



Reform

James Burkhalter

Design Studio 4.2

Grade: 73 (1st)

Acknowledgements

My Tutors

Nigel Bedford

Architecture

Aoife Wiberg

Environmental

Tim Mander

Structures

Tim Osborn

Landscaping

John Griffiths

Tectonics

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An Introduction to Craft, Client and King's Cross

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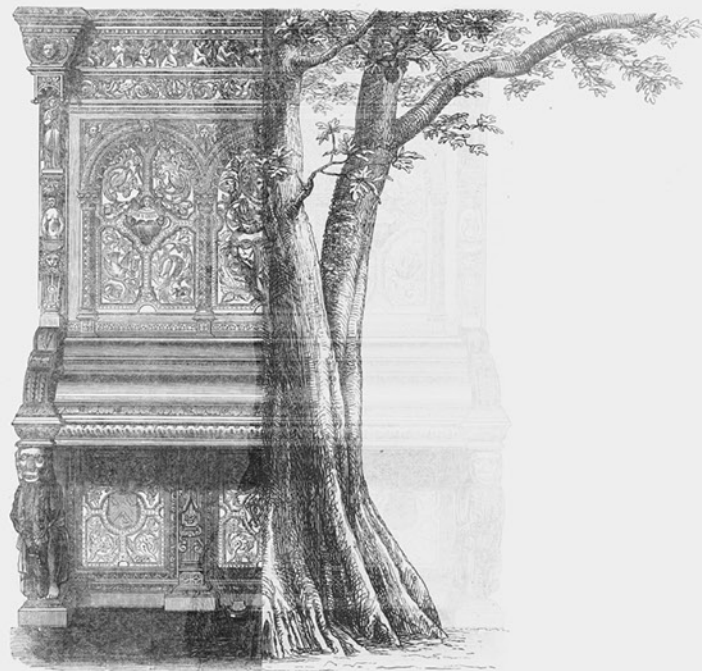
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Act 1
I met a traveller from an antique land
An Introduction to Craft, Client and King's Cross

Foreword

To Reform



Interpretations of Craft are burdened by definition, process and personal perspectives. It is a ‘word to start an argument with’ (p.20), as recognised by David Pye (1968) in *The Nature and Art of Workmanship*. Regardless, Pye’s contemporaries and academic “apprentices”¹ have perpetuated this debate, insecure to the undefinable act of (their own) making.

Craft mutates under observation; *intangible-tangible, process-product, man-machine*; there is a duality to it. To ‘distinguish’ between these states, such as in the case of man and machine, is ‘meaningless’ (Pye, 1968, p.24) — it purely isolates the state of a Craft, subjecting it to: prejudice, historicism and idealisation.

In summary Craft is practiced and tested (Adamson, 2018) through the *repetitive act (craftsmanship)* of making and *remaking* (i.e. to *re-form*), resulting in generations of both the *object (Craft)* and the *maker (craftsman or machine)*. Process *embodied* in *material* (form or surface) and *memory* (virtual or of the mind).

These remnants of making are ubiquitous to civilisations (Risatti, 2007). A primitive act of survival, the act is ‘not localised...[it] transcends [societal] boundaries’ (ibid., p.59). Yet, there is an *intangible cultural heritage* (UNESCO, 2003) of a place — a *genius loci* (Adamson, 2018) — a tacit knowledge of making, inherited through proximity and time.

James Burkhalter

Key Terms:

intangible-tangible, process-product, man-machine, repetitive, craftsmanship, remaking, re-form, object, Craft, maker, craftsman, machine, embodied, material, memory, intangible cultural heritage, genius loci

¹Pye (1968), Risatti (2007), Langlands (2017), Adamson (2018)

Decline

Reason and Rationale

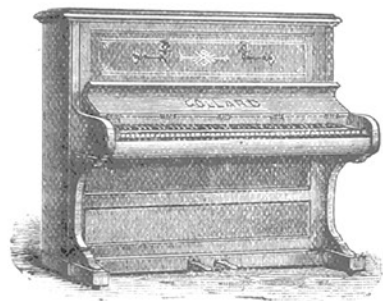


Figure 1.1

The reasons for a craft’s decline are vast and greatly depend on the discipline. To summarise, the following information has been derived from the *HCA*’s and other researcher’s work (Association, 2021a, unless otherwise indicated) and put into three categories:

Inheritance	Trade and Transport	Technology
• Craft and business education (qualification standards, course availability, cost and quality at all levels of academia) • Time — ageing professionals and mastery of a craft • ‘Loss of traditional methods of skills transmission; apprenticeships and intra-family’ • Repair and conservation over making • Perceived as simple peoples producing arbitrary goods (Adamson, 2018)	• Material shortages and increasing costs (of product and material) • Workshop and equipment availability (in cost and production) • Recruitment of apprentices (career paths, skills and earning potential) • Ephemerality and niche of a craft (demand and awareness) • Traditional trade is unsustainable (demand) (Adamson, 2018) • Divisive in cost — an upper-class only experience (Langlands, 2017)	• Congested digital markets (international competitions, lack of skilled work) • Mechanisation of Techniques (in process and materials) • Incompatible Craft-Technology e.g. in Architectural details (Pye, 1968) • Mass manufacturing of products (competitive pricing, ‘customer impatience’) • ‘Lack of [recorded] data’ on the craft • Inexperience with technology and luditism (Adamson, 2018)

Initially published in 2017, *The Red List of Endangered Crafts*, was created by the *Heritage Crafts Association (HCA)*; the first *UNESCO*-accredited *NGO* for *intangible cultural heritage* (Association, 2021a). Surveying the status of traditional crafts across the UK, the HCA monitors the viability of trade practices and promotes their sustainable preservation (Association, 2021b; see Carpenter, 2021).



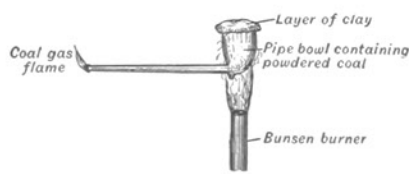
Instruments
Pianos (A Camden Craft)
CRITICALLY ENDANGERED
11 (+1)



Woodwork
Basketwork
CRITICALLY ENDANGERED
1 (+2)



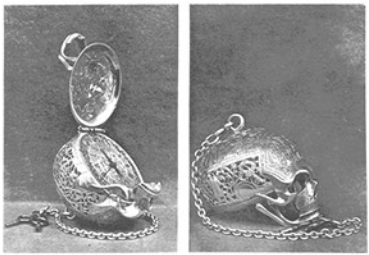
Tools and Equipment
Scissors
CRITICALLY ENDANGERED
10 (+5)



Ceramics
Clay Pipes
CRITICALLY ENDANGERED
3 (+1)



Sports Equipment
Cricket Bats
CRITICALLY ENDANGERED
20



Timepieces
Watchmaking
ENDANGERED
20 (+10)



Hunting
Arrow Smithing
ENDANGERED
5



Papercraft
Fore Edge Painting
CRITICALLY ENDANGERED
1



Metallurgy
Bell Founding
CRITICALLY ENDANGERED
24 (+5)



Instruments
Woodwind
ENDANGERED
50 (+5)



Textiles
Kilt Making
ENDANGERED
20(+25)



Metallurgy
Gold Beating
EXTING
0



Construction
Bricks
ENDANGERED
16 (+50)



Papercraft
Fore Edge Painting
CRITICALLY ENDANGERED
1



Sports Equipment
Cricket Balls
EXTINCT
0

Figure 1.2, A collection of British Library etchings

The Red List of Endangered Crafts

Many traditional British crafts are endangered or at risk of becoming extinct. Above are some examples, detailing the remaining **Practicing Craftsman** (and **Apprentices**)

I met a traveller from an antique land,
Who said—"Two vast and trunkless legs of stone
Stand in the desert. . . . Near them, on the sand,
Half sunk a shattered visage lies, whose frown,
And wrinkled lip, and sneer of cold command,
Tell that its sculptor well those passions read
Which yet survive, stamped on these lifeless things,
The hand that mocked them, and the heart that fed;
And on the pedestal, these words appear:
My name is Ozymandias, King of Kings;
Look on my Works, ye Mighty, and despair!
Nothing beside remains. Round the decay
Of that colossal Wreck, boundless and bare
The lone and level sands stretch far away."

Percy Shelley, *Ozymandias* (Shelley, 1977)

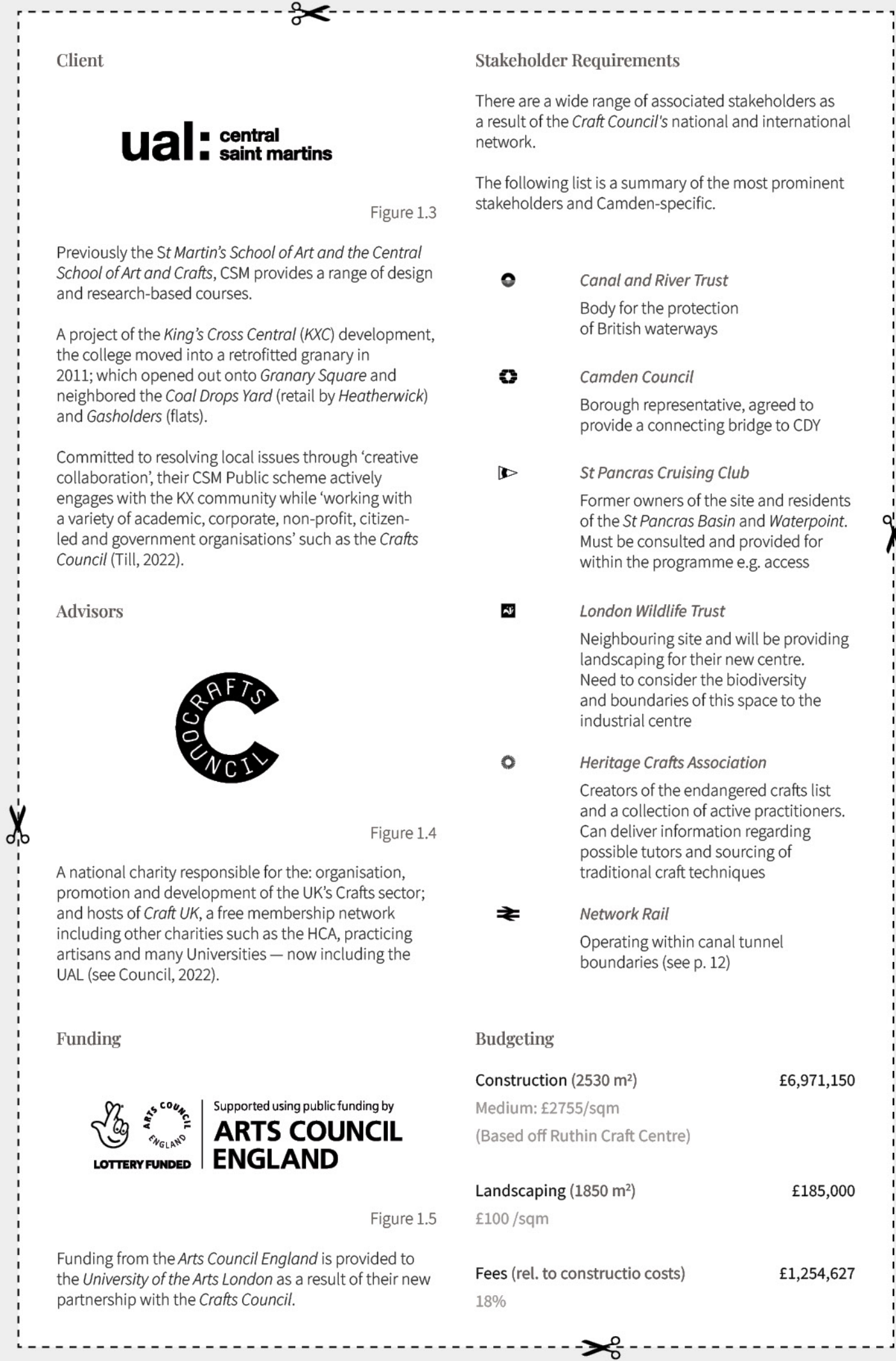
The Brief

Client, Cost and Stakeholder Summary

The following proposal has been put forward:

A *Research and Development Centre for the Preservation of Traditional Crafts (RDC-PTC)* as part of a course-led extension to the internationally renowned arts and crafts college of *Central St Martins (CSM)*, in collaboration between the *University of the Arts London (UAL)* and the *Crafts Council (CC)* as advisors.

As part of the project, the architectural intent is expected to reflect the syllabus and even to *Reform* it; to be read as a palimpsest of craft and education, tightly interwoven from and into the *genus loci* of the site, as if it were tapestry. Examples include the site's Grade II listed Waterpoint and Lock Cottage and even CSM's own Granary Square.

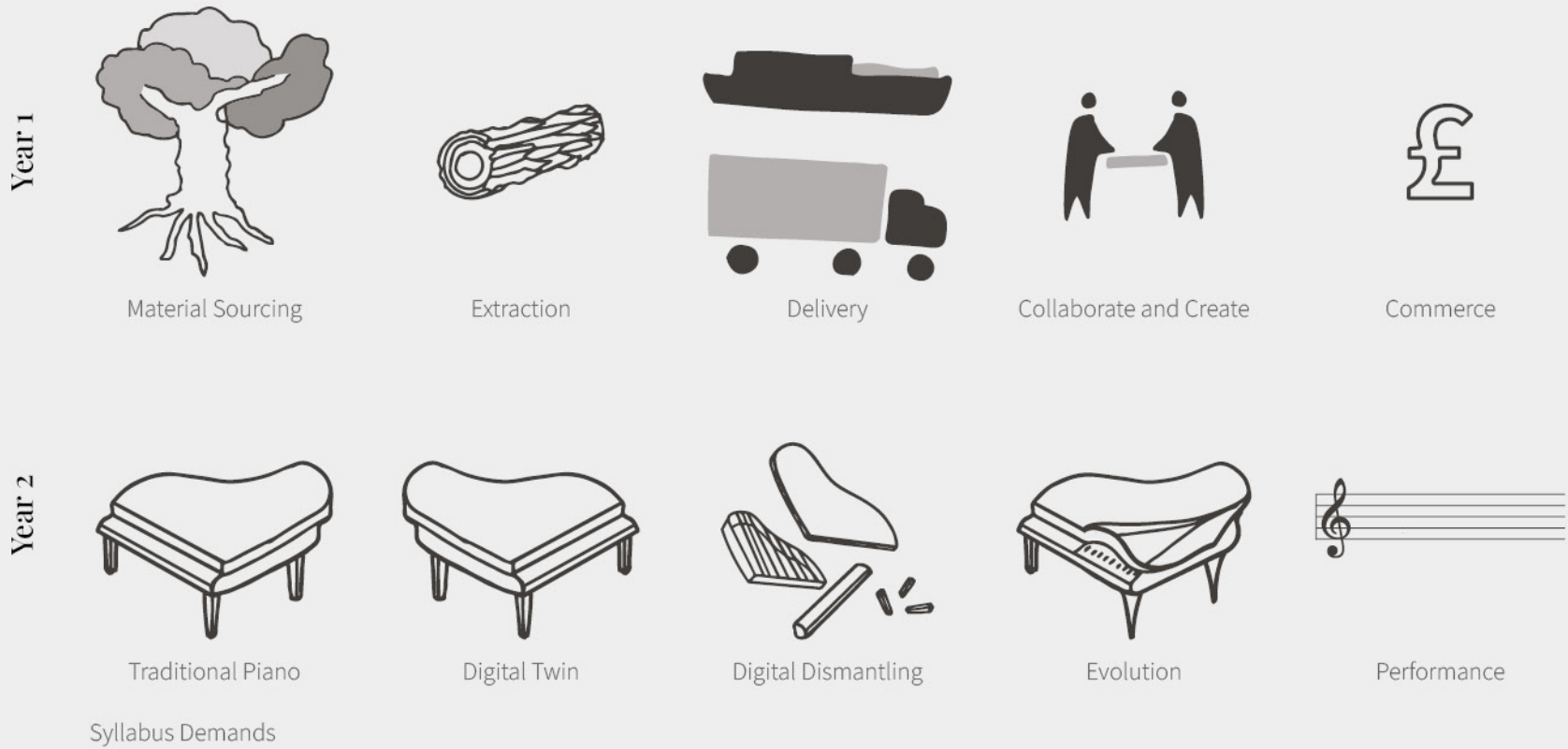


The Course

From Syllabus to Space

Developed from the client's *MA Regenerative Design* course (Martins, 2022), the *Research and Development Centre for the Preservation of Traditional Crafts (RDC-PTC)* comprises of an extension to the *Central St Martins* school focusing on a localised, highly collaborative and multi-disciplinary programme.

At the start of the course, each student is placed into a group of eight that is assigned to one of four permanent tutor that will advise them across the two year course.



Year 1

Unit 1 (6 months)

Place-based Action Research

Field research of the current state of the chosen Camden craft and the process, parts and techniques required to make it. In parallel, students will be undertaking four modules, each from these tutors specialised in their respective crafts of: woodworking, metallurgy, ceramics/polymers and textiles. These disciplines are combined into a final product prototype chosen by the student.

Unit 2 (2 + 4 months)

Permaculture Principles

A. Learning about the commerce of craft, students are expected to learn on how to advertise and sell their product, with the expectation that their work is exhibited within their tutor's retail gallery spaces at the end of a 2-month period.

B. Each group will then start preparing for the second year of the course (Units 3 and 4) by developing what they have learnt in Unit 1 by: modelling functioning parts of the piano at 1:1 scale, assigning group members to these parts, assessing the time required, and the quality control processes. Collaboration and learning with second year students and visiting specialists are expected and forms part of this transition to second year.

Year 2

Unit 3 (9 months)

Crafting the Piano

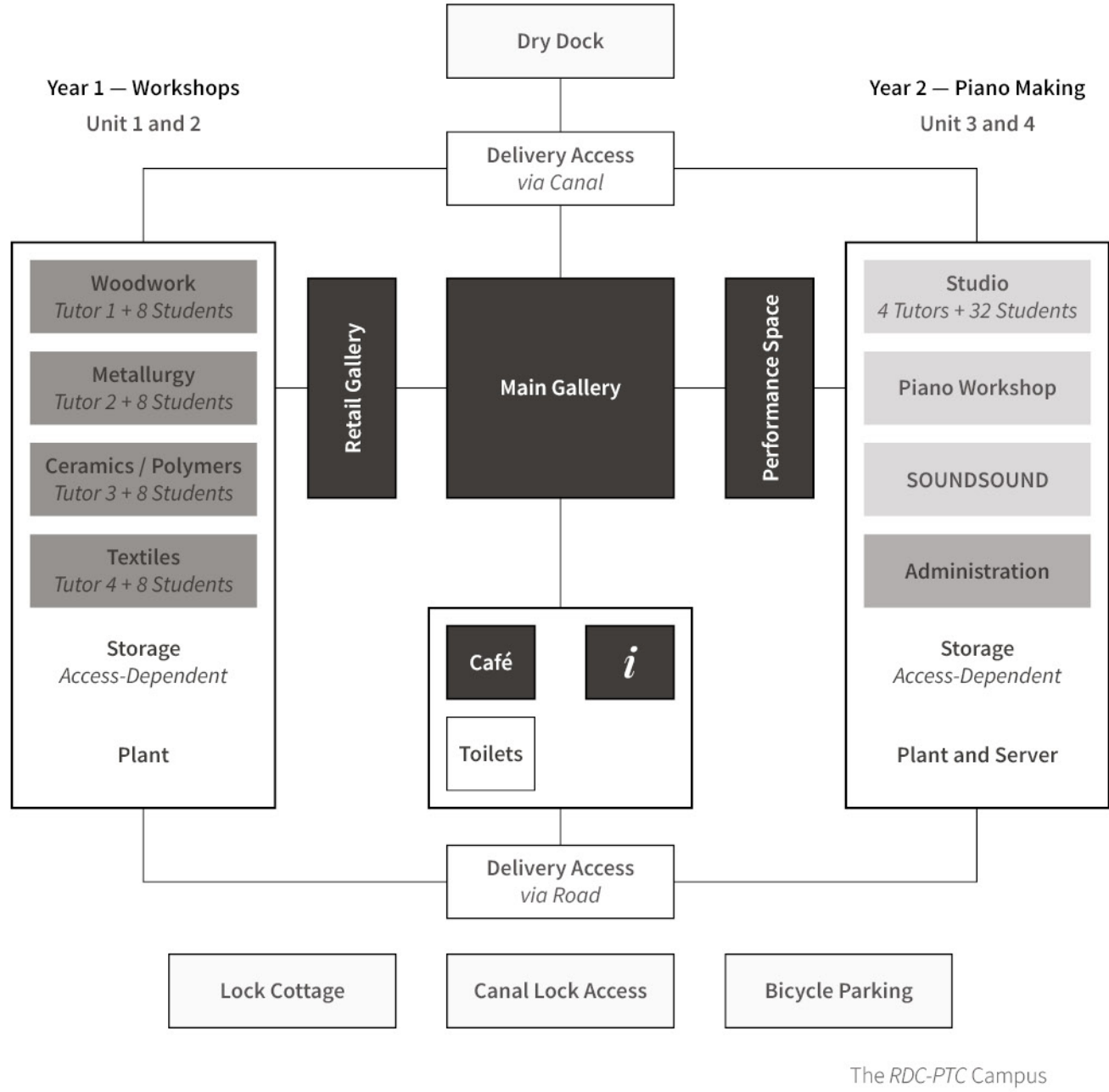
An intensive module that sees each group create a functioning 1:1 piano, following what they have studied and prepared in year 1 (Units 1 and 2). They will continue with their previous tutors as hands-on guides but will be aided by visiting specialists and first year students at key points, such as: stringing, making the action and tuning. Each drawing, manufacturing stage and constructed element will be digitally recorded (e.g. photogrammetry, diaries and photographs) so that in preparation for Unit 4, a digital twin is formed.

Unit 4 (3 months)

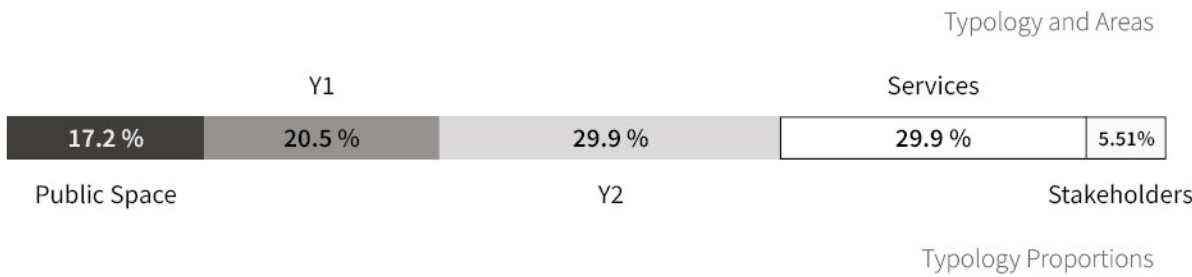
Reform and Regenerative Futures

The archive preserves the piano making process, the hand of the craftsman is logged dimensionally, their memory captured. From the pressure of a pen stroke or grain and of chosen wood to the prose of the maker's logs, the embodiment of craft extends its life. At the end of the course, students will take this digital copy and create an evolved form, that continues to generate variations of functionable models that can be played within a virtual environment. These will be celebrated alongside the other piano at an end of course show. Real and virtual mirrored against each other.

Initial Occupancy		*shared between years	
User	Year 1	Year 2	
Tutors		8*	
Visting Tutors	16	16	
Students	32	32	
General Public	> 20,000 per day		
SPCC Residents	120 (60 moorings, 2 people per boat)		



Category	Area sqm (A1–A5 tkgCO2e)	Category	Area sqm (A1–A5 tkgCO2e)
Public Space	437.5 (131.25)	Services	682 (204.6)
Information Point	12.5	Circulation	~250
Small Café and Kitchen	105	Toilets	24
Main Gallery	200	Plant	>150
Retail Gallery	90 (+250 ext.)	Digital Archive (Server)	7.5
Performance Space	30	Delivery Access (via Canal)	200
		Delivery Access (via Road)	50
Y1/ Tutor Workshops	520 (182)	Administration	
Timber*	130	Offices	(see TW)
Metallurgy*	130		
Ceramics and Polymers*	130	Stakeholder Requirements	140 (TBC)
Textiles*	130	Lock Cottage Retrofit	~100
		Canal Lock Access	TBC
Y2/ Piano Making	760 (228)	Bicycle Parking	40
Studio	320	Canal Bridge	TBC
Piano Workshops	320		
Tuning Rooms	120		
* Includes Makers Yard and Storage			
Total (not incl. stakeholders)	2400 (746)		
A1–A5 Total (kgCO2e/m²)	310		
B1–C4 Total (kgCO2e/m²)	~200		



The R&D Program

A Flexible Campus

Piano making is the foci of the centre as it's the most resource-intensive, space-specific and space-intensive practice, and so the building programme should reflect this. However, there will be alternative modules and course alterations over the building's design life — which aims to rival the site's neighbours through the act of *Reform*. Overall, lending the design to flexible units within a typical campus-course arrangement.

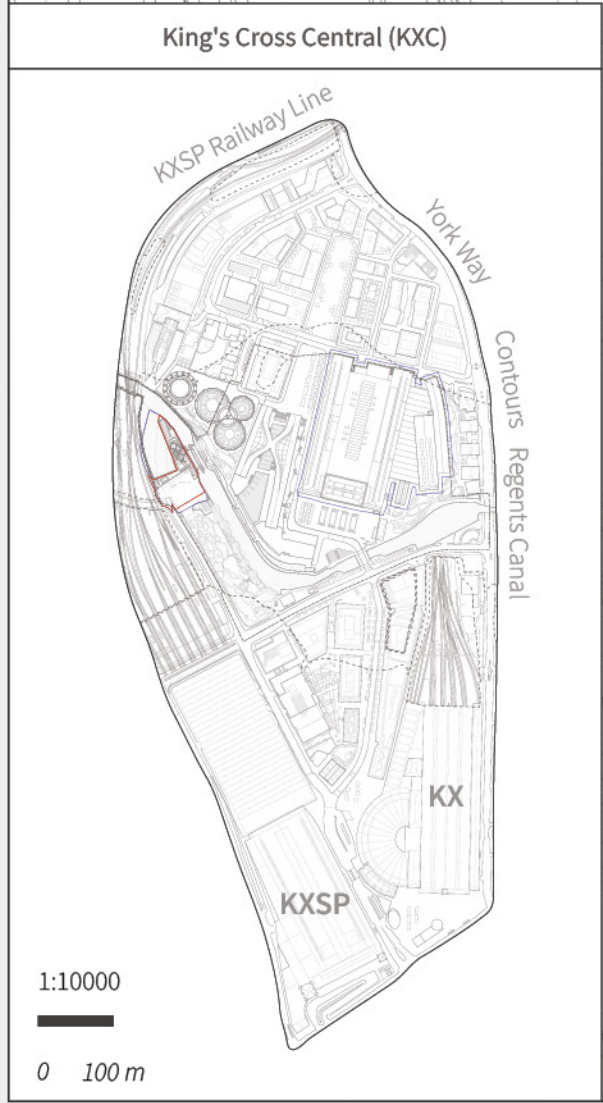
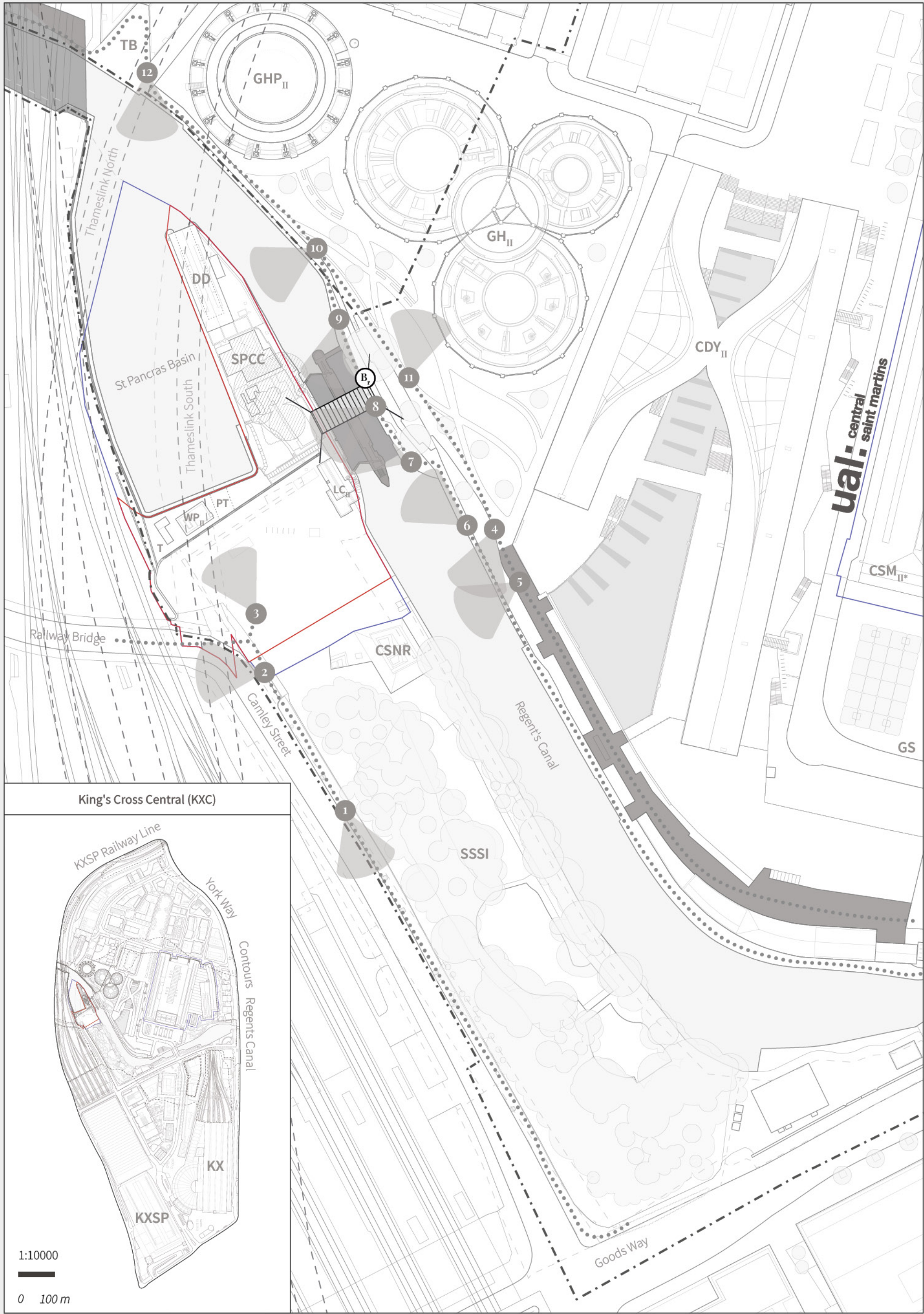
Setting Early Sustainability Targets

LETI 2030 Design Target A1–A5 (kgCO2e/m²)			
Class	Office (Y1 TW)	Education (Y2)	Retail (Public)
A++	100	100	100
A+	225	200	200
A	350	300	300
B	475	400	425

RIBA 2030 Design Target A1–A5, B1–B5, C1–C4 (kgCO2e/m²)			
Class	Office (Y1 TW)	Education (Y2)	Retail (Public)
A++	150	125	125
A+	345	260	250
A	530	400	380
B	750	540	535

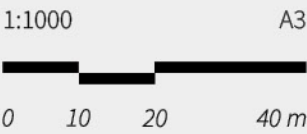
Tables A and B

Based on the LETI and overall RIBA targets and example projects, each area is given a carbon limit to work to (LETI, 2020).



The Island of King's Cross

Bounded by railway, road and the Regent's Canal — King's Cross is overlooked by the peninsula comprising of Camley Street Nature Resere, Waterpoint, Dry Dock and a disused Clubhouse.



View 1 — Camley Street South

Camley Street south forms immediate access to the north of KX via the underpass by motor vehicle. However for the pedestrian it is merely a tertiary street to York Way, with minimal footfall — except to the fairly inconspicuous CSNR.



View 2 — South-East Underpass

Plated steel warren trusses span between pillars of stone-capped brick to create an underpass below the railway line, providing access beyond KX island to south-west Camden. The frequent trains of KX St Pancras pass beneath OHLE suspended between similarly plated trusses.



View 3 — Entrance to St Pancras Basin

Provides security in the form of cameras, controlled gates, etc. to boats moored in the canal basin. There are sometimes limited access on guided tour open-days to the WP.



View 4 — Regent's Canal Towpath South

Vegetation spills into the Regent's Canal, contrasting against the hard landscaping of the towpath that still moores many canal boats along it.



View 5 — CSNR from Coal Drops Yard

Pyramid roof with 'hopper' skylights, inspired by the site's former coal drops (Architecture, 2017). The same inspiration is used in the project, see pages 56 and 120 for more info.



View 6 — Ascent to St Pancras Lock

The contrast in scale is immediate noticeable looking up towards Lock no. 4. New industry dwarfs the old at King's Cross and Camley Street.



View 7 — Lock Cottage and Lock no. 4

Distant high-rise apartments stand out against the 1–3 storeys of the site and notably the lock's lower levels.



View 8 — SPCC Access to WP and Planting

Steep ramped access from car park to lock. Lack of disabled provisions to WP from this point.



View 9 — Private Lock and Basin Access

An existing and secure footbridge. A canal boat stops at this point then descends through the lock.



View 10 — Former Club House and DD

Canal boats frequently passed through, mooring along the site's edge or using Lock no.4.



View 11 — GH, GH Park and TB

Similar to the WP, the Gasholders have been implanted to the site and repainted, their structure forming a soulless non-structural skeleton.



View 12 — St Pancras Basin and Dry Dock

The WP dwarfs the DD, and even the wall from this point — perspective makes the chimney appear as if it's reaching to the height of context behind.

Label	Name
TB	Tapestry Building
GH[P] _{II}	Gasholders [Park]
DD	(St Pancras) Dry Dock
SPCC	St Pancras Cruising Club
PT	Plimsoll Tunnel
WP _{II}	St Pancras Waterpoint
T	Waterpoint Toilet
LC _{II}	Lock (Keeper's) Cottage
CDY _{II}	Coal Drops Yard
CSM _{II}	Central St Martins
CSNR	Camley Street Nature Reserve
GS	Granary Square
KX	King's Cross
KXSP	KX St Pancras

Listed Buildings^{Grade}

Key	Information
• • •	Walking Path and Viewpoints
—	Site Ownership Boundary
3800	Site Area (sqm)
—	Client-Owned Land
---	Land Ownership Boundaries
---	Regents Canal Area Contours (KXC)
---	Regent's Canal Conservation Area (RCCA)
■	Positive Buildings
SSSI	Site of Special Scientific Interest (SSSI)
---	Thameslink Tunnels
///	Demolished Buildings / Planting

Site Walkthrough
An Initial Promenade

I visited the site on many occasions, each time developing a greater understanding of its opportunities and constraints. Notably, the same feeling welcomed me during each of my visits — isolation.

A tall, 6 metre high wall of weathered bricks of various shades, painted edges and climbing plants continues from the railway station to the basin and beyond.

The Waterpoint, peaking beyond the ruined wall, stands as this statuesque monument to the railway industry; and somehow you can tell that it has been moved there. It does not yet belong to the site.

In *Reforming* the site, I am aiming to restore it and so enhance the fundamental character by blending together the vast layers of historical textures of typology, topology and topography.

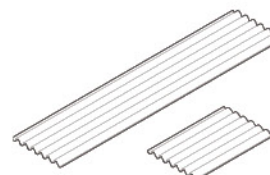
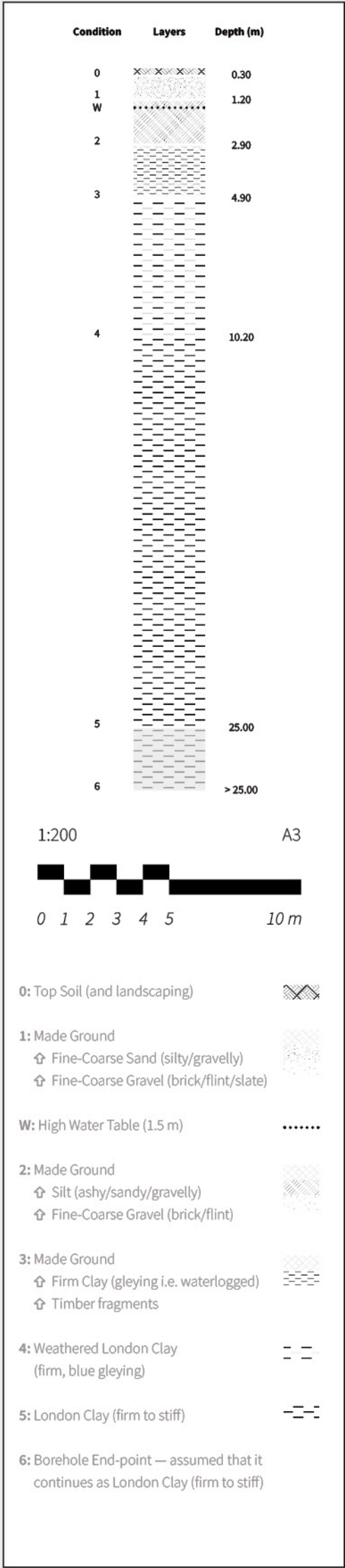
Proposed Canal Bridge

A new canal bridge has been proposed by the author to connect the island and peninsula together, providing access by both RDC-PTC students and the general public on foot and by bike. Due to the complexity of this element, it is considered a separate workstream to the main project and so will only be mentioned or indicated where needed in the report.

The Dry Dock

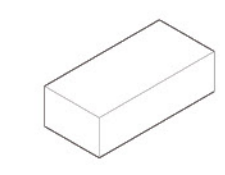
Feasibility Study

As the Dry Dock's management is going to be in partnership with the SPCC, a feasibility study was undertaken regarding possible expansions of the site for the greater handling of construction and workshop materials. To briefly conclude, for the purpose of sustainability, the existing Dry Dock would be used for a trial period during the RDC-PTC construction, and if required, later retrofitted or replaced.



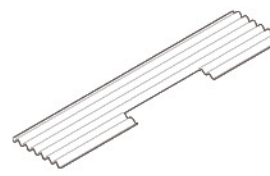
Corrugated Sheets

Mat.: Steel (Powder Coated)
Dim.: (4000/1400) x 900 x 75 mm
Volume: 0.03 / 0.01 m³
Total Quantity: 64 / 14
Source: BIM, Images



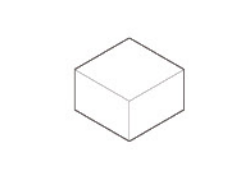
Brick

Mat.: London Stock
Dim.: 215 x 102.5 x 65 mm
Volume: 0.0014 m³
Total Quantity: 1025
Source: BIM



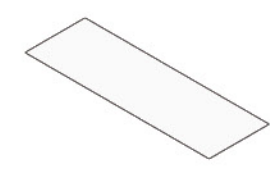
Corrugated S. (NS)

Mat.: Steel (Powder Coated)
Dim.: 4000x 900 x 75 mm
Volume: 0.026 m³
Total Quantity: 16
Source: BIM, Images



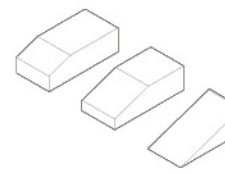
Brick (Half Bat)

Mat.: London Stock
Dim.: 102.5 x 102.5 x 65 mm
Volume: 0.00068 m³
Total Quantity: 97
Source: BIM, Images



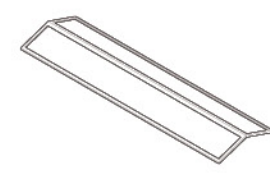
Roof Window

Mat.: Extruded Translucent PVC
Dim.: 4300 x 1400 x 6 mm
Volume: 0.036 m³
Total Quantity: 8
Source: BIM



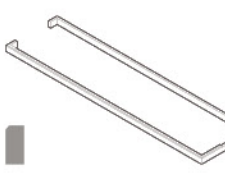
Brick (NS)

Mat.: London Stock
Dim.: N/A mm
Volume: 0.067 m³ (Total)
Total Quantity: 97
Source: BIM



Eave Finishes

Mat.: Steel (Powder Coated)
Dim.: N/A
Volume: 2 m³
Total Quantity: 1
Source: BIM, Images



Plinth

Mat.: Concrete
Dim.: 28200 x 7400 x 1300 mm
Volume: 18 m³
Total Quantity: 1
Source: BIM



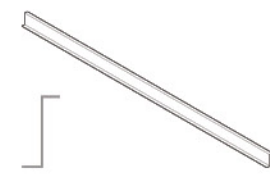
Portal Frame

Mat.: Steel (Intumescent)
Dim.: 7200 x 220 x 3350 mm
Volume: 0.25 m³
Total Quantity: 7
Source: BIM



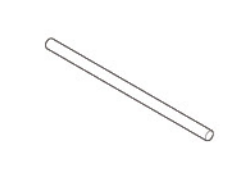
Balustrade (Stands)

Mat.: Steel (Tubular)
Dim.: 1100 x 75 x 75 mm
Volume: 0.0005 m³
Total Quantity: 39
Source: BIM, Images



S-Shaped Purlins

Mat.: Steel (Intumescent)
Dim.: 4600 x 190 x 100 mm
Volume: 0.0065 m³
Total Quantity: 24
Source: BIM



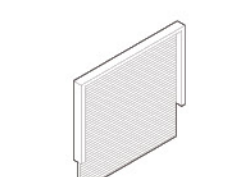
Balustrade(Rail)

Mat.: Steel (Tubular)
Dim.: 13600 x 75 x 75 mm
Volume: 0.025 m³
Total Quantity: N/A
Source: BIM, Images



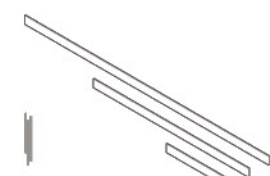
Ridge Purlins

Mat.: Steel (Intumescent)
Dim.: 4600 x 200 x 95 mm
Volume: 0.0067 m³
Total Quantity: 6
Source: BIM



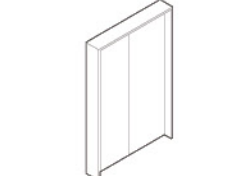
'Garage' Door

Mat.: Steel
Dim.: ~ 4900 x 3500 (Opening)
Volume: N/A m³
Total Quantity: 1
Source: BIM



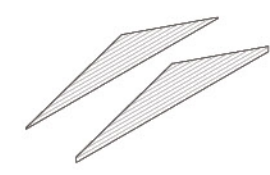
Shiplap Boards

Mat.: Timber (Preserved/Paint)
Dim.: (4600/2900/1170) x 140 x 18 mm
Volume: 0.012/0.0073/0.0029 m³
Total Quantity: 180 / 28 / 30
Source: BIM, Images



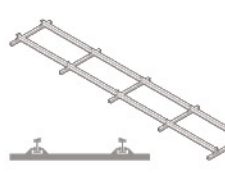
Doors

Mat.: Timber (Preserved/Paint)
Dim.: 2000 x 690 x 25 mm (per door)
Volume: 0.034 m³
Total Quantity: 2
Source: BIM, Images



Shiplap Boards

Mat.: Timber (Preserved/Paint)
Dim.: N/A
Volume: 0.18 m³ (Total)
Total Quantity: 19
Source: BIM



Overhead Gantry

Mat.: Mixed
Dim.: N/A
Volume: N/A
Total Quantity: 1
Source: BIM

- 1 Dry Dock

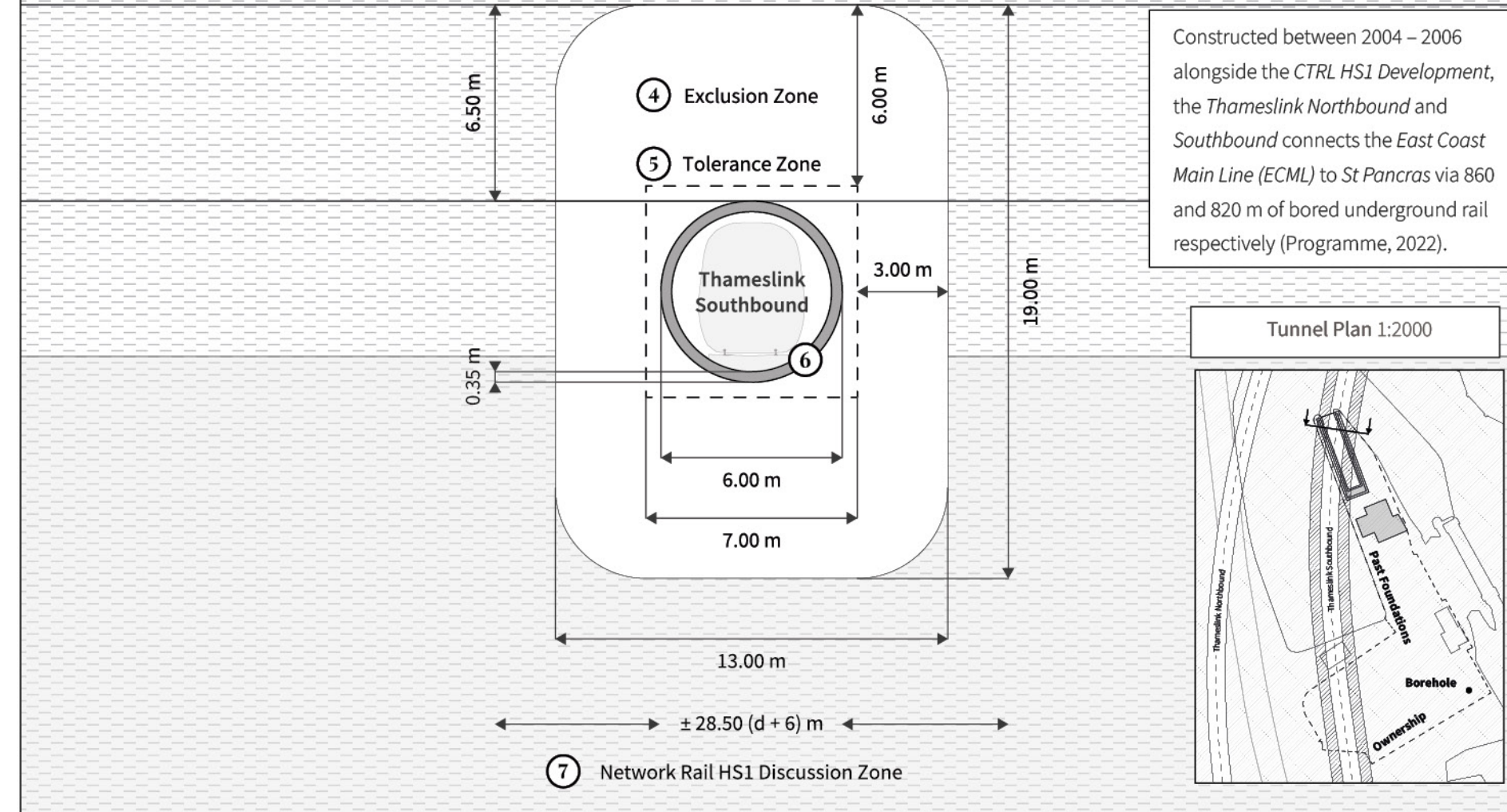
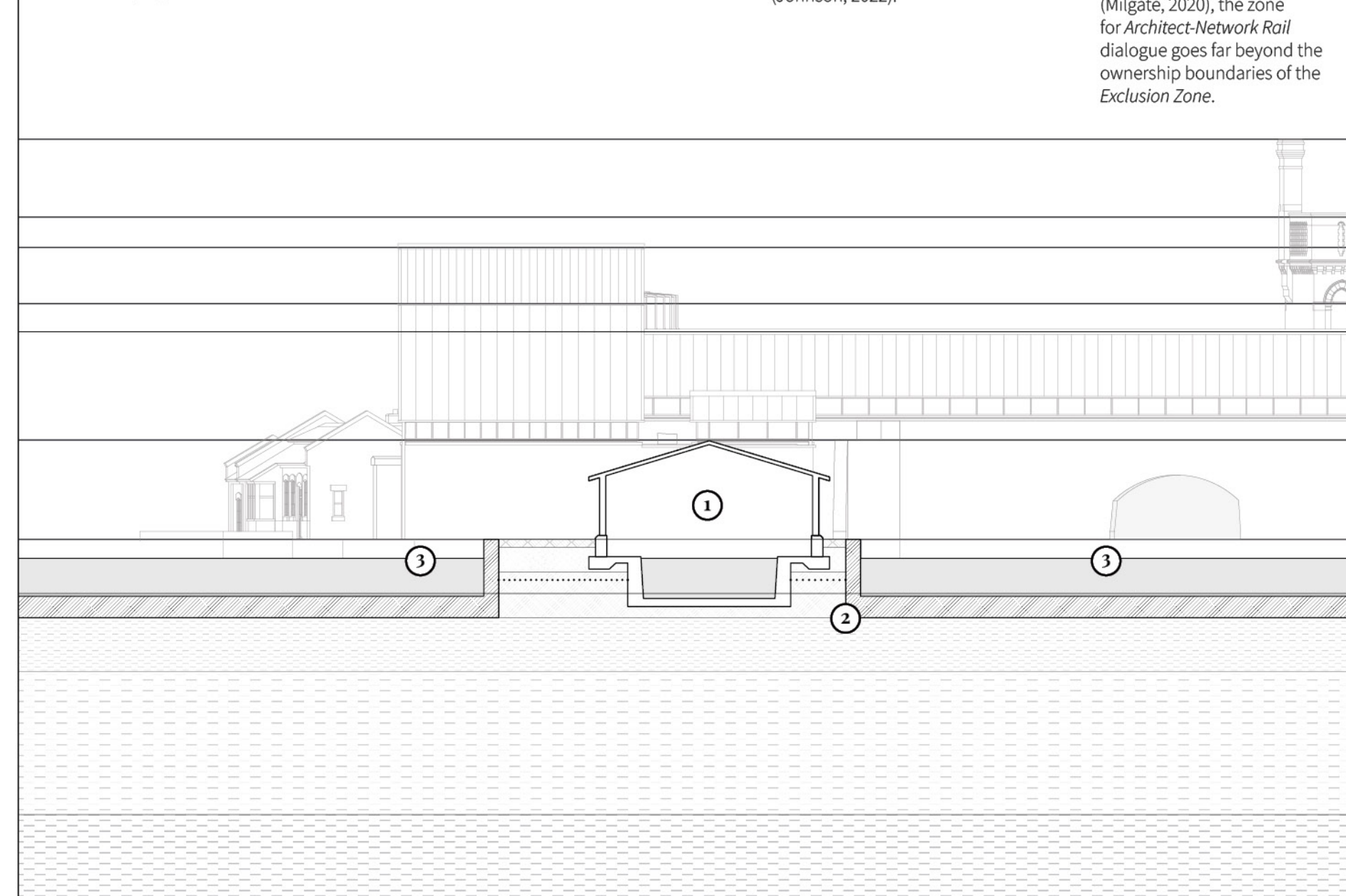
2 Retaining Wall

3 Regent's Canal / Basin

4 Exclusion Zone
- 5 Tolerance Zone

6 Thameslink Southbound

7 Network Rail HS1 Zone



500 – 600 kg, 20 Degrees Celsius, 45–60% RH



Act 2

Tell that its sculptor well those passions read

Historicism, a Piano's Home and the Maker's Hand

Lost Works

Locating Former Factories

Piano manufacturing migrated along *Tottenham Court Road* from *Soho* and the *West End* to the *London Borough of Camden* (Oliver, 1975). Settling throughout the wards of *Bloomsbury* and *Fitzrovia* by the mid-19th Century before being 'drawn North' (ibid.; Hayes, 2012) towards *Camden Town* and *Kentish Town*.

Camden's British furniture industry had already established trade routes for material supplies and the transport of bulky products in the North of the Borough; operating along *Regent's Canal* (see p.55) from the East and centering to the railway infrastructure of *St Pancras*, *King's Cross*, and smaller stations (Ball and Sunderland, 2001; Hayes, 2012; Kent, 2015).

Forming distinct 'enclaves' within the Borough, nearly every street of Camden Town had a factory (Hayes, 2012), as if mirroring the '[now] substantial suburban Churches' that they furnished for; both provided prominent building typologies and leisure for the mid-to-upper classes of *Fitzrovia* and *Bloomsbury* (Ball and Sunderland, 2001, p.163).



The Piano Factories

Today, the firms listed and over a hundred more *Camden* piano-makers no longer exist. *Cavendish Pianos* in *Yorkshire* are the last remaining practitioners.

