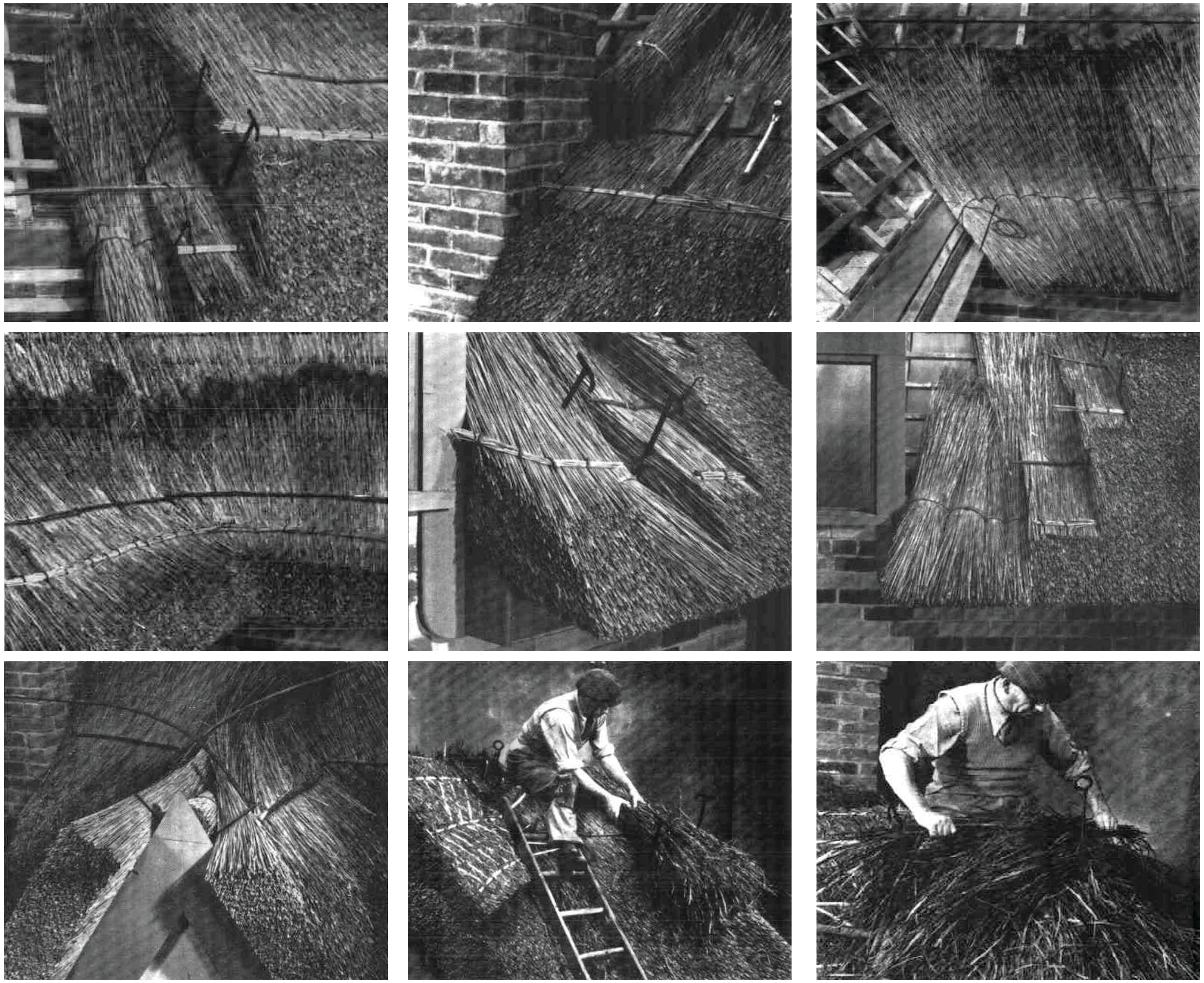





This page:
Tied in bunches, and the first full course swayed down.
The appropriate methods for joints and obstacles.
Bottom: Applying the ridge.

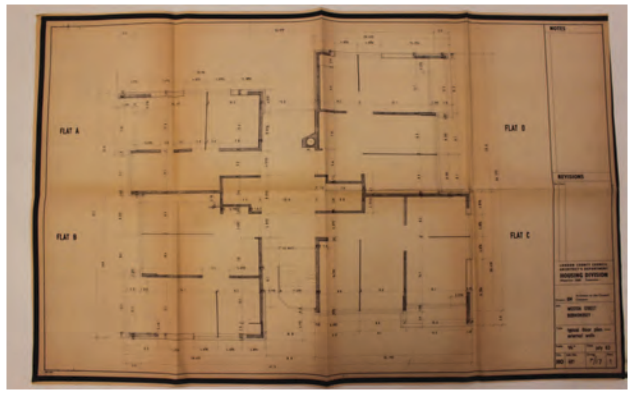
A full 66 pages of illustrations and text provides instruction on how to apply water reed to the roof.

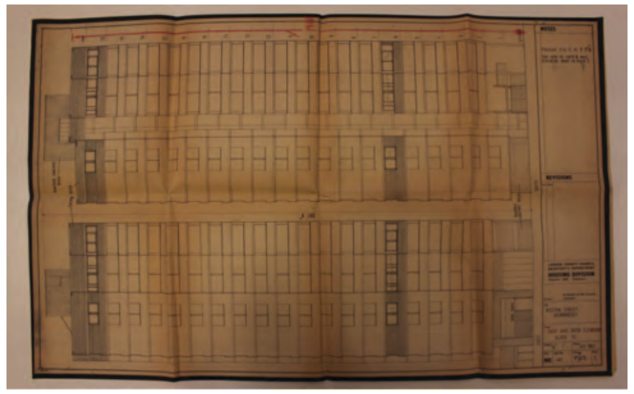


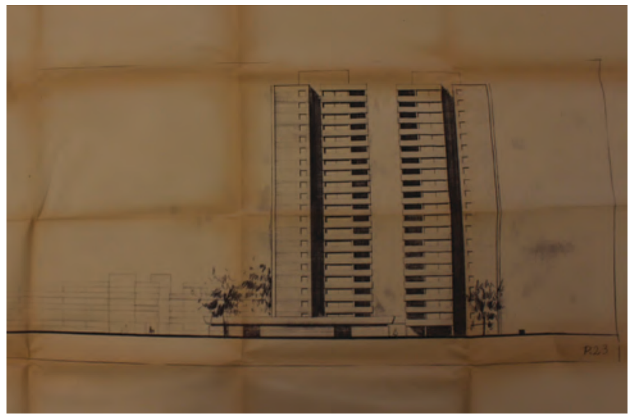
The existing towers Structure and performance

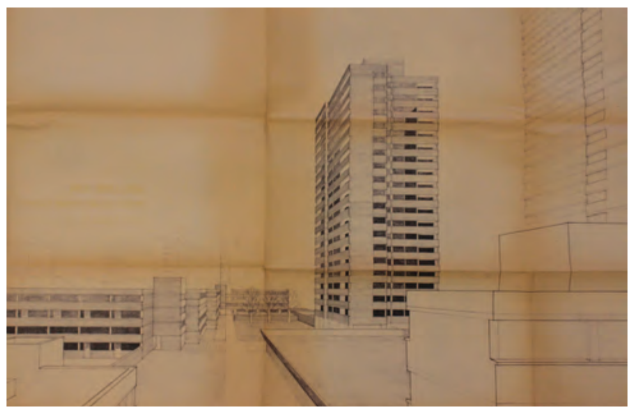
As highlighted in the introduction to this document, the existing Kipling estate towers are a standard form of point block developed by the LCC in the fifties for social housing in Roehampton and subsequently used elsewhere in the capital. Though the Kipling estate is largely undocumented in the architectural press, the job file is available from the London Metropolitan Archives, which contains a disparate selection of drawings and correspondence from the 1960s, when the estate was built.[1]

Adjacent is a selection of some of the drawings available in the file.
Top to bottom: Typical Plan, Elevations, Contextual elevations, perspective view







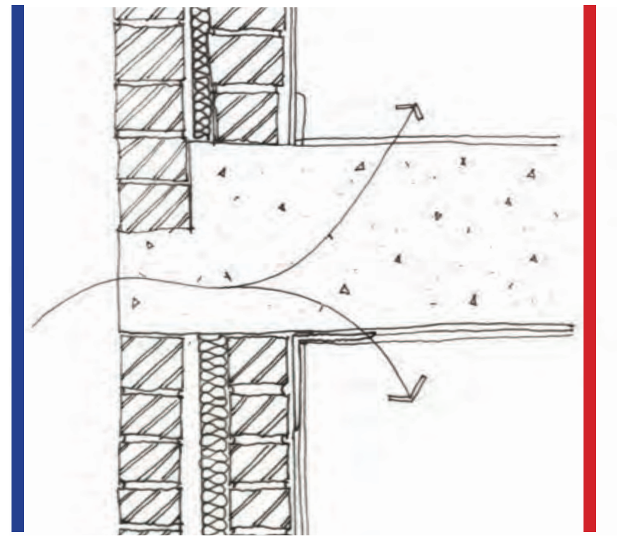


The file has extremely limited contents, and including only a typical flat plan and roof plan (there is no ground floor plan) and the file contains no sections. Fortunately the nature of the building means that it is possible to work out the likely structural system of the towers based on the typical plan alone, though it is necessary to make an educated guess of the ground floor structural layout based on how the building is manifested. The structure of the towers is a load bearing prefabricated concrete structure with brick infill panels forming the external walls. The layout of flats is constrained by a load bearing structural shear wall in each. These stacked walls provide lateral stability to counter with wind loads, as well as supporting the building vertically.

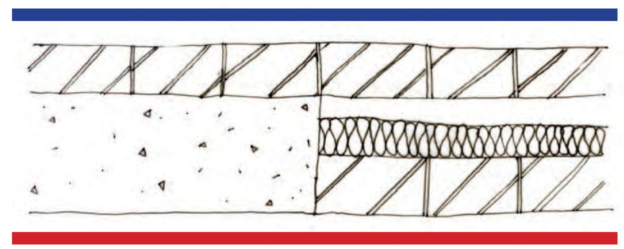
The structural system used for these types of buildings can be problematic, if the joints between precast panels are not strong enough, as was discovered following the collapse of Ronan Point in the London Borough of Newham. The Kipling Estate towers, were completed in 1965, three years prior to the explosion causing the partial collapse of Ronan Point in 1968. There is however no suggestion that the structure of the Kipling Towers is unsafe, though Southwark did not comply with recommendations of the Building Research Establishment following the incident to assess their buildings to ensure they would be able to deal with this type of collapse.

The structure of the towers also poses environmental problems for the residents, due to the nature of the construction method: - The concrete structure is infilled with double skin brick panels between concrete floors. The sketch section on the right shows the likely construction method. The details creates a thermal bridge at the floor and ceiling level, leading to an inefficient building skin for heating, and problems of condensation. Also shown in plan, where the concrete walls are exposed to the outside of the tower, there is a significant thermal bridge as the concrete structure is not insulated from the exterior temperature, covered only by brick skin.

Opposite: a typical plan, showing locations of significant thermal bridging.



