

**Coastline as Commons: Using Spatial Devices
to Link Littoral Temporalities**

by

Lauren Abbass

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Abstract

This thesis argues that architectural interventions can extend the water commons to the fluctuating littoral zone of Kijipuktuk/Halifax Harbour. The present composition of the Harbour as a working waterway favours a colonial perspective and marginalizes already-othered surrounding communities.

The dynamic nature of the Harbour body and the tacit, layered stories embedded within it are activated to strengthen the connections to the coast. A looped path, two ferry stops, and an annual event act together to make explicit the changing sea level and give equal access at three spatial-temporal scales: the Harbour, cultural characters, and the individual. The rising sea level, fluctuating intertidal zone and passage of time are emphasized, measured, and framed architecturally using grids and nodes to position and tell a story through a symbolic event. The thesis imagines the role of architecture as a mediator between perceived and constructed spatial-temporal changes in the landscape and actual change.

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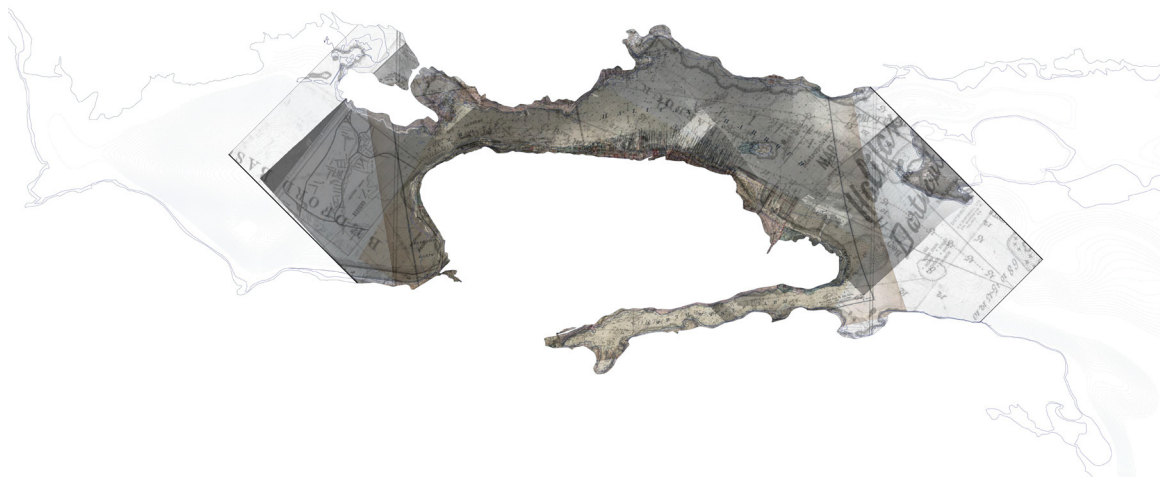
To Ross Henteleff, for everything he did to make the completion of this thesis possible, and sharing with me his knowledge of and love for the coast.

Chapter 1: Introduction

During pre-glacial times, the harbour was a river 120 metres lower than it is today. Variations in the bedrock shaped the region's topography, and glaciers carved out the narrow harbour. The body of water now known as the Bedford Basin over-deepened and became a lake. Thirteen thousand five hundred years ago, Mi'kmaq people followed caribou to the current location of the harbour narrows and the Basin. Between 9,000 and 4,000 years ago, the river that was to become the harbour eroded the topography, forming a system of up to ten lakes. The erosion rate diminished, and the water level at the harbour was 30 metres lower than today. The freshwater Basin was breached and joined the brackish Harbour (Natural Resources Canada 2010). A mere 270 years ago, the English colonized the harbour and thus began making large-scale modifications to the littoral zone. By the end of the 21st century, sea levels in Nova Scotia are expected to rise to 5 metres (Greenan et al. 2018, 381). This harbour, and any waterway, is in a constant state of evolution. Increased social awareness



View of the high water line in Halifax Harbour



The Harbour contains a multitude of hydrological and cultural stories within the uncertain bounds of sea level rise. A boundary of the flooded future delineates layered colonial maps (Nova Scotia Government 2021)



Under the Macdonald bridge, Dartmouth



Facing the shipyard, Halifax



Looking north to energy station, Dartmouth



Mackay Bridge and port, Halifax

can shift perspectives about our broader relationship to the environment and the harbour as a place.

A body of water reflects its surrounding culture, and it embodies changes over multiple scales of time. Awareness of these changes is imperative to understand the human role in the climate crisis. The North End, Tufts Cove, and Harbourview neighbourhoods of Halifax and Dartmouth have limited access to the water due to their locations adjacent to industrial and military areas. This lack of access to the water's edge has compounded historically. Colonialism, racism and eviction define the form of the harbour as settled areas expanded. It also speaks to embedded hierarchical relationships between these neighbourhoods concerning essentials such as fresh food, green space, places to gather and play. Bringing leisure, enjoyment and access to nature at the North Ends elevates these neighbourhoods, which settlers historically cast aside. The water's edge reflects a regional and social attitude for the function and separation of industry and the military, who continuously pushed out the nearby people. A large proportion of the people living in these communities, relative to the rest of the city, rely on public transit more often to get around (Statistics Canada 2019). While the water is often visible from their block, the coast is challenging to access with available means. The residents of any place are deserving of access to the natural forms that define their locale. Designers can aim toward environmental equity using spatial and programmatic means to bring more people to the water.

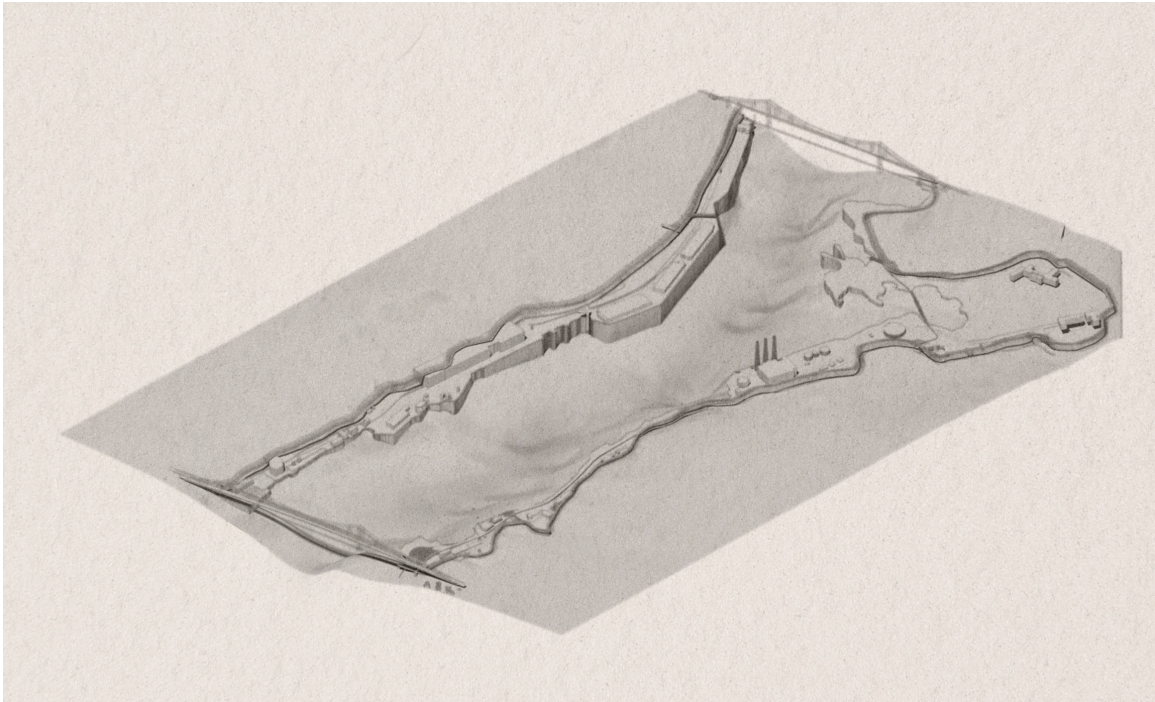
The natural harbour edge formed such that there is an elevation change and distinct separation between the North Harbour and its surrounding neighbourhoods, as there is between an audience and a stage. A path can leverage



North Harbour: Neighbourhood map (HRM 2021)

this form, activate the natural condition, link communities, and create widespread public access to and a view of the water. Elements of the harbour are reinterpreted as parts of a theatre: the water as a stage, the sloping littoral zone as seating, vertical landmarks as lighting, and prop scaffolding. Familiar coastal materials can be applied to create an elevated catwalk path, creating a metaphorical back of the theatre or enclosure of the commons for staging an event abutting a series of spaces to watch the event on the water and gather. These fractal theatres within the more extensive body reference former coastlines, connecting the history to the future.

In early Rome, the founding of towns was commemorated by acting out a dramatic show of their founding. The plan of the city guided the choreography of the event (Rykwert 1988, 29). The same concept was applied to the harbour, using the grid of the harbour and historical and current maps to determine the proposed path and its structure. The



North Harbour volume

event choreography was created to act out the formation and projected growth of the body of water. Layering was used both to analyze the form of the harbour and determine design action. Peter Eisenman's grid strategies from the *Cities of Artificial Excavation* were used to extract from a set of historical layers of the city (Corner and Hirsch 2014, 223). Grids were employed and generated from historical and current maps of the harbour, which were used to abstract the familiar, colonial form, foreground the body of water, the local relationship to it and its own historical and temporal forces, and design the structural form of the proposed path.

The human actors and history create a secondary narrative interpreted as a cast of characters based upon Kevin Lynch's *The Image of the City*. The characters were observed using Susan Buck-Morss's interpretation of the dialectical image matrix, with axes of waking and dreaming and transitory and petrified, to relate the character-defining elements of the harbour to the designer's perspective (Buck-Morss 1991, 211). Following the observation, Bunschoten's four processes of 'Erase,' 'Migrate,' 'Transform,' 'Originate' (CHORA and Bunschoten 2001, 135) were added to the design decision-making matrix to determine program and space at the locations of the characters. Layering is used together with this matrix, as Bernard Tschumi suggests a series of transformations to design the character of a space or program using devices and rules (Tschumi 1996, 154). Six transformations were added to the decision-making matrix to determine design steps at the locations of characters. Saskia de Wit outlines methods of framing the genius loci of a landscape through interventions at the room-scale. Her methods were applied to determine design interventions' spatial organization and materiality (De Wit 2014, 363).

The harbour form, through time, links directly to the path, its city connections, and its event seating to highlight hidden or overshadowed characteristics of the site. Kevin Lynch articulated four ways that the built environment displays change over time, which is registered and articulated in four ways within the built environment. Designing with time in mind can symbolically link one's journey through space to a broader journey across time. Lynch's four methods are temporal collage, episodic contrast, the direct display of change, and the patterning of long-range change (Lynch 1964, 163). These methods were applied at the scale of the individual perspective: ritual, chance, and event alongside de Wit's framing and the event's choreography to highlight the harbour body and the local relationship to it.

This waterway is constantly changing, but this change typically is outside the frame of view of most people in the North Ends of Halifax and Dartmouth. Closer, equitable access to the water, walking distance from nearby communities and usable by people with all abilities are imperative in increasing individual connection to the water; as sea levels rise, the proposal leverages three temporal scales: daily ritual, a chance encounter, and a yearly event. A looped path represents a daily ritual walk and the future coastline. Chance encounters are intersections between the path and the city. They are represented by follies, fieldworks, points of vertical and horizontal access, and two ferry stops that plug into the city's existing system. Finally, the event compresses historical and projected events that have taken or will take place on the harbour. These components work together to mediate between remembered and constructed changes in the landscape by reclaiming dominant infrastructures for a collective public.

Chapter 2: Stories in the Littoral Zone



Facing the narrows from
Halifax

The harbour contains multitudes: geological histories, Mi'kmaq settlements, European colonization and exploitation of the land, and the present looming reality of a climate crisis. The harbour's story includes acts performed within its shores, where the role of the water transitioned from the main actor to the backdrop over time. The state of natural water is like that of language and storytelling: turbulent, flowing and challenging to replicate precisely (Bachelard and Farrell 1983, 187). The landscape surrounding the harbour facilitates interaction: the narrows were known as "Een-tow-dimk" or "where you hollo" across the water (Whitehead 2003, 63); a World War I explosion took place at the exact location, resulting in part from inadequate communication between boats.

Earlier histories of the harbour include its beginning as a river, tributaries, and a set of lakes. Mi'kmaq people followed and lived on the shores of these waters and watched the freshwater river system grow into a saltwater harbour (Natural Resources Canada 2010). The recent colonization of the harbour brought the eviction and separation of Mi'kmaq people from their land, shipwrecks, blocked waterways, and construction waste (National Resources Canada 2010). Post-war immigration increased, and 'Halifax' was experiencing rapid growth. Governments inundated already-marginalized coastal communities of Africville and Turtle Grove with various forms of state-sanctioned violence, many of which are still in effect today (Waldron 2018, 84). Discrimination has compounded into the harbour's built form. As locals watch the sea level rise

from afar, it will be essential to contact and contend with history coalesced in the fluctuating water's edge.



Peggy's Cove, N.S.

While the harbour reflects and produces voices and sounds for people to relate to one another, it also facilitates self-reflection and strengthens the connection to a larger collective. Roni Horn tells tragic tales of the Thames River in the monologue "Saying Water," interspersed with interrogations: "when you talk about water, aren't you really talking about yourself?" (Horn 2013) and descriptions of the interconnectedness and continuity felt by people at the water: "in the company of water I feel in me the presence of things that exceed me" (Horn 2013). The human emotional drive to be as close as possible to the water is as old as humanity. The catharsis felt when nearby and in the water is no surprise; a closer bond to the water is closer to the events occurring over millions of years on the same terrain. Human bodies and bodies of water are part of a closed system that has cycled through since water existed on earth. Water and life are bound; cultures originated and flourished at the water's edge. The water we interact with has moved across many backdrops and through many bodies. Horn reads the water as not a mirror, but a container, heavy with the events it has witnessed: "when you look at the water you see what you think is your reflection, but it's not yours. You are a reflection of water" (Horn 2013). Horn's closing line summarizes the association people have with the water: they are drawn to it as a mysterious, dynamic, and ancient place that amplifies our internal experiences and emotions.



Plants at the water's edge,
LaHave, N.S.

Natural Topographic Changes

Glacial Time

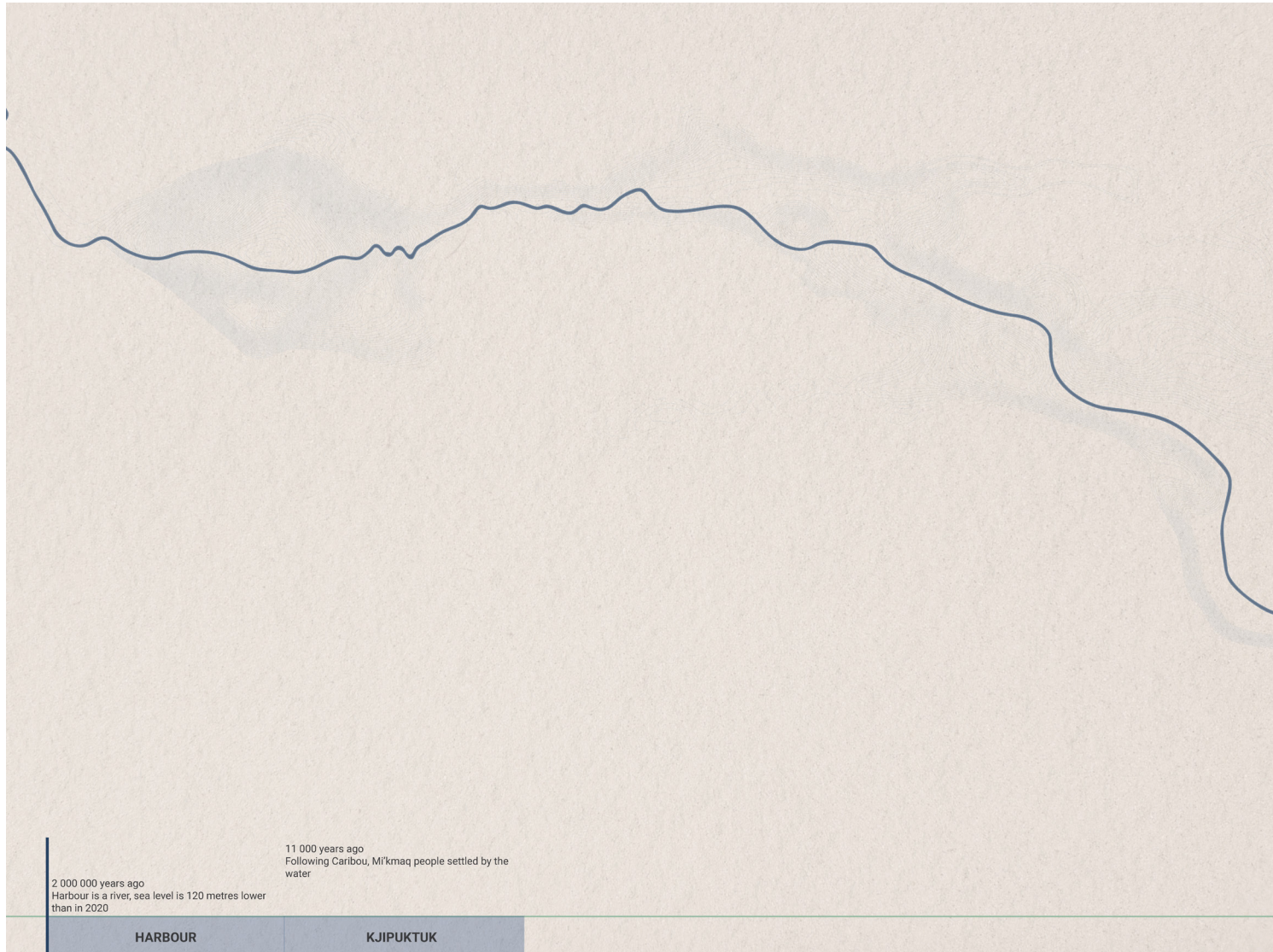
Long before the harbour was a busy port, it was a river. During pre-glacial times when sea level was 120 metres lower than today, it was the ancient Sackville River (Natural Resources Canada 2010).

Variations in the bedrock created the topography of Halifax, and glaciers carved out the narrow Harbour (Natural Resources Canada 2010). Seventy-five thousand years ago, clay deposits left behind by glaciers created the landmark drumlins in the city: colloquially Citadel Hill and Needham Hill. The body of water known as Asoqmapskiajk/Bedford Basin over-deepened and became a lake.

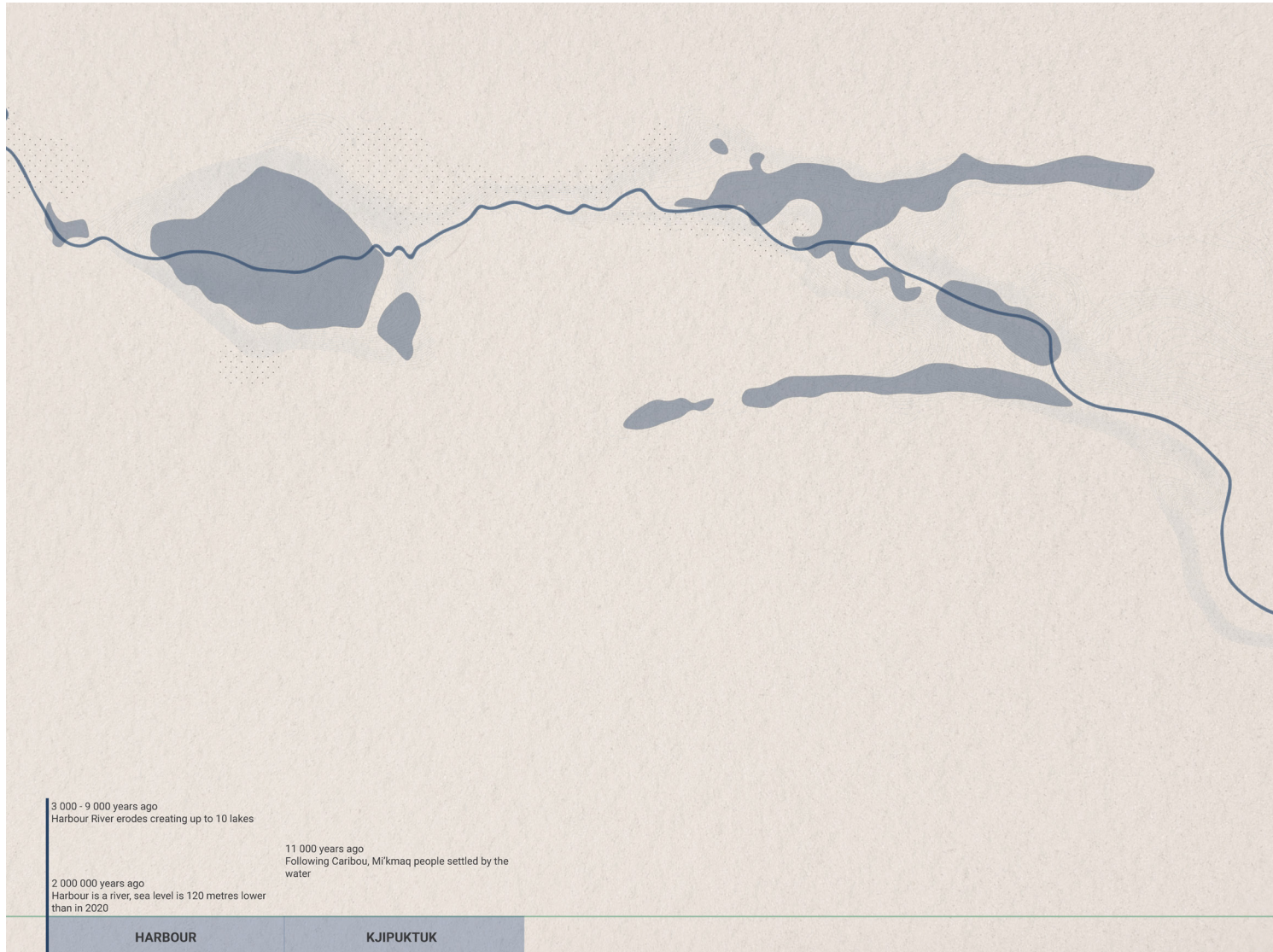
Mi'kma'ki

Thirteen thousand five hundred years ago, Mi'kmaq people followed caribou around the current locations of the harbour narrows and the Basin (McDonald 2016). A system of up to ten lakes when the sea level at the harbour was 30 metres lower than it is today (Natural Resources Canada 2010). Asoqmapskiajk, or Kjipuktuk, the Basin, was breached three thousand years ago and is no longer a freshwater lake. The breach probably would have drastically changed the Mi'kmaq way of life, as the massive bodies of water they used to live, celebrate, travel and fish on stopped freezing and housed different plant and animal life (Natural Resources Canada 2010).