5. Steward & Lamberd
St Paul's Road,
Camden Town

6. Rich Schaw & Co.
138 Camden Road,
Camden Town

7. Burling & Burling
Ferdinand Place,
Camden Town

8. Chappell & Co.
10a Belmont Street,
Camden Town

9. J & J Hopkinson
Fitzroy Road,
Regents Park

11. Joseph Shaw
9a Georgiana Street,
Camden Town



12. Square & Longson
Arlington Road,
Camden Town

13. Heckscher & Co
Ferdinand Place,
Camden Town

14. William Squire
Bayham Place,
Camden Town

15. Monk & Schuppsier
Greenland Place,
King's Street

16. Sandon & Steedman
54 Queen Street,
Camden Town

17. F. H. Saffell
288 York Way,
Kings Cross



1. T.G. Payne
28-34, Fortress Road,
Kentish Town

2. Arthur Allison & Co.
Apollo Works, Leighton Road,
Kentish Town

3. S. Weston & Co.
73 Malden Road,
Kentish Town

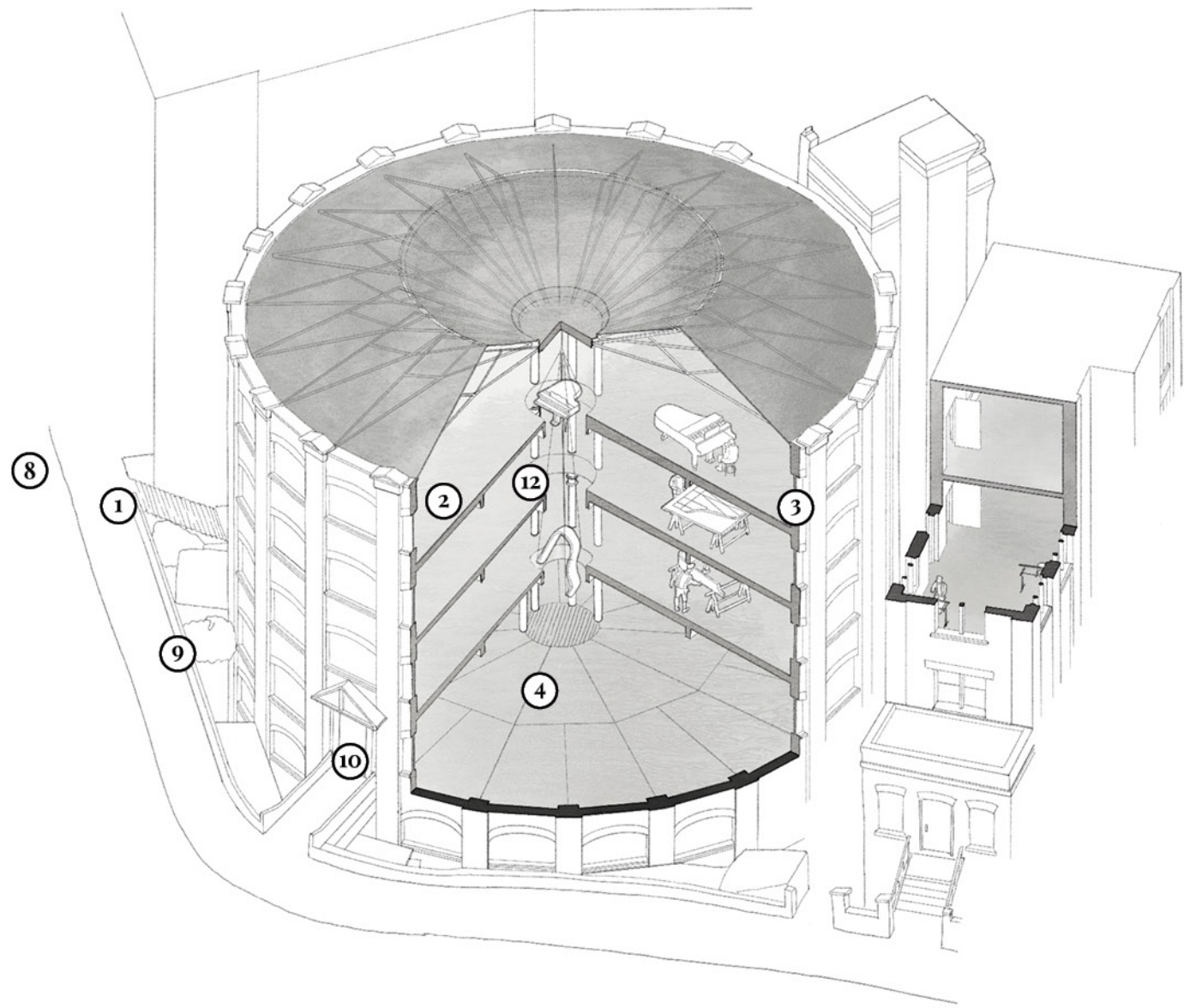


A Unique Typology

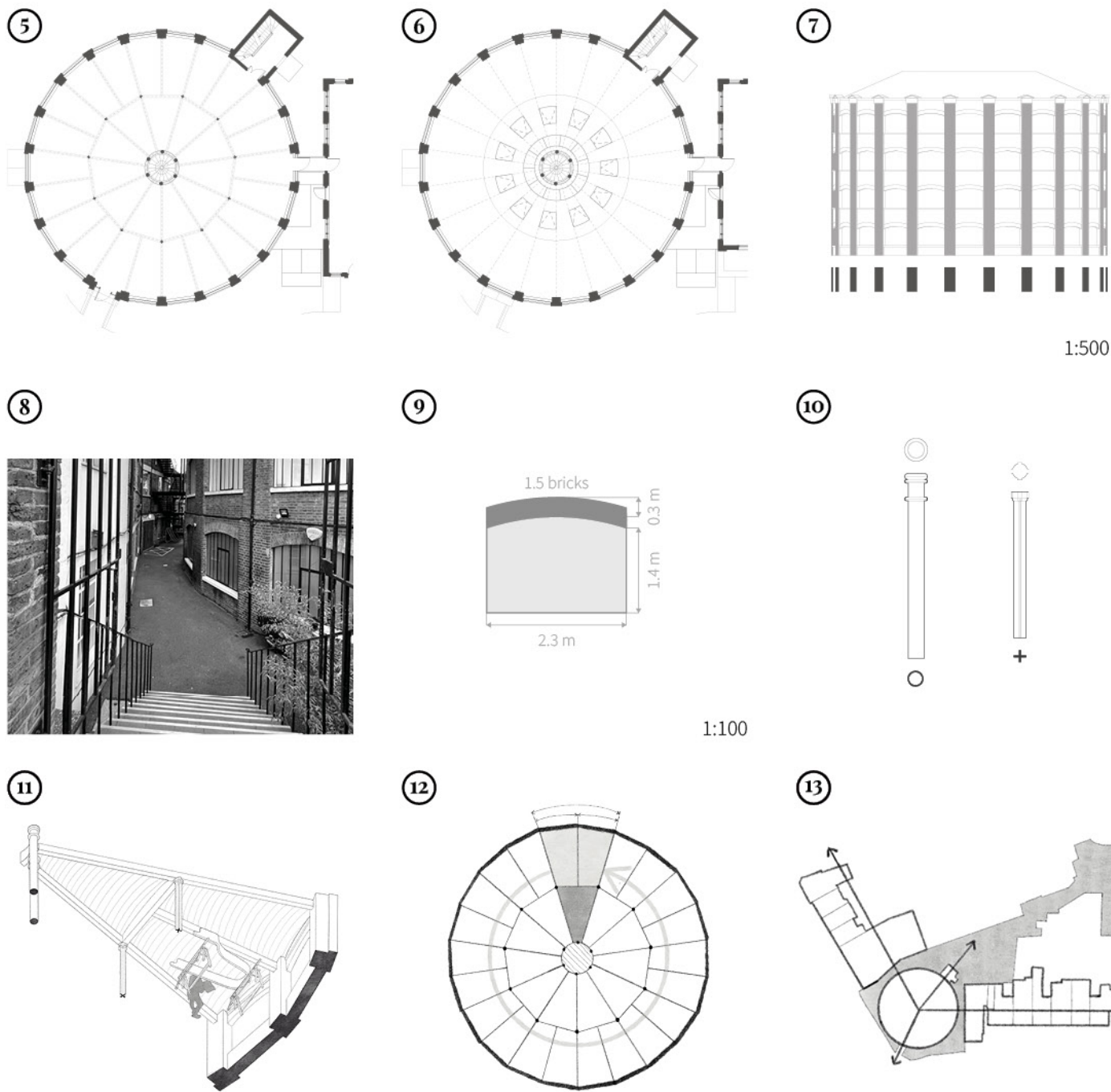
Collard & Collard

An analysis of the former pianoforte manufactory, now known as *The Rotunda*.

- Level Change**
The factory continues below the road level, expanding out into the mew and the import/export access to the North.
- Material in Motion**
Corresponding to its assembly, piano materials move upwards while the completed piano is moved down from the top floor via a central oculus (Ø 2.4 m)
- Spatial Organisation**
The Rotunda and adjoining block are separated, with a bridge connecting the two. Effectively dividing craftsmanship and admin / design respectively.
- Ground Floor**
- Floors 1 – 2**
- Top Floor**
- Panoramic Rhythm**
Each segment shares equal prominence up to the entrance which changes to a triangular (non-segmented) opening. The panoramic buttressed walls emphasise the building's verticality and structure as you orbit it.
- Navigating the Mew**
The condition of circular-to-rectilinear forms create a diverse urban response where you can go below the street, under/over bridges and through the mew cluster.
- Wide Segmented Arches**
London Yellow stock brick. Designed to flood the workshops with natural light.
- Expressed Hybrid Details**
Steel Columns (two-forms shown)
Timber Beams
Load-bearing Masonry (vaults, buttresses, arches)
- Vaulted Ceilings**
Improved internal heights.
- Structure-Use**
Production is also sequenced radially in the structural layout.
- Corner Condition**
A pivot that connects the adjoining linear streets.



The Rotunda, Camden. Formerly Collard & Collard, now Max Fordham Engineers. Illustration by Author



Parts-whole — Elements of the piano factory, aka. the "Churches" of Camden (Hayes, 2012)

"In this instrument," says Thalberg, “the object is to convey from the point where the finger acts upon the string, all the delicacy of action of the finger, so that the piano may participate to a certain extent in the sensibility of touch which is observable in the harp, and which is in consequence of the finger acting immediately on the string, in that instrument without the intervention of any other mechanism.

The power of the piano depending on the quantity of matter brought into vibration; the resonance or the perfection of that vibration depending on the correct proportion of its parts; and the accuracy of intonation depending on the nature of the bridging, the proportions of the strings, and their arrangement with regard to the blow of the hammer which are all most admirable; while the action of depending on the peculiar — mechanism employed far surpasses everything else of the kind, for it enables the player to communicate to the strings all that the finest-formed and most skilful hand can express; and becomes as it were apart of himself, reflecting every shade of his feelings, from the most powerful to the softest and most delicate sounds.

This action is indeed so perfect, particularly in its power of delicate repetition, that if any note is missed in execution it is the fault of the player and not of the instrument.”

Thalberg quoted by Joseph Hatton (1891)



4. J. Brinsmead & Sons
Imperial / Brinsmead Works,
Kentish Town



Typology: Residential (Premium flats)
Building/Mew: 400/>7000 sqm
GIA: 1800 sqm

Initially ‘draw[ing] from the vast substratum of carpentering skills’ (Samuel, 1977, p.89), *Camden’s* piano works were made up of *Mews* or *Clusters* of different artisans and their apprentices, their ‘specialist [workshops]’ each contributing to the ‘assembly-line’ of the Piano (Ball and Sunderland, 2001, p.164; Kent, 2015, p.95).

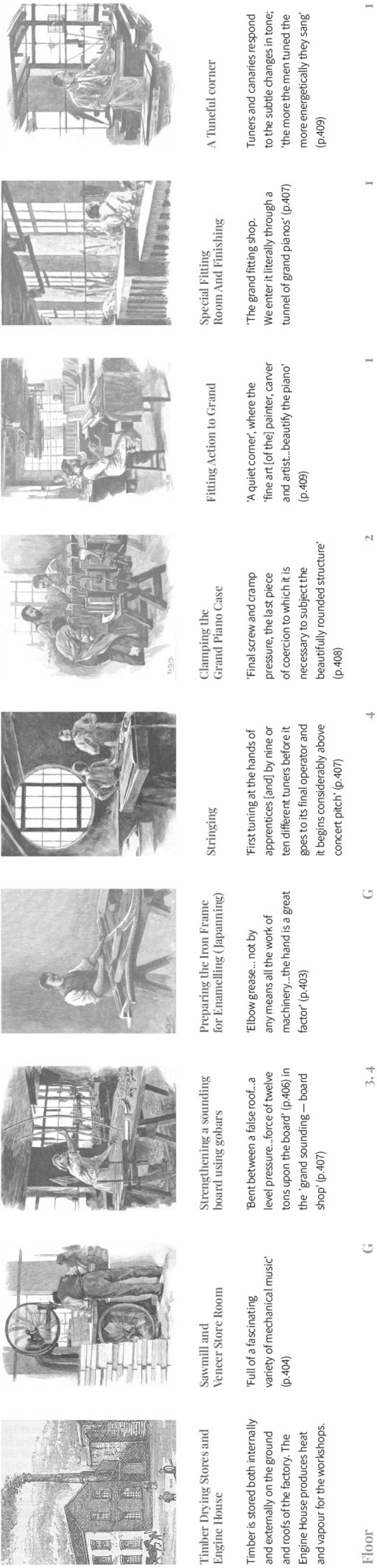


Figure 2.2, How Pianos are Made

How Pianos [were] Made John Brinsmead & Sons

Beautifully narrated by Joseph Hatton (1891), *How Pianos are Made*, guides us through the *Brinsmead Works of John Brinsmead & Sons from a first-person perspective*. A precedent of vernacular space, as well as tools and machinery.

Each of the sequential illustrations show an intimate relationship between material, maker and space. Where architecture forms a helping hand through false ceilings and natural light.

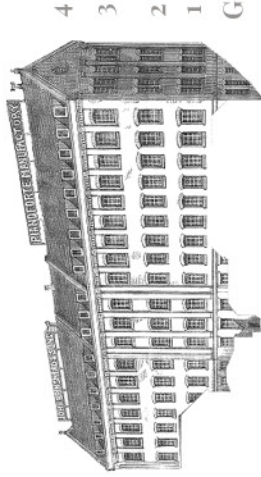


Figure 2.3, Each floor was defined by the process

An Education Reform
A Manifesto



Figure 2.4

The *Craft Council*'s education manifesto outlines 5 acts to *Reform* current education — based off interviews with Craft students (see England, L. (2014) and Council (2014)):

1. Put Craft and making at the heart of education
2. Build more routes into Craft careers
3. Bring Craft enterprise into education
4. Invest in skills throughout careers
5. Promote world class higher education and research in Craft

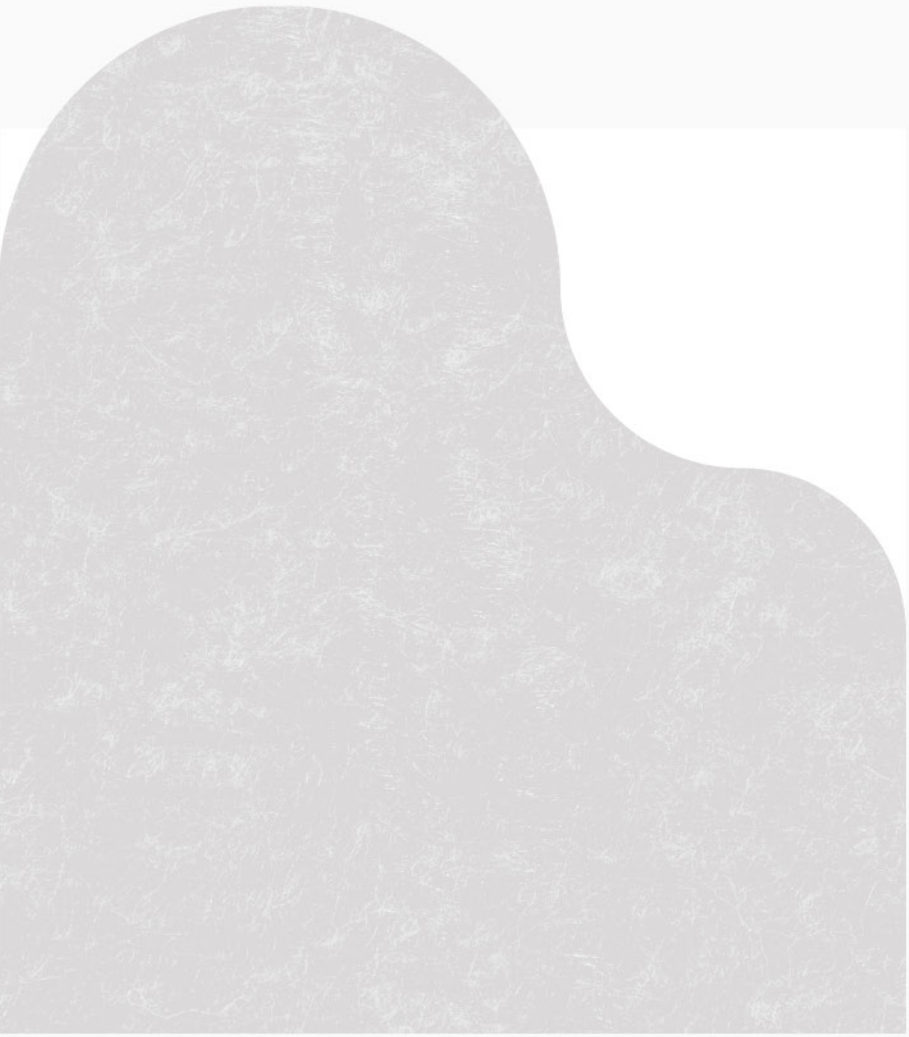
Coinciding with recent developments of rural *Craft Towns* (Brown, 2014) or redefined urban *Mews*, Craft is slowly undergoing a revival. While their former industrial shells are migrated and retrofitted into new and typically commercially driven typologies, we ask: where is Craft to go?

The following architectural aspirations are derived from it:

The *RDC-PTC* should become a case study (5) — as *John Brinsmead & Sons* factory was — for local, innovative and sustainable Craft preservation in a time where specialist courses are in decline (4). Architecturally, it should aspire to reflect the syllabus. To be formed from the vernacular and to conversely *Reform* it (1); intertwined with the genus loci of *Camden* and the site. The Piano, the Centre and the Craft as interchangeable elements.

For example, society has become complacent with the availability of energy (fossil fuels and electricity), material (timber and metals) and manufacturing (rapid prototyping and mass-production) at the flick of a switch/click of a button (Langlands, 2017). The project should aim to be sustainably powered through interpretations of traditional systems. These include 'wind, water, animal [and] human' (Pye, 1968, p.26; Risatti, 2007, p.53; Langlands, 2017).

Part of an educational and enterprise cluster with *Central St Martins*, the centre will provide an interdisciplinary environment (1) and permanent workshops with retail-frontage (3) for tutors. Transmitting techniques through high quality education and apprenticeship (2) opportunities. Providing business management education, as well as through facilitating the recording of the Craft (5) process.

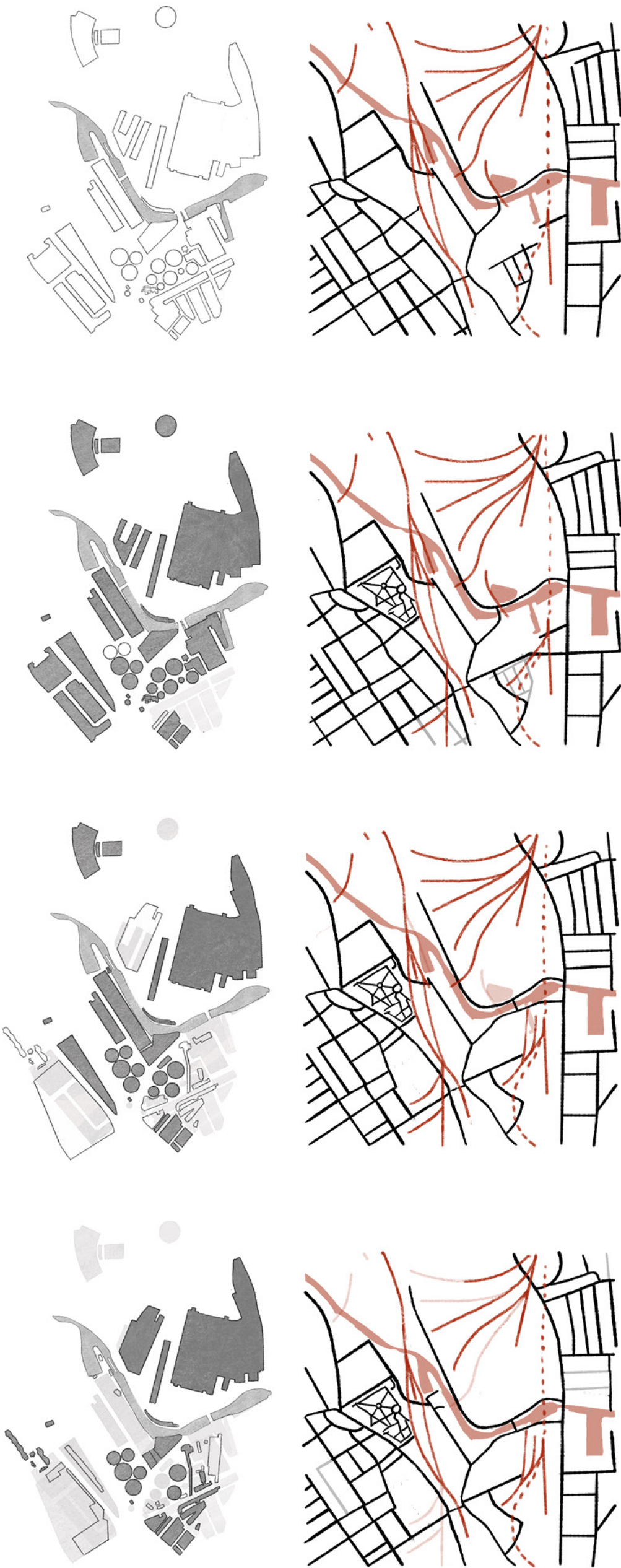


Act 3
Which yet survive

Thoughts, Tapestry and Time

Industrial Revolution

20th Century



The Urban Fabric

The In-Between (Circulation)

Change in King's Cross

How the movement of product and people has shaped its streets



Relocated Monuments

Figure-on-Ground Tracing Textures

During my site walkthrough, my feet traced through lines of stone, a density that went beyond only materiality. A sense of time, overlaid as tapestries of material, I began to form not a Nolli plan but a true figure-on-ground.

Hard Landscaping

What appears as a patchwork of pavement finishes reveals a narrative to the urban grain through the: weathered depth of stone and joint (smooth, coarse or roughly cut), the variations of colour and size, and the response to climate (discolouration and permeability).

Other Surface Materials

Made Ground
Sand and Gravel

Plinth Floor
Concrete and Gravel

Dry Dock Slabs
Exposed Concrete

Soft Landscaping

Details regarding the species of flora and fauna around the site were sourced from an *Ecological Assessment* (Trent, 2014) and information regarding Green Roof build-ups were sourced from *Camden's Biodiversity Action Plan* (Camden, 2013) and the *Green Roof Code* (Harris, 2021).



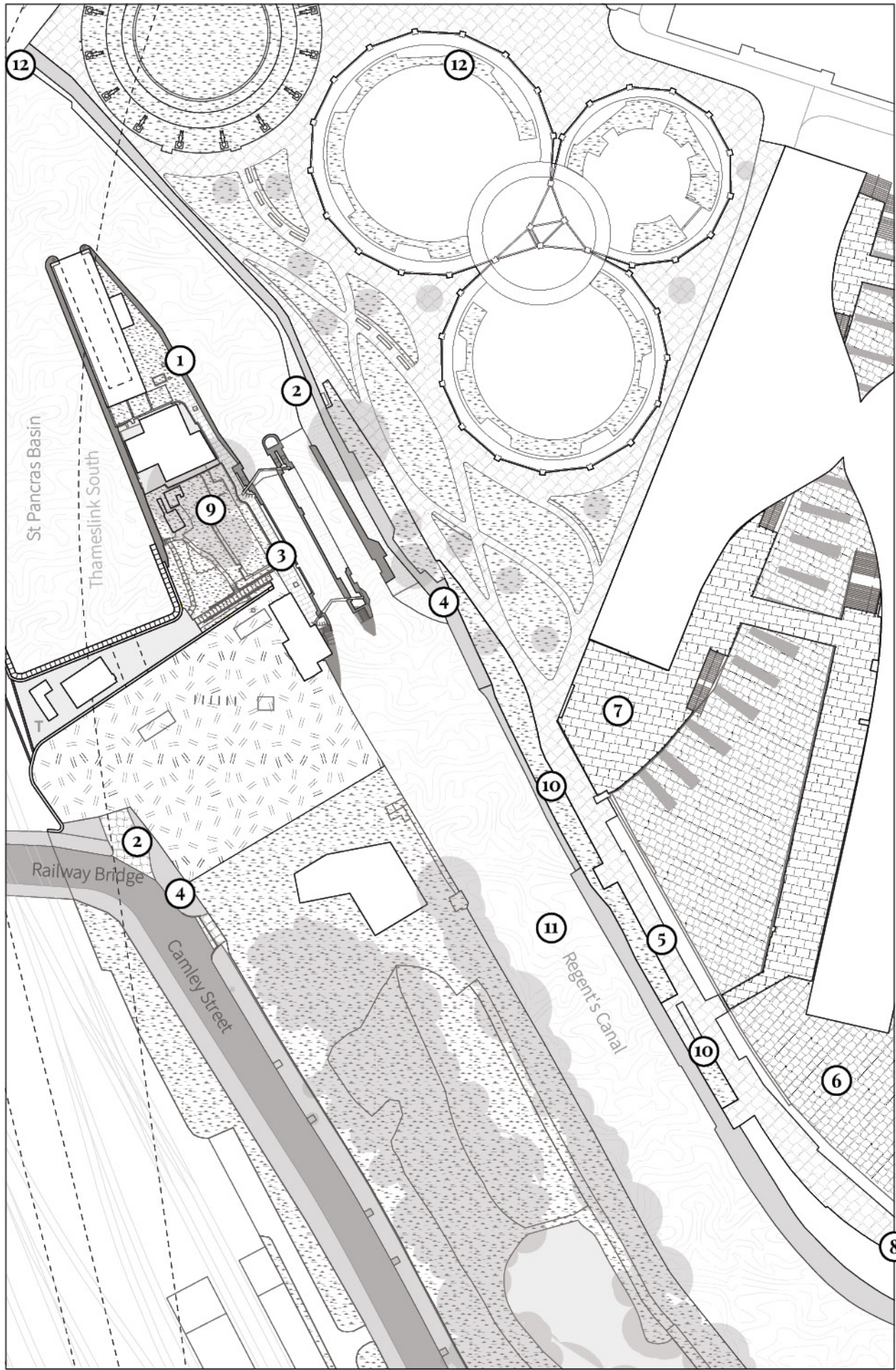
SYCAMORE TREES (3)
Canopy Spread: 14 m
Trunk Diameter: 1100 mm
Root Spread (Max): 21 m
To be excavated from site

Removed before site visit

GOAT WILLOW TREE
Canopy Spread: 9.9 m
Trunk Diameter: 800 mm
Root Spread (Max): 15 m



CANAL-SIDE PLANTING
Type: Variety of trees, shrubs, bushes and grasses as part of SUDs around King's Cross



Canal Palette



CONCRETE CANAL CAP



GRANITE STONE SETTS
Spec.: Naturally Weathered
Colour: Blue-Grey-Pink
Dim.: 100 x 100 x 200–300 mm
Mortar: 10–15 mm



BRICK PAVERS
Colour: Red
Dim.: 65 x 102.5 x 215mm
Mortar: 6 mm

Figure 3.1

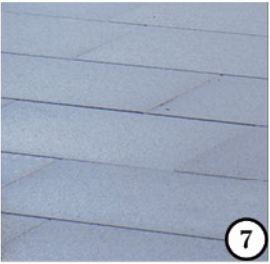


CONCRETE PAVING
Spec.: Protects the HV Line
Colour: Grey
Dim.: 80 x 200 x 300 mm
Mortar: 6 mm

GH and CDY Palette

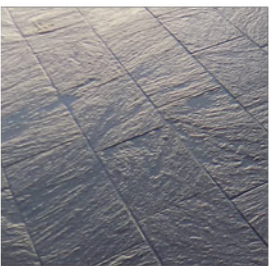


GRANITE STONE SETTS
Spec.: Bush Hammered
Colour: Pink and Mixed (Blue-Grey)
Dim.: 100 x 100 x 200–300 mm
Mortar: 10 mm

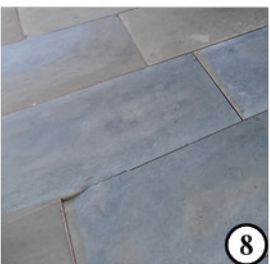


LARGE PAVERS
Spec.: Bespoke to CDY
Colour: Blue-Grey
Dim.: 70 x 200 x 400–600 mm
Mortar: 6 mm

Granary Square Palette



PORPHYRY PAVING
Spec.: Riven
Dim.: 70 x 200 x 400–600 mm
Mortar: 6 mm



YORK STONE PAVING
Dim.: 80 x 200 x 300 mm
Mortar: 6 mm

Other Flora and Fauna

FISH

Species: Red Swamp Crayfish
Coarse Fish

BATS

Additional Information: Important to mitigate the impact of development to neighbouring bats at the CSNR



Figure 3.2

REGENTS CANAL
Type: Sanding Eutrophic
Plants: Canadian Pondweed
Gipsywort

GREEN ROOFS
Precedent Specification: Semi-Intensive
150–200 mm Substrate
15–20 species /sqm

BIRDS

Species: King Fishers / Swans / Moorhens (pictured) / Herons / Mute / Mallards



Site Strata

Regent's Canal bisects the island of King's Cross from the peninsula of our site, creating a 'unique [corridor]' of industrial-era architecture, a biodiverse habitat, and contemporary retail and accommodation (Camden, 2008). Towards Granary Square, the raised plinth — formed from a hard landscaped edge of brick and concrete towpaths/horse slips — provided security to

the yard, with cast iron gates sitting beneath arches that housed horses used for towing barges. Unusual level changes, former tunnels (closed and open), and underground infrastructure (e.g. 400k volt cables, rail tunnels and basins) exemplify the distinct strata of the site.

Plimsoll Coal Drops

Four railway tracks lead from the goods yard in the East then along the *Plimsoll Viaduct* and bridge, and into their bays. The carts are then discharged through mezzanine-levelled hoppers into storage bins or further carts which lead to the St Pancras railway line.

The Hidden Rail Tunnel

Consisting of a cast iron and cellular brick structure, the coal drops abut the hill-like retaining mass adjacent to the St Pancras Basin. A tunnel leading through this allows for coal to be transported to the railway lines or into barges below.

Palimpsest

Tracing the sites industrial grain through plans, photos, accounts, diagrams and remnants such as the half-bricked up tunnel (see p. 112), viaduct outline (see p. 22) and the former Plimsoll bridge (below); these layers began to be navigated through an act of *Reform*.

Beginning by reimagining and excavating the site's narrative moments, the overlaying of contemporary design could be explored as palimpsest.

Figure 3.3, Adapted from Google Earth

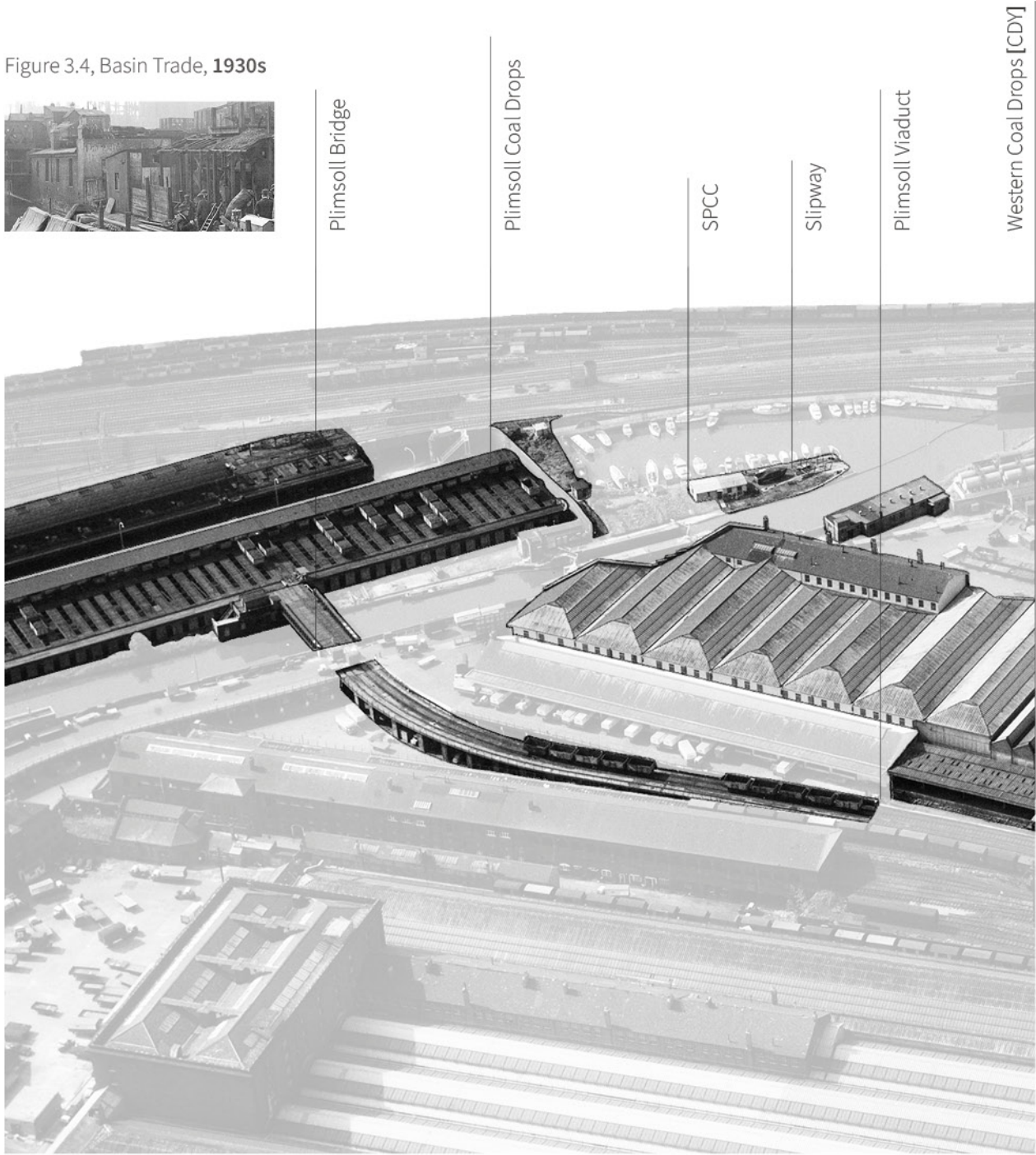


Figure 3.4, Basin Trade, 1930s



Uncovering the Site 1960s

Industrial Archaeology

Figure 3.5, Coal Drop Short Section

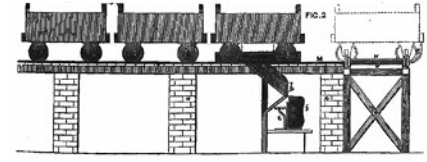
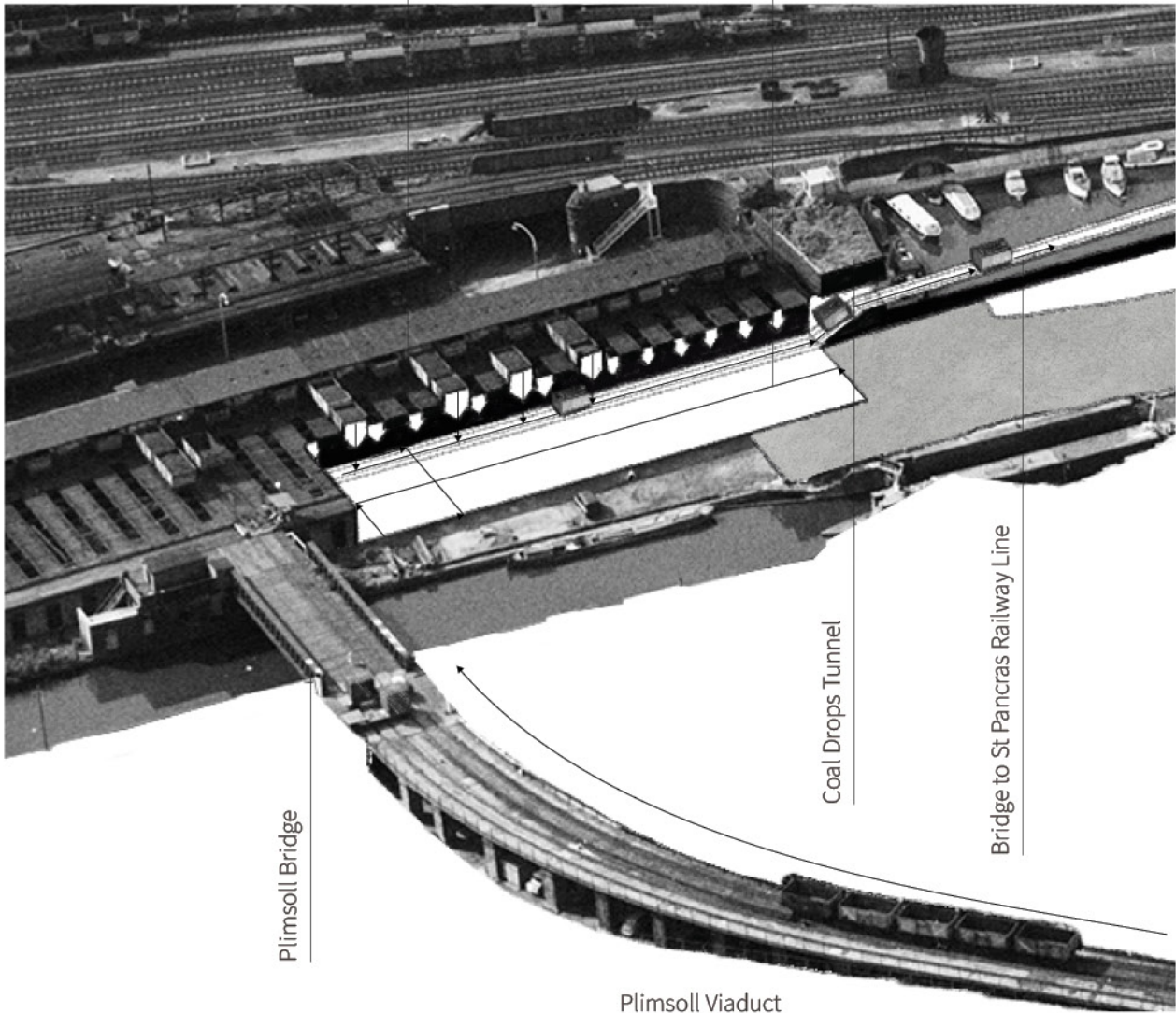
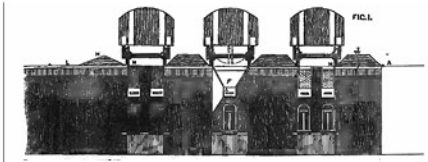
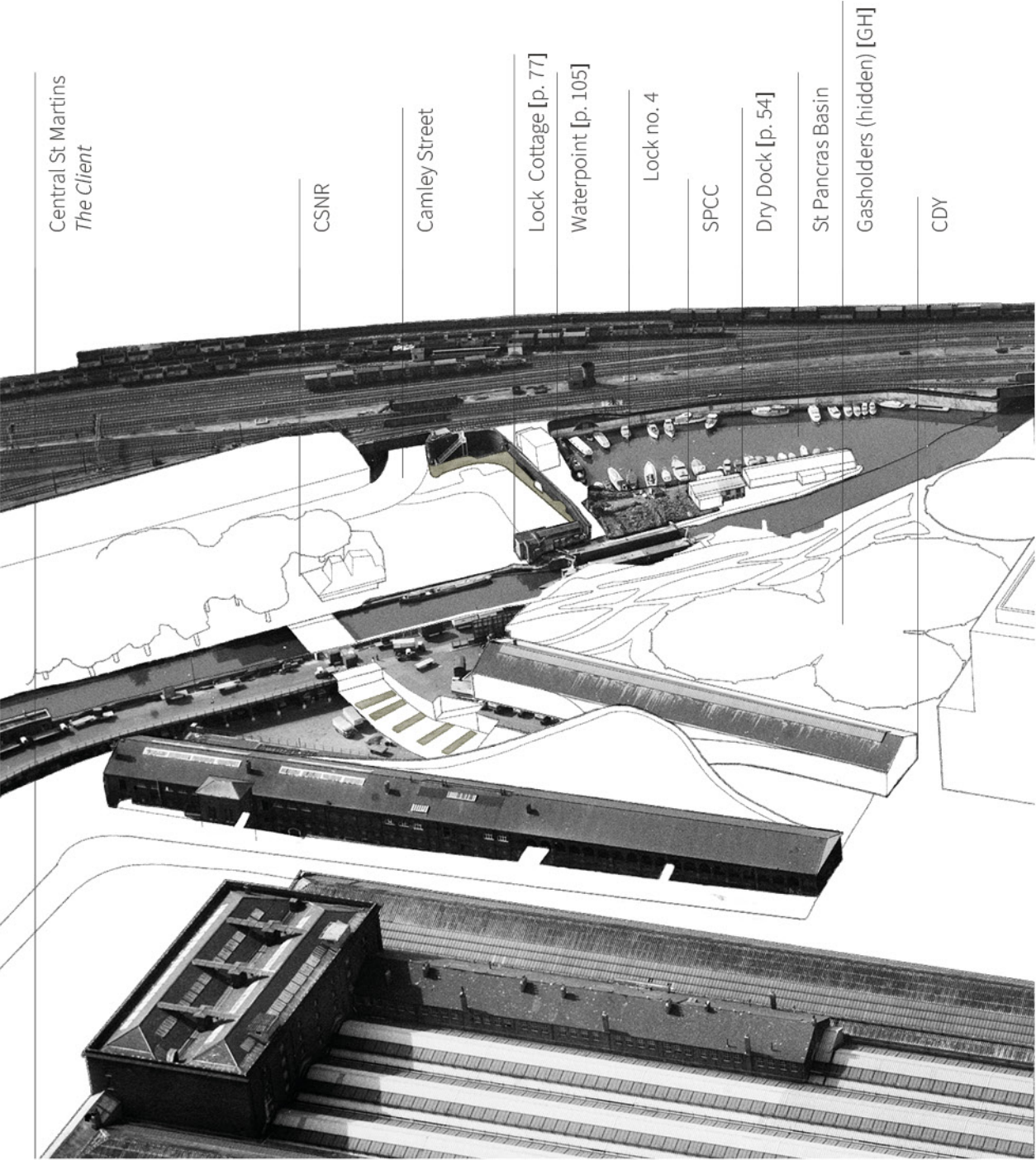


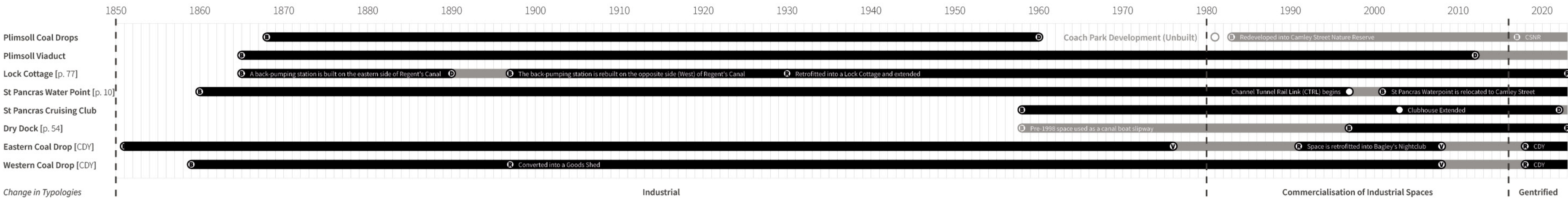
Figure 3.6, Coal Drop Long Section



Reimagining the Plimsoll Coal Drops Industrial Revolution



Site Remnants Today



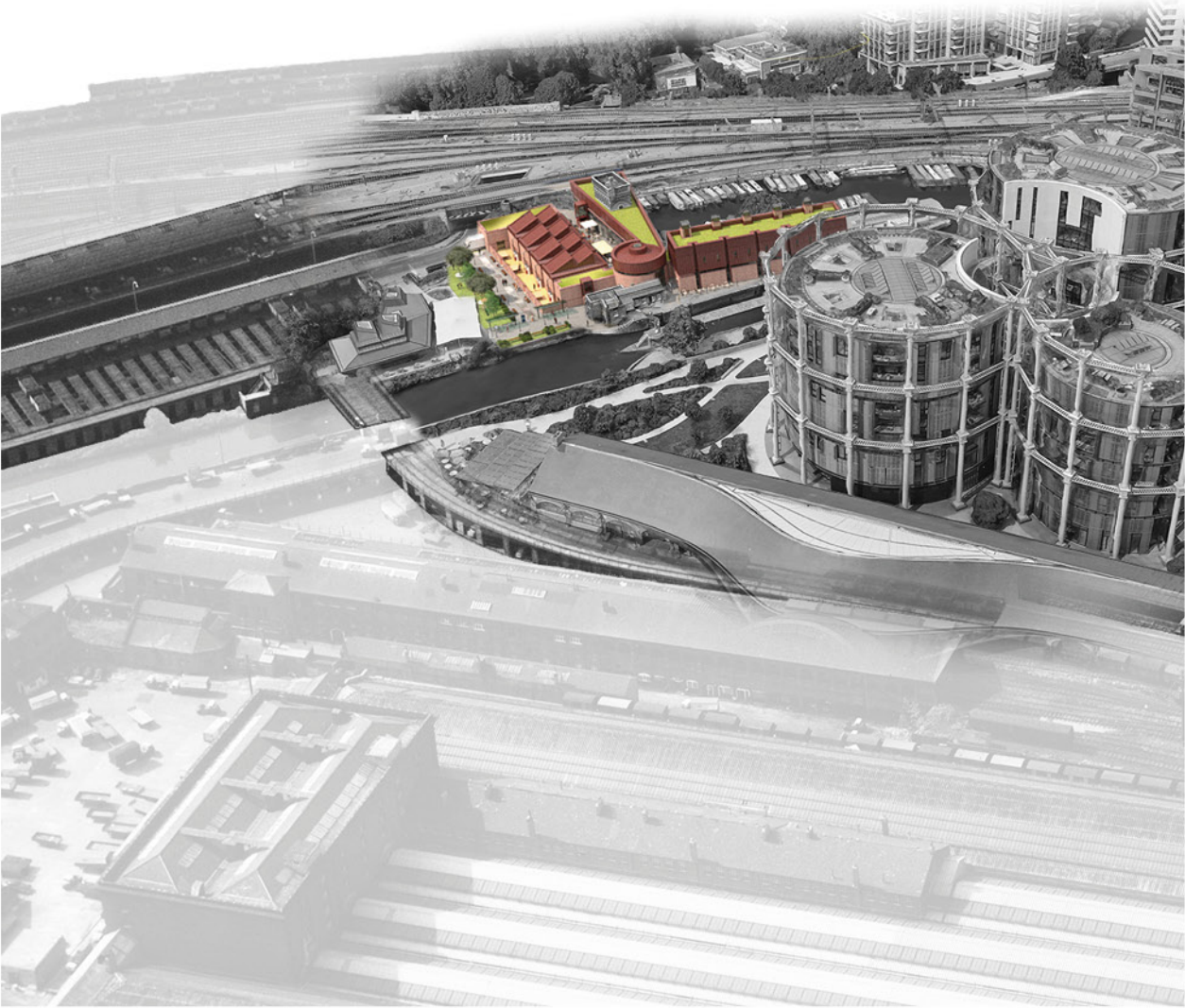
Changes in King's Cross' typology through gentrification were previously explored in the study in Burkhalter (2020). Highlighting the re-introduction of the "creative classes" and commercialisation of industry post-1980s e.g. in the CDY.

Repair as an Act of *Reform*

The remains of industrial archaeology is often, as this research attests to, the unseen layers of history that become the quotidian pavements treaded on throughout the year. Nevertheless, the genus loci of King's Cross — the poverty, hard labour and homelessness; has permeated every slab, brick and sheet of steel like coal dust.

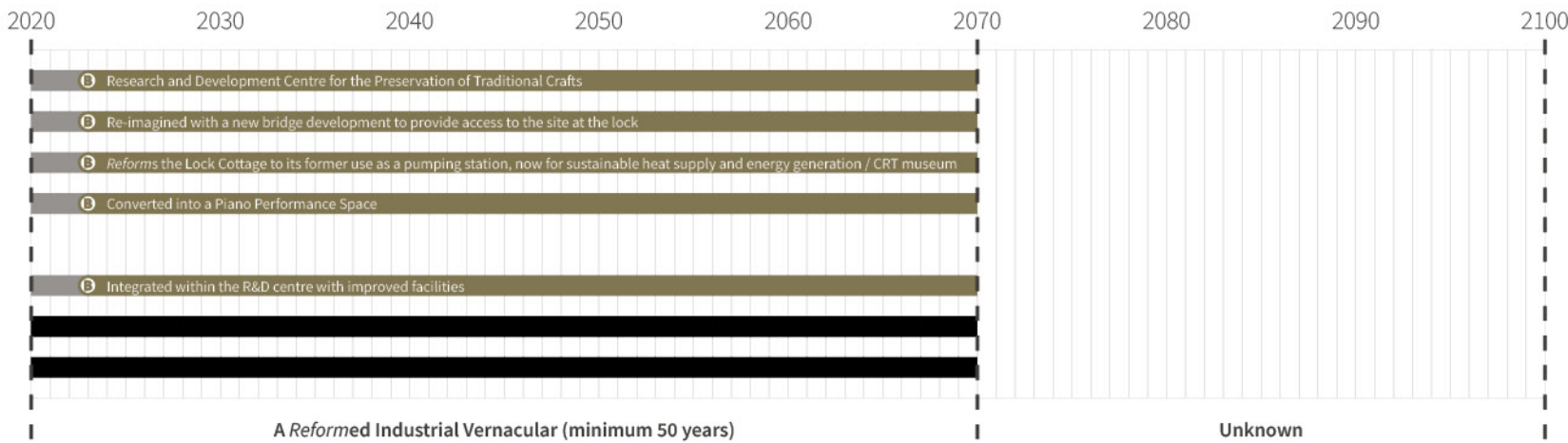
Gentrification has attempted to clean the context into a generic privately-owned-public (POP) retail space, first displacing the working class and then the creative class of pop-up artists and nightclub scenes (Bagley's at the CDY) in favour of the luxury consumer (see Burkhalter, 2020). King's Cross is a centre of industry, not retail — the creative class, a "new" sustainability-spearheaded industry, can prevail at the RDC-PTC by being of this place, at this time.

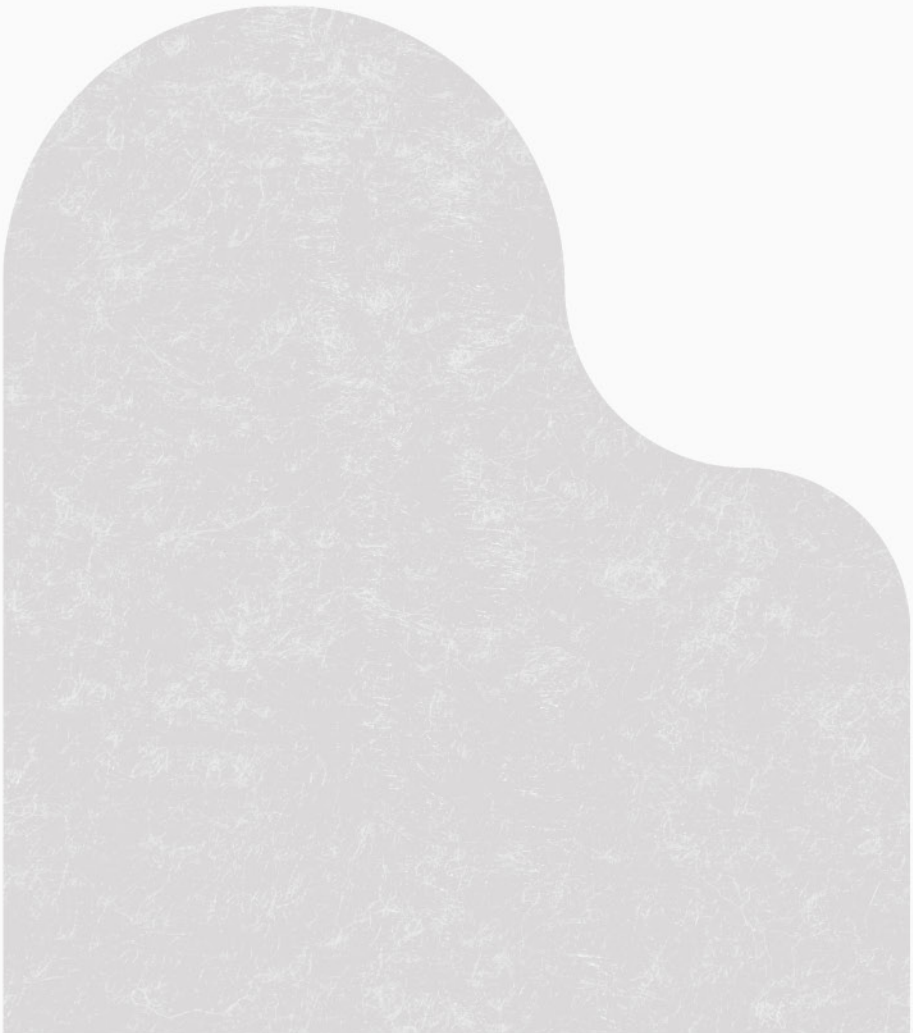
Figure 3.3, Adapted from Google Earth



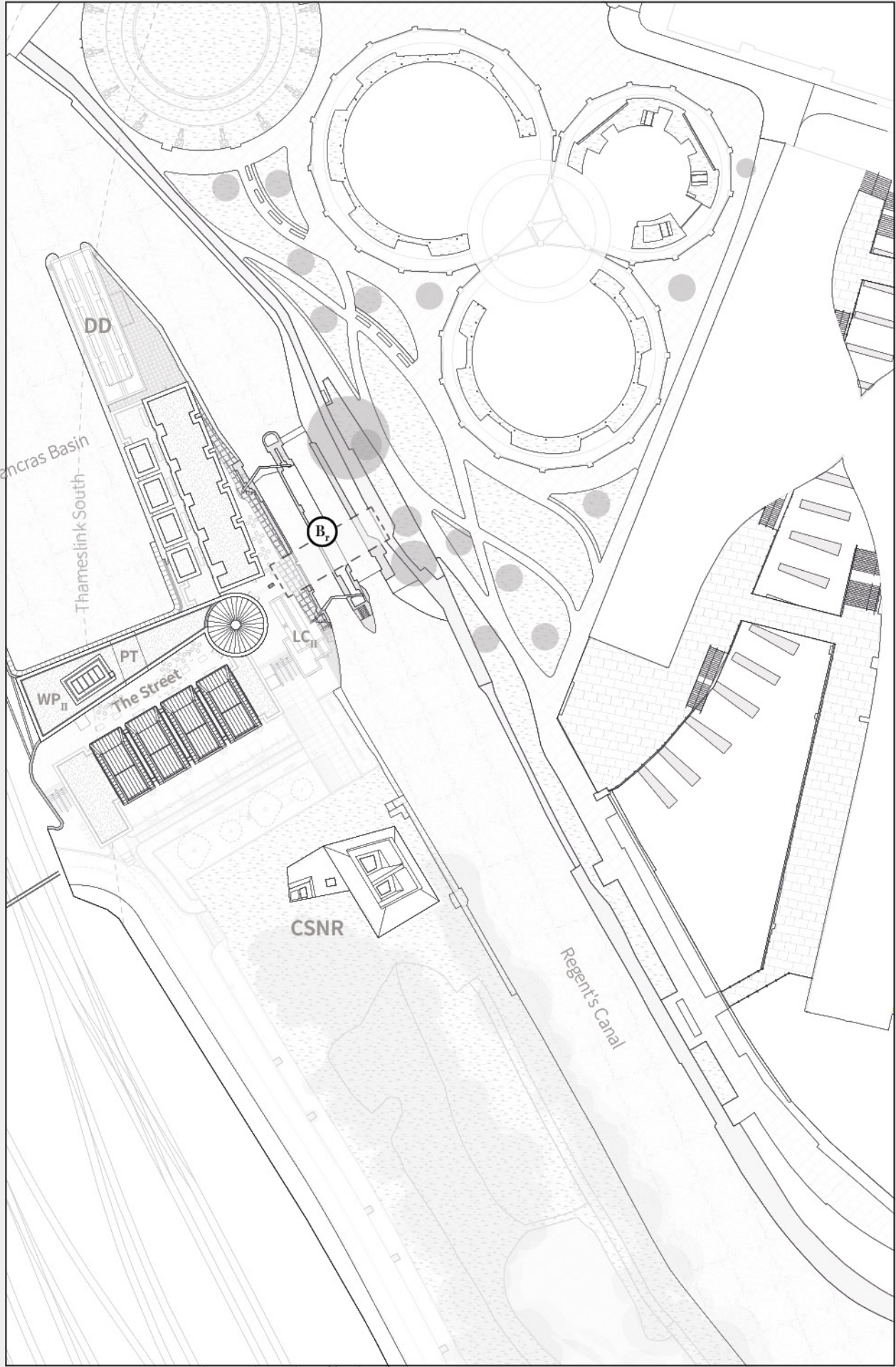
The RDC-PTC

Industrial Archaeology



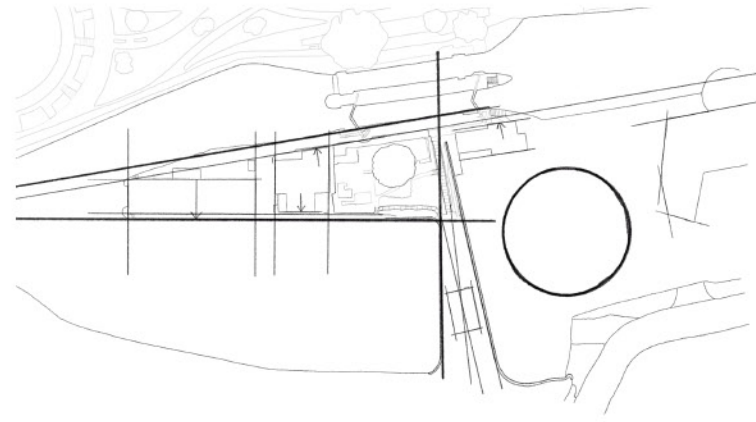


Act 4
Look on my Works, ye Mighty
Process, Proposals and Plans



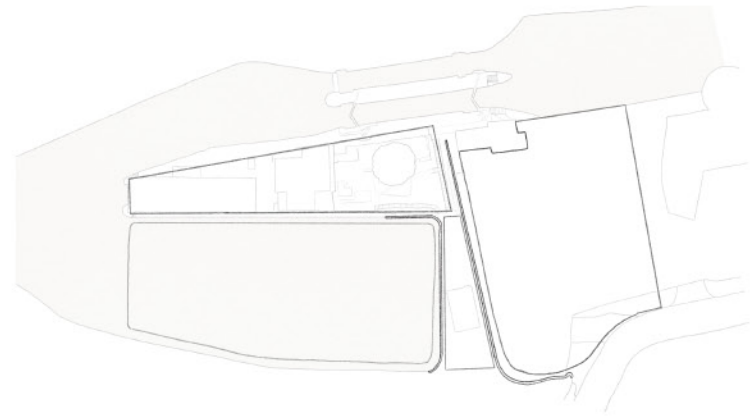
The RDC-PTC

A context plan illustrating the diversity of building forms and roof typologies that constitute King's Cross Central and the peninsula of the RDC-PTC



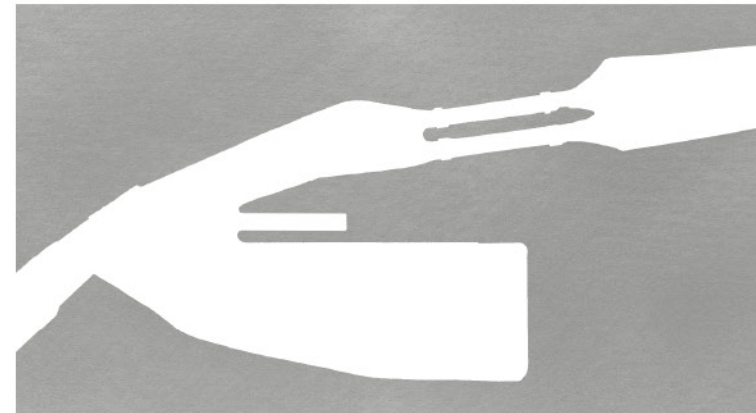
1. Edge Conditions

Regent's Canal converges towards the end of the peninsula at the Dry Dock and as illustrated by the demolished SPCC Clubhouse and the Lock Cottage, the form will follow the closest face to the canal edge. The space between the old Coal Drops wall and CSNR has an undefined edge, a circle.