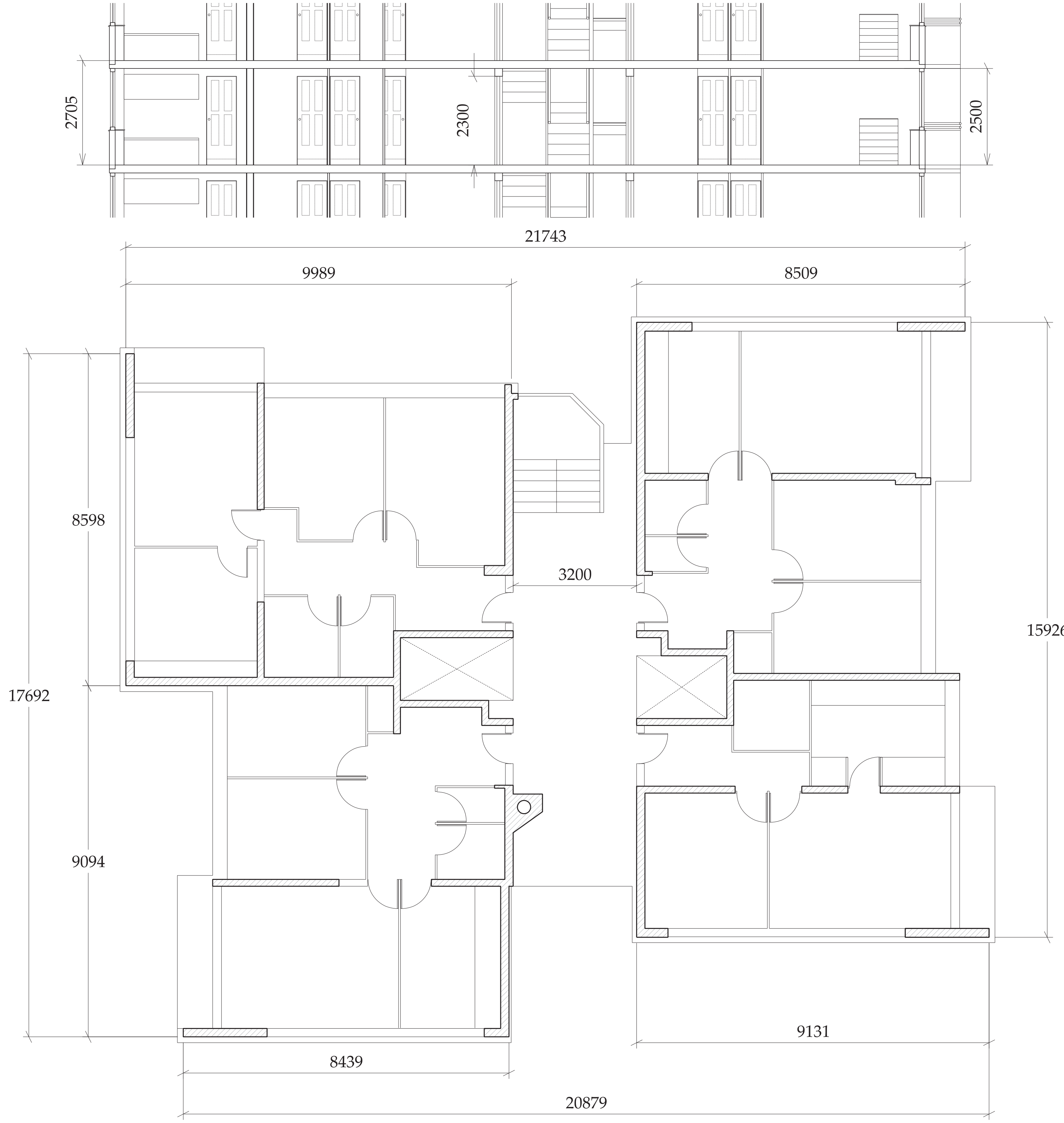
Construction Section of existing building, arrows highlighting cold bridging in the existing structure

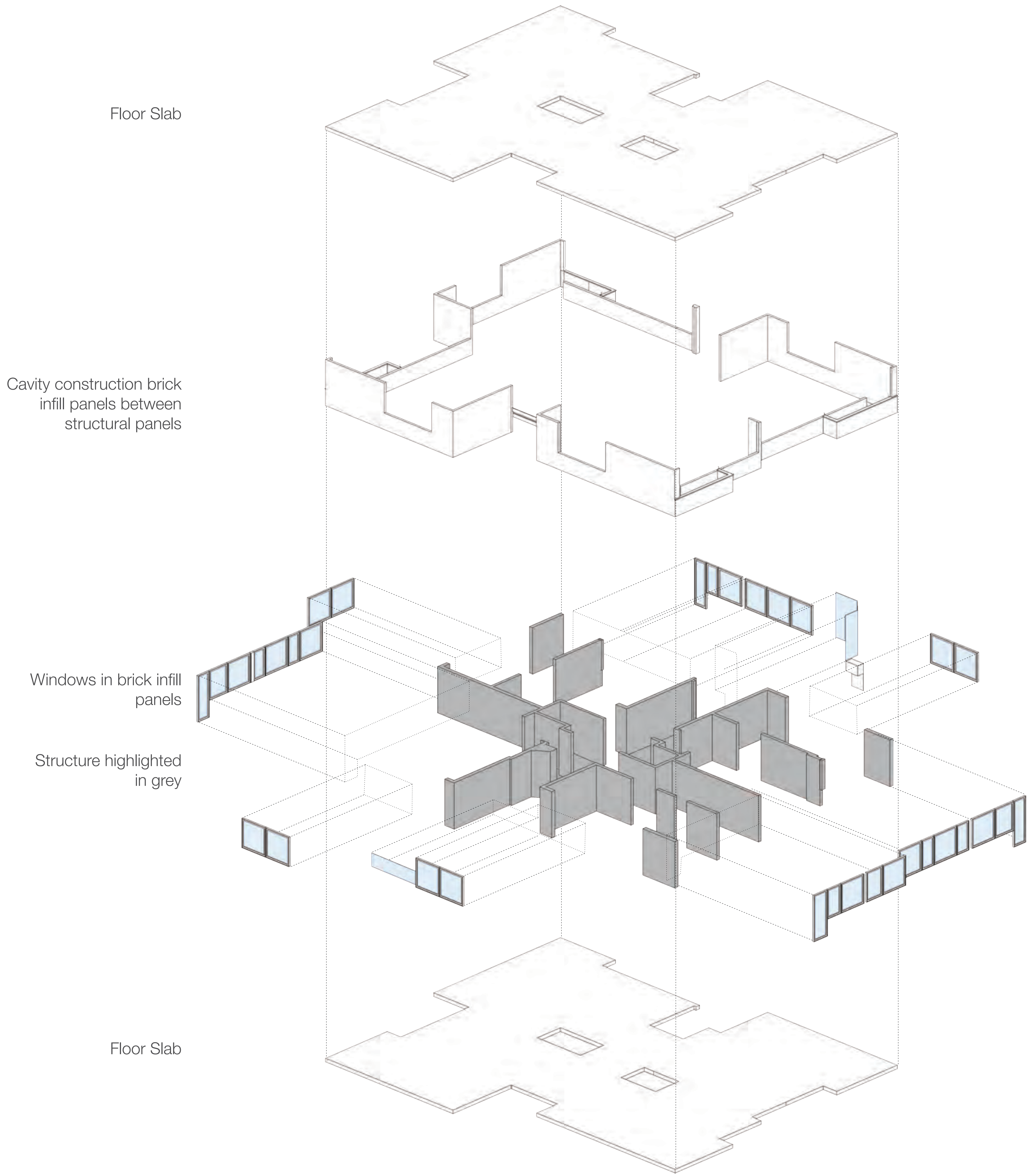


Typical construction plan of existing building, showing problems with cold bridging.

1 Job file number GLC/AR/R/10/BE/H/0054/BA

Elevation detail showing exposed slab edges





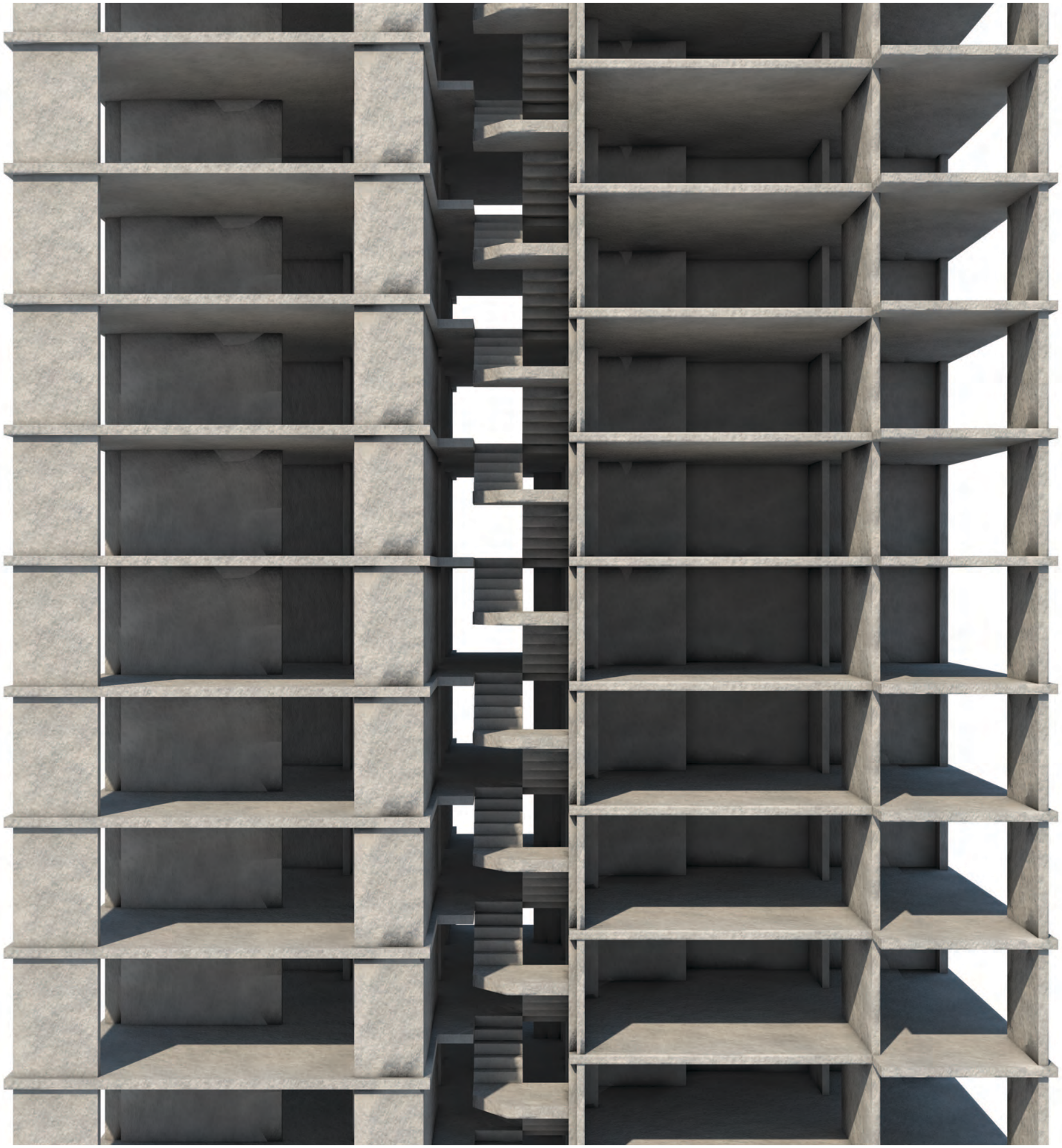
The nature of the structure, shown on these pages means that the possibility of modifying the internal layouts is difficult. Each flat contains one shear wall, and is bounded on two sides by shear walls. The internal walls are therefore difficult to move, and the possibility of changing the layout or size of the flats difficult.

For this reason, in order to improve the flats, and increase the amount of space within them, I am proposing extending the floor plan by building a cage structure around the existing concrete towers which will rest on the floor, and lean against the existing concrete frame.

Shown on the left is an exploded axonometric of the existing structure. On the right is a perspective view into the structure, showing the density of concrete walls.

It is worth noting that in the opinion of the structural engineer, the masonry infill that is being removed for the project is contributing currently to the stability of the existing building. However, given the abundance of walls, removing it will not be a significant reduction, and removal will not make the building unstable. It is on this basis that props are not necessary during the construction process to maintain the structural integrity of the existing towers.

A significant concern is the low floor to floor level in the existing block, which I will be using in my proposed block. The height available is 2705, and seriously constrains the headroom in the proposals. Technical development would be required to achieve a concrete floor slab of the thickness shown in the following proposals.



A forest of concrete walls

- The existing concrete frame

Structural approach

The existing towers' extension and the new backpack towers

The project was discussed with a structural engineer, to ensure that the structural solution proposed was appropriate for the scheme. I had suggested a timber framed structure, with steel connections for both towers. Through discussion, this was deemed possible on the existing towers, but would require a prohibitively large structure on the new towers. The structural solution that is proposed for the new towers replicates the structural language of the existing + extension; namely a concrete frame with a timber secondary structure, and fragile cladding. This maintains and enhances the narrative of the thesis: the elements of the building that are required to be robust, are built in a robust, long lasting material. Those elements of the building that do not require or benefit from the same longevity are built from more ephemeral materials.

Timber is about a tenth of the strength of concrete, and in a 23 storey freestanding tower, would create prohibitively large columns at the base. The new building therefore proposes a reinforced concrete frame, with concrete slabs, and steel tension members between floors on three sides. The floor slabs have increased depth where they transfer between wall arrangements, allowing load changes to function as shear slabs.