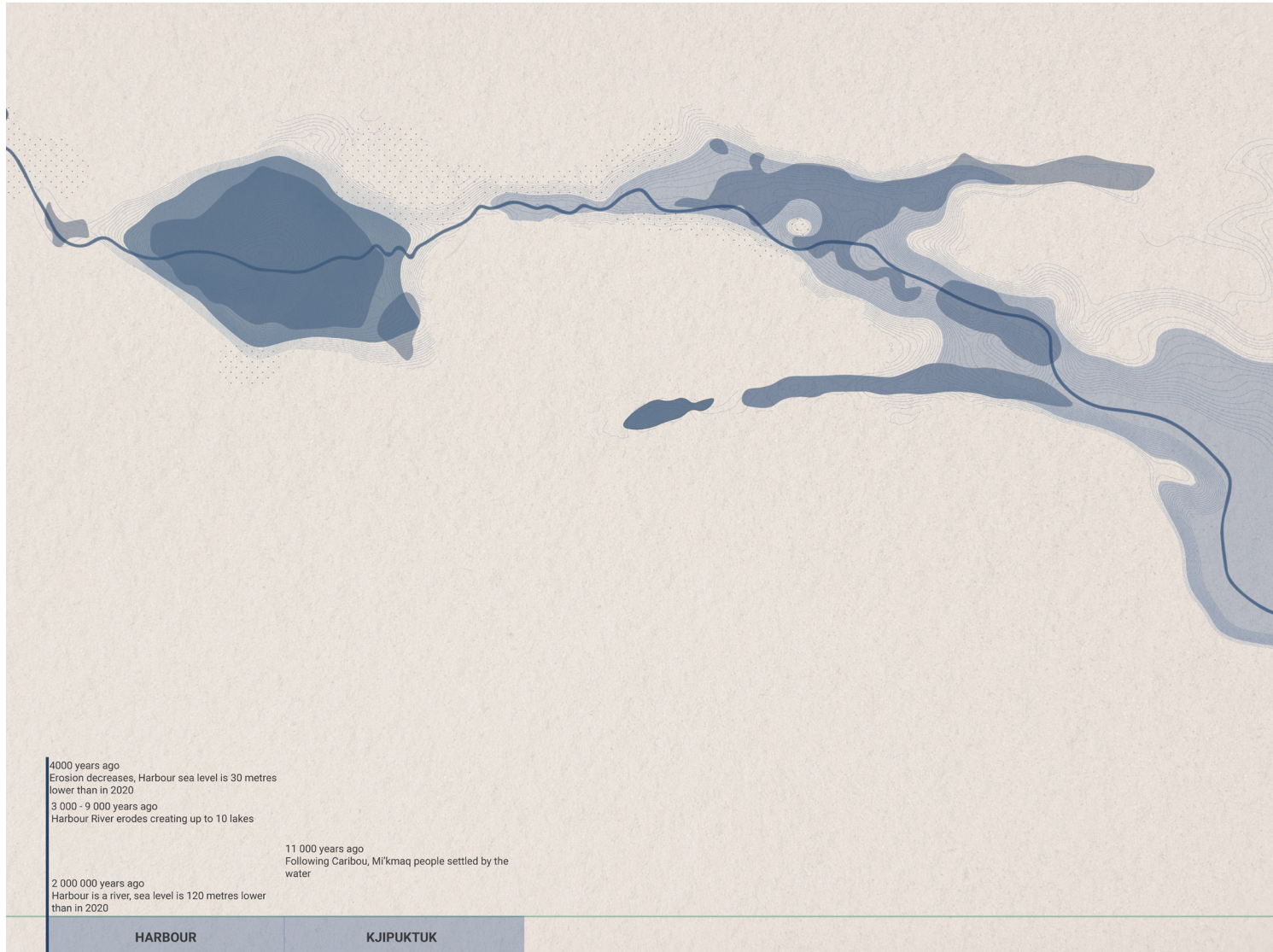
Occupation and storytelling fill sites with symbolic meanings that become their names. Areas within the harbour region had names that express natural conditions, local species, travel, and activity and describe myths, space, and



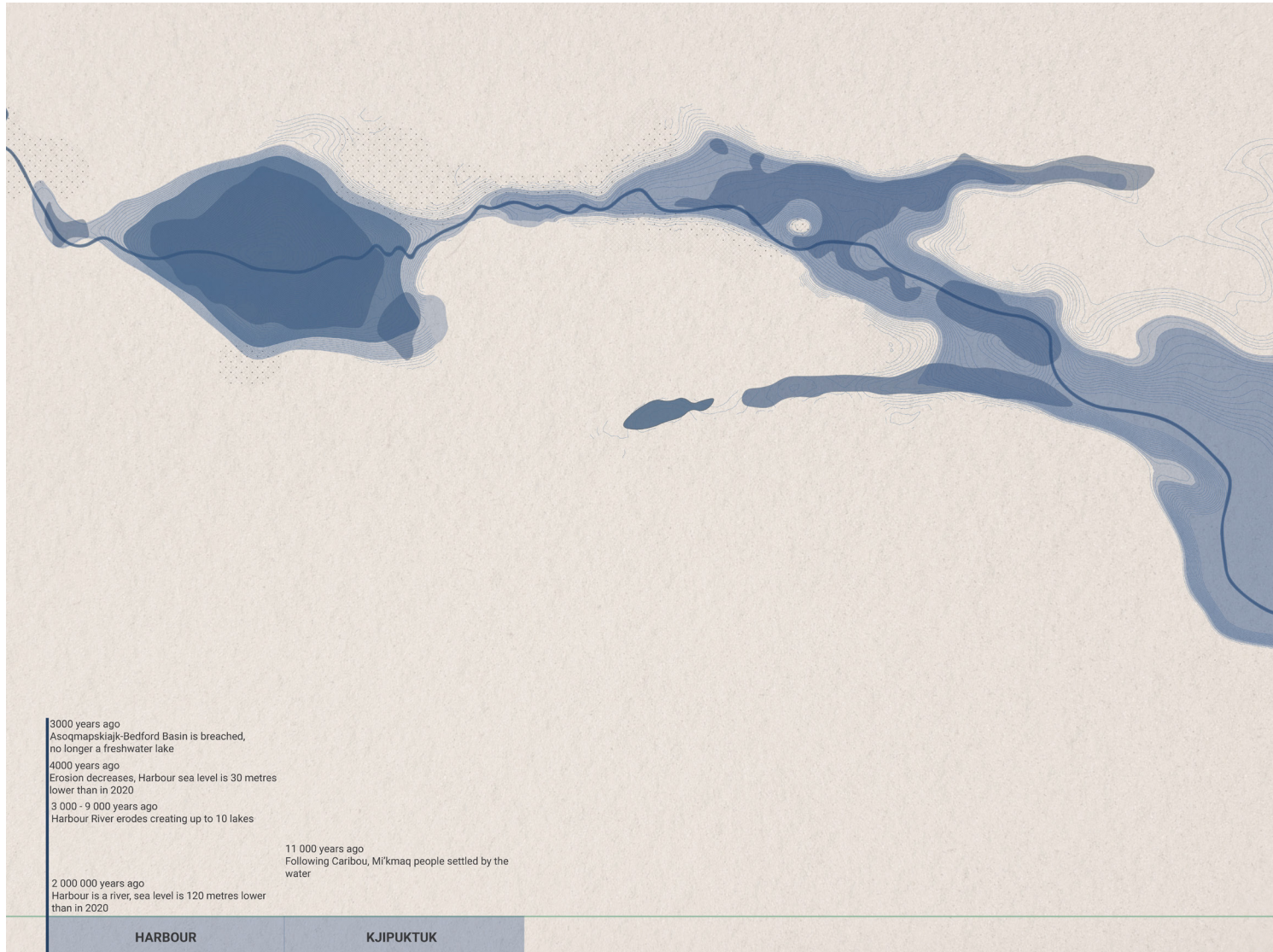
When Mi'kmaq people arrived, they saw a river. The surrounding bedrock allowed glaciers to erode it over time.



The river eroded, stringing together up to ten lakes that, combined, begin to look like the familiar harbour.



As a period of erosion decreased, the lake system became a hybrid, low-lying fresh and saltwater lagoon.



The last freshwater lake was breached at the narrows; ocean waves brought in new plants and animals.



Bridge above Kwe-bek,
montage

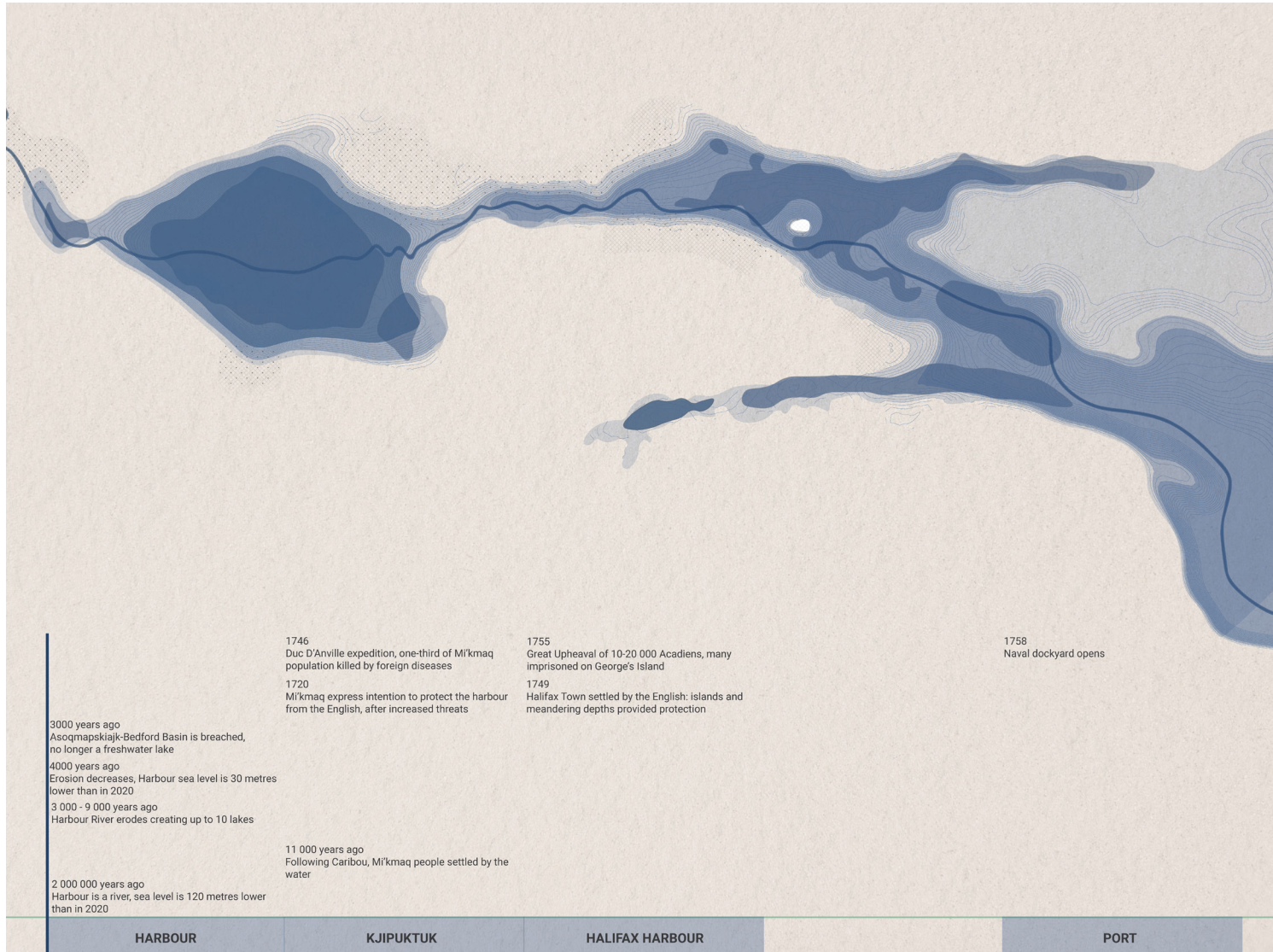
experience. Kwe-bek, according to Jerry Lonecloud, an expert in Mi'kmaq etymology, refers to the narrows, where the two sides of the harbour were one as part of a lagoon, and now are divided, as “where the river runs square into a bay” (Whitehead 2003, 61). This name demonstrates the changing water level throughout the time of the area’s inhabitation with the use of ‘river’ instead of ‘lake’ or ‘passage.’ The North End of the peninsula was known as “Een-tow-dimk,” meaning “where you hollo,” or shout across the harbour to invite others to traverse (Whitehead 2003, 63). The peninsula, now known as Halifax, a dense coniferous forest before colonization, was generally called “Gwo-ar-mik-took,” meaning “place of the great pines” (Whitehead 2003, 65). Surrounding Kwe-bek, nearby and south of Africville where freshwater creeks intersected with the Basin, was known as “Toom-gwol-ek-natch-way-a-ga-deetsh”; “the place where the Cranes [blue heron] hatches” (Whitehead 2003, 73). According to Lonecloud, there is no specific name for the harbour at large, but some sources use the term “Kjipuktuk” for this purpose and to describe Halifax (Roger Lewis, pers. comm.). The entrance to the harbour from the ocean, “big passage,” was known as ‘Dwid-don’ (Whitehead 2003, 65). When European settlers arrived in the 18th century, they took over the same bodies of water, erased their names, and limited the territory of Mi'kma'ki by forcing the people into colonial land divisions and institutions (McDonald 2016).



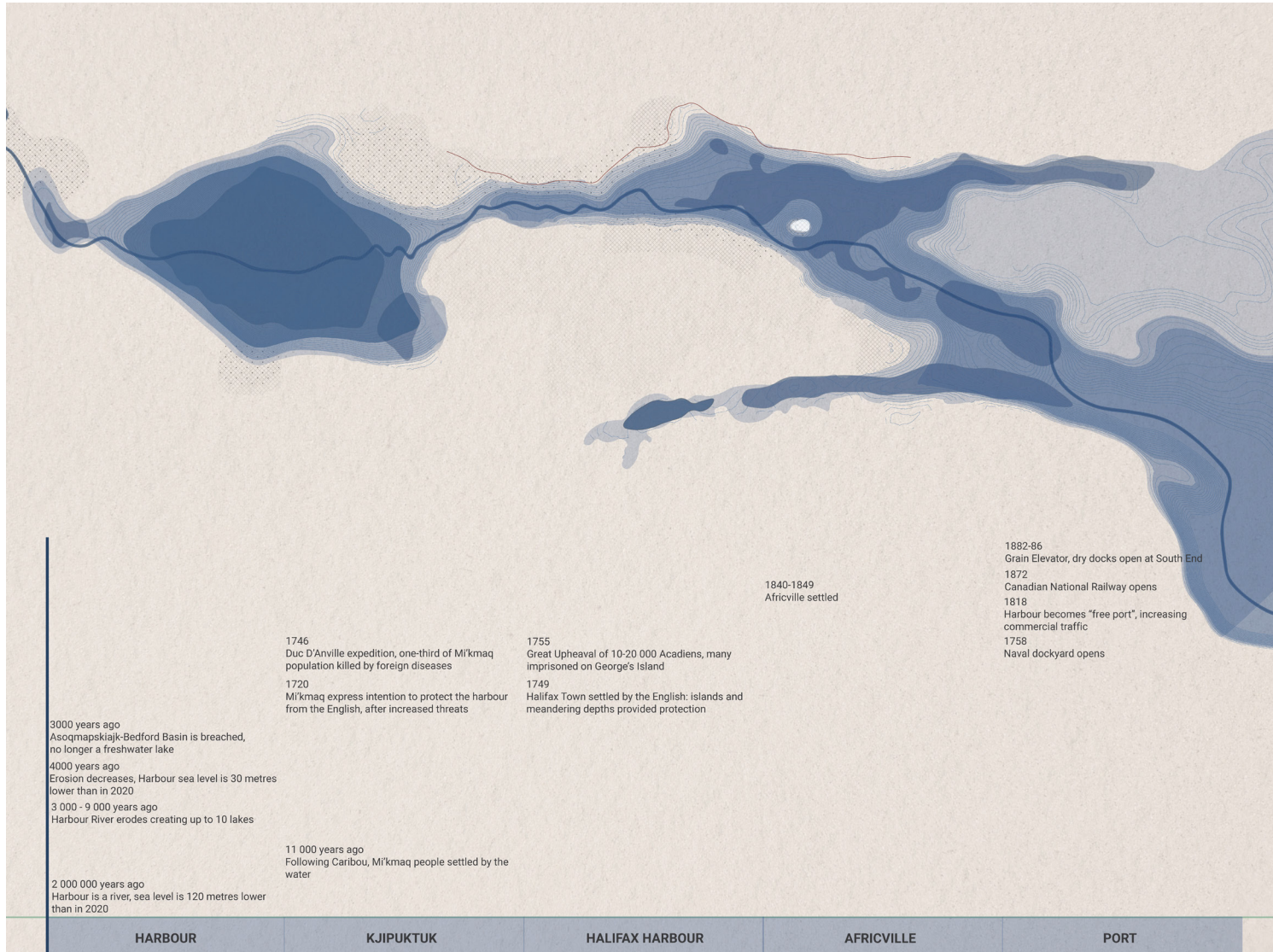
Dwid-don; entrance to the
harbour

The Harbour, Colonized

Just as coastlines are porous and permissive of life and growth, the narrowness of coastal zones means that space is at a premium, and that malleability also permits brutality and exertion of power. In 1720, the Mi'kmaq communicated their



Sea levels stabilized, and the English claimed the harbour and violently forced Mi'kmaq and Acadian people out of the area.



The English expanded the city toward the north and south, establishing the harbour as a port and naval hub.

drive to protect the harbour to the English via the Acadians. The English had invaded the harbour on multiple occasions after multiple threats of entry, but the Mi'kmaq people, who fished on the islands and both sides of the harbour, deterred them (McDonald 2016). The Duc D'Anville expedition was conducted in 1746 by the French as part of a plan to take Louisbourg, Cape Breton, back from the English. The French ship's crew recruited local Mi'kmaq people to support the expedition, which was a failure: disease fell over the ship's crew, and one-third of the Mi'kmaq population was killed (McDonald 2016). The area on the shores of Asoqmapskiajk, Che-boo-took, or the Basin, where the D'Anville ship docked, became known as "alusu'lue kaiik," or "at the place of measles" (Whitehead 2003, 67). Three years after the expedition, the English settled Halifax Town without Mi'kmaq consent. The harbour's depth and islands were attractive to the English and suited their motive to develop a naval base (McDonald 2016). They quickly took the harbour over, using George's Island to imprison Acadians before deportation, claiming the Sackville and Shubenacadie Rivers (Roger Lewis, pers. comm.), and opening the naval dockyard (Port of Halifax n.d.).

