RECONNECTING THE THAMES

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RE-CONNECTING THE THAMES

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ABSTRACT

The focus of this thesis is the architectural question of how to (re-)introduce public spaces to densely-built up riverside environments. The city of London is densifying fast, yet the provision of high quality recreational public spaces is lagging behind. The Thames as London's biggest open space is predestined for the creation of such spaces, yet 1980s dockland regeneration has failed to treat riverside spaces as valuable environments for public recreation. Recent tendencies to monetarise water spaces do so without ensuring the inclusiveness of public spaces. In Wapping, the docklands area closest to the city center, these patterns are especially visible. The ad-hoc urban development of the areas' brownfield sites has resulted in impeded access to the riverfront and in a disrupted connection of river and city fabric.

At the site of the former location of the London Dock entrance in Wapping, the infill of the historical dock has created underutilised leftover spaces and a disrupted spatial relationship of city and river.

In this thesis, a public building is proposed that connects urban fabric and river and provides ample open public space. Spatially and programmatically, the proposed *River Science Center* establishes a new connection between the public and the Thames, to effect a change of the use and perception of London's most valuable recreational space.

Der Fokus dieser Arbeit liegt auf der architektonischen Frage, wie öffentliche Räume nächst dicht besiedelter Flussufer geschaffen werden können. *Die Stadt London wird zunehmend dichter bebaut, während die Bereitstellung von hochwertigen öffentlichen Naherholungsräumen vernachlässigt wird. Die Themse als Londons größter Freiraum ist prädestiniert für die Schaffung solcher Räume, doch die Revitalisierung der Docklands in den 1980er Jahren hat es versäumt, Flussufer als wertvolle öffentliche Erholungsorte zu behandeln. Neuere Tendenzen hin zur Monetarisierung von Flussufern stellen oft nicht die Inklusivität öffentlicher Räume sicher. In Wapping, einem früheren Hafenviertel in der Nähe des Stadtzentrums, sind diese Trends besonders gut erkennbar. Die ad-hoc-Entwicklung der Brachflächen dieses Gebietes hat den Zugang zum Flussufer erschwert und die Verbindung von Fluss und Stadtgefüge unterbrochen.*

Auf dem ehemaligen Standort des Londoner Docks in Wapping hat die Füllung des historischen Docks in wenig genutzten Restflächen und in einer unterbrochenen räumlichen Beziehung zwischen Stadt und Fluss resultiert.

In dieser Arbeit wird ein öffentliches Gebäude vorgeschlagen, das städtisches Gefüge und Fluss verbindet und weitläufige öffentliche Freiflächen bietet. Räumlich und programmatisch stellt das vorgeschlagene River Science Center *eine neue Beziehung zwischen der Öffentlichkeit und der Themse her, um eine Veränderung der Nutzung und Wahrnehmung von Londons wertvollstem öffentlichen Erholungsraum zu bewirken.*

CONTENT

Chapter 1

CONTEXT

The question of how the Thames' water spaces and riverside are used has always been emblematic for London's identity, for the relationship of Londoners to the world and the city's prevailing views on society.

1.1.
LONDON AND ITS RIVER - THE THAMES AND ITS CITY

The relationship between London and its river has always been an intimate one, yet subject to changes in intensity and quality throughout the centuries.

The Thames rises at Thames Head in Gloucestershire and flows through southern England for 346km before it finally discharges into the North Sea. Still, the stretch of the river that travels through London is predominant in the public imagination.[1] The Thames has significantly influenced the evolution of London's urban fabric, from defining the location of the city to constituting the main factor directing its growth.

In 43 AD, Londinium was established when Roman troops on their way north found the Thames to be a major obstacle and started to bridge it, (Fig.1) slightly east to what is today the location of London Bridge. The settlement grew around the point where the Thames was sufficiently narrow for the construction of a bridge, yet sufficiently deep to allow for seagoing ships to pass. Positioning it within the Thames Tideway (the section of the river downstream from where today is Teddington Lock, that is subject to changing tides from the North Sea) ensured a relative ease for ships sailing upstream and against the current.

Settling next to the river further provided a strategic control of all land and sea ways and easy access to continental Europe.[2]

As London grew into an Anglo-Saxon bastion during the middle ages, expansion happened almost exclusively on the north side of the river, as the site was protected from attacks from the south and east - the main directions of possible hostile motion - by the Thames and its tributaries.

The geographical advantage of an east-facing river estuary, (Fig.2) pointing directly to the low regions of Western Europe that were the strongholds of the medieval economy, meant that the city of London was able to develop fast.[3]

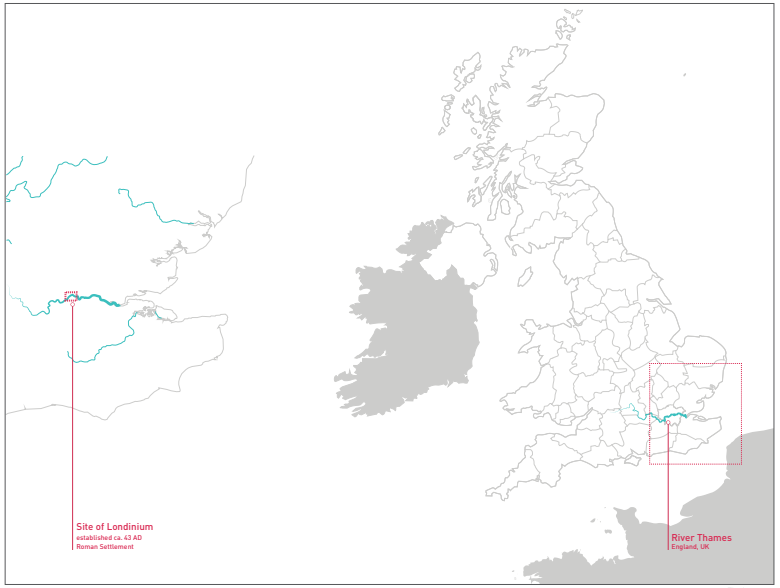


Fig.1

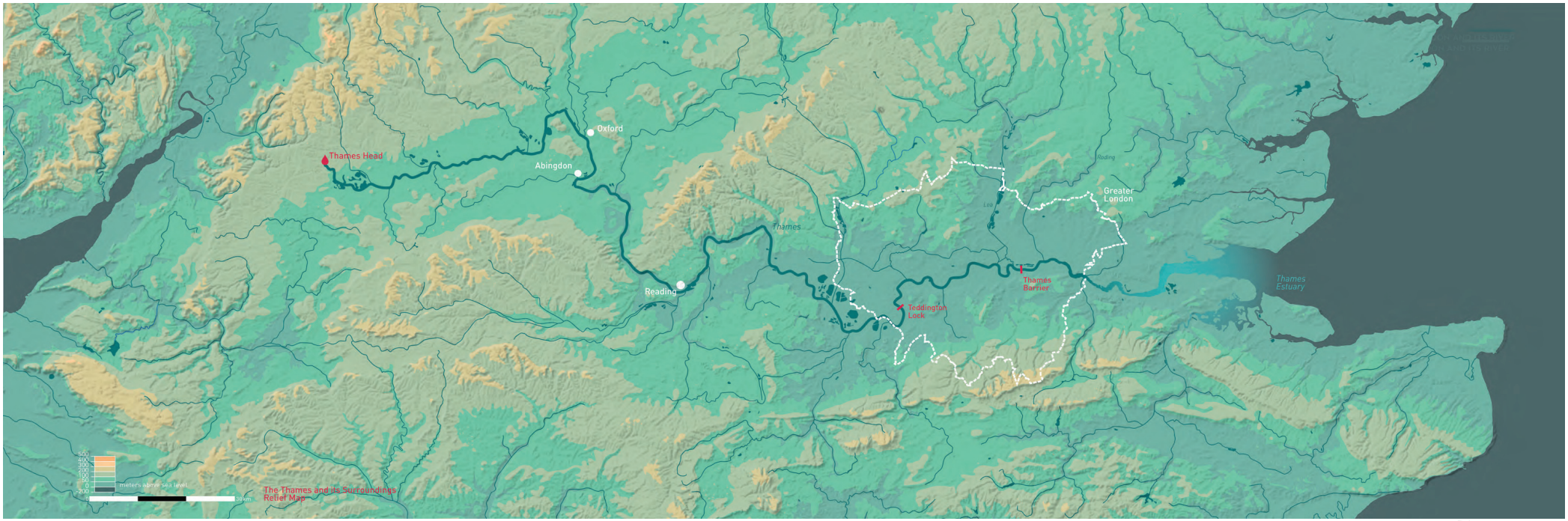

Thames Head
Oxford
Abingdon
Reading
Thames
Roding
Lea
Greater London
Thames Barrier
Teddington Lock
Thames Estuary
500
400
300
200
100
50
0
-200
meters above sea level
0
5km
The Thames and its Surroundings
Relief Map

Fig.2

As economic prosperity grew, competition over the river and its resources intensified: some wanted to use the river mainly for travel and trade, others as a site for fishing and agricultural production.[4] Still, the river was nowhere the restrained, steadily flowing stream it is today: its marshy riversides and surrounding built-up areas where subject to unpredictable floods, freezes and droughts. With technological advancement, marshland surrounding the river was drained step-by-step and converted into agricultural ground.

From 1176 to 1209, under King Henry II, the wooden bridge that had been partly destroyed, repaired and re-erected on many occasions since Roman times was replaced by a stone bridge. The bridge acted as a barrier for the Thames flow and influenced its tidal behavior, to the extent that it caused more severe freeze-overs in winter. As the only crossing of the river Thames, 6 meters wide and over 200 meters long, the bridge developed into a location in its own right, up to the point that most of the bridge was built-up with housing and was considered as a separate district until the 18th century. The south side of the river Thames remained a thinly populated area up until 1850, including what now is Southwark and a strip continuing east to Deptford, Greenwhich and Woolwhich.[5] During Tudor times, the south side of the Thames was not under the jurisdiction of the crown, which led to its development into a location for unregulated entertainment, nightlife and prostitution.[6]

As early as 1300, the Thames and its tributaries were used to dispose of the City of London's waste matter[7], which gradually led to severe pollution and the regular outbreak of diseases.[8] With rapid population growth came also an increase of pollution from manufacturing and food production, until the upper and middle classes began turning their back on the river: from the 17th century onwards, no new luxurious houses with river-facing facades were built. Londoner's relationship to the Thames became, at best, an economical one: the people remaining by the riverside where the ones whose livelihood depended on the river: watermen, shipbuilders and garbage collectors.[9]

1.2.
THE DOCKLANDS AS AN EMBODIMENT OF WORLD TRADE

By the early 18th century, London was the buzzing center of the British Empire, and the Thames one of the world's busiest waterways. With the advent of large-scale international shipping and trade came the need to address the problem of a purpose-built commercial dock and transportation system.[10] The docklands originated as a separate area within London's urban fabric. Large parts of East London, the area east to the medieval city center and the Tower of London, were radically transformed from a local maritime trading community to an international one.

Until the 1790s, traded goods where stored in cellars or shacks associated with merchant's housing close to the river, and docks where not much more than wooden landings placed at the river's edges.[11] The construction of large-scale, solidly built docks and warehouses was the result of private Acts of Parliament from 1800 to 1830, meaning that a small number of private developers invested in and constructed the entire trading infrastructure. Construction incorporated novel methods of engineering[12] and followed a "[...] distinctive form of engineer's classicism which placed aesthetic emphasis upon repetition and harmonious proportions."[13]

The rapid and complete transformation of the built environment led to a disconnection of the dock basins from their older surroundings of Wapping, Blackwall and Bermondsey, and the local population plummeted by nearly 60%.[14] Vast water basins and high security walls around each dock system isolated the area spatially, and the constant flux of international goods and the presence of overseas sailors intensified its enclave-like feel.

An entirely functional landscape, the docklands did not incorporate public commercial spaces like markets, and the only building typologies not based on commercial trade were the dockworkers houses, ducked between monumental warehouses and waterway systems.[15]

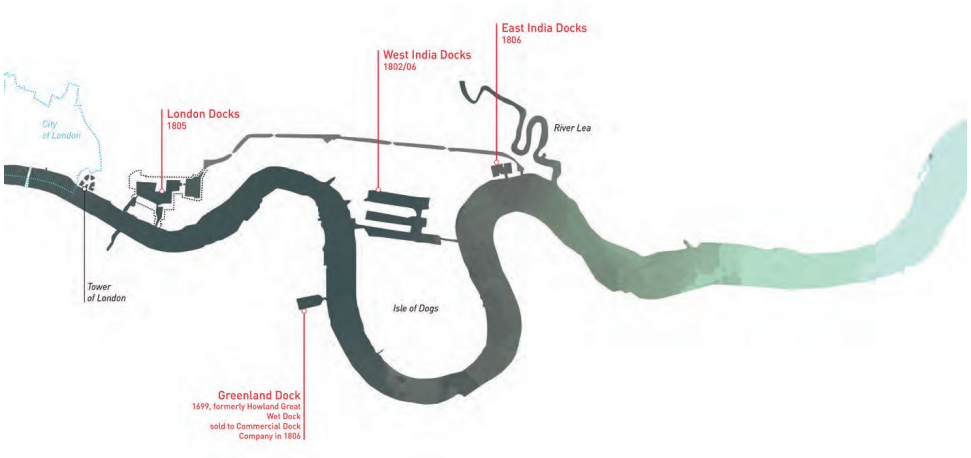


Fig.3. London Dock 1803
Fig.4. East India Dock 1806
Fig.5. Millwall Dock 1868

During the Victorian area, international trade intensified and the docklands spread between Wapping and Poplar, where the West India trading company established a vast industrial landscape of docks and warehouses around the Isle of Dogs.

In the public perception, people and areas associated with the river where of low worth, mirroring the reality of people living in neglected and toxic environments by the water. London's upper class spatially and mentally distanced itself from the sites where its financial fortunes where made – the river Thames and its docks and ports.[16]

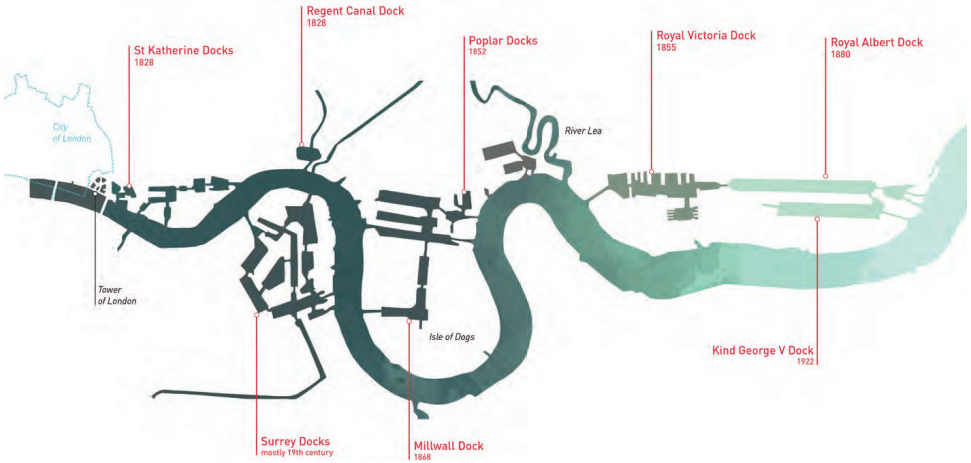



Fig.3


Fig.4

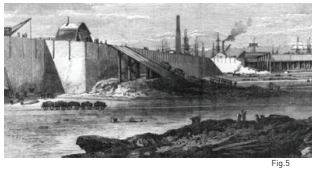


Fig.5

1.3.
DOCKLANDS 1980s DEVELOPMENT - AD HOC URBANISM

The docklands' creation stemmed from privately orchestrated commercial infrastructure provision during the 19th century. Comprehensive planning was only implemented after World War II and, interestingly, "[...] derived not so much from the [...] local boroughs, but from the Port of London Authority [PLA]."[17] Launched in 1908, the PLA was responsible for the maintenance and updating of the dock infrastructure until the 1960s.