The pitched elements on the lowest 6 floors of the backpack tower are timber framed, truss roof construction, onto which counter battens, battens and thatch is fixed. Only primary members are shown on the adjacent image.

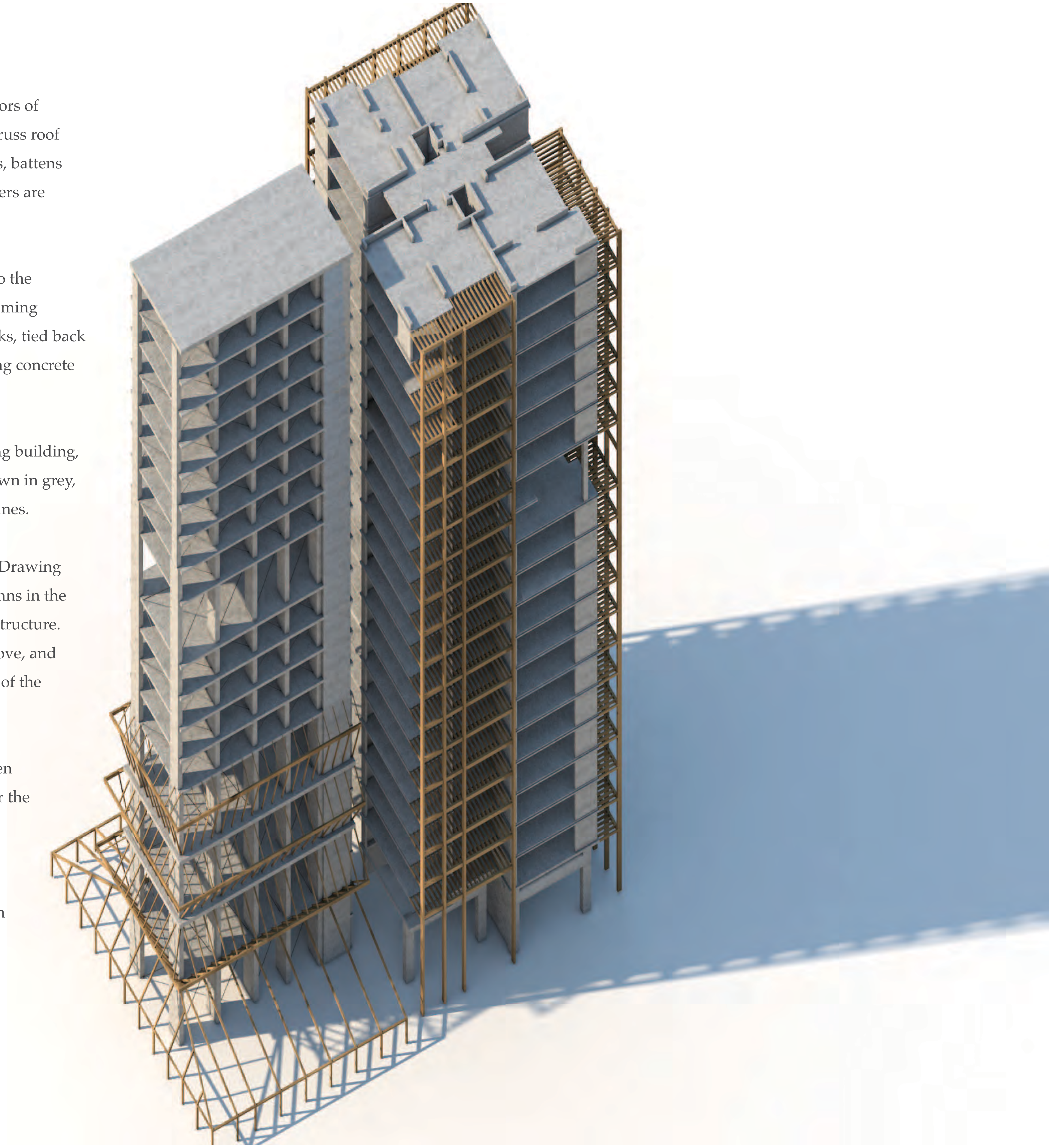
The proposed system for the extension to the existing towers is a timber secondary framing structure around the existing tower blocks, tied back to the slabs and shear walls of the existing concrete frame.

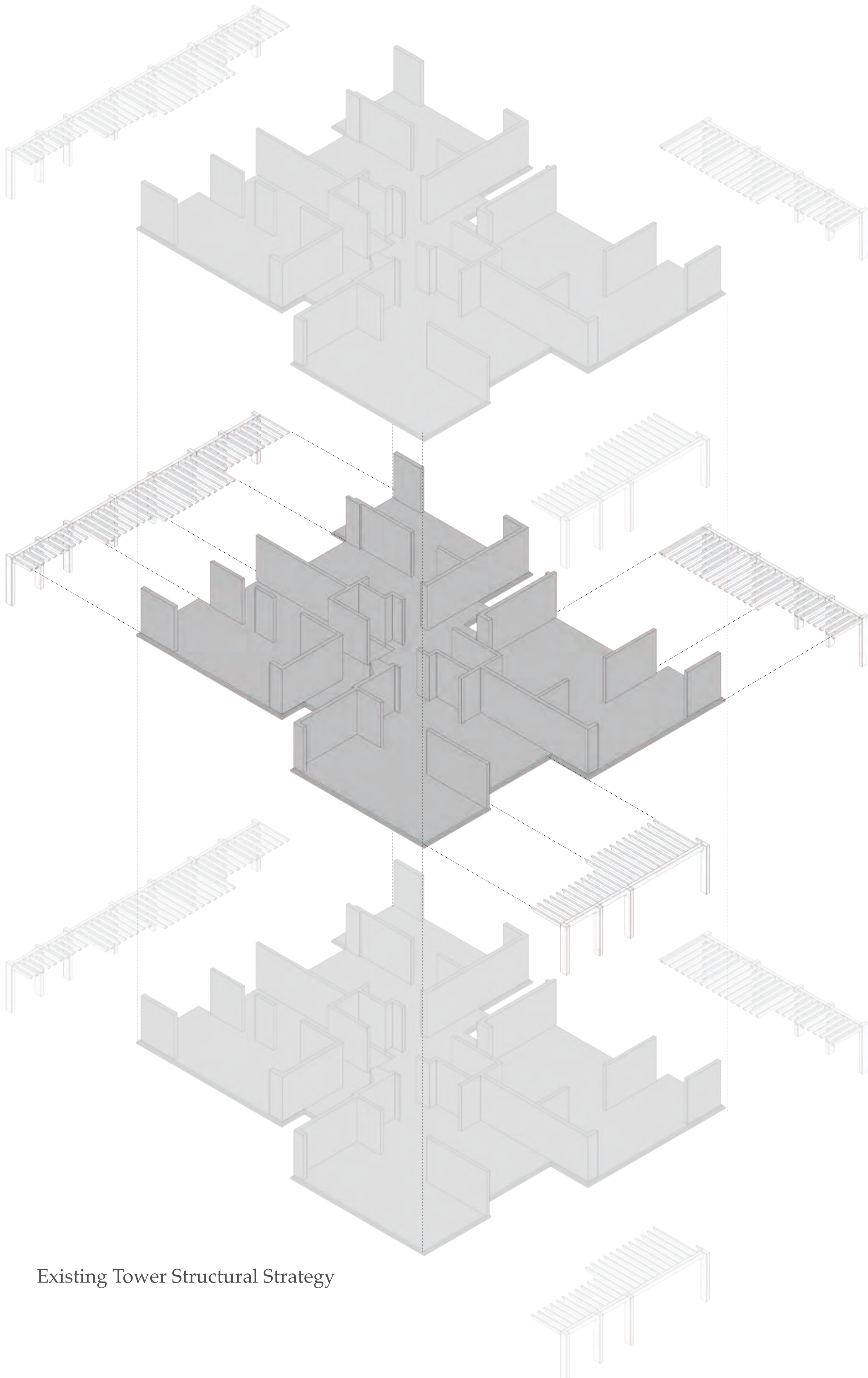
Right: Structural Schematic of the existing building, with the proposals shown. Concrete shown in grey, timber in brown, and steel ties in black lines.

Far right, upper and lower tower plans. Drawing illustrates the change in size of the columns in the new backpack tower, the higher up the structure. The upper floors support less weight above, and span smaller distances allowing the size of the column to be reduced to about half.

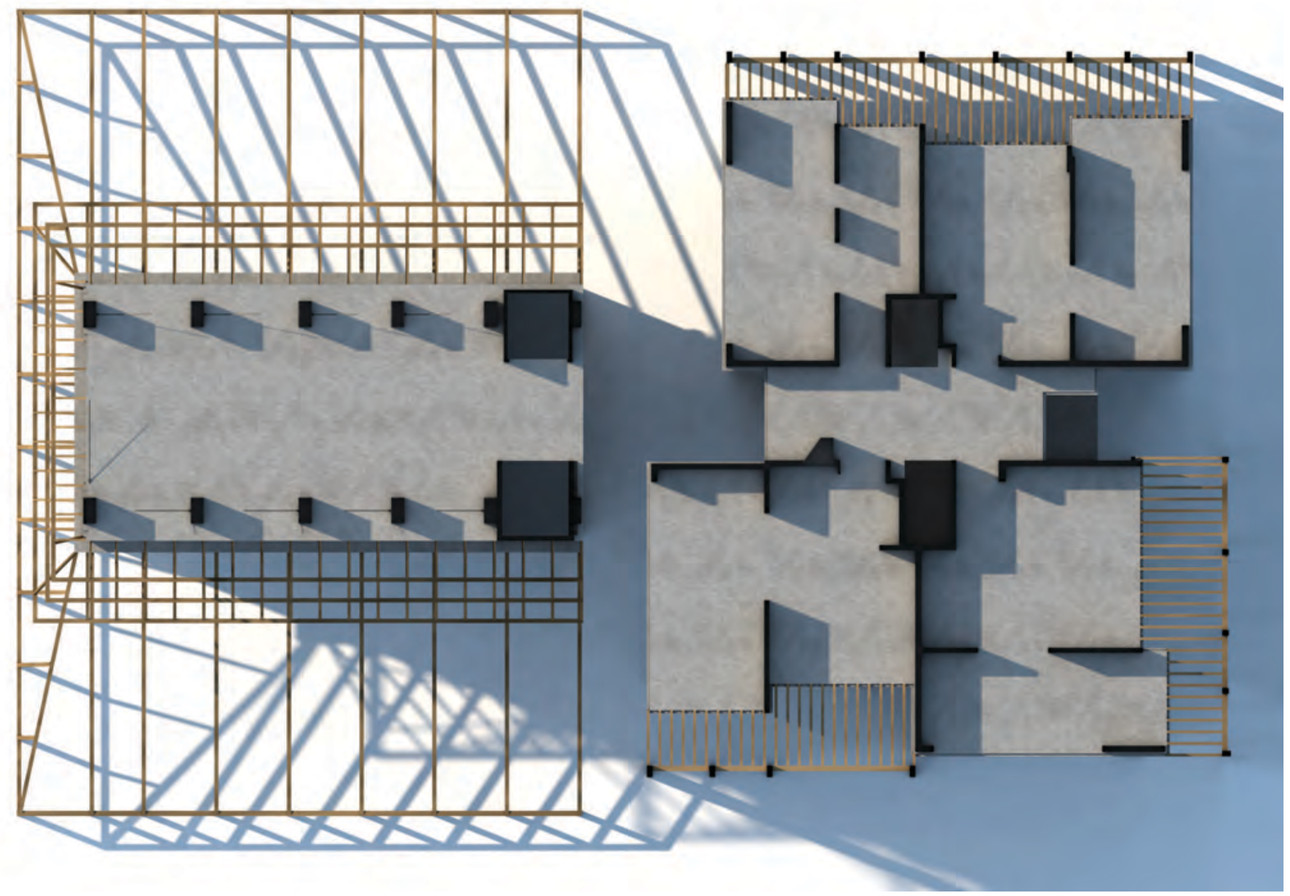
For this schematic, the columns have been calculated at around span height / 12 for the minimum dimension.