Navy and Port

Commercial port traffic and immigration increased in the early 1800s, which led to the expansion of settled areas on the waterway. Halifax solidified its status as an important port by the end of the century with the construction of the Canadian National Railway in 1872 and the South End grain elevator in 1886 (Port of Halifax n.d.). Maroons, Black refugees, and formerly enslaved people settled Africville in the 1840s at the peninsula's North End, on land undesirable to the English on the outer limits of the town (Nova Scotia

Archives n.d.). Throughout the 19th century, the English made multiple attempts to divide the province into reserves, forcing much of the Mi'kmaq population to less arable land (Lewis 2017).

Africville



View of Africville, Bedford Basin, train line (Brooks 1965b)

Located on the north tip of the peninsula, Africville was settled in the mid-1800s by Black refugees after the War of 1812. Some residents had fishing, farming, and commercial businesses by the end of the 19th century. The community paid municipal taxes but did not receive even the most essential benefits such as freshwater, sewage disposal, waste collection, recreational facilities, public transport, streetlights, and police protection (Waldron 2018, 84). A municipal plan was in place to demolish the community for industrial use by 1912. After the local government decided to rezone the city, they flippantly exerted their will to expel locals by building hazards close to Africville: a fertilizer plant, slaughterhouse, tar factory, stone and coal crushing plant, cotton factory, a prison, two infectious disease hospitals,



Map of Africville location at the peninsula's northern edge (HRM 2021). The city afflicted the community with precarious buildings like a prison and oil storage.

three systems of railway tracks, and an open-pit dump (Waldron 2018, 84). The rezoning resulted in the expulsion of Africville residents to rental housing elsewhere in the city and the razing of their homes. Halifax razed Africville between 1962 and 1970, but protests continue (Nova Scotia Archives n.d.).

Infrastructure

A World War I explosion, resulting from the collision of two vessels, took place at the narrows in 1917. The areas that received the brunt of the explosion were the North Ends of Halifax and Dartmouth. The communities at Africville and Turtle Grove received no assistance after the disaster, and by 1917 plans were already in place to expel both communities in favour of further developing the city in Halifax's interests. In Turtle Grove, the explosion displaced the community to other areas of the province (Lewis 2017). The area known as Mulgrave Park, close to Africville, was developed as war housing (Nova Scotia Archives n.d.).

Eleven years after the explosion, Pier 21 opened at the South End, which would receive over 1 million immigrants to the country over 43 years (Port of Halifax n.d.). After the second world war and increased immigration, the city developed more of the land. The Macdonald Bridge was built over the naval yard in 1955 (Port of Halifax n.d.).

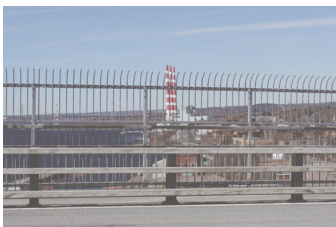
Tufts Cove energy plant was first constructed in 1965 and was modified over the following years (Port of Halifax n.d.). The MacKay Bridge was built over Africville and the narrows in 1970, and the Cogswell Street interchange, a highway system that links the downtown area to the north of the peninsula, was built that same year (Port of Halifax n.d.). The South End container terminal opened in 1969, and the North



View looking west toward Halifax from site of Turtle Grove



View looking south of naval infilling, from the Macdonald Bridge



View looking north toward Tufts Cove energy station from Macdonald Bridge



South End container terminal, facing the outer harbour



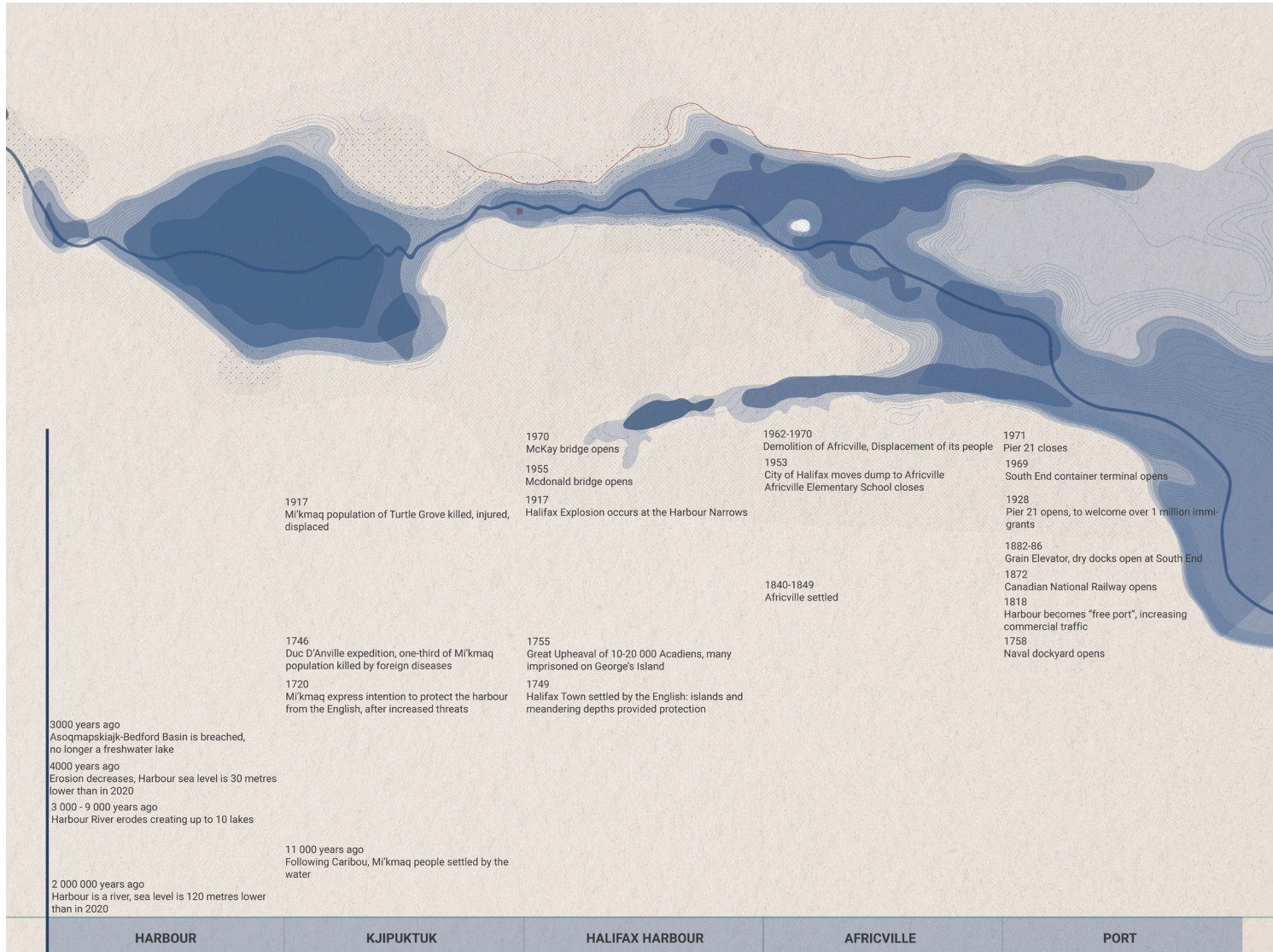
South from Macdonald Bridge: Harbour at left; naval buildings; parking lot; pedestrian path; Barrington St leading to Cogswell St Interchange

End container terminal opened in 1981 (Port of Halifax n.d.). Both of these projects involved the infilling of the harbour, which drastically changed the city's coastline. Together, the ports, the naval yard, the railway, and the highway system become an impenetrable barrier between residential areas of Halifax and the water's edge. The city expanded from the populous South End northward to steep, rocky, less desirable land. The infrastructure and programming along the coastline, a product of that growth, are for industrial and military labour and do little or nothing to provide coastal leisure and amenities for North End residents.

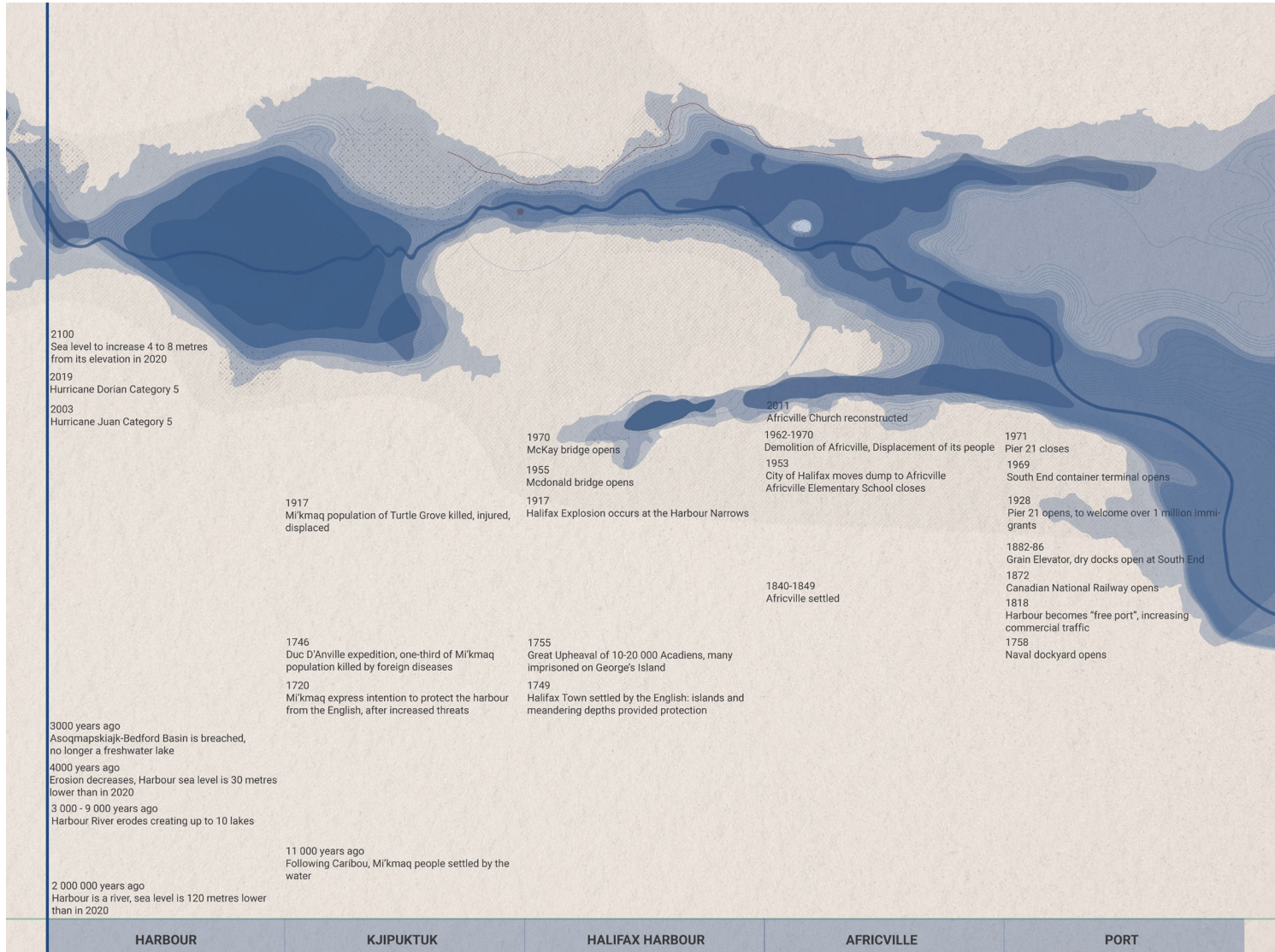
Present Day

The North Ends of Halifax and Dartmouth, enclosed by bridges, mirror one another. The Harbour form deprives the inhabitants of each side of the opportunity to reach the water on foot, faced with obstacles, intermittently in Dartmouth and consistently in Halifax. Many people living in these areas rely on public transit to get around (Statistics Canada 2019), in contrast to the South End of the peninsula, which contains more significant swaths of relatively accessible, highly commercialized, and artificially infilled waterfront. In the North Ends, the two sides speak to one another – the area is characterized by Africville and Shannon Park at the north and then the port and Tufts Cove energy station. The edge conditions contain the histories of what occurred there.

Through layering existing physical, past, and projected images of past events along the existing edge, and the future edge, strategies can be derived, resulting in shifted perspectives of the harbour. A network of interventions can act as a measuring device for tracking the ever-in-flux edge. Adjacent to the energy station, the water can be accessed,



An explosion at the narrows and increased immigration led to the destruction of the Turtle Grove and Africville communities.



Generational increase in storms will lead to coastal infrastructure damage and a higher sea level.



SS Daisy: a boat lodged in the shoreline below the Macdonald Bridge



Barnacles mark the high water line on a pier

on the Dartmouth side, by a tunnel of brush that opens up to infilled land and the railway. The Halifax side of the water is currently inaccessible. A border was created at Grove Street when the English colonized. A shipwreck is under the bridge. These tacit histories can be translated into form to serve an educational purpose – looking back and forward, opportunities for play, dialogue, and introspection. The history of a place is not necessarily tied to locations but flows and traces of movement: natural rhythms made spatial by social, rigorous practice: the human and ecological histories are inextricably linked.

The Harbour's Future

Sea levels are expected to rise between 1 and 5 metres by 2100 (Greenan et al. 2018, 381). This is exacerbated by the fact that the land in Nova Scotia is subsiding. High-intensity storms and flooding will happen more frequently, and coastal erosion will accelerate due to its exposure to the Atlantic Ocean (Greenan et al. 2018, 382). In Halifax, coastal public space, such as the waterfront, infrastructure such as the railroad, and industry such as the north and south ports, are at risk (McClearn 2018). Port infrastructure will need to move or adjust to floods, and the city is adjusting slowly to the idea of constructing protections to its valuable waterfront infrastructure (McClearn 2018).

Matthew Gandy has written about London's flooded future (Gandy 2014, 187). Recent global increases in flooding have revealed the vulnerability of modern cities to extreme climatic events. Inundations at the Thames would endanger London's city centre and the British economy if the city's flood defences were to fail. A significant breach may be followed by repeated floods and result in large-scale



Fallen trees after Hurricane Dorian, Halifax



Flood Waters of River Epte
(Monet 1896)

abandonment of the urban landscape. Gandy says that the Thames would return to a broader floodplain (Gandy 2014, 189). Hundreds of years after widespread emigration, few traces of London would be left. Flash flooding is an event exacerbated by surface water runoff, the paving of the city for parking, and the increased use of cheaper, impenetrable landscaping solutions. Impervious topography inevitably leads to vulnerability (Gandy 2014, 190). Options for London are a large-scale intervention or restoration at the mouth of Thames estuary or designation of some area for flooding where development cannot occur. Gandy criticizes the emergent interest in floodplain restoration due to its reflection on a distantly past image of the meaning of a river and the projection of this no-longer-existent riverbank onto a very different looking future (Gandy 2014, 199). He says that the Thames estuary is often depicted as an in-between space, stigmatized and associated with dirt, danger and disorder (Gandy 2014, 200). These preconceptions are dangerous, as they can serve as a basis for which complete erasure and redevelopment can be justified. According to Gandy, the construction of a new floodplain should acknowledge the hybridity of the urban landscape (Gandy 2014, 207). Solutions for flooding need not be painted in a dystopian light: he points to art projects such as Squint/Opera's "Flooded London" that visualize London at a higher water level and its inhabitants taking the opportunity to reinvent and explore the flooded urban landscape with resilience (Gandy 2014, 208).



End of sidewalk on Barrington Street; ship building at left



Looking south toward the water from behind Tufts Cove energy station

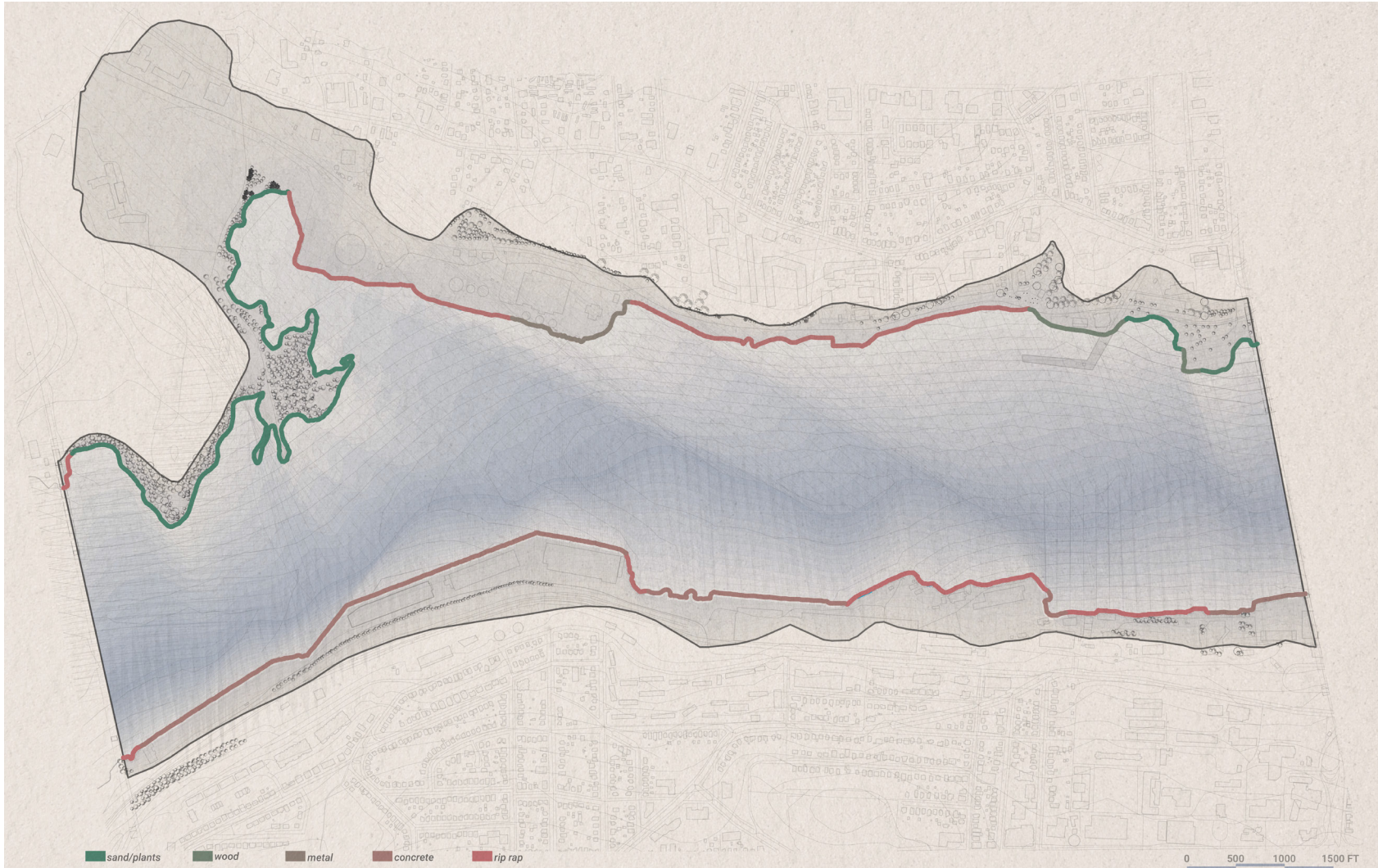
Urban Form

Access

The North End neighbourhoods of Halifax and Dartmouth have limited access to the water due to their being situated adjacent to industrial and military areas. These industrial zones are comprised of points, lines, and fields: edifices, roads, parking lots and working zones. The working character of the North Ends is conspicuous and defines the visitor's experience moving around the harbour. The north half of the peninsula and its mirror image in Dartmouth vary significantly in character but are unpleasant to move around on foot. The lack of water access at the North Ends casts aside these neighbourhoods, reinforcing historical socioeconomic bias. A large proportion of the people living in these North Ends, relative to the rest of the city, rely on public transit to get around (Statistics Canada 2019). The main thoroughfares provide spotty water visibility and access to disconnected sidewalks, active railroads, or informal desire pathways between the two bridges. This anti-pedestrian condition contrasts to the South End of the peninsula, which contains more significant swaths of relatively accessible parks and artificially infilled commercial and industrial waterfront. Military interests have infilled or fenced off historically natural conditions, such as creeks. While built features often block a view or access to the water, their proximity to it carries the symbolism of this body of water by its height or representation of coast-adjacent programs such as the navy. The massive scale of the bridges, for example, further precludes comfortable walkability. The size of these infrastructural, industrial, and military structures is spectacular; however, the scale can only be taken advantage of when paired with paths or access points at the human scale. The space underneath the



Map of Halifax and Dartmouth (HRM 2021) within 15 minutes of the water on foot. Pedestrian access is precluded by private naval and commercial sites, with most direct passage to the water limited to the South End.