With the decline of the importance of waterborne trade during the 1960s, London's ports where moved eastwards and out of the city, and the vast warehouses emptied out. Stripped from its sources of income, the PLA was forced to repay its debts to central government by infilling docks and developing the resulting land for low-grade industry, furthering the decline of the docklands area.[18] During the 1970s, local planning committees envisioned housing and public infrastructure development, but the plans were not carried through. Social and physical deterioration intensified, and the remaining dock walls still divided the area from its surroundings. In the first years of the Thatcher government, the docklands had become one of London's most pressing domestic problems.

The London Docklands Development Corporation (LDDC), a quasi-non-governmental organisation, was formed under the Thatcher government to spur the docklands' regeneration. Employing free market urban development paradigms, the organisation stood in contrast to the master planning approach of then recent decades. Its board consisted of industry and property development experts that provided the necessary know-how for marketing sites, selecting suitable developers and controlling the land prices to the LDDC's advantage, rather than for coherent urban planning. Board meetings and development decisions were not open or accessible to the public, and long-term employed staff was reduced to a minimum, ensuring that most of decisions were crafted with private consultants.[19]

The LDDC did not have a significant amount of capital and was given land ownership to the the docklands area.[20]

It was also given exclusive rights to issue planning permissions and could therefore ensure quick delivery by specifying only the height and building foot-print for certain developments.[21] In addition, the Thatcher administration set up an enterprise zone, with special legislation, e.g. tax breaks, to spur development.

The quick selling of land led to large profits for the LDDC and a number of private investors during the 1980s, yet public infrastructure such as roads or the Docklands Light Railway, an automated light metro system, was mostly funded by the state.[22]

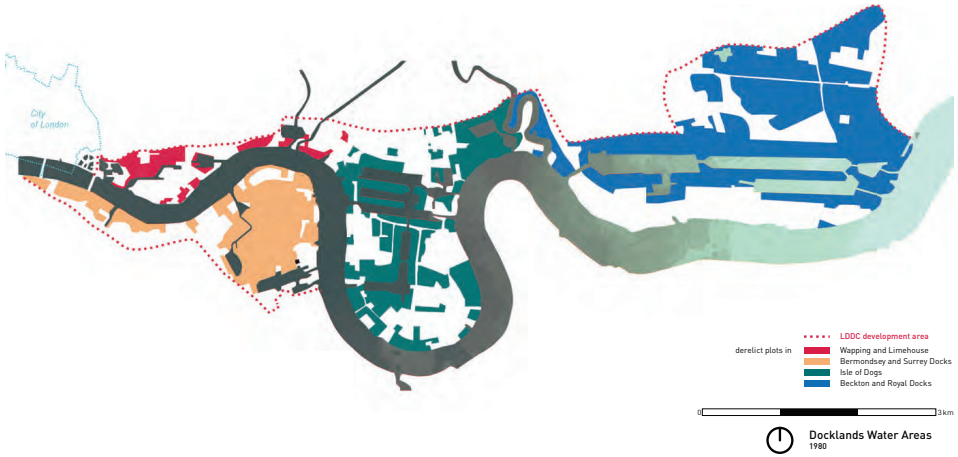
The LDDC's approach to urban design comprised of a list of guidelines issued in 1982, calling for, among other things, termination of the filling of docks, the reconstruction of dock walls and river banks, and the provision of water, gas, electricity and drainage.

In essence, this is a valuable contribution towards the "[...] repair of a disjointed landscape"[23].

Fig.6

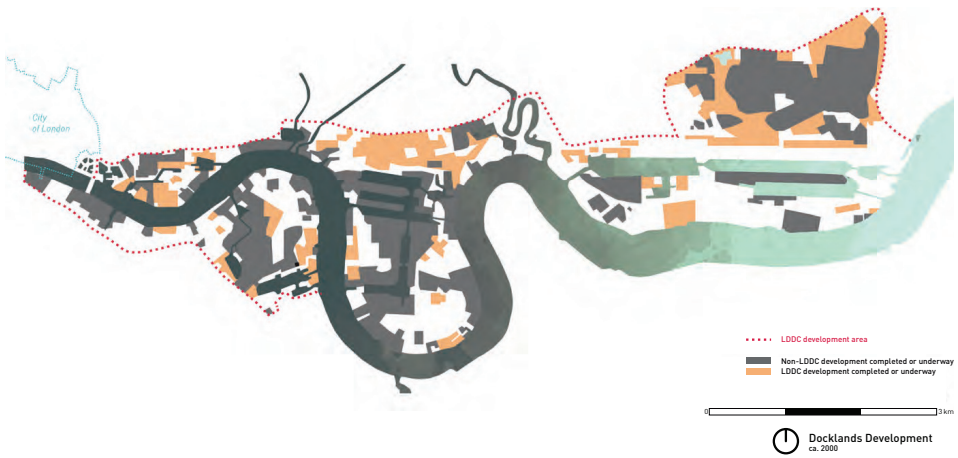
Fig.7

Fig.6. West India Docks 1982
Fig.7. West India Docks 1993



Yet, critics have pointed out the incomplete urban design framework, without genuine vision for the area's future. Lax planning regulations led to ad-hoc urban development, with a multitude of architectural styles realised. Speculative office space as well as housing boasted an international, commercialised aesthetic, while the area's distinct, maritime character was often eroded by land packaging. Compulsory purchase orders, designed to parcel together land for bigger projects, where readily employed, yet with sometimes little consideration for the preservation of historic elements within the built environment.

Especially at areas close or immediately adjacent to the Thames, the LDDCs disregard for local planning frameworks manifested itself in a neglect of public riverfront spaces and in disrupted spatial relationships to the water. While it was promised to make the areas isolation "a 'thing of the past'"[24], the ad-hoc selling of plots without the backing of coherent urban design policies meant that landowners were able to introduce 'permissive' access to their properties.



This means that the public was only allowed to enter certain properties at certain times or days, which was negotiated on a per project basis. The result is a complex web of different rights of way along the Thames riverfront and serious restrictions of public access to the river.[25]

The large-scale conversion of empty warehouses and ports led to a steep ascend in property values along the river. This in turn meant that large stretches of riverside space were used for upper-segment real estate, while other aspects of urban development, e.g. the planning of connections to adjacent neighborhoods or the implementation of a coherent urban design, were neglected. The role of the river Thames in these developments was reduced to providing a value-adding backdrop and marketable views.

1.4.
2000s AND BEYOND: RIVERSIDE SPACE AS AN ASSET

From 2000 onwards, property development planning began to shift from a land-use based approach seeking to maximise returns by building right up to the river edge, to an approach where the introduction of riverside open spaces was perceived as adding value to a particular development.[26]

Developers are increasingly incorporating public interests, such as the provision of riverside spaces, into their schemes, as doing so is believed to increase public acceptance of a particular scheme. This is also deemed to have a significant effect on the acceptance of luxury developments, where the purchase price of living units usually remains well beyond the average salaried person's reach. Secondly, schemes that consciously incorporate river-side spaces as a central element of their design sell the late-capitalist idea of recreation in the city center, and in close proximity to the work place, marketing directly to affluent consumers.

Such value engineering is increasingly accompanied by biodiversity and habitat legislation and flood directives promoting flood resilient built environments.[27] Moreover, the Blue Ribbon Network policy guidelines, part of the London plan published in 2004, finally recognised the river Thames as an unique element within the city, and its "[...] special character [...]" as both a "[...] strategic and a scarce resource [...]", and asked to "[...] address the competing needs, uses and demands that are placed [...]" on river spaces.[28]

The awareness of the profitable nature of London's riverside spaces has led to the aquisition of key riverside locations by private investors, e.g. Nine Elms, the area surrounding the iconic Battersea Power Station. These privately owned riverside open spaces fall under the category of privately owned public spaces (POPs), and may look and feel like public spaces, yet at best - restrict the use of their amneties, at worst ban particular groups of people altogether. The rules applying to a particular POP are usually not accessible to the public.[29] Moreover, public rights of way are often unclearly delineated, thus thinning outside spaces directly and clearly dedicated to the public.

Fig.8. POP at More London

Fig.9. POPs at Greenwhich Peninsular

Fig.10. POPs at Nine Elms

Fig.8

Fig.9

Fig.10

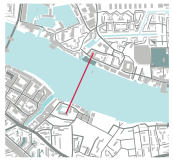
The importance of common public space and the partial disregard of public interests insribed in these corporate-owned spaces has even reached the mayor of London, Sadiq Khan, who is to issue a public space charter as part of the new London Plan.

The charter will "[...] set out both rights and responsibilities for users and owners of public spaces, regardless of whether they are council-run or in the hands of private developers."[30]

As London densifies, new solutions for public riverside spaces have to be introduced. In order to be both effective and implemetable, such solutions should realistically account for the tendency of public space monetarisation, yet provide high quality , clearly delineated recreational spaces for the public, as a common good.

1.5.
RIVERSIDE SPACES TODAY

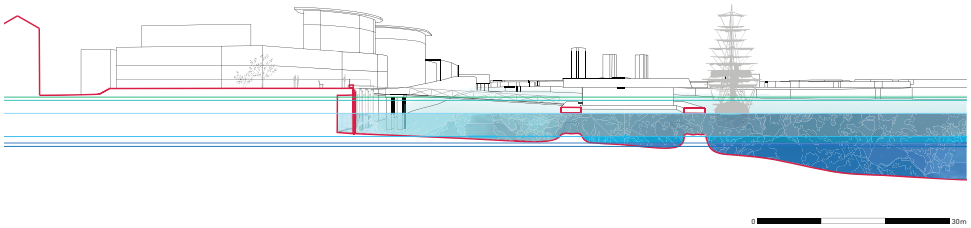
Case Study A: Hermitage Moorings



Hermitage Park is a council-owned riverside park in Wapping, borough of Tower Hamlets. It provides the first open riverside space downstream from Tower Bridge. A privately owned mooring is accessible from a ramp leading to the east edge of the open space. The park's lanscape design and opportunities for rest ensure a pleasant atmosphere to stop and enjoy the riverside. It is local in feel, frequented by joggers and nearby dwellers.

The spatial relationship to the river is given when sitting at the riverfront benches, yet the private access to the moorings disrupts a genuine experience of the river's water spaces.

The tide in section is shown at mean high water neap (MHWN).



⊕ open riverside space

⊖ restricted access to mooring and water space

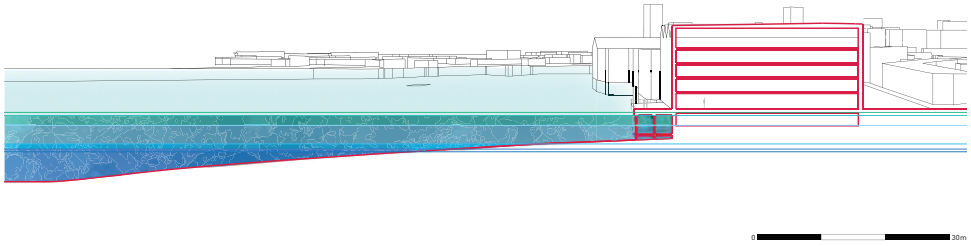
Case Study B: Metropolitan Wharf

Metropolitan Wharf is a grade II listed riverside warehouse, erected between 1862 and 1898, converted to luxury penthouses and creative industry office spaces by UK Real Estate in 2017.

Its historic wharf terraces now form part of the rentable office spaces. By law, the the building's owners are required to grant public access to this terrace as part of the Thames Path. A plaque on the door informs potential visitors of their rights of way between 9am and 5pm.

When asking at the porter, access was not granted. From the public street side of the building, there is no sightline or spatial relationship to the Thames.

The tide in section is shown at mean high water springs (MHWS).



⊕ preservation of historic building mass

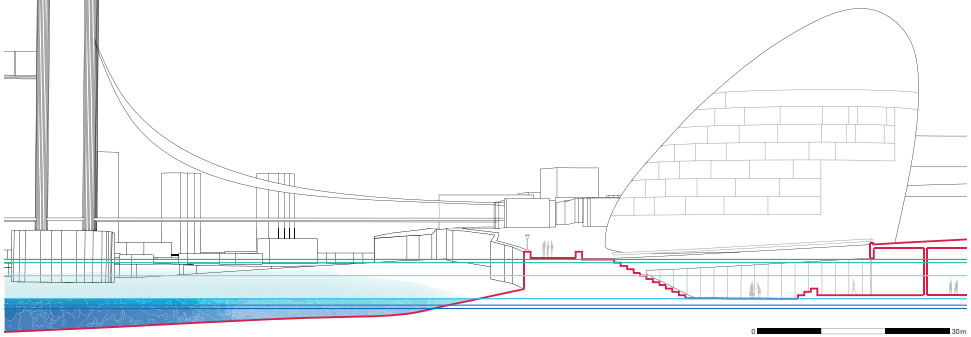
⊖ no public riverfront access

Case Study C: More London Riverfront

More London is a private development of offices and commercial spaces, owned by the St Martins Property Corporation, which is in turn controlled by the Kuwaiti state. The City Hall, the seat of the London mayor, and the Scoop, an open-air amphitheater, are both landmarks in their own right. The areas open spaces fall under the category of private public space (POPs).

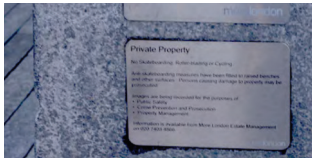
When passing the site, security guards were present. The overall feel of the open spaces is clean and impersonal. The water space serves as a backdrop for tourists' pictures, a generous promenade provides ample riverside space.

The tide in section is shown at mean low water neap (MLWS).



⊕ high quality riverfront promenade

⊖ surveillance and behavioural restrictions



1.6.
THE TIDAL THAMES

The tideway is the stretch of the River Thames that is subject to tidal fluctuations of the water level. It reaches from Teddington Lock downstream to the Thames Estuary.

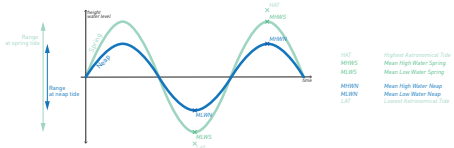
Depending on astronomical circumstances, the river's water level rises and falls two times a day, sometimes by over seven metres. The subsiding of water takes around three hours longer than the influx of water, as the Thames Basin is filled with ocean water constantly.[31]

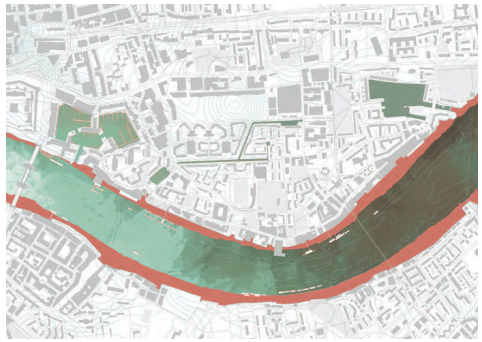
A spring tide occurs twice a month, at new moon and full moon, when the sun, moon, and earth are in line with each order. Tidal forces, caused by the combined gravitational pulls of these celestial bodies, then result in a very strong gravitational pull and a very high tide.