Column dimensions:
Lower third of new tower: 1800 x 450mm
Mid third of new tower: 1350 x 450mm
Upper third of new tower: 900 x 450mm

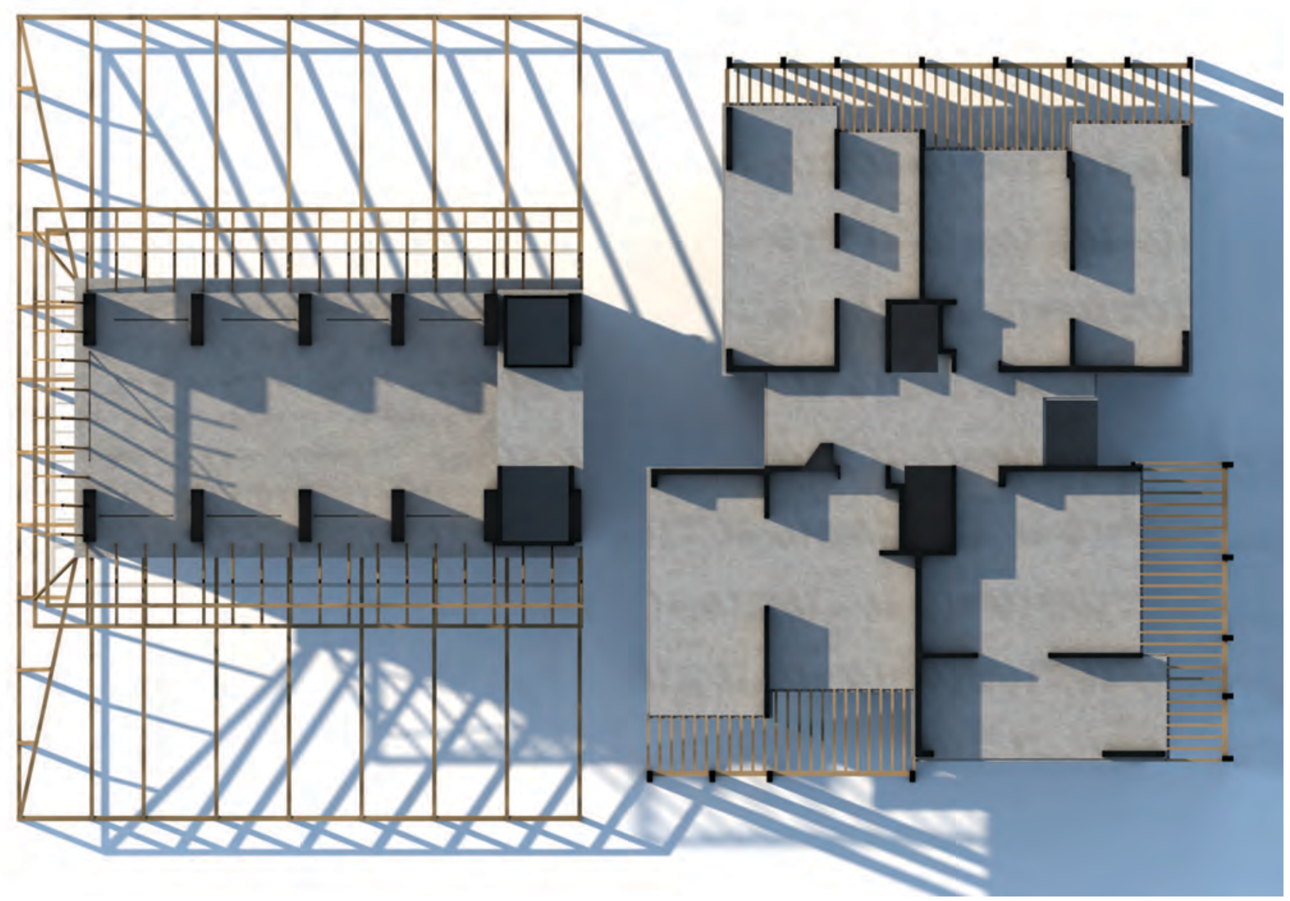




Existing Tower Structural Strategy

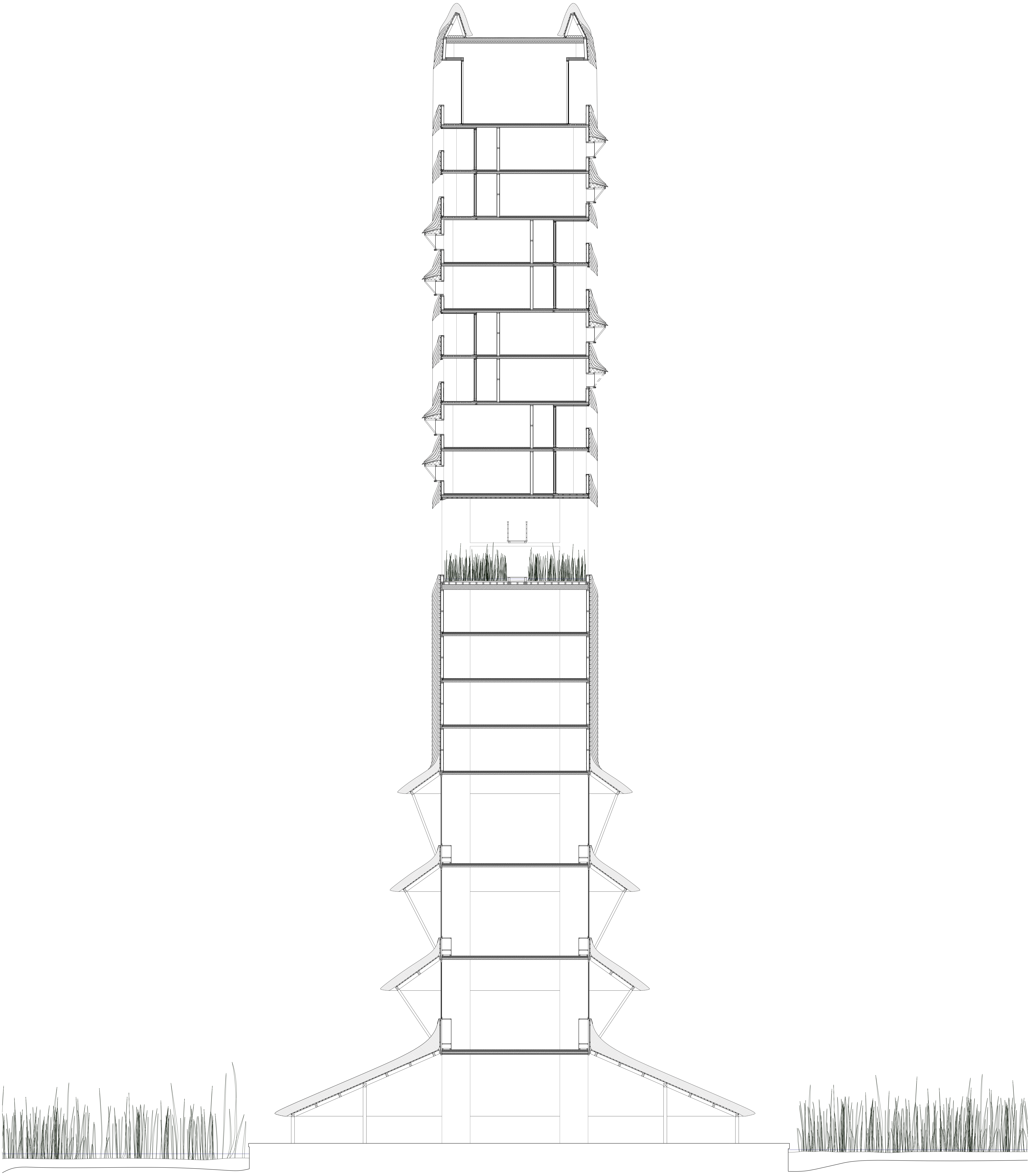


Structural Strategy Diagrams. Upper and lower floors

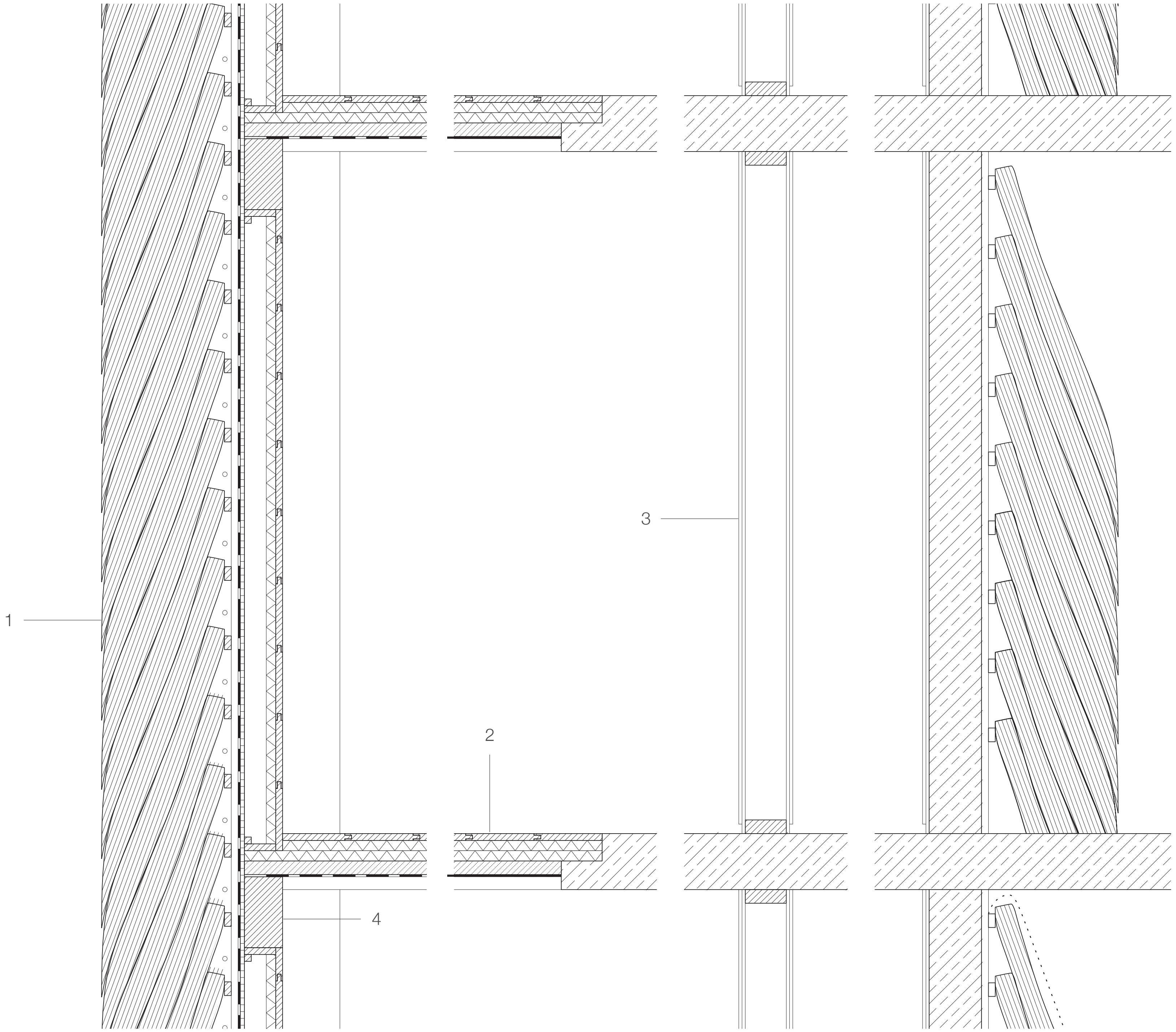


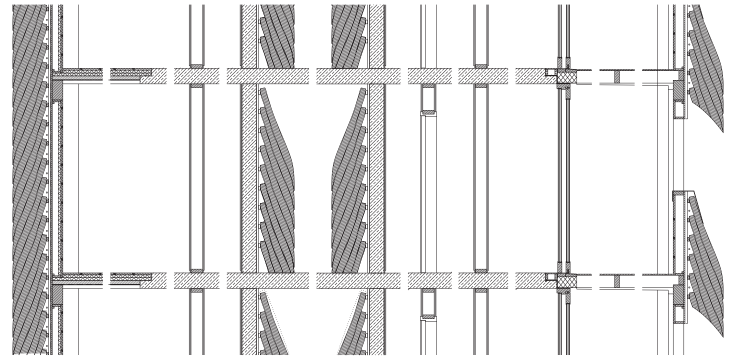
Please unfold - Structural Section AA showing the complete structure.

Please refer to details on the following pages.