The North Harbour water's edge materials describe the area's programmatic use. Port, railroads, and bridges are next to concrete and rip rap. The energy station and shipbuilding building use metal edges. Wood and plants appear at the most publicly accessible areas. (HRM 2021)



Under the Macdonald Bridge, montage

bridges is unique: the sound of traffic and the road directly above one's head create a sense of vertical compression, emphasizing horizontal expansiveness, forcing one to pay close attention to the nearby shore. The ground below the Macdonald Bridge is overgrown with thorny brush, and the only access path is steep and made of loose gravel that shifts and floods after rain. Human-scale interventions and a more comprehensive approach can bring this space to life.

Coastline as Commons



People at Peggy's Cove, N.S.

The residents of any place are deserving of access to the natural forms that define their locale. A body of water reflects its surrounding culture, and it embodies changes over multiple scales of time. As Charles Moore describes in *Water and Architecture*, all ports and harbours share that human access is brought as close as possible to the water's edge, regardless of their size or location (Moore and Lidz 1999, 160). Architecture is a medium that negotiates connections and separations between people and the water, communicating sensory clues through forms and materials (Moore and Lidz 1999, 200). This manifests in docks, piers, moored ships, sloped grounds, or rocky shores. These media are the physical symbols of the relationship between people and the water.



People seated at the end of a pier, Halifax

Inequitable access to the water is not open access. One method of bringing people closer to nature is increased outdoor recreational space. A park, when carefully located and designed, can bring attraction to a neighbourhood. Parks are not a singular solution that can be applied everywhere, especially along a coast with varied surroundings. They must accommodate and reflect their diverse social and economic groups who are within reach. Jane Jacobs broke



Prospect Park, Brooklyn
(Jowers 1980)



Enclosure and intricacy
in the Prospect Park plan
(Olmsted 1870)



Washington Square Park,
New York (Hall 1900)

down four elements necessary to a park used as a “public yard”: intricacy, centring, sun, enclosure (Jacobs 1961, 101-106).

- Intricacy: a variety of reasons to visit; suitable for various activities with diverse topography, landscape features, focal points. For example, Prospect Park, New York.
- Centring: a focal point, crossing, centre, stage, arena. For example, Washington Square Park.
- Sun: surrounding structures shape light and shadow within the park.
- Enclosure: surrounding buildings around a park turn it into a room in the city.

City parks “mean nothing divorced from the tangible uses and hence they mean nothing divorced from the tangible effects on them – for good or for ill – of the city districts and uses touching them” (Jacobs 1961, 111). Parks can enhance the experience of a neighbourhood when the scale and programme respect the surroundings.

According to Matthew Gandy, in the late 1920s in Weimar Berlin, urban access to and integration with nature and the water was becoming necessary as the city expanded toward the surrounding woods and lakes. Berlin had become increasingly disconnected from the water as a sphere of work, transport, and leisure; bodies of water lost their functional roles to railways, roads, new industry but had not yet developed a new relationship with the city (Gandy 2014, 62). Urban building commissioners such as Martin Wagner sought to make people aware of the connection between people and nature by making that physical connection



Intersecting water management and leisure at Kinderdijk, Netherlands

openly accessible, like the Bauhaus concept of removing ornament to make explicit the connections between objects and society (Gandy 2014, 59). Wagner's perspective was that work, leisure, and urban space should be integrated, and he advocated for new ways of investing in the city, such as worker-owned and controlled housing. His view was that the rationalization of the city should bring the rationalization of happiness, space and time so that less time would be spent at work, and more time could be spent in the city and nature (Gandy 2014, 55-75). A new intersection of the city with modern, large-scale infrastructure and engineering projects deepens and diversifies the relationship between people and the water.

Inequity on the Harbour

The North Harbour littoral zone is compounded with layered historical shifts in infrastructure, settlement, and embedded power dynamics and biases. The North Harbour's topography was disrupted by infilling: the imposition of an artificial edge not harmonious with the natural flow of fresh water and ocean wave action. Infrastructure reinforces the disconnection between natural conditions and imposed settler interests, linking industry to itself while blocking communities from the water. The harbour's edge thickened as Halifax prioritized the expansion of the port and the military, casting aside the North End communities of Africville and Turtle Grove. The Harbour composition is defined by exploitation, colonialism, racism and eviction. Environmental racism refers to a disproportionate concentration of polluters situated near communities of colour and the working poor (The ENRICH Project n.d.). The ENRICH (Environmental Noxiousness, Racial Inequalities and Community Health) project, led and founded by Dr. Ingrid Waldron of Dalhousie University's

Faculty of Health, sought to examine and address the effects of environmental racism across African Nova Scotian and Mi'kmaq communities through advocacy, community-based research and engagement, publications, policy analysis and legislation (The ENRICH Project n.d.). Systemic change at all levels of government is needed to address these issues. Within and surrounding the area of focus in the harbour, there are two glaring, prolonged cases of environmental racism: Turtle Grove/Tufts Cove, where naval property and a quarry were built, contributing to the expulsion of the Mi'kmaq who lived and fished in the area; and Africville, a Black community where toxic facilities were built by the city, and essential services like roads and sewage disposal were not. Environmental equity describes a situation where no group or community is made to bear a disproportionate share of harmful environmental effects of pollution and noise (Gobert 2019), a goal that can be aimed toward using spatial and programmatic means, like bringing access to the water and coast-adjacent activities to communities. The ENRICH map layers locations of toxic industries, their range of effect, with locations of Mi'kmaq and African Nova Scotian communities around the province (The ENRICH Project n.d.). Many instances across the province where Mi'kmaq and African Nova Scotian populations are located near polluters such as waste disposal facilities, thermal energy facilities, and mills (The ENRICH Project n.d.). There are two such current overlaps around the Halifax Harbour: African Nova Scotian communities in Mulgrave Park and the downtown Dartmouth area within 4 kilometres from Tufts Cove energy station (The ENRICH Project n.d.). In addition to Tufts Cove, these areas suffer from noise pollution from

highways, railroads, and industry. These are also barriers that prevent North End dwellers from accessing the water.

Africville and Turtle Grove were on the outer boundaries of the city, and as Halifax expanded, it encroached on their land with increased pressure. Africville is the result of the racist erasure of a community by the city of Halifax that began in the 1960s, and its effects are still felt today. Before the settlement of Halifax town by the English, Turtle Grove was an area used by Mi'kmaq people in warmer months to access the harbour for travel, celebrations, and fishing. However, colonial land division projected false barriers on Mi'kma'ki, relegating people to disconnected communities, forcing assimilation, and limiting travel and water access to the locations Mi'kmaq people frequented for 13 500 years (Roger Lewis, pers. comm.).



A sign advising people to boil water from a well; in the background, people approach a train (Brooks 1965a).



Eddie Carvery's five-decade long, ongoing protest

Africville was first settled in the 1840s and was demolished in the 1960s. Though part of Halifax, the community received no water, sewage disposal, police, or education services that the rest of the city benefitted from (Nova Scotia Archives n.d.). The Canadian National Railway ran through the community. The city dump was moved directly adjacent to it in 1953, the same year that the Africville Elementary School closed. As part of an “urban renewal” effort in the 1960s, the city of Halifax forced the population of Africville to relocate to public housing, and their land was razed (Nova Scotia Archives n.d.). In the 1980s, a public dog park was constructed on Africville land. In 2011, their church was reconstructed, and a museum within it (Nova Scotia Archives n.d.). In 2019, the belongings of Eddie Carvery, who has been protesting this community erasure since it began, were bulldozed by the city (Chiu 2019).

At present-day Tufts Cove sits the pipeline terminus, an energy plant with three red smokestacks, a railroad that runs along the harbour front, a neighbourhood of modest size, and the MacKay Bridge. Before these character-defining elements sprouted up, the area looked different – a Mi'kmaq population lived between the Sackville and Shubenacadie Rivers. When the English arrived, they encroached on the vast Mi'kmaq territory at both rivers (Lewis 2017). Early in their Harbour settlement, the English cut off their territory to the current junction of Grove Street and the Harbour, where a military building is now (McDonald 2016). The Halifax explosion decimated what was left of Turtle Grove, and the community received no support from the city of Halifax.

The current Halifax harbour water's edge reflects a regional preference for industry and the military. It has forced out the people who live nearby, driving the public waterfront area to be densely crowded and unpleasant. Public and widespread access to the water is limited, leading to a lack of connectivity and a sense of apathy towards the coastline, a place that naturally attracts people. If access to water is possible and within view, it should be open, to improve the quality of life for the people in these communities. Environmental racism and exclusion are conditions that are related to this regional industrial preference. A landscape is intertwined with social processes and enables spatial violence to occur (Waldron 2018, 57-8). The level of access to the water is a statement and reflection of values. Henri Lefebvre has described the elemental class struggle, where the production of natural space, water, air, and earth has become more prevalent as these elements become scarce. Elements had no economic value but have since entered the domain of wealth (Lefebvre and Nicholson-Smith 1991, 329). This condition

describes the current lack of access to the water's edge, where populations settled coastal areas and were pushed out by the population in power. The expansion and infilling of the littoral zone and prioritizing of industry, military, and infrastructure mean that, ironically, areas that people work prevent them from enjoying where they live.

Chapter 3: Theory and Methods

The harbour is formed such that there is an elevation difference between surrounding communities and the water. The North Harbour's edge was infilled to benefit industry and the military at the disadvantage of existing communities. As a result, private interests and infrastructure dominate the edge, creating a barrier of access and visibility along, and from both sides of, the North Harbour's surrounding neighbourhoods.

At the scale of the North Harbour, the body of water and its stories are first interpreted as elements of theatre: stage, script, and a cast of characters. The form of the harbour landscape becomes the stage on which the script, or harbour history, plays out as choreography in an event. The characters are prominent elements or symbols that define the experience of moving around the Harbour or less visible stories that contributed to the formation of the harbour body.

At the site scale, a walking survey and overview of the history and future of the harbour determined the characters. They are traced, reinterpreted, distorted, and amplified to generate programs and space. Characters are framed and highlighted over the stages of the event. Kevin Lynch's imageability of the city served as a starting point to uncover a cast of characters. The non-visible histories of the harbour were revealed through layered maps and appended to that cast. Walter Benjamin's dialectic image, used as a means for the designer to relate to one's environment, combined with Raoul Bunschoten's four processes, intended to bring about the visible expression of urban phenomena in that environment, and Bernard Tschumi's layered transformations, meant to generate space and program

responsive to the existing conditions, become the design decision-making matrix.

A set of grids was generated to interact with the layers of the complex, storied harbour landscape. The grids utilized the harbour's environmental and cultural harbour bodies and histories and were based, in part, upon Peter Eisenman's layered grid method. At the scale of inhabitation, characters representing the environmental and cultural stories are highlighted and framed, articulating the genius loci discussed by Saskia de Wit. The architecture and the event test Kevin Lynch's methods of representing, framing and emphasizing change over time.

Interpreting

Harbour as Stage

The current Harbour composition is formed such that there is a distinct separation between people, neighbourhoods, and the water, like between an audience and a stage. This can be flipped to be a desirable quality to democratize access to the harbour. It is essential that regions in a city house a central, accessible space for public gathering, organization, and performance for a sense of unity and shared growth.

Harbours, by their definition, are located at the edges of islands or continents (Moore and Lidz 1999, 59). Places that include water also carry their history and symbolism, which plays a role in strengthening the connections between people, water and nature (Moore and Lidz 1999, 199). The nature of the edge condition defines how people build in that area. For example, Lisbon and Venice have their central piazzas situated next to the water, with buildings on three sides and the ground gradually sloping to the water on the



Pozzuoli Amphitheatre
(Sommer n.d.)



Acropolis Theatre (Bacon
n.d.)



Sloped ground and port



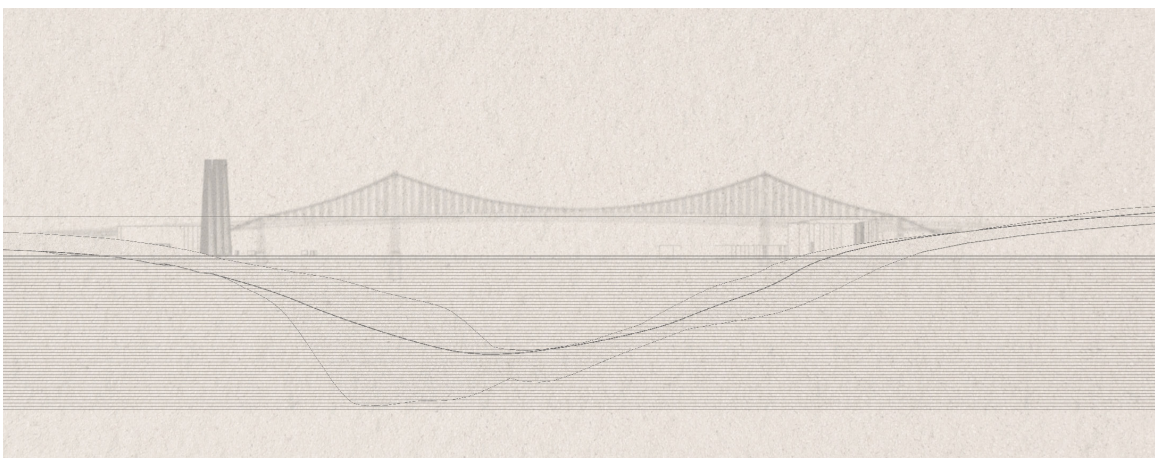
Harbour looking north



Sloped ground and Barrington Street

fourth side. Nova Scotian shorelines are dotted with timber finger piers and hardy foliage sitting on seaweed-coated granite, boldly protruding into the rough Atlantic water. Other coastlines are comprised of gradually sloping salt marshes next to sandy beaches. However, in the built-up harbour, the edges are built of rubble and metal retaining walls to support artificially infilled industrial land. A greater connection can enhance the sense of a collective between familiar coastal forms (rocky piers and marshes) and the familiar harbour form (stage and spectator).

The harbour can be interpreted as a massive black box theatre with some additional elements: both stage and audience are flexibly arranged, and entrances and exits are adjustable. To lean into this metaphor, some requirements of converting a natural space into a theatre are the stage, sightlines, seating, a catwalk, sound attenuation, backstage area and loading (Parker, Wolf and Block 2003, 8-18). A stage format can frame the environment, bringing the expansiveness of the water to the human scale. “It is one of the most important aspects of the human relationship to the sea – to be able to confront its eternity within the context of the limited” (Moore and Lidz 1999, 159).



Section at North Harbour facing south, showing water body and sloping topography

Harbour as Script

The Harbour history can be expressed in a limited way with fixed architecture, but the bounds are fewer when stories are interpreted and performed by people moving on a stage. An event that leverages the harbour landscape as a stage represents the temporality of the water.

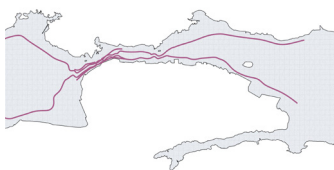
In early Rome, the founding of towns was commemorated in recurring festivals, where monuments marked the axes of the town and anchored the ritual to the terrain, roads, and buildings (Rykwert 1988, 29). The founding of Rome began before recorded history and had uncertain beginnings, so the history of Rome begins with the foundations of the built environment (Rykwert 1988, 31). Commemoration events were performed so that all inhabitants were aware of the relationship between the city plan and its history (Rykwert 1988, 64). Military camps also borrowed and miniaturized the city plan, another act of performance (Rykwert 1988, 64). The steps of the founding procedure were: (1) acting out of a dramatic show of the creation of the world, (2) manifestation of the story in the plan of the settlements, edifices, and institutions, (3) alignment of structural grid to “universal axes,” (4) foundation acted out regularly with festivals, and monuments (Rykwert 1988, 194). A similar approach to signify the beginnings of the harbour can be performed by tracing pivotal moments in the formation of the harbour and acting those out at a 1:1 scale.



Act 1: Old River



Act 2: Lakes

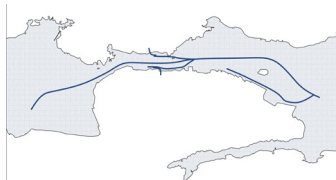


Act 3: Harbour breach

The harbour history was divided into 9 acts representing eras of its form and surrounding activities: Old River, Lakes, Harbour breach, Dispersion, Military occupation, Settlement and port activity, Halifax Explosion, Infrastructure and development, and Sea level rise.



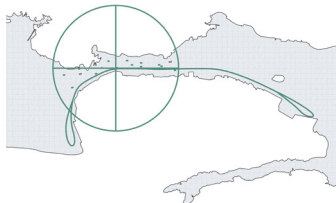
Act 4: Dispersion



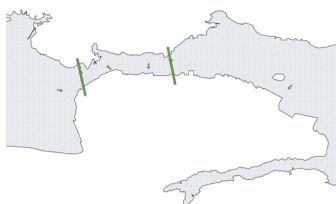
Act 5: Military occupation



Act 6: Settlement and port activity



Act 7: Halifax Explosion



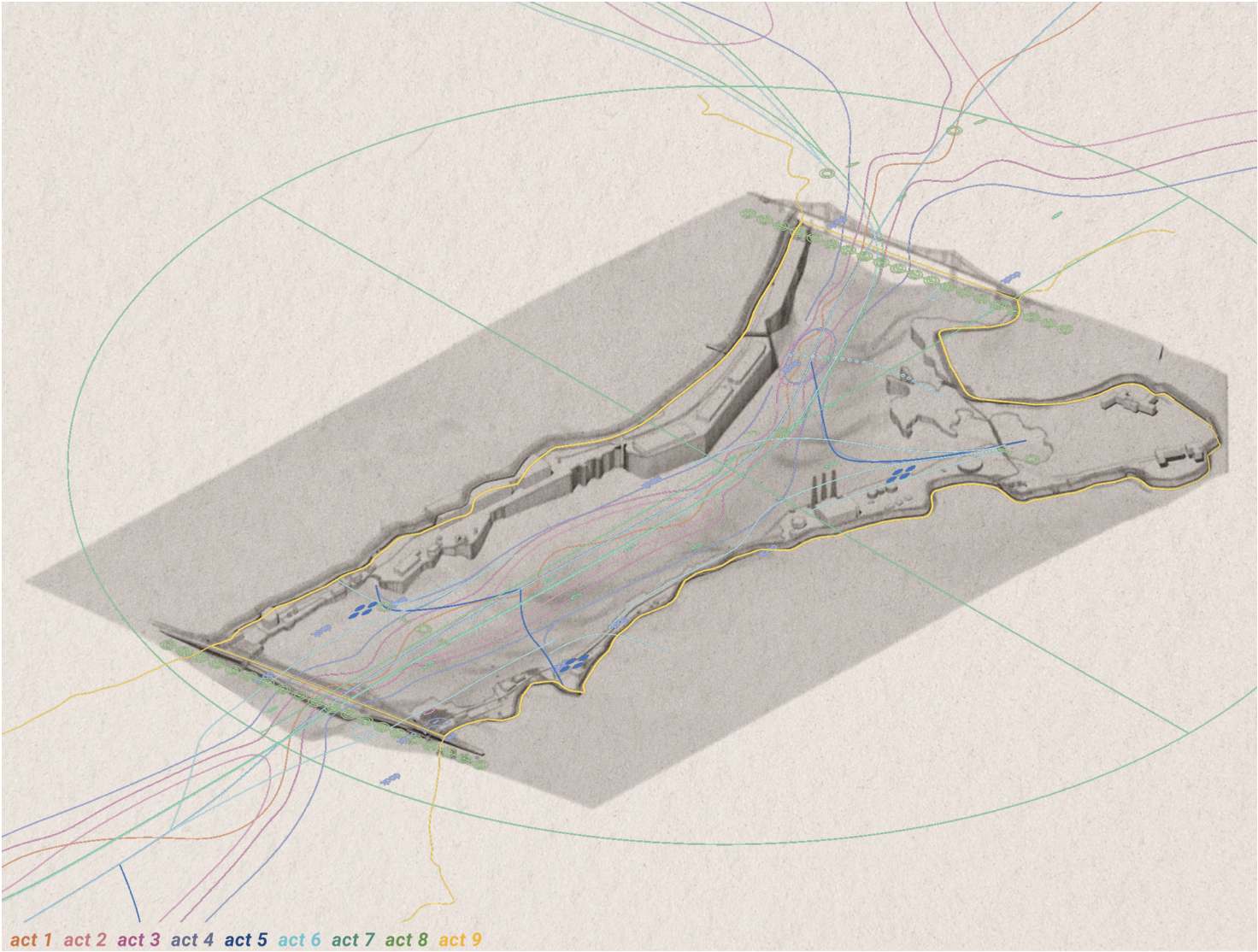
Act 8: Infrastructure and development



Act 9: Sea level rise

The passage of time is amplified in this performance, as the events representing two million years take shape over 12 hours. Boats, symbolizing the level and type of human activity, rhythmically move along the paths of former coastlines, tracing the historical “water’s edge.” In the final act, the viewers of the event join the cast as actors as they stand on the illuminated future coastline.