A neap tide also occurs two times a month, when the sun and moon partially cancel out their tidal forces due to their position relative to the Earth, and results in less extreme tidal changes to the water level.[32]

The tidal activity at London Bridge is recorded in tide tables that issue times of high tides (see diagram).

The river's foreshore, a transitory space that appears at times of low tides, was historically used as a commercial and recreational space. Today it is mostly a site of amateur archeological activity, directed towards the river's and London's maritime trading past.



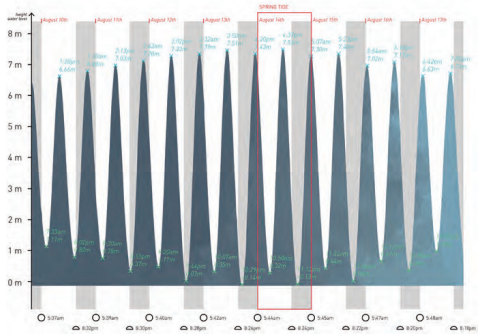


Left: Thames water levels in relation to time (including terms for standardised water levels)

Top Left: Thames waterbody at HAT

Top Right: Thames waterbody at LAT (foreshore highlighted red)

Right: London Bridge tide tables for August 14th, 2018 (maximal tidal range 7.74m)



Chapter 2

REFERENCE PROJECTS

To tackle the architectural question of how to introduce high quality public space to dense riverside environments, research is undertaken on the notions of
(1) interior urbanism and
(2) building as infrastructure,
in the form of two architectural reference projects.

2.1.
INTERIOR URBANISM AND PUBLIC SPACE

"The interior has grown to be an endless type of urban form"[37]

In late 20th and early 21st century global cities, privately owned public spaces (POPs) are being increasingly created in cities across the globe, predominantly in key infrastructural and recreational locations such as transportation hubs or at spaces close to water. Arguably, these POPs have also been accepted by the public to a greater and greater extent.

Interestingly, such spaces often disrupt the traditional dichotomy between interior private and exterior public space apparent in many architectural and urban designs. If a building as well as its surrounding is intended for public use, yet owned and maintained by private actors (instead of a commonly elected actor in the form of e.g. municipalities), the threshold between private and public shifts to create a new kind of space, as well as new architectural challenges and opportunities.

An exemplary study of the city of Toronto's PATH network, a mostly underground pedestrian retail network that includes shopping malls, restaurants and subway stations, shows these spaces as "[...] part of a proliferate system of interiorly-oriented sheds."[38] Every section of the PATH walkway is privately owned and maintained by one of the 35 corporations involved, and connects its users to Toronto's main entertainment, work and tourist locations.[39]

A contempory interpretation of urban interior POP space is the Rotterdam Market Hall by MVRDV.

Fig. 13. Development of Toronto's PATH interior urban network since the 1970s

Reference Project A:
MVRDV, Market Hall Rotterdam

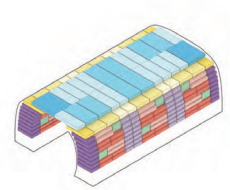


Fig. 14. Stacked housing units and market hall

The building is located in the Laurens Quarter, the original pre-war center of Rotterdam, and was completed in 2014. The architects stacked 228 apartments over a cylindrically shaped market hall with a height of approximately 35 meters, containing produce stalls, retail units, and a supermarket.

The housing units form the roof and enclosure of the market hall, incorporating sightlines into the hall. This results in (1) a clearly defined, yet porous threshold between private and public space, and in (2) the utilisation of the market hall enclosure as a 2-layered system, representing both a media facade for the hall and a system of stacked apartments.

This layering of spatial function leads to synergies between the building's different programs, and to a large and airy, partially underdetermined interior public space. Market stalls are loosely placed throughout the ground floor, while retail units are pushed to each side of the building, resulting in a multi-directional space that does not predefine user's routes through the hall, and thus allows for partial spatial appropriation.

The vertical glass façade at each side of the market hall allows for a smooth continuation of the buildings' adjacent urban fabric, while the surrounding buildings are framed by the round clearances forming the hall.

Fig. 15. Exterior View - continuation and framing of surroundings

Fig. 16. Interior View - market hall and public space

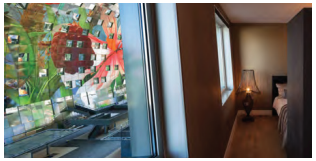


Fig. 17. Interior View - porous threshold between housing units and market hall

2.2.
BUILDING AS INFRASTRUCTURE - ROOF AS SYSTEM

Forming a meaningful relation between interior urban spaces and their surrounding urban fabric is a challenge that can be addressed by the notion of building as infrastructure.

Designing a space that is not only optimally responding and connected to its immediate context, but a seamless continuation and elaboration of existing spatial relationships, requires a reinterpretation of a building as an infrastructure in its own right, where the hierarchy of infrastructural, "servient" space and programmed space (space for use) is dissolved.

It is then possible to conceive various architectural elements of a building as radically new typologies, where users are not limited to one program or mode of being (e.g. "passing through" or "staying put", but rather are free to choose between various modes of possible behaviour.

The Yokohama International Port Terminal by FOA (Foreign Office Architects), completed in 2002, is a brilliantly executed example of such a building as infrastructure, where **the roof as a distinct architectural element becomes reinterpreted to form a hybrid between urban park, vertical circulation and structural load bearer.** The circulation through the building is conceived as a continuous loop with no dead ends,[40] resulting in seamless transitions between building storeys, with the roof's lanscape-like formations continuing as one progresses into the building.

Reference Project B:
FOA, Yokohama Port Terminal

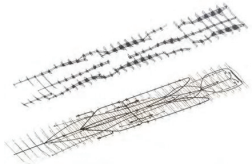


Fig. 18. Circulation diagram, structural elements and 3 vertical levels

The building's design is based on a program-specific circulation diagram, with circulation loops creating a continuous and multi-directional spatial experience, unlike traditional, strictly directional pier layouts.

The architects transformed the lines on the circulation diagram into a folded surface that gently branches out into various layers and ramps, forming simultaneously the vertical circulation and hosting the building's program and the urban park. The building was designed mainly by drawing sections, which was necessary to grip the multitude of spatial relationships and their formal complexity.

A structural system, consisting of steel-trussed folded plates and concrete plates, was conceived to hold up the resulting complex roof shapes. The structure is fully integrated in the folding roof surface, and is especially suited to dealing with the seismic forces typically occurring during earthquakes in the area.[41]

While representing an entirely new urban typology, realised with what at the time was the most advanced CAAD technology, the building remains sensitive to its context, especially due to the seamless continuation of the existing waterfront and its low height, ensuring minimal disruption of existing sightlines.

Fig. 19. Arial View -the roof as a system

Fig. 20. Structure - steel trussed folded plates

Fig. 21. Roof View - urban park

Chapter 3

SITUATING POTENTIAL

Searching for a suitable location for high quality public space at the Thames means taking a closer look at the riverside's leftover spaces, once hubs of commerical activity.

3.1.
THE LONDON DOCK THEN AND NOW

The London Dock, erected in 1805, is one of the oldest London trading docks and was chosen as a strategic site for further design development.

Its location in contemporary London Wapping make the London Dock an ideal starting point for the exploration of new modes of riverside public space, as Wapping is wedged between the touristic hotspots of the city centre, e.g. the Tower of London and London Bridge, and some of the most dense and deprived neighbourhoods in the borough of Tower Hamlets: Shadwell and Whitechapel. Contemporary Wapping is mostly a middle to upper-class residential neighbourhood, with luxury housing and office spaces along the riverfront.

Yet, Wapping is special: the neighbourhood serves as a gatekeeper to a riverfront that has managed to retain its maritime and trade history in many places. Remnants of busy maritime activity point to alternative patterns of public use. After the decline of British seaborne trade during the 1950s and 60s, Wapping was a derelict brownfield site, isolated from surrounding neighbourhoods. The London Dock was closed and sold by the Port of London Authority to the Borough of Tower Hamlets. The western pool was completely filled with the intention of erecting public housing estates.[33] Plans for development, however, were not carried through until the London Docklands Development Corporation bought the still derelict land in 1981. Redevelopment comprised 1,000 properties, with a focus on living near water around the Tobacco Dock and Shadwell Basin.

Today, Hermitage Basin and Shadwell Basin are existant in their original form. Wapping Basin was infilled and is now a sports facility, while parts of the Eastern Dock are now public green space. Partial infill has created leftover spaces at the former entry canals of Wapping Basin and Hermitage basin.[34] Its history as a Dockland and derelict brownfield area means that Wapping still has a somewhat isolated feel. That is partly because of its complete redevelopment in the 1980s, that focused more on land revenue planning and suburban-style housing provision than on a coherent urban design, or suitable spatial connections to surrounding neighbourhoods and the river.[35]

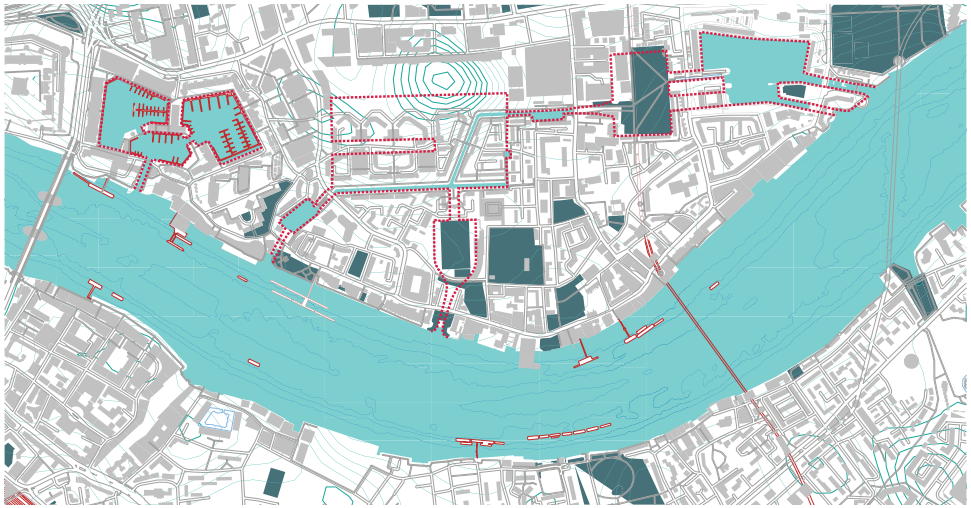


Fig.11. Historic impression of the London Dock

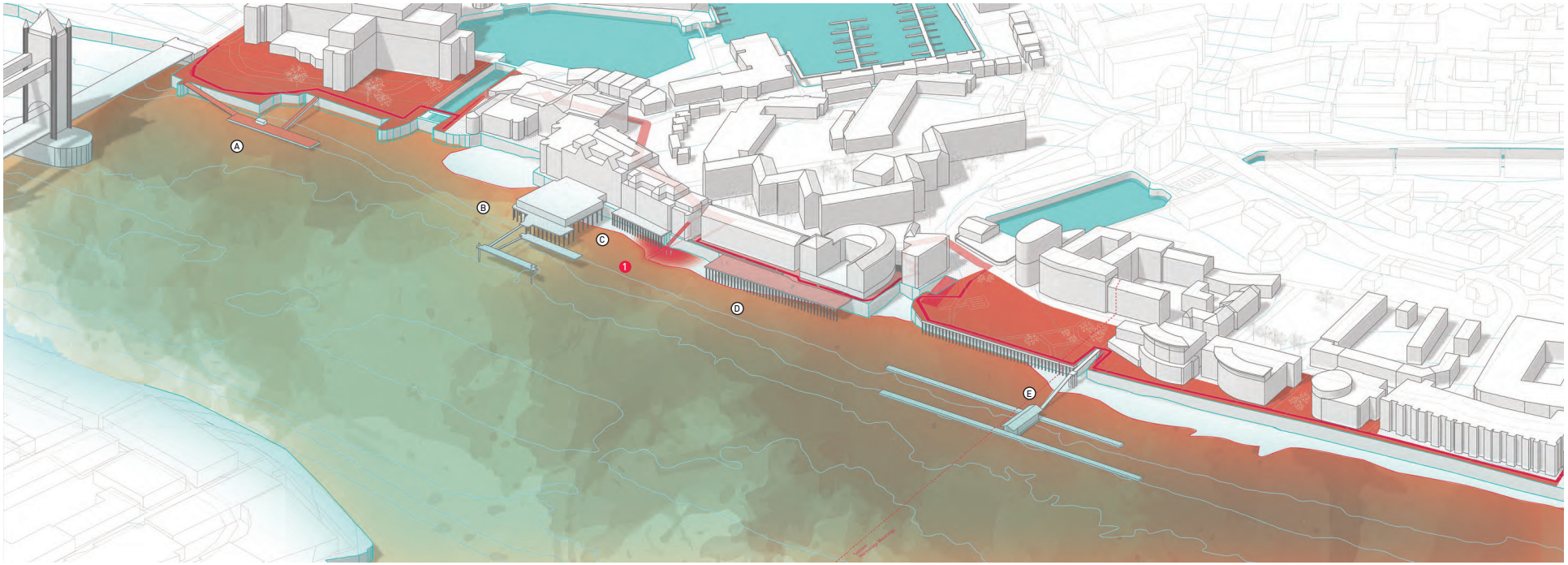
3.2.
RIVERSIDE ACCESS: CASE STUDY LONDON WAPPING

Rapid urban development by the LDDC during the 1980s led to a number of issues, still observable in the resulting urban fabric of contemporary Wapping. One of these issues is the lack of access to high quality riverside spaces.

A missing urban design framework assured that every inch of riverside space was used for upper-segment real estate, while other aspects of urban development, e.g. the planning of connections to adjacent neighborhoods or the creation of public space, were neglected.

The implementation of the Thames path, a public path alongside the Thames (National Trail Status, 1989) was meant to alleviate riverfront access issues. In a 2003 report[35] by the Greater London Authority, however, the spatial disruption of the Thames path by private developments was pointed out, as well as a lack of maintenance by London boroughs. The direct inheritance of the 1980s Docklands redevelopment becomes apparent here: in the absence of clear urban design guidelines and planning frameworks, the importance of the Thames path as a recreational axis through London was neglected by private developers.

A careful investigation of riverside conditions in London Wapping shows that access to the Thames' riverside and foreshore spaces is disrupted. Continuous use of the Thames Path is not given. The historic watermen's stairs provide access to the foreshore, but are often (partly) derelict or represent a safety hazard.