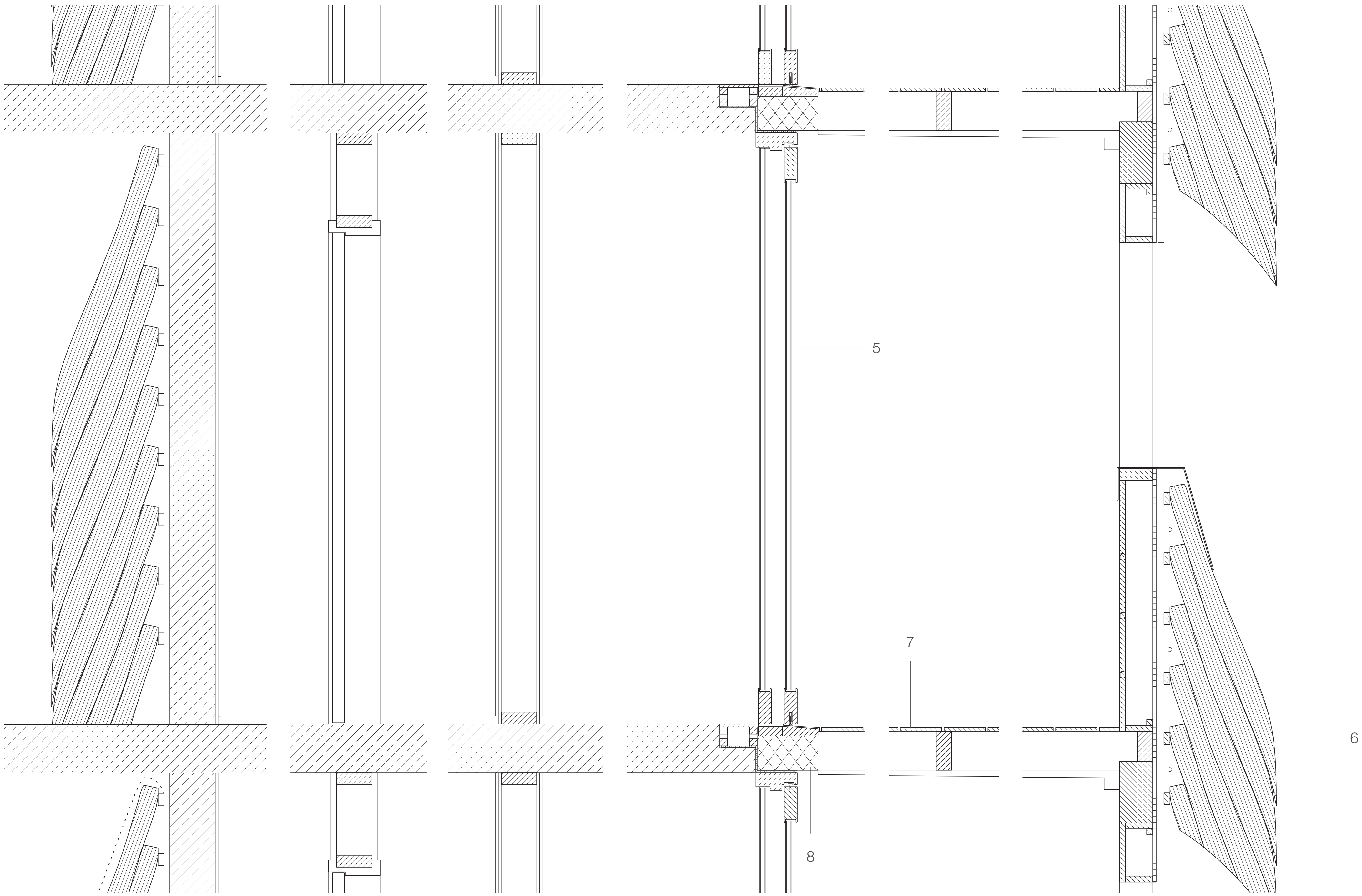
Typical Thatch construction section – Existing Building Extension



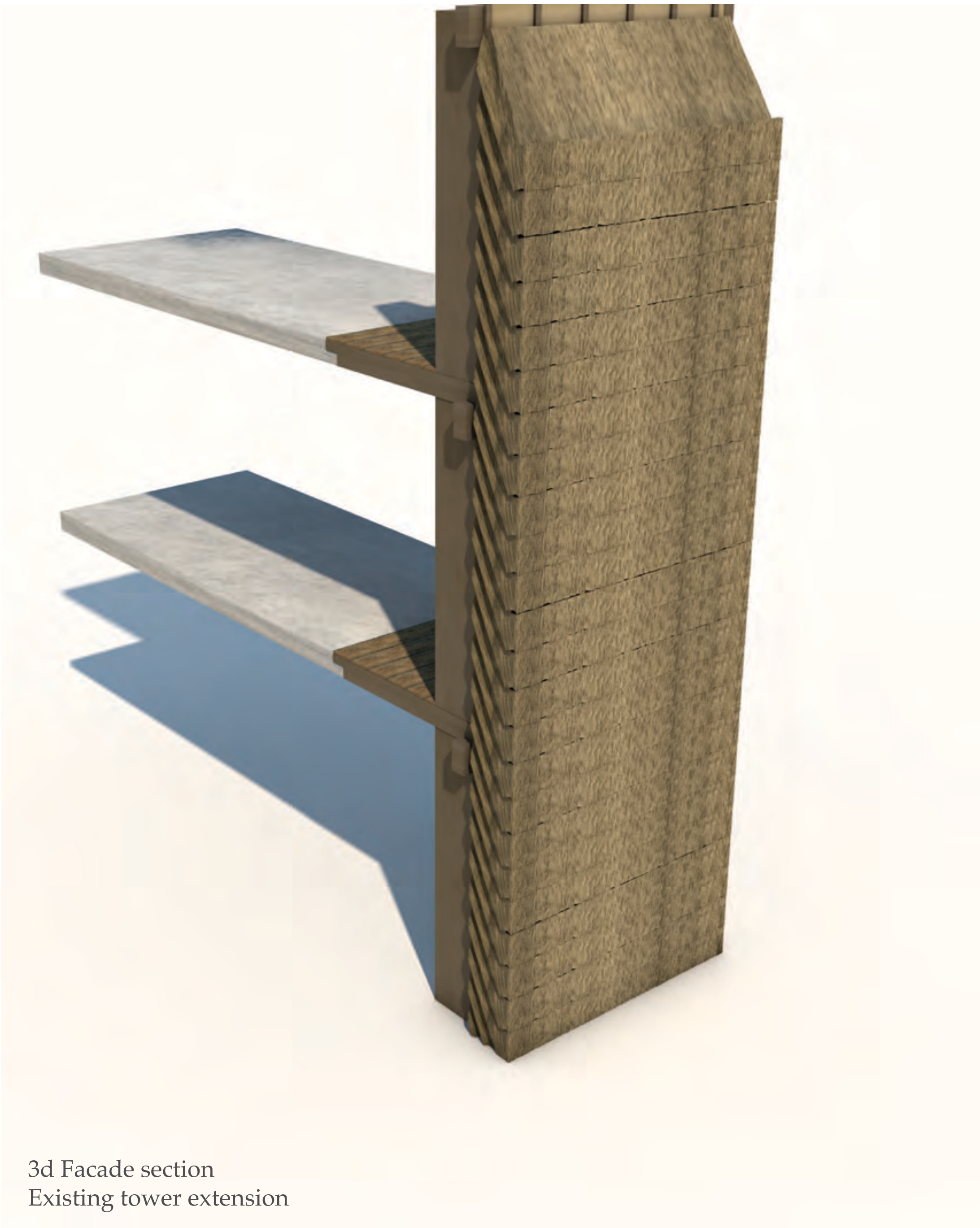


1 450mm Bermondsey water reed thatch with 8.5 mm copper sprinkler pipes on
25 / 50 mm battens on counter-battens
thatch firewall membrane acting also as waterproof membrane seal
15mm oriented strand board on
115 / 35 mm softwood studs with 35 mm polystyrene insulation between
25mm spruce tongue and groove boards nailed to studs
2 25mm spruce tongue and groove flooring nailed to
180 / 50 mm softwood joists
2 x 37.5 mm wood fibre insulation
50 mm cement panel
5 mm impact sound proofing, fleece
3 2 x 12.5 mm gypsum board
on softwood timber studs @ 400 mm centres
4 140 x 260 mm timber primary structure

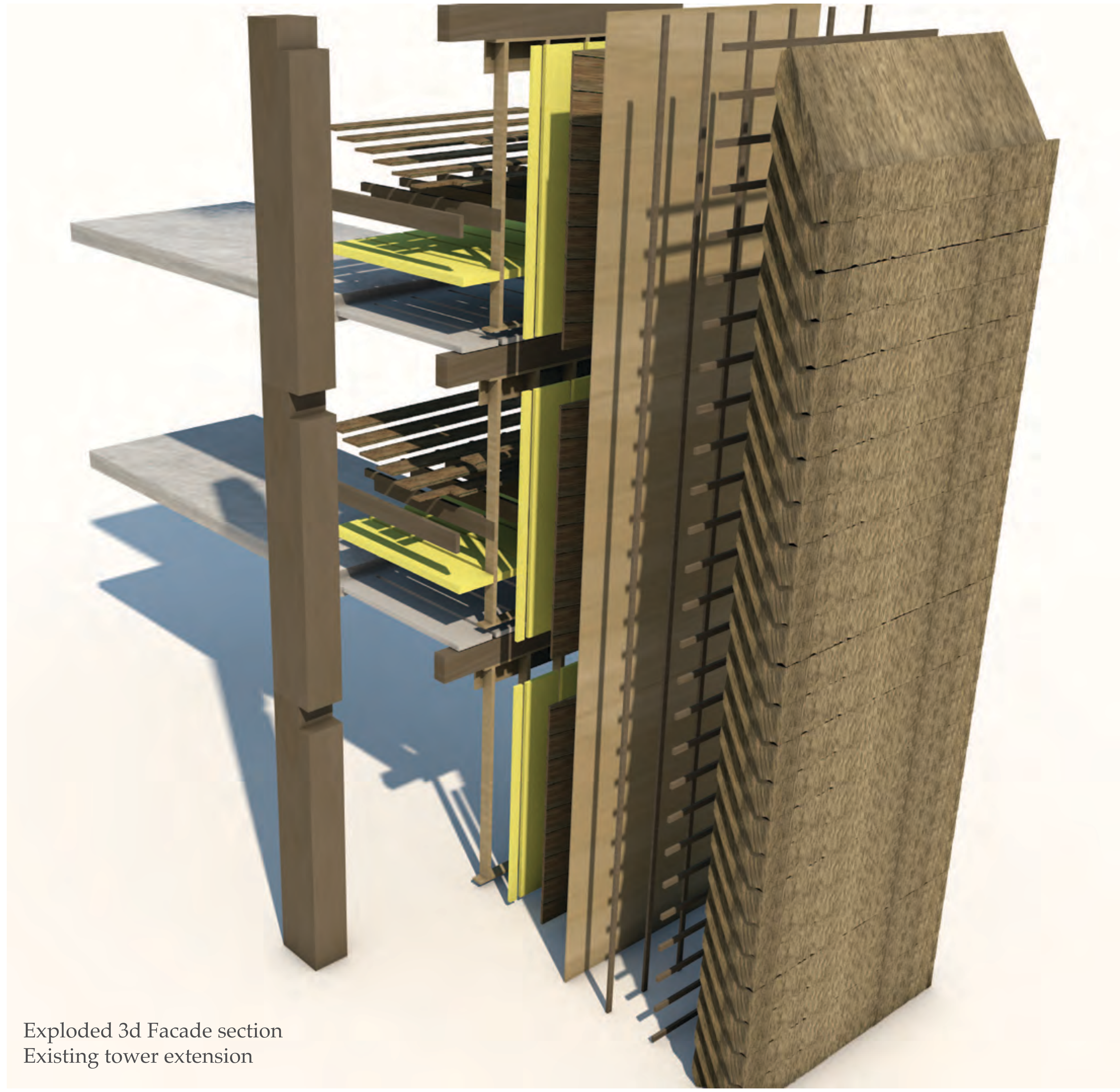
5 triple glazing in oak frame:
3 x 4 mm toughenend glass +
2 x 16 mm vacuum cavities
fixed to steel framing, bolted to concrete slab
6 450mm Bermondsey water reed thatch with 8.5 mm copper sprinkler pipes on
25 / 50 mm battens on counterbattens
15mm oriented strand board on
115 / 35 mm softwood studs
25mm treated spruce tongue and groove boards nailed to studs
7 15 mm treated spruce flooring nailed to
165 / 115 mm softwood joists
3 mm steel sheet metal, galvanised coated 0.6% slope
8 145mm rigid insulation between timber floor joists