The meaning of any situation or performance in architecture is dependent on the relationship between space, event, and movement (Tschumi 1996, 162-163). These concepts were developed to critique architecture by Bernard Tschumi, who defined an event as an incident, occurrence, particular item in a program, even a singular use. Events contain insular logic and momentum (Tschumi 1994, xxi). Sequences or frames within an event can be chronological, linear, and temporal. A linear order of frames, or acts within the event, builds cumulative memory of previous scenes so that the meaning of the finale has maximum impact on the viewers (Tschumi 1994, 10-11). In the act of this thesis, the event is the acting out of historical and future events on the harbour. In the performance of a play, the event is the story and the dynamic between viewer and character. In the founding of Rome ceremonies, the event is the narrative being taught and followed and the corresponding festivals. Movement is defined as the action or process, or manner of moving. Movement cannot be prescribed, and the unpredictability of movement should be considered (Tschumi 1994, xxi). Movement in the context of this thesis is the water and the environmental and cultural forces acting upon it. In the performance of a play, the movement consists of the flows, vectors and collisions that occur by and between players. In the founding of Rome ceremonies, movement is the



Layering the future and former coastlines results in a set of vectors for performers to follow.

choreography of people and structures representing the narrative along the universal city axes.

Space is defined as form, a social construct, or a two-dimensional projection of bounds. Space contains insular logic as well. Physical, tangible transformations can be used to modify space (Tschumi 1994, xxi). This is discussed in the section "Layering Transformations." This thesis defines space as the catwalk path and seating below, the littoral zone determined by sea-level rise and historical boundaries, and the water. In the performance of a play, space is the stage and the theatre. In the founding of Rome, space is the city settlements and structures activated by the projected universal grids put in place for the ceremony. Kijipuktuk/Halifax harbour's colonial history is told through monuments and events throughout the city and the year. A commemorative event can be performed and modified that spatially acts out and performs the Harbour growth from its inception to a projected future.

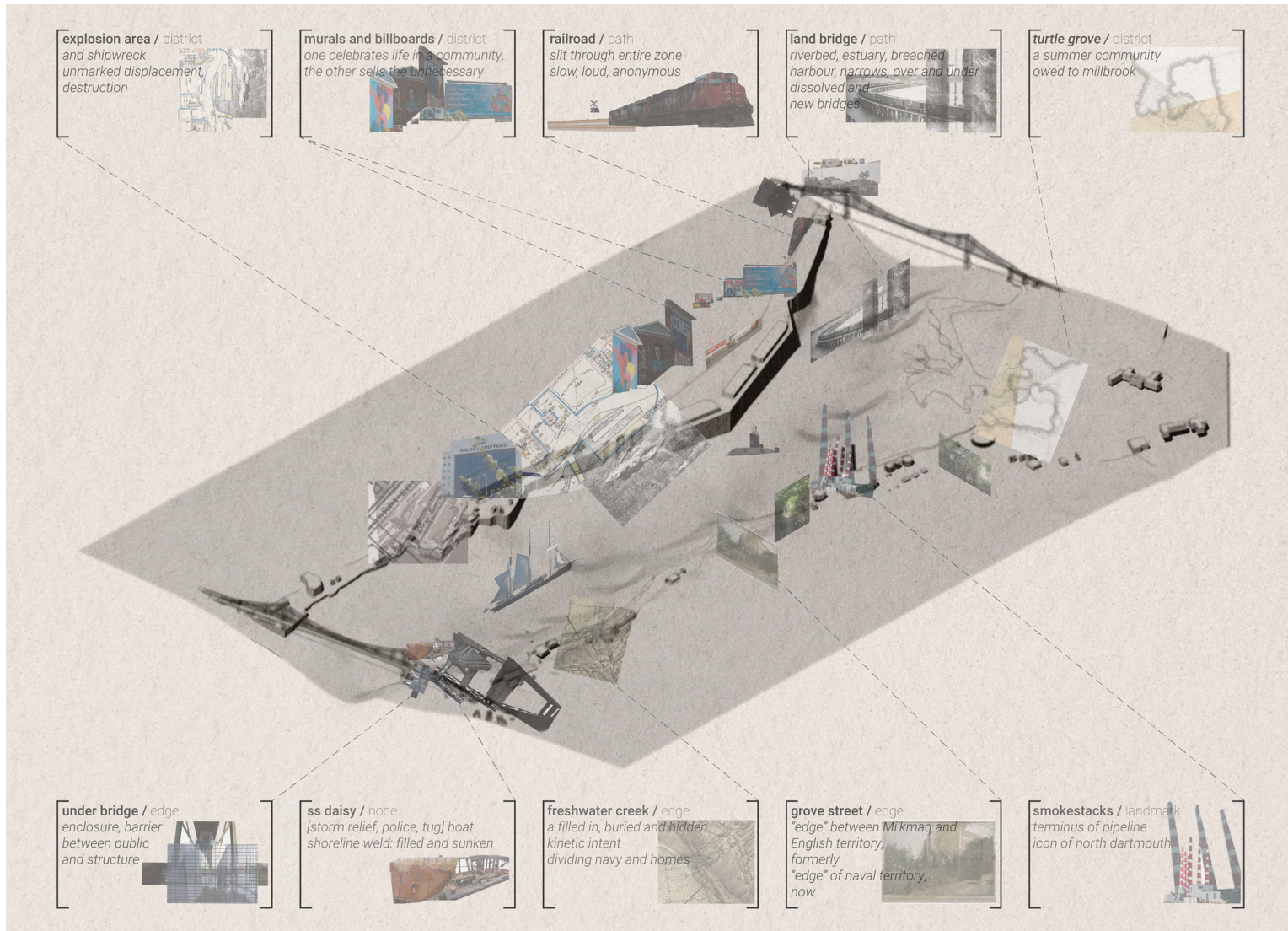
Harbour as a Cast of Characters

Observation

A walking survey of the harbour revealed physical elements or points of reference that strengthen a visual connection to the water by their location or content. These elements define the experience and character of moving around the harbour as close to the water as possible at a walking pace. The harbour landscape was evaluated in terms of imageability, which resulted in a set of characters. Kevin Lynch describes the imageability of a cityscape as a feature in a building, city, or object which evokes a strong image in any given observer. Imageability enables the creation of recognizable, structured, useful mental images of the environment (Lynch

1964, 46). An image is a guiding symbol, a wayfinding point for inhabitants moving around urban space. Elements in the city that contribute to its legibility include paths, edges, districts, nodes, and landmarks (Lynch 1964, 46).

Paths are channels along which people move and view the city. Examples on the Harbour are main roads, such as Windmill Road and Barrington Street, railroads, and footpaths that meander between rail and road. Edges are linear elements and not paths: boundaries, divisions in continuity, and organizing features, such as the water's edge and wooded or planted areas dividing industrial and public space. Districts are sections of the city with some typical character, identifiable within the district (but not always outside it). The North Harbour has two zones on each side of the water, and they are defined by the programme of buildings in the littoral zone. Naval buildings and houses are at the south, a modest scale except for the shipyard. The land is steep on the Halifax side, and the slope of the ground is gentler on the Dartmouth side. Toward the north of the North Harbour is more open space and larger structures, like the energy station, oil drums, and port warehouses. The ground on the Halifax side is steeper than in the south and has more plant life. The Dartmouth side has an abundance of greenery, and the topography is shallower than on the south side. Nodes are points, strategic spots, junctions, convergences, or concentrations of activity related directly to paths. Nodes on the Harbour are the points of entry to the bridge, which define the four corners of the North Harbour zone. Landmarks are points of reference but viewed externally, clues of identity and structure, for example, the energy station, the bridges, the shipyard, and the sun.



Combining hidden and visible characters yields a montage of inhabitation on the Harbour.

In addition to visual characters, there are other less visible characters, such as the locations of former boundaries or the former programme of a site. They are recorded in historical maps and written and oral histories of the harbour, as perceived and written landscape. Since these characters and stories are less tangible, they are more open to individual interpretation. Combining hidden and visible characters yields a montage of human inhabitation on the harbour.

Susan Buck-Morss's explanation of Benjamin's Dialectic Image, as a "way of seeing," is used to understand, relate to and decode the vast array of visible and invisible conditions along the harbour. Susan Buck-Morss sketched a matrix diagram to visualize the dialectical image, waking/dreaming on the Y-axis and transitory/petrified on the X-axis (Buck-Morss 1991, 211). The origin of the axis is Benjamin's dialectical image, the commodity, or in this case, it is the littoral zone. Buck-Morss defines the four quadrants as follows (Buck-Morss 1991, 211):

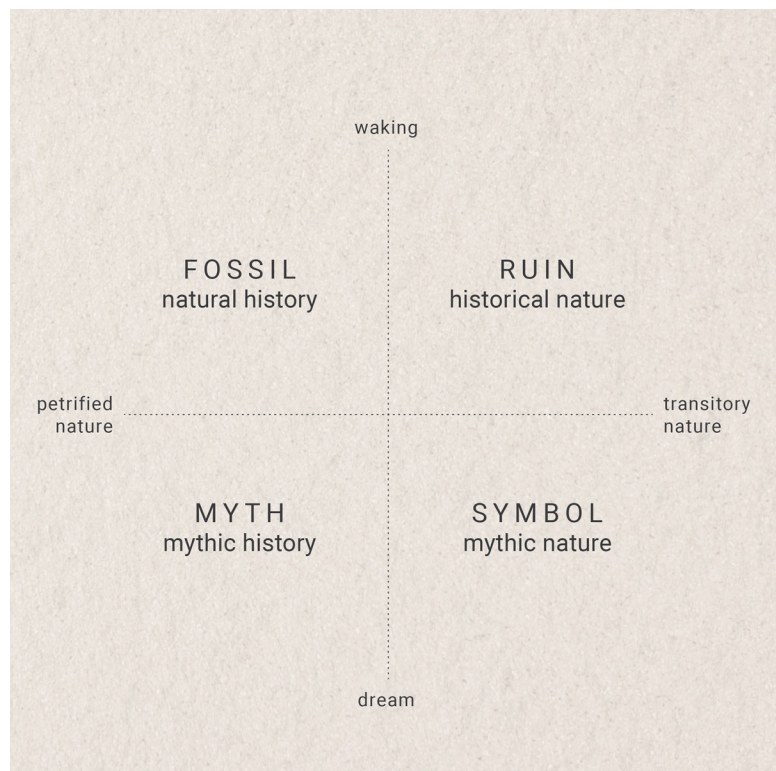
- Natural History: the imprint of objects left in their casings
- Mythic history: an arrested history, a phantasmagoria
- Mythic nature: transitory, dream form of potential
- Historical nature: form in which past visions of the future exist, as building blocks for the future

The matrix is reinterpreted to unpack and sort the mix of characters present in the harbour zone. The four quadrants become:

- Natural History: the linear ecological and cultural composition and traces of the site

- Mythic history: invisible, nonlinear elements, existing sometime in the past
- Mythic nature: invisible, existing sometime in the future
- Historical nature: the kinetic present, carrying the potential for future change

The dialectical image works between waking and dreaming; a threshold in which this project operates: the particular and uncertain; linear and nonlinear; past, present, and future landscape conditions. Others can duplicate this method of interpretation without getting any of the same results. The interpretation of a character, image, symbol or condition is not contained in itself but the relationships between it and the observers (Lipton 2016, 75). The dialectical image



Each field in the matrix describes an aspect of the appearance of the origin point (Buck-Morss 1991, 211); in this case, the harbour.

matrix, and the matrix format in general, is a lens to filter the various seen and unseen site conditions, with a range of interests often at odds with one another and convert that into design action.

Action

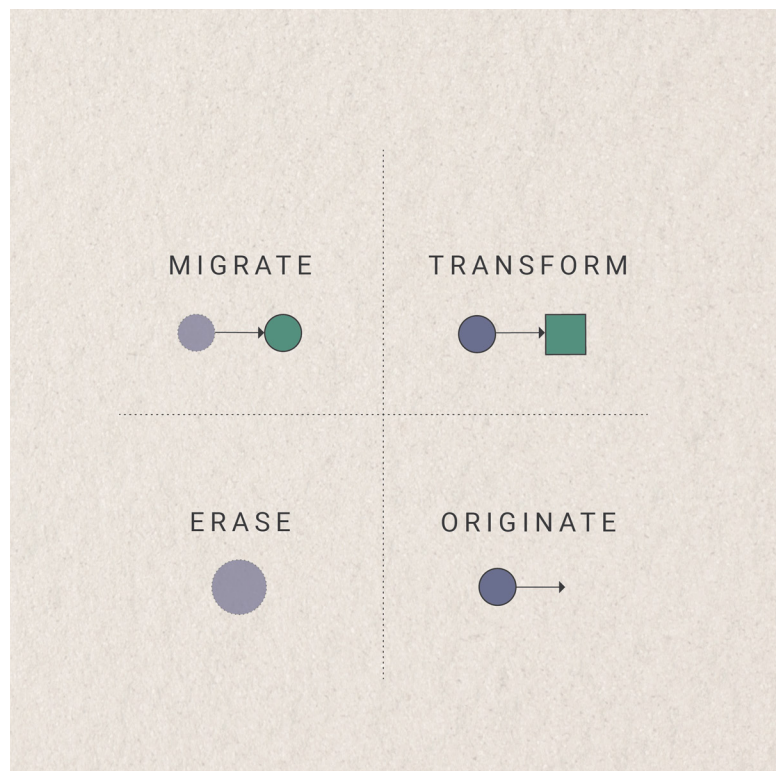
The dialectical image matrix filters observation and facilitates the relationships between viewers and symbols. Raoul Bunschoten's four processes are used in a matrix to convert observations into design actions and directions, allowing the viewer-symbol relationship to be retained in a design process. Bunschoten employs the concept of proto-urban conditions and a set of four processes to understand a large site with many participants and forces acting on it. Bunschoten defines proto-urban conditions as potentially productive situations in a site/city: they are like emotions (CHORA and Bunschoten 1999, 35). Proto-urban conditions form a metaphorical space in the city and deserve to be expressed physically. In order to work with proto-urban conditions, they need to be made visible (Corner and Hirsch 2014, 224). Bunschoten does this by graphically mapping them and determining the intentions of the different actors and participants. A "gameboard" is set up not to predetermine the outcome but to mediate social interaction, negotiation, association. On such a large scale, Corner describes urban design as less about spatial composition and more about orchestrating or choreographing the various conditions at play in the environment to activate one another (Corner and Hirsch 2014, 224). Bunschoten uses the four processes of "Migrate," "Transform," "Erase," "Originate" to encourage criticism, suggestion and the diagramming and filtration of emergent phenomena (CHORA and Bunschoten 1999, 28):



Contributing interests in an urban-scale gameboard (CHORA and Bunschoten 1999, 245)

- Migrate: moving things from one point to another; things that leave and do not return, sometimes leaving traces behind.
- Transform: continuous change between two states, change with beginning and end.
- Erase: removing, making space
- Originate: the point at which something begins, the basis for reaction

Bunschoten's action methods complement the dialectical image matrix and add a design-oriented trajectory. Benjamin and Bunschoten's methods were selected to address the characters of the site and the scales of time at play. They were combined to generate a program or building form or gesture from the reading of the site, with a framework that could be



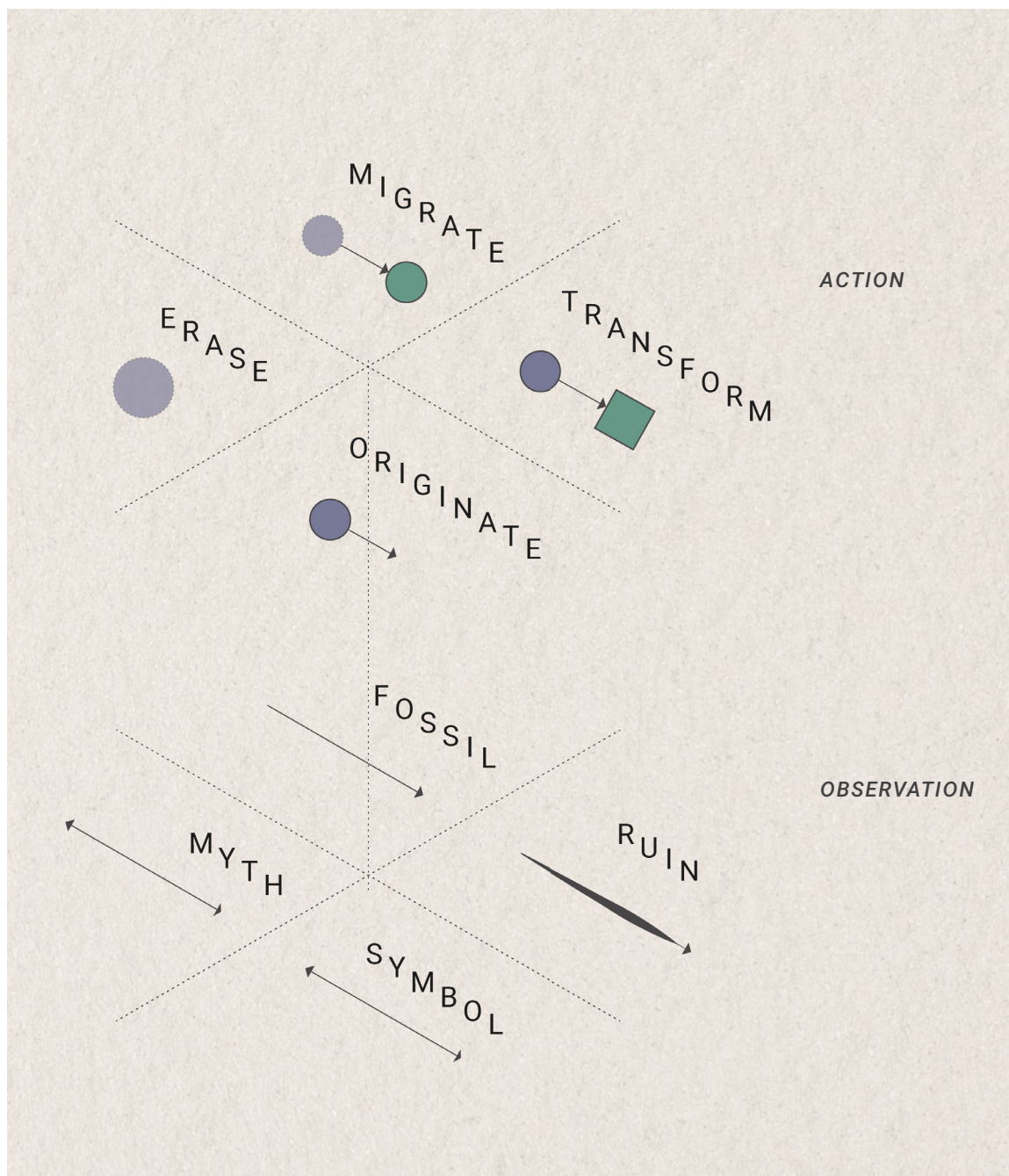
Four processes spark and parse out design action for large, complex sites.

applied elsewhere, as the matrices allow for a multiplicity of interpretations and actions. The four quadrants of the dialectical image and four processes were diagrammed to harmonize with one another. Migrate, Transform, Erase, and Originate were arranged into a matrix and overlaid with Benjamin's dialectic matrix. Each character was read and placed in a quadrant of the dialectic matrix. The dialectic matrix is the designer/observer's present evaluation. Future action is determined by projecting onto the four processes matrix.

A site of this scale requires synthesizing both a range of interests and programmes and incorporating the histories of the place to back that up. The land formation of the harbour led to its interpretation as a stage. The historical layers of the body of water and surrounding littoral zone created a performance sequence, and the existing landmarks, through the observation-action matrix, led to an architectural vector to follow. These methods combine with layering and framing to advance the architecture, rooting it in the site form.

Layering

Layering is a method of design and analysis defined by James Corner as the "superimposition of various independent layers one upon the other to produce a heterogeneous and 'thickened' surface" (Corner and Hirsch 2014, 219). Within each layer is an organizing system that varies depending on the contents of the layer, such as program or circulation. When combined, layering is a multiplication; any hierarchy within individual layers is blurred. This structural obstruction allows relationships to be drawn between layers of the composite: "unlike the clear order of the compositional plan, the layering of independently structured conditions leads to



Observation and action matrices, layered.



Layered maps of the harbour show how the perception and occupation of the water's edge has shifted over time.

a mosaic-like field of multiple orders” (Corner and Hirsch 2014, 219). Layering draws connections between historical and projected harbour futures. It extracts the underlying characters, landmarks, or geometry of the harbour and, like the observation-action matrix, has space for a gamut of interpretations and thus a range of spatial and programmatic responses.