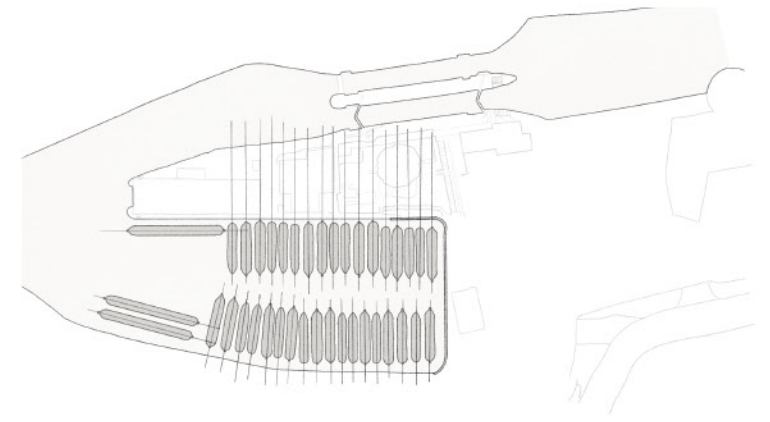
2. Zoning the Site

The site is composed of 3 clear zones and the St Pancras Basin that have been divided by the canal, ruined wall and a level change from the North and South of the site.



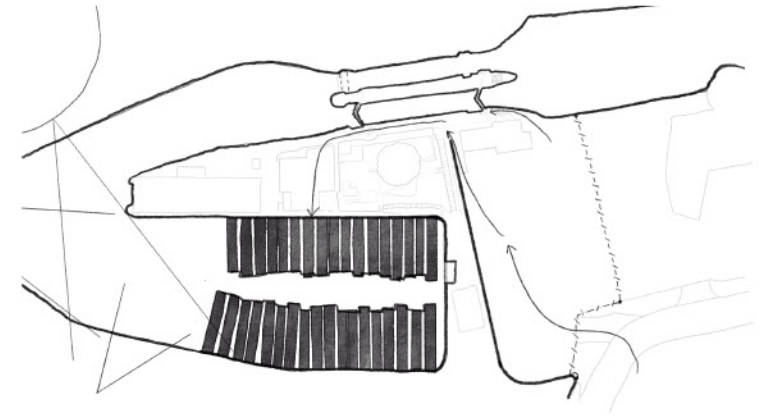
3. Regent's Canal, King's Cross Island and the Peninsula

The land mass that currently houses the Dry Dock, derelict Clubhouse and vegetation, projects outwards to form the St Pancras Basin. If the same mass was off the coast of Croatia or Italy, it would be considered a land-mark — except it has declined into an isolated post-industrial "thing" that purely exists.



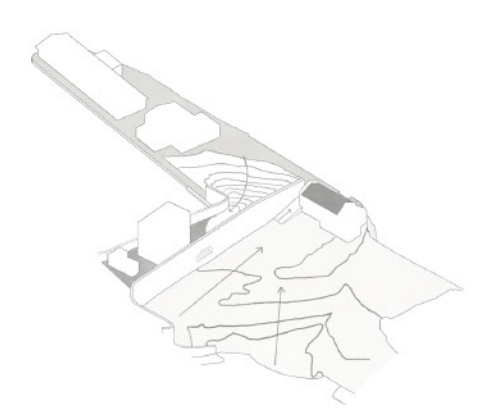
4. A Floating Village

The canal basin is a unique typology not typically experienced in architecture projects. To see how the boats, aligned to the jetty and so the canal edge, varied in size, shape, fittings and colour — it would be difficult to not compare it to a floating village. Each boat moors like one of the multi-coloured houses of Bristol or Lyme Regis.



5. Improving the Public Realm — Existing Basin Access

A public-realm first approach to site access and landscaping was part of a dedication to improve facilities for the many users and stakeholders of the site. This included improving elderly/disabled access (currently only a steep ramp is available) to the basin and direct bridging from the King's Cross Centre (and so CSM) to the site.



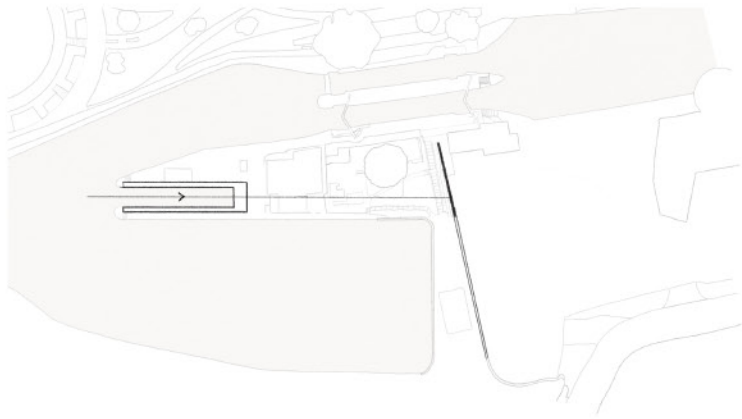
6. Navigating the Level Changes

A small (for a lock) but significant level change of around 1.8 metres separates the North and South of the site. Understanding how to resolve this was challenging but navigated through physical and digital modelling (see p. 135), and most importantly to the project's principles of *Reform*; historical research. This resulted in finding the exact location, historical significance and dimensions of the covered coal tunnel.

Design Strategy Overview

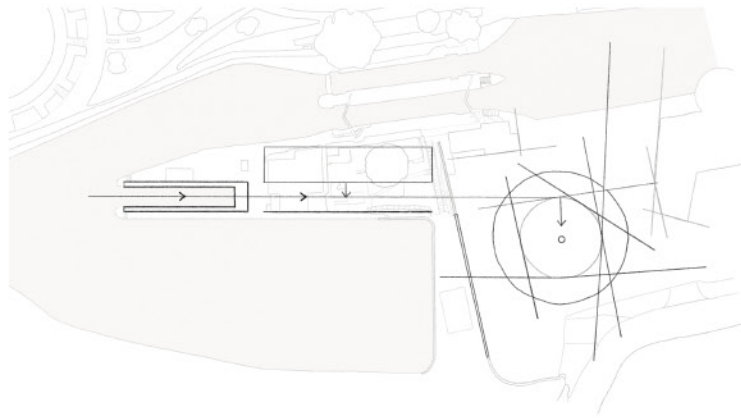
A summary of key observations, decisions and processes





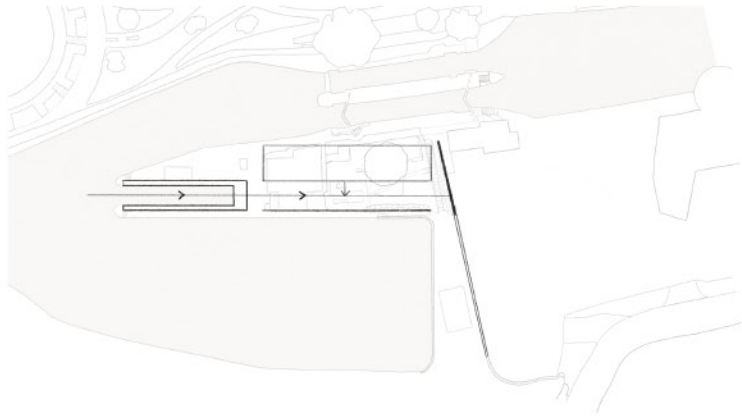
7. Defining the Datum

Integration of the Dry Dock to facilitate the canal network (see p. 53) as an initial concept of *Reform* rationalised it as the main axis to anchor the movement of construction materials, workshop materials and people.



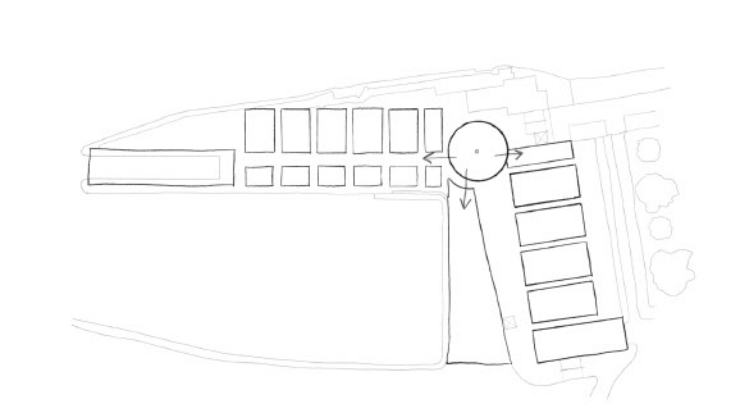
10. Creating a Focal Point

In its abundance of possible parallel faces, it is best resolved by having none — and so the location of The Centre was rationalised and the precedent for circular heritage buildings in Camden was equally motivational in this decision e.g. The Rotunda (p. 16), Roundhouse (a performance space) and the Gasholders opposite the site.



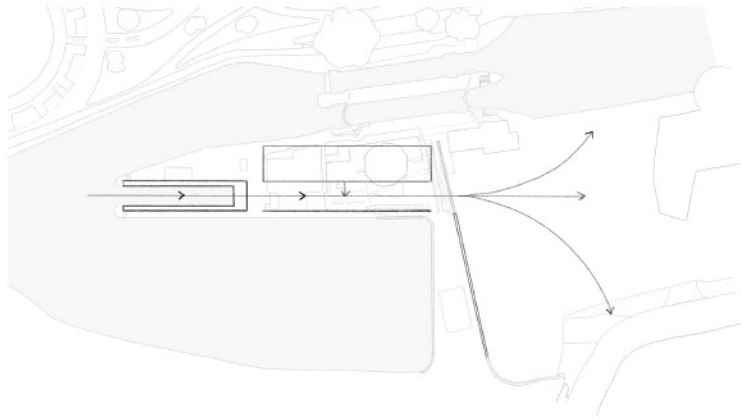
8. Adding to the Axis

A workshop block feeds off this movement of product and people, creating the first corridor. Variations of this alignment (i.e. through the block and to the East of it was also explored). However the corridor is stopped in each iteration by the wall's remains and the changes in level — breaking the circulation from North–South of the site.



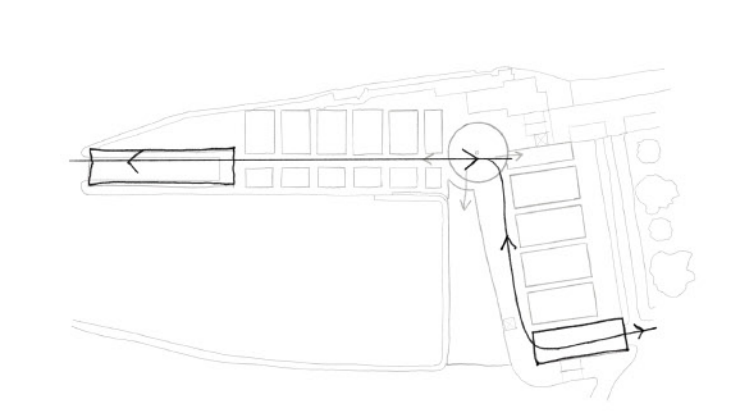
11. A Radial Plan

Pivoting from The Centre, the course programme (p. 7) defined the groups and units of the modules in Year 1 and Year 2; as well as the need for individual tutor workshops which permanently house the work of these craftspeople. Each unit became defined by streets and corridors, and the existing wall and new bridge fed into this mew.



9. Partially Removing the Wall

Upon removing the walls, the datum meets the undefined space created by the Wall, Lock Cottage and Camley Street Nature Reserve. At this stage I began exploring how the campus could grow beyond this axis. Whether it enveloped or sat adjacent to the wall, if it integrated the Waterpoint or not, and how it interacted with the Lock Cottage — is the RDC-PTC its new neighbour?



12. Process as Plan – Plan as Process

The functionality of the RDC-PTC was essential from the beginning at all levels of design (e.g. from equipment spacing, p. 122; to ventilation systems p.124). At a macroscopic level, the induction of the Dry Dock became the starting point of the piano making process and the R&D centre management as a whole.

While the change in levels illustrated that the site was still somewhat divided, it could be re-utilised to improve the operational performance of the site. By having two delivery points from two separate sources of transport (canal and road), the site became increasingly flexible in managing the import and export of materials — in addition to immediately supplying the two separate Y1 and Y2 blocks with material storage (and plant).

Design Strategy Overview

A summary of key observations, decisions and processes





See Figure 3.3 (altered)

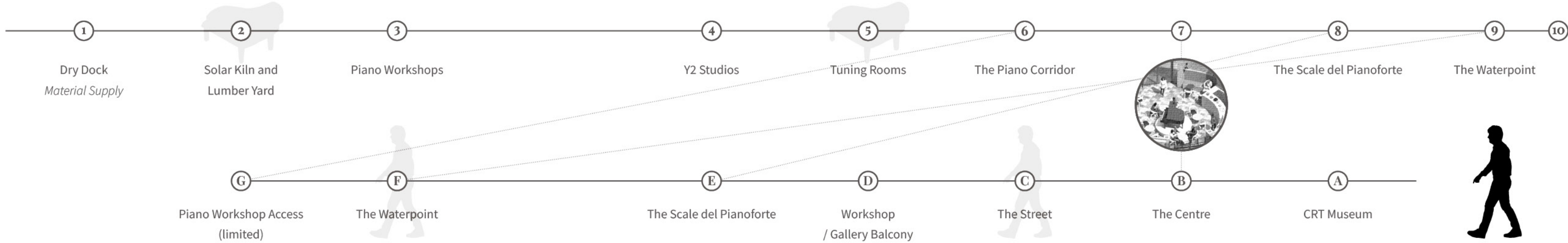
RDC-PTC Overview

Processes in Parallel

The movement of product and people is consistent throughout the history of King's Cross — shaped by their changing demands over time, and so this continues to be reflected in the RDC-PTC.



The Piano



The Public

Plan of
Y1/ Tutor Workshops and Landscaping

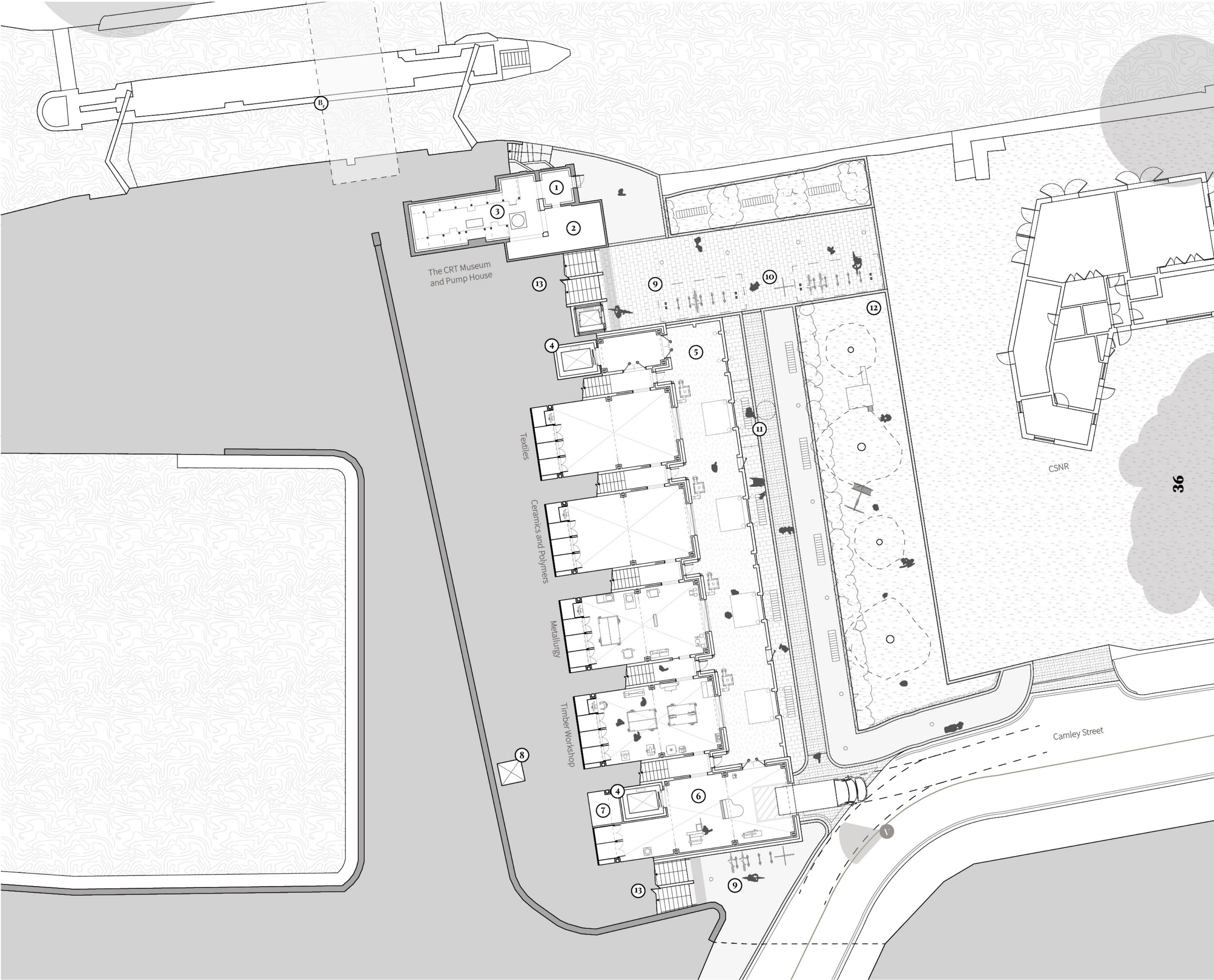
The lowest floor of the scheme is defined by the Y1 module facilities and the landscaped boundary between the RDC-PTC, Camley Street Nature Reserve and lower Regent's Canal.



V. A visiting tutor returns to her bike

Key

- 1. Water Source Heatpump
- 2. Water Storage (all types)
- 3. Museum Floor
- 4. Goods Lift
- 5. Year 1 Workshop Yard
- 6. Preparation and Deliveries Room
- 7. Below-Street Piping Access
- 8. Lift Shaft
- 9. Bicycle Storage (Covered and Uncovered)
- 10. Wayfinding
- 11. The Third Street — seat access designed for disabled people
- 12. Public Park (shared with CSNR)
- 13. Stair and lift access to the retail street



Plan 1F

Y2 / Workshops and Public Realm

Plan 1F is the primary access floor for the RDC-PTC, with it providing direct access from Central St Martins. The sprawling site has a diverse range of typologies, and notably the existing Dry Dock and Lock Cottage (now retrofitted into a CRT museum, as indicated by the dark grey fill).

Key

- | | | | |
|-----|--|-----|---|
| 1. | The CRT Museum Display Balcony | 12. | Plant and Delivery Storage |
| 2. | The Centre Café | 13. | Lift to Waterpoint |
| 3. | The Scale del Pianoforte
(The Piano Stairs Gallery) | 14. | The Dry Dock |
| 4. | Security Access for Students/Tutors | 15. | Naturally Ventilated Chimney |
| 5. | Reception and Security | 16. | Mechanical Chimney |
| 6. | The Retail Street / Industrial Mew
— the weekend displays have a
dedicated space for each tutor. | | The Lumber Yard and Solar Kiln |
| 7. | The Tunnel / Secure Basin Access | | The New Bridge (a separate
project workstream) |
| 8. | Goods Lift | | |
| 9. | Retail Gallery Balcony | | |
| 10. | Tuning Rooms | | |
| 11. | Year 2 Piano Workshops | | |

1:200

A3



Plan 2F
Y2 / Studios

The Year 2 studios provide vistas across King's Cross Central, while being isolated from the noisy St Pancras Railway Line, the workshops below and the retail opposite. The RDC-PTC's green roof provides the students with a light biodiverse scene that compliments the CSNR and improves wellbeing.

Key

- 1. Goods Lift
- 2. Green Roofs
- 3. Dry Dock Roof
- 4. Lock Cottage Roof
- 5. Lift Top
- 6. Naturally Ventilated Chimney
- 7. Mechanical Chimney

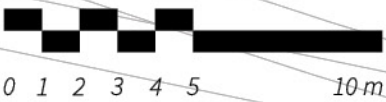
The Year 2 Block

See page 99
for this plan

The Year 1 Block

1:200

A3



St Pancras Railway Line



Act 5
An Interlude
The Sonority of Structure



Looking up at the Spoke Wheel Ceiling

Structural Plan

Overview of Structure, Spans and Systems

A variety of steel frame systems are utilised throughout the building. This includes the following:

1. Year 2 Piano Workshops, Studios and Tuning Rooms

A series of individual primary steel frames (similar to a portal frame) that are tied together by a CLT diaphragm and cores (in grey).

2. The Centre

A spoke wheel radial plan comprising of an array of CHS steel columns with EA plated beam elements tied together with cross bracing, and an outer tension ring and inner compression ring (see above render). This was greatly inspired by David Mellor's Cutlery Factory.

3. Year 1 Tutor Workshops

Mansard-esq Pratt trusses run along the shortened length of the tutor workshops and with CLT-boxed upstands to create the unique roof form and skylight.

4. The Scale del Pianoforte (Gallery)

CHS columns sit between the retrofitted weathered wall, with I-beams running along its varying widths at equally varying depths. Minimising steel to only its structurally-efficient depth, reducing embodied carbon.

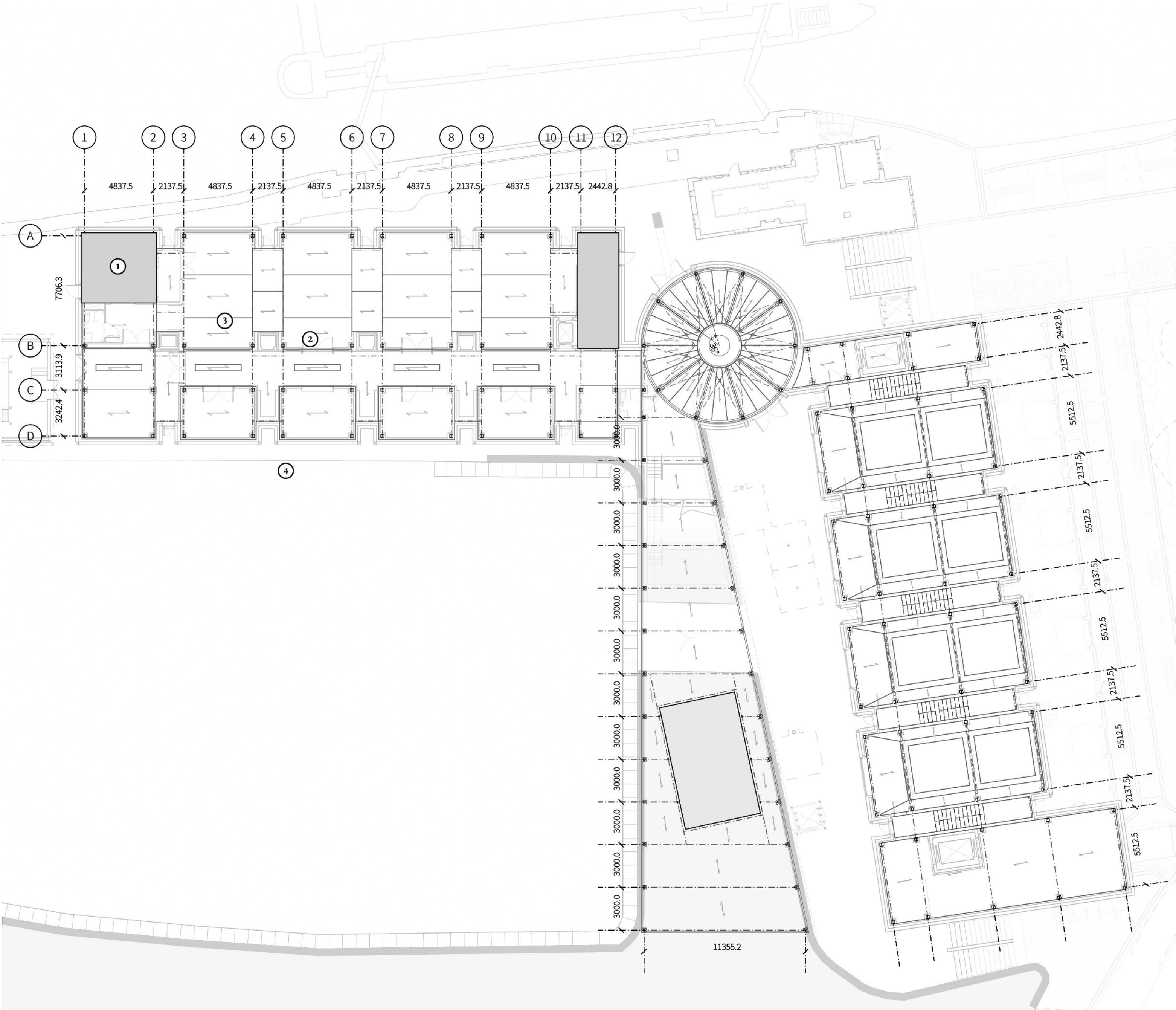
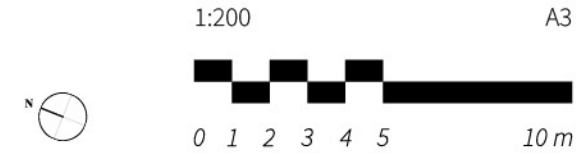


Diagram illustrating the stress distribution in a rectangular plate under a central load. The plate has a total length $L = 5000$. The load is applied at the center, and the distance from the load to the right edge is $2L/3$. The distance from the load to the left edge is $L/2$. The stress contours are shown as dashed lines, indicating a maximum stress of 3333 at the center of the plate.

$$S = 3.5d + 0.02L$$

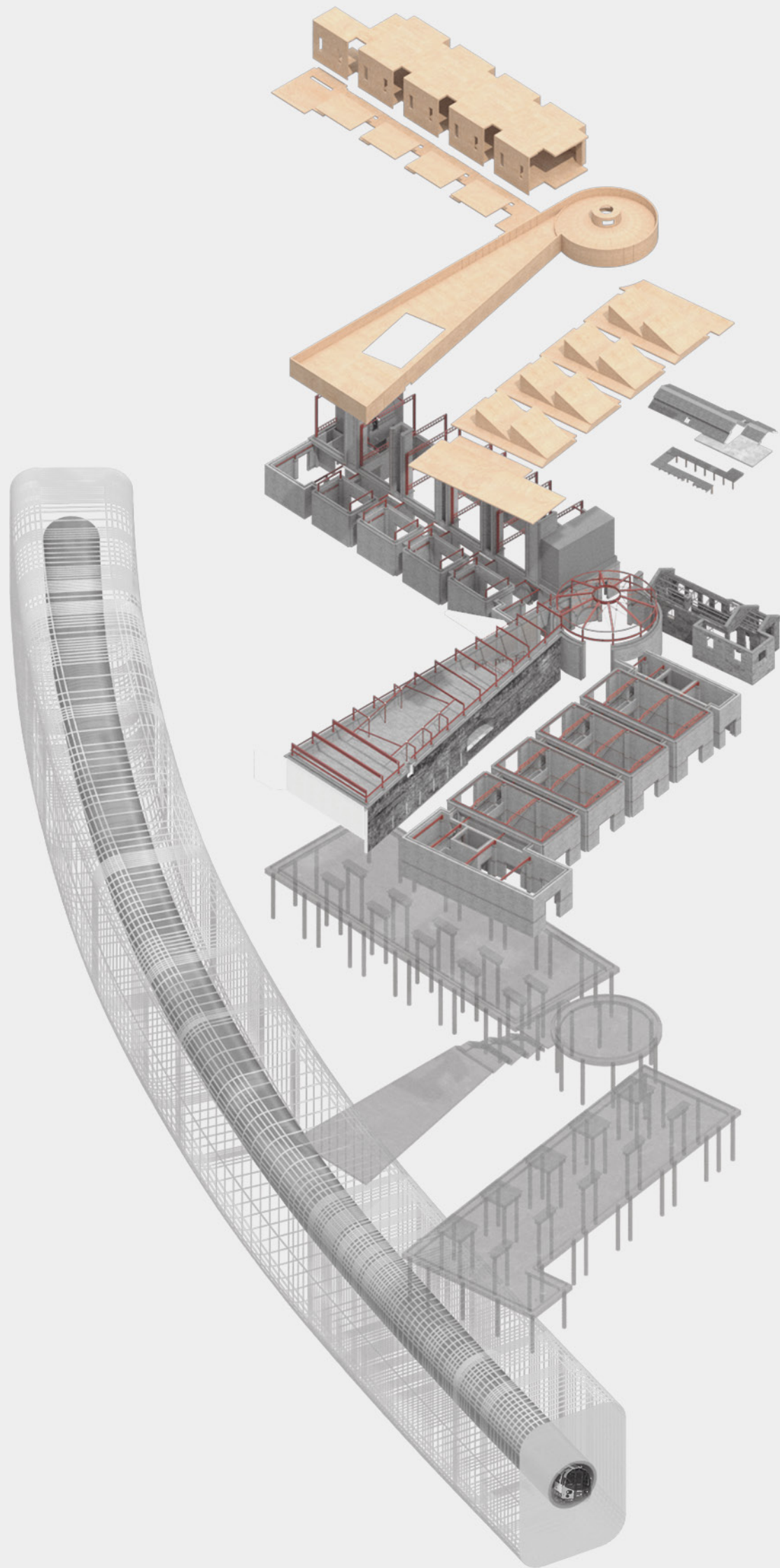
Pile Spacing = $3.5 \times \text{Diameter} + 0.02 \times \text{Pile Length}$

$$S = 1520 = 3.5(400) + 0.02(60000)$$

Pile Spacing — based on maximum length
at the Y2 Workshops

The foundations have been thought through in-depth due to the complexity of above-tunnel design and their significant contribution to embodied carbon in research-based buildings.





CLT System
Primary and Secondary

CLT Cores
Primary

Westok Beams*
Primary

Fink Truss
(existing)
Foundations

Inverted Steel Spoke Wheel*
Primary

Steel Pratt Truss*
Primary

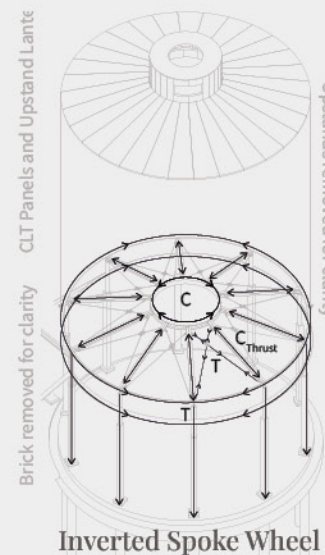
*Secondary steel systems
are minimised and
replaced with CLT

Simple Lightweight Slab
(retrofit)
Foundations

Piled CFA Raft
(main)
Foundations

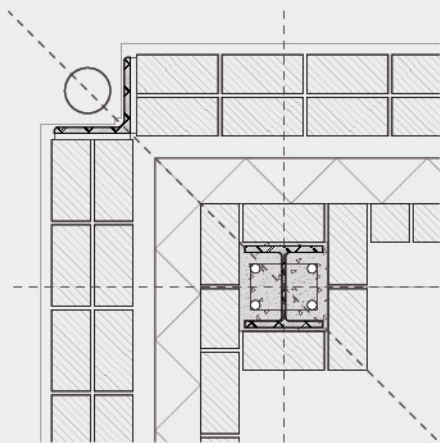
Thameslink Southbound
and Exclusion Zone
Foundations

A hybrid steel-based structure that integrates both CLT and brick into its construction, as inspired by *The Rotunda* (see pt. 10 on page 16.) and the use of steel within the context, i.e. the Gasholders, St Pancras Railway Line and the Coal Drops Yard.



An inner compression ring supports a CLT lantern which contains ventilation grilles and a central skylight positioned to direct light around The Centre's central display.

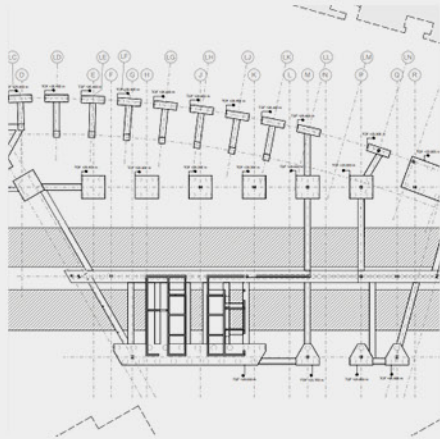
Two tension rings are formed from equal angles that follow the perimeter. These provide further support to the CLT upstands and roof panels.



Steel Columns 1:20

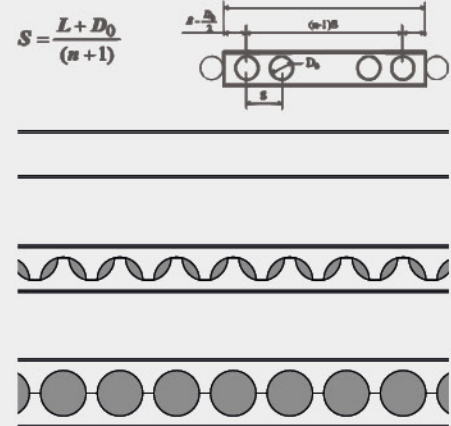
Columns are designed to be smaller by being reinforced with concrete and rebar, which is then capped off.

Lower grade, recycled steel can therefore be utilised to a much higher load bearing capacity — reducing the embodied carbon per load.



Local Precedent
King's Cross Central S3—S5 Figure 5.1

Developments S3—S5 in King's Cross are built on top of the Thameslink Tunnels. In building S3 (see above) by AHMM, they use pile foundations and ground beams that cross over the existing tunnel. Discussions with engineers on these projects highlighted the complexity of above-tunnel construction e.g. use of jacked piles, mini-piles, etc.



Westok Beams

The formula shown above was used to design the beams in the RDC-PTC.

Westok beams are used to aid the complex ceiling system that supports the piano workshops.

In conjunction with the CLT slabs, they support the following:

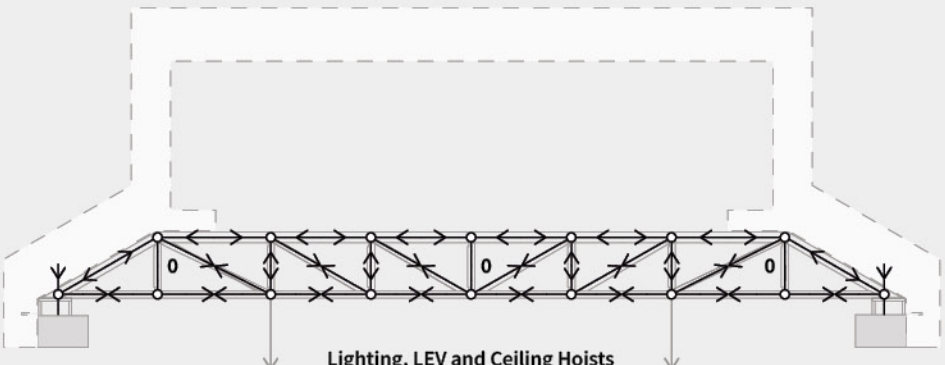
- A. Gantry
- B. Lighting
- C. Hoists
- D. Sprinkler System
- E. LEV
- F. Fresh Air Supply

CLT System

The CLT floor acts as a primary spanning diaphragm, transferring lateral loads (mainly wind) directly to the columns and via the Westok beams.

It is designed to withstand substantial live load from suspended elements (e.g. gantry, piano parts, LEV, sprinkler system, lighting etc.) and as described in detail on page 130, further oversized to act as a compartment floor.

Each panel is dimensioned according to HGV logistics on page 56 i.e. a maximum CLT panel height of 3 m and length of 15 m (n.b. no panel is this long).



Steel Pratt Truss 1:50

A simple girder-styled Pratt truss spans between the workshops, supporting the LEV system, lighting and any hoists — emulating the St Pancras Railway girders (used to suspend OHLE) that run adjacent to the site.



Local Precedent
Railway Trusses and OHLE Catenary

Heavily plated trusses are seen throughout the site and in British railway architecture more generally. Their proximity to and visibility from the Y1/Tutor Workshop's skylights rationalised their use for its structure.



Local Precedent
The Lost Viaduct Figure 5.2 1800s

Plimsoll's
The former Plimsoll Coal Drops that existed on the site was connected to the (today's) Coal Drops Yard via a plated double-intersection Pratt truss which has since been demolished (pictured).

Working Values

Concrete	0.12
(ρ, kg/m³)	2380
CLT	-1.2
(ρ, kg/m³)	480
SlimDek-type flooring	-
(kgCO2e/m2)	~150
Brick	0.25
(ρ, kg/m³)	1900
Reclaimed Brick	0.0027
(ρ, kg/m³)	1900
Rebar	1.99
(ρ, kg/m³)	7800
Recycled Steel	0.8
(ρ, kg/m³)	7800
Virgin Steel	2.8
(worst-case)	
(ρ, kg/m³)	7800



(Per Bay) CLT Primary Diaphragm vs. Secondary Steel System

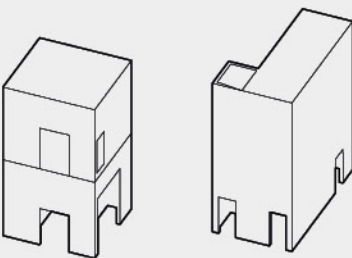
Calculated relative to the primary steel frame system shown and with the same floor build-up

CLT Primary Diaphragm	
Volume (m³)	20
CLT Quantity (t)	250
Total CLT EC (tkgCO2e)	30

SlimDek-Styled Concrete-Steel Floor

Area (m²)	82
Total EC (tkgCO2e)	12.3
Relative Carbon Reduction (tkgCO2e, incl. seq.)	24

The use of CLT flooring for a primary structural solution helps reduce the carbon impact of the total steel frame.



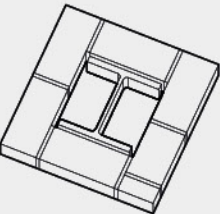
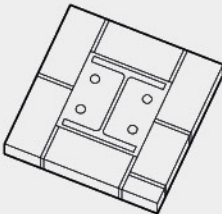
Concrete Core vs. CLT Cores

Volume (m³)	105
Concrete Quantity (t)	250
Total Concrete EC (tkgCO2e)	30
CLT Quantity (t)	50
Total CLT EC (tkgCO2e)	-61
Relative Carbon Reduction (tkgCO2e, incl. seq.)	91

Additionally, by eliminating any monolithic concrete construction beyond the foundations, the concrete contractor has minimal involvement / will not need to return later on.

Sequestered carbon via the CLT cores can account for a 30% increase in the A1–A5 allowance in the service spaces (see page 8).

These cores provide cross bracing to the steel structure at either end of the piano workshops, transferring lateral forces from the frame to the foundation.



Reinforced Recycled Steel Columns w/ 20% Reclaimed Brick vs. New Steel Columns w/ No Rebar or Concrete

Calculated per metre of bricked column, see the diagram above

Brick Volume (m³) (1 brick height used, 65 mm)	0.0089	Brick Volume (m³) (1 brick height used, 65 mm)	0.0089
Steel Volume (m³)	0.00013	Steel Volume (m³) (assumes the same volume for this calculation though will likely be greater)	0.00013
Steel Rebar Volume (m³)	0.0028		
Concrete Volume (m³)	0.00059		
Total EC (kgCO2e)	9.89	Total EC (kgCO2e)	16.3
Area (m²)	0.19	Area (m²)	0.19
Total EC/m (kgCO2e/m)	52	Total EC/m (kgCO2e/m)	86

Overall resulting in at least a 60% embodied carbon reduction for each column /m. By being cast into the masonry column, the brick walls can provide some additional lateral stability to the frame — acting as a bracing.

Embodied Carbon



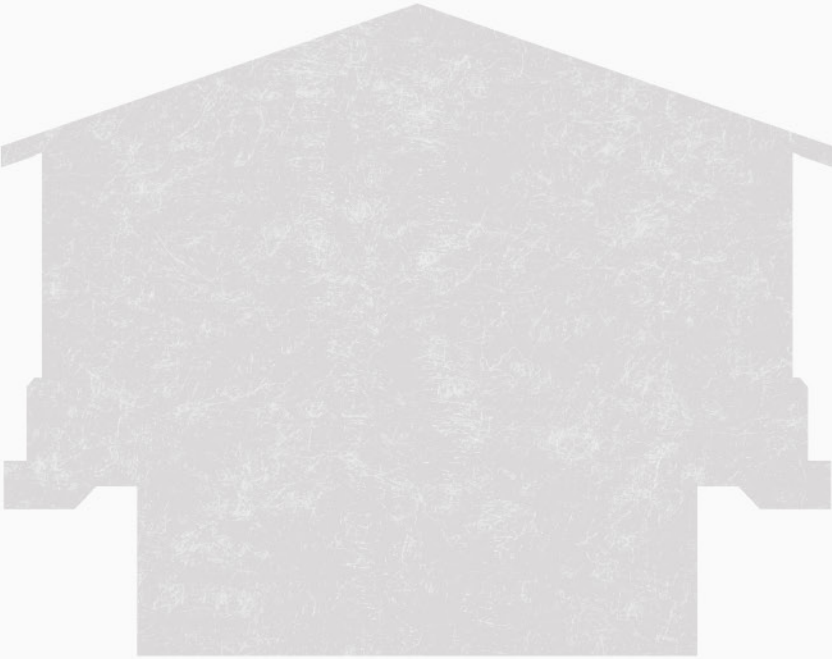
Typology Precedent Figure 5.3
Glyndebourne Production Hub

Nicholas Hare

A hybrid CLT and Steel structure that achieved a BREEAM rating of Excellent as a low-carbon workshop and research-based facility.

Hybrid structures can allow for greater flexibility in material-choices, and so the assignment of low-to-high embodied carbon materials optimally in order to reduce the building's footprint. These are some structure-based examples.

To compare with the data used in these calculations, please look at the following source, Bath (2019), and any branching sources recommended within its spreadsheet.

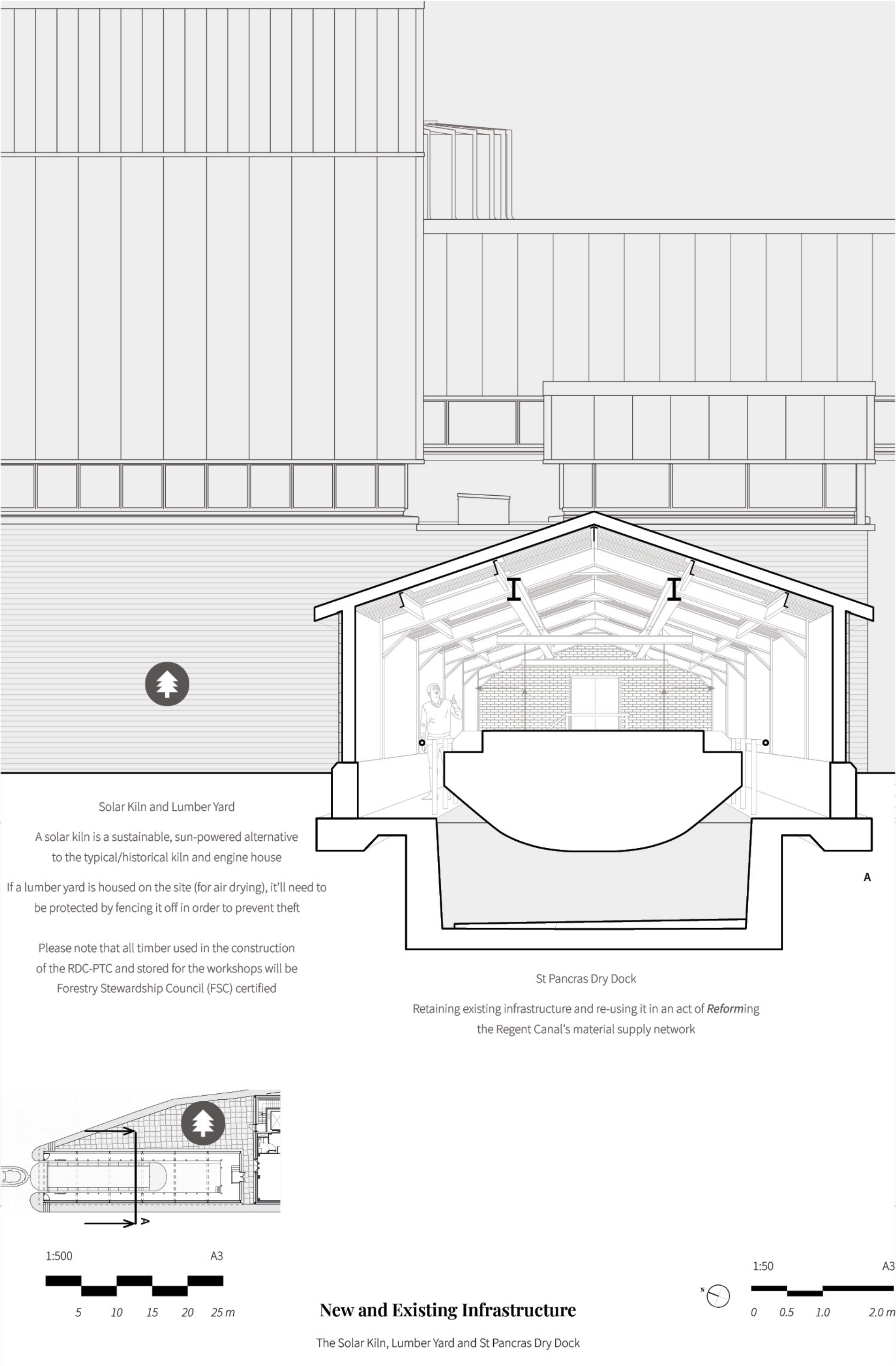


Act 6
The Overture
The Dry Dock



Delivery to the Dry Dock

A late order of supplies arrive at the CSM's / SPCC's during a wet and cold Tuesday night in King's Cross (a view from Tapestry Building)



Regent's Canal Reformed

The Canal Network

Pianos, piano parts and building materials such as bricks, timber and steel were once transported via London's inland waterways — as enabled by the many Wharves, Docks and Basins constituting the distinctive canal-side industrial grain, for example: *Dingwall's Wharf's* softwood stores (see plans below) (Camden, 2008).



Figure 6.1, Coal Barges to Horses at St Pancras Basin

Period	Trade (t/yr)
1830	0.5 m
1850	1.0 m
1870	1.4 m
– WW1	1.0 m
– WW2	-
1960s	Ends

Canal Trade

A greater dependency on rail freight (ibid.), post-industrial change and Two World Wars (see figure 6.2) saw the canal fall into 'dereliction and decline' (Parry, 2021), shifting from transport network to public cruising.

See figure 6.3, Towpath In-Use (site peninsula to right of picture)

And figure 6.4, Towpath Today (CDY, Coal and Fish Offices, and underpass remain)

Figure 6.2



Local Precedent

A Unique Opportunity

Although there are significantly fewer operational transport facilities, the site's pre-existing (and only city-wide) dry dock, basin and tunnel, as well as an uninterrupted canal-edge offers a unique opportunity to *Reform* the network as we enter what Parry (2021) terms a “Green Industrial Revolution” for London's canals. Utilising canal freight to supply materials for both construction and R&D projects.

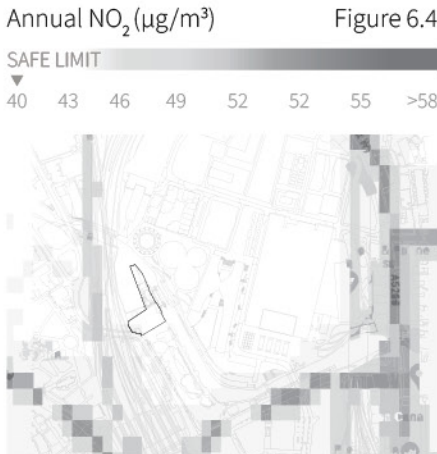
Figure 6.3



A4 Reduction

Canal freight contributes to only 25% of CO2 emissions (CBOA, 2022b) of the equivalent road haulage, while offering greater storage capacities (in many cases 3–4 times) (CRT, 2022) and the ability to be used as additional storage space on-site where access is limited e.g. at the Dry-Dock end.

For each journey of an 80 t canal barge, a saving of 706 kgCO2e is made.



Air Quality Commitment

KX (an *Urban Island*) is congested with traffic from *Euston Road* and *York Way*. Road transport is 20% of the UK's GHG emissions (CRT, 2022) and the LBC is in an Air Quality Management Area (AQMA) committed to reducing NO₂ and PM_{10/2.5} from vehicles/construction. As freight burns 25% of the amount of diesel (CBOA, 2022a) and can operate with biofuels, it supports a significant step in improving the air quality.



Local Precedent

Supplying Building Materials

The Woodhall & Heward fleet was used in the construction of the King's Place cultural centre in King's Cross by transporting stone cladding and other building materials. A local precedent that further demonstrates the logistical capabilities of canal *Reform* in the construction of the RDC-PTC.

Figure 6.5

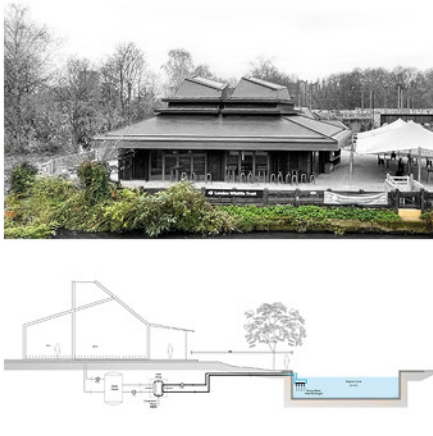


Local Precedent

Providing Maintenance

The Woodhall & Heward fleet and the Powerday Waste Reprocessing have set a precedent for the use of canal freight in the transport of operational waste from the site on behalf of the St Pancras Cruising Club. A relationship that should be maintained and furthered in the Research and Development Centre.

Figure 6.6



Local Precedent

Expanding the Canal's Use

Erect Architecture

A closed-loop WSHP, specifically a 4.0 Coefficient of Performance (COP) 3000 x 500 mm *Nuenta Energy Blade*, is installed along the banks of the Regent's Canal at a depth of 1 m. This provides underfloor heating and cooling to the CSNR (Architecture, 2017). Their energy strategy follows the principles of : Be *Lean* (reduce), Be *Clean* (efficient) and Be *Green* (renewable) (ibid.).

Logistics Study



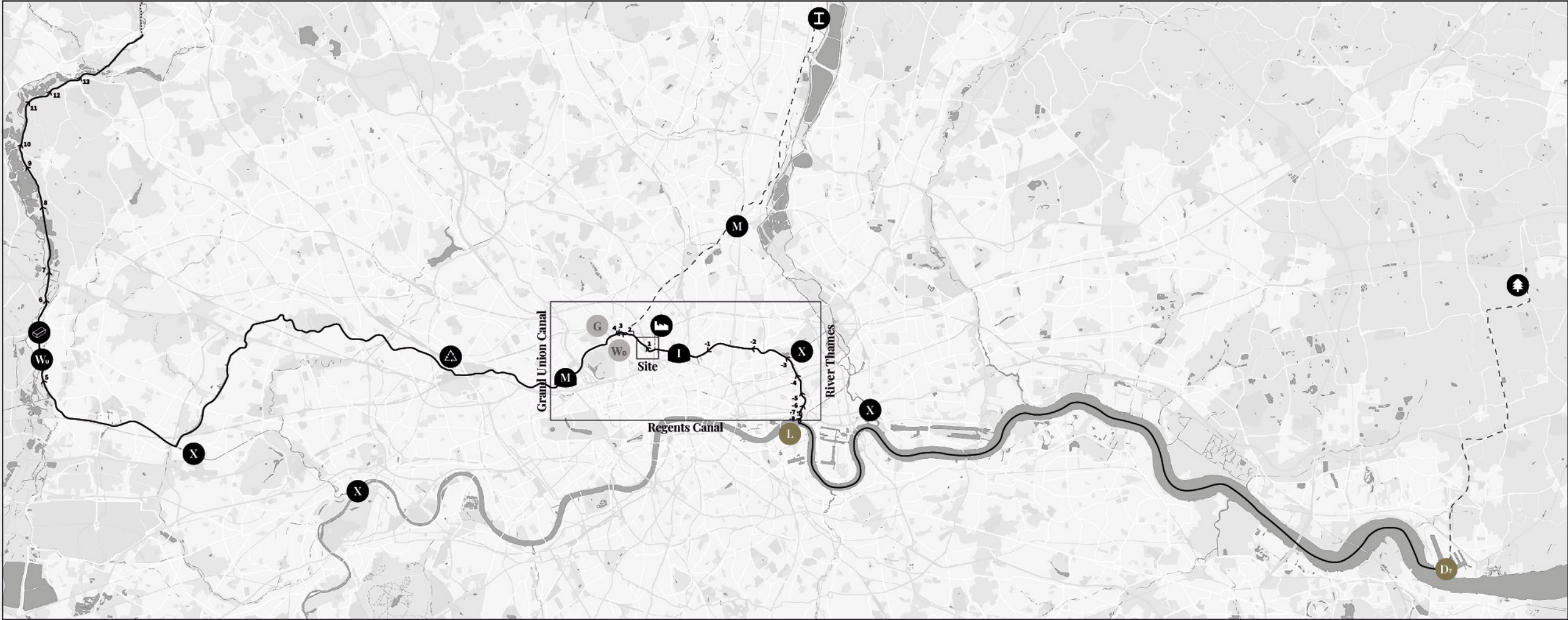
National Waterways



A Readily Available Network

Adjacent to the *Regent's Canal*, the site is connected to a 3,000 mile long transport network in the form of the *Grand Union Canal (GUC)*.