5
7
6
8

Typical Thatch Section
3d and exploded 3d view
Existing building

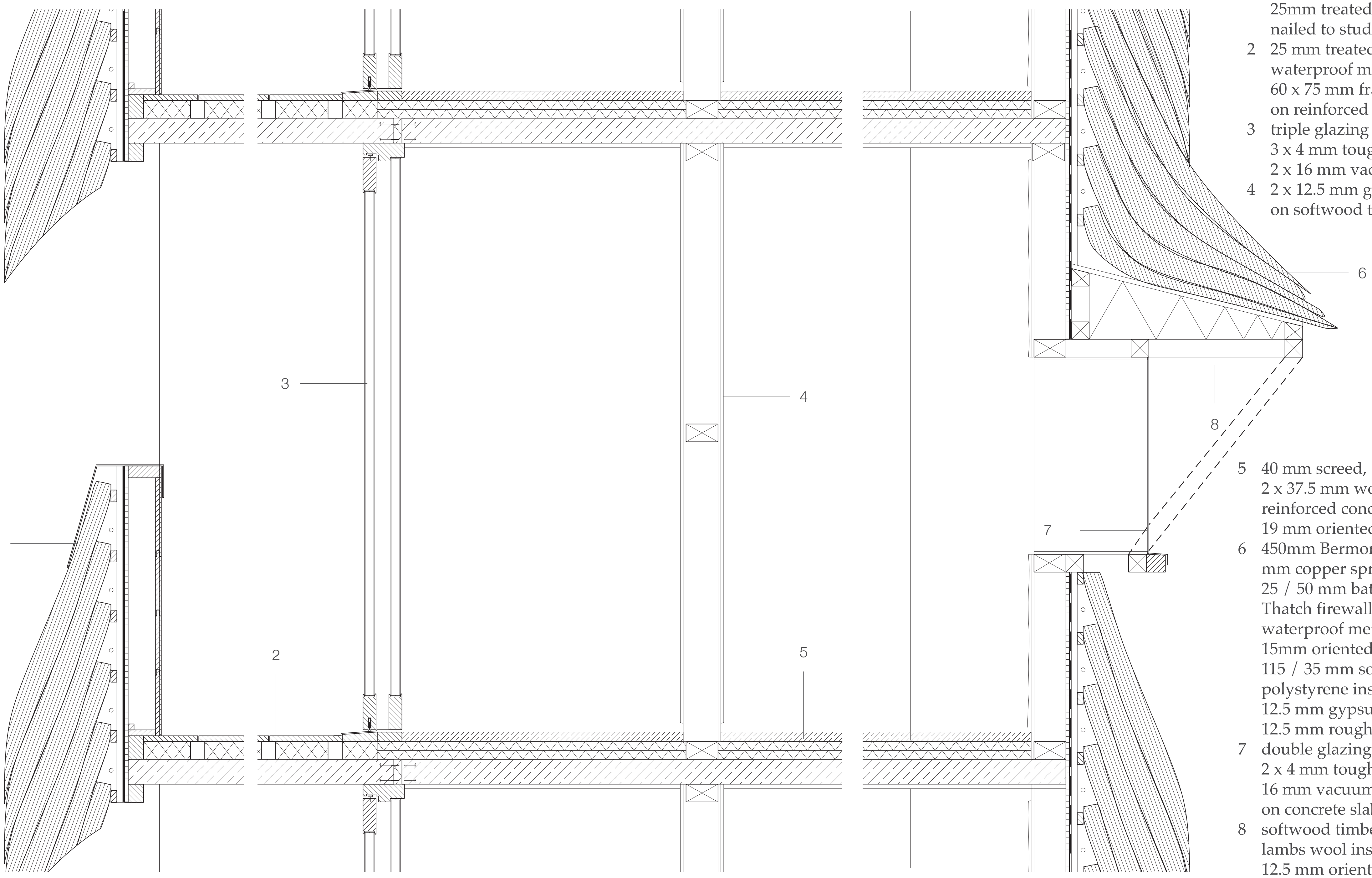


3d Facade section
Existing tower extension



Exploded 3d Facade section
Existing tower extension

Construction Section
New backpack tower – Residential detail



1 3 mm galvanised sheet metal covering
450 mm Bermondsey Water Reed thatch with 8.5 mm copper sprinkler pipes on
25 / 50 mm battens on counterbattens
thatch firewall membrane
15mm oriented strand board on
115 / 35 mm softwood studs
25mm treated spruce tongue and groove boards nailed to studs

2 25 mm treated spruce flooring
waterproof membrane
60 x 75 mm framing
on reinforced concrete floor slab

3 triple glazing in oak frame:
3 x 4 mm toughenend glass +
2 x 16 mm vacuum cavities on concrete slab

4 2 x 12.5 mm gypsum board
on softwood timber studs @ 400 mm centres

5 40 mm screed, quartz aggregate, polished
2 x 37.5 mm wood fibre insulation
reinforced concrete slab
19 mm oriented fibre boarding

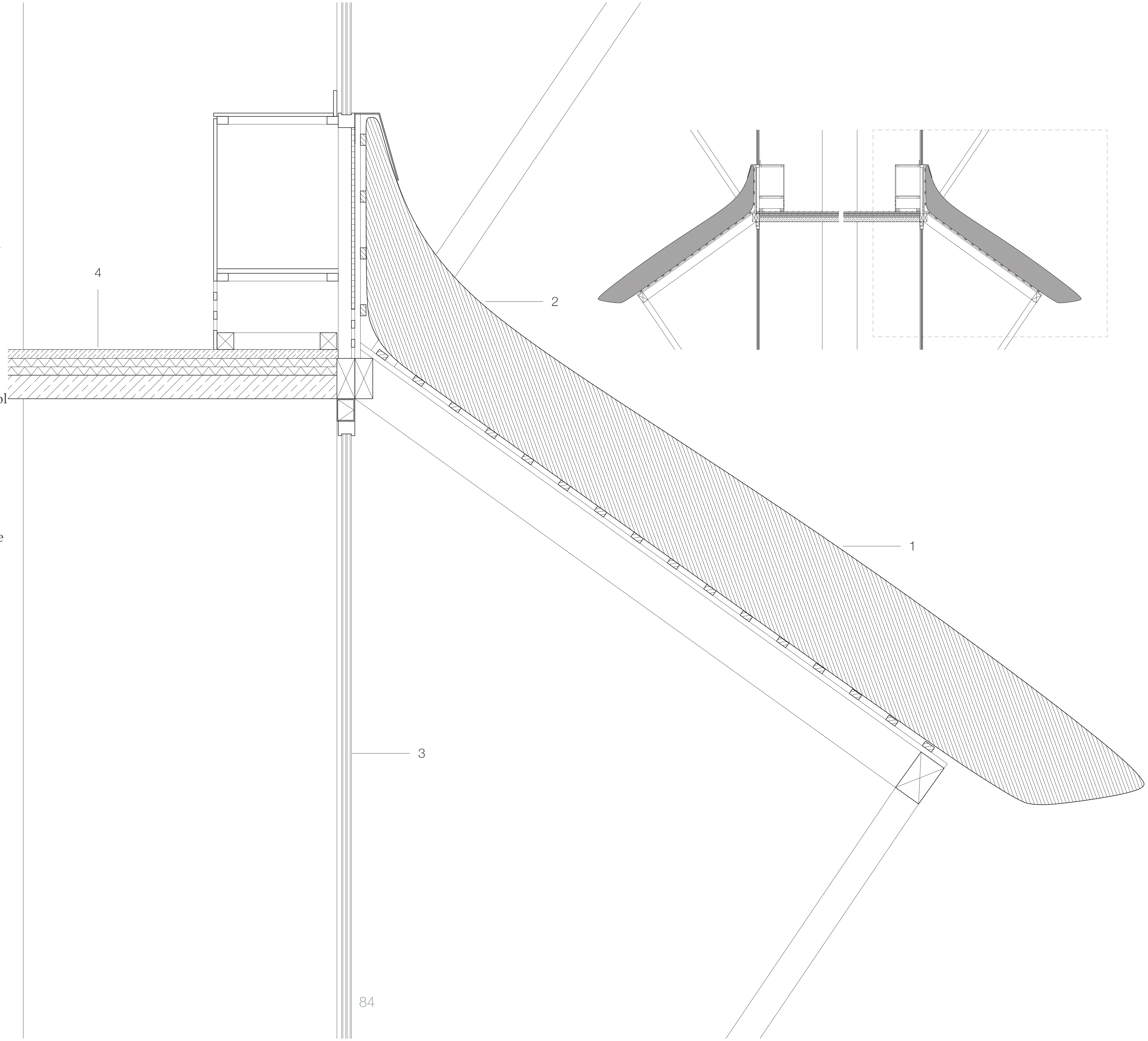
6 450mm Bermondsey water reed thatch with 8.5 mm copper sprinkler pipes on
25 / 50 mm battens on counterbattens
Thatch firewall membrane acting also as waterproof membrane seal
15mm oriented strand board on
115 / 35 mm softwood studs with 35 mm polystyrene insulation between
12.5 mm gypsum board
12.5 mm rough plaster

7 double glazing in oak frame:
2 x 4 mm toughenend glass +
16 mm vacuum cavities
on concrete slab

8 softwood timber framing
lambs wool insulation
12.5 mm oriented strand board

Construction Section
New backpack tower – Workshops Floor

1 Roof construction: 400 - 500 mm Bermondsey
Water Reed thatched roof on
25 / 50 mm battens on counterbattens
115 / 35 softwood rafters
Wall Construction: 3 mm galvanised sheet metal
2 covering
450mm Bermondsey water reed thatch with 8.5
mm copper sprinkler pipes on
25 / 50 mm battens on counterbattens
Thatch firewall membrane acting as waterproof
membrane seal
15mm oriented strand board with ventilation
opening at base.
Softwood timber studs packed with sheep's wool
insulation.
Softwood timber framing of ventilation and
storage unit
15 mm spruce board cladding unit
3 triple glazing in oak frame:
3 x 4 mm toughened glass +
2 x 16 mm vacuum cavities
fixed to softwood timber joists bolted to concrete
slab edge.
6 40 mm screed, quartz aggregate, polished
2 x 37.5 mm wood fibre insulation
reinforced concrete slab
19 mm oriented fibre boarding



3 The Life of the thatch

The varied appearance of the thatched facades

Deterioration of thatch occurs at the exposed surface of the roof and progresses inwards. Within the layer of reeds outer, middle, and inner zones develop representing different stages in the decay. The zones move inwards as thatch deteriorates.[1]

A study completed for the University of Cambridge, quoted above recorded the decay of water reed thatch on roofs of differing pitches, with differing orientations, and analysed the results of their studies. The study is unsurprising in that steeper thatch results in a slower rate of decay, and north facing thatch generally has a greater population of fungi, though some types of fungus were not affected by the orientation. These types of fungi are "*generally characterised as `stress-tolerant ' organisms which are able to endure continuously unfavourable conditions.*"[2]

The roof shown adjacent shows both dry and damaged thatch. The moss covered thatch on the right side of the page is north east facing, shaded, and beneath a tree's canopy, and retains a significant amount of moisture. The moss growing on the roof acts like a sponge, retaining water, and contributing to the break down of the thatched roof. The dry thatch shown on the far right is south west facing, and is dry. The direct exposure to UV, whilst breaking down the thatch to some degree actually has the effect of killing some of the types of fungus, and protects reeds.

The orientation of the thatch will significantly affect how long it lasts, and the frequency with which it must be replaced. North and west facing thatch will gererally deteriorate more quickly than the drier south and east facing walls and roofs.

1 Anthony, P.A. (1999). *The macrofungi and decay of roofs thatched with water reed, Phragmites australis.* Mycological Research, 103 , pp 1346-1352
2 *ibid.* p1352

Maintaining the thatched facade

The thatched facade will operate on a regular maintenance schedule, being slowly rethatched over a period of 40 - 50 years. (Water reed is the longest lasting thatch material. Wheat reed and long straw have life expectancies of 25-40 and 10-20 years respectively.[1]) As noted, it is likely that the different areas of thatch will break down at different rates, and some areas will need to be refurbished more frequently than others.