Two layering methods were used. Bernard Tschumi’s layering of transformations was appended to the observation-action matrix from the previous section, and Peter Eisenman’s layering of grids was used to abstract and analyze the harbour body for the proposed architecture. Tschumi employed layers in the proposal for the Parc de la Villette competition in 1983. The process of layering during design, Tschumi says, results in a series of transformations (Corner and Hirsch 2014, 219). Individual layers are expressions of the site’s complexity and program. Together, through layering and transforming the resultant composite of layers, internal logic is derived that can be overlaid on the site, resulting in an architectural response directly related to the existing site (Corner and Hirsch 2014, 219). By layering, Tschumi sought to deconstruct the present conditions by critically analyzing the historical layers that precede it, even adding other layers derived from elsewhere (Tschumi 1987, 12). Layering searches for an abstract system to mediate between the site and given constraint and some other concept beyond city or program (Tschumi 1987, 12). Tschumi’s idea of using a set of transformations as a framework to design was used in this project by assigning design moves to the observation-action matrix. This results in a link between the initial observation of the site, the design process, and the result.

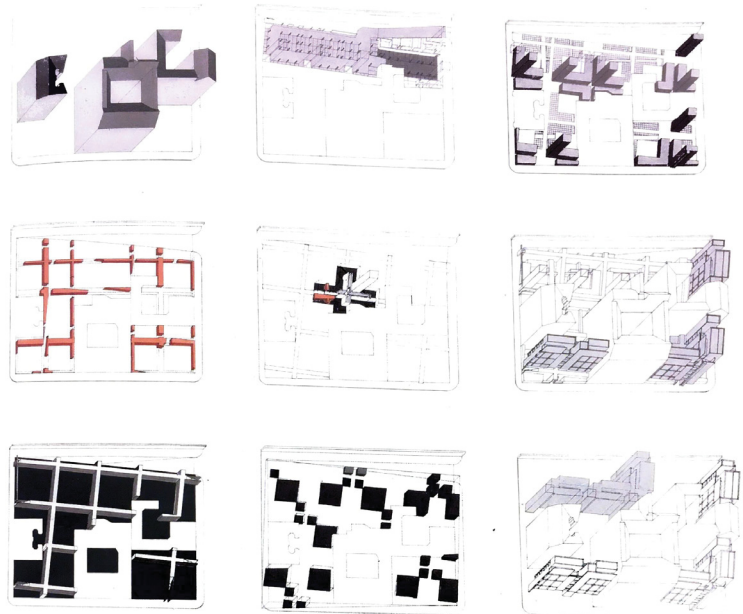
Another filter through which the design form moves is a layered composite of grids. Grids were drawn from the harbour's existing and projected conditions based on the regional relationship with the water. Individual grids relate to cultural, hydrological and temporal conditions. Designed elements utilize the grids that they resonate with most strongly. Peter Eisenman employs the concept of layering with the effect that no layer received precedence over another so that intersections between layers are not prescribed and can be interpreted subjectively (Corner and Hirsch 2014, 223). How the project narrative is assembled, the relating or registering one thing to another "constructs a radically new fiction out of old facts" (Corner and Hirsch 2014, 223). In *Cities of Artificial Excavation* by Eisenman, several significant historical moments were found while documenting a site in Berlin. These were identified and drawn as discrete shapes: each figure became a layer, modified according to the sequence of transformations. Unlike Tschumi, Eisenman's layers are less intended to accommodate various changing activities than to produce new formal arrangements (Corner and Hirsch 2014, 219). In both cases, traditional notions of centring, bounding, and imparting meaning are omitted to favour a pluralized view of the project over time (Corner and Hirsch 2014, 222). Instead, transformations are used, such as displacement, reduction, enlargement, inversion, and tracing, to remove a fixed or preconceived reading of the site. The tracing and reinterpretation of the site are intended to produce an abstract figure of the existing conditions to remove any of the designer's predeterminations. Through mapping, layering, and transforming, Eisenman argues that a project can evolve a future form from specific local histories (Corner and Hirsch 2014, 223).

Narratives

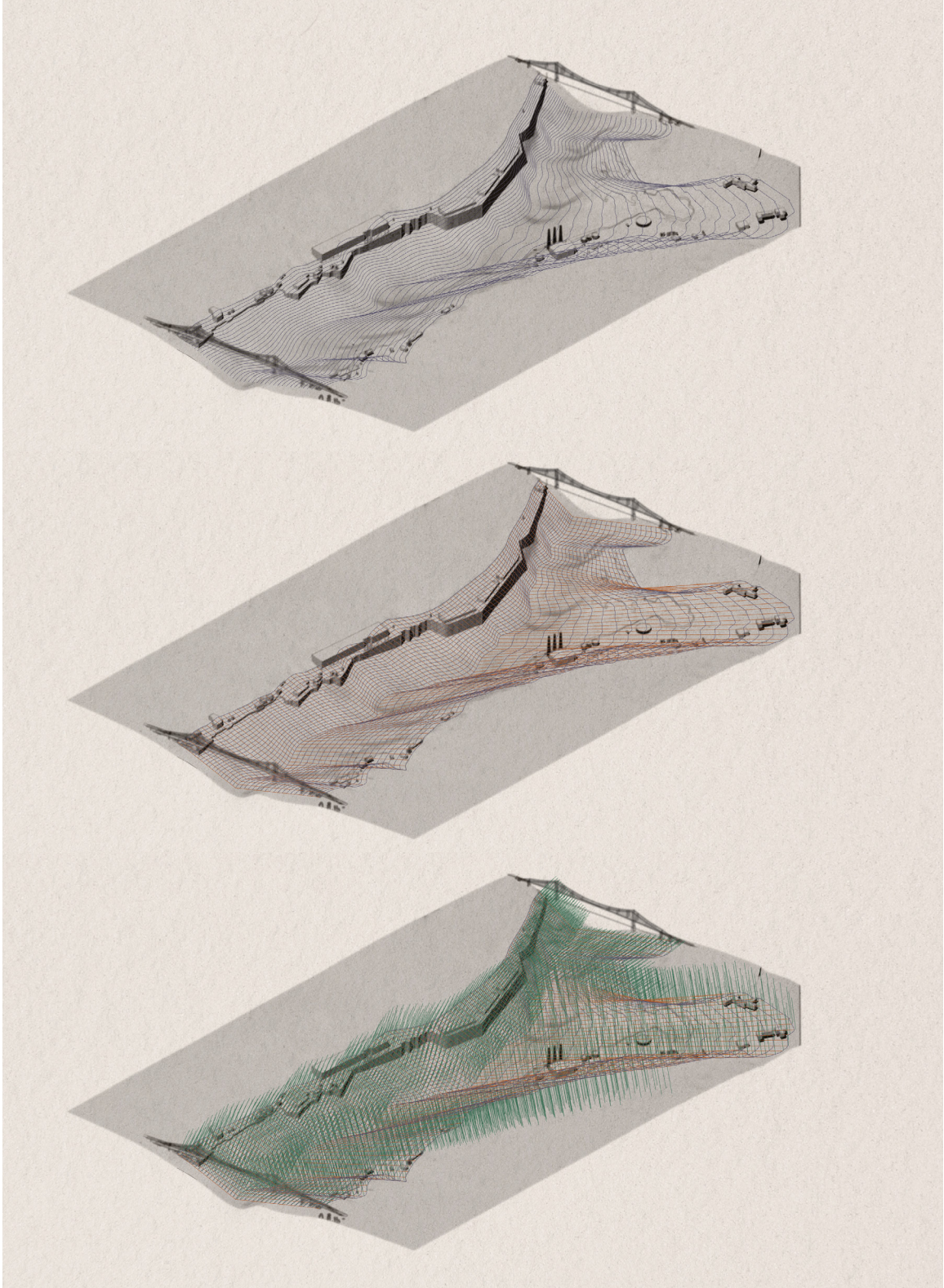
Grids

In the Harbour context, which is at the mercy of the frayed edges of the English colonial grid and the infilling of the harbour edge resulting from the prioritization of industry and the military, this thesis acknowledges the existing grid system but favours a grid determined by the approximation of natural flows, erosion and sea-level rise. From the conflict between human and natural grids comes the architectural solution.

Peter Eisenman generated grids as a formal basis to express and refer to multiple facets of his Berlin block's story in *Cities of Artificial Excavation*. Grids allow the measurement of sometimes-immeasurable existing conditions and exchange between the old and new environment and culture while creating a framework for flexibility in the future. Multiple grids determine city layouts at odds: Eisenman takes this



Berlin grid diagrams (Eisenman, Bédard, and Balfour 1994, 79)



The future coastline merges with the path of the former river (top); perpendicular lines connect the opposite future coastlines to the river and their intersections create an X-Y origin (centre). A Z-axis is created at the intersections of the grid (bottom): a three-dimensional grid that compresses the lifespan of the harbour.

approach to represent different eras and interests. Eisenman drew a generic grid to extrude a 3.3-metre height, matching the Berlin wall, using elevated walkways to oversee the location of the former Berlin wall and look at the block like an excavation site (Eisenman, Bédard and Balfour 1994, 23). The grids used in the city plan represent the traditional land division and urban building, but the radial plan, used by Eisenman, represents the universality of a political and architectural order of things: both remain in conflict (Eisenman, Bédard and Balfour 1994, 19-23). Eisenman's method is parallel to the layering of grids used in this thesis. Eisenman uses grids to represent the varied history and forces acting upon a block in the urban context of Berlin. This thesis generates grids using hydrological conditions, foregrounding the natural over the colonial and imposed.

A set of grids was generated by combining historical and current maps and a topographical-bathymetrical model of the harbour and its surroundings. The grids represent, isolate and abstract the hydrological, cultural, and temporal qualities of the harbour. Hydrological grids were determined by the former coastline, the path of the old river, and the future coastline. The grids were created by drawing perpendicular lines from the projected past and future coastlines within the bounds of the North Harbour zone, reflecting the piers ubiquitous in the maritime coastal landscape. The perpendicular relationships between coastlines past, present, and future were drawn to create a three-dimensional grid in the temporal grids. In addition, equidistant lines were drawn in three dimensions, linking the projected coastline, the present coastline, and the path of the former river. These grids combined created a three-dimensional volume of the harbour that informed



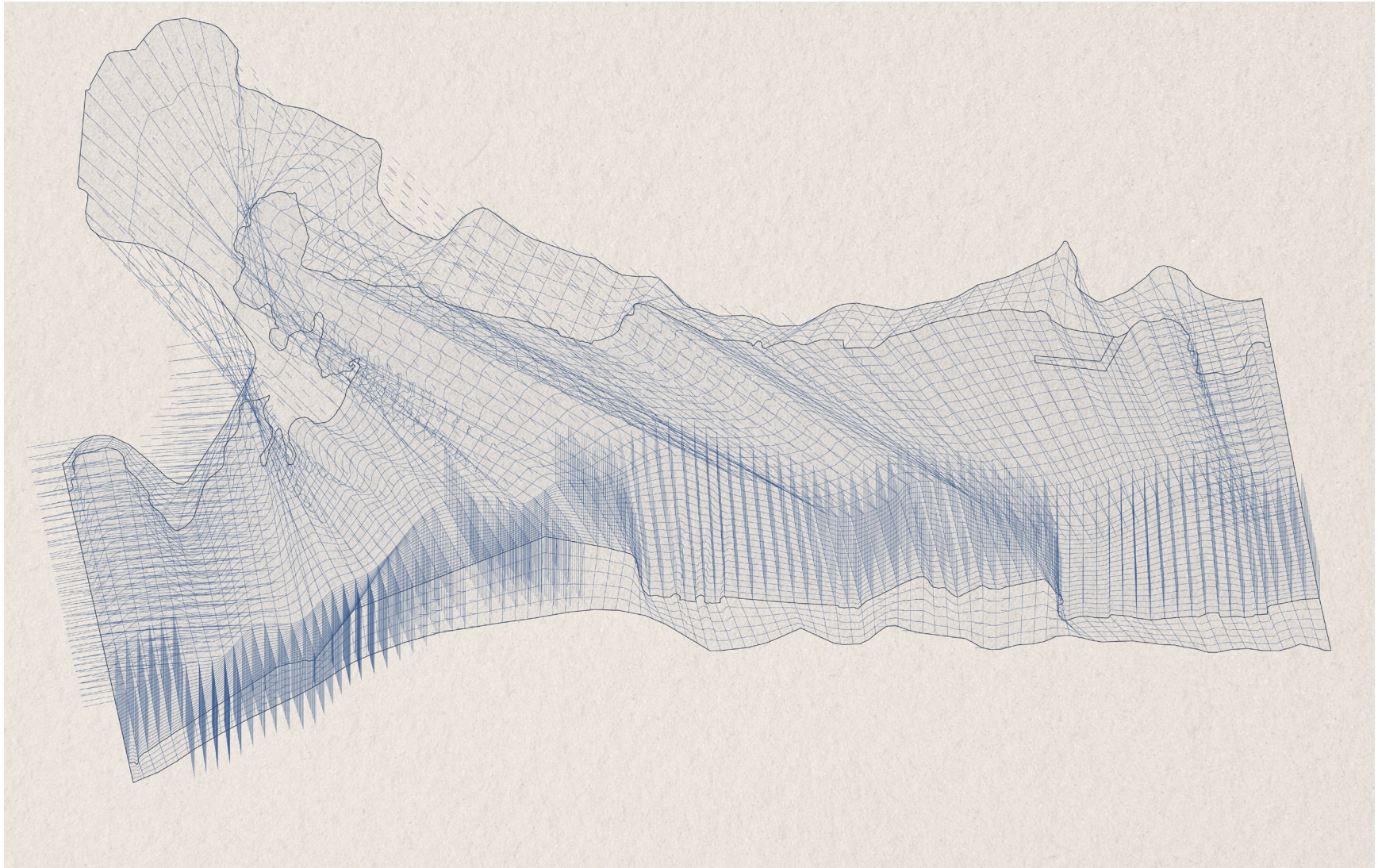
Cultural Grid: Access to the water is marked by paths, roads and railroads. Within the bounds of the future coast, most passages are private.



Cultural Grid: Historical paths and borders are revealed on old colonial maps. Lines perpendicular to the coast represent the edges of naval and Mi'kmaq land, and crossings represent a former bridge (left) and a former ferry (right).



Hydrological Grid: The former coastline and surrounding creeks from early English settlement are traced from historical maps.



Temporal Grid: The present coastline is joined to the future coastline, and the path of the river. Perpendicular lines connect the coastlines. Vertical lines create a three-dimensional space made up of the union of the three coastlines: past-present-future.



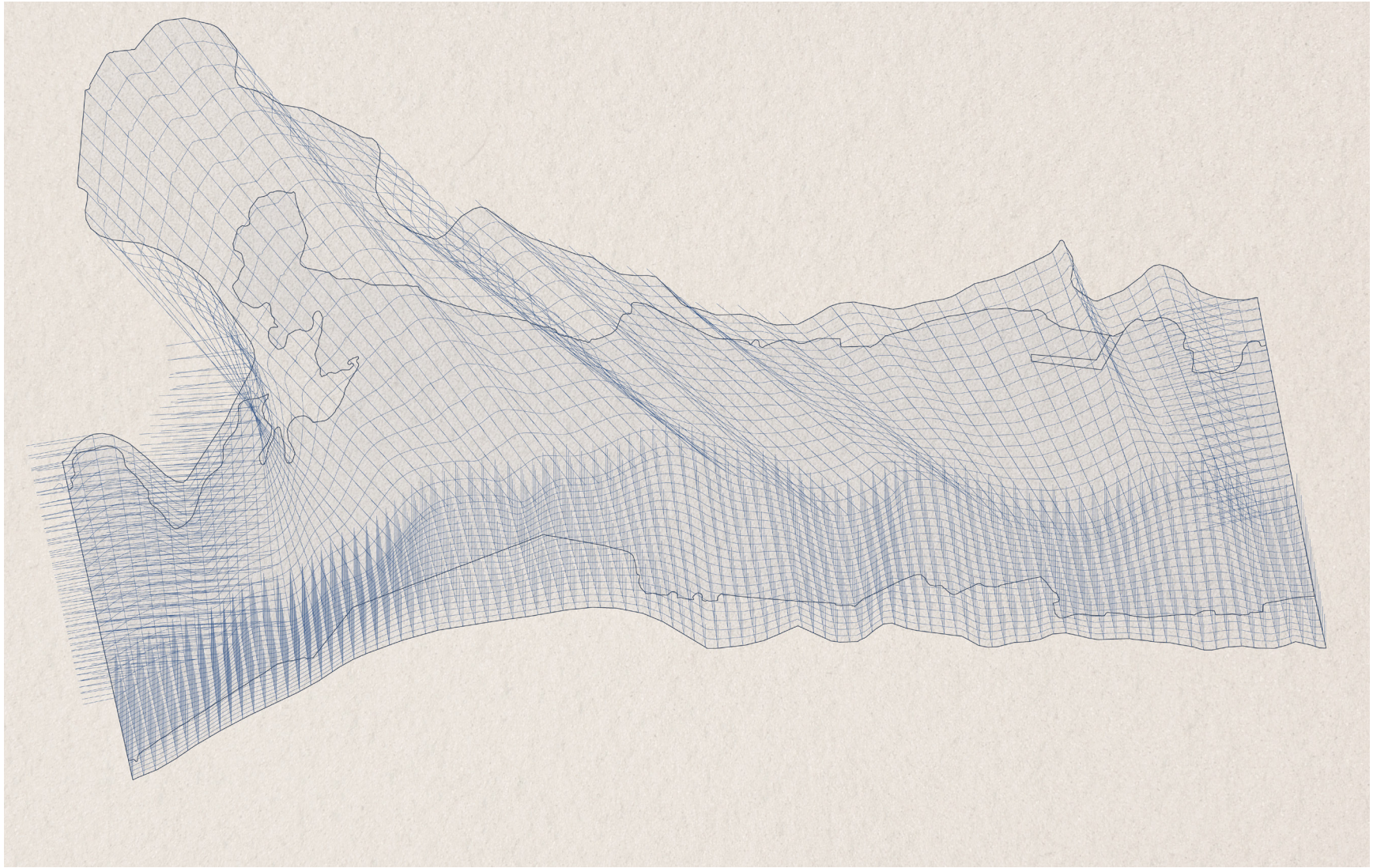
Hydrological Grid: Perpendicular lines jut out from the old river path, like piers connecting to the present and future coastlines.



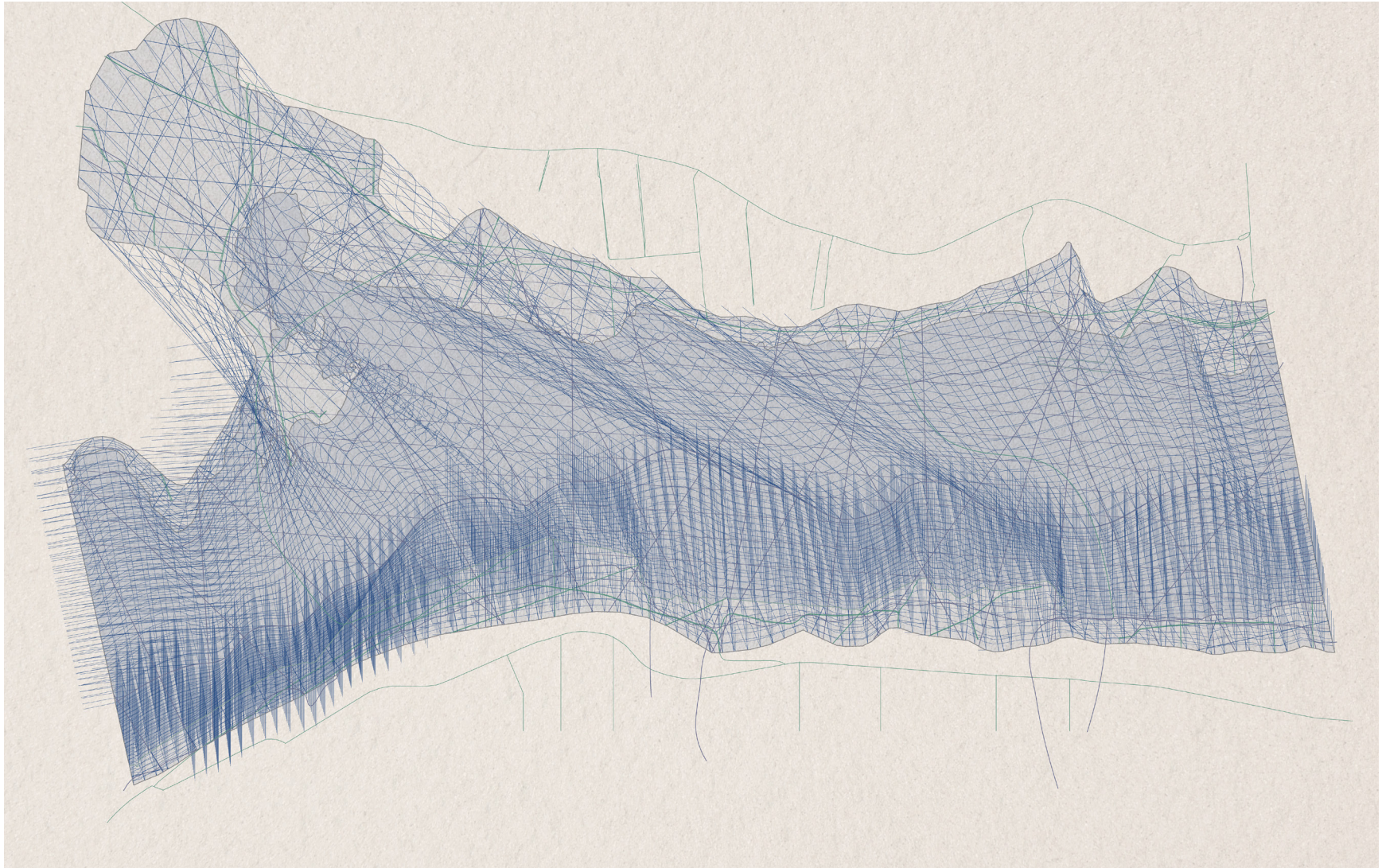
Hydrological Grid: Vectors show ocean wave directionality.