Foreshore access - watermen's stairs

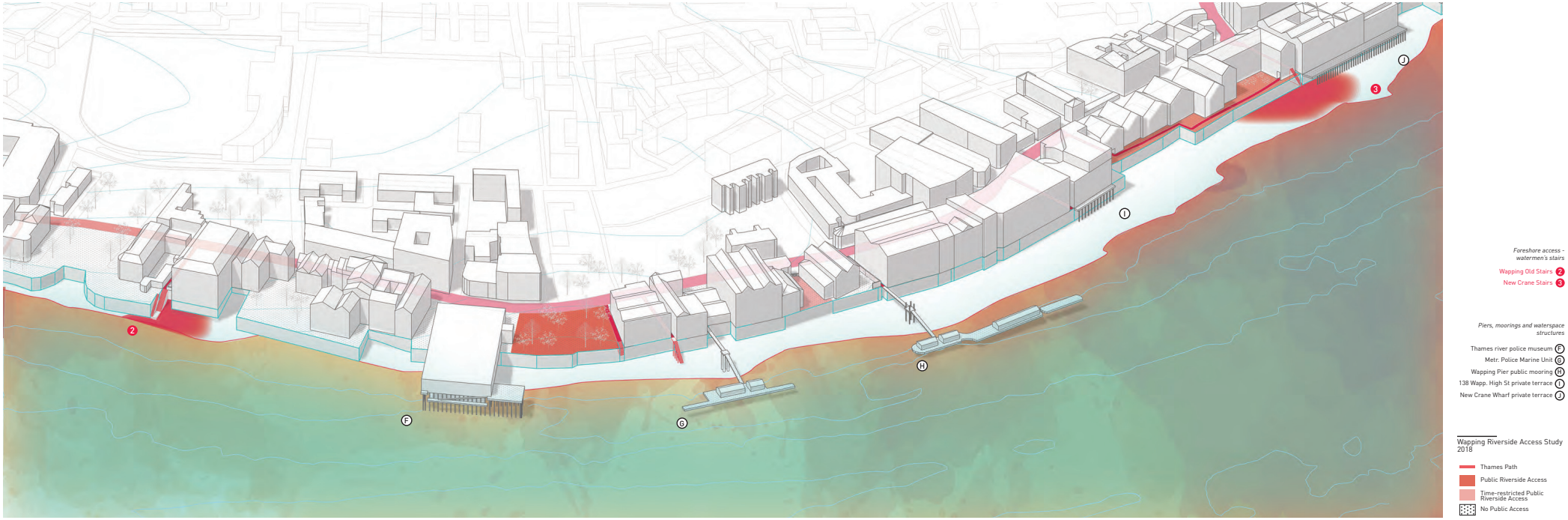
Alderman Stairs 1

Piers, moorings and waterspace structures

St Katherine's Pier (A)
HMS military base mooring (B)
Millers Wharf private terrace (C)
St Kath. Way 4-6 private terrace (D)
Hermitage community moorings (E)

Wapping Riverside Access Study 2018

Thames Path
Public Riverside Access
Time-restricted Public Riverside Access
No Public Access



Foreshore access - watermen's stairs

Wapping Old Stairs 2

New Crane Stairs 3

Piers, moorings and waterspace structures

Thames river police museum F

Metr. Police Marine Unit G

Wapping Pier public mooring H

138 Wapp. High St private terrace I

New Crane Wharf private terrace J

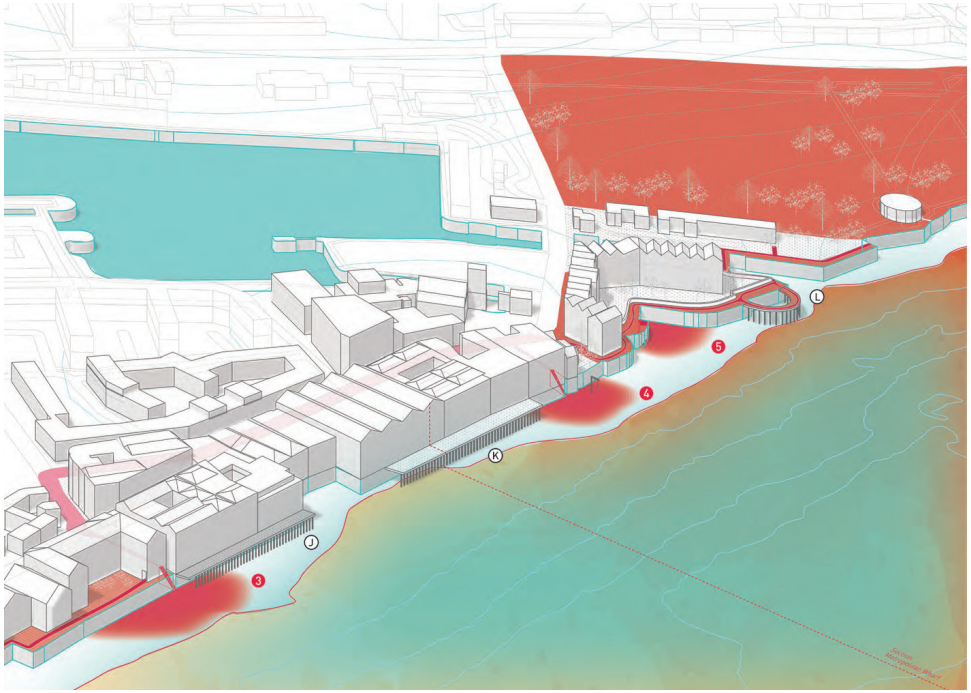
Wapping Riverside Access Study 2018

Thames Path

Public Riverside Access

Time-restricted Public Riverside Access

No Public Access



Foreshore access - watermen's stairs

New Crane Stairs 3

Pelican Stairs, Execution Dock 4

Thames Path public stairs 5

Piers, moorings and waterspace structures

New Crane Wharf private terrace J

Metr. Wharf private terrace K

Thames Path public terrace L

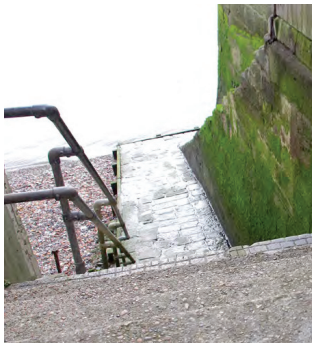
Wapping Riverside Access Study 2018

Thames Path

Public Riverside Access

Time-restricted Public Riverside Access

No Public Access



3.3.
PROGRAMMATIC STRATEGY: THE THAMES AS A NATURAL ENVIRONMENT

The programmatic strategy for the public building should be sensitive to the historical context and contemporary Wapping, picking up on programmatic themes that are already apparent in the area, as well as formulating a new programmatic relationship to the river, that points to its future place within the public consciousness.

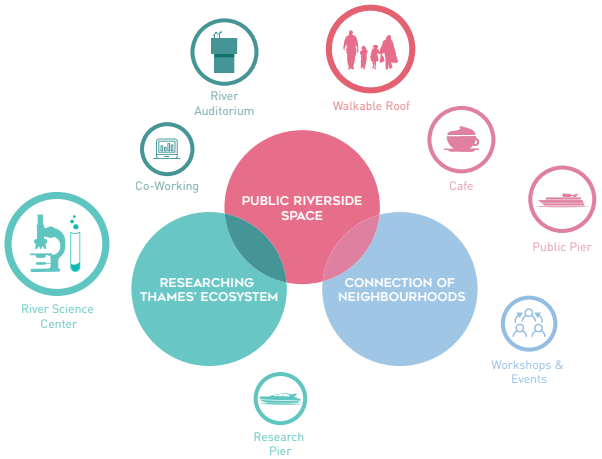
A study of existing programmes in Wapping reveals a focus on maritime (or river-related) public programmes at the riverfront. To respect the contemporary and historic focus on such programmes, the new public building will have a similar focus.

Looking at recent developments concerning the regard and treatment of the Thames, one can identify the following shifts towards sustainability and ecosystem preservation: From the 1970s onwards, major technological interventions ensured increased protection of the river's most imminent threats – water pollution, and the high risk of flooding. The Thames Barrier, operating since 1984, prevents the flooding of Greater London in the case of extremely high tides and storm surges from the North Sea.[36] Hand in hand with water purification and modern flood protection came a new understanding of the Thames.

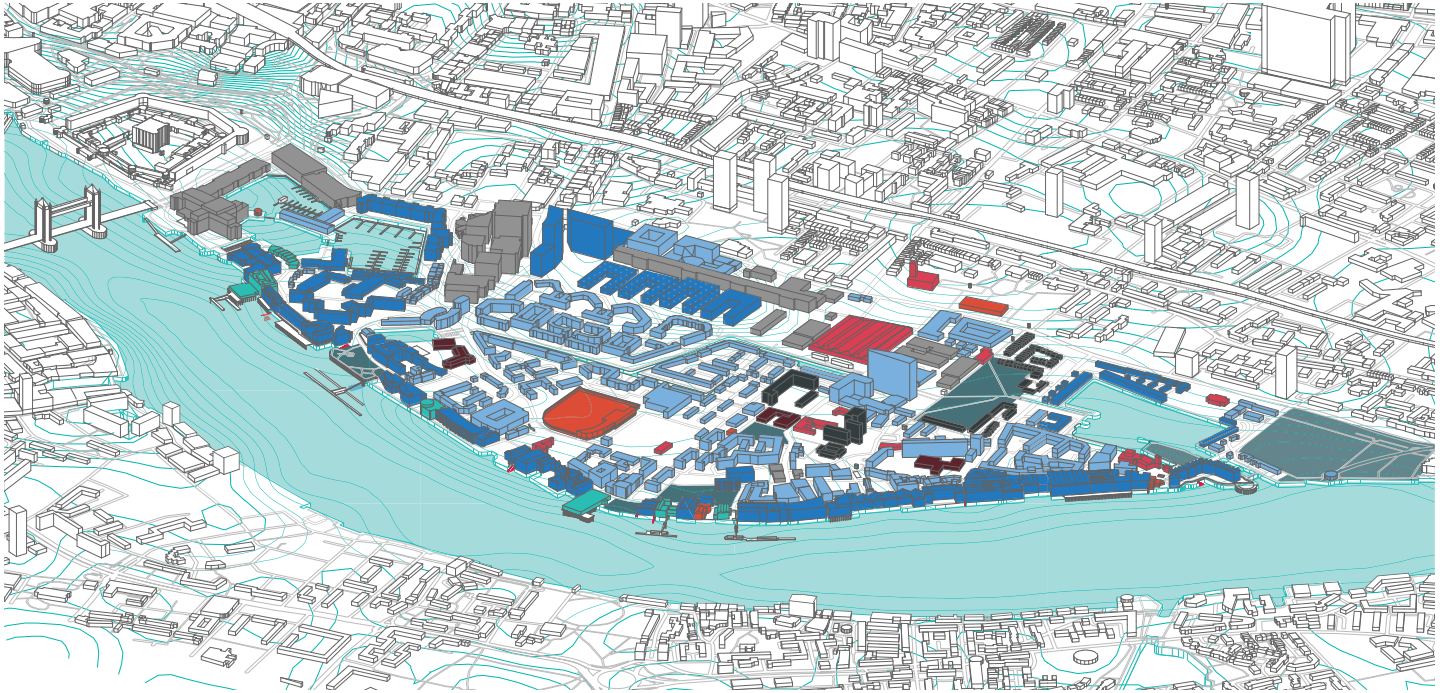
From the 1960s to the 2000s, the river turned from a source of health dangers and potentially life threatening natural disasters to (1) a space where urban regeneration could take place on a massive scale (during the LDDC's redevelopment), and later to (2) a natural environment that should be taken care of, and that is able to establish diverse spatial connections to its surroundings.

The new public building should intertwine interests in (1) maintaining a clean ecosystem, and a sustainable and healthy relationship between city and river, and (2) providing high quality public spaces.

The new building will be a catalyst for learning about and upkeeping the river's natural ecosystem, using it's water spaces as high-quality recreational spaces, and connecting dense London neighbourhoods with ample open river space.



Programmatic Strategy for the new public building



Wapping Programmes Study 2018

- Maritime (river-related)
- Educational
- Recreational
- Cultural
- Commercial / Office
- Residential, low income
- Residential, mid range
- Residential, luxury
- Open space - parks
- Open space - water

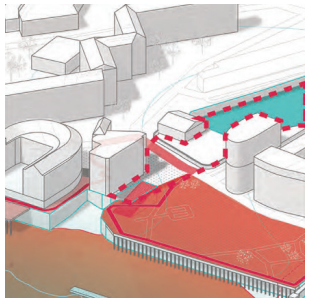
3.4.
URBAN DESIGN STRATEGY: TRANSFORMING LEFTOVER SPACES

Wapping is a tight mesh of historic as well as contemporary building mass. Suitable locations for a new building providing high quality public space and public programmes were found in the leftover spaces resulting from 1960s dock infilling.

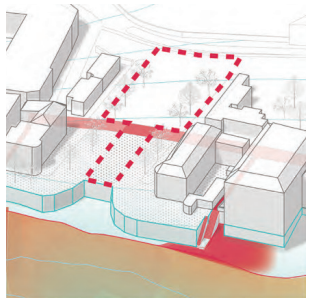
The leftover space at the former entrance of Hermitage basin, as well as the leftover space at the former entrance of Wapping Basin were selected for development. Both are underutilised and partly fenced off from public access.

In order to create plot borders that incorporate high quality riverspace as well as water spaces, their extents were offset from the shore by 60 metres, which is also the historical scope of dock royalty for passing ships. An offset of existing buildings by their respective heights respects the sunlight and shading conditions already in place. A special emphasis was put on not harming existing trees within the leftover spaces. This further narrowed the width of the plot. Potential buildings should not exceed the height of 7 metres, so as to ensure minimum intrusion of the existing urban fabric.

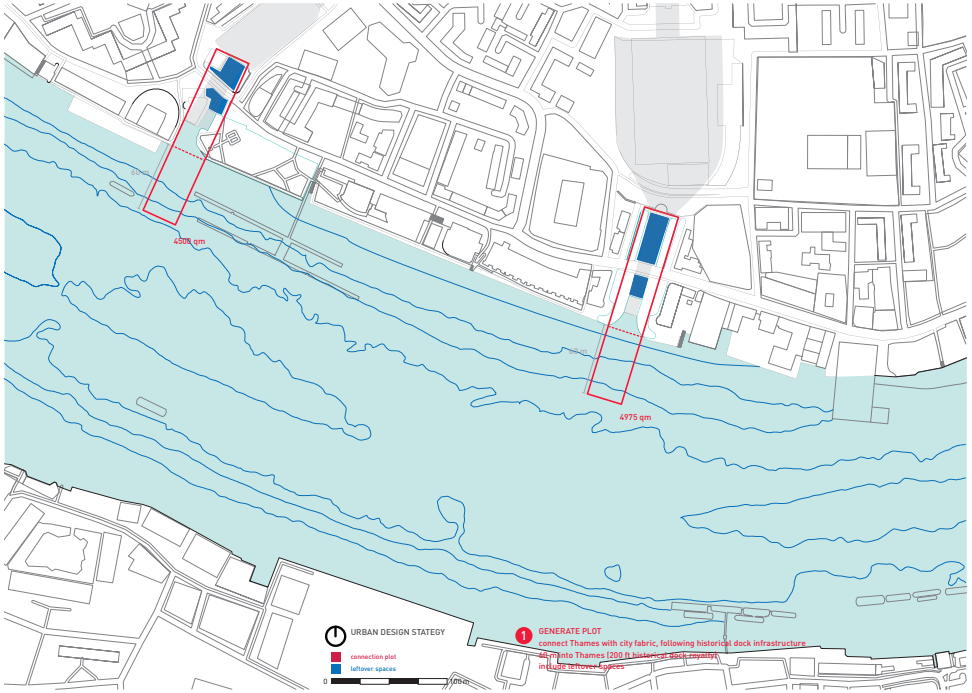
The resulting elongated plot serves as a connective axis between the immiate riverside spaces and 'landlocked' parts of Wapping.