Categorised as *Broad Waterways*, the *GUC* is still authorised for commercial freight due to the minimum width of 4.4 m and the minimal number of locks along the canals (R). The number of locks and tunnels have been noted for each route.



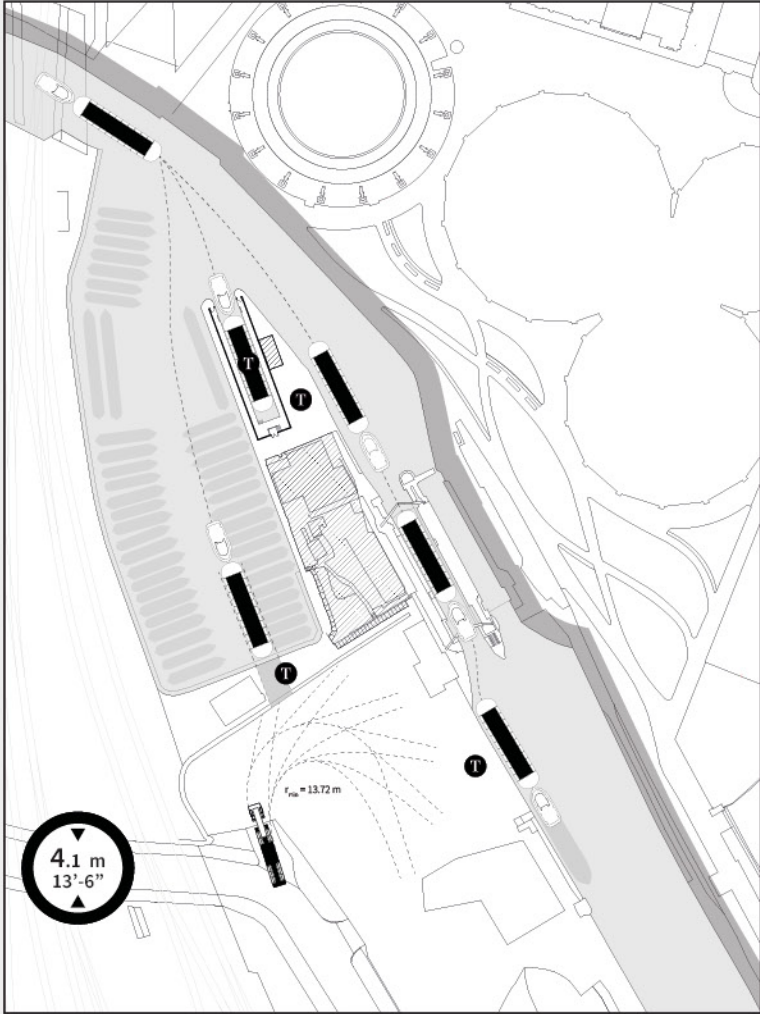
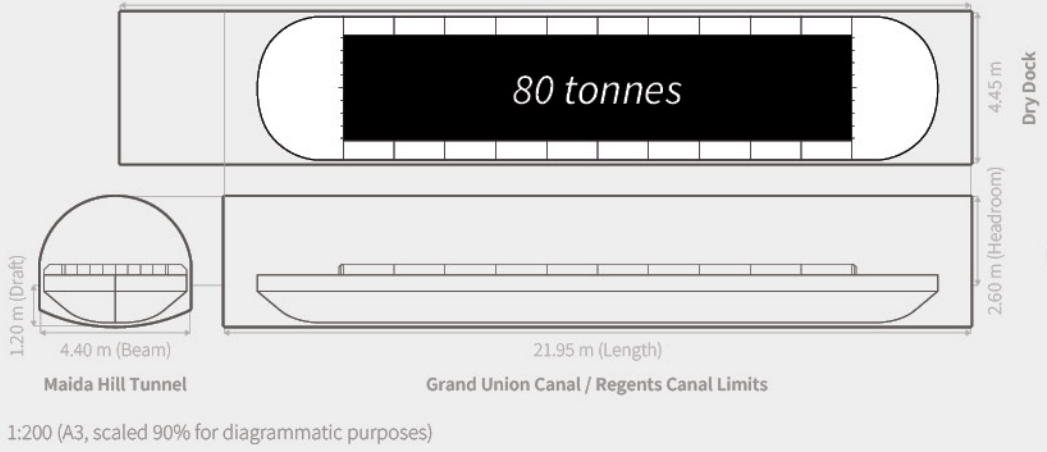
Local Waterways (*Reformed* / *Historical*)



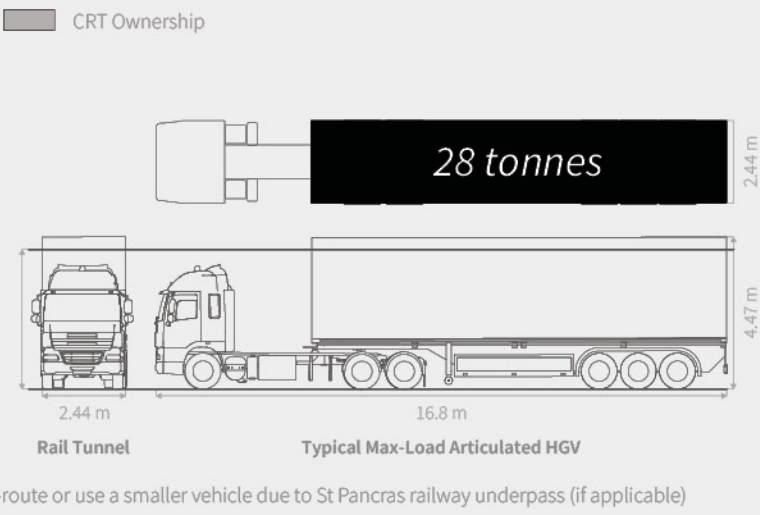
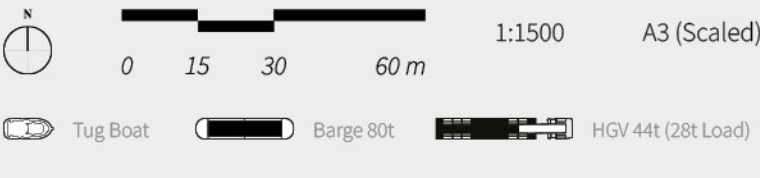
Material Sourcing

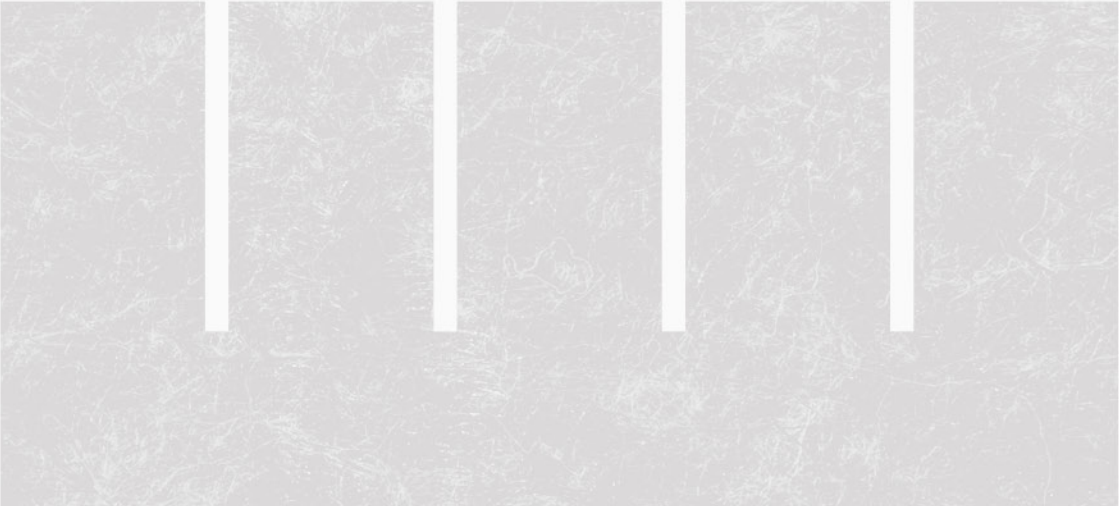
Resource	●	<	●	Canal Distance to Site (km)	HGV Distance to Site (km)	A4 (kgCO2e)	Reduced /80t Journey	e. HGV Distance to Site (km)
Powerday Waste Reprocess.	4	1	10.2	-	25.7	49.0	10.9	
H.G. Matthews Brick Maker	33	1	63.6	13.7	191	199	58.4	
London Reclaimed Brick	6	1	33.8	2.09	89.9	313	60.4	
Robinson Timber Manu.	9	1	41.0	15.3	138	199	59.5	
Metalcroft Metalworks	-	-	-	7.40	16.8	-	7.40	
Cannon Steels	-	-	-	18.0	41.0	-	18.0	
Cemex Concrete	-	-	-	1.12	2.56	-	1.12	
Total Reduction (kgCO2e)							706*	
Conv. Factor (kgCO2e/tkm)				0.028	0.65		*Minimal savings initially but will increase per journey	

Vehicle Limits



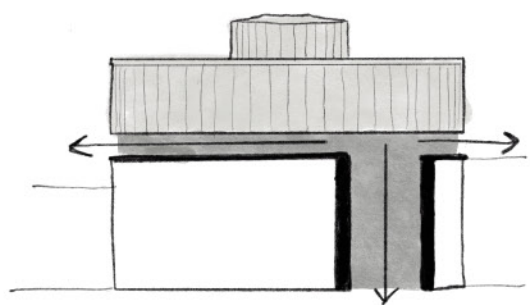
Delivery Access (construction and workshop supply)





Act 7
An Exposition

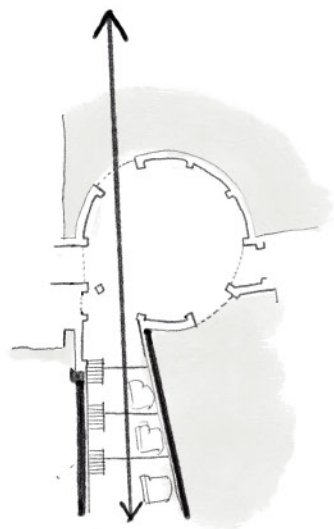
Entering the RDC-PTC



Defining the Primary Entrance

The horizontal bands of curtain walling expand and push down to the ground. Glazing becomes threshold as it breaks apart the continuous stained concrete cill causing it to also fall towards the ground; defining the entrance. Moreover, the primary entrance is emphasised by facing the bridge and CSM.

This is mirrored on the other side for the secondary Retail Street/Industrial Mew entrance.



A Permeable Threshold

A continuous view up and towards the Grade II listed Waterpoint (now a performance space) is maintained by this grand entrance. As you enter perpendicularly to the threshold, the view changes, bringing the café start-point and street into focus (and vice versa from the retail street behind).

All that remains of the industrial wall at the front of the RDC-PTC is the large brick pier that originally concluded the wall. Now forming part of the wayfinding, a sign for the centre will be attached to it's front face or on top e.g. a flag.

The Centre of the RDC-PTC

A Welcoming

Under, over, in-between, through — the interweaving between old and new.





Local Precedent
No.5 Grand Union Walk
Grade II
1988

Grimshaw

As a Camden-based project, it greatly influenced my response to a similarly tight site constrained by the GUC, main roads and limited area. In addition to demonstrating a contemporary re-interpretation of the GUC's unique industrial character. As observed in the stratified façade of concrete, clerestory glazing and aluminium; the rhythm of solid (units) and void (shadow / glazing), and distinct vertical circulation.



Local Precedent
CSM / Granary Building — Vertical Rhythm

Stanton Williams / Lewis Cubitt

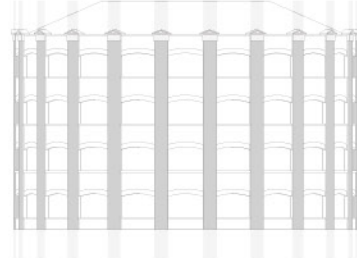
The vertical rhythm is created by the original set back faces that would have housed the multi-level cranes. It has now been replaced with continuous glazing that is subtly broken up by these old divisions.

NV = Natural Ventilation Chimney
MV = Mechanical Ventilation Chimney/Flue



Figure 7.1 (adapted)
Roof / Materiality
Scaled Diagram

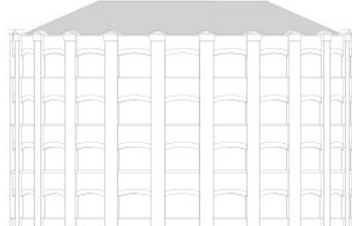
A mansard roof-styled lantern with skylights protrudes from the top of the CSM — which is visible on entering Granary Square because of the significant open space in front of it.



Local Precedent
The Rotunda — Circular Rhythm

Collard & Collard Piano Factory

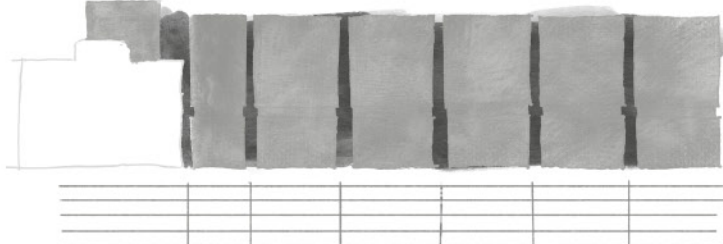
A continuous vertical rhythm runs around the 22-faced oval and as with the Granary Building, it is broken up by fenestration — which the PWS learns from and adapts to create these deeply recessed glass 'T' shapes that denote the (shadow) thresholds for each group's space.



Roof / Materiality
1:50

Similarly to the CSM, a tiled double-roof form continues beyond the façade in order to create a central oculus for the space.

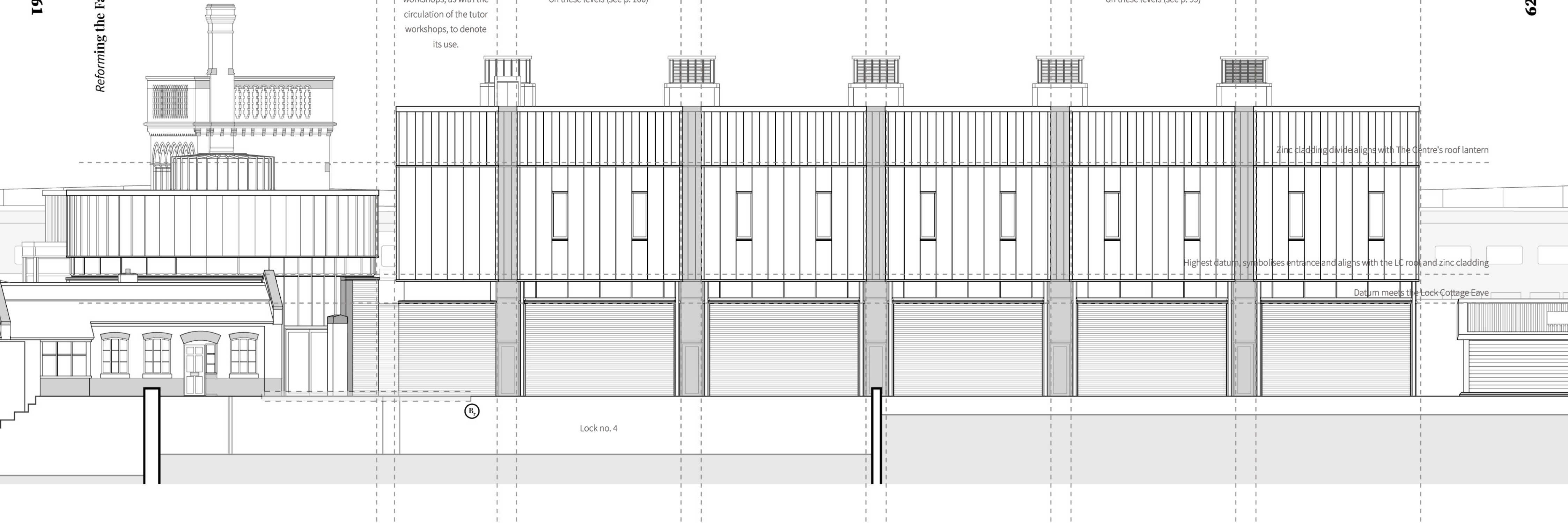
The same design rationale has been emulated for The Centre.



Music in Elevation

There is a great similarity between staves to lines of mortar and bars to the (shadow) thresholds between the workshops. A concept that was explored throughout the façades composition.

The proposed Y2 block continues the Waterpoint in harmony — no longer an isolated monument.



Façade Composition
Detailed Elevation

Zinc Cladding Panel
Oxide Red
RAL 3009

The zinc panels, square profiled corners and horizontal divisions are made of 80 mm deep standing steams. This produces rich shadow profiles and when combined with the slightly reflective/speckled coating.

Resulting in a diverse, ever-changing building façade.

Painted Steel
Ruby Red
RAL 3003

Contrasting against the "oxide red" of the zinc cladding, the ruby red intrumescent painted steel highlights the strong industrial aesthetic.

Aluminium Frame
Mouse Grey
RAL 7005

Deep and thin glazing bars minimise glare and direct sunlight through vertical shading and by creating a continuous light shelf for each of the bays.

The aluminium frame provides an element of syncopation to the rhythm of the Waterpoint by producing a further set of divides (1.2 metres) that break at the coners through continuous glazing.

Stained Cast Concrete
Terracotta Red Brown
RAL 0305020

Stained concrete breaks up the two levels of cladding, brick and zinc, and so forming three datum lines for their respective building (Y1/Tutor Workshops, The Centre and the Y2 Piano Workshops). As also shown on page 61.

Luton Grey Brick
H.G. Matthews
Buckinghamshire

As sourced on page 55, the Luton Grey Brick's are a form of fletton bricks, with dark kiss marks from where they have been in contact in the kiln. Process, as with the building form or workshop ceiling, is marked on the surface. The rich pink-red-orange and grey tones with the beige mortar complements the diverse textures of the site — from the orange of the tapestry building and the red-beige of the Waterpoint to the yellow and red stock mixed brick of the Lock Cottage and canal edge.



Façade Composition
Translating the Waterpoint

Architectural patterns have a distinct musical quality. Rhythm can be visualised through the proportions, repetition and overall composition of a cladding. Though the RDC-PTC will not always serve as a site for piano-making, the tuneful similarities of these two subjects are inescapable.

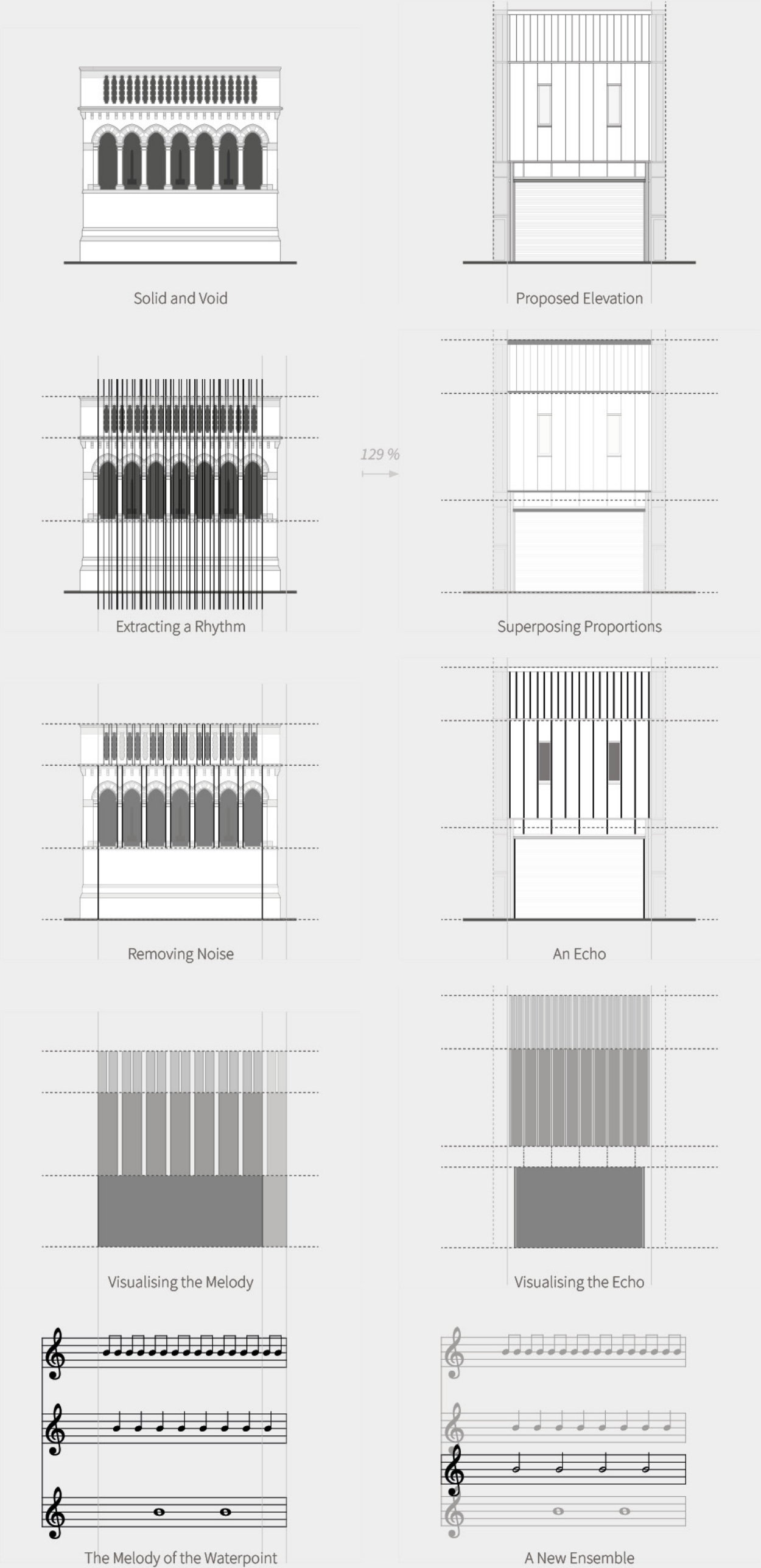
A sense of scale can be easily lost within the dense urban architecture of London, however King's Cross and the site is a rare moment of openness. Panoramically, the large Granary Square, St Pancras Basin and Nature Reserve, allow each building to breathe — scale and its prominence is not lost but emphasised.

Thin horizontal bands of beige stone break apart the visually massive red brick walls of the Waterpoint into 3 divisions (and a chimney — not pictured). An echo that is repeated practically in the RDC-PTC.

As with the Waterpoint, an English cross bond course is used — made up of alternating headers and stretchers with king and queen closers.

The sizing of zinc cladding panels initially determined the division of each tier. At a maximum size of 600 mm, the possible next sub-division was either 100, 200 or 300 mm. Recommendations from my tutor regarding the difficult constructibility of panels smaller than 200 mm narrowed down my initial options, and the Waterpoints melody confirmed it at a 2:1 (600:300 mm) composition.

Strongly inspired by Niall McLaughlin's Jesus College façade (see McLaughlin, 2019) and earlier work during a music-based project in first year — the translation of architectural patterns to notation or sound waves has been well developed.



The Tectonics of Rhythm

Military Axonometric



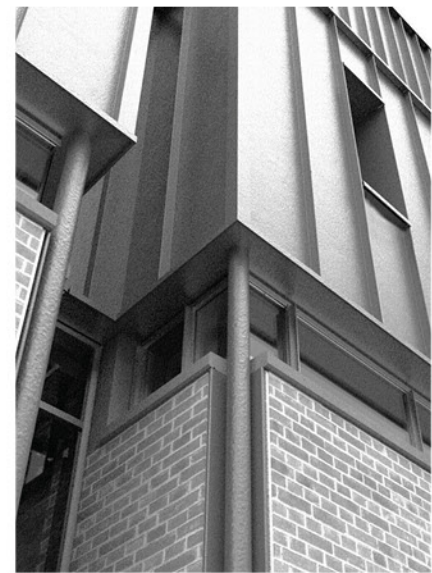
Local Precedent The Tapestry Building

Níall McLaughlin Architects

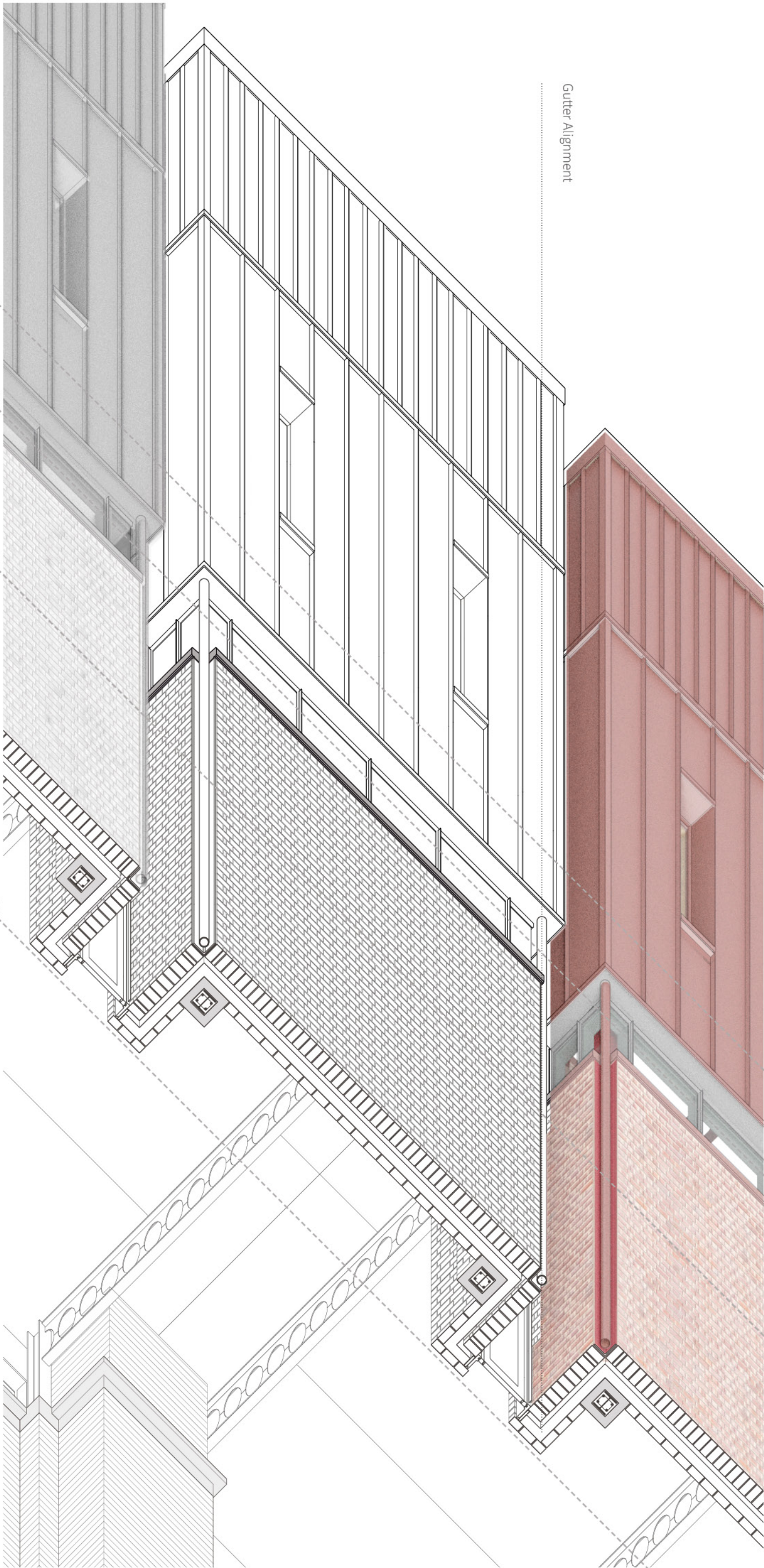
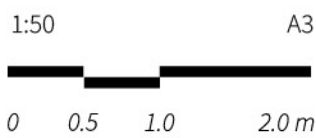
The Tapestry building is clad with Techcrete's terracotta-coloured (G171 R12000) GRC panels (Techcrete, 2019), a reddish-orange colouring alike to KX St Pancras and WP, while contrasting CDY's yellow stock London Brick. Each panel is ornamented with recesses and flower-like motifs emulating patterns from Assyrian textiles at the British Museum (Burton, 2014). A stylistic application with similarities to the Art Deco movement's and Egyptian geometry.

Niall McLaughlin was inspired by Louis Sullivan's Guaranty Building (as confirmed in McLaughlin (2014), a case study for the application of Semper's theories relating but not limited to craft, tectonics, textiles and polychromy.

As described on the opposite page, cladding and cladded rhythm continues upwards from the brick wall — with the curtain wall glazing and rainscreen zinc panels being aligned, coloured and patterned as if an item of clothing.

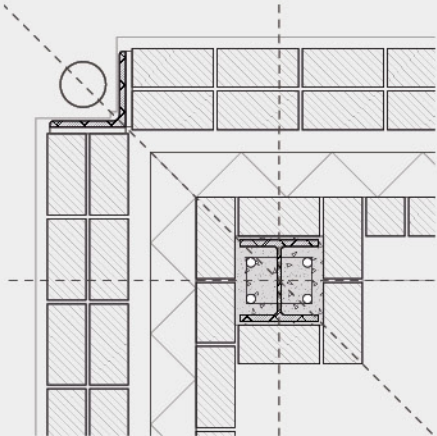


Looking up at the corner



Constructing the Corner

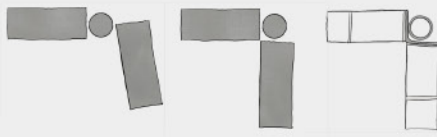
Expressing the "Mundane"



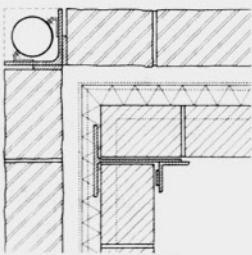
A negative corner, created by the use of equal-angle steel plates accentuate the disconnected wall — with the outer façade acting as a piece of woven textile that has been hung between; suspended like the piano elements within the workshops.

Guttering then rests within this negative space, emphasising the verticality of the façade — following the movement of water under gravity and meeting the ground.

As the circular gutter inhabits the square profile of the equal-angled columns, it becomes a radial point to the linear walls; translating the building's relationship from site-to-building / macro-micro at the tectonic level.



Macro to Micro Tectonics (Plan–Corner)



Typology Precedent Shoe Factory

Figure 7.2
1995

Haworth Tompkins

Originally seen in Birkhauser's Masonry Construction Manual (Pfeifer et al., 2001), I have been obsessed with the use of an equal angle to break-up what can be perceived as monolithic walls of masonry. Tompkins took this one step further with the inclusion of a gutter in his design for a series of workshops for shoes.

Year 2 Modules

Unit 3 (9 months)

Crafting the Piano

An intensive module that sees each group create a functioning 1:1 piano, following what they have studied and prepared in year 1 (Units 1 and 2). They will continue with their previous tutors as hands-on guides but will be aided by visiting specialists and first year students at key points, such as: stringing, making the action and tuning. Each drawing, manufacturing stage and constructed element will be digitally recorded (e.g. photogrammetry, diaries and photographs) so that in preparation for Unit 4, a digital twin is formed.

Group 2 are hard at work, the masters students of the RDC-PTC begin fitting the action to the piano, as their final year project draws to a close.

Unit 4 (3 months)

Reform and Regenerative Futures

The archive preserves the piano making process, the hand of the craftsman is logged dimensionally, their memory captured. From the pressure of a pen stroke or grain and of chosen wood to the prose of the maker's logs, the embodiment of craft extends its life. At the end of the course, students will take this digital copy and create an evolved form, that continues to generate variations of functionable models that can be played within a virtual environment. These will be celebrated alongside the other piano at an end of course show. Real and virtual mirrored against each other.

The rest of Group 2 are helped by their tutor during a late evening of digital modelling and report writing for Unit 4.



Music is liquid architecture;

Architecture is frozen music.

Goethe (1749–1832),
as seen in *McLaughlin* (2019)

How Pianos [are] Made
The Piano Workshops



3 Bending the Rim

No. Craftspeople: 5

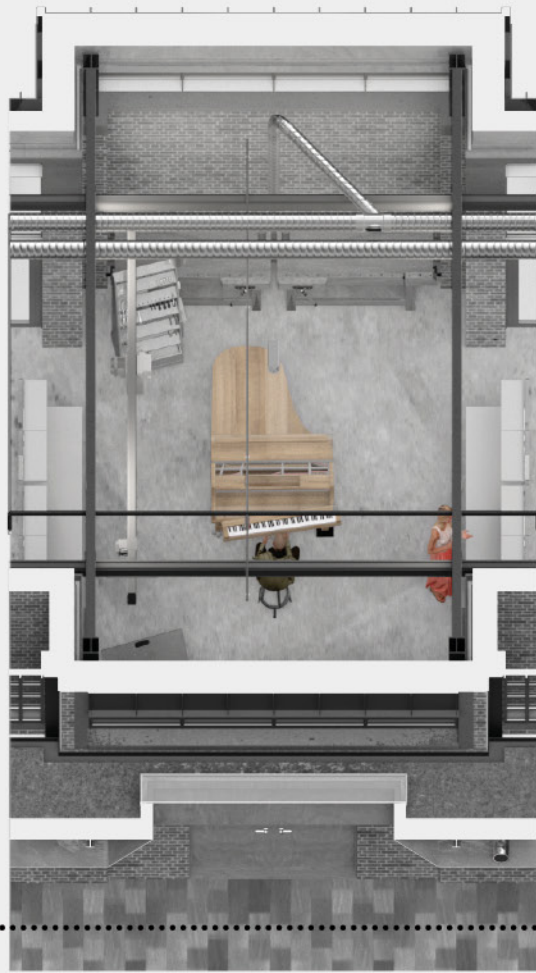
Comprising of 16 layers of planed maple that are glued together, the rim is clamped in place on sawhorses and then left to be conditioned for two months.



4 Casting and Enamelling the Piano Plate

No. Craftspeople: 3

Grey cast iron is monolithically formed to withstand 40k pounds of force from the strings. This can be produced off-site and transported in via canal or van from a foundry or produced on-site using the Y1 Workshop's Metallurgy facilities. Typically the plate is sand cast and then sanded and primed to be painted bronze by hand.



12 Fitting and Checking the Action to Grand

No. Craftspeople: 1

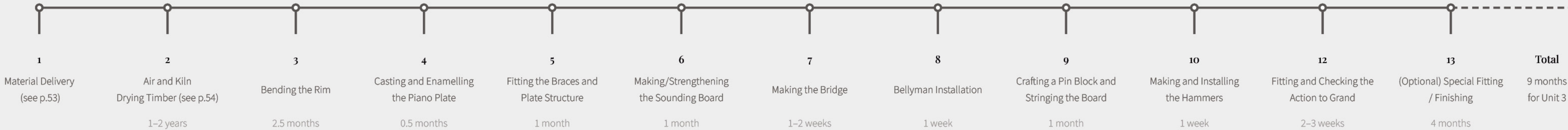
As previously described on p.18, fitting the action to grand is a quiet conclusion to the piano making process and can be either carried out in the Y2 Workshops or the group-dedicated Tuning Rooms. N.B. Each space is appropriately dimensioned to allow for additional room-in-room construction e.g. high ceilings, flexible LEV provision and sufficient area.



13 (Optional) Special Fitting / Finishing

No. Craftspeople: 2

Portable industrial-sized spray booths can be built inside of the workshop space and connected to the extract system. Sanding, varnishing, painting and so on can all be applied in this space. Typically this constitutes around 3 weeks of painting, and of drying. In addition to a 3 month finishing period if needed (e.g. japanning).



Steinway Precedent
8 Bellyman Installation



Steinway Precedent
5 Fitting the Braces and Plate



Steinway Precedent
8 Bellyman Installation



Steinway Precedent
10 Making and Installing the Hammers

Y2 Workshop and Studio

Detailed Section (STF)

Detail Key

Externally-Internally / Up-Down

Typical 1F Wall / Detail A

Luton Grey Brick	215 mm
Cavity	58.75 mm
Insulation	120 mm
Luton Grey Brick	102.5 mm

Typical Window / Detail B

Double Glazing	24 mm
w/ Low-e Coating	

Aluminium Frame	70 mm
-----------------	-------

Compartment Floor / Detail C

Wooden Floorboards	20 mm
Heated Screed	60 mm
Protective Membrane	
Acoustic Insulation (impact)	60 mm
Chipping Infill	30 mm
Emergency Membrane	
CLT (protected, see p. 130)	245 mm

Typical 2F Wall / Detail D / Rainscreen

Zinc Panel	0.8 mm
Plywood	18 mm
Timber Batten	120 mm
(and metal fixing)	102.5 mm
Ventilated Cavity	>150 mm
Insulation	120 mm
Breathable Membrane	
CLT	139 mm
Acoustic Plasterboard	36 mm

Typical "Flat" Green Roof / Detail E

Sedum / Planting	20 mm (min)
Soil Substrate	100 mm
Filter Fleece	
Drainage Board	20 mm
Protection Mat	
Protective Membrane	
Insulation	200 mm
Breather Membrane	
CLT	245 mm
Suspended Ceiling	

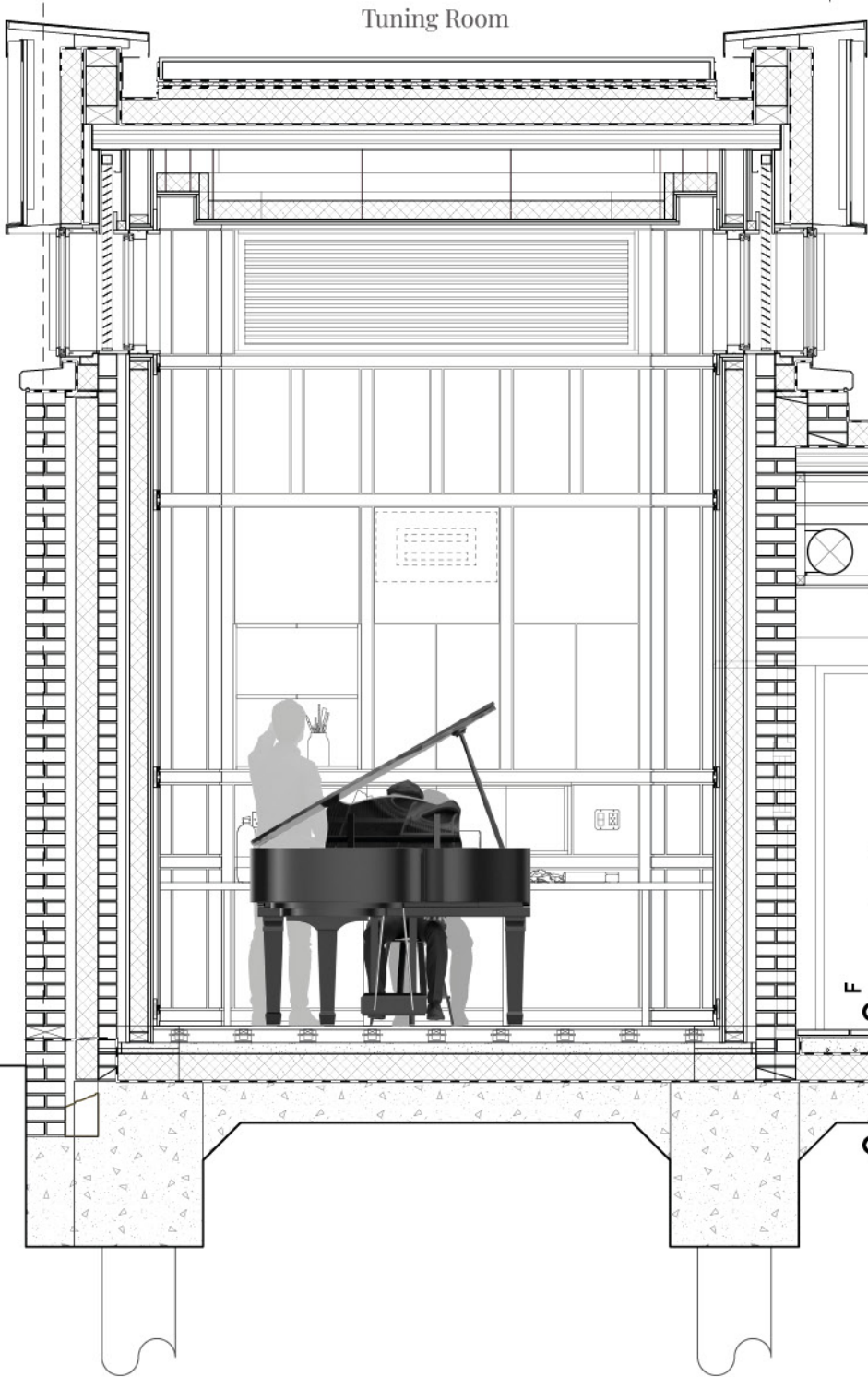
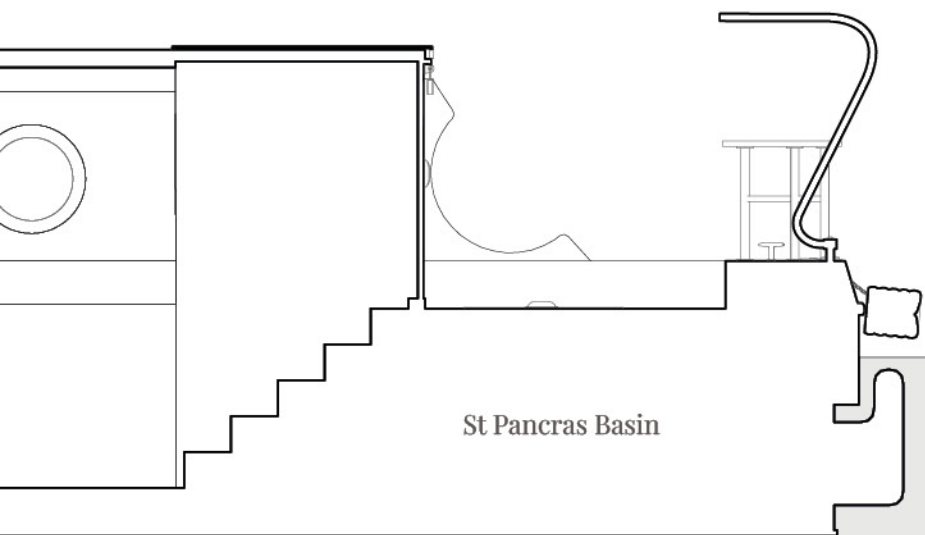
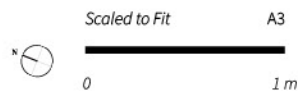
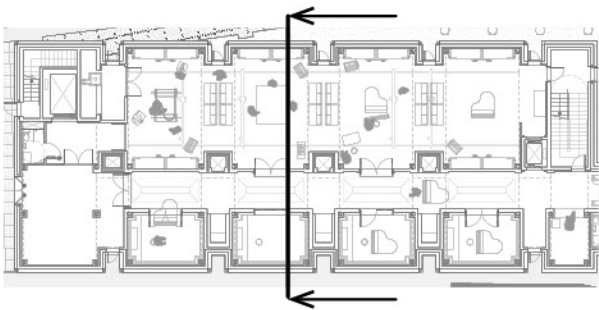
Typical Ground Floor / Detail F

Stone Tiles	30 mm
(smaller but matches landscaping)	
Mortar	10 mm
Heated Screed	90mm
Protective Membrane	
Insulation	150 mm
Raft-Pile Foundation	>225 mm

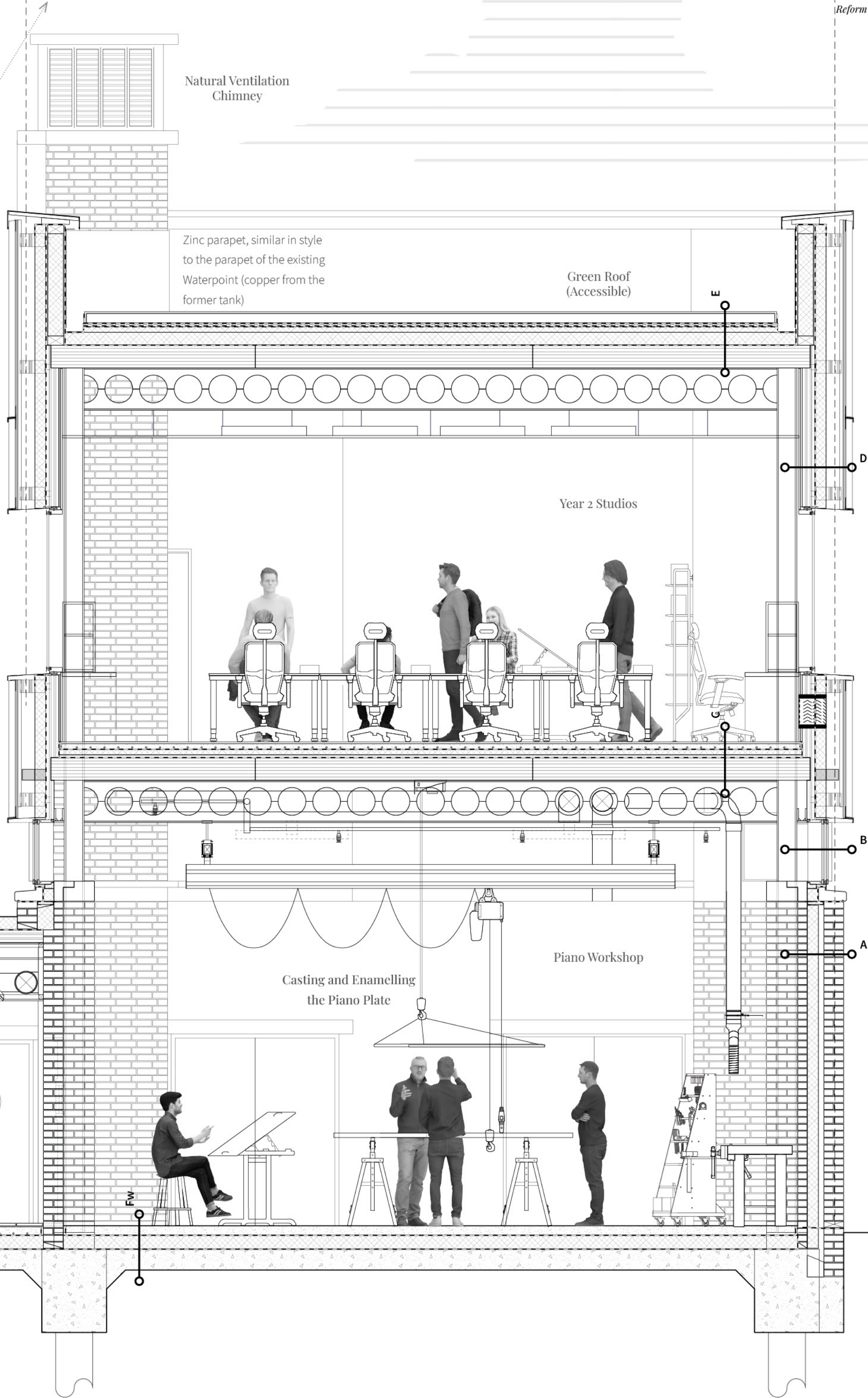
Typical Ground Floor / Detail Fw

Resin Coating	5 mm
Wearing Screed	100 mm
(to manage significant loads)	
Protective Membrane	
Insulation	150 mm
Raft-Pile Foundation	>225 mm

Increases in height away from the St Pancras Basin — to not dominate in scale, overshadow the boats and minimising the Urban Canyon effect



Gutter Alignment



LETI Climate Emergency Design Guide	
Element	Target U-Value (W/m²K)
Walls	0.13 – 0.15
Floor	0.09 – 0.12
Roof	0.10 – 0.12
Windows	1.2 (double)
Doors	1.2

Part L2 — Limiting U-Values	
Element	Target U-Value (W/m²K)
Walls	0.26
Floor	0.18
Roof	0.18 (0.16, p)
Windows	1.6
Doors	1.6

Project Target	
Element	Target U-Value (W/m²K)
Walls	0.16
Floor	0.12
Roof	0.12
Windows	1.6 (double)
Doors	1.2

For references relating to building regulations and standards, please see page 128.

Typical 1F Wall / Detail A			
Material Layer	Conductivity (λ, W/mK)	Thickness (m)	R-Value (m²K/W)
External Surface Resistance (R _{se})	-	-	0.06
Brick	0.62	0.3075	0.50
Mortar	-	0.01	Negligible
Ventilated Cavity	-	>0.05	0.12
Insulation	0.022	0.12	5.50
Internal Surface Resistance (R _{si})	-	-	0.12
Total R-Values (m²K/W)	6.25		
U-Value (W/m²K)	0.16		

Typical Window / Detail B	
Material Layer	U-Value (W/m²K)
Double Glazing w/ Low-e Coating	0.96
Aluminium Frame	1.9

Typical 2F Wall / Detail D			
Material Layer	Conductivity (λ, W/mK)	Thickness (m)	R-Value (m²K/W)
External Surface Resistance (R _{se})	-	-	0.06
Zinc	110	0.08	Negligible
Ventilated Cavity	-	0.05 (min)	0.12
Insulation	0.022	0.12	5.50
CLT	0.12	0.139	1.16
Plasterboard	0.25	0.036	0.144
Internal Surface Resistance (R _{si})	-	-	0.12
Total R-Values (m²K/W)	7.05		
U-Value (W/m²K)	0.14		

Typical "Flat" Green Roof / Detail E			
Material Layer	Conductivity (λ, W/mK)	Thickness (m)	R-Value (m²K/W)
External Surface Resistance (R _{se})	-	-	0.06
Green Roof	0.95	0.1	0.11
Insulation	0.022	0.2	9.10
CLT	0.12	0.25	2.04
Internal Surface Resistance (R _{si})	-	-	0.12
Total R-Values (m²K/W)	11.4		
U-Value (W/m²K)	0.10		

Typical Ground Floor / Detail F			
Material Layer	Conductivity (λ, W/mK)	Thickness (m)	R-Value (m²K/W)
External Surface Resistance (R _{se})	-	-	N/A
Stone Tiles	1.73	0.03	0.02
Mortar	-	0.01	Negligible
Screed (varies)	1.1	0.1	0.09
Insulation	0.022	0.15	6.82
Foundation	2.3s	0.225	0.10
Internal Surface Resistance (R _{si})	-	-	0.12
Total R-Values (m²K/W)	7.14		
U-Value (W/m²K)	0.14		

Typical Pitched Zinc Roof / Detail G (Warm Ventilated Roof, see p. 112)			
Material Layer	Conductivity (λ, W/mK)	Thickness (m)	R-Value (m²K/W)
External Surface Resistance (R _{se})	-	-	0.06
Zinc	110	0.08	Negligible
Ventilated Cavity	-	0.05 (min)	0.12
Insulation	0.022	0.2	9.10
Internal Surface Resistance (R _{si})	-	-	0.12
Total R-Values (m²K/W)	9.39		
U-Value (W/m²K)	0.11		

Typical U-Values

Meeting Regulation and Sustainability Targets



Act 8
Intonation

Crafting the Canal Cottage

The Lock Cottage(s)

Originally situated on the opposite side of the canal as a *Back-Pumping Station and Cottage*, it was migrated adjacent to the *Lock no.4* and *St Pancras Basin* due to increased demands resulting from a series of dry summers at the end of the 1890s (GLIAS, 1995). Upon the merger of the Regent's Canal and Grand Junction Canal companies into the GUC in 1929, the building was extended and converted into primarily a *Lock Keeper's Cottage*.

Grade: II (1974)

Architect (known for)
Sir John Wolfe Barry
(Tower Bridge)

Year: 1898 (Replacement)

Owners:
Canal and River Trust

Users
Residential



Figure 8.1 and 8.2, The Lock Cottage(s) (Original vs. Today)



Figure 8.3, 1895 Figure 8.4, 1953

1. Chimney

Provided draught to the *Boiler Room*. There was not sufficient material except the image on page 79 to show the location and size of the *Chimney*, therefore the diagram is purely indicative but based on other pumping stations (e.g. Claverton pumping Station).

2. Pump Well

Housed the "Centrifugal Pump" (GLIAS, 1995) to help maintain the Regent Canal's minimum water levels.

3. Canal Culvert

Water access from the bottom of Lock no. 4 to the Pump.

4. Engine House / Boiler Room

Based on historical precedent, the double-height space would have provided an enclosure for the *Engine, Boiler* and any other equipment necessary for powering the *Centrifugal Pump* (5).

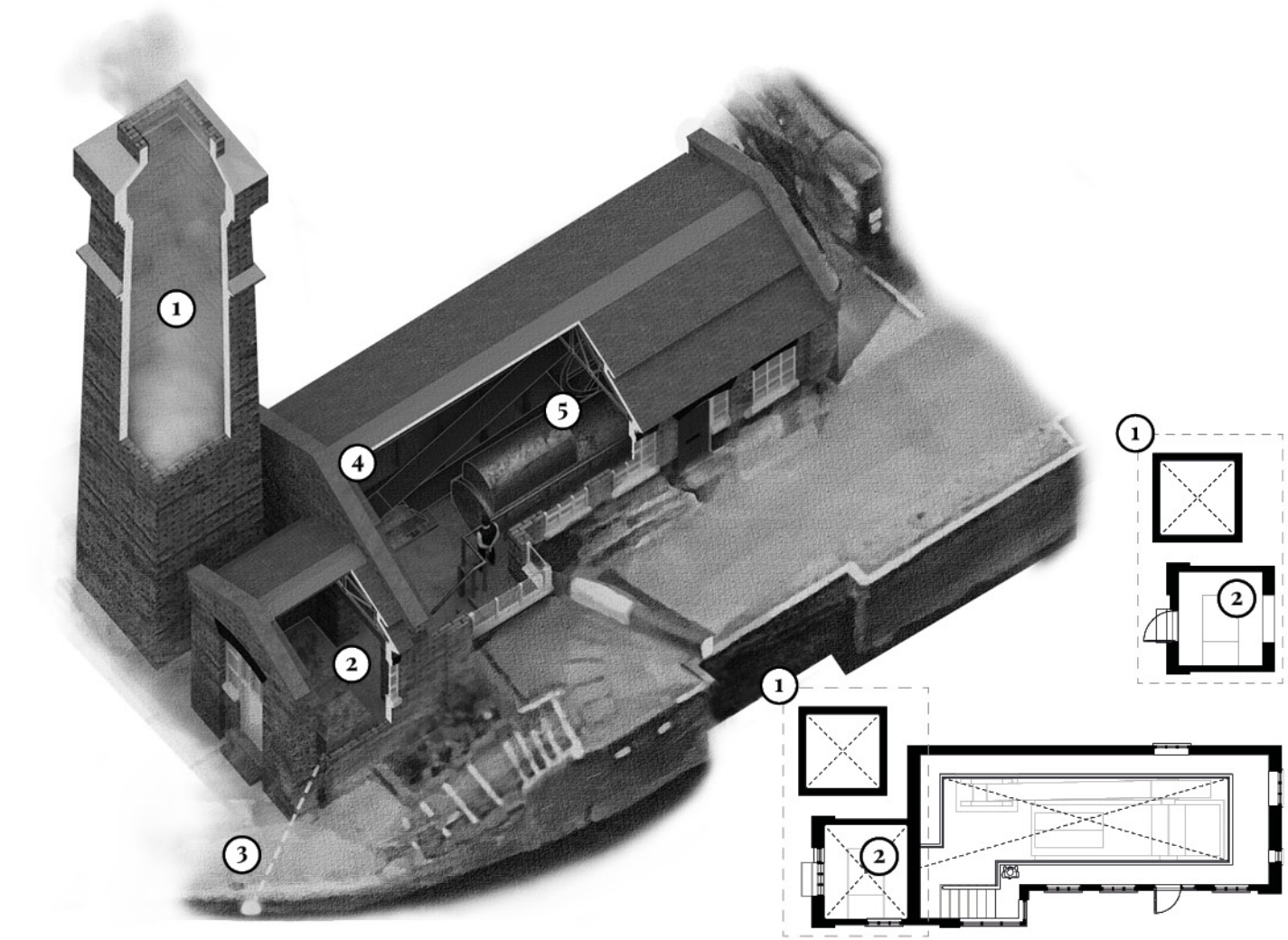


Figure 8.5, 1897: The Rebuilt Back-Pumping Station

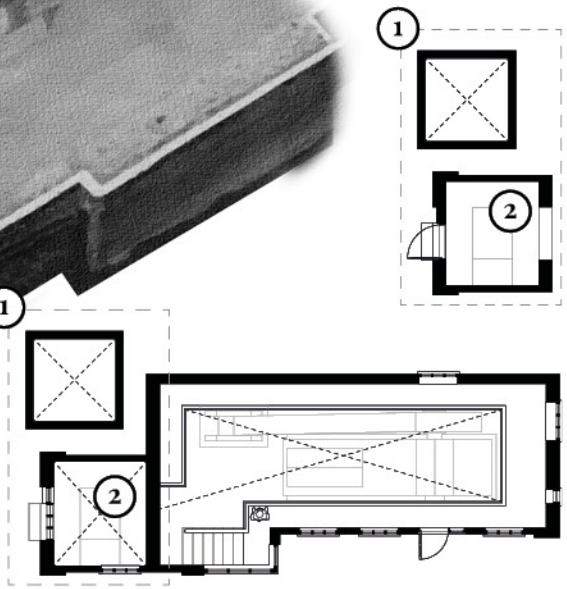


Figure 8.6, 1897 Floor Plans (assumed)

6. Bedrooms

Part of the Lock Cottage extension.