Temporal Grid: Perpendicular lines jut out from the future grid, connecting and showing the disparity between the topography and infilled edge.



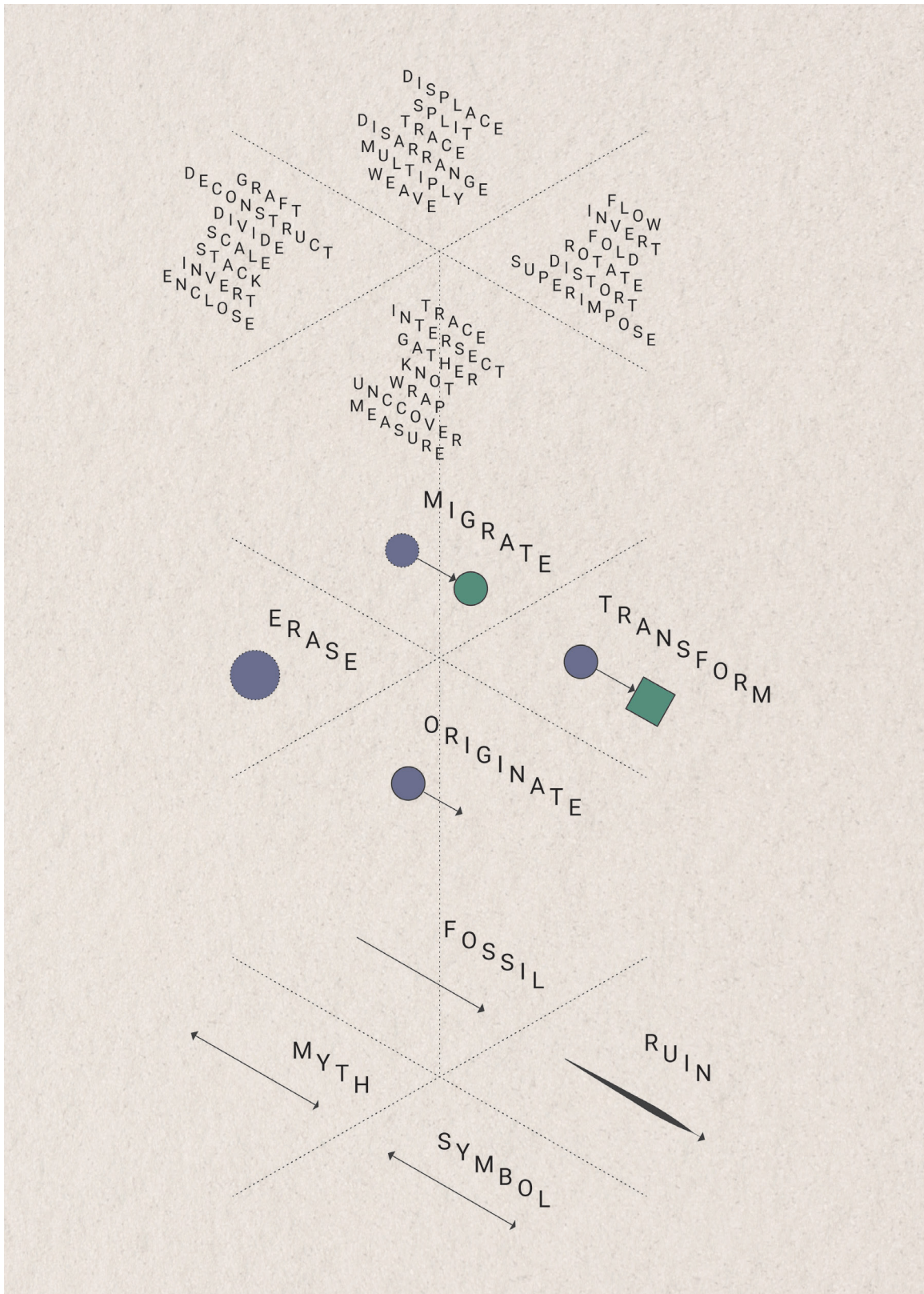
Temporal Grid: The future coastline merges with the path of the former river, overlooking the infilled coast to emphasize the ephemerality of the present.



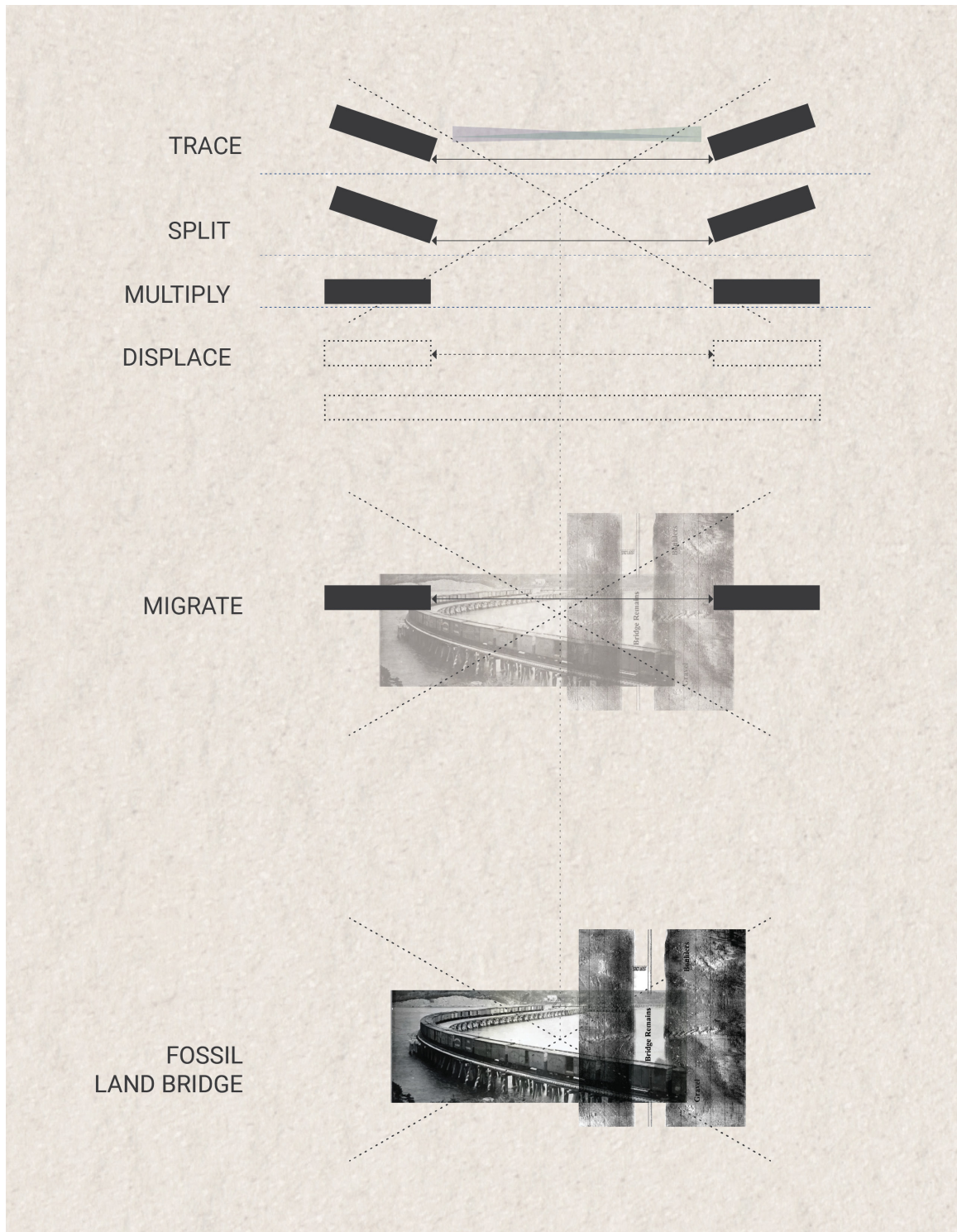
The grids combined are a cloud of layers, used selectively in the architecture to emphasize different aspects of the harbour: the cultural, hydrological, and temporal.

the proposed path architecture. The literal or cultural grids trace current access points, paths, and historical paths and borderlines. This array of grid types allows the architecture to respond to a combination of conditions. For example, the proposed ferry stops, developed in response to the former land and rail bridges, work within the grid representing the cultural history and the temporal grid that connects the past to the future coastlines.

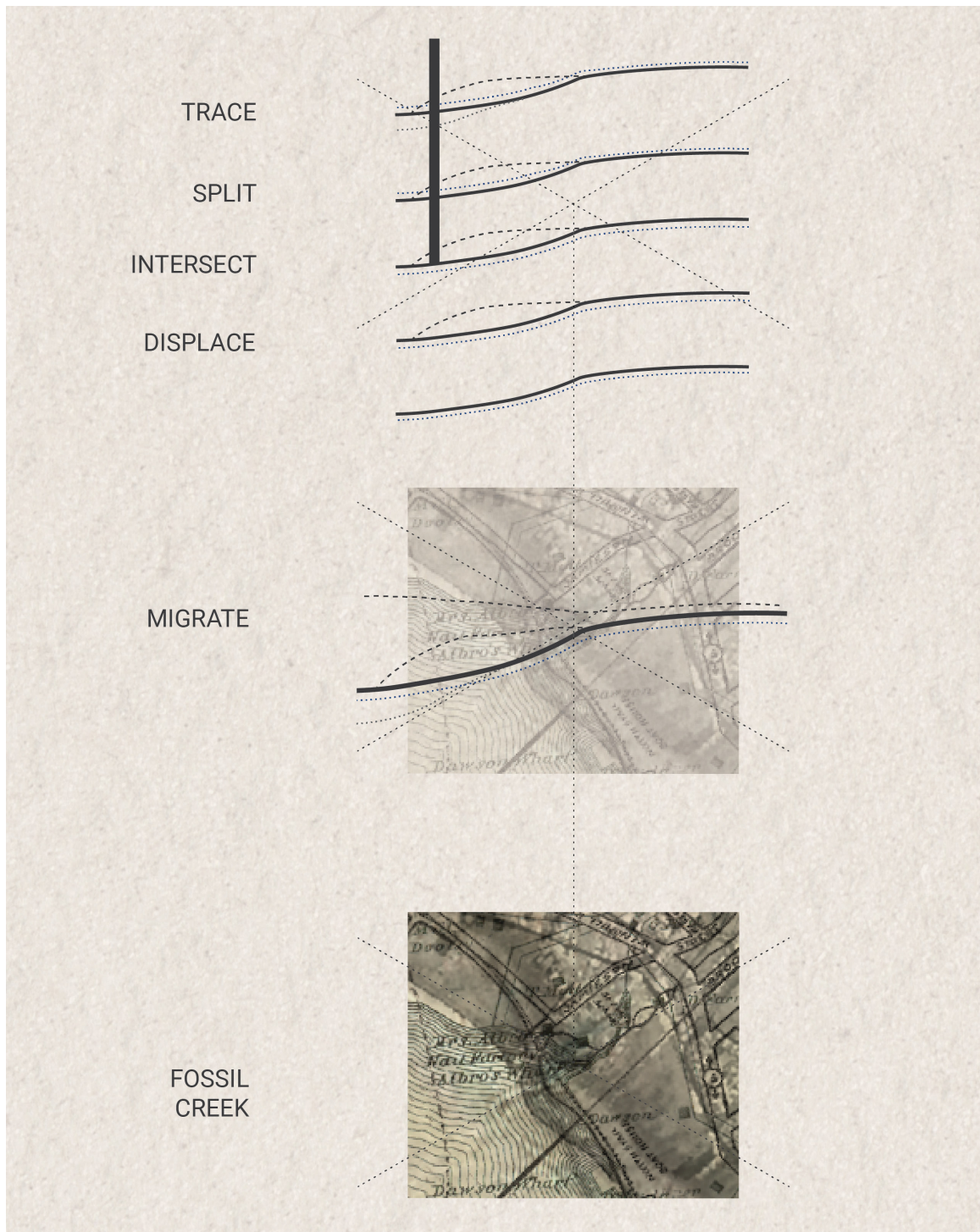
The layering of historical maps mimics a strategy covered by Eric Sanderson, an American landscape ecologist. He created the Mannahatta project, which synthesized georeferenced ecological maps to create a looking glass into Manhattan island's past and future to discover and inform future intervention (Sanderson 2009). In this thesis, a collection of 15 historical maps that include the harbour were georeferenced and layered together in a working document. This process revealed former locations of creeks, borders, and settlements. It also showed the variety over time of mapping accuracy: wooded and unknown areas to the cartographers, all English settlers, were rendered coarsely with a heavy hand. As settlement continued, the intent of the maps pivoted from communicating the potential of an area to serve as a port and base to the dictation of a colonial grid and military bases that related directly to prominent landscape features that were roughly drawn years prior. The layered map also illustrates the fluctuation of a coastline over time: as mapping methods change, so do our ideas of how a landscape is represented. Finally, the historical maps were converted to a vector drawing and combined with the present conditions and a future coastline projection, using a 5-metre sea-level rise benchmark to create a holistic image of the harbour over its lifespan.



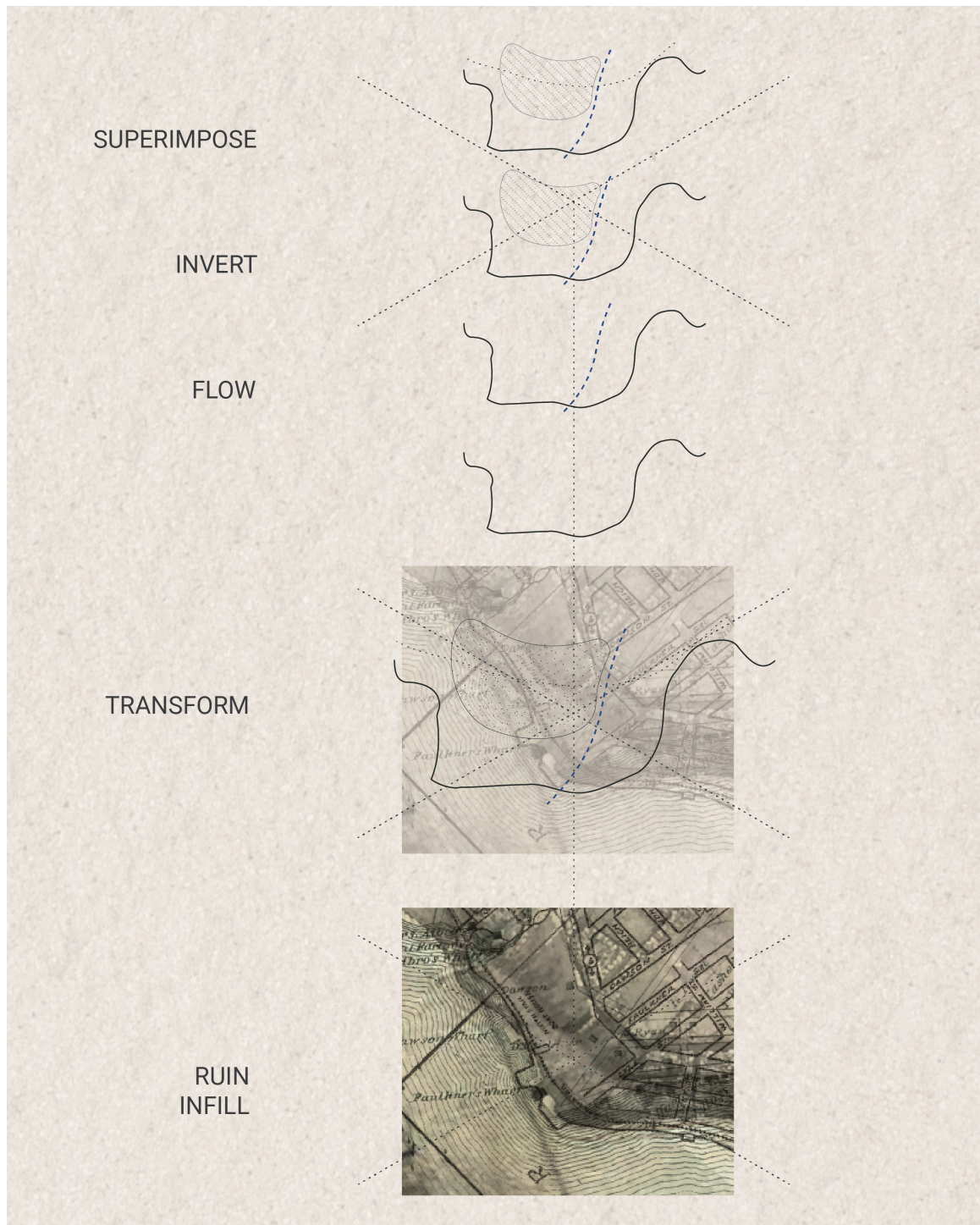
Method Matrix: The observation matrix (bottom) connects the viewer to the site; the action matrix (centre) determines a design direction; the transformation matrix (top) provides situational or programmatic architectural moves.



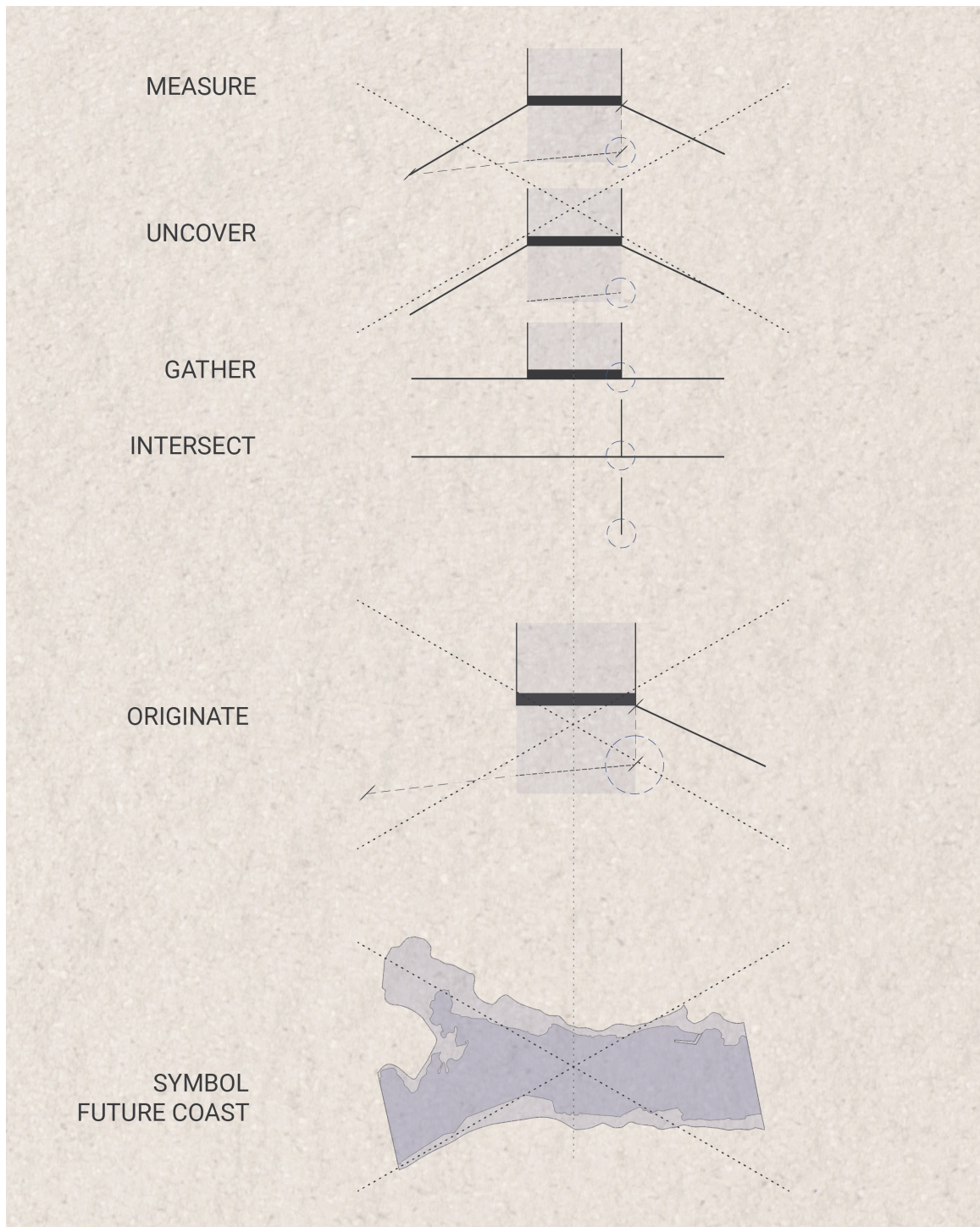
The location of the former swing bridge and land bridge at the narrows is evaluated as a fossil, resulting in migration, which is architecturally expressed as a ferry stop displaced from the ground plane, multiplied in two, split from the coastline, and traces former views from either side.