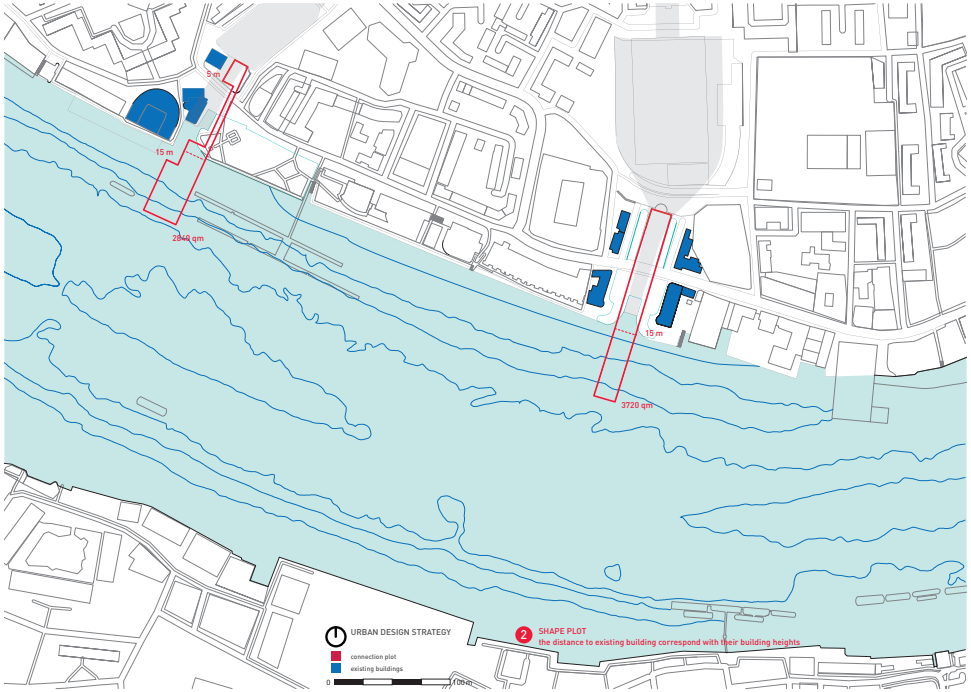


Leftover space at the former entrance of Hermitage basin



Leftover space at the former entrance of Wapping basin


4305 qm
4975 qm
URBAN DESIGN STATEGY
connection plot
leftover spaces
0
100m
1 GENERATE PLOT
connect Thames with city fabric, following historical dock infrastructure
60 m into Thames (200 ft historical dock depths)
include leftover spaces


5 m
15 m
2844 qm
15 m
3720 qm
URBAN DESIGN STRATEGY
connection plot
existing buildings
0
100m
2 SHAPE PLOT
the distance to existing building correspond with their building heights

3.5.
THE SITE: WAPPING PIER HEAD

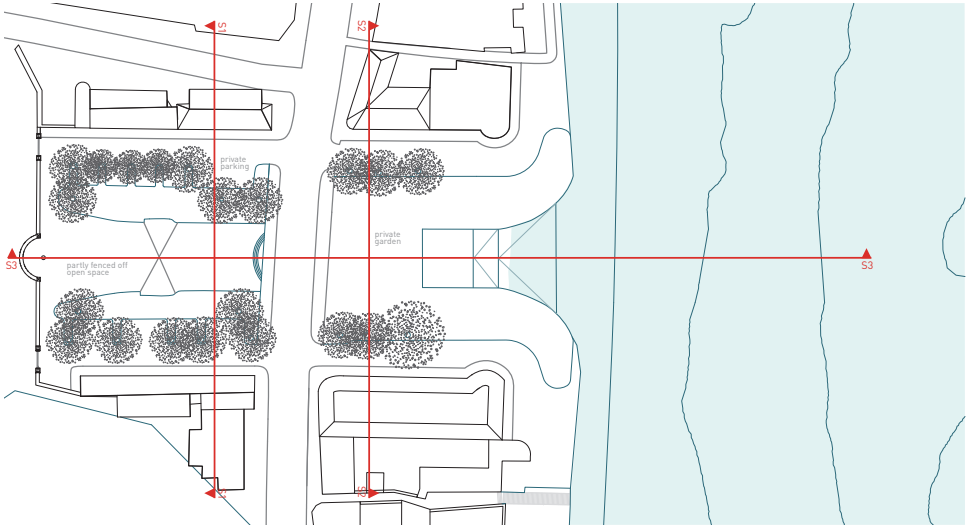
The former location of the entrance to Wapping basin, today Wapping Pier Head, was chosen as a suitable site for a new public building.

The canal forming the main maritime entrance was located between two Georgian houses that remain until today, originally built for customs officers and dock officials. After the closure of the docks and surrounding warehouses, the dock and its entrance canal were filled in. Remants of the old dock entrance are clearly visible in the contemporary urban fabric, which make it possible to develop new building mass with respect to historical spatial relationships.

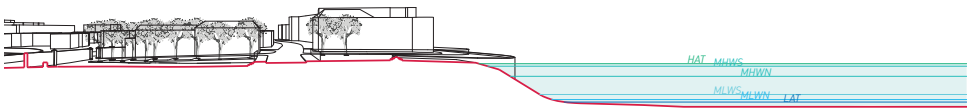
The site's former trade-based relationship to the Thames can be reinterpreted for the 21st century, as connections to the river are clearly visible in the remaining elongated shapes outlining the former canal walls, and leftover spaces are underutilised and serve at best as partly fenced-off open space.

A number of old trees frame the site, adding additonal quality to the planned open public space.

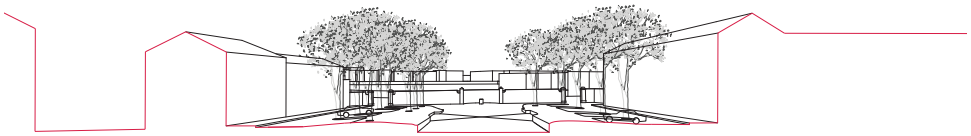
Fig.12. Wapping Pier Head before dock infill, 1922



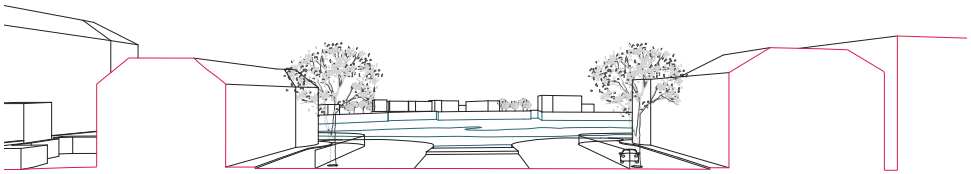
Site as existing: Plan
M 1:800



Site as existing: Section 3
M 1:800

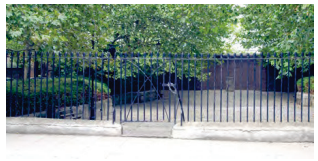


Site as existing: Section 1
M 1:400



Site as existing: Section 2
M 1:400

Impressions of the site,
Section 1



Impressions of the site,
Section 2

Chapter 4

DESIGN DEVELOPMENT

The design takes into account contextual research, urban design strategy and reference projects, with the aim to create a high quality public building, that establishes a new relationship between the site and the Thames.

4.1.
PROJECT AIM

Based on the urban design strategy and its resulting boundaries for the building envelope, a building should be created that answers to the need of open public space with a close connection to the Thames.

In order to ensure the funding of ample public facilities such as urban public space, co-working and workshop spaces, an auditorium and a cafe, private actors in the form of research and development groups are involved. The focus of research activity should be on river science and ecology, and specifically on the upkeeping of a sustainable river eco-system.

Spatially as well as programatically, the building should serve as a catalyst to form a new relationship to the river Thames.

Architecturally, the project investigates the spatial possibilities of the element *roof*, regarding it as a two-layered, moldable surface that is able to provide horizontal as well as vertical circulation.

The interior space should be as open as possible and provide users with partly undetermined spaces. Borders between programmatic areas should be dissolved where possible, to effect synergies between the building's different users.

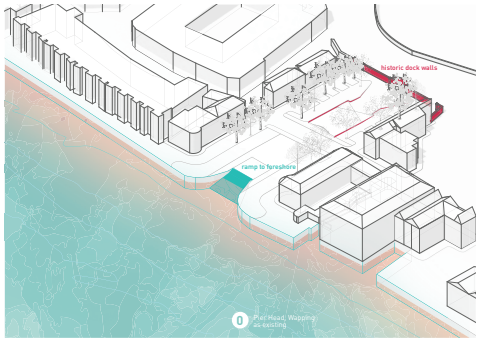
Right: Project Aim Diagram

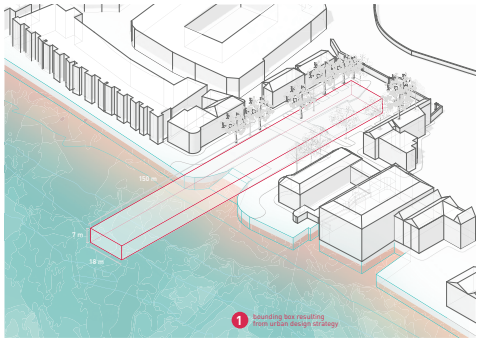
4.2.
INCREMENTAL DESIGN DEVELOPMENT

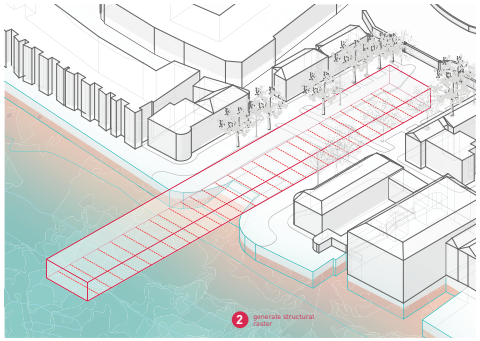
Starting from the building's plot volume, the design is developed in 5 major stages.

In stage (1), a bounding box of 150m lenght, 18m lenght and 7m height is defined. It is to confine the building envelope, based on historic dock dimensions and the urban design strategy.

In stage (2), a raster of ca. 5 meter width gets introduced in transverse plot direction. The raster marks the location of the primary structure and therefore informs all later design decisions.



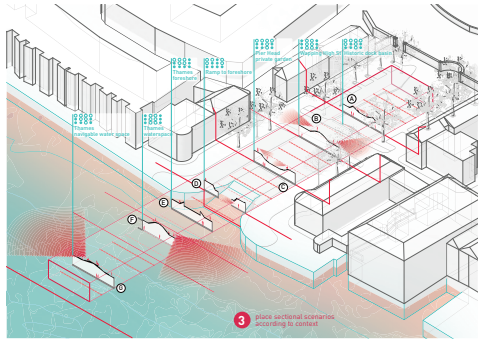


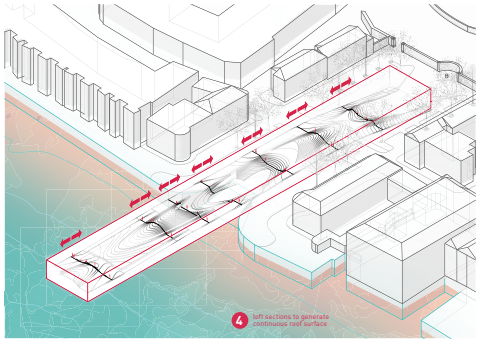


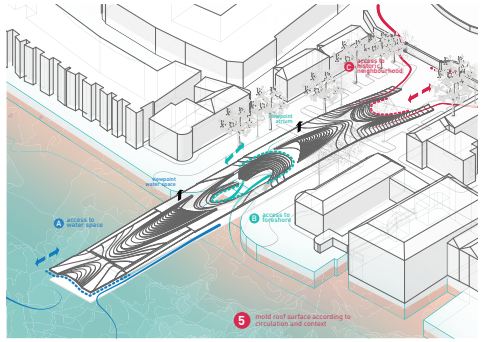
In stage (3), the sectional scenarios developed from formal studies and sectional elaborations (see subchapter 4.3) are placed within the raster according to contextual requirements. Placed at open water spaces, for example, the sectional scenario should have a high degree of extroversion, to ensure a close spatial relationship to the water. Placed at the historic dock basin, however, the sectional scenario should have a higher degree of introversion, so as not to disturb the close-by housing terraces.

In stage (4), the sections are lofted to create a continuous stepped roof surface.

In stage (5), the roof surface is modulated with respect to context and desired circulation, to effect high quality spatial connections between the building and its surroundings. A special emphasis is placed (a) on the close experience of open water spaces, (b) on the vertical transition between foreshore, riverfront and roof surface, and (c) on the relationship of historic dock structures and the building.







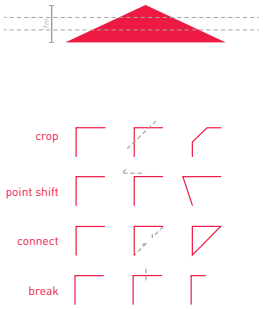
4.3.
ROOF AS SYSTEM: FORMAL STUDIES AND SECTION ELABORATION

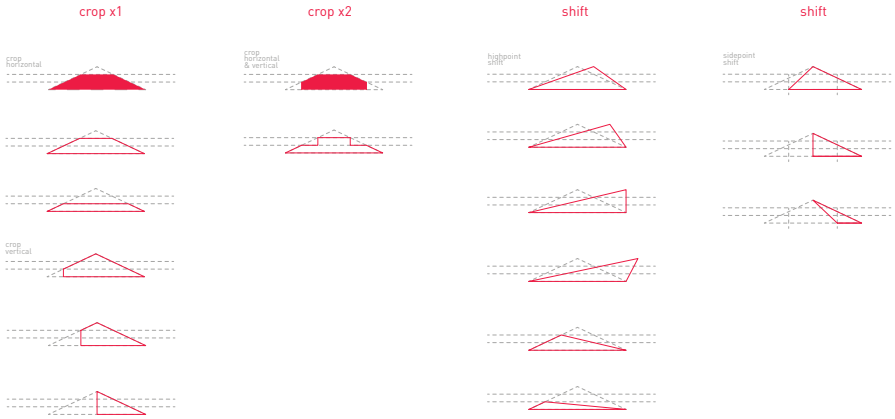
Treating the architectural element *roof* as a *system*, meaning not merely as a building enclosure but as a programmable, double-layered threshold, can yield possibilities for new typologies and architectural expressions.

On this basis, a series of sectional formal studies was undertaken. The base triangular shape is created from the existing site dimensions, and takes the height restrictions of the urban design strategy into account. A series of simple geometrical operations (crop, point shift, connect, break) was employed to diversify the classical triangular roof shape and generate formal variety.

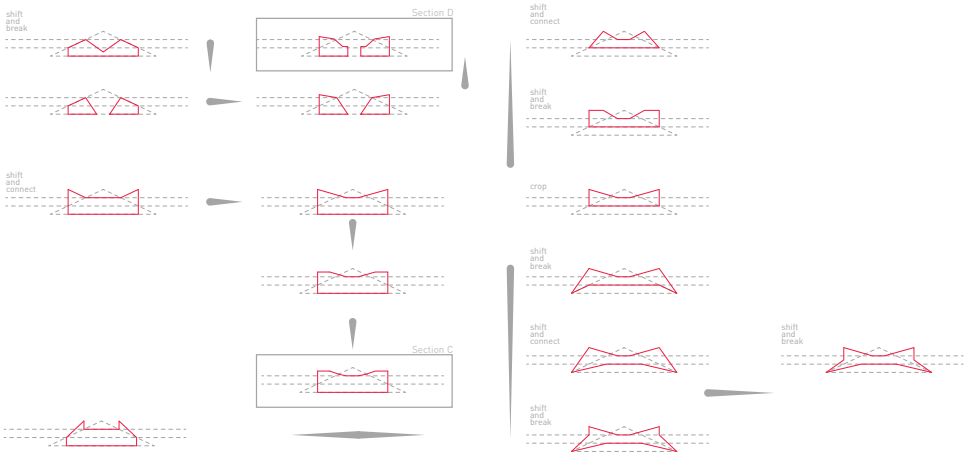
A number of formal outcomes was chosen for further section elaboration. To make the roof into a continuous, walkable public space, steps and benches were included in the design.