7. Bathrooms

A suspended timber floor has been added to level-off the Lock Cottage so that it is all one floor — covering the *Pump Well* and making the door obsolete.

8. Hallway

9. Living Room and Kitchen

As with the bathroom, the 1.5m height space has been levelled off with a suspended timber floor and a chimney (10) has been installed into the space. The chimney would have provided wood-fired heating in the 1930s.

The existing steel truss and roof lanterns have been covered up by a beige plasterboard ceiling.

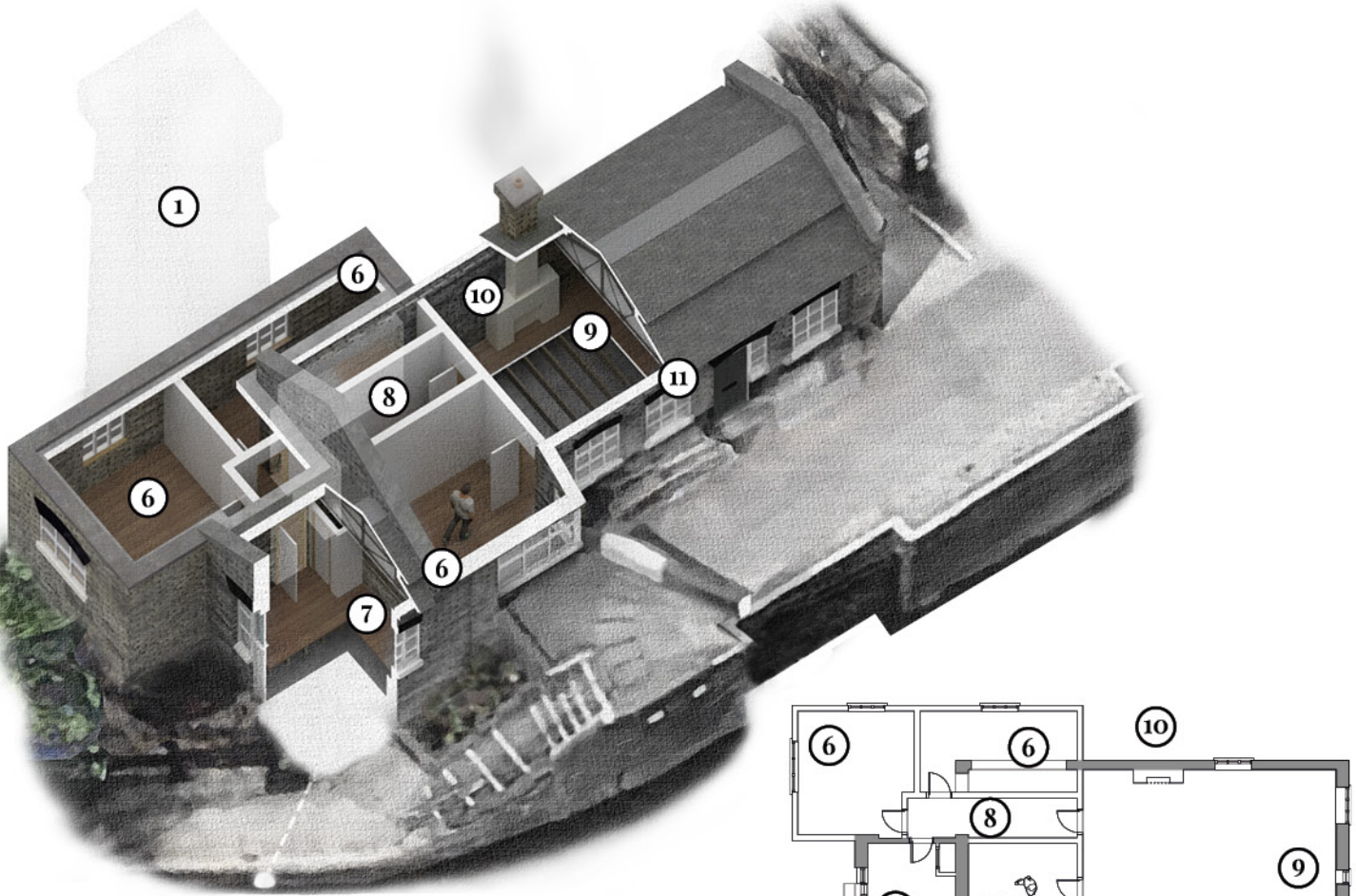


Figure 8.7, 1930 / Today: Converted into a Lock Cottage and Extended

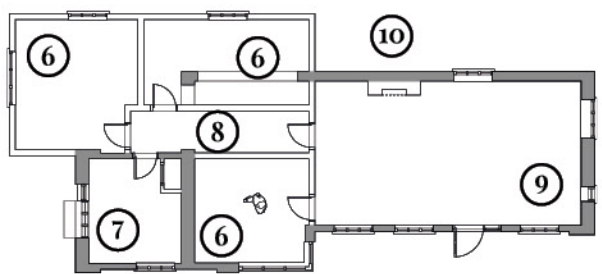


Figure 8.8, 1930 / Today's Floor Plans (adapted)

The Lock Cottage

The CRT Museum and Pump House

Society has become complacent with the availability of energy (fossil fuels and electricity), material (timber and metals) and manufacturing (rapid prototyping and mass-production) at the flick of a switch/click of a button (Langlands, 2017).

As a museum space, the interpretation of traditional systems for sustainable power should be visual, interactive/educational and celebrated. Traditional systems will include the use of 'wind, water, animal [and] human' (Pye, 1968, p.26; Risatti, 2007, p.53; Langlands, 2017).

11. Internal Balcony Display

The suspended floor should be removed, with any structural elements and flooring material (e.g. floorboards, carpeting etc.) re-used for the internal balcony. *Reforming* the original balcony arrangement of the 1897 Back-Pumping Station.

12. The CRT Museum

It is unlikely that an original pump and engine can be returned to the museum as this will require the removal of roof or wall elements to install it.

Alternatively, the *Canal and River Trust* can display many artefacts relating to the site and the Regent's Canal. Examples of this could include: water-powered drills, hammers and other workshop equipment in functioning condition — emphasising the sustainable power-production from historical methods.

13. Water Source Heat Pump

Beyond the principle of *Reforming* the pump house, the Lock Cottage's well and culvert is re-used to provide heating and cooling throughout the RDC-PTC.

14. Water Storage

Grey water, rainwater, hot water and cold water are all stored within the Lock Cottage — with rainwater being sourced from green roofs and permeable paving (SUDs) around the site (see p. 112/113).

15. Exposed Structure

All internal structure should be exposed and protected with the same red intrumescent paint as used in the RDC-PTC's steel frames.

16. Solar Renewables

Potential locations for discrete solar renewables (e.g. solar water heating and photovoltaics). Do not fix any on the 1897 roof.

The Lock Cottage's retrofit further exemplifies (as with the Waterpoint and Wall) the attitude to minimal design intervention and the *Reforming* of historically-significant spaces in the built-environment. A principle of both design and sustainability that is seen throughout the project.

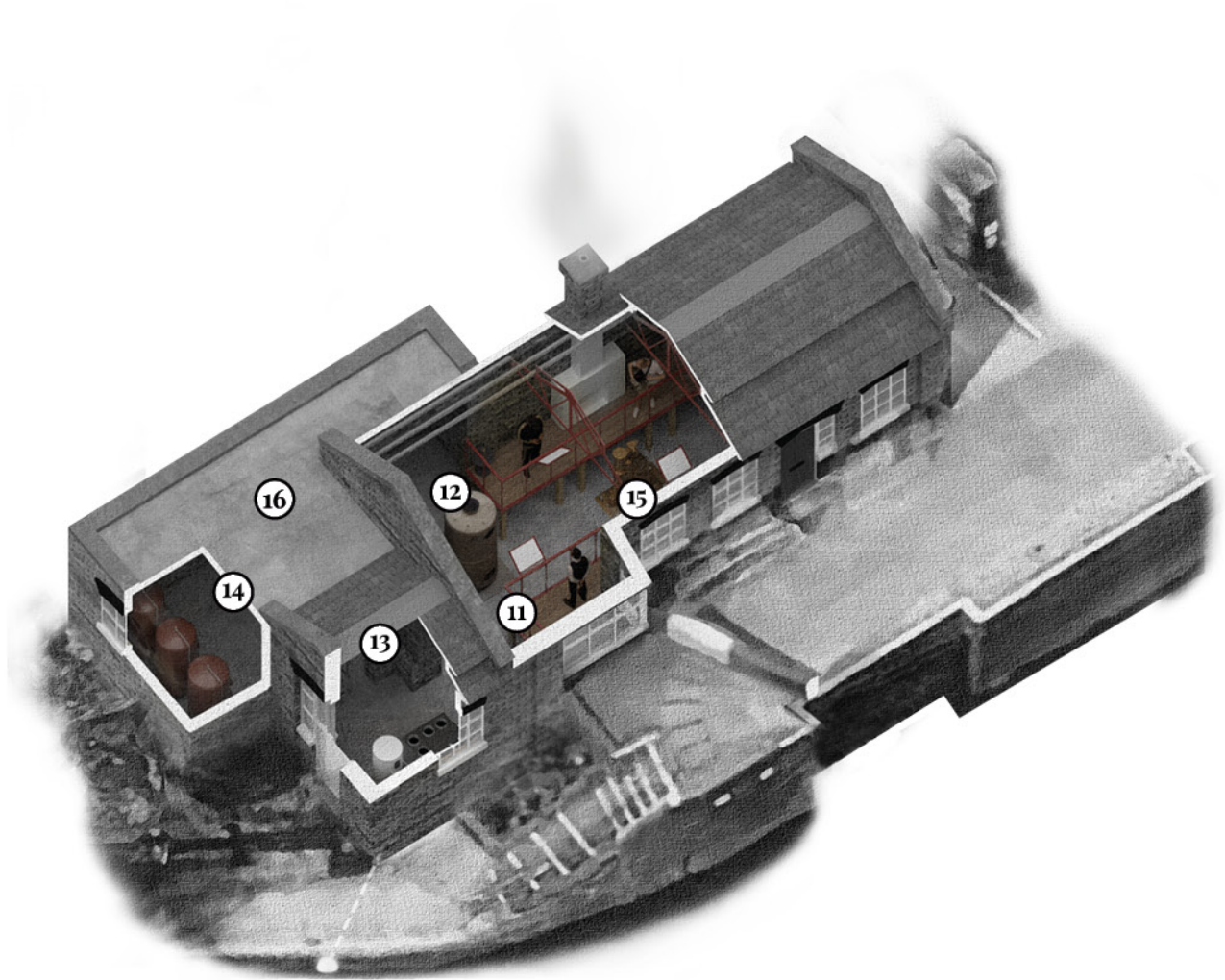


Figure 8.9, The CRT Museum and Water Source Heat Pump Supply and Storage

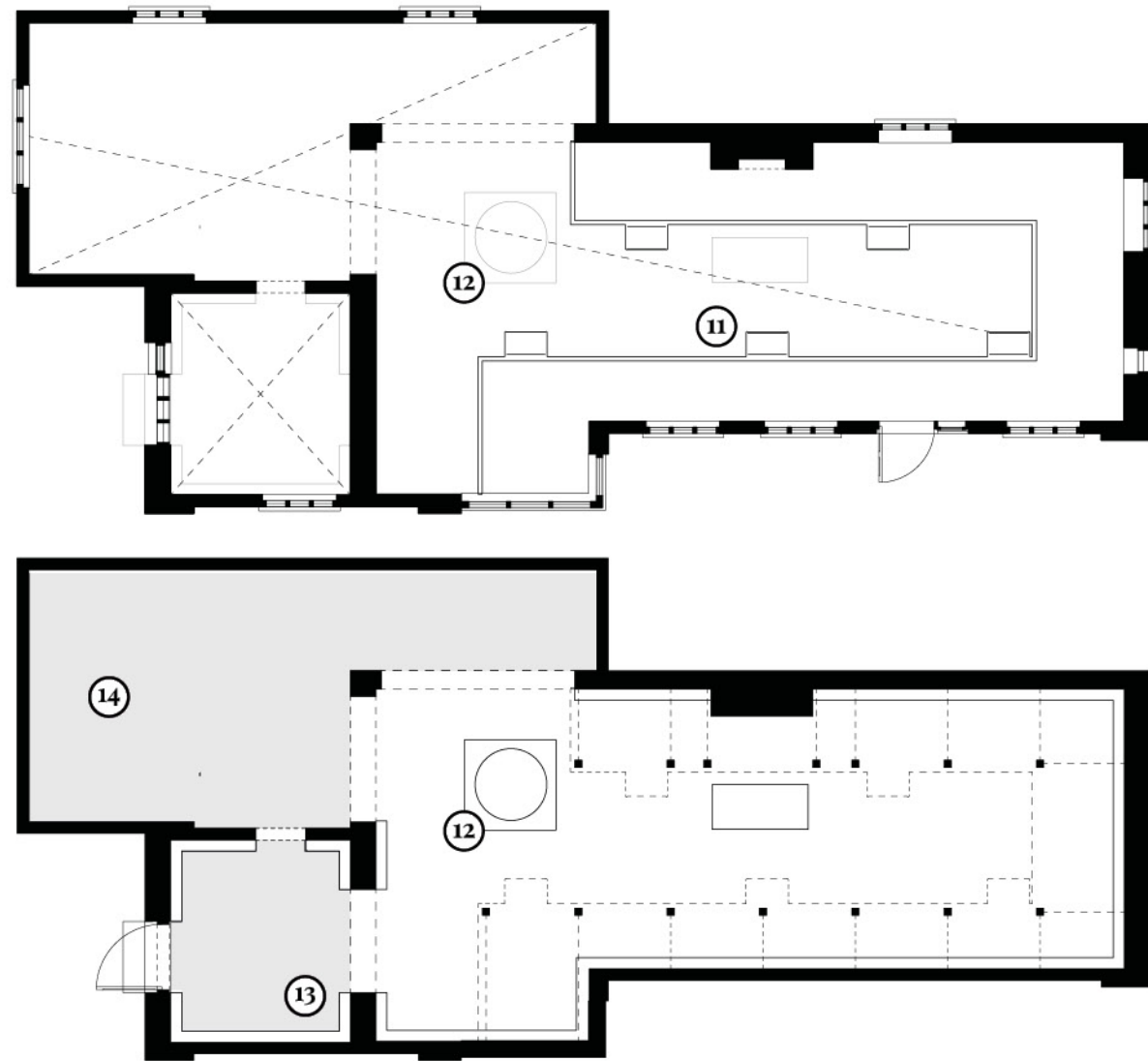
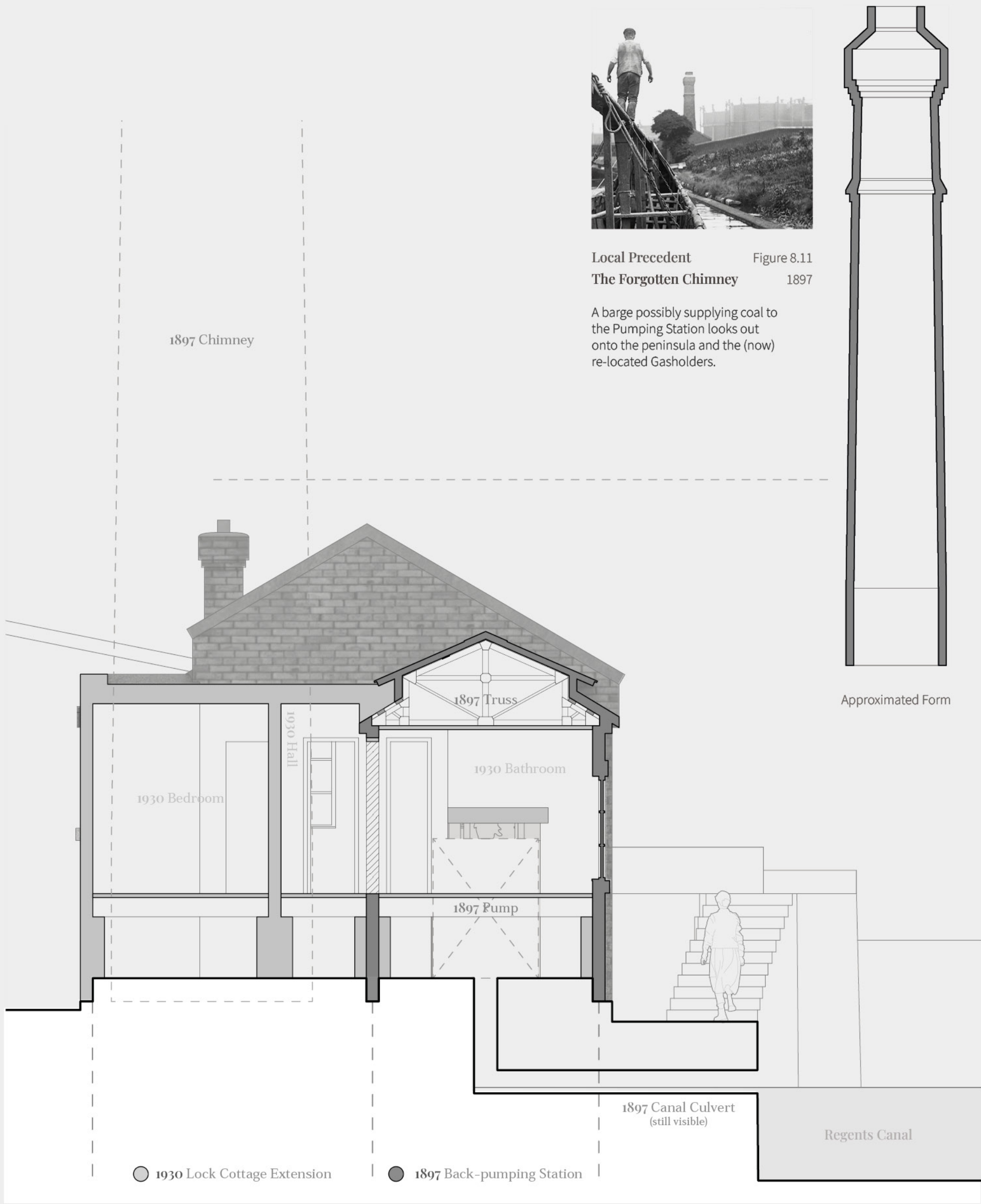
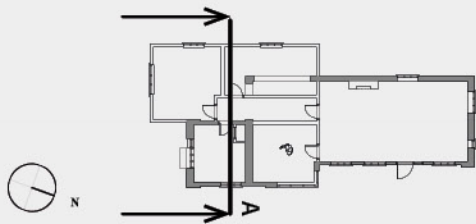


Figure 8.10, Retrofitted Floor Plans

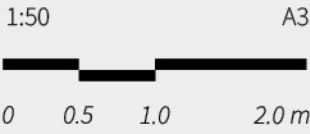


A



Time and Tectonics

Tracing the life of the Lock Cottage in section illustrated the alterations of its form over time, and a hidden tectonic character that could be celebrated.



Regent's Canal Reformed

The New Pump House

Integrating a Water Source Heat Pump (WSHP) into the existing pump house and lock cottage infrastructure.

Local Planning Guidance (Camden, 2021)

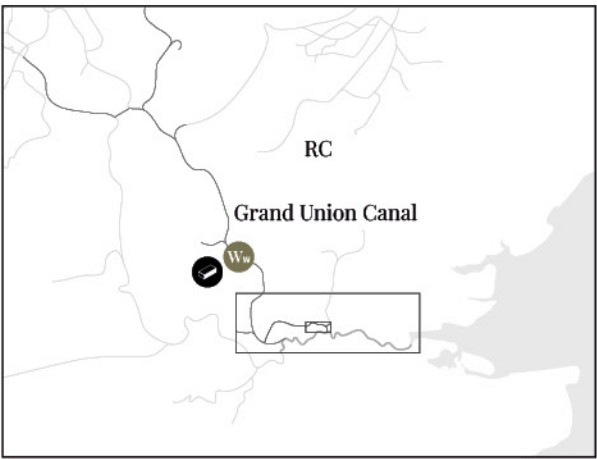
4.25 Any development within 200 metres of the Regent's or Grand Union Canal to prioritise water source heat pumps

4.9 Major developments in close proximity (< 500m) to existing DENs should prioritise immediate connection to them and fully test the feasibility of doing so

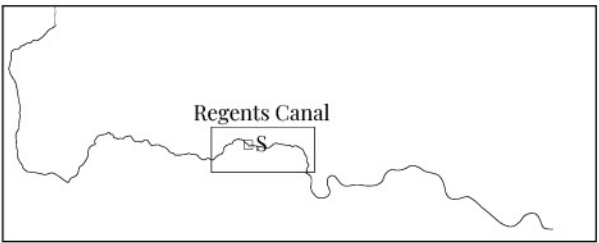
WSHP vs. the KX CHP DEN

Considerations were made to connect to the KX District Energy Network (DEN), however the following points proved it untenable in comparison to a WSHP:

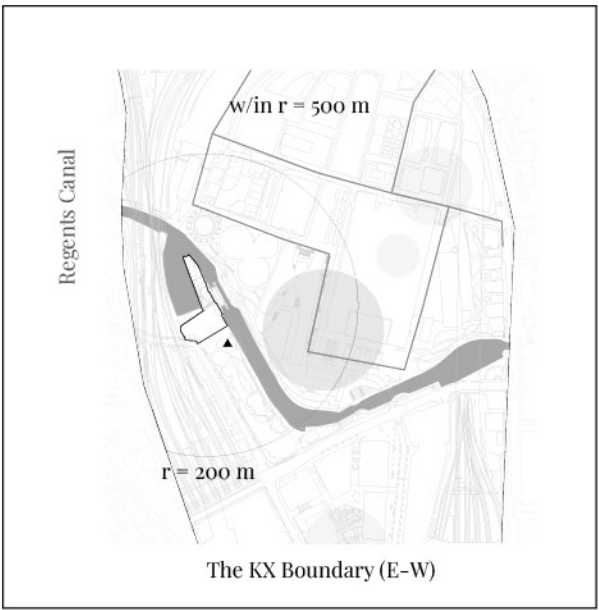
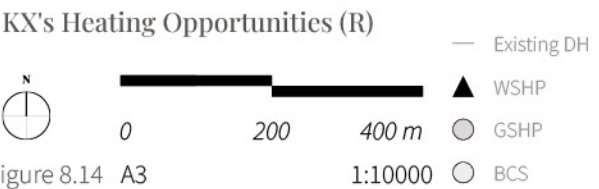
- The WSHP has a renewable and sustainable source of heating and cooling that is readily available locally. The biomass pellets for the CHP are sourced from Scotland.
- Does not locally produce greenhouse gasses or particulates (e.g. NO₂ or PM_{10/2.5}) that contravene the AQMA requirements of the LBC, unlike the CHP system.
- As the "carbon benefit[s] of CHP will cease by 2032", less than ten years post-construction and is one third into a "15 year" life cycle (Camden, 2021), attempts to connect to the DEN will have minimal carbon savings before a new system is required.
- Adjacent to the RC vs. difficulty in connecting over it, and so will require a bespoke (high carbon / cost) solution.



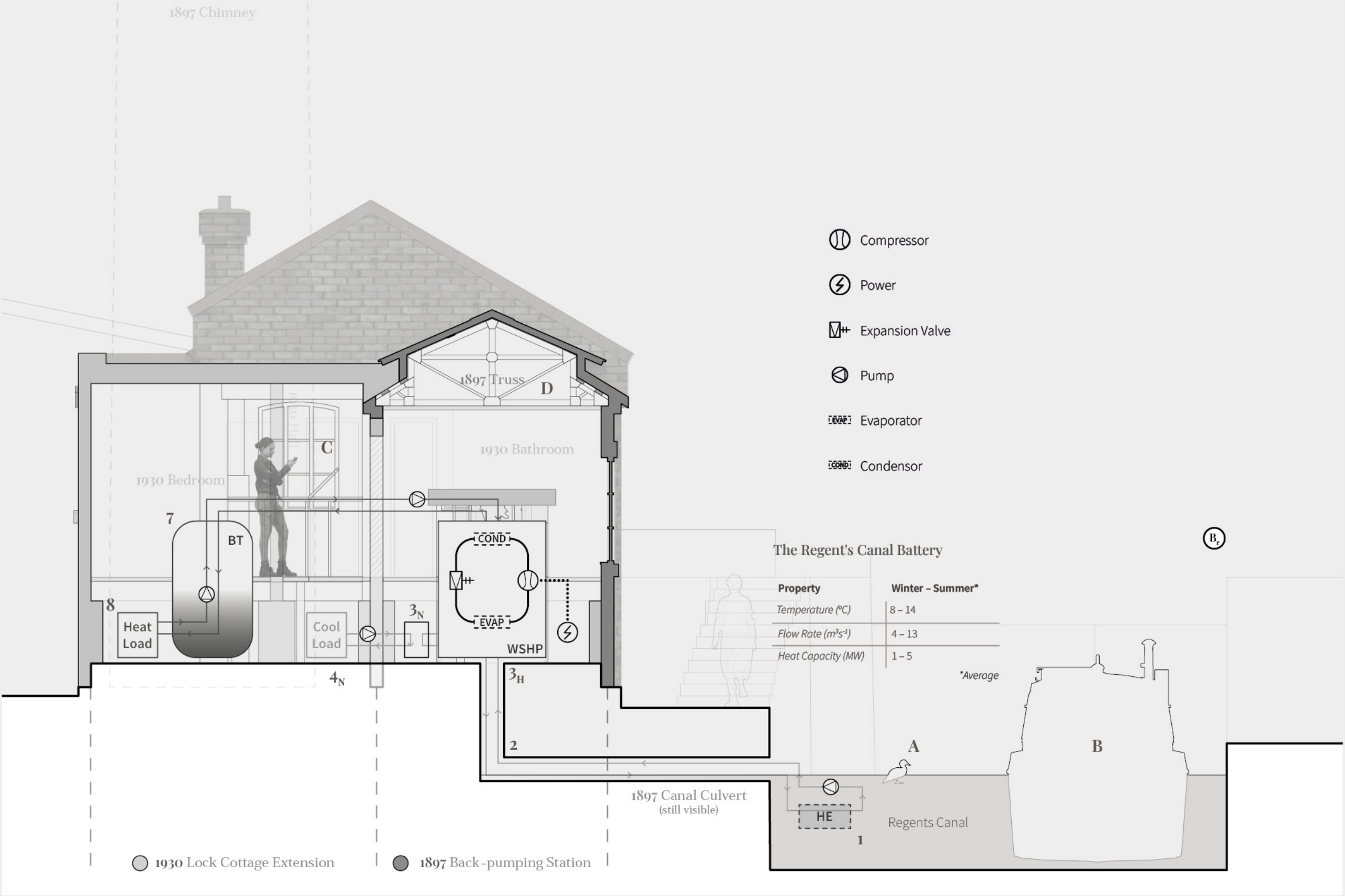
Total Heat Capacity of UK Canals Figure 8.12



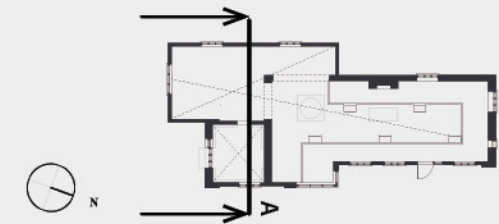
Grand Union Canal — Regent's Canal — Site Figure 8.13



Logistics Study



A



Annual Use

Natural Cooling (Example)

Other system arrangements are possible depending on loads and the space available, notably: combined WSHPs, cold water storage and low-loss tanks. Depending on consultation with M&E engineers.

- A thermal transfer fluid (TTF) is pumped through the closed-loop heat exchanger. Low grade heat is then extracted from the RC via the fluid
- The fluid is then pumped to the WSHP through the existing canal culvert (1897)
- TTF from the evaporator is transferred to a heat exchanger
- Then cold water provides comfort cooling for spaces requiring controllable conditioning all year round i.e. the Café, Tuning Rooms, and Y2 Studios

Heating Mode / Winter Operation

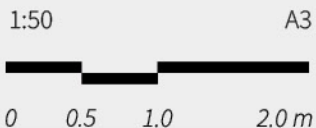
Figure 8.15's diagram depicts the WSHP in heating mode

- A thermal transfer fluid (TTF) is pumped through the closed-loop heat exchanger. Low grade heat is then extracted from the RC via the fluid
- The fluid is then pumped to the WSHP through the existing canal culvert (1897)
- Water Source Heat Pump (WSHP) Heat is absorbed by a refrigerant, where it then evaporates and is transferred as a low-temperature gas to the compressor
- The refrigerant vapor is then compressed, increasing its temperature to 45 – 65 °C
- Energy from the high-temperature vapor is exchanged via the condenser to heat water
- Hot water is then stored in a buffer tank (minimises cycles)
- A combination of underfloor heating and MVHR then conditions spaces

Cooling Mode / Summer Operation

Figure 8.16 is the reverse of Figure 8.15, the WSHP in cooling mode

- Any excess heat from load sources (e.g. occupancy and equipment) is:
 - absorbed by cooler fluid passing underfloor
 - recovered by the MVHR system
- Heat can be stored and recycled for the building's hot water supply (if needed)
- Reversed WSHP
- A reverse valve re-directs the refrigerant flow, switching the roles of the evaporator and condenser around
- Heat is absorbed by a refrigerant, where it then evaporates and is transferred as a low-temperature gas to the compressor, which increases its temperature
- Energy from the high-temperature vapor is rejected via the condenser to the cooler canal-side refrigerant
- A TTF is then pumped from the WSHP through the existing canal culvert (1897)...
- ... and to the closed-loop heat exchanger. Low grade heat is then extracted to the RC via the fluid.



Regent's Canal Reformed

The New Pump House

All-Round Constraints

- Canal Boats
- Fish (e.g. Red Swamp Crayfish)
- Vandalism

Design Solutions

- Canal boats within the area will need to be temporarily moved while being installed.
- A closed-loop system prevents possible canal contamination of aquatic habitats unlike open-loop WSHP.

Stakeholders

- Canal and River Trust**
Requires a license for the movement, discharge and changing the temperature of its canal.

- As opposed to a surface WSHP, the coils will be submerged at a > 1.2 m depth to prevent contact with canal boats.

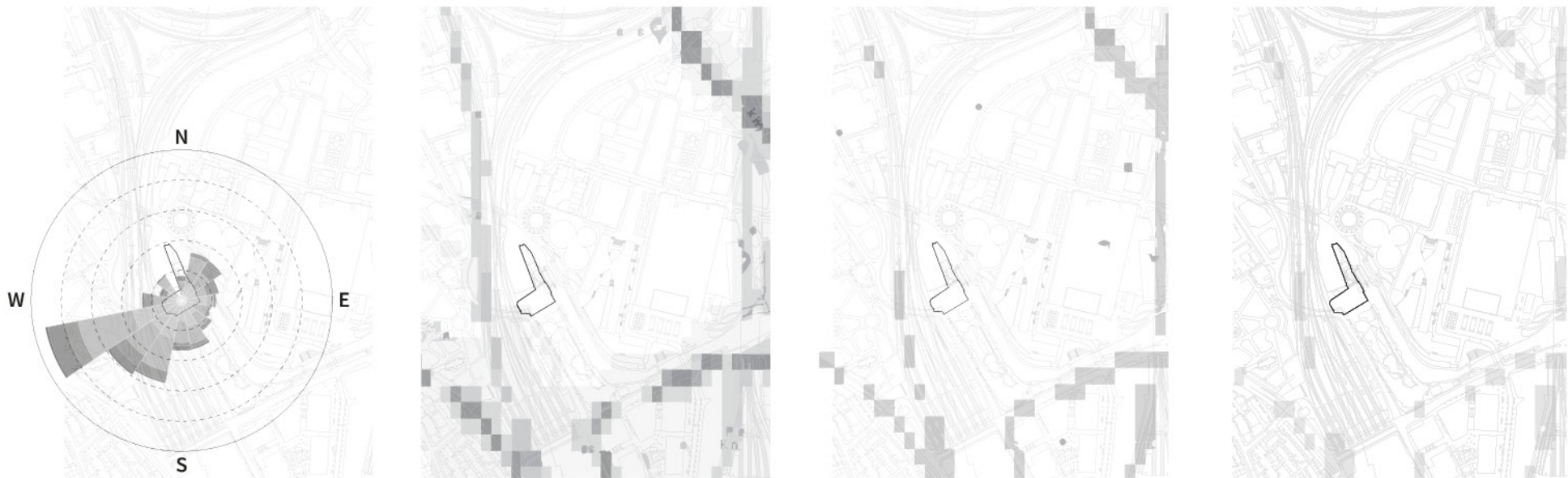
Winter Constraints

- Cold weather reduces the canal's flow rate, temperature and subsequently its heat capacity

Design Solutions

- Fortunately, the canal's flow rate is of a "similar order of magnitude to [a river's] winter Q95" i.e. exceeding the minimum flow requirements 95% of the time.

- In winter, canal temperatures are typically around 2 °C and in extreme cases <0 °C. As 4 °C is the minimum feasible temperature before the exchanger will freeze-up in an open-loop WSHP, it is not suitable for a multivalent system. Antifreeze passed through a closed loop-heat exchanger's TTF allows for the WSHP to operate at much lower temperatures in aquatic habitats unlike open-loop WSHP (see CIBSE, 2016).



Total Building System

Overview of Spaces and Connections

Figure 8.17 (adapted)



Wind Rose (5 Years Avg.)

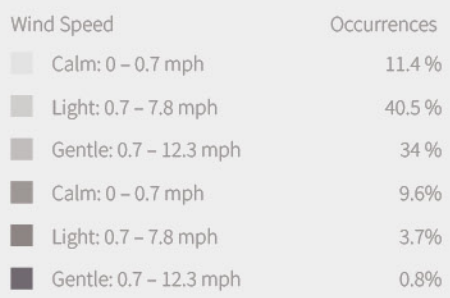


Figure 8.18

Annual NO₂ (µg/m³) 2016



Figure 8.19

Annual PM₁₀ (µg/m³) 2016

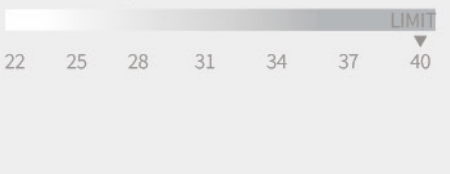
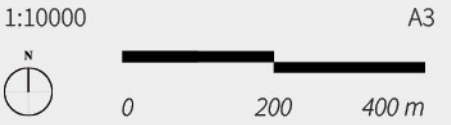
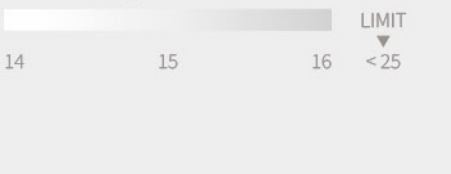


Figure 8.20

Annual PM_{2.5} (µg/m³) 2016



Systems Typology

Mechanical Ventilation Displacement Ventilation

MVHR is used in most spaces in order to improve whole-system efficiency and to utilise excess heat gain from space-use e.g. in the workshops.

Ceiling displacement ventilation is provided in the piano workshops due to the large volume/area that it has to supply. This can be controlled by the BMS in combination with the chimneys (hence their layout, see left).

Mixed Mode Ventilation Chimneys and MVHR

The chimneys are mechanically controlled based on a building management system (BMS) that assesses the wind-direction, temperature, noise and pollution levels. By being South/South-West facing they are in an optimum location.

Overall providing measured natural ventilation via wind and/or buoyancy (solar heating).

Mechanical Ventilation VRF and MVHR Hybrid

VRF (Variable Refrigerant Flow) operates similarly to a 'multi-split system', allowing each space (the tuning rooms, piano stairs, lock cottage, and Waterpoint) to be individually controlled — meeting the highly dependent conditions (humidity/temperature) of these spaces (see Daikin, 2023).

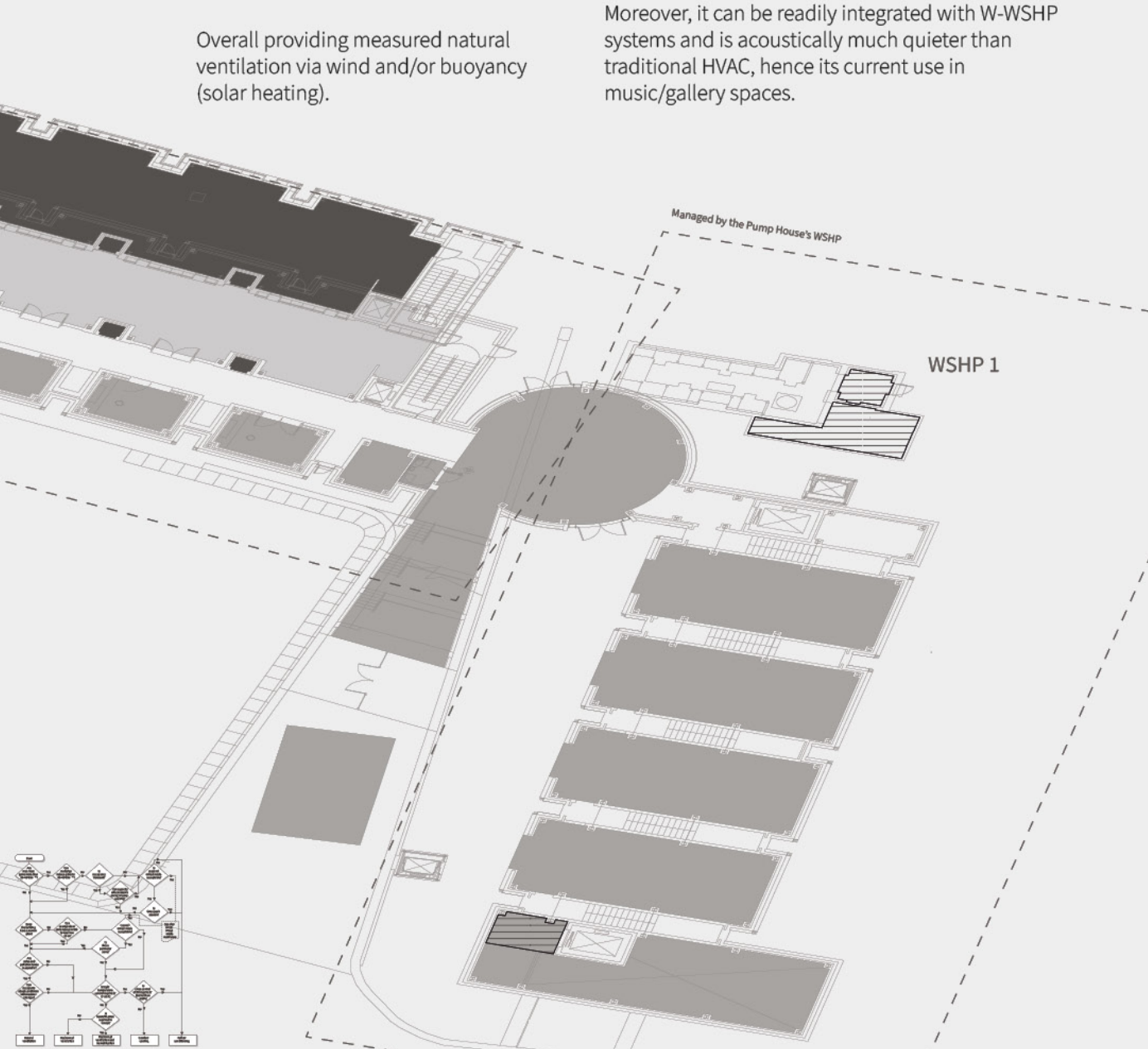
Moreover, it can be readily integrated with W-WSHP systems and is acoustically much quieter than traditional HVAC, hence its current use in music/gallery spaces.

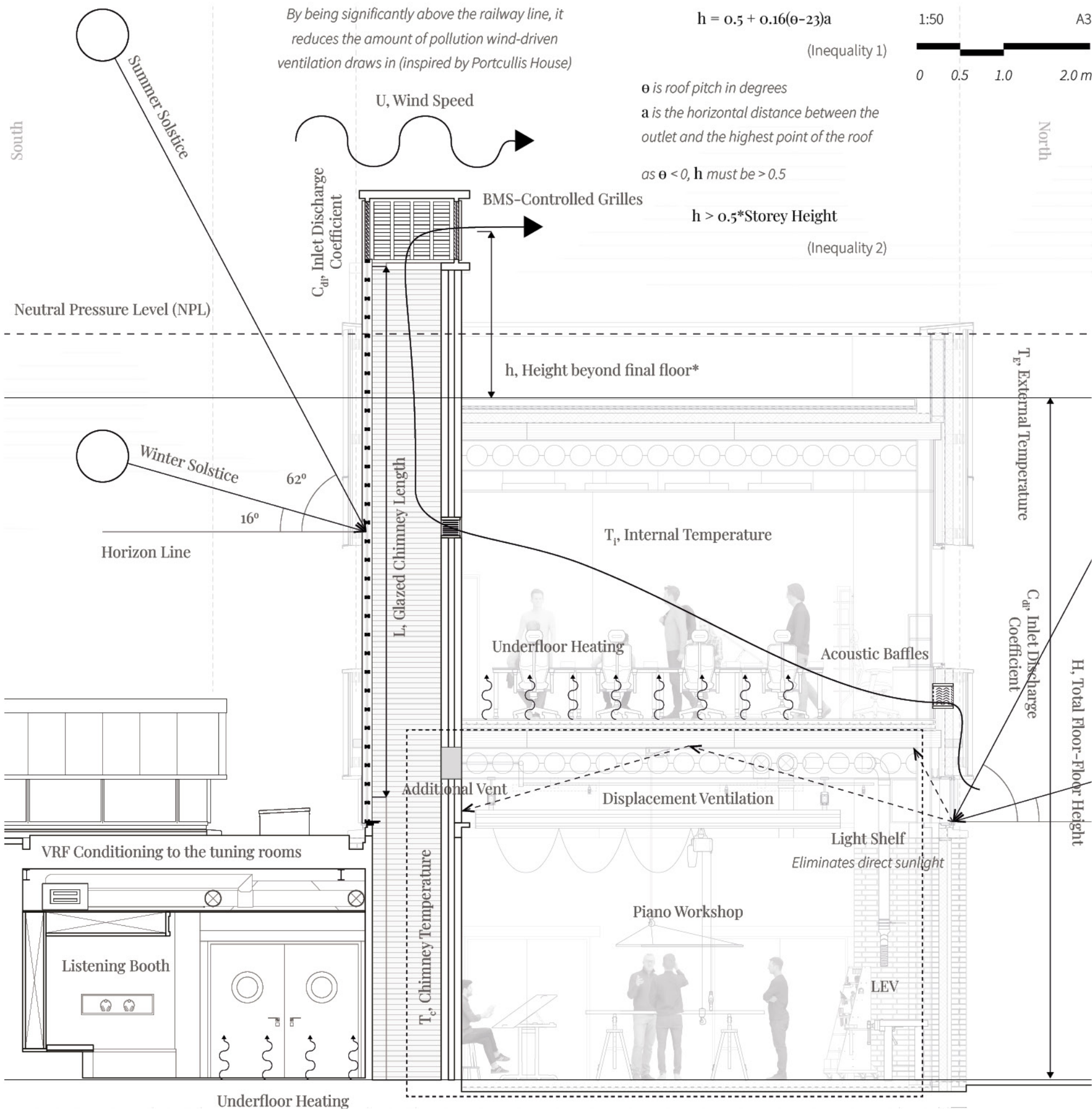
Underfloor Heating Compatible with WSHP

Underfloor heating is only used in the Café and circulation spaces. It must not be used in piano-based zones as rising heat can dry out moisture in the piano casing, warping it and damaging internal and external elements e.g. cracked soundboard, weakened strings (see Shop, 2023)

Rationalising the System CIBSE AM10 Flow Chart (CIBSE, 2005)

To determine what each space required, the CIBSE AM10 flow chart was used, values relating to these decisions are found in their respective sections.





Calculations Reference Diagram

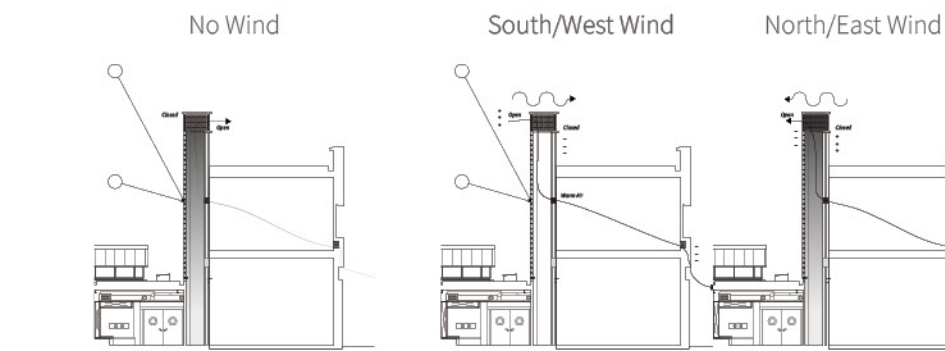
The chimneys are positioned to draw in cooler, cleaner air from the North East (the shaded side) of the RC as a result of the stack ventilation effect — driven by either wind or irradiation from the south-facing glazing.

As outlined on the previous page, pollution and noise from the adjacent railway has to be avoided as it can adversely affect the health of the users.

The glazing will likely need to be rotated upwards to avoid possible glare impacting the adjacent railway line and the moored boats.

Needing to be quite prominent vertical structures, the Chimneys have to have a greater internal temperature than the adjacent Piano Workshop and Studio that they supply.

Subsequently, a large area of glazing and a high thermal of mass brick is used (the chimney is insulated separately to prevent overheating to adjacent spaces and heat loss from it).



Summer Cooling Mode (Buoyancy Example)

Lower wind-velocity, reducing wind-driven stack ventilation, fans can be fitted within the chimneys to aid this. Cooler air is sourced from the North.

Winter and Non-Summer Heating Mode (Wind > Buoyancy)

Greater wind velocity and fewer sunlight hours. Grille control prevents flow changes due to pressure differences reversing.



Precedent BRE Offices

Figure 8.21 1996

Feilden Clegg Bradley Studio

The Year 2 Block

How the Year 2 block works, focusing on one NV Chimney

Change in Density

Ventilation Inlets

Change in internal pressure ΔP for the final inlet opening (i) and the chimney (c) are opposite and equal.

$$\Delta P_c = \Delta P_o - \rho_o g (H + h) + \rho_o g (H + h - L) + \rho_c g L$$

(Equation 1)

$$\Delta P_c = \Delta P_o - \Delta \rho_o g (H + h) - \Delta \rho_c g L$$

(Equation 2)

Change in internal pressure ΔP for the final inlet opening (i) and the chimney (c) are opposite and equal.

$$\Delta P_i = -\Delta P_c$$

(Equation 3 = - Equation 2)

$$\Delta P_o - \Delta \rho_o g z_{2F} = -(\Delta P_o - \Delta \rho_o g (H + h) - \Delta \rho_c g L)$$
$$2\Delta P_o = \Delta \rho_o g z_{2F} + \Delta \rho_o g (H + h) + \Delta \rho_c g L$$

$$\Delta P_o = 1.56 \text{ Pa}$$

Chimney Outlet

$$H = 9.9 \text{ m} \quad T_i = 25^\circ \text{C} \quad \rho_o = 1.2 \text{ kgm}^{-3}$$
$$L = 8.2 \text{ m} \quad T_e = 28^\circ \text{C} \quad C_{di} = 0.61$$
$$h = 2.5 \text{ m} \quad T_{(c \leftarrow o)} = 3 \text{ K} \quad C_{dc} = 0.8$$
$$g = 9.81 \text{ ms}^{-2} \quad T_c = 28^\circ \text{C}$$
$$U = 0 \text{ ms}^{-1} \quad T_{(c \leftarrow o)} = 3 \text{ K}$$

Calculating the area of the chimney outlet

$$\Delta \rho_o / \rho_o = (T_i - T_e) / (T_e + 273)$$

(Equation 6)

$$\Delta P_o = 0.01$$

$$\Delta \rho_c / \rho_o = (T_c - T_e) / (T_e + 273)$$

(Equation 7)

$$\Delta P_c = 0.01$$

Change in Pressure

ΔP_o is substituted into equation 3i to find ΔP_i

$$\Delta P_i = \Delta P_o - \Delta \rho_o g z_i + 0.5 \rho_o U_z C_{pi}$$

(Equation 3i)

$$\Delta P_i = 0.89 \text{ Pa}$$

ΔP_o is substituted into equation 3c to find ΔP_c

$$\Delta P_c = \Delta P_o - \Delta \rho_o g z_n + 0.5 \rho_o U_z C_{pc}$$

(Equation 3c)

$$\Delta P_c = 0.89 \text{ Pa}$$

buoyancy-driven condition, so $U = 0$

$$0.5 \rho_o U_z C_{pl/c} = 0$$

Opening Areas

Calculating the area of the inlet opening

$$C_{di} A_i = (q_i / S_i) \cdot (\rho_o / 2 \Delta P_i)^{0.5}$$

(Equation 4i)

$$A_i = ((q_i / S_i) \cdot (\rho_o / 2 \Delta P_i)^{0.5}) / C_{di}$$

(Equation 5i)

$$A_i = 0.969 \text{ m}^2$$

Calculating the area of the chimney outlet

$$C_{dc} A_c = (q_c / S_c) \cdot (\rho_o / 2 \Delta P_c)^{0.5}$$

(Equation 4c)

$$A_c = ((q_c / S_c) \cdot (\rho_o / 2 \Delta P_c)^{0.5}) / C_{dc}$$

(Equation 5c)

$$A_c = 2.95 \text{ m}^2$$

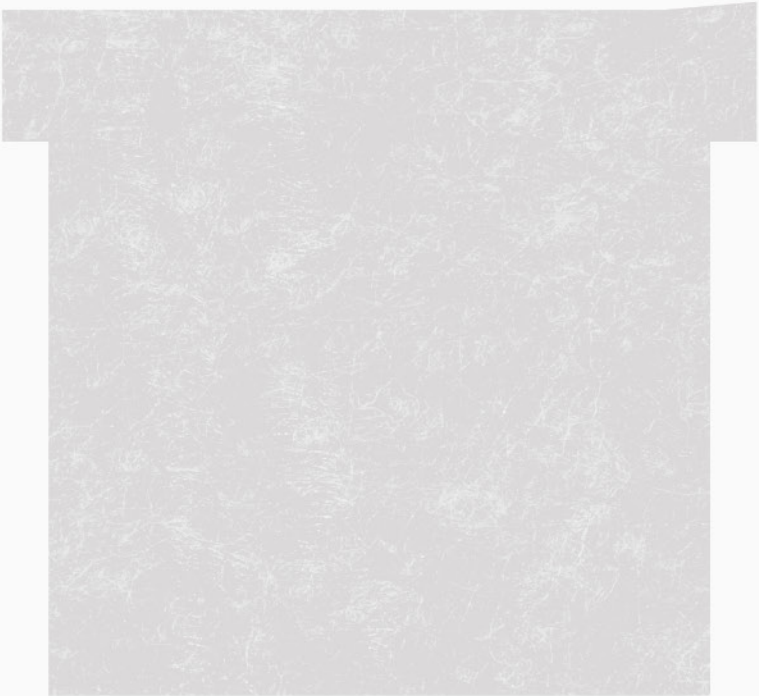
Key Values

Openings	z / m	qi / m ² s ⁻¹	Flow Pattern	Si	ΔP_i / Pa	C_{di}	$A_{required}$ / m ²
2F	5.6	0.72 (*4)	Inward	+1	2F	0.61	0.24
Chimney (c)	5.6 (NPL)	-2.88	Outward	-1	Chimney	0.8	0.98

A sophisticated spreadsheet was created by the author that utilised these calculations, and so can be re-used for different/future floors, changing conditions and any building alterations

Chimney Calculations

Inlet and outlet sizing calculations for the buoyancy-driven ventilation conditioning the Year 2 Studio Space



Act 9
Tuning

Non-absolute Acoustics

Without atmosphere a painting is nothing.

Rembrandt



*A Man seated reading at a Table (?)
in a Lofty Room*

Follower of Rembrandt
Figure 9.1

The Tuning Room

In-Use

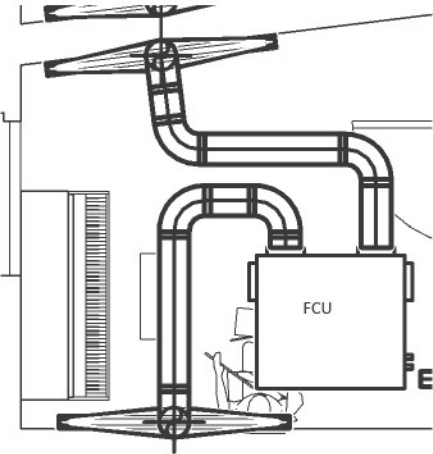
Considered an individual practice room, as per BS ISO 23591:2021, The *Tuning Room* is designed for individuals or pairs (teacher and student) for the practicing and tuning of musical instruments and so can become very loud (BSI, 2021).

Precedent
Hallé Music Facility

Figure 9.2
1:50

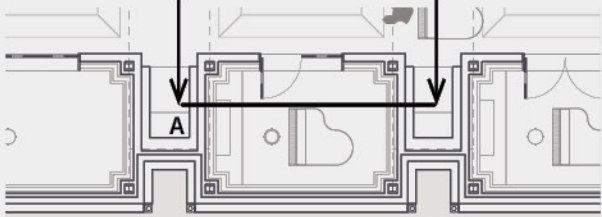
Stephenson Studio

Inspired by Max Fordham Engineer's response to a diverse range of room typologies. Notably the 'small practice rooms' which consist of fixed-windowed box-in-box constructions that are climatically controlled by individual VRF units. Each of these have been 'located in [adjacent underfloor-heated corridors] to [minimise breakout noise]' (Engineers, M.F., 2023).