Regular maintenance is essential to keep water from saturating the thatch. Typically the upper layers of thatch are removed and replaced, removing any decayed thatch underneath. Patching the surface of the thatch can help to extend its life, and means that wholesale replacement of the facades and roof will be required less frequently. Moss coverage (shown on the right) on the roof will be removed regularly, as the moss holds moisture against the thatch and significantly contributes to its decay. The location of thatch that requires most frequent replacement is the ridge, which is more exposed to rain. Due to the nature of the buildings, there is limited ridge work to be completed. The steeper the pitch that the thatch is applied to, the longer it will last.

The lower three floors, which have pitched roofs, onto which the rest of the building drains, may require rethatching much more frequently. This is due to the pitch, which is directly related to the longevity of the thatch.

1 *Thatch in Hampshire - Sustaining A Tradition* Pub. Hampshire County Council p11. Original Source: The Thatcher's Craft. pub. 1988 The Rural Development Commission

The benefit of a more frequent rethatching regime is that the students in the school of thatching will have a safe, low roof on which to work, which will mirror the types of roofs they are likely to work on, on a day to day basis.

The method of thatching the lower roofs will be traditional, allowing the students in the schools to learn the trade, and the traditional method of thatching. The facades of the buildings will require a different set of skills, though the thatching method is the same.
After stripping off the remaining portion of the old ridge, the entire roof area is dressed and cleaned down with the leggett, removing any moss which may have grown on that part of the roof which has a northerly aspect. Any holes in the main reed coating can be repaired by drawing down the reeds around the affected parts, and inserting small bunches of new reed which have been shortened to the appropriate length. The old and new reed is then dressed in together, level with the main coating.

It will be necessary to fix a reed roll to the apex of the roof, after which the ridge can be applied. Using sedge or good quality wheat straw. The whole roof area should then be lightly dressed and all eaves and barges levelled.

Repairing Water Reed from The Thatcher's Craft

The thatched walls on the sides of the high rise will require a different approach to be maintained. All high rise buildings require some maintenance, and the proposals seek to use this maintenance to the advantage of the architecture. Technology has been developed to allow facade maintenance to happen safely, and my proposals would appropriate this technology.

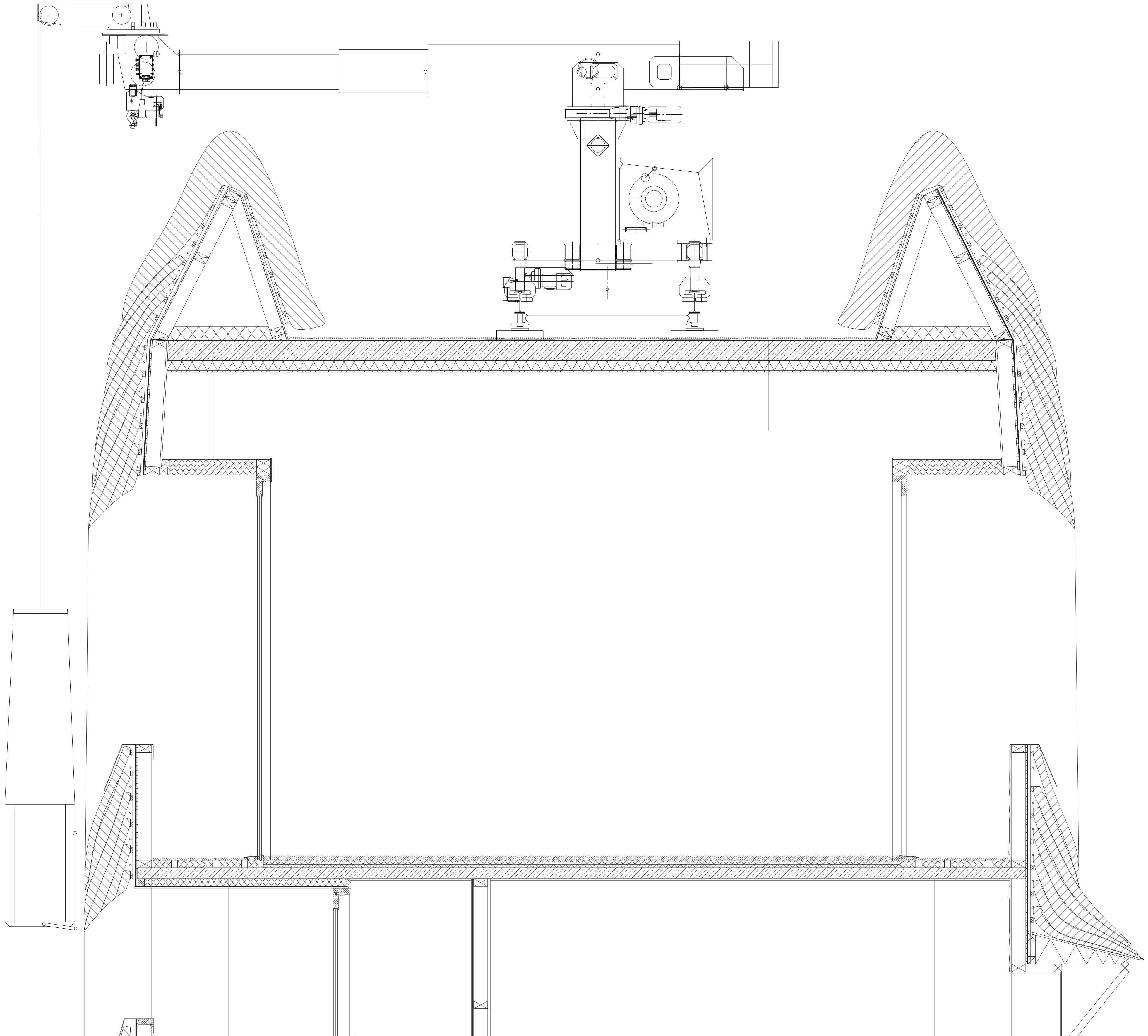
I would propose using a large scale extendable rig and cradle on tracks fixed to the top of the building, from which all thatched sides of the building can be worked on. A mansafe system would allow the ridges at the tops of the buildings to be worked on, in the traditional (if terrifying) manner

On the right, and left is shown an extendable, trolley building facade maintenance rig and cradle. Control of the arm is operable from inside the cradle, to allow the operatives to move with precision to the required location on the facade.

It is possible to attach a large two storey cradle to a rig of this kind, to allow a large area of thatch to be worked on, and to allow for a large quantity of thatching materials and tools to be stored for application on the facade.

The rig would be constructed on a track to allow all sides of the building to be operated on from the cradle.

The device, from Cento, an Essex based company that specialises in facade maintenance equipment, is shown here applied to the roof of my proposals. Drawing source: Cento. Glass/Cladding replacement. Standard Detail. Drawing no. QD012. I have shown the drawing attached to the roof of my proposal.



The environmental performance of the thatched wall

Thatching is recognised as a craft, and the abilities and the knowledge of the thatcher is instrumental in the construction and appropriate specification of the thatch. Having said this, a number of considerations need to be taken into account, in order for the thatch to perform in a way that is required.

Thatch is a high performing material, which breathes and self ventilates, providing a thickness of insulation for the building. Current environmental design thinking often promotes a sealed interior, with mechanical ventilation, with a heat exchanger, on the Passivhaus model. The benefits of this type of construction are numerous, and this technological approach provides an extremely low requirement for direct heating of internal space. The system has been shown to be effective in reducing considerably the carbon footprint, and associated costs of running a building.

Whilst my proposals do not seek to criticize this method of producing a sustainable architecture, I wish to suggest that other, more traditional methods of construction can provide environmental benefits also. The use of thatch in almost the opposite to a Passivhaus construction, in which the wall is breathable. The large depth of insulation, (provided by both the reed, and the additional insulation behind) keeps warmth inside the building, and controlled openings facing east, south and west maximise solar gain, whilst shading the interior.

Constructed well, a thatched roof should provide a well sealed building envelope, whilst still allowing the wall buildup to breathe and remain dry. Thatch is considered a warm roof construction and consequently doesn't require separate ventilation.[3] The construction method also does not rely on a technological solution (namely pumped ventilation with a heat exchanger) to maintain the quality of the environment, and this may have benefits in an uncertain future.

Internal Air Quality

Limited research appears to have been done in relation to vernacular constructed thatched roofs' effect on internal air quality, though research has been undertaken in relation to the quality of air inside homes in developing countries, with exposed cooking and heating equipment. One Study - Improving Indoor Air Quality for Poor Families: A Controlled Experiment in Bangladesh[4] found significant improvement on air quality inside thatched homes (roof and walls) on those of masonry or mud. The main pollution in this study was burning of fuel inside the homes, and dust pollution outside the home. In the summer months, the exterior dust pollution was a greater threat. In London, the pollution level is dangerously high, with 4267 people dying prematurely per year due to the pollution in the air.[5] "The European Environment Agency found the level of nitrogen dioxide at London's Bellwether monitoring station in Marylebone Road was the fourth highest in Europe - out of almost 3,000 locations."[6] The results of the study in Bangladesh found some improvement in indoor air quality with thatched walls or roof, though the results varied, room by room. In London, thatch could provide some particulate filtering to the indoor spaces.

In addition to the potential filtering quality of thatch, as a plant, water reeds to not contain volatile organic compounds (VOCs) , which are a danger to health. Many building materials produced for the

Air quality example map around the site. Dated 2004 - Air quality has improved considerably since, but still remains at dangerous levels for human health. Red: >32 μg/ m³ Yellow: 25 μg/ m³ The site is shown at around 26 μg/ m³. In March 2011, the City of London remains the only UK region in breach of the European Commission's air quality limits.
Image source: London Air. http://www.londonair.org.uk/london/asp/virtualmaps.asp?view=maps

3 *The Complete Thatch Guide* pub. The Thatching Advisory Service, Devon.

4 *Improving Indoor Air Quality for Poor Families: A Controlled Experiment in Bangladesh* The World Bank Development Research Group. December 2007 available at http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2007/12/03/000158349_20071203145318/Rendered/PDF/wps4422.pdf

5 Source: *London election: Mayors' air pollution records compared* BBC News 25 April 2012 http://www.bbc.co.uk/news/uk-england-london-17827814

6 ibid.

UK (including paints, adhesives, wall boards and ceiling tiles) emit volatile organic compounds (or VOCs) which is defined as"any organic compound having an initial boiling point less than or equal to 250 °C measured at a standard atmospheric pressure of 101.3 kPa and can do damage to visual or audible senses"[7] VOCs are what cause what is known as sick building syndrome. Good ventilation, and natural materials can significantly reduce the VOC emissions in the indoor environment. The significant ventilation provided by the thatched construction will reduce the amount of VOCs in the air, and contribute to a healthy environment.

Biodiversity

In addition to that provided in the reed beds, thatch provides habitats for birds and insects. Some of these are problematic for the thatch, others are of less consequence. The fact remains however, that thatch provides a wide range of habitats for animals including insects and birds which contribute to the biodiversity of the city. The London Plan requires the Mayor to expand and manage the extent and quality of the biodiversity in the city as well as providing green infrastructure. Providing large areas of natural habitats, and significant areas of thatch will contribute to this policy.

The thatch primarily provides a home for a large number of insects and spiders which provide a source of food for many types of birds.

Having said this, some work also has to be undertaken to limit the amount of fauna in the thatch; nesting sparrows, whilst acceptable to a degree can cause significant damage to the makeup of the walls and roof, and biodegrading organisms can lodge in the thatch, such as soil microflora, or deposits from the wind, birds and other wildlife.

A managed approach to biodiversity is the most appropriate way to deal with the benefits and disbenefits that the application of thatch to the city can bring.