Sections were then placed within the building's bounding box, with respect to the existing building mass and desired spatial scenarios.

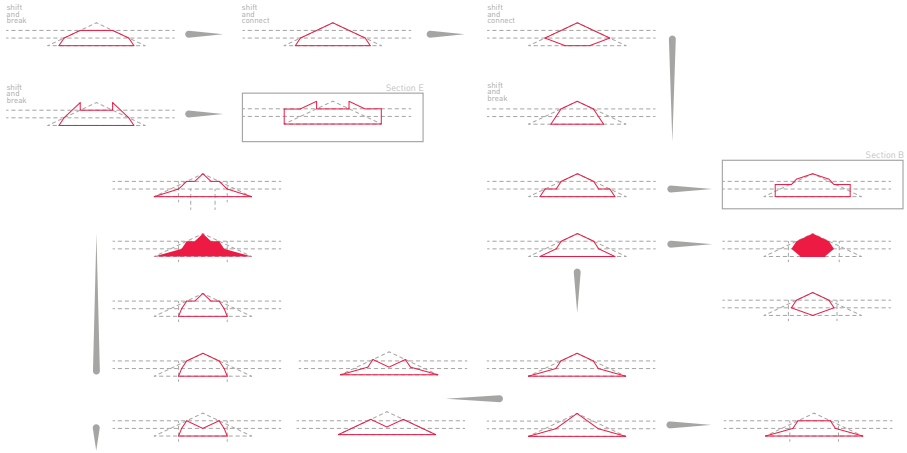




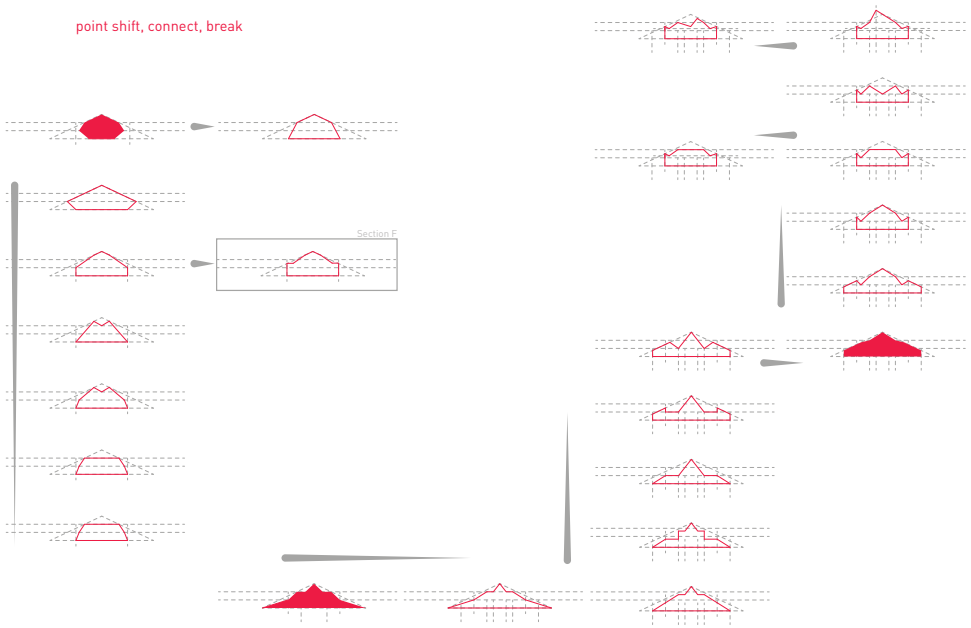
point shift, connect, break, crop



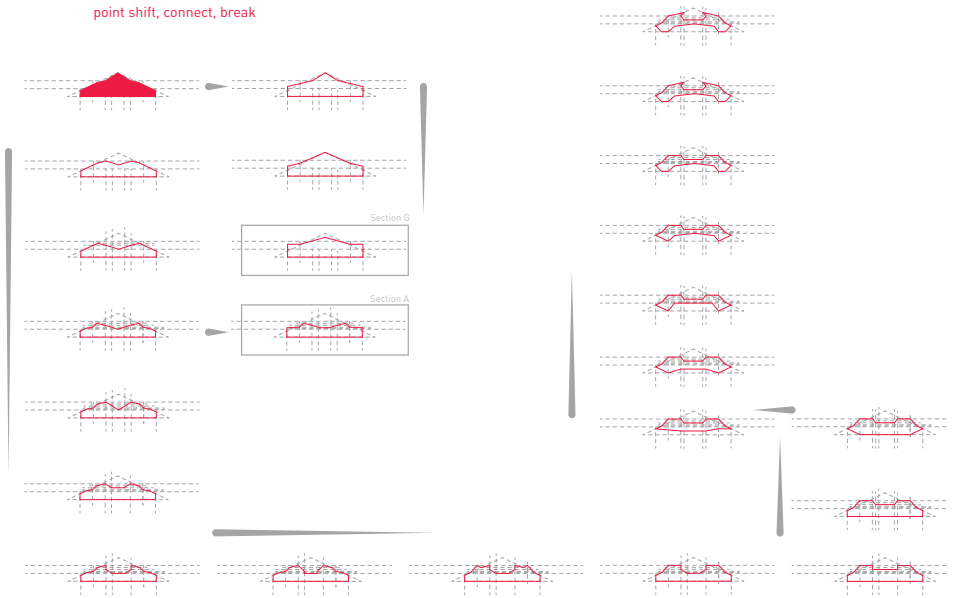
point shift, connect, break

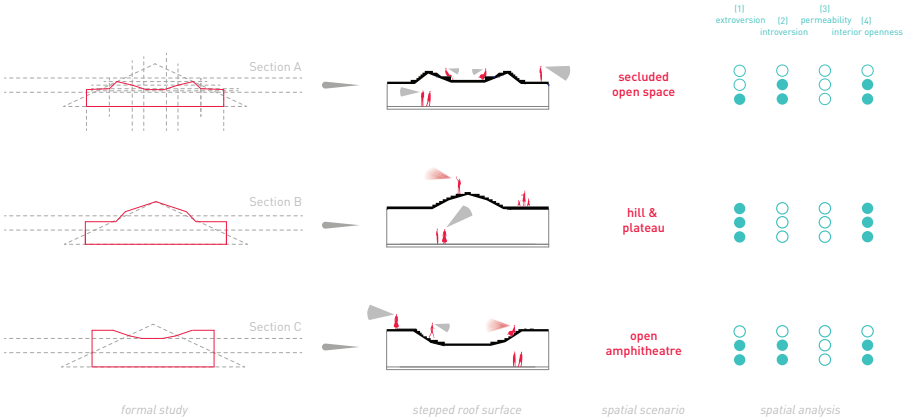


point shift, connect, break



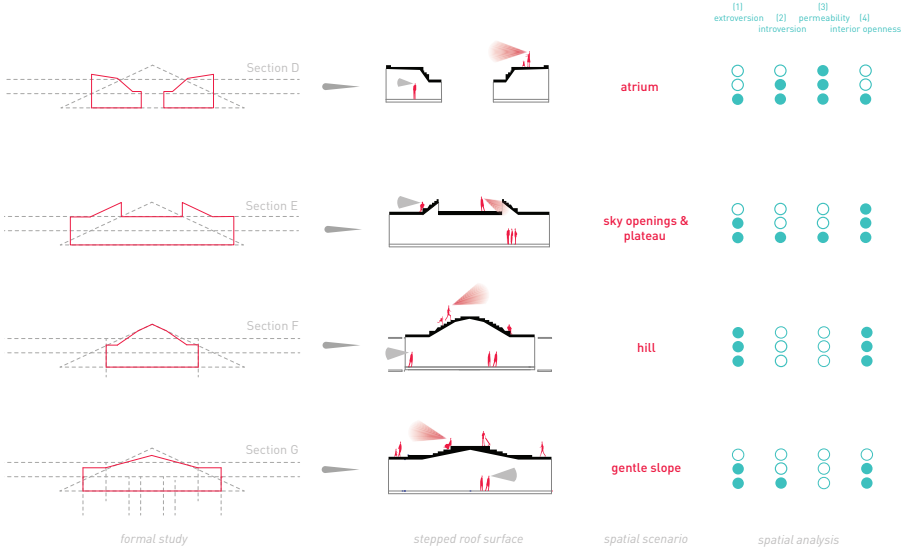
point shift, connect, break





The elaboration of the sectional formal studies A to G into stepped roof surfaces leads to different sectional **spatial scenarios**. An emphasis is placed on the behaviour of the roof as a threshold, deliniating different types of open spaces.

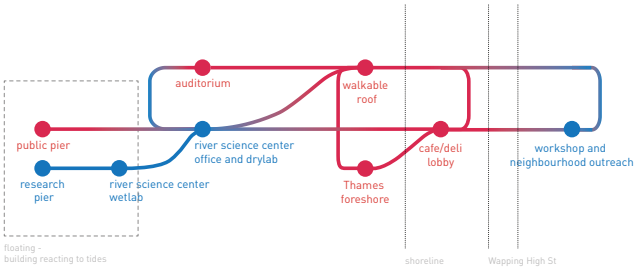
Resulting scenarios are then analysed based on their spatial qualities.



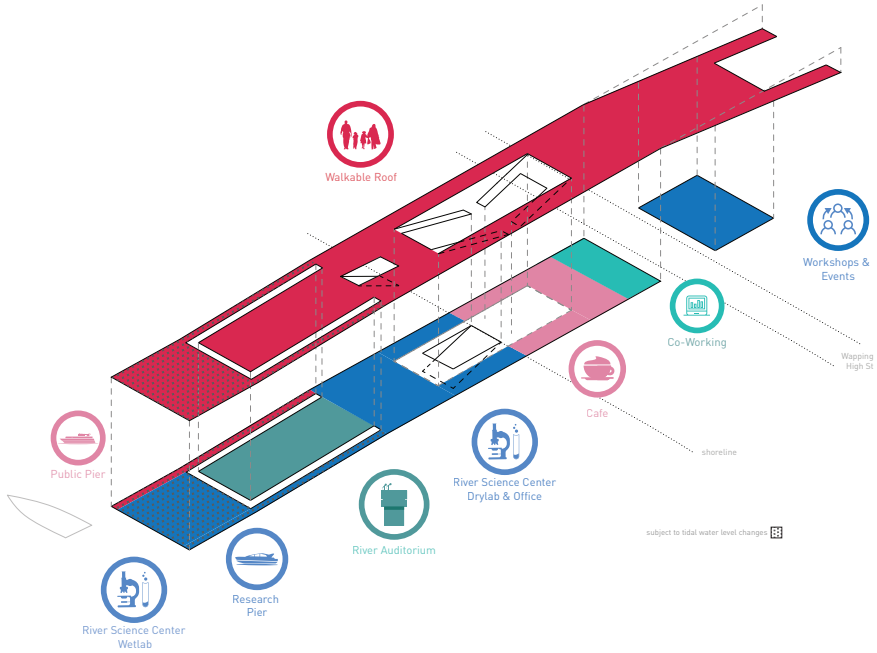
4.4.
CIRCULATION AS DESIGN PARAMETER

The circulation diagram shows programmatic nodes and their connections. The nodes should be connected by a loop with a minimal number of dead ends. **The walkable roof should form the main connective node, meaning the most easily reachable node, and hence the center of the building.**

The spatial allocation of prorammes within the bounding box (resulting from the urban design strategy) is based on the desired circulation. The programes are distributed over two levels. The public and research pier, as well as the river science wetlab, are subject to the river's tidal behaviour.



Circulation Diagram



Spatial allocation of programmes

Chapter 5

RIVER SCIENCE CENTER

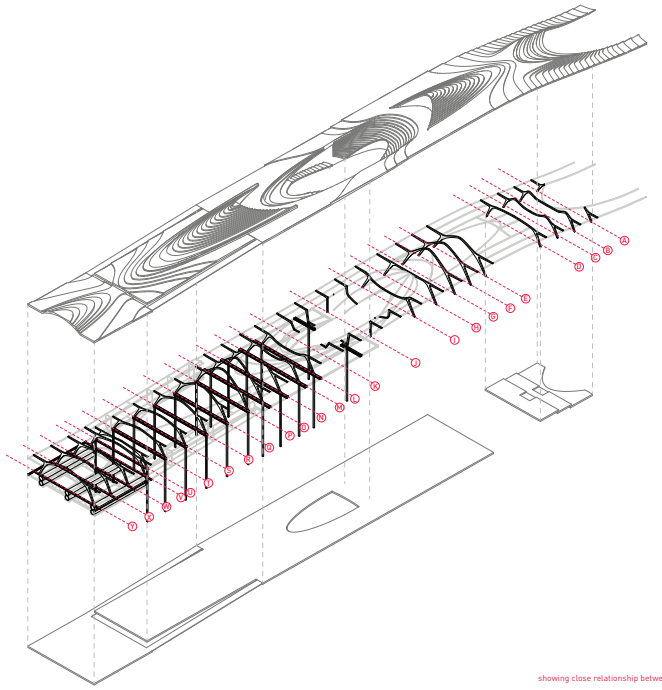
The proposed river science center is a double-layered structure that comprises ample interior and exterior public space and intertwines public programmes and historic specificities of the site to form a new connection between city and Thames.

5.1.
STRUCTURE

The structure of the building is devised in close relationship to the stepped roof surface and informs all later design decisions.
The primary structure is placed on the structural raster and follows the form of the roof, consisting of steel arches with bespoke, rectangular profiles (300 x 200 x 16mm).

The arches allow for a very large span of 15 meters, so as to ensure airy, uninterrupted and multi-directional interior open spaces.

The secondary structure consists of bespoke, curved steel girders with the dimensions of 200 x 100 x 16 mm, again closely following the contours of the roof.



Structural Axonometry
showing close relationship between structure and stepped roof surface

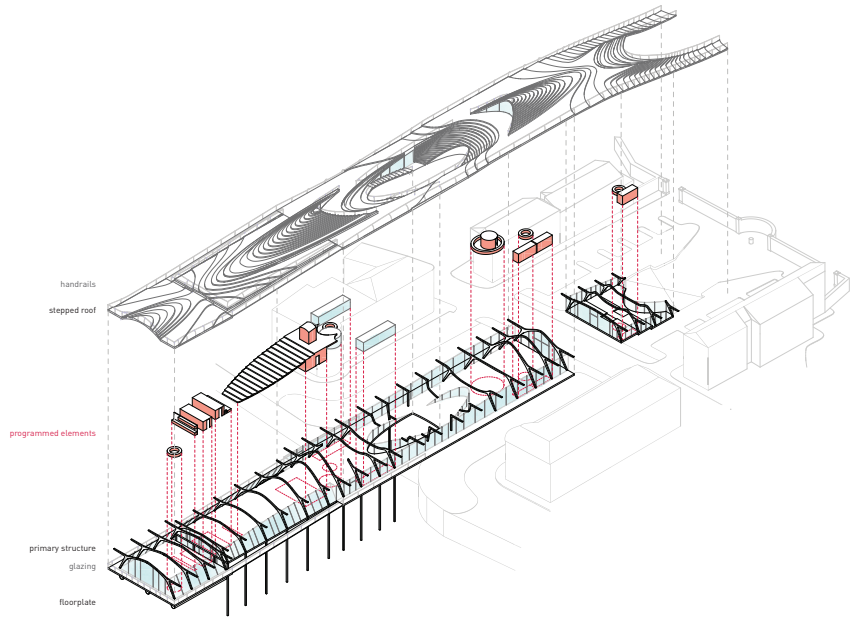
5.2.
DESIGN PRESENTATION

The design elements axonometry shows all significant parts of the design, as well as the multi-directional interior open spaces that result from confining most programs in distinct elements. Programmatic areas are positioned around these programmed elements in a semi-determined fashion. This ensures that the users can experience different programmatic areas in a seamless transition, and can move through the building without many dead ends.