+.. A Tuneful Corner 14. Tuning Room A Designed for All

A Man seated playing a Piano in a Lofty Room



1:50 A3

Detail key

- | | |
|-----------------------------|-----------------------------------|
| 1. Timber Floor | 8. Acoustic Mineral Wool (Cat. C) |
| 2. Floor Spring System | 9. Plywood |
| 3. Acoustic Seal (Cat. C) | 10. Min. 50 mm Void |
| 4. Upstand Insulation | 11. Floating Screed |
| 5. Thermal Block | 12. Glazing with Blinds |
| 6. Acoustic Panel (various) | 13. Rigid Insulation (Cat. C) |
| 7. Soundbloc Plasterboard | 14. Underfloor Heating |

CA = Ceiling Absorbers

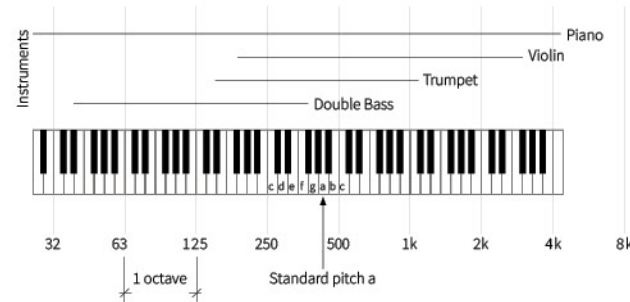
Rw = Sound Reduction Index

WA = Wall Absorbers

BA = Bass

L'nT,w = Normalised Reduction Index

Figure 9.3. Instrument Frequency Ranges



Piano Dynamics

Dynamic Range of a Piano	Sound Power Level (SPL), L _{WA}
Pianissimo <i>pp</i>	<60 dB
Piano <i>p</i>	>60 dB
Mezzoforte <i>mf</i>	>70 dB
Forte <i>f</i>	>90 dB
Fortissimo <i>ff</i>	100 – 115 dB

Table A

Table B. Key Noise Values and Targets

Criteria and Level Difference Targets	Value	Authoritative Source
Background Noise in Schools	35 dB(A)	WHO
Imission in Villages / Mixed-use Zones	60/45 dB(A)	Day / Night. TA Lärm, Technical Instructions on Noise Abatement, Germany.
Imission in General Residential Areas	55/40 dB(A)	
Imission in Purely Residential Areas	50/35 dB(A)	
Railway, L _{Aeq16h}	55–70 dB(A)	Extrium
UK Permitted Noise Level from Neighbours	34 dB(A)	UK GOV
Daily / Weekly Exposure	87 dB(A)	HSE Noise Regulations
Maximum Peak Noise Exposure	140 dB(C)	

Formula for Acoustic Details

$$R = L_1 - L_2 + \log_{10}(S/A_2)$$

$$S/A_2 \text{ is often } \sim 1, \text{ therefore } \log_{10}(S/A_2) = 0$$

$$R = L_1 - L_2 \quad (\text{Equation 1})$$

R= Level Difference (see targets)
S= Area of the Transmitting Wall
L_{1/2}= Sound Pres. (Room 1/2)
A₂= Absorption Surface Area of Wall

Room Proportions

Small tuning rooms have fewer room modes than typical rehearsal rooms and so dissimilar proportions are needed to produce low frequencies (20 – 200 Hz) and to minimise unwanted superposition /audible resonance events.

Initially, it is assumed that $l \geq w \geq h$, however as $h > w$, h and w switch in these inequalities (Rindel, 2021)

$$\begin{matrix} l/w= & 1.48 & 1:1.44:1.2^A \\ h/w= & 1.38 & 1/h= 1.1 & 1:1.38:1.48 \end{matrix}$$

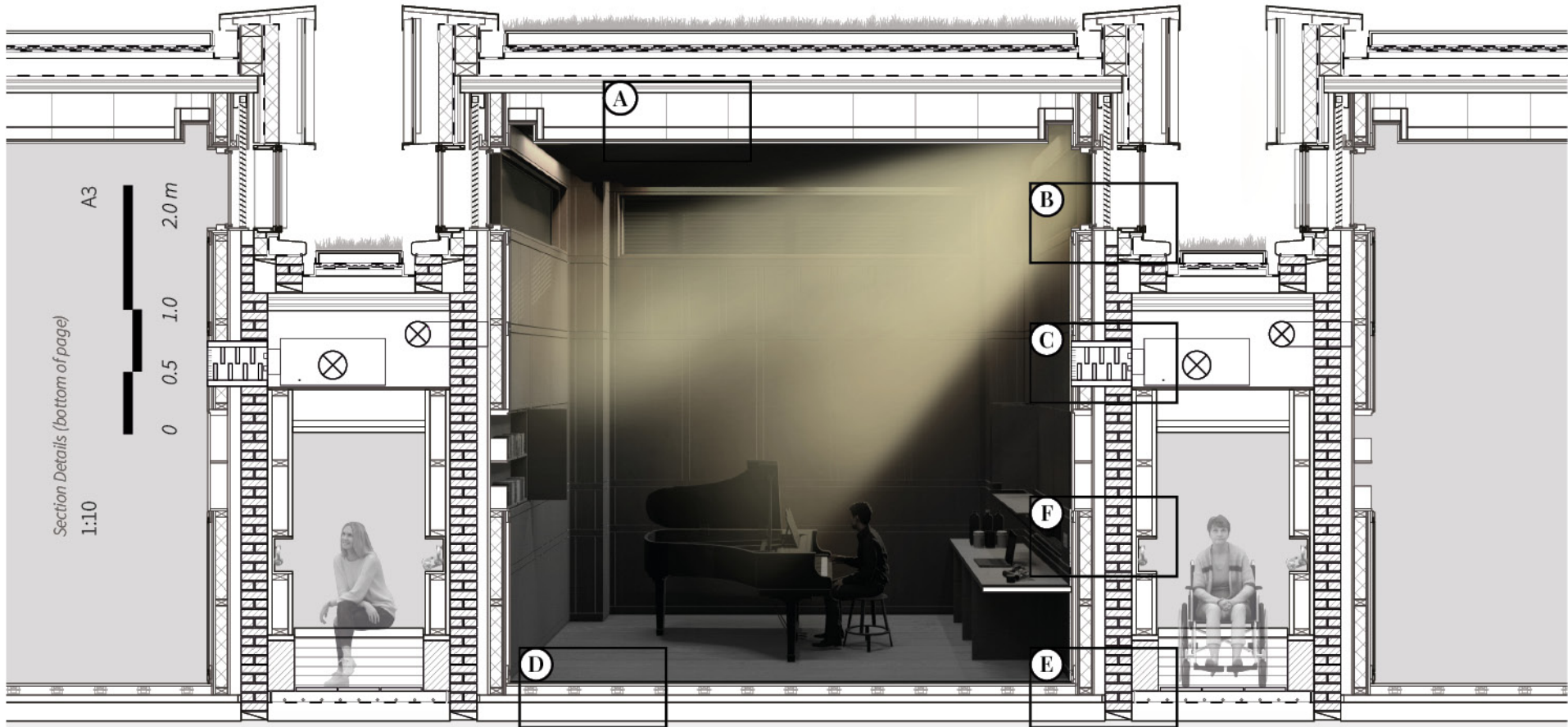
$$\begin{matrix} 1:w/h:l/h & 1:h/w:l/w \times \\ (\text{Proportion 1a}) & (\text{Proportion 1b}) \end{matrix}$$

$$\begin{matrix} w/h > 1.1 & h/w > 1.1 \checkmark \\ (\text{Inequality 1a}) & (\text{Inequality 1b}) \end{matrix}$$

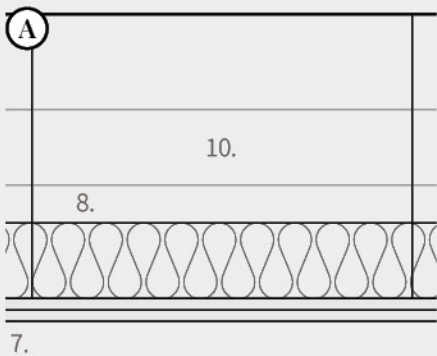
$$\begin{matrix} 1.1 < 1/w < 1.6 & 1.1 < 1/h < 1.6 \checkmark \\ (\text{Inequality 2a}) & (\text{Inequality 2b}) \end{matrix}$$

Unfortunately, due to the constrained site and programme, the optimum ratio (A) is not met but each of the inequalities are.

This can be compensated through the small tuning rooms design.



The Tuning Room



Suspended Acoustic Ceiling (CA)

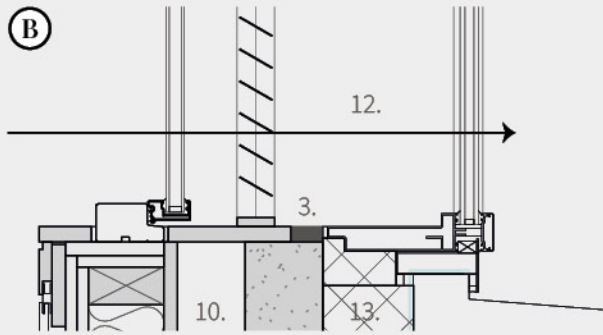
Standard Windows

Rw + (C;Ctr)¹, dB 53

Double Windows

Rw + (C;Ctr)¹, dB >~58

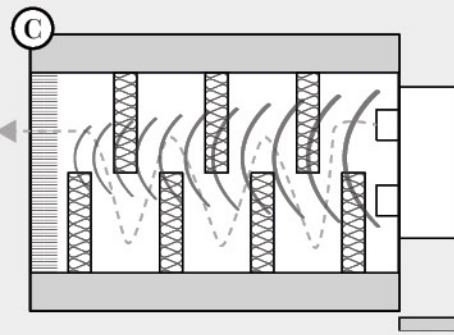
1. Assumes a +8dB conservative difference
N.B. On a grounded floor so will contribute much less to airborne noise than walls



Primary and Secondary Glazing

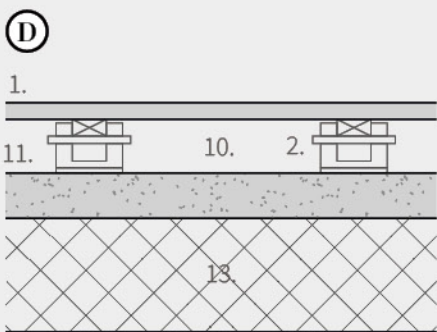
3/12. Electrical blinds are stored within the window void in order to minimise their mechanical noise. A double-double glazing studio system is used as part of the *box-in-box* construction. Acoustic seals (e.g. 3) are used to minimise the *Deep Niche Effect* of light shelves and so transmission loss in the glazing via 'interreflections' (Egan, 2007).

Acoustic Details and Flanking Paths



Acoustic Baffle Box for VRF Ventilation

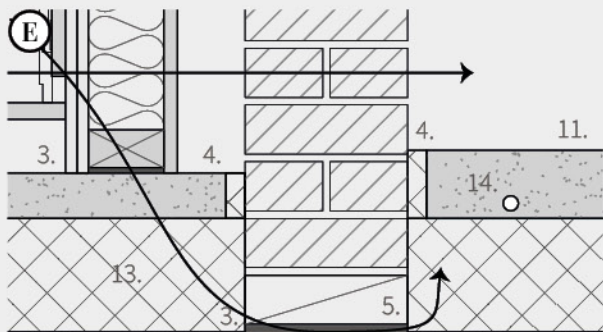
Provides damping for the VRF fresh air supply, totally eliminating any possible mechanical noise (~ 20 – 35 dB(A)). All build-ups are designed to subtract from the **115 dB** maximum SPL from a piano playing fortissimo. Target values are shown on the adjacent page.



Floating Timber Floor on Screed

Airborne DnT,w dB 58 T³
Airborne DnT,w + Ctr dB 53
Rw + Ctr¹, dB 61 72
Impact L'nT,w dB 50 28

1. Assumes a +8dB conservative difference
N.B. On a grounded floor so will contribute much less to airborne noise than walls

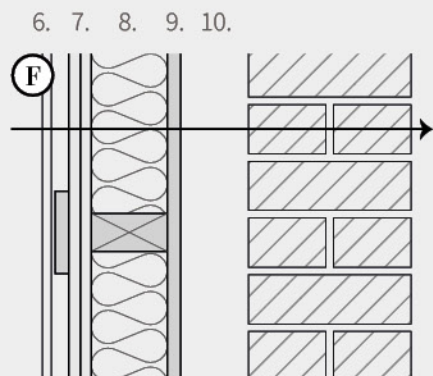


Corner Junction

2/3/11. A combination of acoustic seals and floating floors (both timber and screed) minimise flanking transmission from airborne and impact noise.

5. Thermal blocks provide a continuous thermal envelope.

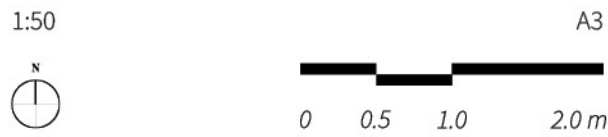
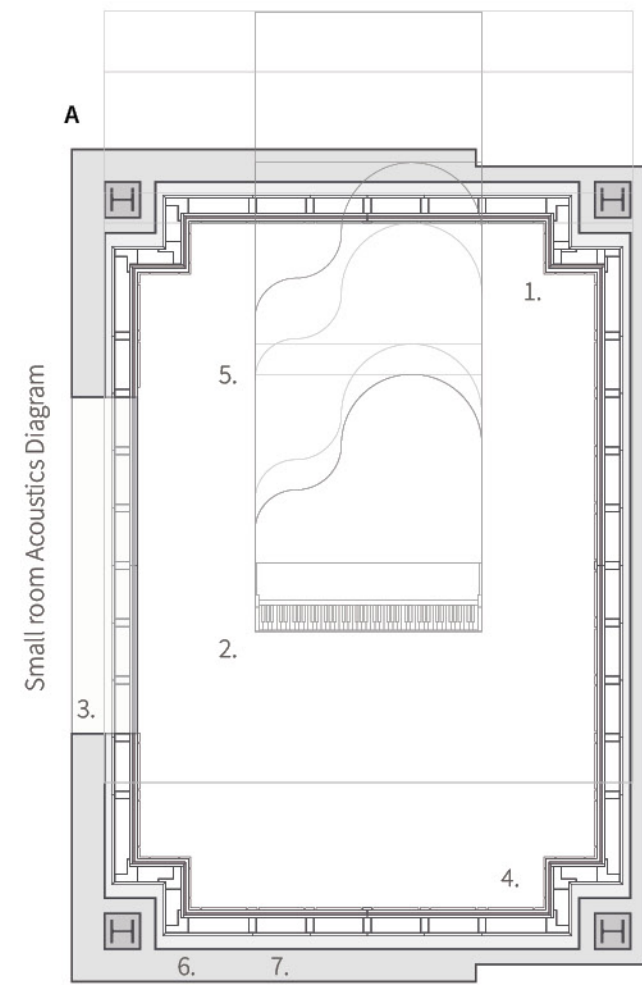
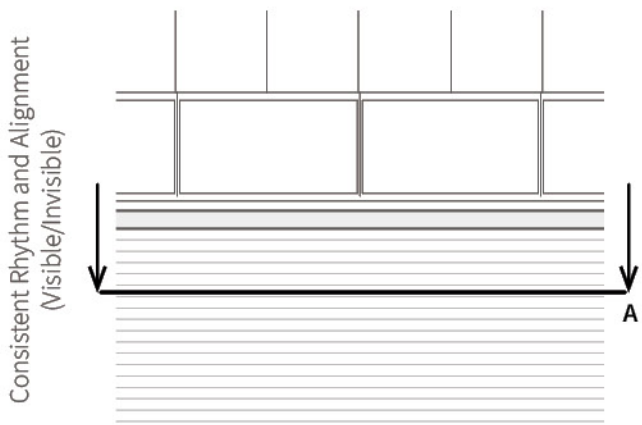
3. Target for a Category C music room



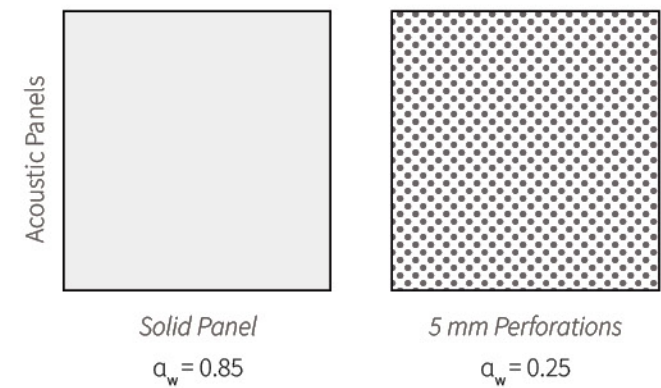
Internal Timber Frame (WA/BA)

Airborne DnT,w dB 64 T
Airborne DnT,w + Ctr dB 60
Rw + Ctr (Single-Brick)¹, dB 68
Rw + Ctr (Double-Brick)², dB 73 72

1. Assumes a +8dB conservative difference
2. Mass Law — Double mass, +5 dB



Small room Acoustics Diagram	Criteria and Level Difference Targets			a	b	T _{mid}
	Loud Acoustic Music, Upper Limit			0.6	0.5	0.6
	Loud Acoustic Music, Lower Limit			0.4	0.3	0.4
	Quiet Acoustic Music, Upper Limit			0.75	0.65	0.7
	Quiet Acoustic Music, Lower Limit			0.55	0.45	0.5
	T _{mid}			≤ 0.8 ✓		
	Legislation (Practice Room, V > 30 m³)			BB93		
	R _{T60}			0.6 – 0.8		



Small Room Acoustics

Careful consideration was undertaken regarding the tuning room in regards to: how it functioned, connected with the piano-making process and its future-use — continuing this theory of constant holistic *Reform*.

1. Non-fully rectangular space with the use of the inward corner
2. Designed to the piano's dimensions and frequency requirements (sized to baby-parlour room pianos)
3. Self-closing Studio Doors (increased thickness and sound reduction)
4. Sound Absorption / Reflection Panels (based off *Gustafs*) — absorption (α) varies depending on surface finish e.g. perforations, solid, thickness etc.
5. The inward corners create a space for a built-in desk and storage, as inspired by SALT's Steinway Showroom.
6. 50 mm minimum air gap increases 'low-frequency absorption' from the small room proportions, 'reducing boominess' (Foley, 2020) and eliminating any transmission bridging across a solid build-up.
7. Box-in-box construction, offers a loose fit and acoustically resilient construction (with levelled access being enabled by differing floating screed levels) that allows these spaces to be changed in the future e.g. if a different small work environment is needed, more offices, more gallery space, etc..

Reverb Time

Small rooms are ideal for practice and tuning room, with them provider shorter reverb time than typical performance spaces. The following calculations and considerations were made:

$$T_{mid} = a \log_{10}(V) - b$$

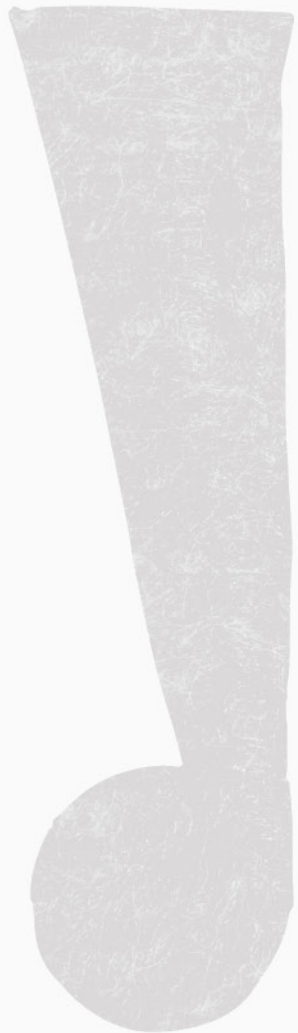
(Equation 2)

T_{mid} = Average value of reverberation times at the octave bands from 500 – 1 kHz — 'where the human ear is most sensitive' (BSI, 2021)

$$R_{T60} = 0.161V / Sa$$

(Sabine Equation [3])

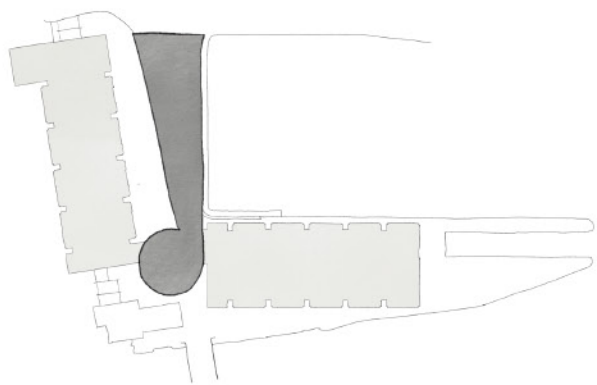
R_{T60} = 'Time (in seconds) for the average sound in a room to decrease by 60 decibels after a source stops generating sound' (AcousticComfort, 2023)



Act 10
The Anti-Cappella
The Public and the Piano



Through the Piano Corridor



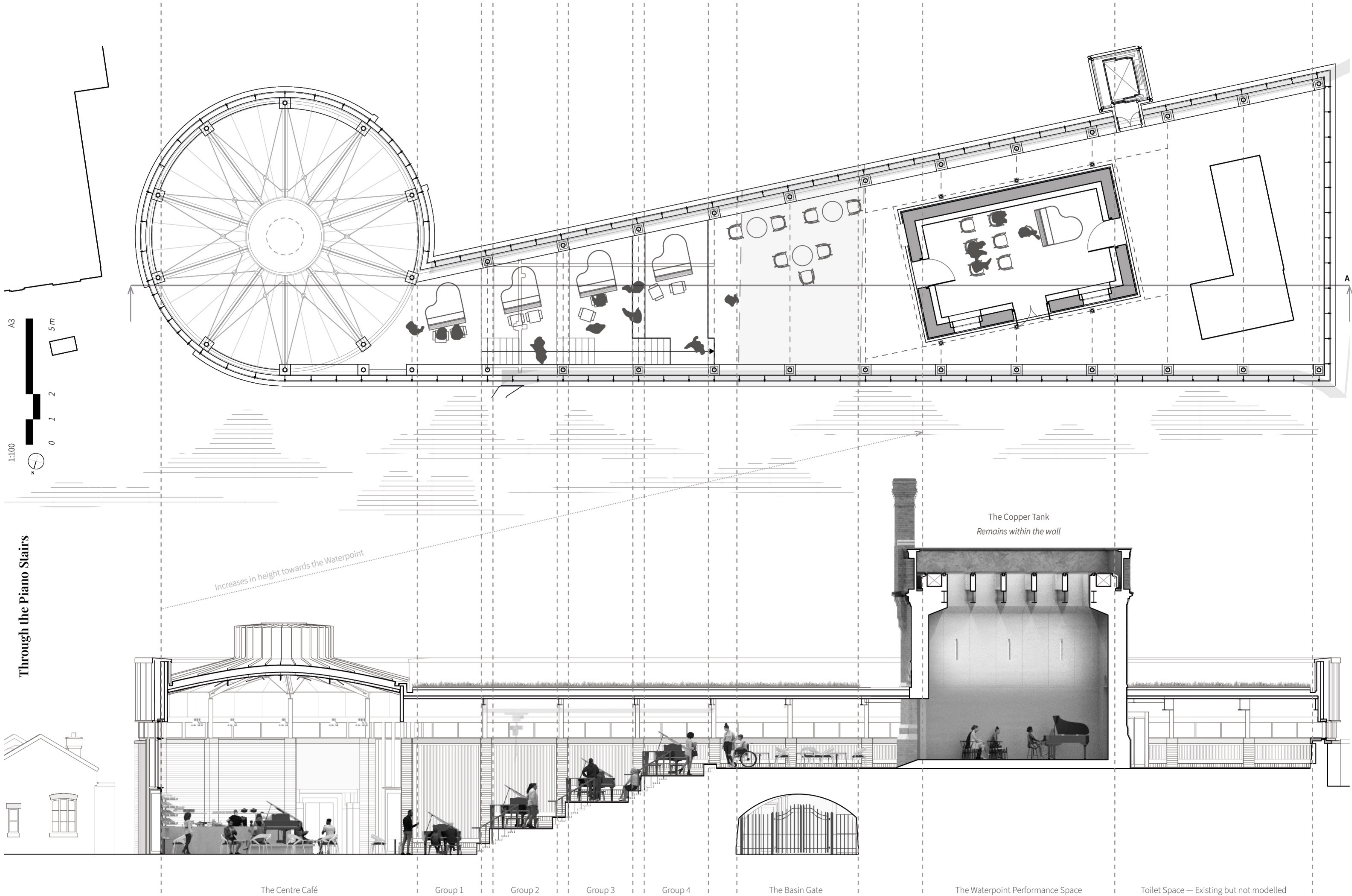
Form finds Function in a music note

The Café

A Meeting Point

As a centre point the café is able to serve the many users from CSM, the Camley Street Nature Reserve and the general public throughout the week. As well as the St Pancras Cruising Club, of which this constitutes as replacement to their clubhouse space — eliminating the divide that the existing site had between canal enthusiasts and King's Cross.





The Centre Café

Group 1

Group 2

Group 3

Group 4

The Basin Gate

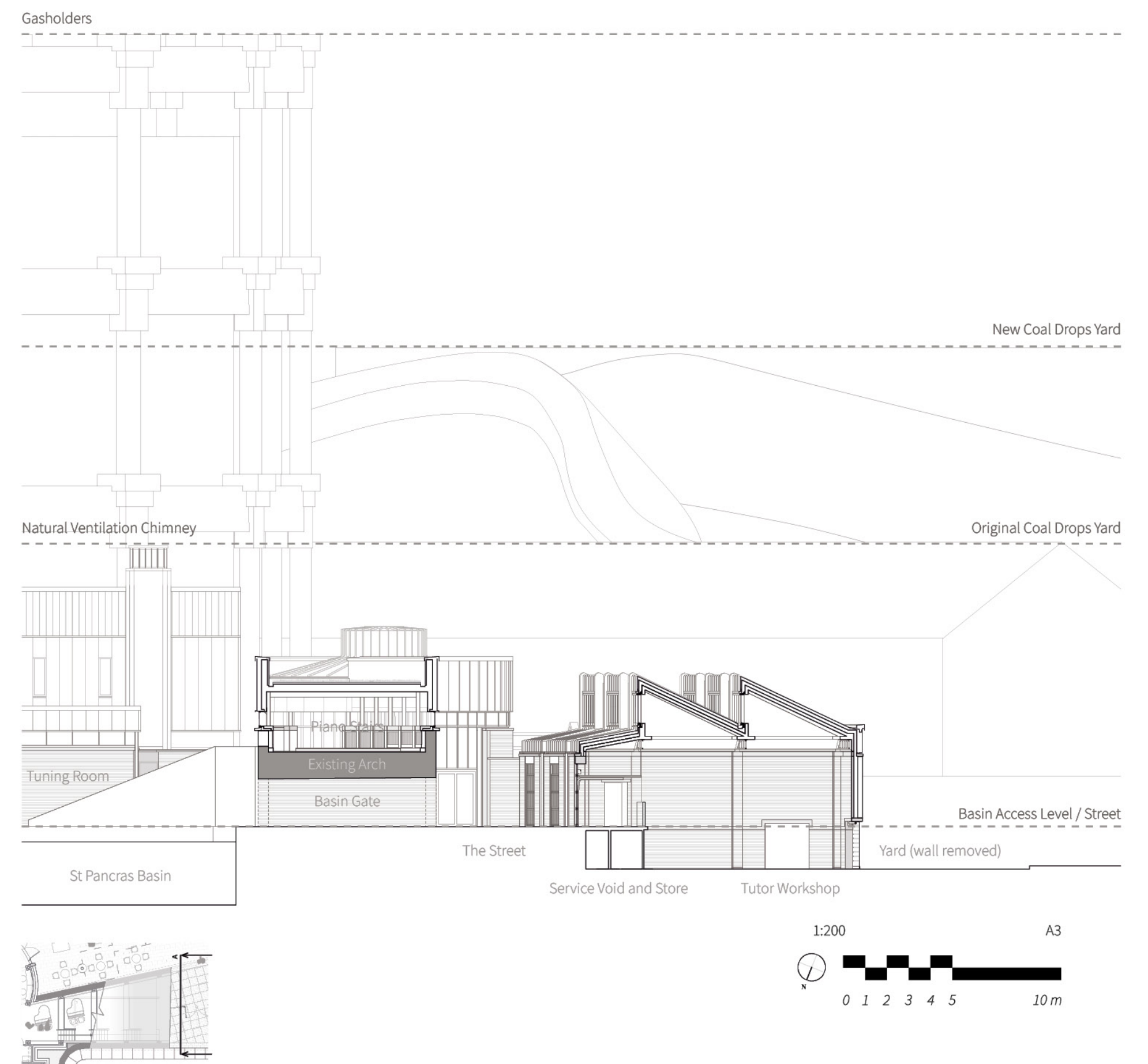
The Waterpoint Performance Space

Toilet Space — Existing but not modelled



The Scale del Pianoforte

The Piano Stairs/Scales — a noisy corridor filled with finished pianos and an enthusiastic public ascending the steps towards the Waterpoint's performance space. The crescendo of the piano-making process.



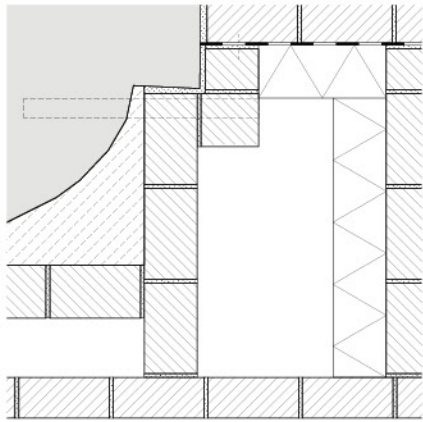
A New Mew

A modest addition in comparison to the Gasholders and retrofitted Coal Drops roof but it continues to follow the industrial grain of the original Coal Drops and so when viewed from the Eurostar or the Regent's Canal corridor it meets the scale of the context.

Inhabiting the Wall

Retrofit Details

New and old brick overlap and are defined by the stained cill and zinc "cap" (see p. 63), and internally by ribbed timber panels (and shadow gaps) that provide acoustic absorption and reverb balance for the piano at each level.

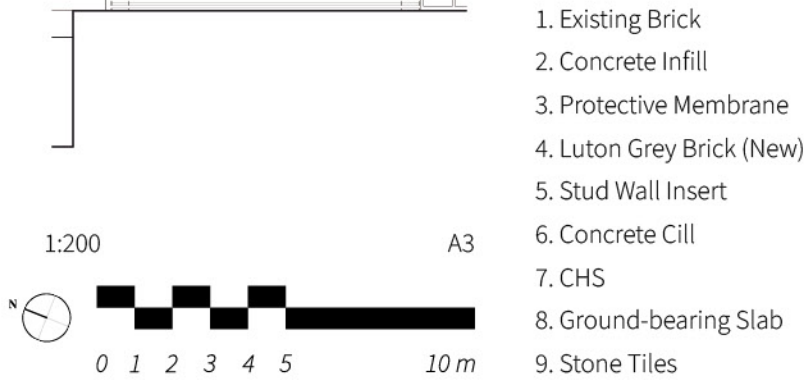
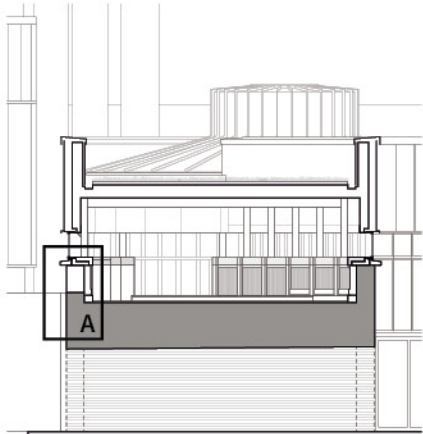
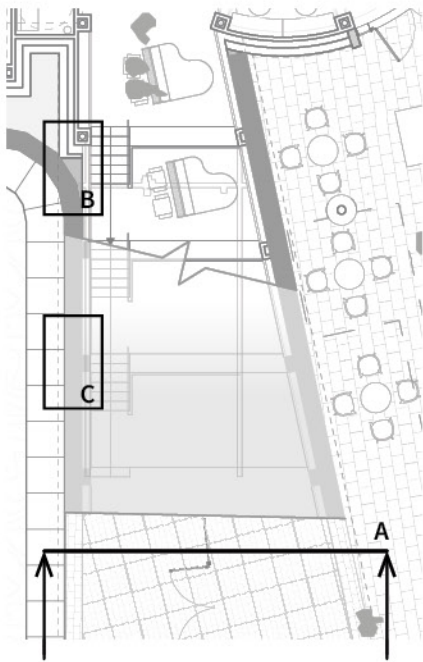


Retrofit Precedent
Astley Castle

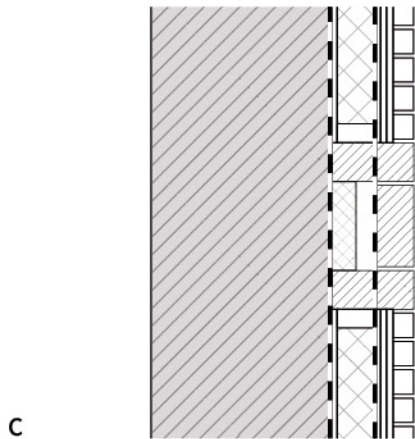
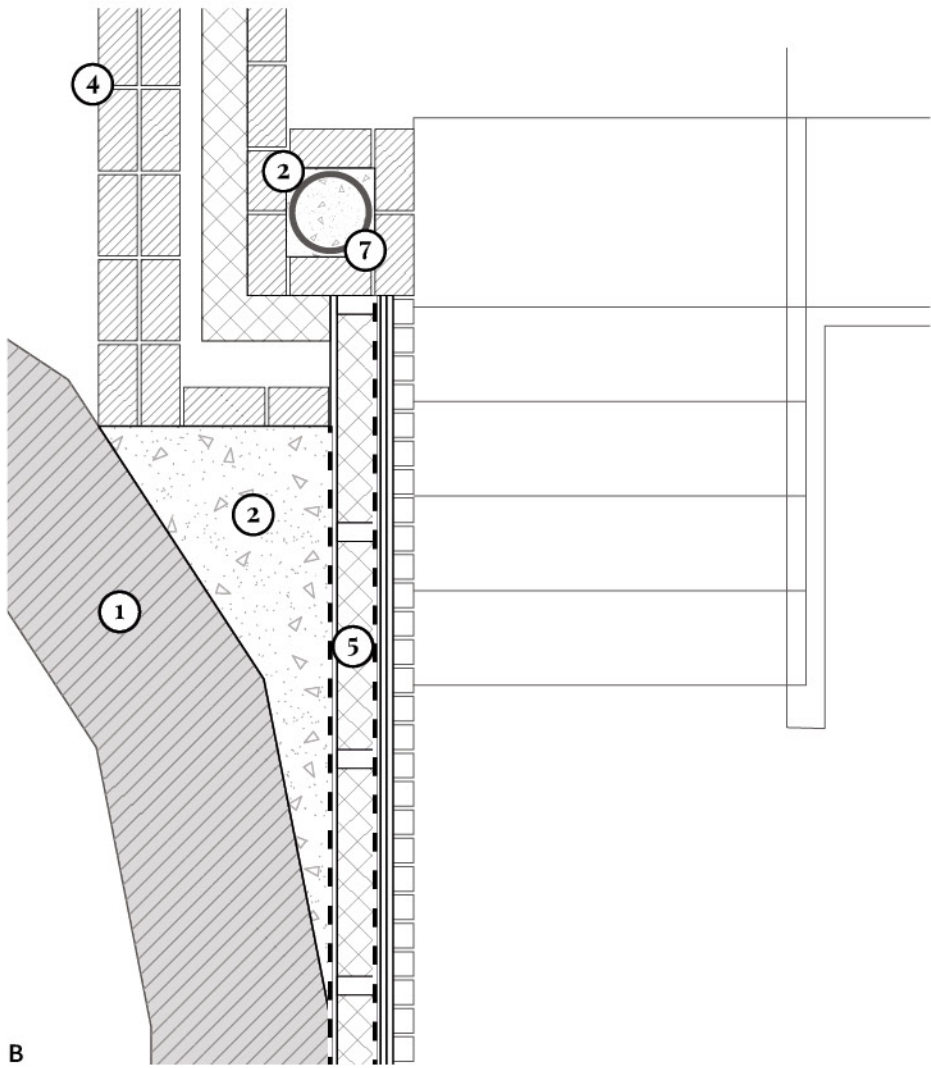
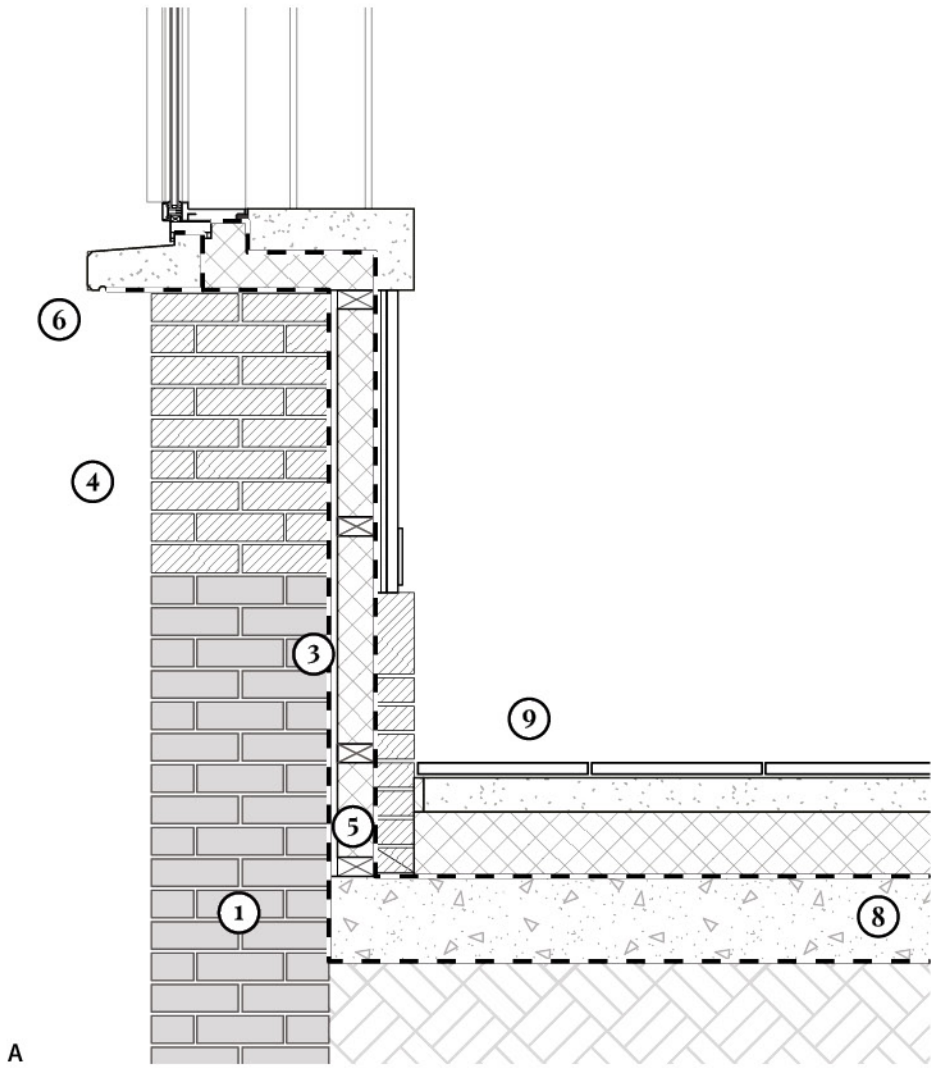
Figure 10.1
Grade II*

Witherford Watson Mann

Use of a concrete infill to create a primer when building against existing masonry structures. Unlike WWM's detail, I've decided to leave the concrete exposed so that this transition is visible.



1. Existing Brick
2. Concrete Infill
3. Protective Membrane
4. Luton Grey Brick (New)
5. Stud Wall Insert
6. Concrete Cill
7. CHS
8. Ground-bearing Slab
9. Stone Tiles



St Pancras Waterpoint

A Relocated Monument

A steam locomotive Waterpoint for St Pancras Station. Relocated over 700 metres from 'Barlow's train shed' to Camley Street to accommodate the Channel Tunnel Rail Link (HS1); it is now refurbished and used by the St Pancras Cruising Club for social functions (Abrehart, 2022). Only remaining waterpoint of seven for St Pancras' steam trains (Camden, 2008).

Grade: II (1974)

Architect (known for)
Sir Gilbert Scott (St
Pancras Station)

Year: 1860s

Owners / Leased to

London Historic
Buildings Trust
/ British Waterways

Users

St Pancras Cruising Club

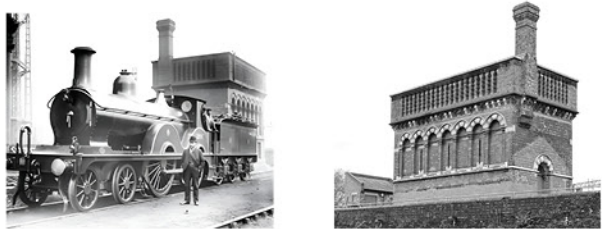


Figure 10.2, St Pancras Waterpoint (Then vs. Now)

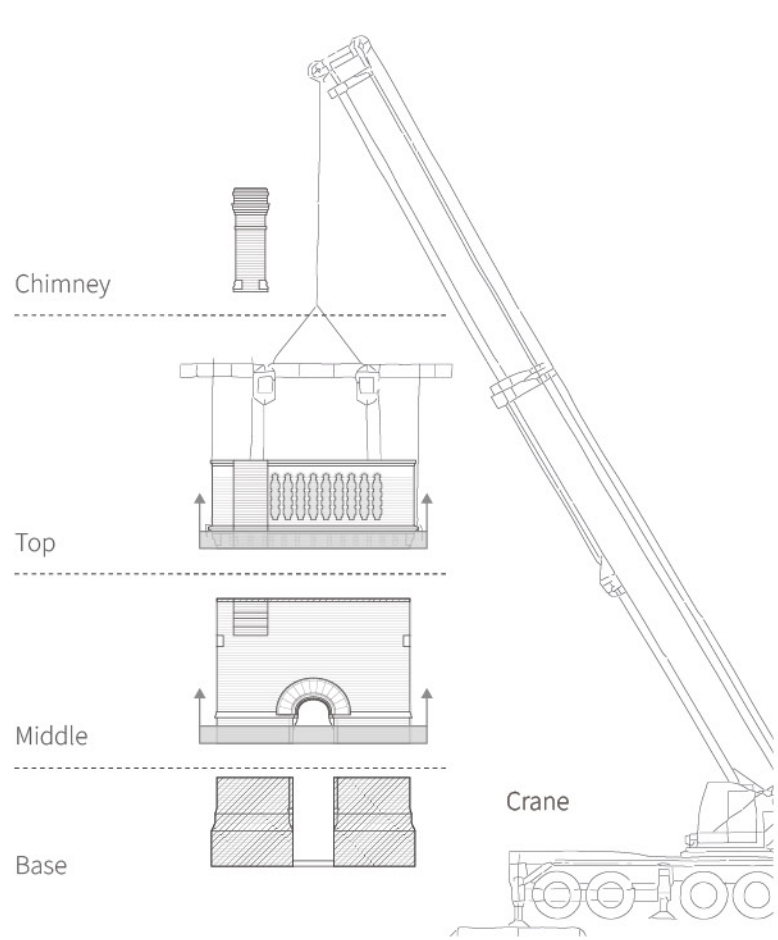


Figure 10.3, Moving the Monument (adapted)

Old Brick New Brick Lifting Beams

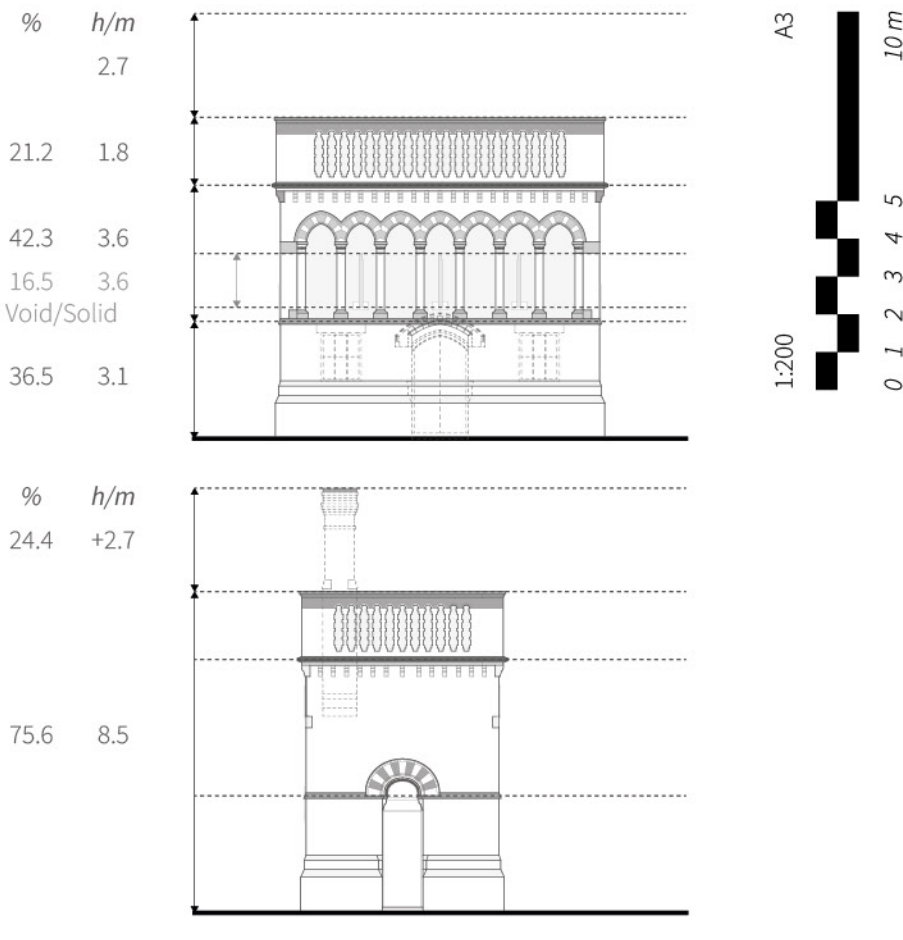


Figure 10.4 (adapted elevations)

1:50 A3
0 0.5 1.0 2.0 m

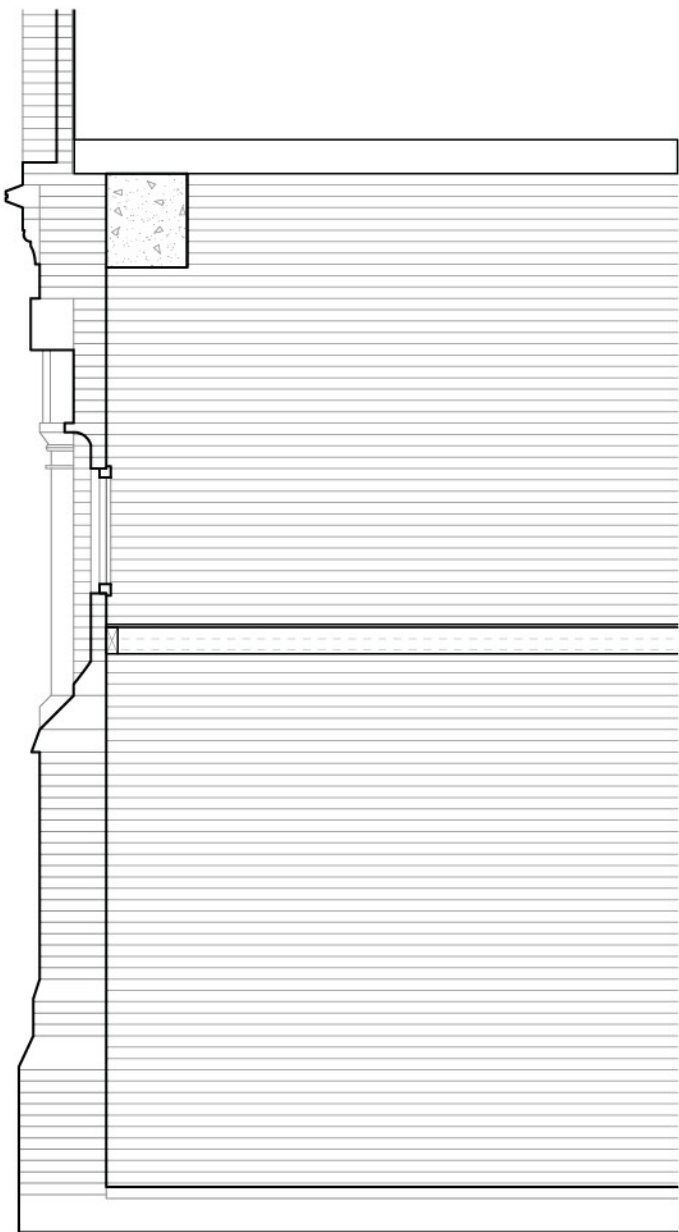
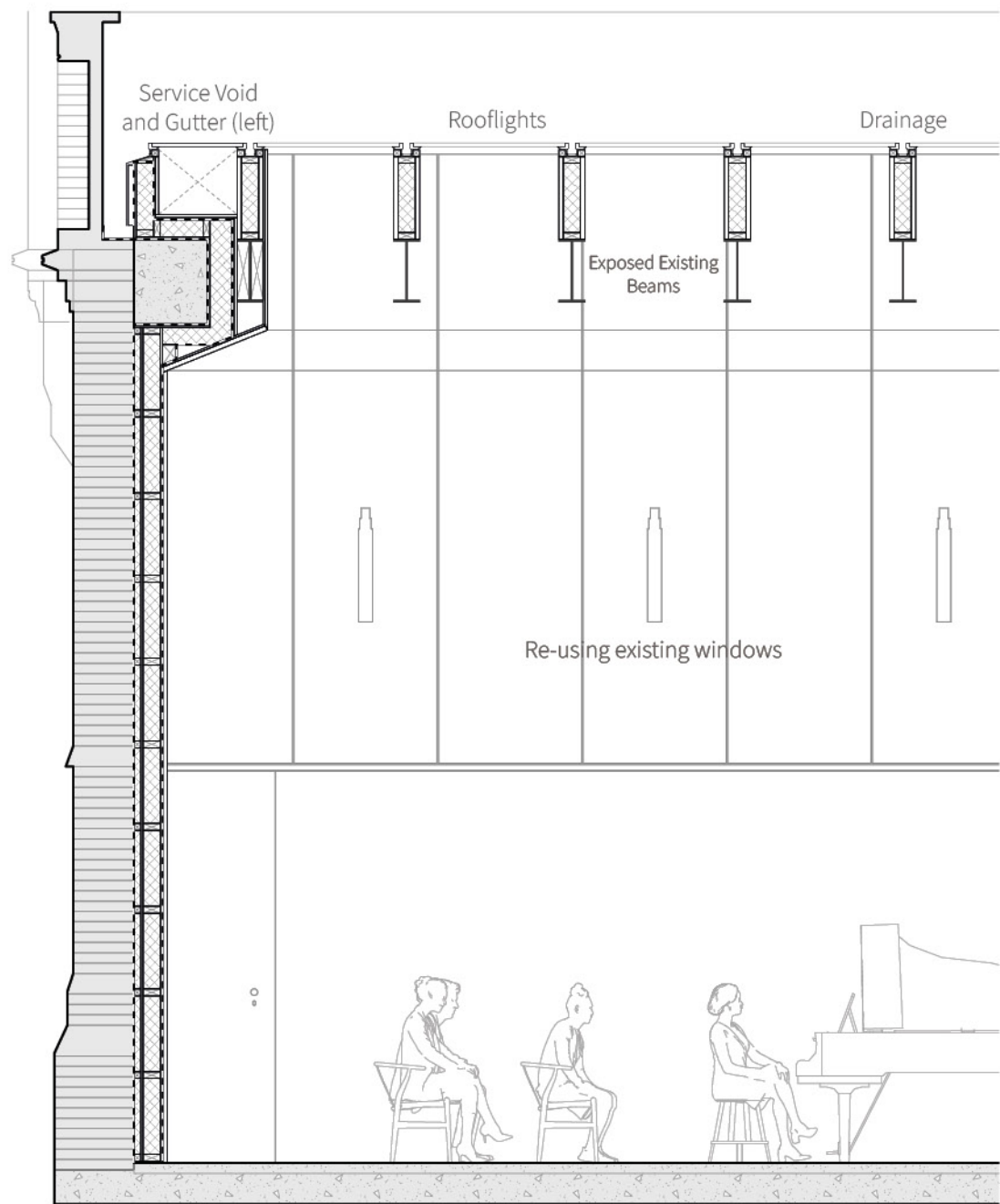
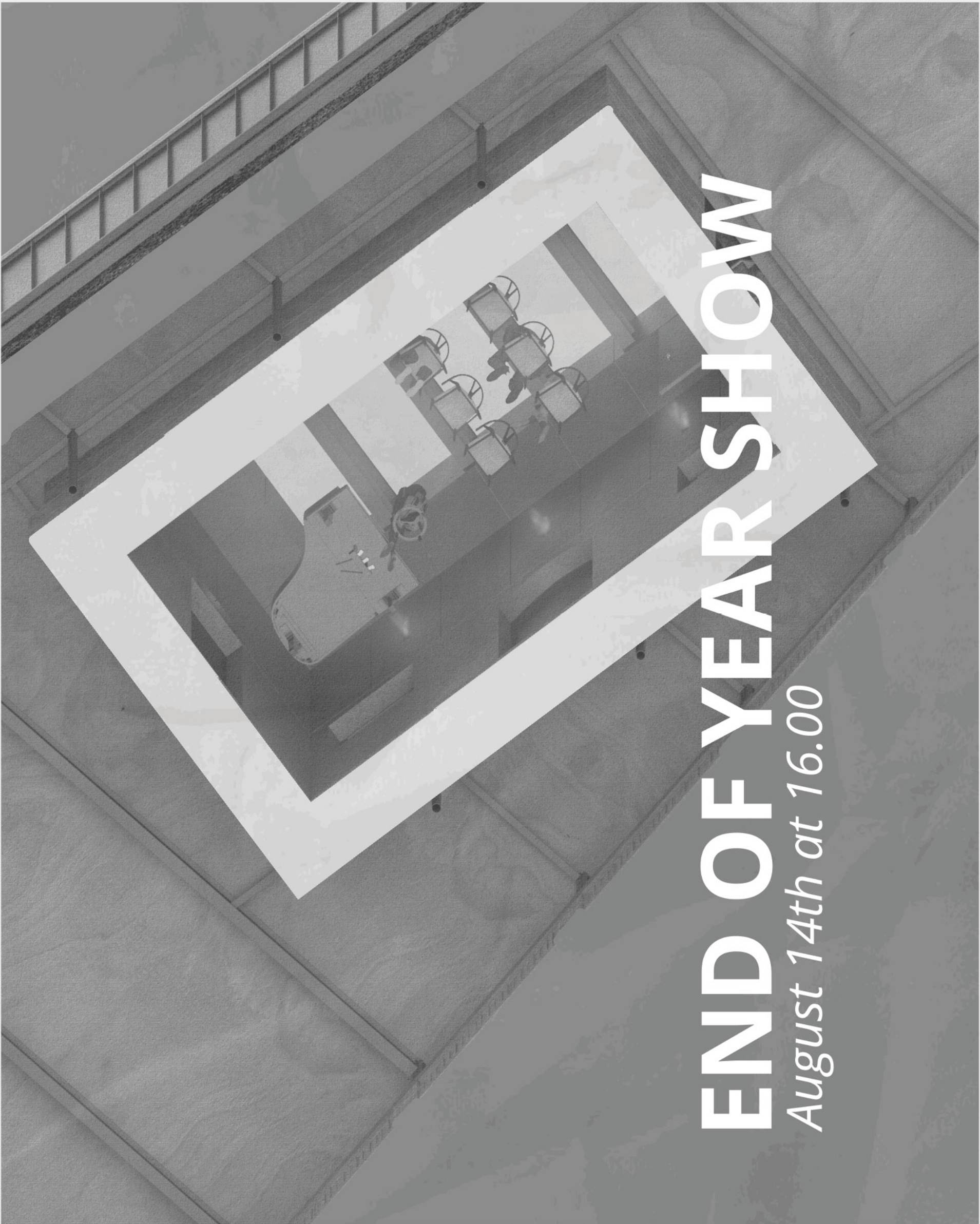


Figure 10.4, Existing Structure



Proposed Retrofit — Up to Performance (see tuning room / wall retrofit for similar details)



St Pancras Waterpoint — Up to Performance

The Waterpoint offers a unique venue for the end of year show, with a retrofitted acoustically-controlled interior similar to the small tuning rooms of the RDC-PTC



Act 11
After the Cappella
Site, Sights and Safety



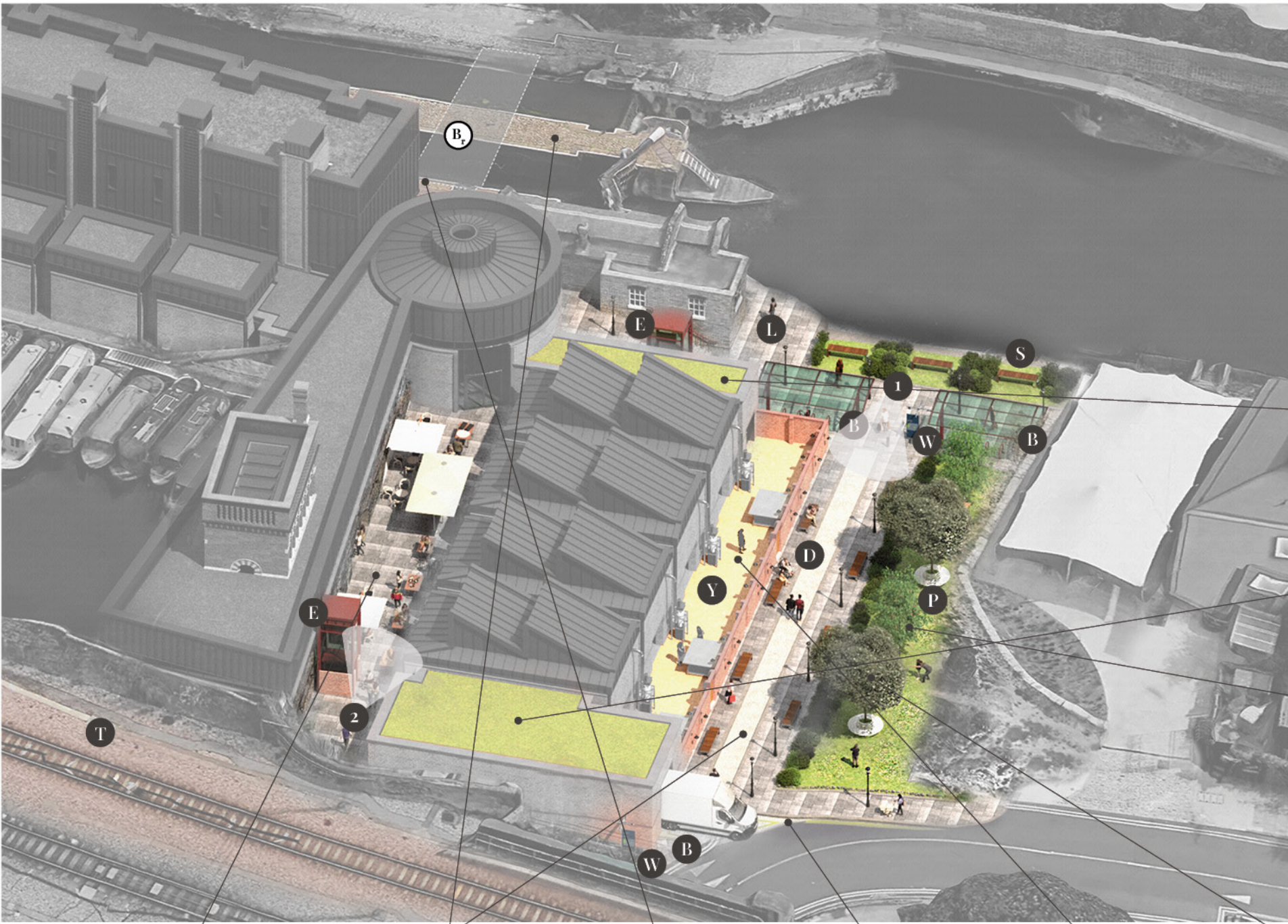
1. A Tributary of Camley Street (top)



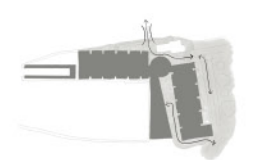
2. The Industrial Mew / Retail Street (bottom)

- E.** External elevators provide disabled, elderly, and bike access to the upper levels of both the main entrance and the Waterpoint performance space.
- W.** Clear, well-lit maps and signs are essential to navigating this campus. The existing style of mapping used on opposite of the canal has been adapted at the site.
- B.** Parking for at least 16 bikes is provided to restore the 5 used car park spaces removed during the building's construction. A shift from road vehicles to cycling is needed in King's Cross, as inspired by the many urban Scandinavian street models and with AQMA in London (see p. 82).
- L.** Measured street lighting is essential in this area for many reasons, examples include:
 - Safety*
Most notably for women and girls coming to and from the retail of CDY.
 - Bats (at CSNR)*
Light pollution disturbs their hunting.
 - St Pancras Basin*
Neighbouring canal boats should not be affected by light pollution. Solutions to this include low-level light modes for the gallery and tuning rooms can not be used beyond 20:00.
- Y.** A maker's yard minimises the demands on extract ventilation e.g. when using paints or adhesives. Moreover it increases the workshop area and provides secure external storage if required. It is unlikely that noise from this space will have any impact.
- D.** All bench seating is disabled friendly, with a space of at least 1000 x 2000 being provided besides them. Additionally the benches are homeless-friendly, with no exposed metal or handrails that could prevent sleeping.
- T.** The acoustic impact of the St Pancras Railway has been assessed (p. 92).
- Br.** A new bridge will span over the lock, extending in line with the axis of the piano stairs.
- P.** The boundary park is between the RDC-PTC and the CSNR has been designed by the author but it will be managed by the nature reserve due to their specialisation in habitat management.