Right: Thatch provides habitats for many types of animal, due to the nature of its form. Controlling infestation is important in a thatched building to avoid decay of the thatch.
Photograph: James Kirk

7 Directive 2004/42/CE of the European Parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products EUR-Lex, European Union Publications Office. Retrieved on 2010-09-28. at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004L0042:EN:NOT

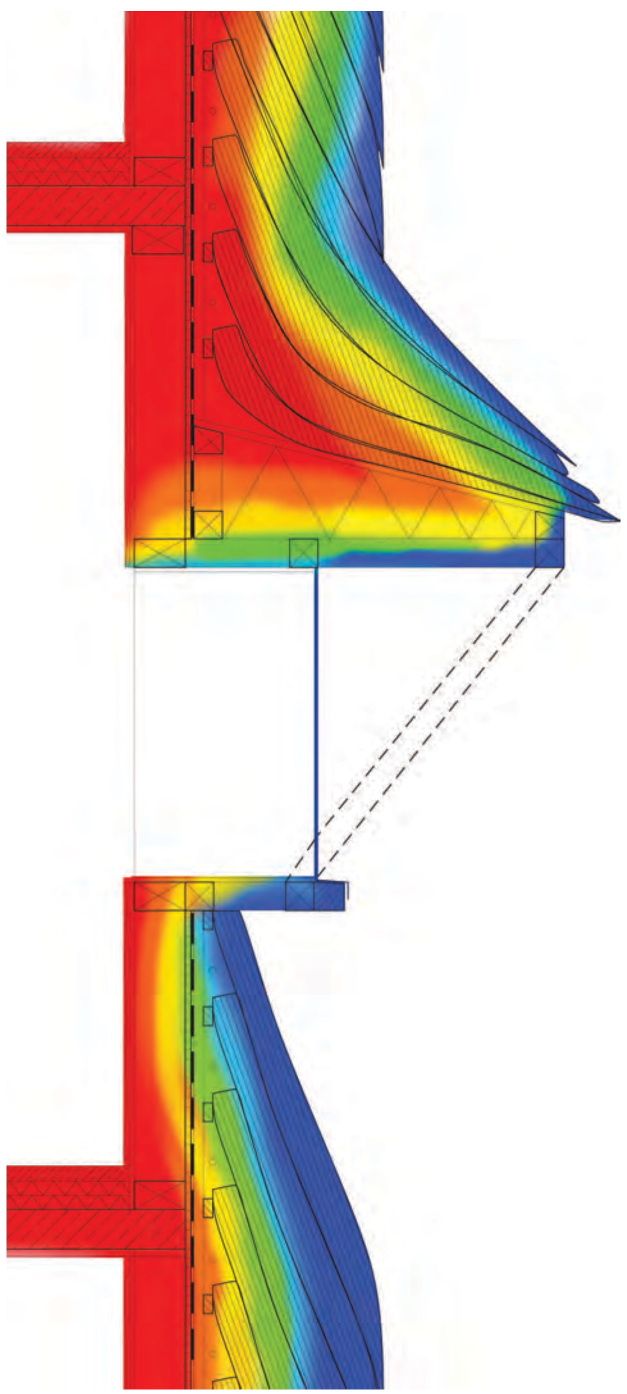
The thermal performance of the thatch

Thatch is an inherently high performing material, when applied with adequate thickness. The benefit of thatching the tower proposals is that there is little to limit the thickness of the external walls, as the buildings are not constrained laterally.

Water reed thatch has a thermal resistivity (r-value) of 11.1mK/W (and therefore an associated thermal conductivity of 0.09W/mK)

To achieve a u-value of 0.2 for thatching, 350mm of water reed is required. I intend to improve on the required performance levels as specified in the building regulations, and therefore am proposing a 450mm thickness. It is necessary also to increase the thickness of the thatch overall, particularly on the vertical wall elements, as the thickness of the thatch (and therefore the associated u value) is not uniform over the whole building, due to the way that the thatch is applied. This is shown in the section opposite.

Thatch when applied to a roof is considered a warm construction method, meaning that additional ventilation is not required in the buildup. Consequently when applied to a wall, the thatch can act as a jacket for the building, fully enclosing the structure in insulation, and allowing the concrete frame of the existing buildings to act as thermal mass for the internal spaces. The sketch section on the right shows how the thatch insulates the construction of the building.

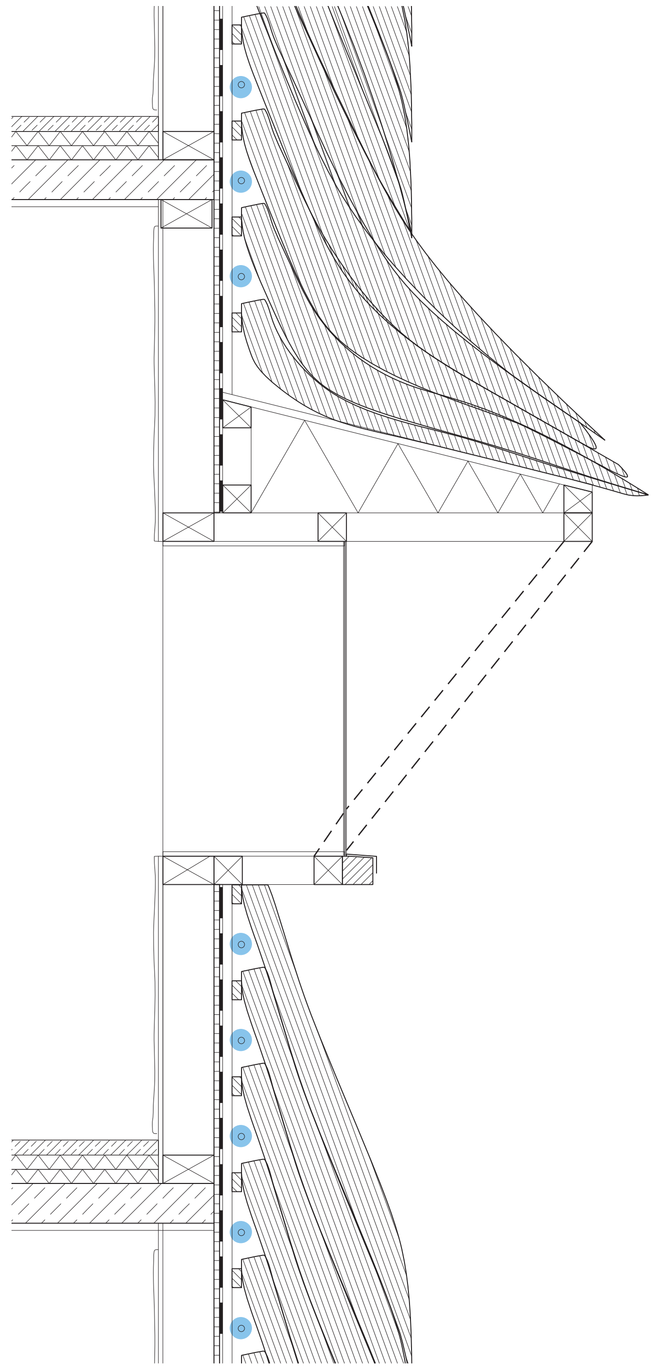


Protecting the thatch from fire

Thatched buildings are no more likely to catch fire, than any other building type, though the association of fire safety with thatch is inescapable, and the consequences of a thatched building on fire may be more problematic than the existing brick. The main causes of fire in thatched (residential) buildings are chimneys, which make up around 90% of fires. Electrical fires, caused by shorting and poorly fitted lighting can also cause fire within the thatch. For this reason, all electrical services and lighting will be kept a minimum of 1m away from the thatched walls. Another major cause of fires is lighting, and as the thatch is being applied to towers, a tall lighting rod, protruding from the roof of each tower will be installed.

The primary method of dealing with fire will be a sprinkler system in the void behind the thatch bundles, between the battens. The sprinklers will be fed from a rainwater collection tank pumped to the roof of the two existing towers. The tanks will be topped up with mains water during dry periods. The sprinklers are highlighted in blue on the right.

The interior will be protected by a firewall membrane, providing a 1 hour fire barrier, stapled to the rafters. The fire barrier also acts as a water resistant membrane. Mentioned in the strategic report is the proposal to build a mock-up of a wall to test how the thatch performs in a fire. This will be a useful tool to discuss the proposals with building control, and would contribute to the detailed design of the fire suppression systems, and wall buildup.



4 Removing the Thatch

Composting the Reeds

At the end of its useful life, the thatch will be removed from the building. By the time it is removed, it will come away from the structure easily, as wet thatch may have rotted to some degree, and dry thatch will likely have become dusty and brittle. It is removed from the building, and dropped to the ground where it is collected. A tarpaulin will need to be applied to parts of the sloped roofs on the lower floors of the new building, in order that the discarded thatch does not damage it.

The thatch will be removed to a level of around 100mm so as to avoid wasting the serviceable base layer of thatch that is unlikely to be damaged by water or fungi.

Having been removed, the thatch will be commercially composted. There is little value in applying compost to the reed beds, as they are fed nutrients by the effluent water from the towers.

New thatch will finally be reapplied using the facade maintenace system, using reeds grown and stored on site, by the trained thatchers from the thatching school.

A mixture of old and new discarded straw during the re-thatching process.
Photograph: James Kirk

Technical Conclusion

The main study of the life of the reed, from growing through use, maintenance, removal and composting was chosen as the technical study because the use of thatch on a modern, large scale building is unprecedented, and to lend a sense of reality to the project, it was important to show that it was technically possible to thatch a tower block. The project is fundamentally a technical problem, and without this associated technical report, the project would be lacking. I was pleased to discuss the project with the National Society of Master Thatchers, and feel that observing a thatcher at work was invaluable in helping me to understand the processes involved.

Though the technical problem of thatching 1960s tower blocks appears to be quite possible, there are a number of strategic and regulatory reasons why a project of this type may not be possible in the current political climate, and this is covered in the attached strategic report. The project was conceived from an interest in the relationship between the ephemeral and the robust in contemporary architecture, and my early studies into ephemeral, fragile materials helped me to understand how materials behave as they break down. This proved invaluable when designing the thatched towers. By understanding the unpredictability of a fragile material architecture, I am better placed to design using materials that decay, weather, and design an architecture that promotes these as qualities, rather than trying to fight them. As Juhani Pallasmaa identifies in his essay: *Hapticity and Time - Notes on Fragile Architecture*

> The inevitable processes of ageing, weathering and wear are not usually considered conscious and positive elements in design. Consequently our buildings have become vulnerable to the effect of time, the revenge of time.

By designing with time, weathering and decay in mind, buildings are better able to withstand and reflect these factors as they age.

The project is a reaction against the typical redevelopment of London's tower blocks, that is so often simply a recladding of the brick skin with plastic or terracotta panels. The proposals seek to bring a number of social benefits to the redevelopment, and re-establish a technical skill for some of Bermondsey's residents.

The project allowed me to develop an approach to the redevelopment of London's LCC blocks, and though I have chosen the Kipling estate as my canvas on which to apply this architecture, the project serves as a model that could be applied to any number of similar buildings across London. This is down to the construction methods that defined the era during which the LCC built much of its public housing, and it is my hope that in the future, considerable investment could be available to build and refurbish public housing, as happened in the 1950s and 1960s.

Though thatching is an extremely old construction method, it is also a complex and skilled craft, and despite the fact that I have come to understand some of the processes involved, I now recognise that it would require the input of a skilled master thatcher to be realised well.

Beyond the technical realisation of the architecture, I feel that the use of thatch as a construction material could lead to significant benefits to the occupiers of the buildings, and my proposals could act as a case study to analyse the health and wellbeing of the occupants and users. Evidenced-based design (EBD) is a field of research that is becoming increasingly used to influence the design process. EBD is a field of study that emphasizes the use of data and research to influence the design process, in order to improve an organisation or building user's performance, productivity or health. Currently EBD is used largely in healthcare architecture, to improve the performance of hospital buildings, but could start to be used to improve the quality of housing, and the wellbeing of those living in EBD designed buildings. A number of factors could contribute to the improved wellbeing of residents in the thatched tower block, including the potential to remove any materials that give off VOCs that contribute to sick building syndrome, improving the internal air quality, as well as the increased outdoor private amenity space. I would suggest that the proposal could be used as a case study for an evidence based architecture.

If I were to continue working on the project, I would be keen to test the performance of the thatch for a number of different factors. Firstly I think it would be essential to assess how the material works in fire, and how effective the sprinkler system within the wall build up would be at controlling the spread of flames. I would be keen to test the assumption that the densely packed thatch will smoulder slowly, and be controllable by the sprinkler system. Furthermore, I would like to test the environmental performance of the thatch, including how the orientation and age of the thatch affects its u-value, and how the construction method that I have proposed performance in an air tightness test; - the construction method does not attempt passivhaus type air tightness, but relies on a heavily insulated breathable skin to improve the air quality inside the buildings. This type of research would lend further reality to my proposals, and would likely influence the design proposals proposed in this report.

Overall, writing and researching these reports in conjunction with the developing design of my proposals has highlighted the difficulty with which a quality architecture can be realised in the real world. A fundamental change to the way in which we build and use our buildings would require a change of mindset for designers, builders, clients, users and politicians to achieve a fragile material architecture.

I think that there is a great deal more to research into a fragile architecture to be undertaken, and further research is certainly something I hope to take beyond my academic studies.

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