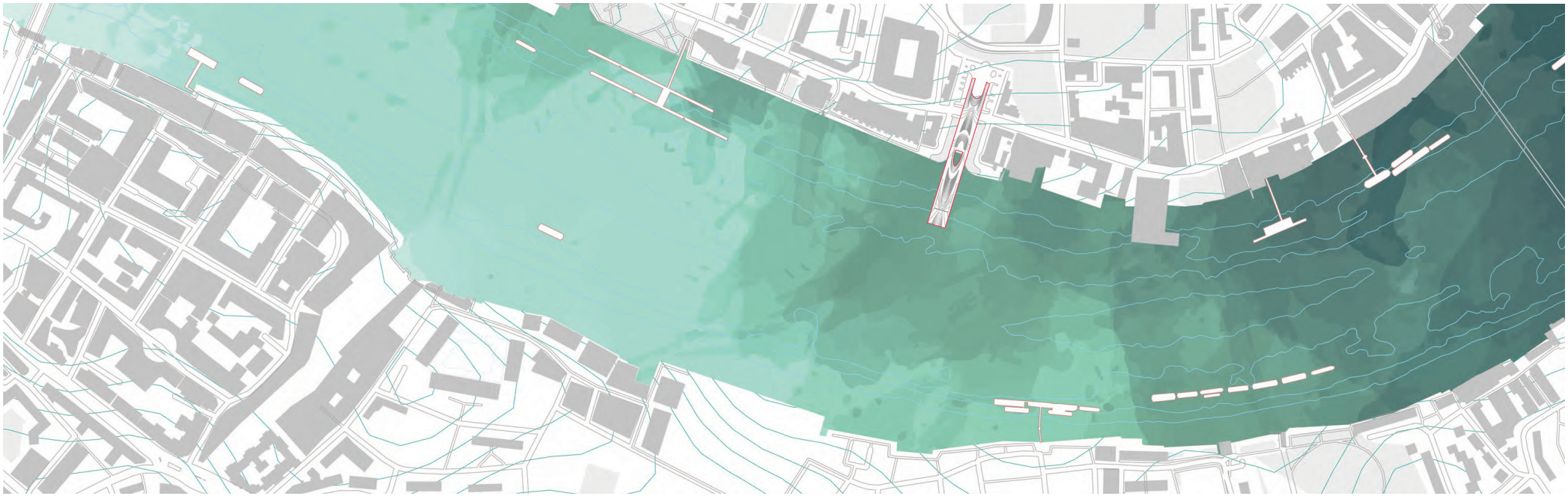
In plan and section, this openness of interior spaces becomes visible, as well as the generous provision of open public spaces on the roof of the building. Users can circulate through the building by passing through the interior spaces, walking on the roof, or by using the public walkway that connects the public pier with Wapping High Street on the ground floor level.

Through detailed facade sections and a detailed elevation, the building's construction and materiality are discussed. Generous glazed facades contrast with the natural stone and concrete finish of the floor surfaces.

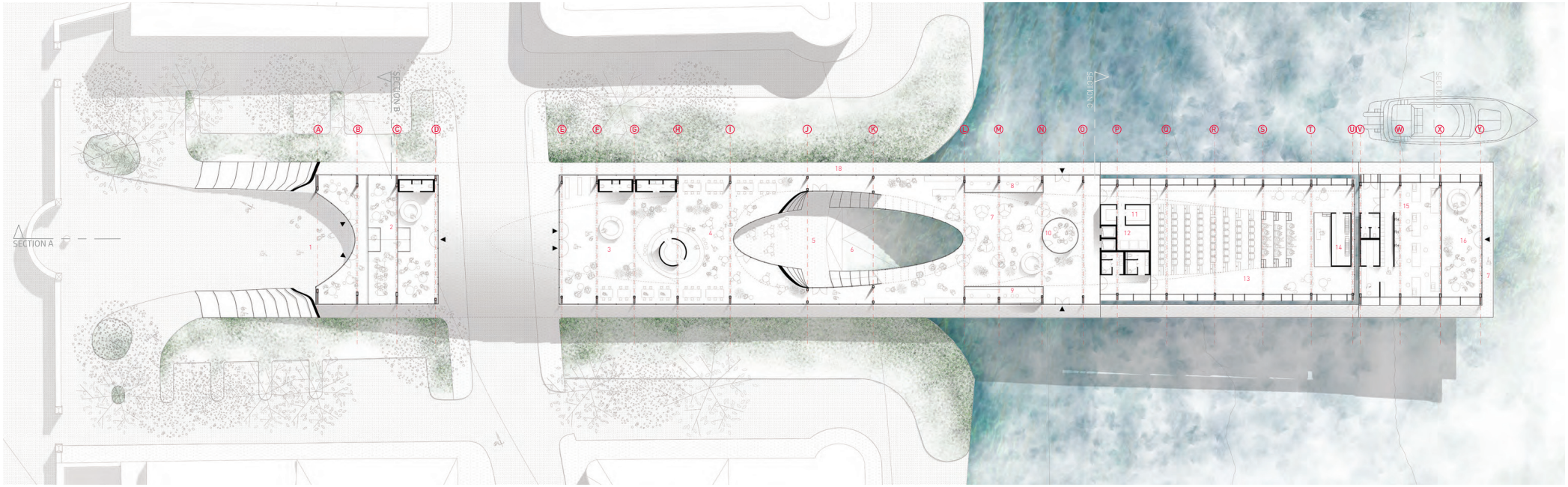
Perspectives and axonometries show the diverse spatial situations and relationships between the building and the Thames, as well as the capability of the building to spatially connect the river to its surrounding urban fabric and to the London public.



Design Elements Axonometry
showing design elements and multi-directional interior open space

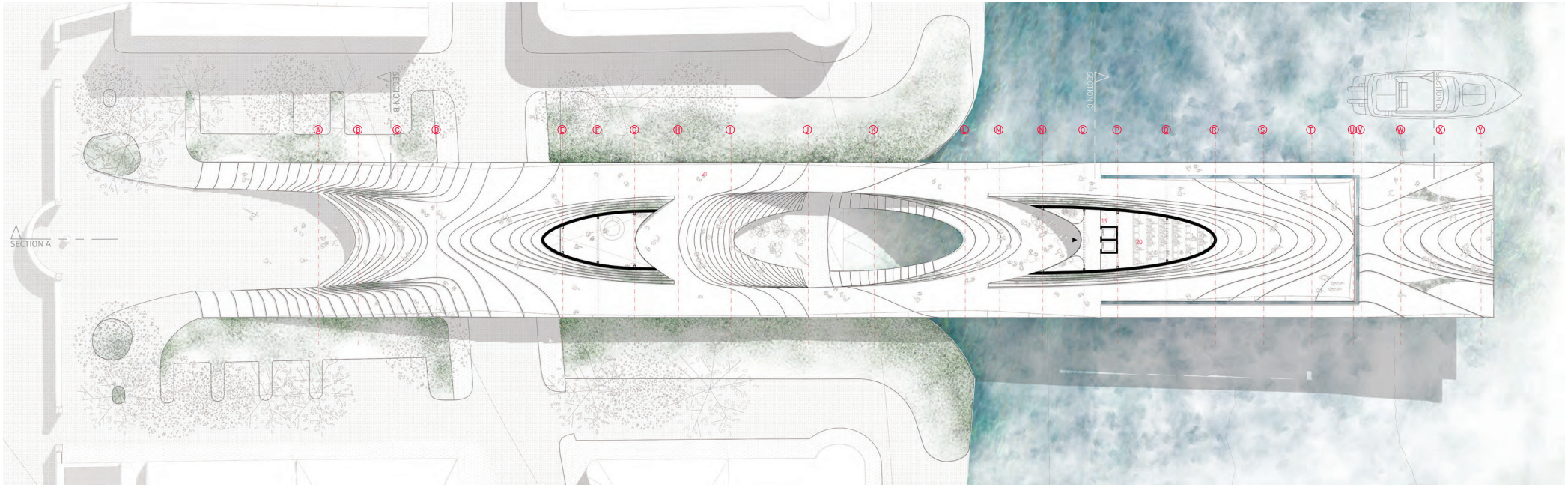


Site Plan
M 1:3000



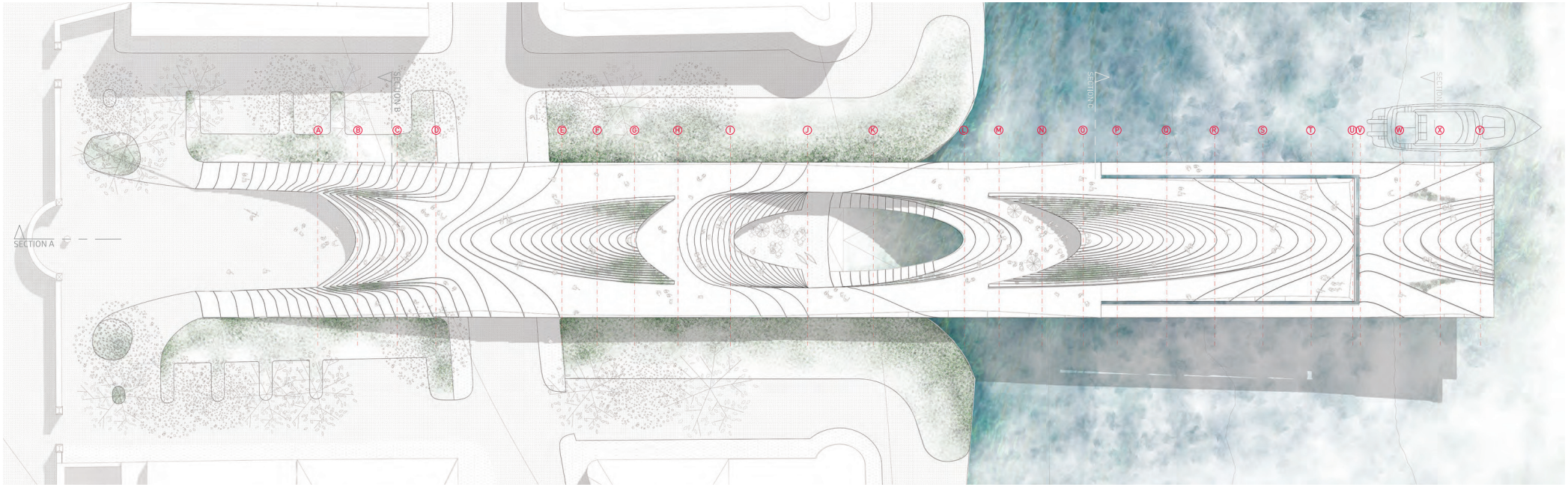
1 Workshop & Event Terrace
2 Workshop & Event Space
3 Lobby River Science Center
4 Cafe
5 Cafe Terrace
6 Ramp to Foreshore
7 Open Office
8 Dry Lab East
9 Dry Lab West
10 Meeting Room
11 Techn. Equip.
12 Freezer Room
13 River Auditorium
14 Storage & Backstage
15 Wet Lab
16 Public Pier Lounge
17 Public Pier
18 Public Walkway

Ground Floor Plan
M 1:350

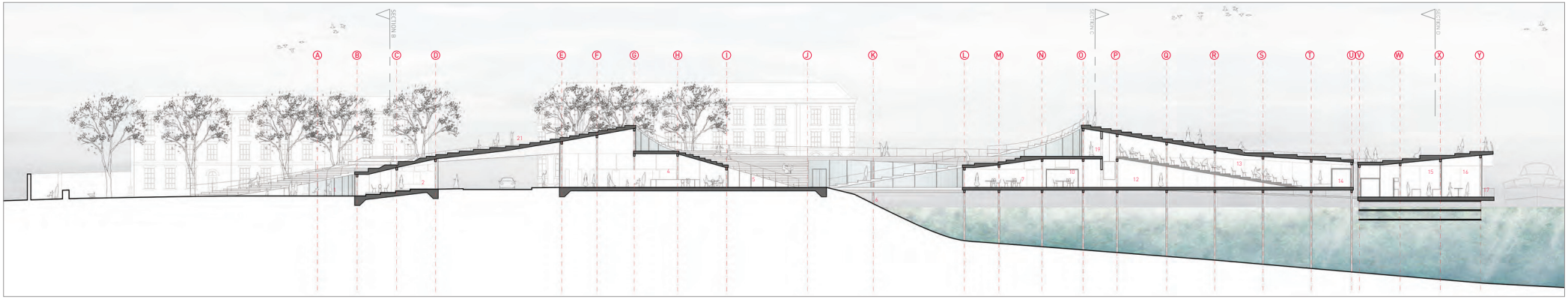


19 River Auditorium Lobby
20 River Auditorium
21 Walkable Roof

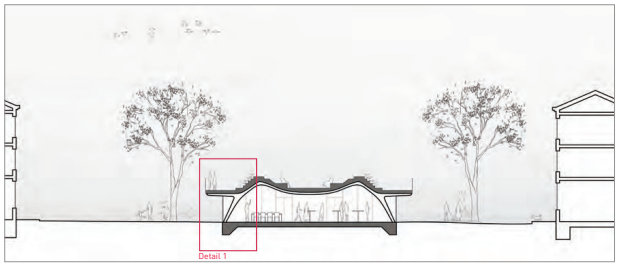
First Floor Plan
M 1:350



Roof Plan
M 1:350

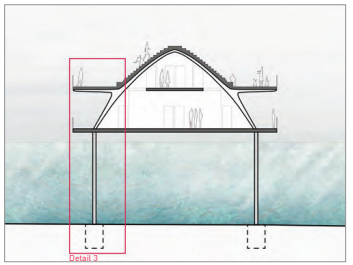


Section A
M 1:350

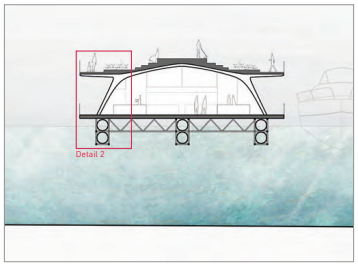


Section B
M 1:350

1 Workshop & Event Terrace
2 Workshop & Event Space
3 Lobby River Science Center
4 Cafe
5 Cafe Terrace
6 Ramp to Foreshore
7 Open Office
10 Meeting Room
12 Freezer Room
13 River Auditorium
14 Storage & Backstage
15 Wet Lab
16 Public Pier Lounge
17 Public Pier
19 River Auditorium Lobby
21 Walkable Roof