Figure 11.1 (adapted)



Balancing Hard-Soft



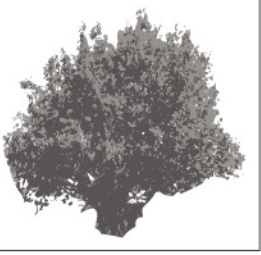
Closed Building Access



A Series of Streets



Light Sedum Planting and Gravel



Goat Willow Tree



Sycamore Tree
Based on existing flora at the site



Large Pavers
/ York Stone



New Granite Setts
Permeable as part
of the SUDs



Existing Granite Setts
Permeable as part
of the SUDs



Brick Pavers
Permeable as part
of the SUDs



Concrete Capping



Bonded Sand / Gravel
Easy to replace
and maintain

The Industrial Mew

Opening the Street

Reforming the multi-level industrial mew, as seen at the: Coal Drops Yard, Granary Square, The Rotunda and the Ruthin Crafts Centre. A contemporary craft village with a retail frontage.

Fortnightly Timetable

Term Time						
M	T	W	T	F	S	S
○	○	○	○	○	●	●

Summer

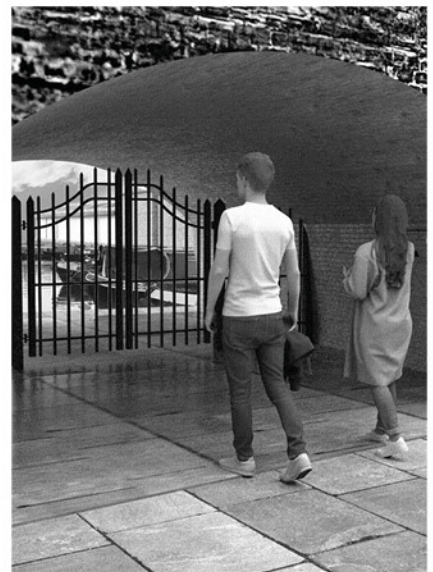
M	T	W	T	F	S	S
○	○	○	○	●	●	●

Winter (weather-dependent)

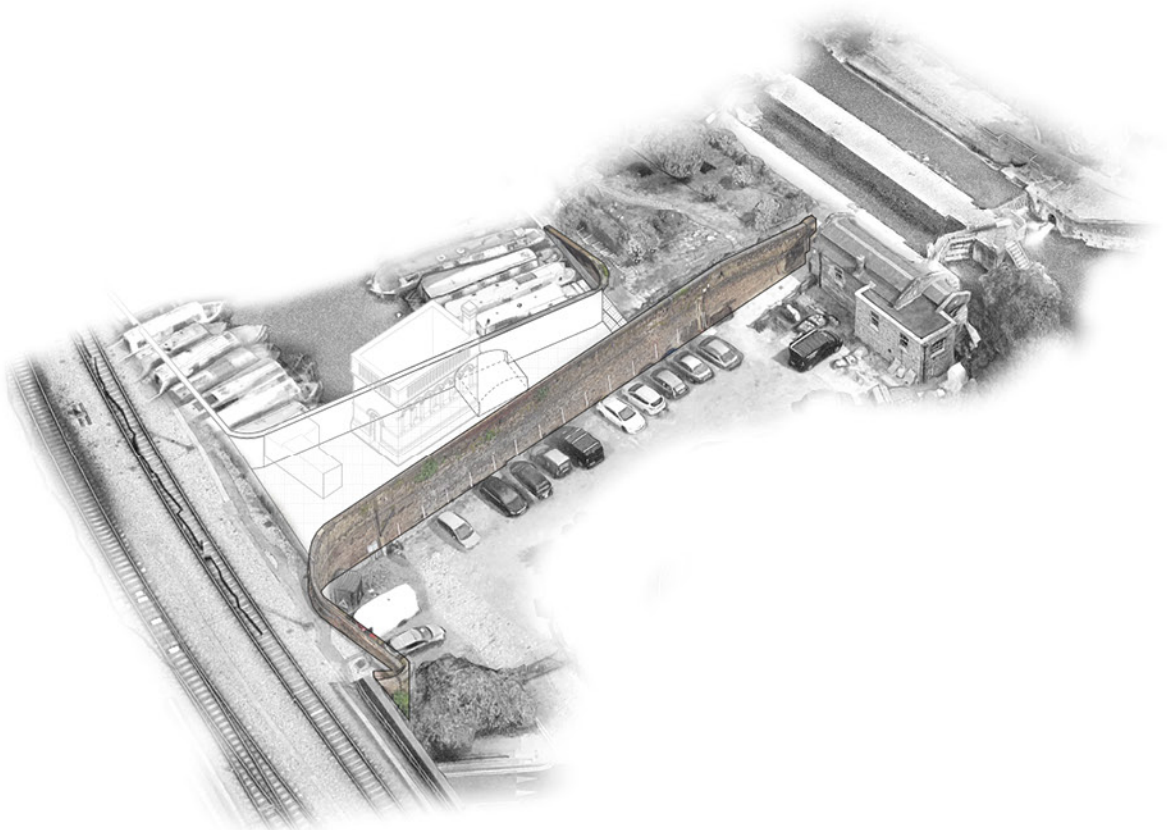
M	T	W	T	F	S	S
○	○	○	○	○	●	●

● Retail ○ Street ● Prep.

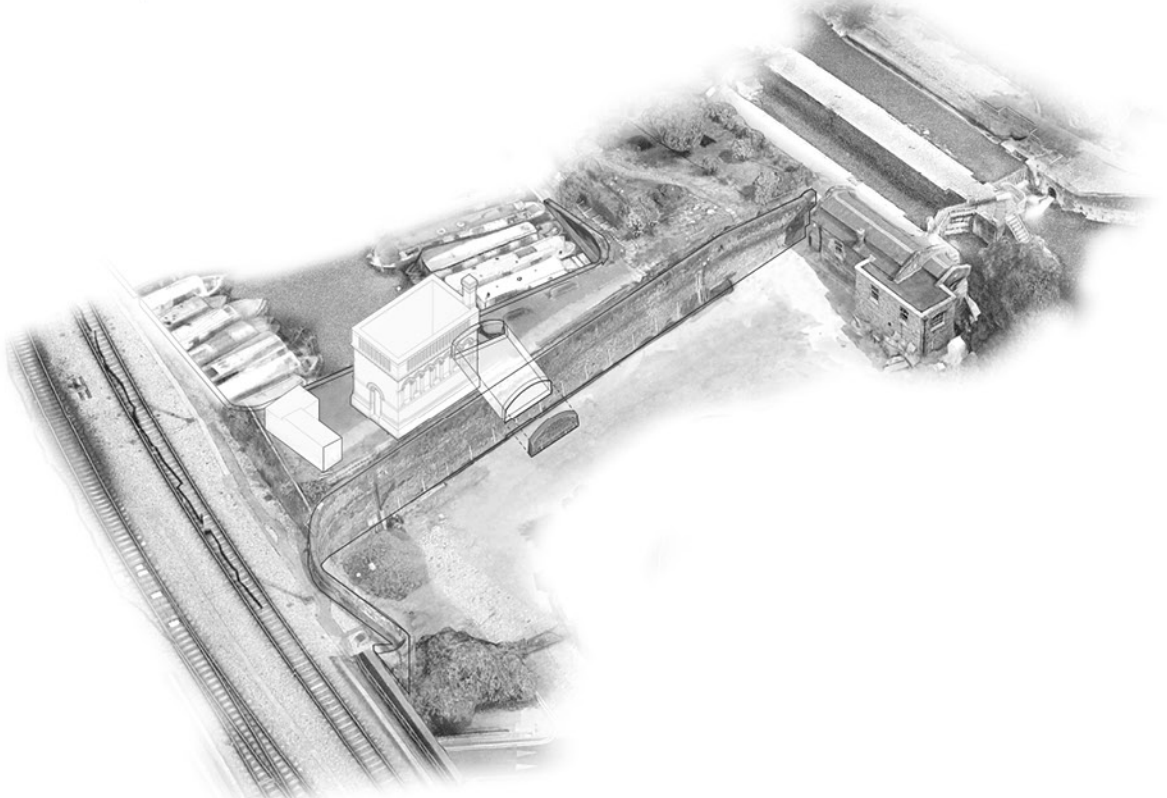
Access to the street varies throughout the week and term times and is fortnightly to give tutors time for their own projects. Most notably are the retail gallery days, where tutors are able to exhibit their workshop space and sellable products either externally or internally (climate-dependent). Preparation days are provided so that the working tutors have time to set-up their display. Otherwise on all days, the street and café/piano stairs (except during maintenance or other special days e.g. total school closure) are totally accessible to the public. The basin is only accessible to members of the SPCC or in the case of a fire. See page 131 for more information on access.



Accessing the St Pancras Basin

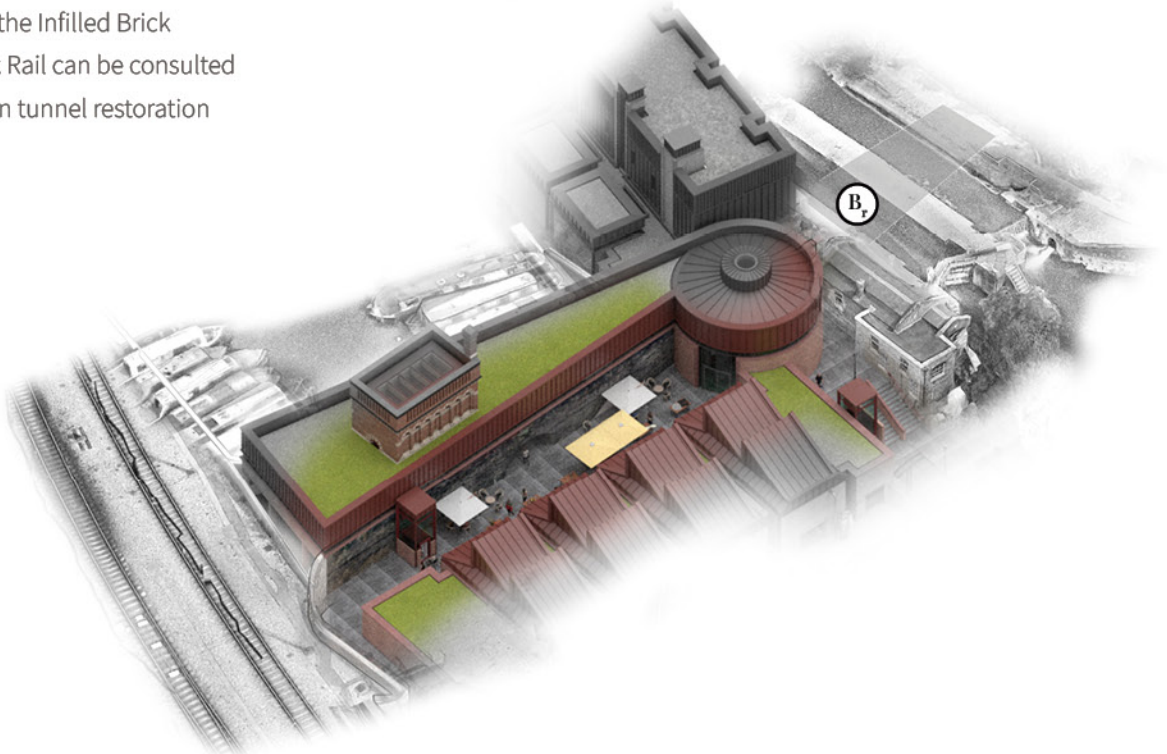


The Weathered Coal Drops Wall and the Hidden Tunnel

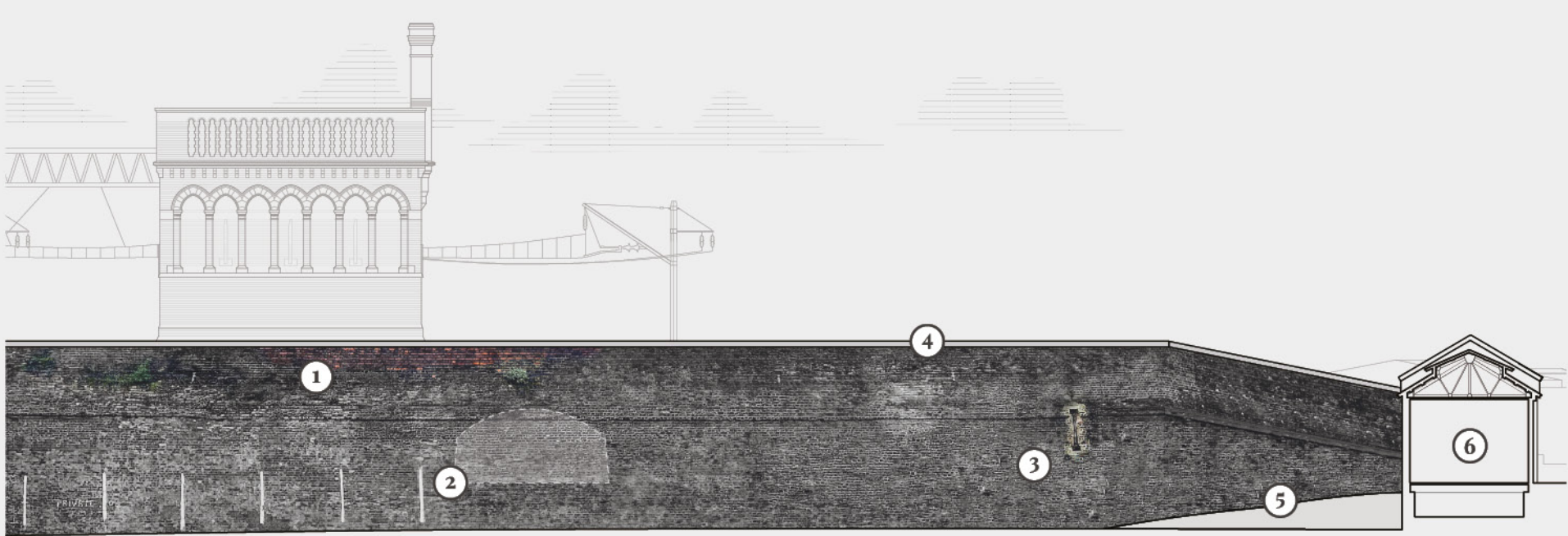


Removing the Infilled Brick

— Network Rail can be consulted on Victorian tunnel restoration



The Fortnightly Weekend Retail Gallery



The Existing Wall

1. Red stock infills the brickwork of the weathered wall. A theme that is consistent throughout the site, from the Waterpoint's façade, doors and frames to Niall McLaughlin's stained-concrete tapestry building, red equates to new.

2. Vegetation, pollution, rain and the patina of age hides the former tunnel. A passerby would never know that it was there.
3. A small slit, like that of an embrasure or archer's loophole, it is not clear why it features along the wall.

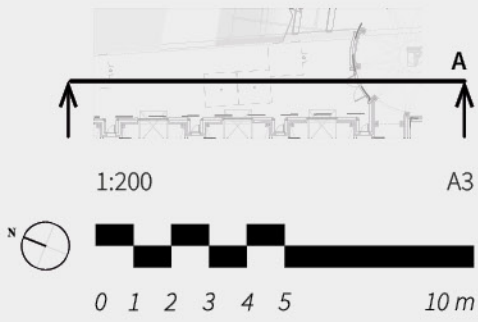
4. Victorian industrial walls — as seen abutting the British railway network — have a distinctive semicircular capping that runs along it.
5. A steep ramp provides the only disabled access to the elevated clubhouse (disused), DD and LC.

6. See page 105 for details on the existing lock cottage and how it has been retrofitted



The Centre Café

The Mew



1. The Waterpoint breaks through the gallery roof, no longer an isolated monument but a connected performance space within a Grade II listed piece of industrial architecture.

2. The piano stairs form a second street that runs in parallel to the retail gallery and which can look beyond towards the basin, nature reserve, railway line and even St Pancras Gardens.
3. A lift provides disability access to the piano gallery and performance space. The Waterpoint was previously inaccessible to wheelchair users. See page 131 for more.

4. Security is keycard-based in order to protect the basin — improving the current security of a single manually operated fence.
5. As with the permeable gallery entrance, the street-access provides visibility to the the publicly accessible central café.

6. The CRT-managed museum space will be open to the public on a permanent basis and managed by volunteers. While the heat pump that supplies the site is operated by the university.

The Street Section — Before and After

Integrating the wall within the RDC-PTC and the wider landscaping

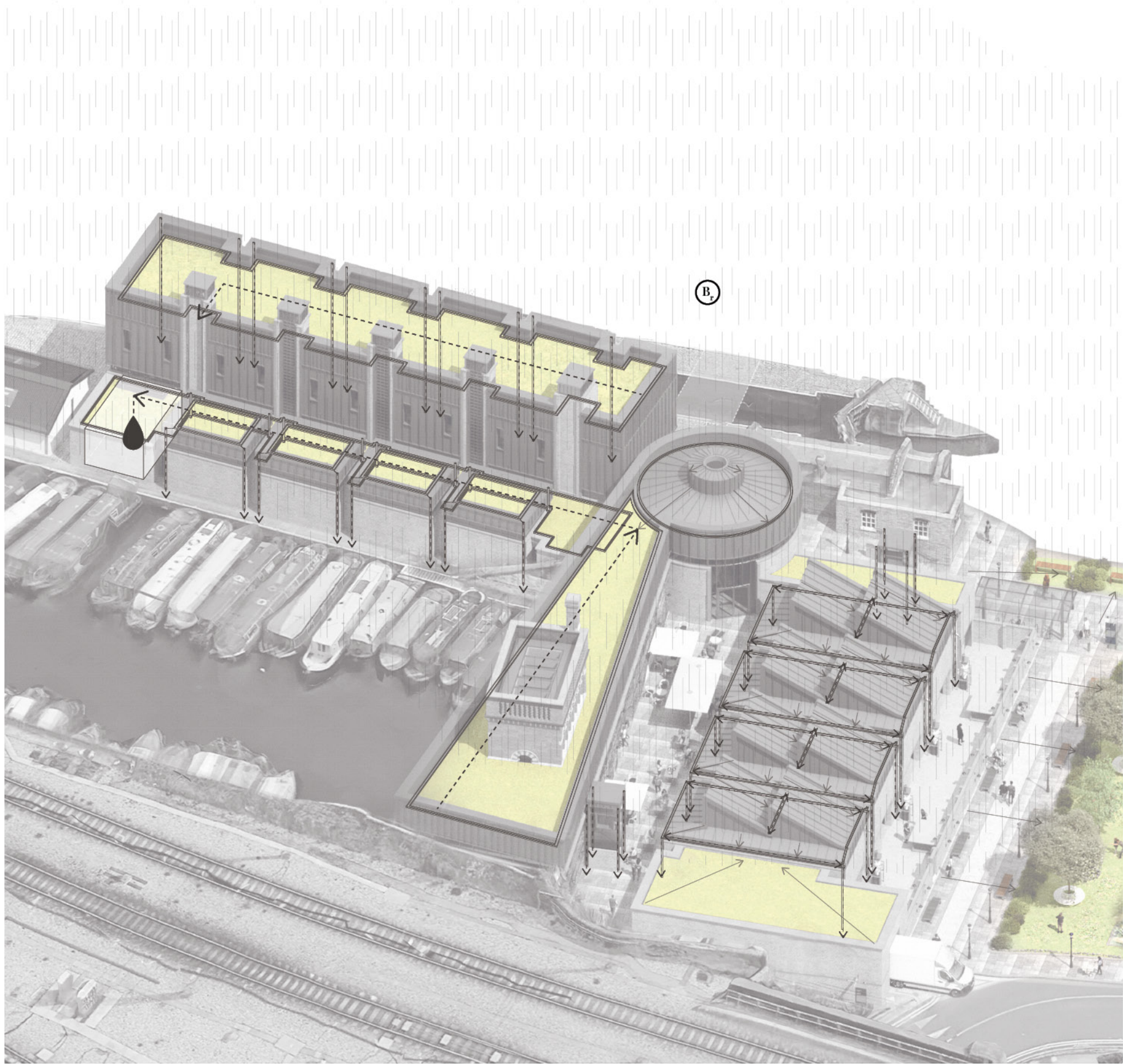
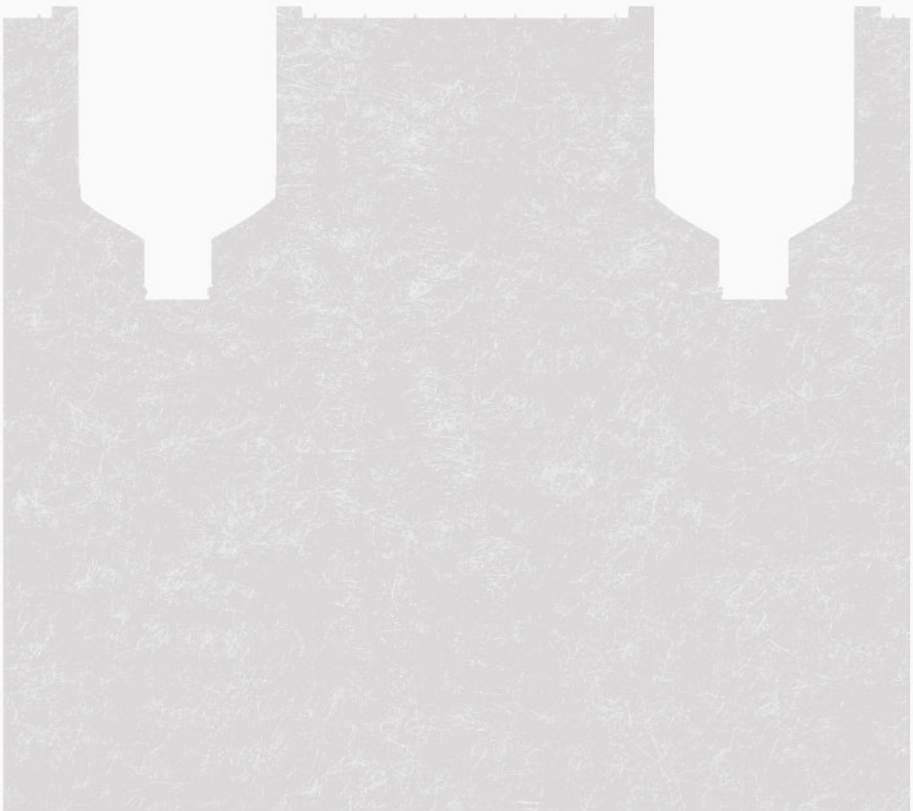


Figure 11.1 (adapted)

Green Roofs

Makes up part of the water-management strategy which has been integrated into the landscaping and tectonic design of the RDC-PCT e.g. with SUDs.

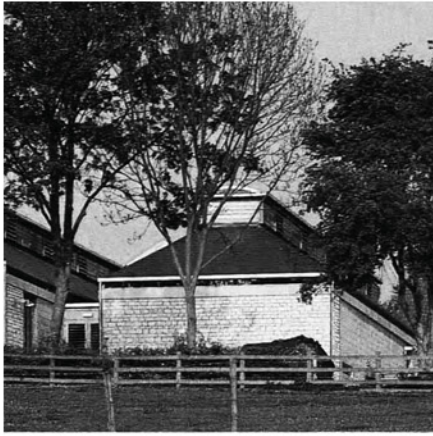


Act 12
Legato

Tutors, Teachers and Traders

The Street Front

Detailed Elevation



Typology Precedent
Shoe Factory
1995

Haworth Tompkins

After reading up on Haworth Tompkin's Shoe Factory, I began testing the same form on my site, with the same orientation as my tutor workshops. In identical conditions, as the opposite page shows, there is a significant amount of glare due to the clerestory glazing and the diffusing skylight filter having minimal effect.

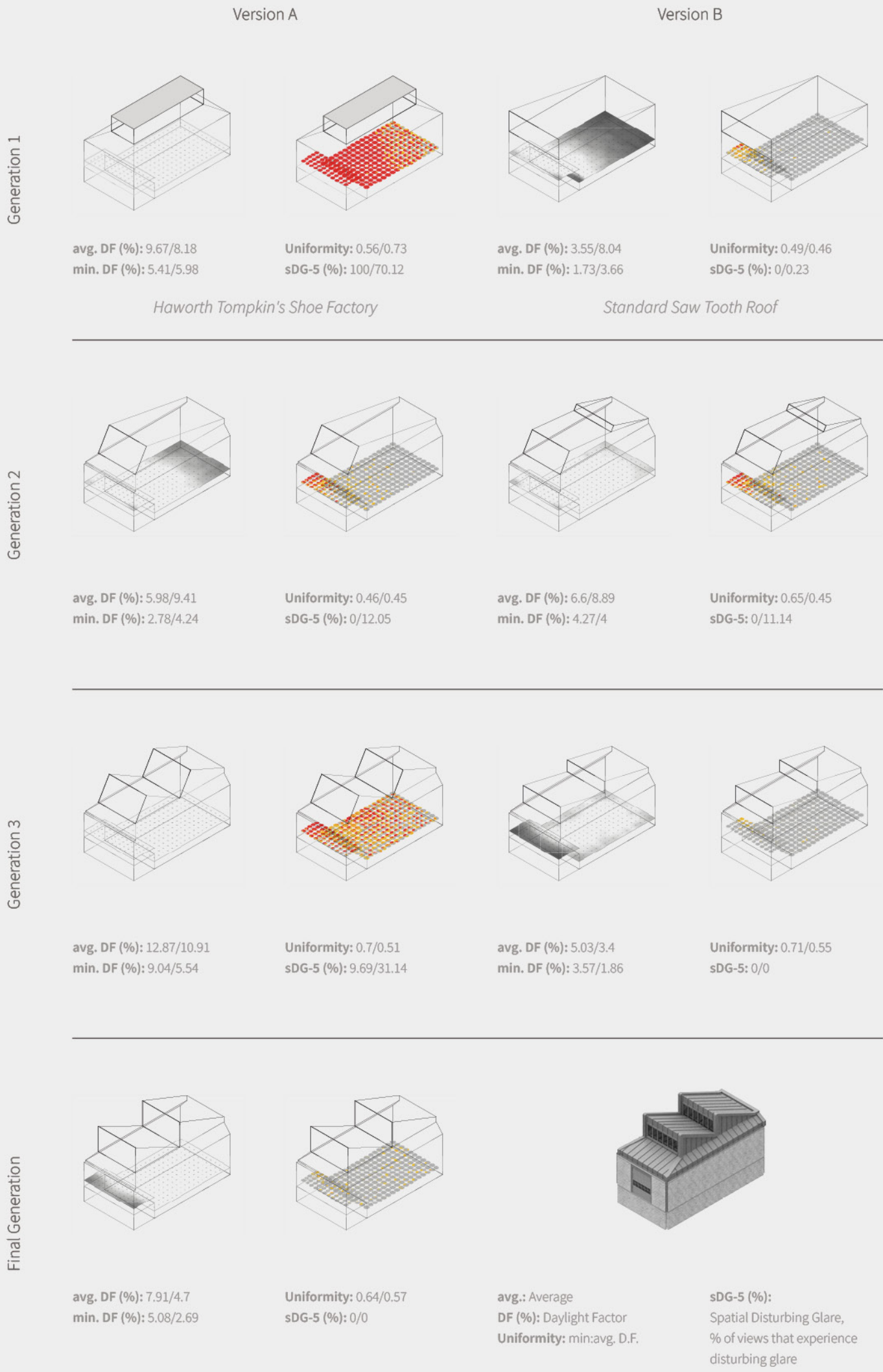
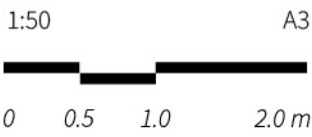


Typology Precedent
Oxbow School
1998

Stanley Saitowitz

A similar typology to the RDC-PTC, the Oxbow School provides a mixed-media one-semester programme for students of all ages and qualifications (e.g. secondary school, foundation and graduates). A series of workshop units open out onto a dense Californian habitat — the large glazed garage-like doors blends the internal and external spaces together.

Similarly, large partially-glazed doors open on either side of the tutor workshops — to the North, the industrial mew and to the South the Camley Street Nature Reserve. Due to the UK's juxtaposing environment, the opening of these doors would be more controlled but still benefit the movement of materials and for the retail galleries.



Material	Maintained Illuminance (lx)	Average D.F.*	Minimum Uniformity	Source	Glare (sDG-5)
Timber	300 (General) – 750 (Intricate)	6 – 15	0.6 – 0.7	CIBSE LG1: The Industrial Environment Working Plane — 0.85 / 0.7 m	0
Metallurgy	300 (General) – 750 (Intricate)	6 – 15	0.4 – 0.7		
Ceramics	50 (Drying) – 1000 (Painting)	1 – 20	0.4 – 0.7		
Textiles	300 (Washing) – 750 (Sewing)	6 – 10	0.6		
Preparation	500	~10	0.6	CIBSE LG5: Lighting for Education	

*Design Sky Illuminance (85% of the time between 9–5) for London = 5000 lux

**Aim to have no disturbing glare throughout the year as this will impact machine-use and therefore safety

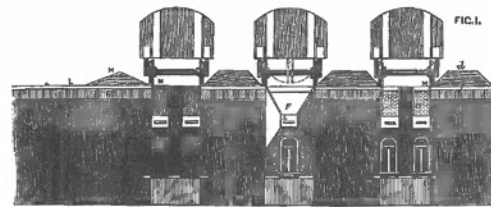
Sculpting with Light

Modelling daylight conditions with different roof typologies based on the vernacular architecture of the site.

Y1/ Tutor Workshops
Form and Function

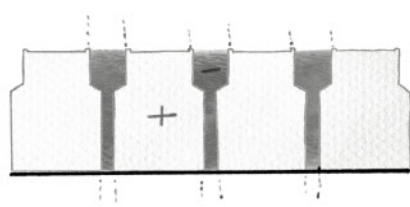


Tutor Workshop, Front Corner Detail



Local Precedent
Plimsoll's Coal Drop Hoppers
Figure 12.3
1:50

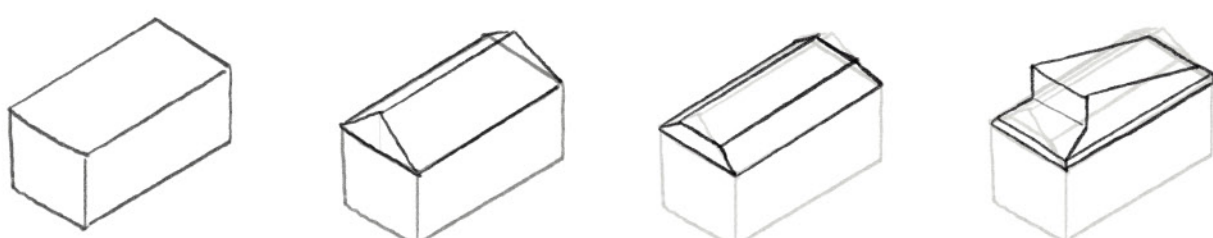
The historical coal drops, as shown on page 24, had strong vertical and horizontal openings that created a distinct rhythm of building and coal cart through y-profiled hoppers.



Creating the Hopper Form
Solid and Void
The gable end of the Lock Cottage initially led to the flat brick-filled face of the tutor workshops and as the form changed from pitched to sawtooth, the hopper-language could be found in the void.



Local Precedent
CSNR's Vernacular
Erect Architecture
Similarly, the hopper form was rationalised by the neighbouring CSNR, with the positive profile of their skylight (Architecture, 2017).

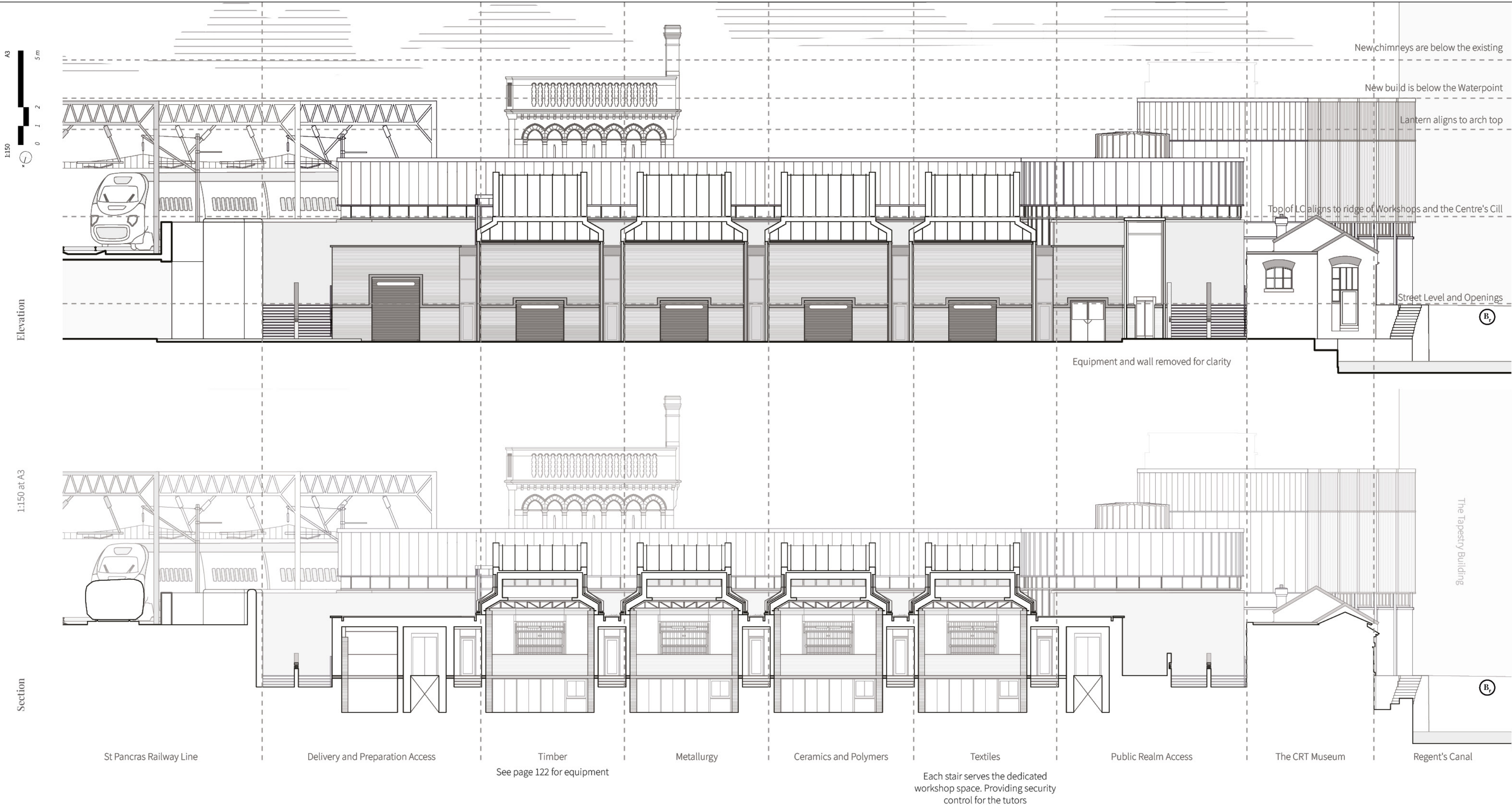


A Building Block Gable Ended Mansard Roof Sawtoothed Mansard

Form-Finding

611

120

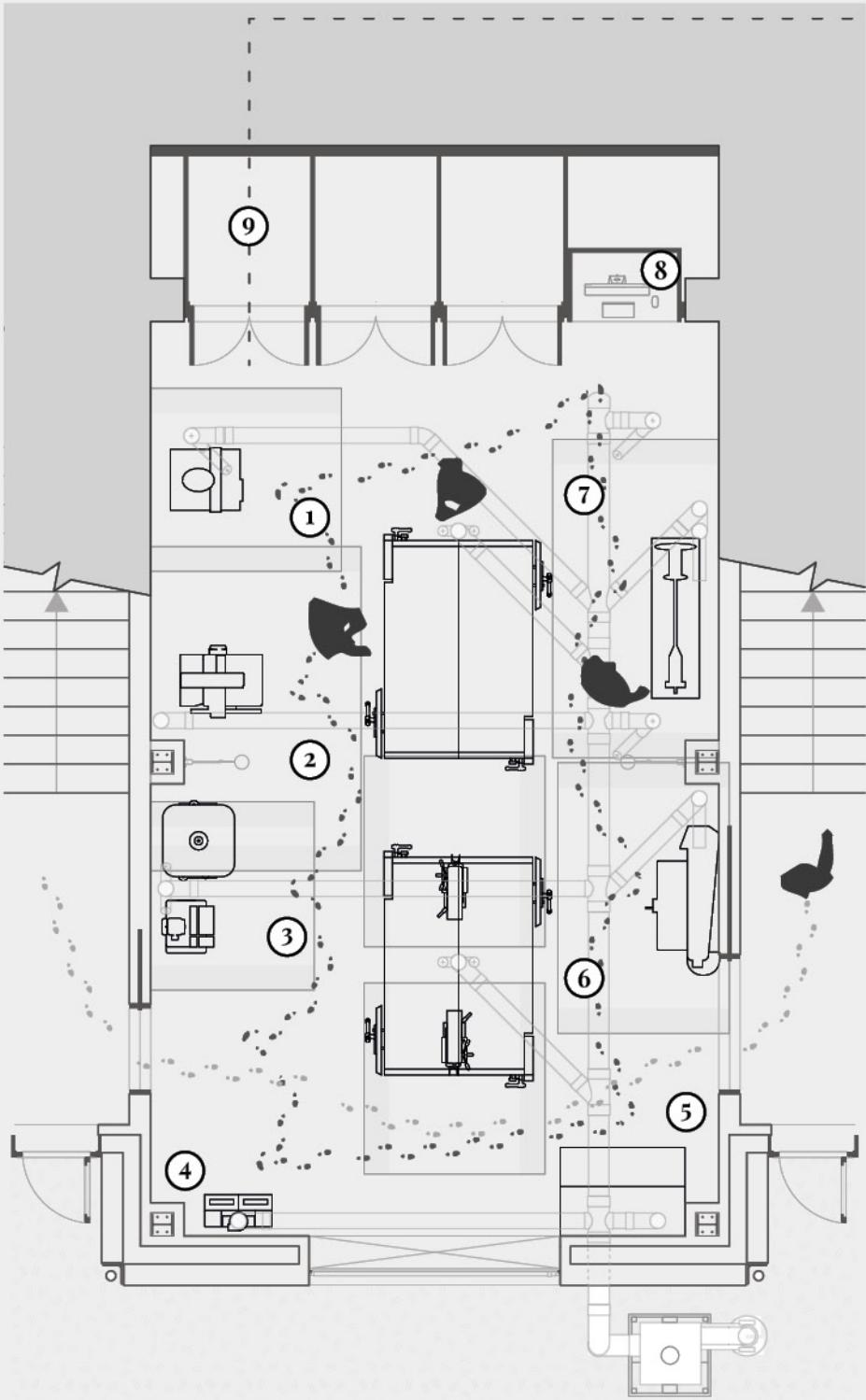




The Gallery Balcony

A member of the public looks out onto the workshop during an open day

Most of the equipment is easily portable (built on wheels) to provide flexible workshop layouts that can be altered based on different tutors or course / module demands.



BB81
Building Bulletin 81
Design and Technology
Accommodation in Secondary Schools

Each piece of machinery has a safe working area which in most practical cases overlap. However, from first principles it was essential that there was sufficient working room for the tutor and students. Layout options were defined by the safe area and the location of local exhaust ventilation (LEV), with similarly demanding equipment being positioned next to each other. In addition to being ordered by process (as with the RDC-PTC itself) e.g. positioning the drills in the middle of the space and having access to sanding equipment either side, and finishing equipment (spray booths/ downdraught) being at the end of the room.

Timber Workshop Equipment

- 1. Morticer
- 2. Bandsaw
- 3. Gerbil and Disc Sander
- 4. Spray Booth
- 5. Downdraught Table
- 6. Belt Edge Sander
- 7. Lathe
- 8. Computer
- 9. Storage and HVAC Access

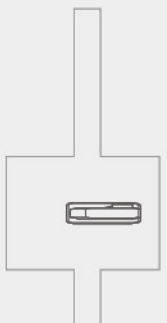
Preparation Equipment



Grindstone



Sharpener



Metal Hacksaw



Moulding Bench

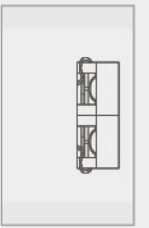
Metallurgy Equipment



Welding Bench



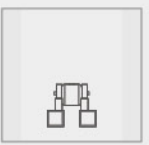
Crucible Furnace



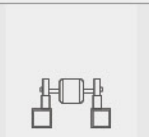
Brazing Hearth



Milling Machine



Grinder



Polisher

Textiles Equipment



Sewing Machines

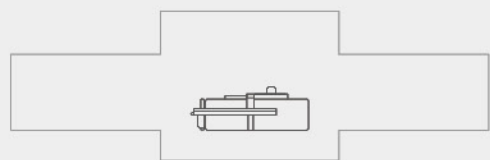
Industrial Printers

Polymer Equipment

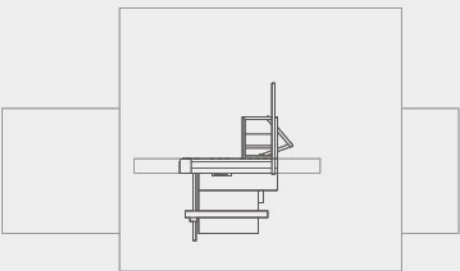
FDM Printers

Resin Printers

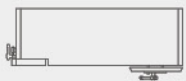
Vacuum Former



Planer



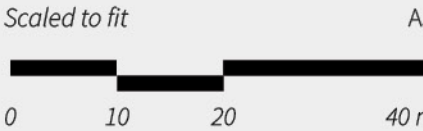
Circular Table Saw



Workbench

Workshop Equipment

Sizing, positioning, power and flexibility are just some of the demands a new workshop and its equipment needs.





The Timber Workshop

A tutor works on the lathe while two students begin crafting their timber module.
The ventilation grilles can be seen integrated above the storage.

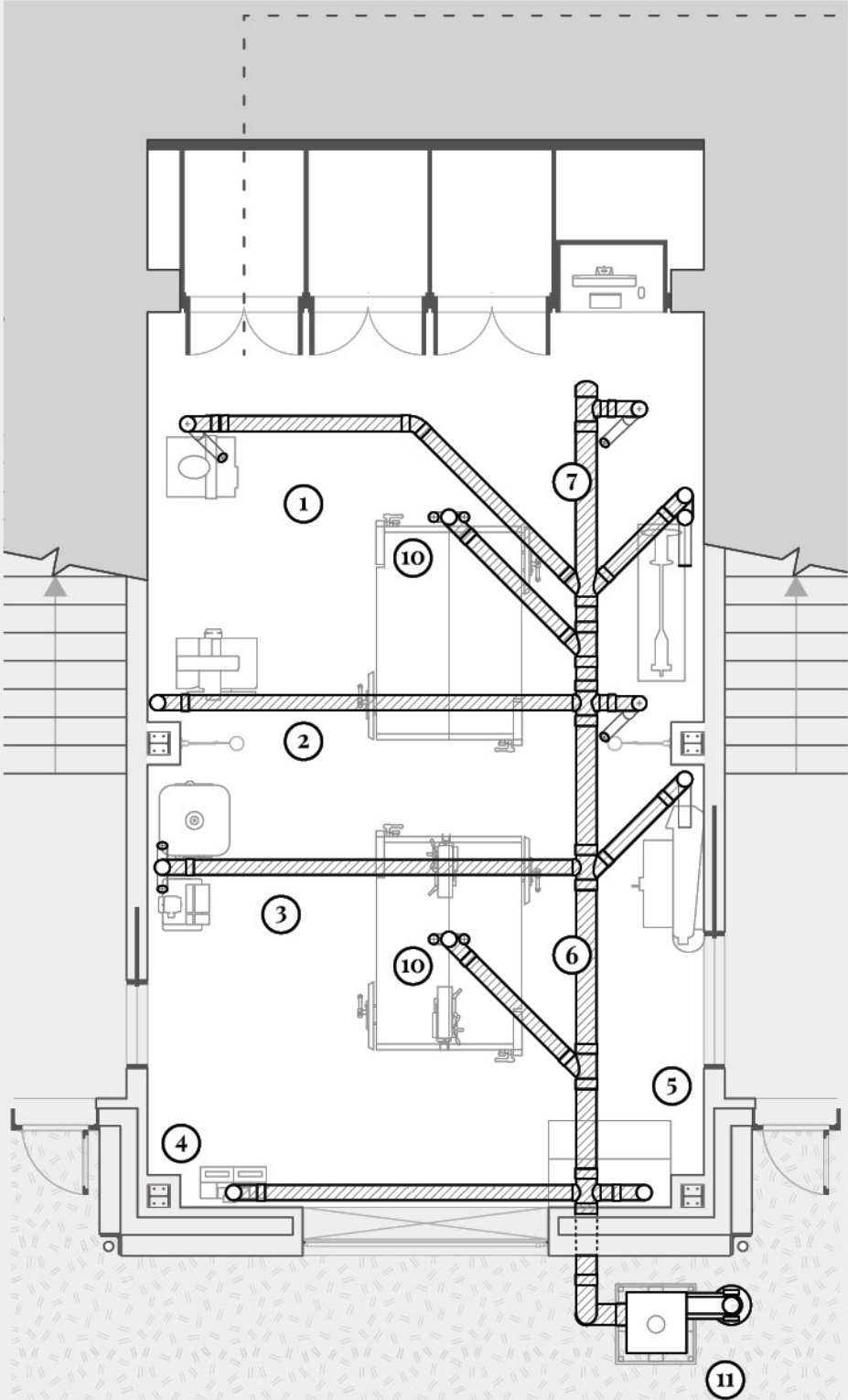
BB101 and ASHRAE 62.1

Building Bulletin 101
Guidelines on ventilation, thermal
comfort and indoor air quality
in schools

The BB101 recommends a minimum
exhaust rate of 2.5 l/s/m², a minimum
3 m height for high pollutant emitting
spaces and a secondary method for
getting fresh air (e.g. the garage door/
glazing and adjacent yard doors) for
general pollution control — as based off
ASHRAE 62.1 *Ventilation and Acceptable
Indoor Air Quality*.

The following calculations use formula
from ASHRAE:

Variable	Value
	20 (L/s.p)
Min. Suggested Air Supply Rate per person (p) from ASHRAE 62-1	72 (m³/h.p)
	0.02 (m³/s.p)
Room Height	6 m
Room Area	60 m²
Volume	350 m³
ach /per person	0.21
Typical Occupancy	10
Max ach	2.1
Suggested Air Supply Rate	200 l/s
Suggested Air Exhaust Rate over an area	3.1* l/s/m²
* Meets minimum required by UK Government's BB guidance	



COSHH

Control of Substances Hazardous to
Health

COSHH is a legislative requirement to
'adequately control exposure to [harmful
substances]' (see HSE, 2023). Examples
of this include: micro-organisms, liquids,
gasses, powders, etc.

Workplace
Exposure Limit (WEL, *ibid.*)

Hardwoods: 5mg/m3
Softwoods: 3mg/m3

Hazardous Substances

Hazardous substances within a timber
workshop include:

Dusts
e.g. wood, MDF, laminates

Liquids
e.g. adhesives, paints, varnish

Risks

Carcinogens
Asthma
Skin Irritation

No.	Equipment	Approx. Dim. (m)	LEV-Type	Min. Airflow (CFM)	Prov. Airflow (CFM)	Minimum Branch Ø (m)	Contaminant	Duct Velocity (m/s)
1	Morticer	0.7 x 0.7 x 1.5	Receiving Hood	350	403	0.11	Process Dust	20
2	Bandsaw	0.8 x 0.8 x 1.9	Connected	350	403	0.11		
3	Disc Sander	0.7 x 0.5 x 1.0	Receiving Hood	195	213	0.08		
4	Spray Booth	0.7 x 0.5 x 0.6	Partial Enclosure	325	325	0.11	Condensing Vapours	1.5 at surface
5	Draft Table	1.3 x 0.6 x 0.8	Partial Enclosure	~ 2000 m³/h		0.13	Process Dust	
6	Belt Sander	1.5 x 0.5 x 1.2	Connected	550	550	0.13		
7	Lathe	1.6 x 0.8 x 1.2	Receiving Hood	350	550	0.13		
10	Workbench	Varies	Hood / Sweeps	728	750	0.15		20
11	Dust Extractor							

Note: The supply duct for the LEV will likely have a diameter of around 0.2 – 0.3 m

Health and Safety in a Workshop

Beyond the safe operation of equipment, the need for fresh air and ways of extracting
pollutants created by the making process is essential to user safety.