Section C
M 1:350



Section D
M 1:350

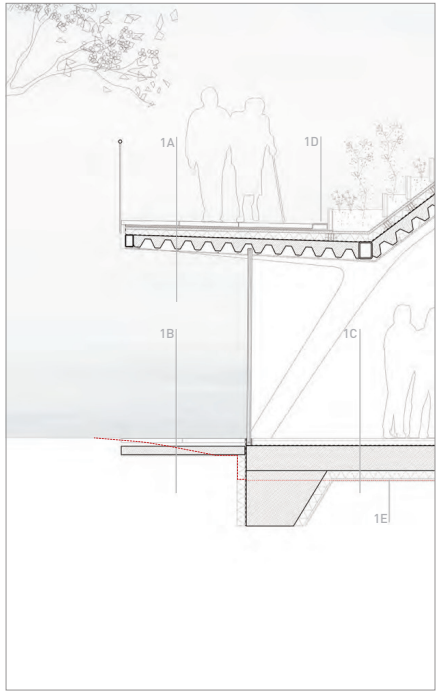
1A | Natural Stone Travertine Tiles 50mm (+ 2mm joint cross)
Gravel Bed 20 mm
FL 150 Filter Fleece (polypropylene fibers)
Sedumdrain 25 Water-Retention and Drainage Plate 25mm
SLI 125 Seperating Fleece
XPS Insulation 100-60 mm
Bauder Thermoplan Sealant (root resistant, two-layered, FPO-PP tracks)
Reinforced Concrete Composite Ceiling 200mm
Trapezoidal Sheet + Fire Protection Coating Epoxy
Plaster Plate (glass fiber inforced) 14mm, mounted on steel profiles

1B | Natural Stone Travertine Tiles 50mm (+ 2mm joint cross)
Mortar Bed 50 mm
Concrete Slab 50 mm
Roller Burnish

1C | Concrete Flooring 30mm
Screed 55 mm
Sealant
Reinforced Concrete Slab 300mm
Perimeter Insulation 100mm
Roller Burnish

1D | TGF terrace rust

1E | existing terrain level



Detail 1
M 1:50

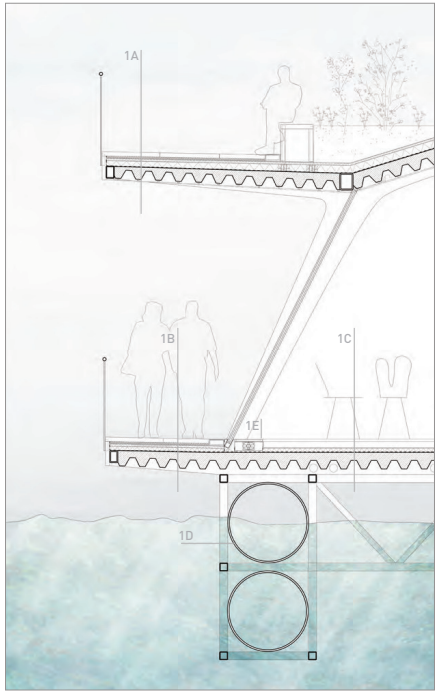
1A | Natural Stone Travertine Tiles 50mm (+ 2mm joint cross)
Gravel Bed 20 mm
FL 150 Filter Fleece (polypropylene fibers)
Sedumdrain 25 Water-Retention and Drainage Plate 25mm
SLI 125 Seperating Fleece
XPS Insulation 100-60 mm
Bauder Thermoplan Sealant (root resistant, two-layered, FPO-PP tracks)
Reinforced Concrete Composite Ceiling 200mm
Trapezoidal Sheet + Fire Protection Coating Epoxy
Plaster Plate (glass fiber inforced) 14mm, mounted on steel profiles

1B | Natural Stone Travertine Tiles 50mm (+ 2mm joint cross)
Gravel Bed 20 mm
FL 150 Filter Fleece (polypropylene fibers)
Sedumdrain 25 Water-retention and Drainage Plate 25mm
SLI 125 Seperating Fleece
XPS Insulation 100-60 mm
Bauder Thermoplan Sealant (root resistant, two-layered, FPO-PP tracks)
Reinforced Concrete Composite Ceiling 200mm
Trapezoidal Sheet + Fire Protection Coating Epoxy

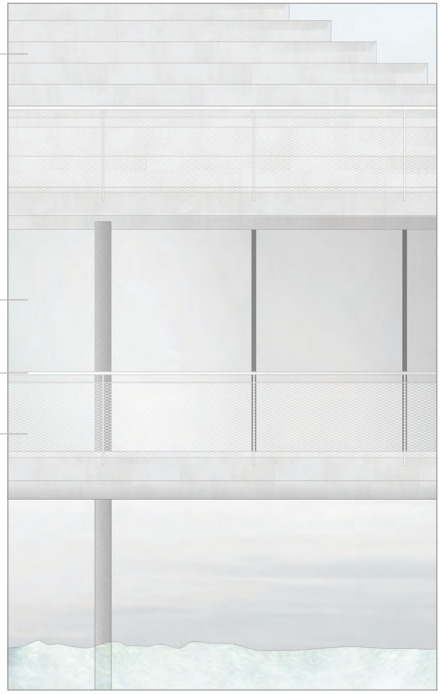
1C | Concrete Flooring 30mm
Screed 70 mm
Seperation Layer
Sound Insulation 50mm
Bauder Thermoplan Sealant (root resistant, two-layered, FPO-PP tracks)
Reinforced Concrete Composite Ceiling 200mm
Trapezoidal Sheet + Fire Protection Coating Epoxy
Installation Layer

1D | Steel Pontoon 1000mm diameter
(mounted on steel truss framework)

1E | Jaga Mini Canal H014 Trench Radiator
(140mm, stainless steel top)



Detail 2
M 1:50



Detail 3 Elevation
M 1:50

1A | Natural Stone Travertine Tiles 50mm (+ 2mm joint cross)
Gravel Bed 20 mm
FL 150 Filter Fleece (polypropylene fibers)
Sedumdrain 25 Water-Retention and Drainage Plate 25mm
SLI 125 Seperating Fleece
XPS Insulation 100-60 mm
Bauder Thermoplan Sealant (root resistant, two-layered, FPO-PP tracks)
Reinforced Concrete Composite Ceiling 200mm
Trapezoidal Sheet + Fire Protection Coating Epoxy
Plaster Plate (glass fiber inforced) 14mm, attached with steel profiles

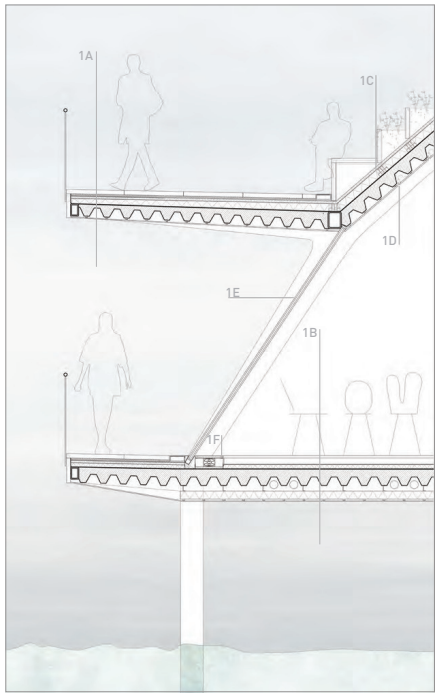
1B | Concrete Flooring 30mm
Screed 70 mm
Seperation layer
Sound Insulation 50mm
Bauder Thermoplan Sealant (two-layered, FPO-PP tracks)
Reinforced Concrete Composite Ceiling 200mm
Trapezoidal Sheet + Fire Protection Coating Epoxy
Installation Layer
XPS Insulation 100mm (mounted on C Profile carriers)
Plaster Plate (glass fiber inforced) 14mm, attached with steel profiles

1C | T Profile Stand, mounted on wood square plank with seal screws

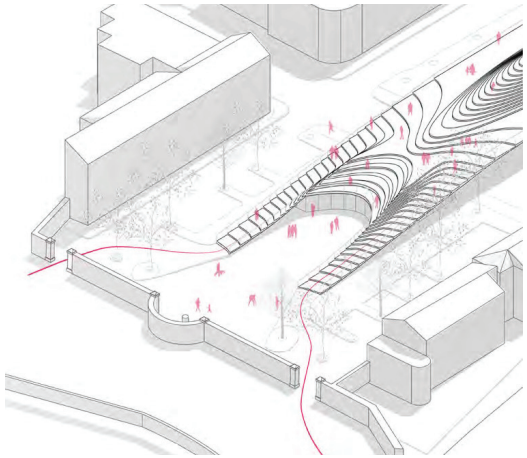
1D | Cold Cathode Tube Light (20 mm diameter)

1E | Double Glazing

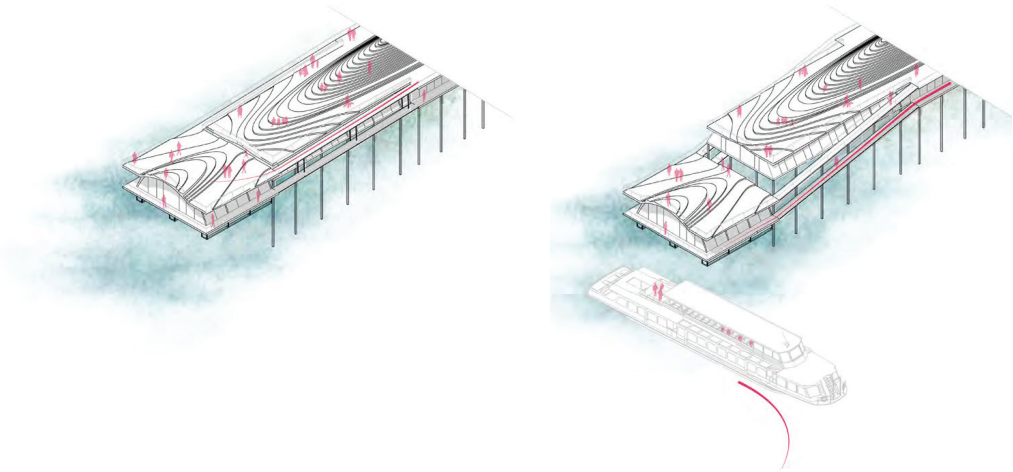
1F | Jaga Mini Canal H014 Trench Radiator
(140mm, stainless steel top)



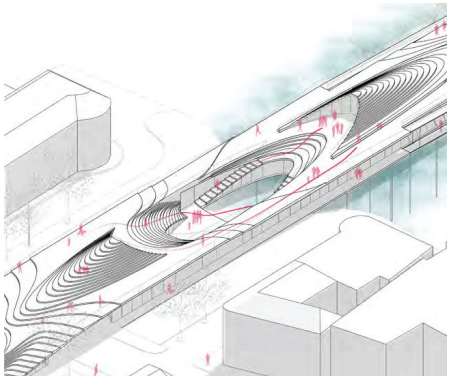
Detail 3
M 1:50



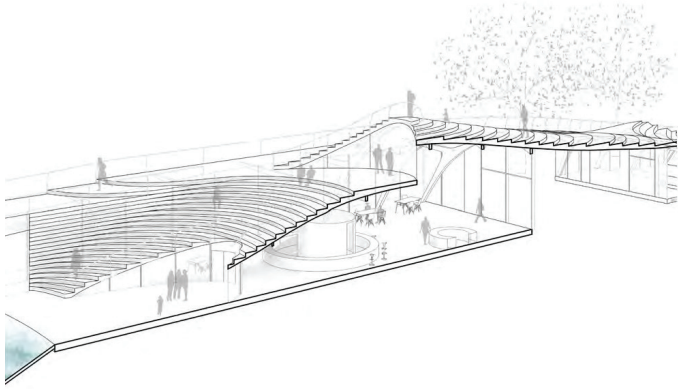
Exterior Spaces Axonometry: At the Old Dock
showing the relationship of the building and remnants of the historic dock, including the spatial connection to its Wapping neighbourhood



Exterior Spaces Axonometry: At the Pier
showing the relationship of the building's pier and the Thames' water spaces, including the reaction of the building to tidal changes



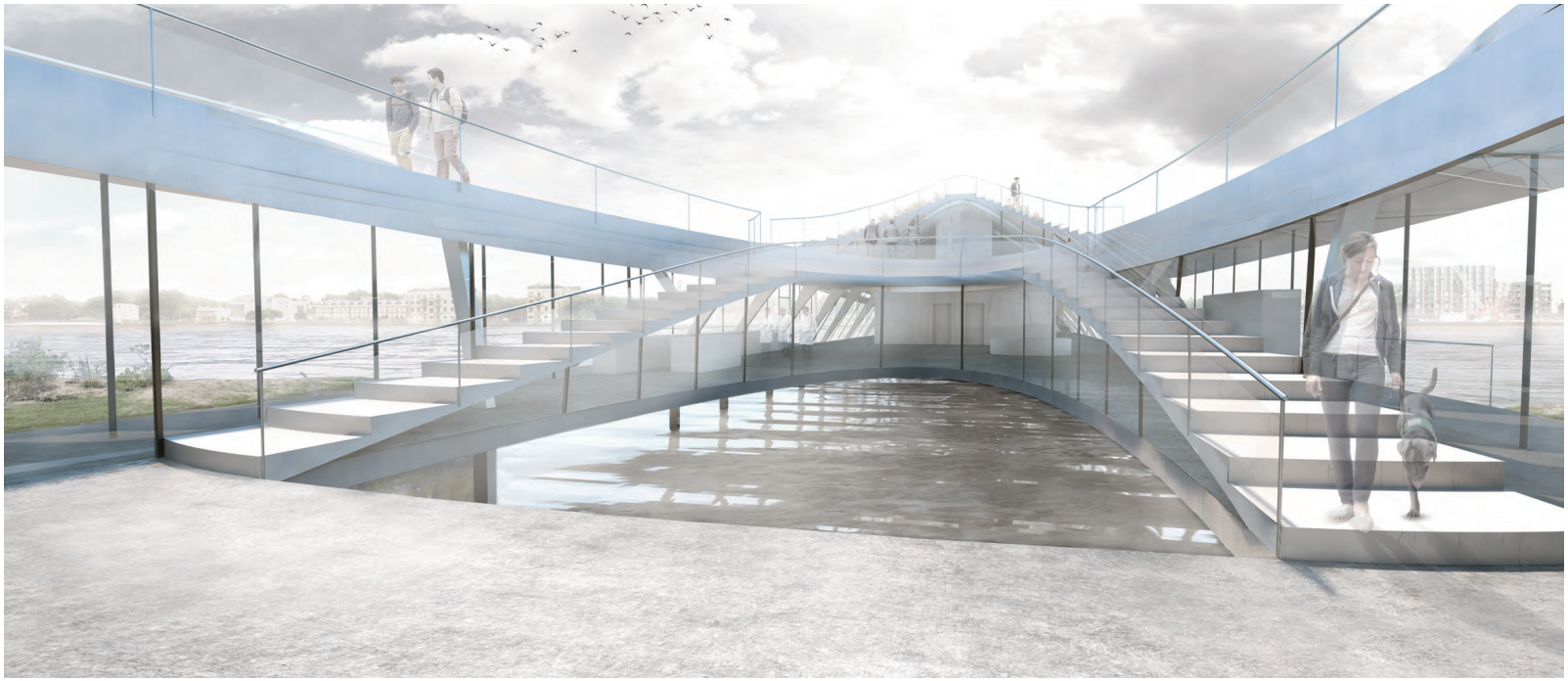
Exterior Spaces Axonometry: At the Atrium
showing the relationship of the building and the foreshore, including vertical circulation at the infrastructural center of the building



Interior Spaces Axonometry: River Science Center Lobby and Roof
showing the diverse spatial qualities of the roof and the interior as a double-layered system

Perspective A
At the Old Dock: View from Wapping High Street

Perspective B
At the Pier: View from the Thames



Perspective C
At the Atrium: View from the Terrace

APPENDIX

LIST OF REFERENCES

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LIST OF FIGURES

If not stated otherwise, all figures are created by the author.

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