R

Act 13

Regulations

Rules, Requirements and Risk

Code	Building Regulations	Reference
Part A	Structure	(Gov, 2023a)
Part BV2	Fire Safety	(Gov, 2023b)
Part C	Site Preparation and Resistance to Contaminants and Moisture	(Gov, 2023c)
Part D	Toxic Substances	(Gov, 2023d)
Part E	Resistance to the Passage of Sound	(Gov, 2023e)
Part F2	Ventilation	(Gov, 2023f)
Part G	Sanitation, Hot Water Safety and Water Efficiency	(Gov, 2023g)
Part H	Drainage and Waste Disposal	(Gov, 2023h)
Part J	Combustion Appliances and Fuel Storage Systems	(Gov, 2023i)
Part K	Protection from Falling, Collision and Impact	(Gov, 2023j)
Part LV2	Conservation of Fuel and Power	(Gov, 2023k)
Part M1	Access to and Use of Buildings	(Gov, 2023l)
Code	Building Bulletin	Reference
BB81	Design and Technology Accommodation in Secondary Schools	Slightly outdated but useful re: equipment safe zones and typology, (Gov, 2004)
BB93	Acoustic Design of Schools — Performance Standards	(Gov, 2004)
BB100	Building Bulletin 100: Design for Fire Safety in Schools	(Gov, 2014)
BB101	Ventilation, Thermal Comfort and Indoor Air Quality 2018	(Gov, 2018)
Code	British Standards	Reference
BS ISO 23591:2021	Acoustic Quality Criteria for Music Rehearsal Rooms and Spaces	(BSI, 2021)
BS 9999:2017	Fire Safety in the Design, Management and Use of Buildings	(BSI, 2017)
BS EN 12845	Fixed Fire fighting Systems. Automatic sprinkler systems. Design, Installation and Maintenance	(BSI, 2015)
Code	Chartered Institution of Building Services Engineers	Reference
CIBSE Guide A	Environmental Design	(CIBSE, 2021)
CIBSE Guide B	Heating, Ventilating, Air Conditioning and Refrigeration	(CIBSE, 2005b)
CIBSE Guide B2	Ventilation and Ductwork	(CIBSE, 2016b)
CIBSE Guide B3	Air Conditioning and Refrigeration	(CIBSE, 2016c)
CIBSE Guide G	Public Health Engineering	(CIBSE, 2014)
CIBSE TM46	Energy Benchmarks	(CIBSE, 2008)
CIBSE AM10	Application Manual 10, Natural Ventilation in Non-Domestic Buildings	(CIBSE, 2005a)
CIBSE AM13	Application Manual 13, Mixed Mode Ventilation	(CIBSE, 2000)
CIBSE CP2	Surface water source heat pumps: Code of Practice for the UK	(CIBSE, 2016a)
Code	Other Notable Regulations and Guides	Reference
TA Lärm	Technical Instructions on Noise Abatement	(Lärm, 1998)
HSE COSHH	Control of Substances Hazardous to Health	(HSE, 2023)
HSE	Noise at Work	(HSE, 2022)
LETI CEDG	LETI Climate Emergency Design Guide	(LETI, 2023)
LETI ECP	LETI Embodied Carbon Primer	(LETI, 2020)
WHO	World Health Organisation	(WHO, 2023)
Extrium	England Noise and Air Quality Viewer	(Extrium, 2023)
UK GOV	Noise Nuisance Guidance	(Gov, 2017)
ANSI/ASHRAE Standard 62.1-2022	Ventilation and Acceptable Indoor Air Quality	(ASHRAE, 2023)

Building Regulations

Fire Strategy

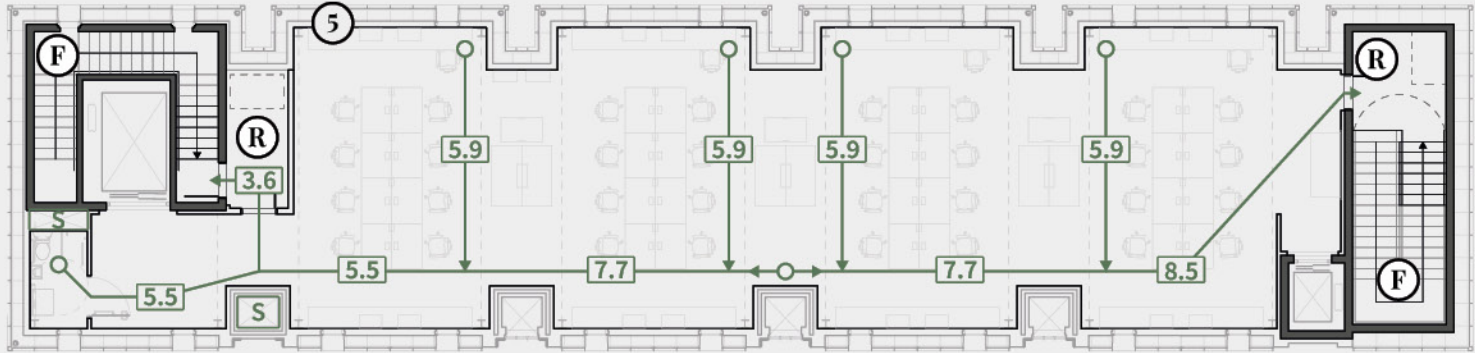
All of the following information is derived from the Approved Document Part B V2 and the Building Bulletin 100: Design for Fire Safety in Schools, unless otherwise stated, with the strictest limits taken from each. See Table B for each of these limits and the previous page for reference locations.

Refuge areas (**R**, min. 9 x 1.4 m) are adjacent to the stairs in a protected enclosure (left) or directly within the staircase have been implemented (right). These differ due to site size constraints and programme (i.e. plant and storage requirements).

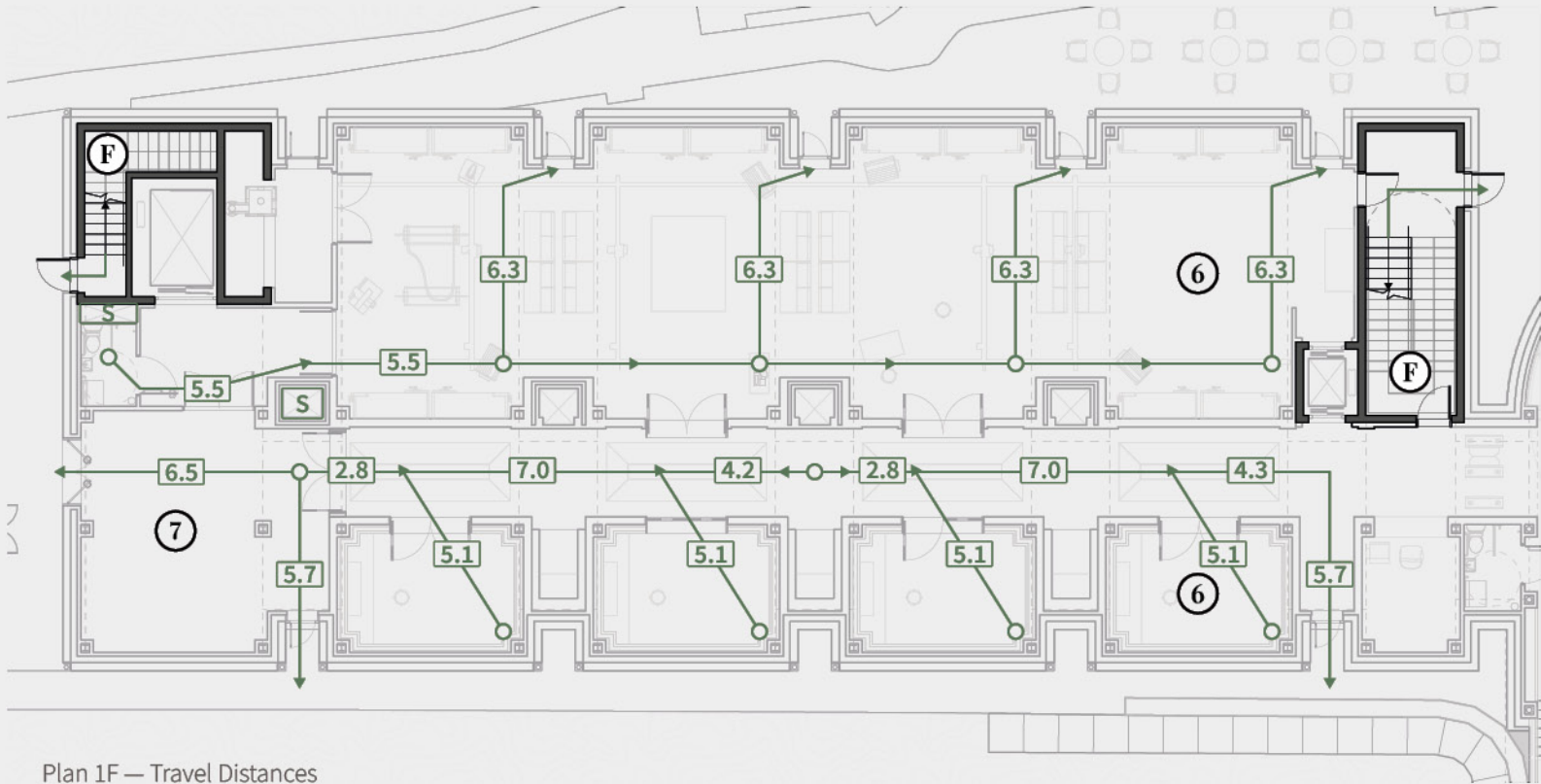
An emergency voice communication (EVC) system (BS 5839-9 compliant) is installed adjacent to a "fire detection and alarm panel" within the refuge areas. Moreover, each escape route is appropriately signed, as shown on page 53.

All escape routes are provided with doors that open in the direction of egress and fire stairs (**F**) meet minimum widths (>1100 mm).

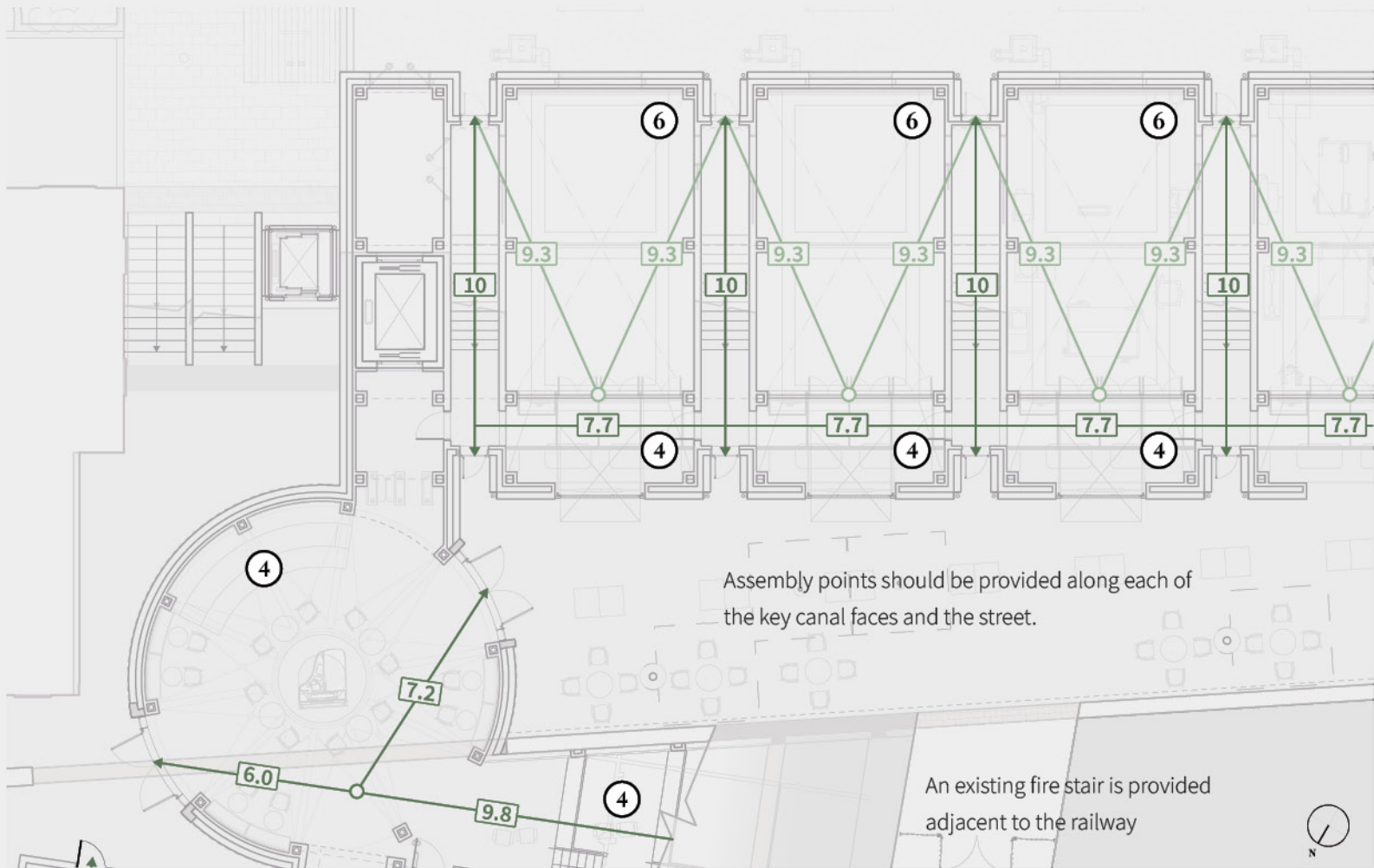
The final exit continues with the same width as the stairs, with self-closing fire doors in order to mitigate spread beyond higher risk spaces e.g. the workshops.



Plan 2F — Travel Distances

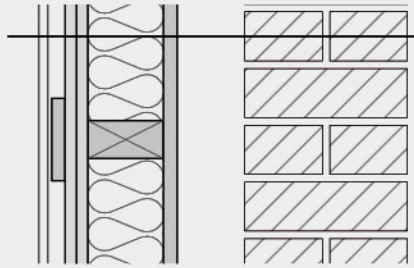


Plan 1F — Travel Distances

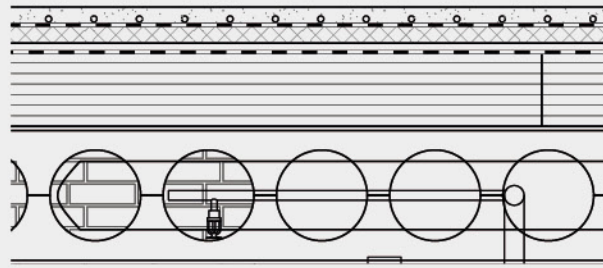


Plan 1F — Travel Distances

B2/3: Internal Fire Spread (linings and structure)

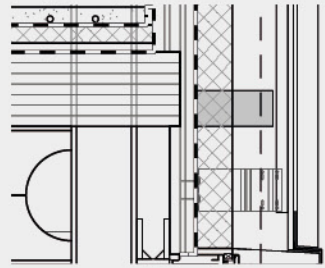


All internal linings will meet the required class rating as set out within the regulations and will otherwise be treated if not supplied to that standard. Examples of compliant material include the *Gustaf* styled acoustic panels used for the tuning room, which has a rating between B (perforated) and A2 (non-perforated) and soundproof plasterboard at A2-s1m d0 (left-right)



The required REI ratings for materials are provided in table B. Timber elements such as CLT, plywood, battens etc. can be coated in intumescent paint to achieve high fire ratings of 90 mins. Most notably for the primary CLT *compartment* slab separating the first and second floor of the Y2 building, which requires an REI of 90 mins. The CLT has been oversized (245 mm) to enable structural stability and fire resistance e.g. 160 mm CLT provides REI 90 (Enso, 2019).

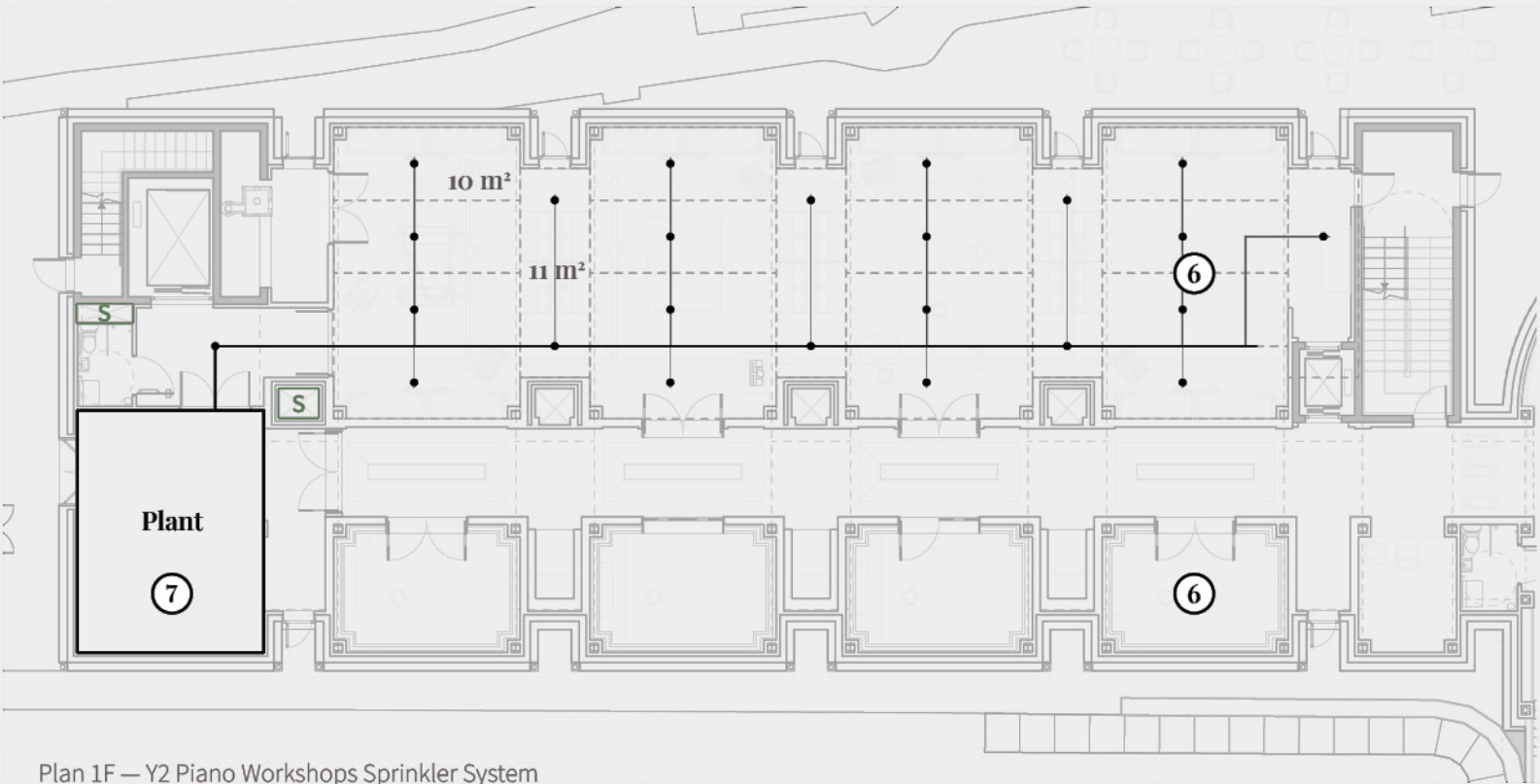
B4: External Fire Spread



Including but not limited to:

- Zinc cladding is rated beyond B-s3, d2, at A1 (for 0.8 mm thick zinc).
- A fire stop and non-combustible insulation (Euroclass A1) is installed within the rainscreen cladding to provide a maximum 44 mm gap. The location and appropriateness of the fire stop used should be coordinated with a fire safety specialist.

B3: Internal Fire Spread and BS EN 12845



Plan 1F — Y2 Piano Workshops Sprinkler System

Based off BS EN 12845, *Fixed fire fighting systems — Automatic sprinkler systems — Design, installation and maintenance*, the Piano Workshops are rated as an *Ordinary Hazard 3 (OH3)* class. Related examples to this class include: factories and mills for timber, textiles, polymers and so on. Each sprinkler supports a maximum area of 12 m² at this class and the required pipe diameters are shown.

No.	Occupancies	Travel Distance (One Direction)	Travel Distance (Two Direction)	Fire Rating w/ sprinklers (mins)	Fire Rating w/o sprinklers (mins)	Additional Fire Rating for Compartments b/n different occupancies
4	Shop and Commercial	18	45	60	60	+60 ^{bc}
5 ^a	Assembly and Recreational	15	32	60	60	
6	Industrial (Normal hazard)	25	45	90	60	
7	Storage (Normal Hazard)	25	45	90	60	
F	Fire Stair			30		
R	Refuge Area			30		
S	Sprinkler Riser			30		
^a includes Schools as per both Part B and BB100						
^b For example: the compartment floor used between 1F and 2F of the Piano Workshops and Studios						
^c BB100 recommends a +60 minute increase for property protection regardless						

Table B

Building Regulations

Site and Building Access

B5: Access and Facilities for the Fire Service

Due to the changes in level and difficult accessibility for fire services to the North of the peninsula, a number of options were explored:

Approved Document Part M1: Access and Use of Buildings (OTD)

1.33 800 mm deep 'corduroy' hazard warning surfaces have been used within a minimum 1200 mm deep landing at the top and bottom of all external stairs.

Where applicable, steps with projected nosings of 18 mm (< 25 mm) are used, e.g. the tiled staircases dividing the workshops.

1.37 Two contrasting styles of handrail are used for the internal and external circulation. Partly this is so that the stair width can be maintained without encroaching into it.

2. The entrance doors are out-swinging, self-closing and both manually and mechanically powered. Push buttons are provided at a suitable distance so that wheelchair users do not need to move out of the way to access the door.

2.21 The main entrance doors have been designed to not open into any circulation routes, with at least 1.5 m provided around it.

3. It was challenging to attempt to integrate a functional ramp that worked within the context, especially due to the 1.8 m level difference, and so external lifts for both disabled and bike access is provided.

An external lift provides disabled access to the previously inaccessible Waterpoint (now a performance space), and the vista across the piano stairs.

3.34 All lifts have at least 1.5 x 1.5 metres of space in front of them for unobstructed wheelchair turning and all adhere to the 1100 x 1400 mm minimum car dimensions.

4. All external seating areas have been provided with at least 900 x 1400 mm of space beside them for wheelchair users, and the path between the yard and park is designed to at least a 1.5 m turning circle.

5. All toilets have been designed based on part M's specifications.

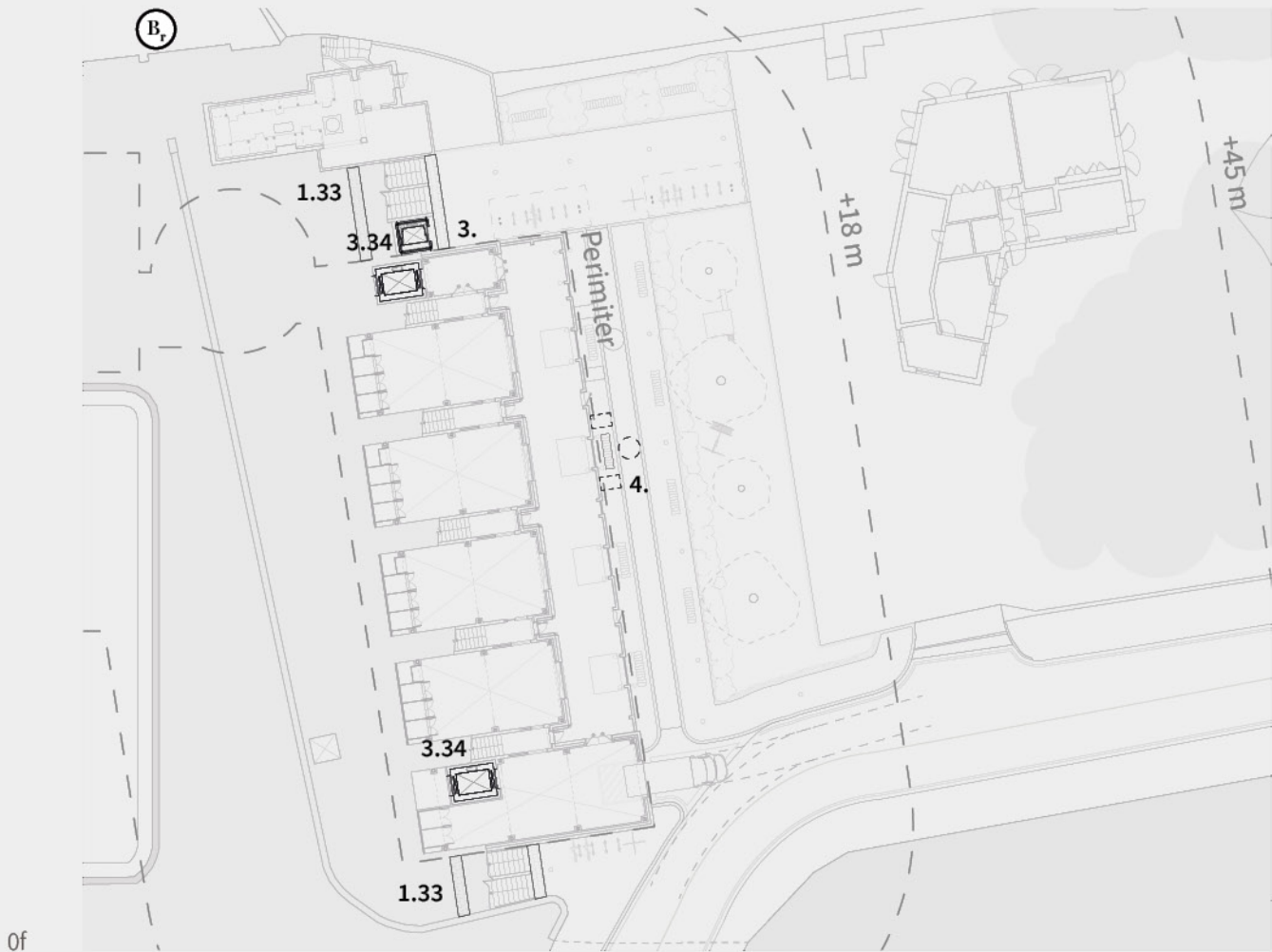
In addition to Part M1, all stairways have been designed to information set out in Approved Document Part K — Protection from Falling, Collision and Impact

- As the main volume of the RDC-PTC was considered to have an internal area less than 2000 m² and a top storey less than 11 m in height. This provided sufficient vehicle access to the Year 1 block and The Centre within 45 m. However this did

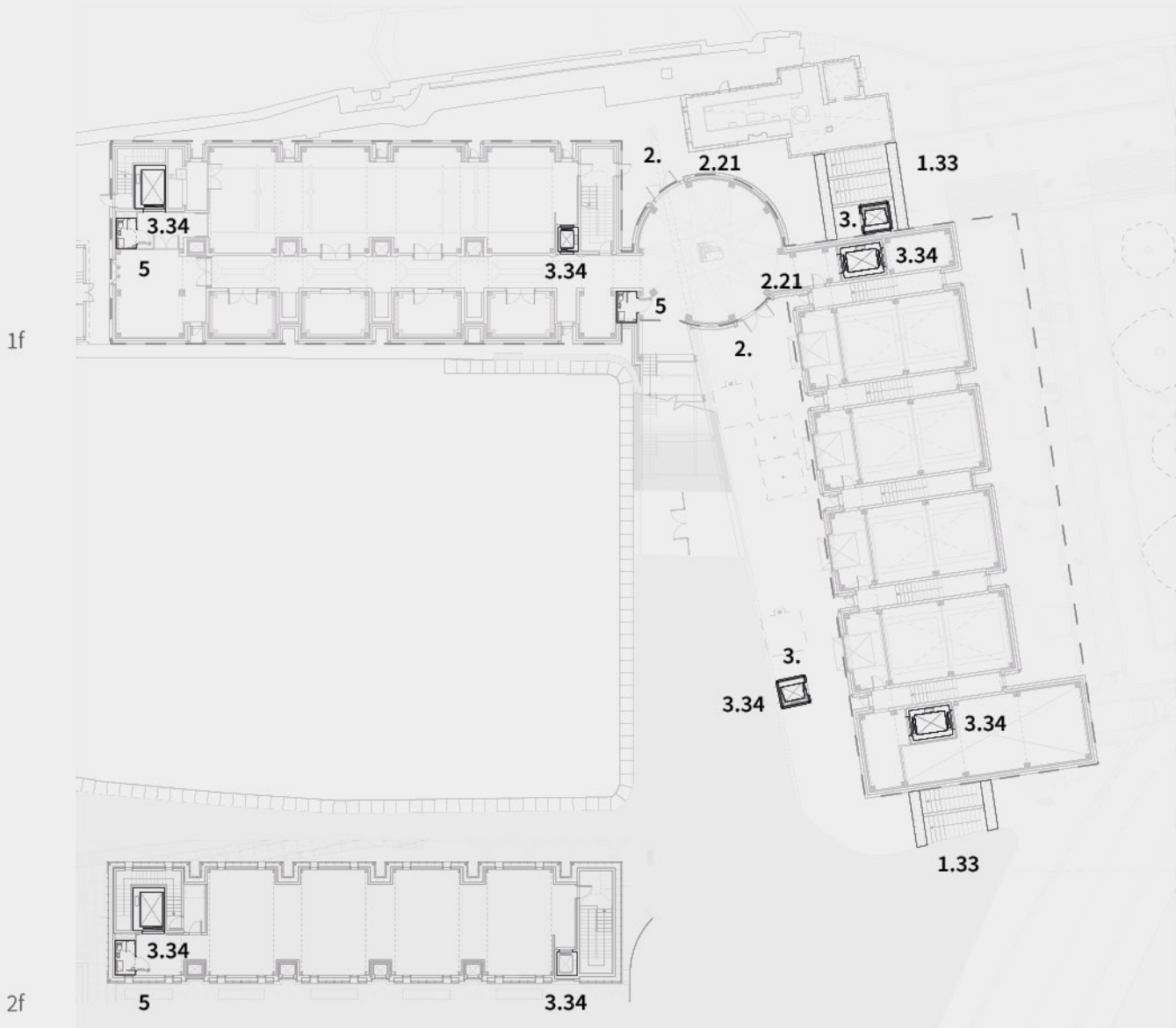
not extend to the Dry Dock and Year 2 block.

- The Y2 Workshops and Studios are composed of a compartment floor system and sprinklers. As this is over an area greater than 280 (320) m², fire hydrants will be installed.

- Riser space for the installation of dry or wet risers have been designed into the plan — depending on feedback from a fire consultant in regards to appropriate access to the North of the site (hence the 18 m boundary).



0f



1f

2f



1:500

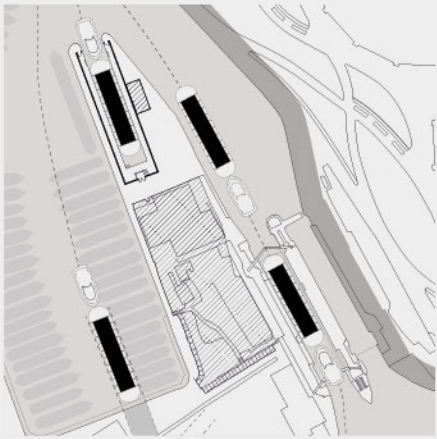
A3



Building Regulations

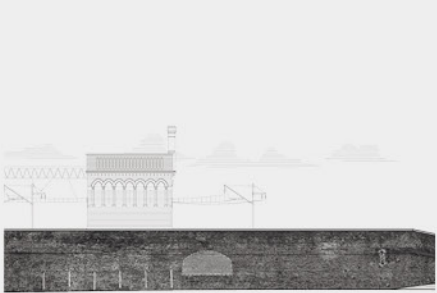
Construction, Design and Management

All information relating to the CDM 2015 regulations (see Gov (2015)) has been sourced directly from the UK Government's legislation website and relate to their respective sections as indicated in brackets. Compliance to the CDM 2015 includes but is not limited to the following considerations:



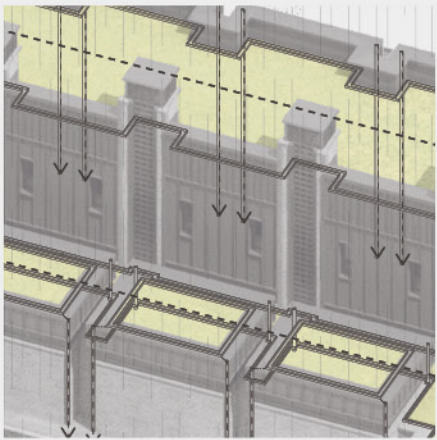
The Regent's Canal

Barges and tug-boats used for the transporting of construction material must not be 'overcrowded or overloaded' (26). The logistics concerning this are outlined on page 55. The canal edge can be temporarily fenced off to minimize the risk of people or equipment (28) falling in. However, access to and from the basin must be maintained, so a safe walking route will be established and altered throughout the course of the construction. Permanent rescue provisions will be provided along the edge as the site will be publicly accessible in the future.



Excavating the Site

Detailed excavation (22) inspections will be carried out on the site as a result of the Thameslink Southbound running below it. Tunnel compressions and ground movement should be measured during additional borehole explorations and piling — in coordination with Network Rail, as outlined on page 12. Removal of the existing wall for the basin tunnel and the excavation of earth and brickwork within the existing wall must be provided with 'support or battering' to prevent collapse.



Cleaning and Maintenance

Cleaning and maintenance of the roof and its guttering has been thought out in detail with green roofs greatly minimising the impact of local forma and the blocking/overflowing of drainage.



Site Boundaries

Existing hoarding surrounding the SPCC can be removed and a new perimeter fencing erected around the site with identifiable signage (18). Demolition of the SPCC has already been assessed prior to the project and should be carried out during the pre-construction phase as part of a separate workstream.



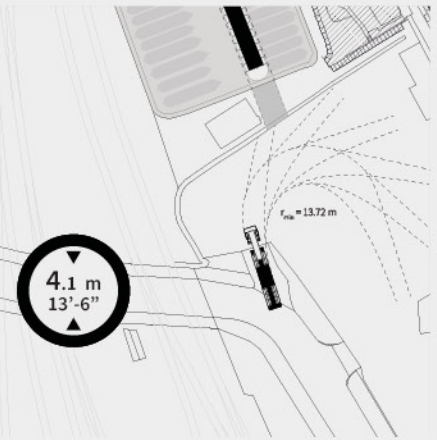
Neighbours

Noise and lighting (35) should not be an issue at the site, with construction only commencing during daylight hours and has been planned to be minimized through design e.g. CFA piles, supplying materials via barge (quieter than HGVs).



Retrofitting

On a separate note, work undertaken on the Grade II listed Waterpoint and Lock Cottage should be in coordination with Historic England, the The Historic Buildings and Monuments Commission and the GLIAS (Greater London Industrial Archaeological Society) — with approval from Camden Council. Architecturally-sensitive temporary support work is required in these spaces to prevent damage to existing structures.

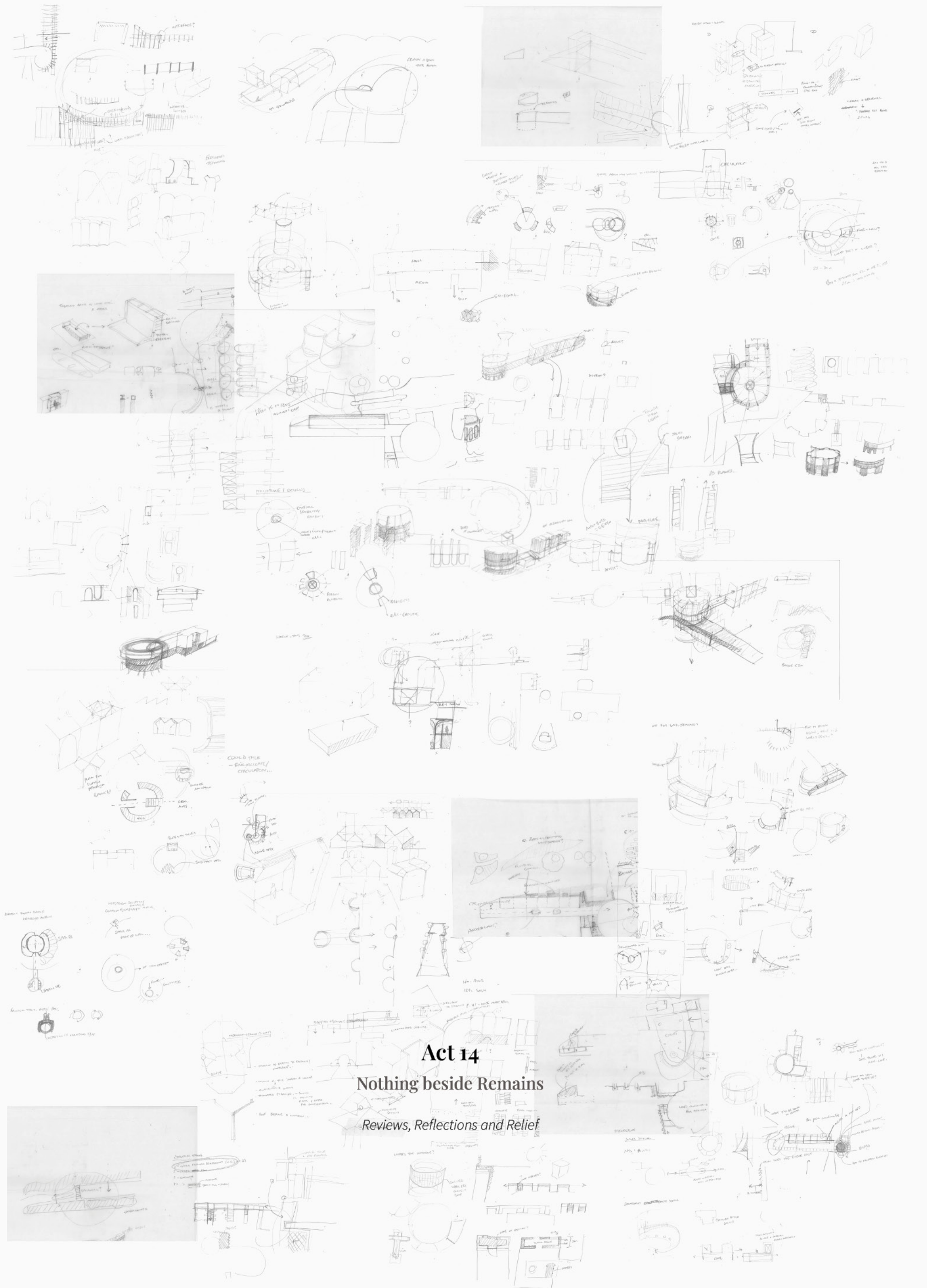


Site Traffic

The existing space in front of the basin wall provides sufficient pushed-back access for delivery and construction vehicles. No vehicles should be parked alongside Camley Street as this will adversely block traffic (27).

CDM Co-Ordinator and the Health and Safety File

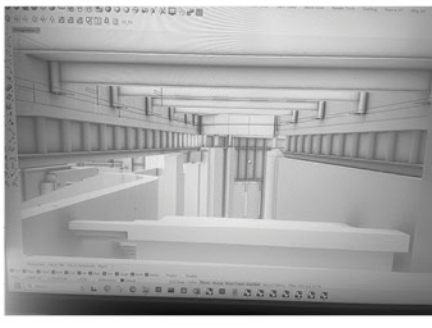
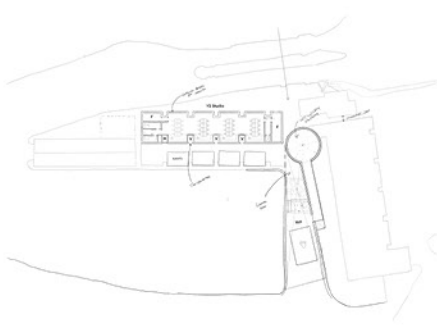
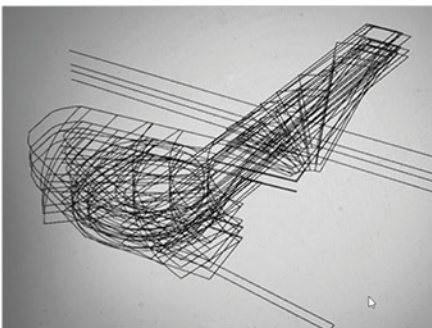
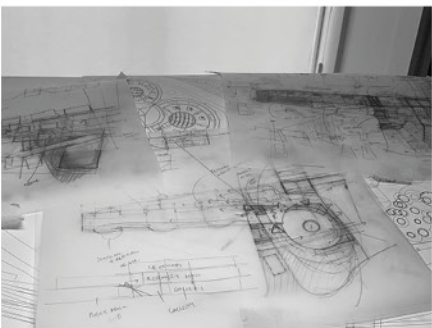
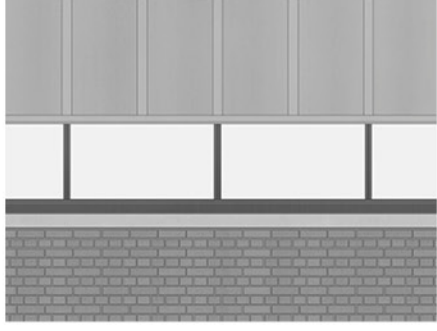
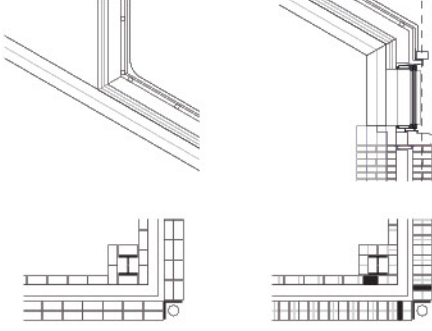
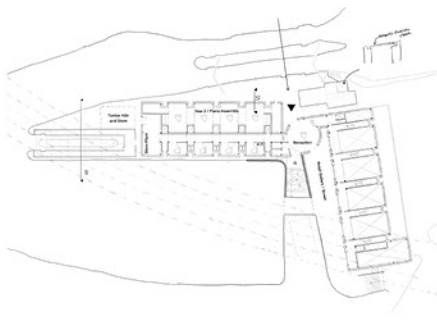
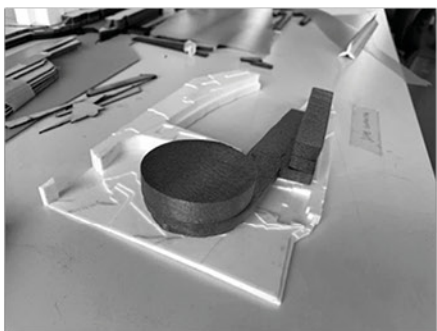
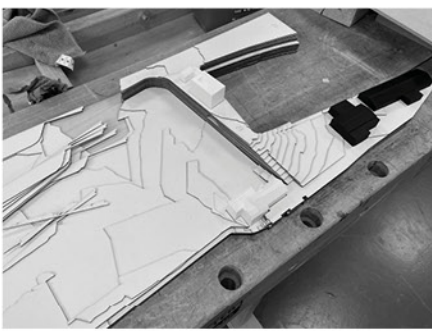
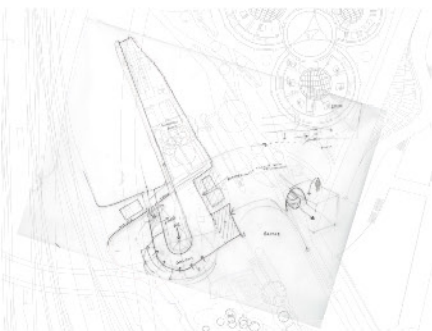
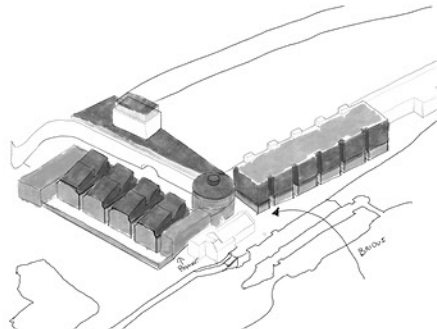
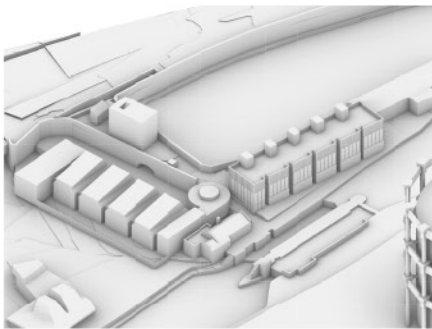
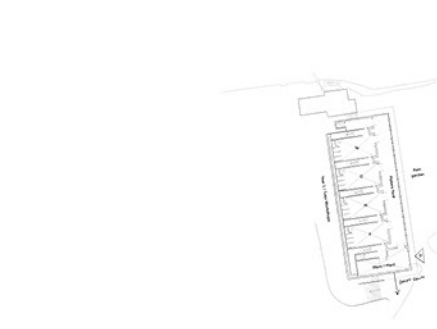
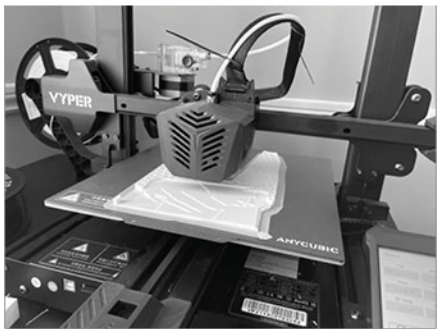
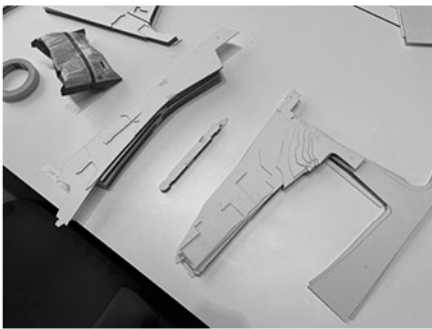
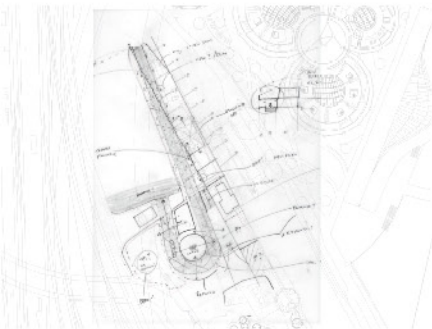
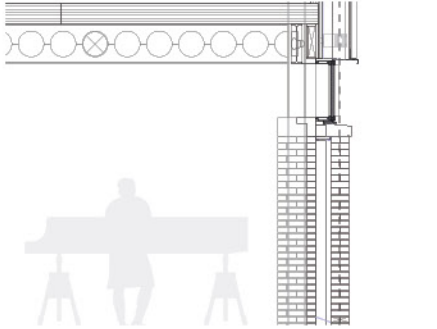
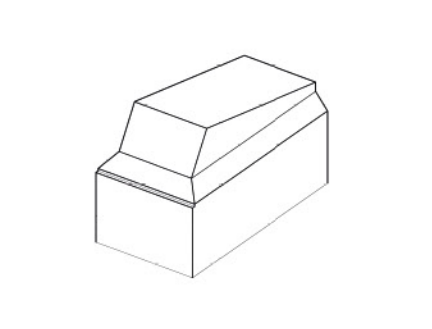
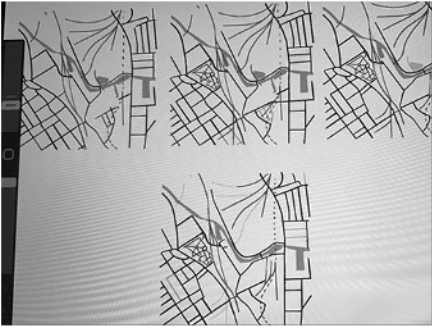
Please note that as the project will go beyond 30 working and have more than 20 workers on it simultaneously, a CDM co-ordinator will be appointed prior to the pre-construction phase. 'Appropriate information' relating to the maintenance, hazards, risks and controls throughout the site / RDC-PTC will be included in a health and safety file. This HS file will be reviewed throughout the construction process by both the principle designer and contractor before being passed onto the client.



Act 14

Nothing beside Remains

Reviews, Reflections and Relief



The Project Begins

Ideas were translated to stacks of A4 and A3 sheets, tracing and iterating the weird, the wacky and the wonderful through it all; to extend the Regent's Canal, to build over the St Pancras Basin and to build next to the railway line; these were just some of my immediate thoughts.

Purposefully labyrinthine, no thought of mine or tutor suggestion could go unexplored at any scale — this was a week to be creative. Beyond this, my own interests in archaeology, vernacular architecture and place-making (especially in KX's industrial past and gentrified present) led to a rabbit hole of GLIAS and emailing museums for plans. I slowly began to develop a new collage style that I've ever since enjoyed using when I can.

Experimenting

Spending too long in 2D, I shifted to begin modelling massing and exploring the more complicated elements of my site like distinct level changes, access, deliveries and retrofitting existing buildings (or not).

My historical research produced many questions, ideas and solutions to how I was to meet the demands of a very constrained site. Examples of this include finding the tunnel, the Lock Cottage's former use as a pumping station and what made up the Dry Dock.

The significant level changes and tunnel meant that I needed to explore the site more in 3D, so two models — a 1:500 3D printed model and a 1:200 hand-made/laser-cut model were made. Foam and paper models began to occupy them.

Pause

Many iterations of the massing were produced over the next couple of weeks at varying scales, layouts and orientations. In parallel to this, the project was now being rationalised to scale, the dimensions of everyday life were being seen in plan, section and elevation.

The first interim review, was very positive, with both tutors pleased by the very grounded context-driven approach to the scheme. In addition to the radial plan that appeared to reach out (as if fingers to a hand) into the context with the bridge and multi-level contact points with the wall.

After this stage, following a family bereavement, I went into suspense. The Project was now on pause.

Return — "Tail Wagging Dog"

"It is more difficult to restart a project than to start a project from scratch"

Nigel Bedford (paraphrased)

After pausing the project, all of my work (and more I'm certain) had been lost to the pandora's box of drawings, models, digital folders and ideas soon to be lost to time. I endeavoured during my time out to retain what I could, so that I could return with a vast synopsis of my project so far — which included to-brick tectonic plans, with a totally load-bearing masonry system, at least 4-levels of building, multiple terraces and a not-yet retrofitted Waterpoint and Lock Cottage.

All I could ask myself was — What was I thinking a year ago?

How much does your piano weigh Mr Burkhalter?

It is impossible to go beyond this section without thanking my tutor, Nigel Bedford for the patience and commitment he showed to helping me get back into the rhythm of University life, despite now commuting once or twice per week from home (5 hours there and back) to make it to tutorials. Advancing from a single A1 tube to an A1 backpack.

I now began to recognise that the building (and the brief by extension) needed to go on a diet. To lose the weight of past decisions and to go back to first principles — a Piano Workshop, an industrial site and a way to *Reform* craft education. I could now see new, positive and motivational opportunities like retrofitting the wall and Waterpoint and how every space must be designed to the piano.

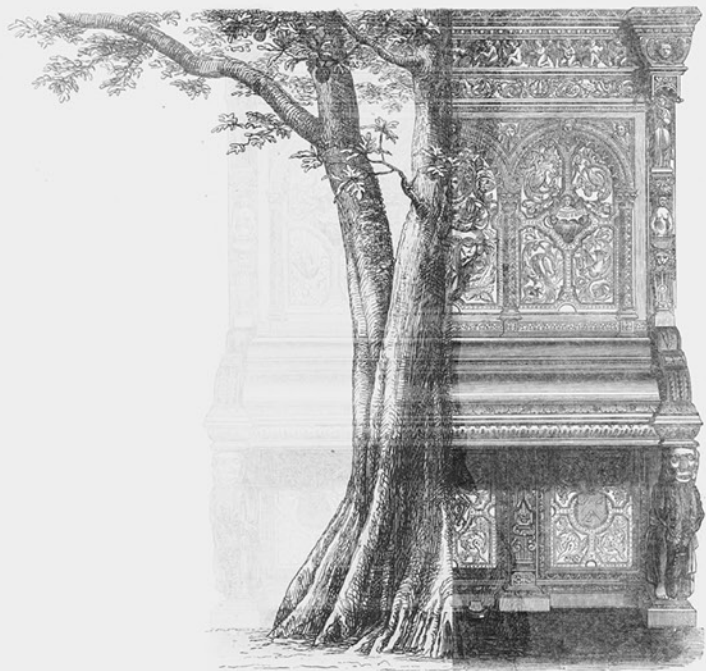
The Corner

So in answering, *How much does your piano weigh?* I can reply, around 500 to 650 kg, with a typical length and width of 1500-1700 mm for Baby Grand and Parlour Pianos. I can also reply that it takes nearly one year to build one, there are many roles (my favourite in name being the Bellyman), and a tuning room has very specific requirements (notably the lack of underfloor heating).

Following a one-year anniversary, the process of *Reform* began to go beyond just the project and into my personal life. I soon realised that I had developed a tectonic obsession with my building (beyond other things). I had to "perfect" the corner and then the section and then the... and so on.

Self-Reflection

An Echo



Reform, was as much a self-reflecting verb as any conceptual noun for my project or own architectural thoughts. There is no coincidence that the project related to improving design-led education — having taken at least four years to realise that any crit, regardless of tutor or audience, could never be as self-critical or obsessive as I could be with the RDC-PCT.

However, it was a fortunate coincidence to be based in King's Cross. An area that I was strongly passionate about, having written *King's Cross Central: A Critical Analysis on the Socio-Historical Outcome of its "Regeneration" from the Perspective of Vulnerable Groups* (Burkhalter, 2020). The 'creative-class', as termed in this essay, was just one of many peoples churned through the gentrification and formalisation of the site, and in this case the few who were given a home in Granary Square. Yet not going beyond just occupation when it came to inhabiting the context. So the RDC-PCT was proposed.

Inhabiting my imagination, I am walking towards the tutor workshops on a rainy April morning, a proverbial packhorse of art tubes, laptop, a small Wilko plastic box of foam models and my lunch stuffed in a multitude of coat and trouser pockets. Later walking up echoing fire stairs towards a half-filled studio, I see tables of drawings, models and tired-eyes; tutors and students discuss projects and life – it's hard to differentiate. Setting down my box of models and draping my drenched coat over my chair (or has it been swapped with someone else's?), I look out over the studio and its beginning to empty.

The project is over and so when I ask myself, what would I do if I had more time?

I can simply reply:

I don't, I've had enough time — this is my project.

James Burkhalter



An Outro — Anthony's Song

Post-performance, the pianos are donated to where they can be best utilised in the local area for free (unless earmarked for special commendation)

B

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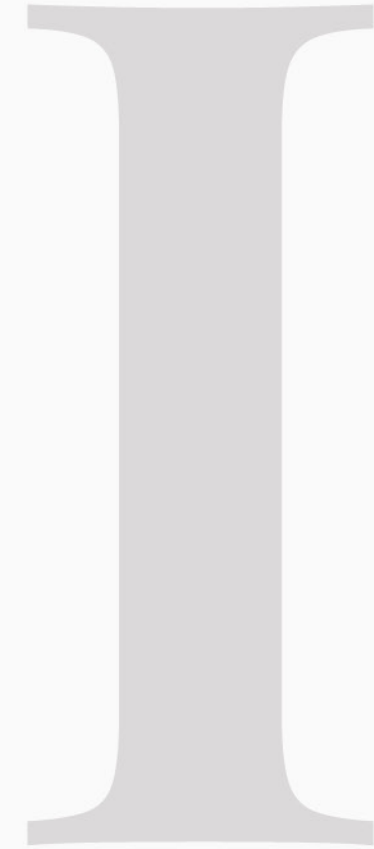


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