The location of the former creek is evaluated as a fossil, resulting in migration and expressed architecturally as a set of paths for water and people. The ground above the creek is displaced to create a ramp, the train line intersects the site with a tunnel, and the former coastline is traced and revealed with a split in the ground.



The infilling below the Macdonald Bridge is observed as a ruin and transformation leads to topographic modification. The former creek is allowed to flow again, the area within the bounds of the former coast is inverted to create a new water's edge, and the former edges are superimposed on the site with paths.



The future coastline is observed as a symbol, making it an origin point. The future coast is intersected with city connections, gathering is made possible by creating a spatial path, which is then elevated to uncover the ground and measure at the site of the 5-metre water level.

Grids were generated to express and leverage the relationship between the past, present, and future coastlines. The aim of this was to abstract and demonstrate the compression of time: while the water's presence is a constant, its elevation, its formal state, and the way that people engage with it are ever-changing.

Each site or element has a related era or condition. Therefore, the form of a design element follows the grid that represents its respective era. For example, the proposed looped path refers to the future coastline; thus, it follows the grid generated from the future coast. Likewise, the path's structure is a link between the past and the future coastline, and thus, the future-past grid generates the structural members of the path.

Transformations

Layering is both a process and a result; according to Bernard Tschumi, the result comes from sequences of transformations. Transformations can be rotation, insertion, cutting, transference, inversion, substitution, dissolution, displacement, multiplication, et cetera. Transformations can apply to spaces and events. Sequences of event, use, activity, incident are superimposed on fixed spatial sequences, like actors on a stage, but are independent of one another. A stage can house anything like an actor can act the same performance anywhere (Tschumi 1996, 155-157). Application of transformations to the dual matrices created with Benjamin and Bunschoten is then appended with a set of transformations inspired by those suggested by Tschumi. These transformations are broken down from Bunschoten's four actions: Erase, Transform, Migrate, Originate. Combined with the matrices, the transformations

create a theoretical framework that can be applied to design a space, program, or movement.

Coastal Responses

Palisade Bay was an interdisciplinary project including architects, landscape architects, engineers, planners, and students who intended to develop a soft infrastructure strategy to anticipate climate change for New York harbour. The harbour was divided into five implementation zones based on their programs, densities, histories, and topographies. (Nordenson, Seavitt, and Yarinsky 2010, 154). Design strategies were developed for each. The idea of soft infrastructure resulted from combining mandates of protecting the region from storm surges and adding programmes to the edges of the water. A strategy of layering program is possible with soft infrastructure, which opposes fortification of edges in favour of resilience (Nordenson, Seavitt, and Yarinsky 2010, 96).

Before human settlement along the water's edge, changes to it were generally gradual, caused by extended climatic processes such as coastal erosion, following the laws of nature (Nordenson, Seavitt, and Yarinsky 2010, 184). When people began exploiting the land more efficiently, the land was filled in and added to by deliberate, artificial processes. Coastlines were reshaped to maximize productivity. The use of the water's edge generally extended to industry and the military (Nordenson, Seavitt, and Yarinsky 2010, 184), and transportation links and infrastructural junctions became important in the quest to exploit the land. The water's edge is considered as not a line but a zone that contains these historical inconstancies. In Palisade Bay, the surface of the edge zone is situated between the pierhead

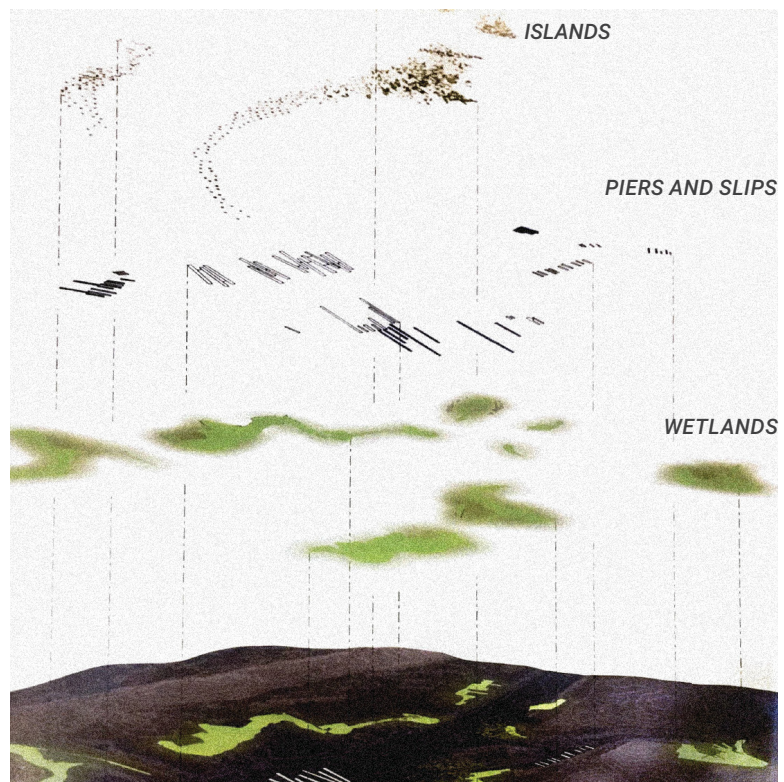


Pier 4, Brooklyn (Hassler 1918)



Pier 4, Brooklyn Bridge Park (Schaer n.d.)

line, bulkhead line, former coastline, and extent of former wetland marsh. Design strategies propose modifying the edges through additive and subtractive means, such as piers and slips (Nordenson, Seavitt, and Yarinsky 2010, 94). For example, Brooklyn Bridge Park runs continuously from the Brooklyn Bridge for 2 kilometres south toward Cobble Hill, adaptively reusing defunct cargo shipping and storage complexes for the public, modifying existing piers to house athletic facilities and densely programmed parks. With a similar scale, the following strategies can also apply at the harbour. The use of existing structures as a framework to support social and ecological growth weaves together the labour history of the waterway and its status as a natural place to be preserved. The park adds paths that act to link the water to the residential fabric and transport systems. It uses a different ground material language to communicate



Soft infrastructures are layered to bring public programmes and resistance to erosion to Palisade Bay.

the artificial and natural coastlines. Paths and floating piers measure the changing water level. Pedestrian bridges are used to circumvent roads, and pocket parks work as green corridors to reach the park from the surrounding neighbourhoods. It successfully uses the original coastline as a base path to combine soft infrastructures with a broad spectrum of accessible programmes.

Framing



Under the Macdonald Bridge, Dartmouth

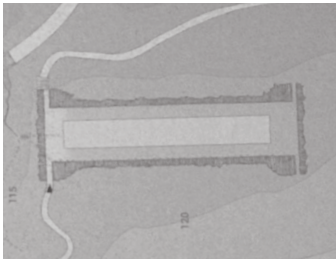
The path is used as a framing device to connect the vast scale of the harbour with individual experience. Tschumi defines framing as always displaying two conflicting fields: the frame and framed content. The frame is regular and predictable and framed content questions the frame and its context. The interplay between the frame and framed communicates a narrative (Tschumi 1994, 11). In the Harbour context, according to Tschumi's space, event, and movement, the frame is the path or space, and the framed are the familiar characters and the event: the dynamic water level and the sequence acts in the harbour commemoration event.

Nature

In Saskia de Wit's study of gardens, enclosures are used to frame and highlight existing landscape conditions, even in artificial contexts. In de Wit's arcadian landscape, the addition of urbanization is so transparent that the remains of old layers of the landscape remain tangible as "relics: monumental gaps, hidden nooks and crannies, or frayed territories" (De Wit 2014, 363). *Terrain vagues* like this can guide situating a garden at a strategic location in the landscape to frame and highlight the genius loci and connect it to the urban context (De Wit 2014, 363). De Wit outlines a



Wild forest juxtaposed against hedges, framed in view (de Wit 2014, 133)



Procession and framing of reflection pool (de Wit 2014, 132)

reflection garden in which the genius loci are made visible. The hidden quality on the site is groundwater, which is displayed and magnified, with an intentional procession related to the flow of water. Any metropolitan landscape, de Wit argues, is ripe for in-between spaces, at the edges of networks and territories, made up of gaps, overlaps and fringes (De Wit 2014, 367). Interstitial spaces result from the city growing in layers. Leaving space to preserve memory and balance different areas must be essential to the city (De Wit 2014, 368). Gardens created in these interstices are marginal spaces outside the functional logic involving “green spaces” and “natural” leisure environments. They fit well in these interstices: there is often not enough space for development, and their often-unique qualities create opportunities for social interaction and mixing (De Wit 2014, 367). The water table, existing trees, and the reflection of sunlight determined the position and orientation of a pool (De Wit 2014, 130). The pool mimics natural forms, and the overall garden plans mimic natural ecosystems (De Wit 2014, 129). The plan follows the local city grid but not the grid of the estate in its immediate surroundings, highlighting and abstracting its autonomy. This juxtaposition is similar to Peter Eisenman’s usage of grids to defamiliarize, abstract, and extract the existing site conditions. In both, a series of thresholds enhances that disconnection. It is organized along an axis, giving architectural definition to the tacit formal elements of the forest and making genius loci tangible (De Wit 2014, 130).

The high-water table and groundwater testing determined the location of the pool, which filled from beneath the surface. (De Wit 2014, 131). The pool functions as a looking glass to reflect the sky and provide a view into the interior of the

ground, dramatizing the surroundings (De Wit 2014, 132). A two-way hedge acts to enclose the pool on the interior, and on the exterior evokes and reflects its wild surroundings. This condition emphasizes and pinpoints the position of the garden “in the metaphorical sequence of nature and culture” (De Wit 2014, 134). The garden’s position in the forest creates the distance necessary to take in the beauty of the forest, both enclosed by it and outside its bounds (De Wit 2014, 135).

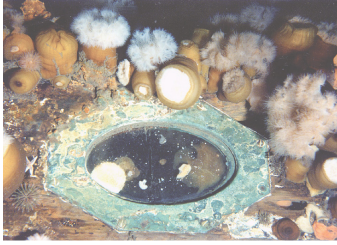


High line plants against Manhattan grid

The High Line uses a similar strategy of framing and enclosure, emphasizing nature by juxtaposing wild plants against the industrial railroad. The line elevates nature out of its familiar context and uses it to connect the ground and railroad data. The path runs through buildings and connects a wide range of programmes, giving the visitor a view of the multiplicity of Manhattan. The materials and construction create a spatially diverse experience along the path. Both landscape and architectural forces successfully drive it. The old railroad is built upon weaves through the city grid, connecting points and creating views down central corridors, working as a visual mediator between Manhattan and Hudson River views and the space of the path.

Time

Water embodies change: ripples in ponds and fountains expand outward; the moon draws tidal motion. With winter, rivers freeze, and spring brings melting rapids; monsoons and hurricanes mark seasonal changes, and their increased frequency marks a climate crisis. Human activity moves from fishing, paddling, swimming to skating and diving. The human experience of time differs: seasonal change is marked by gradual shifts in weather, influencing human



Sea life on the wooden hull of the Havana, which sunk in 1906, Halifax (Marine Heritage Database, 2007. Photo: Dwyer, 2007)



Snow Storm: Steamboat Off a Harbour's Mouth (Turner 1842)



Simultaneous Windows (Delaunay 1912)

behaviour. Time moves slower at the bottom of the ocean, where sunlight cannot reach traces of former coastlines, extinct objects and species. According to Nova Scotian diver Bob Chaulk, underwater visibility ranges from three to five metres (Chaulk 2002, 42). The visible underwater space is known as the water column, and though it is not pitch-black, weather conditions control the length of perceptible space. Regardless, the view in any direction is unchanging, creating the sensation of being inside a timeless void (Chaulk 2002, 42). According to Kevin Lynch, four ways we can understand the change in time within a dynamic environment are (1) temporal collage, (2) episodic contrast, (3) direct display of change, (4) patterning of long-range change. Awareness of change is crucial because it enhances our experience of surroundings, encourages curiosity and attachment to the place, which becomes its character with an explicit story to be told and interpreted. Architecture expresses change over time similarly to other art forms, such as poetry, literature, dance, and fine art, which show and compress the dynamics of the landscape. Fine artists accomplish this with “distortions, interpenetrations, lines of force, violent contrasts” (Lynch 1972, 168), seen in the work of Joseph Mallord William Turner, Robert Delaunay, in paintings showing movement, layered time, and climate; Andrey Tarkovsky, in atmospheric, layered film sequences; Pierre Huyghe, Maya Lin, Olafur Eliasson, Janet Cardiff, in experiential art installations that recontextualize environmental changes, and Carlo Scarpa, in architecture, embracing weathering with materiality.

These art forms are reminiscent of designing by layering and the layering of transformations to the landscape described by Bernard Tschumi in architecture and disjunction. Designing for a body of water and visitors in motion can



L'expédition scitillante by Pierre Huyghe: an experiential translation of a hypothetical arctic expedition (Huyghe 2002)



Water, steps, porous materials and plant life mark change at Scarpa's Brion Cemetery (Kinold 1985).

enhance temporal dynamics and flow (Lynch 1972, 185-6). In gardens, a series of contrasting settings can be designed, so the order they are seen enhances the experience. Designing sequences can link contrasting locations, fusing movement through space to move through time. Lynch says that the expression of time can quickly become chaotic, so sequences should be straightforward (Lynch 1972, 185).

Of Lynch's four methods, the first is temporal collage, a layering of symbols of the past, highlighting the depth of time (Lynch 1972, 168). This could be the merging of multiple eras of architecture, for example, in the Hagia Sofia or the mosque of Cordoba, but there is a "careful differentiation between modern and genuine remains" (Lynch 1972, 168). flipping the function of historical buildings is not preservation, Lynch argues, but attention to their history beyond the physical structure that still stands (Lynch 1972, 170). By letting go of the notion of preservation of isolated monuments and buildings in favour of attention, which may mean destruction and modification, as different generations will have different interpretations of history, "the selection of remains whose visual presence should be amplified is a consequence of that interpretation" (Lynch 1972, 170), history can be seen as a continuum, rather than a series of so-called "important" moments. Some past transformations of the landscape are retained when layering or collage is applied; others are destroyed. Space is made for new layers to be added in the future. Older transformations to the landscape are dug out to be seen, and newer transformations are located to resonate, aid in the organization of the whole. Variation in age can be framed using material or detail: by using coastal materials anticipating the future encroachment of the coast, "the permanent dark hardness of flint, for example,



Ruins in Nostalgia
(Tarkovsky 1983)

versus the soft erosion of warm-colored brick. Near-future hopes and fears should be traced on present surfaces. Venice should be seen to be sinking. A sketch of the full-grown tree should accompany the seedling” (Lynch 1972, 171). A temporal collage is the deliberate juxtaposition of seemingly disparate elements so that the form and meaning of each are amplified, yet a coherent whole is maintained. Temporal collage might also be used more broadly in the design of territories: preserving and contrasting sections of different ages, connecting them with junctions, vectors, or activity links, inserting new activities into older settings of contrasting meaning. Collage is a means of combining building or landscape, material, visual, sequential elements to create a holistic image of history, vivifying the way that we experience the passage of time (Lynch 1972, 172).

Episodic Contrast



Layers of erosion, LaHave,
N.S.

Display of recurrent, opposed states of time made the inhabitant aware of the rhythmic nature of time by the contrast between the present and remembered or expected states. For example, the display of an industrial harbour next to a flooded harbour, a river, a fishing harbour can bring about awareness of the dynamic nature of the waterway. Episodic contrast is characterized by the effects of change being emphasized with their cyclical nature (Lynch 1972, 174), such as tides, and the underlying continuous structure throughout the change, such as the growth of a tree. When paired together visually in one space, changes over a longer span are impressive, as if the states exist simultaneously. “The remembered contrast resounds in the present ... The future is here with us because it will be like something we knew in the past” (Lynch 1972, 174).

Environments dramatize change, using light, acoustic surfaces, directing waves, wind, and then the absence of those things. Environments rich with kinetic energy like this are well suited as a backdrop for events and celebrations, where an everyday setting can be transformed (Lynch 1972, 176).

At some point in our lives, we have all experienced that particular sensation of a suspended moment, a 'great present' that focuses all our attention and seems to hang motionless before us. It is an intense and mystical personal experience. Things are presented to us directly, not through the veil of customary meanings. The inside and outside worlds connect, and we seem to be the landscape itself. It is not a stoppage of time but a sense of vital stillness, wherein change and time seem immediately apprehensible. Permanence and evanescence, rapid biological rhythms and long cycles all seem to be there together. ... it may happen in some cave or mountaintop or garden or by water in some very special place whose access was difficult and whose presence surprises us. (Lynch 1972, 177)

Episodic contrast juxtaposes multiple states of change, distinct from one another, to tell a story about the passage of time. It is accomplished with visible and sensory means such as light and shadow, wind and waves. Episodic contrast compresses time using sensory elements, drawing inhabitants closer to the temporalities of the landscape.

Direct Display of Change

Environmental changes can also be displayed directly, in a manner closer to how they occur, by using the process of change itself as the actor (Lynch 1972, 180). The direct display of change allows the inhabitant to be primed for change in a multisensory way. For the designer, control of all facets of change is required for this method. For example, in a dramatization of an event, natural elements play a role similar to cinematic effects. Less control over the elements means that the product will be crude; however,

this format is more suitable for a large, spread-out audience (Lynch 1972, 180). An event using the direct display of change uses familiar means of performance organization, such as building tension, slowing, climax, counterpoint, contrast, rate variation, and rhythm (Lynch 1972, 181). The structure is simple and uses precise rhythms, movements, and swells to a climax. Cinematic storytelling devices can also be used, like the illusions of floating or time moving backwards. City lights can be used to highlight traffic, landmarks, show direction with movement, show time with a visible pulse, mark coastlines and indicate significant events, and contrast natural light. Natural transformations can control displays or events, for example: the amplification of sound with flowing water, wind with banners and plants, clouds or fire with reflective surfaces, tides amplified with floating objects, bells rung at the tides or sun/moon rise/set, imperceptible moments like solstice, equinox, noon can be amplified with prisms, lenses, mirrors, amplify changing sunlight with reflective surfaces (Lynch 1972, 182). A successful installation of this kind has simplicity, rhythm, slow pace, grandeur, emphasis on a constant background, direct connection with natural changes, and references to human activity (Lynch 1972, 184).

Patterning of Long-Range Change

A method with fewer real examples, Lynch suggests long-spanning change can be foregrounded in our fields of view by being made to appear faster or slower (Lynch 1972, 187). Long-range change exhibits rhythmic change while calling ahead and back to future projections and past events (Lynch 1972, 187). It can be developed as art or exhibit, where the broader timeline of a long event is considered instead of an episodic breakdown. For example, a time-lapse video of

the growth of a flower can highlight otherwise imperceptible movements to human eyes, like how a slow-motion video of a slam dunk can display the mechanics at work, making the feat appear more impressive. Lynch suggests public-use devices, such as films, photos, signs, diagrams, and mutoscopes that speed up past images or slow down the present movements. The same principle can be applied to any length of time: compression or expansion of time can emphasize the long-range change. This can result in a new appreciation for the place or a desire to learn about it. In the case of the harbour, key moments from its entire lifespan can be acted out at full scale, compressing the events of 2 million years into a 12 hour day.

Our perceptual range is limited. Using slow shots with minimal movement can bring about “the rich, strange world of very rapid vibratory motion” (Lynch 1972, 189). Methods open rich possibilities for experiment, training, public participation and add directly to our enjoyment of the world and vivify and make coherent our image of time (Lynch 1972, 189).

At the harbour scale, interpreting the entire body of water as a stage was the first step in its abstraction. The natural and artificial topography and bathymetry, and changing water line are a space for performers and the audience; the characters, symbols of the harbour, are reinterpreted, traced, and framed in the proposal’s architecture and the choreography of the event. Maps and lines representing existing conditions were combined in layers. Grids were generated, in response to different facets of the harbour’s figure, to use as an architectural framework. Used in concert with the grids, at the site scale, the design matrix informed by Benjamin, Bunschoten, and Tschumi compartmentalizes the relationship between designer and site and determines

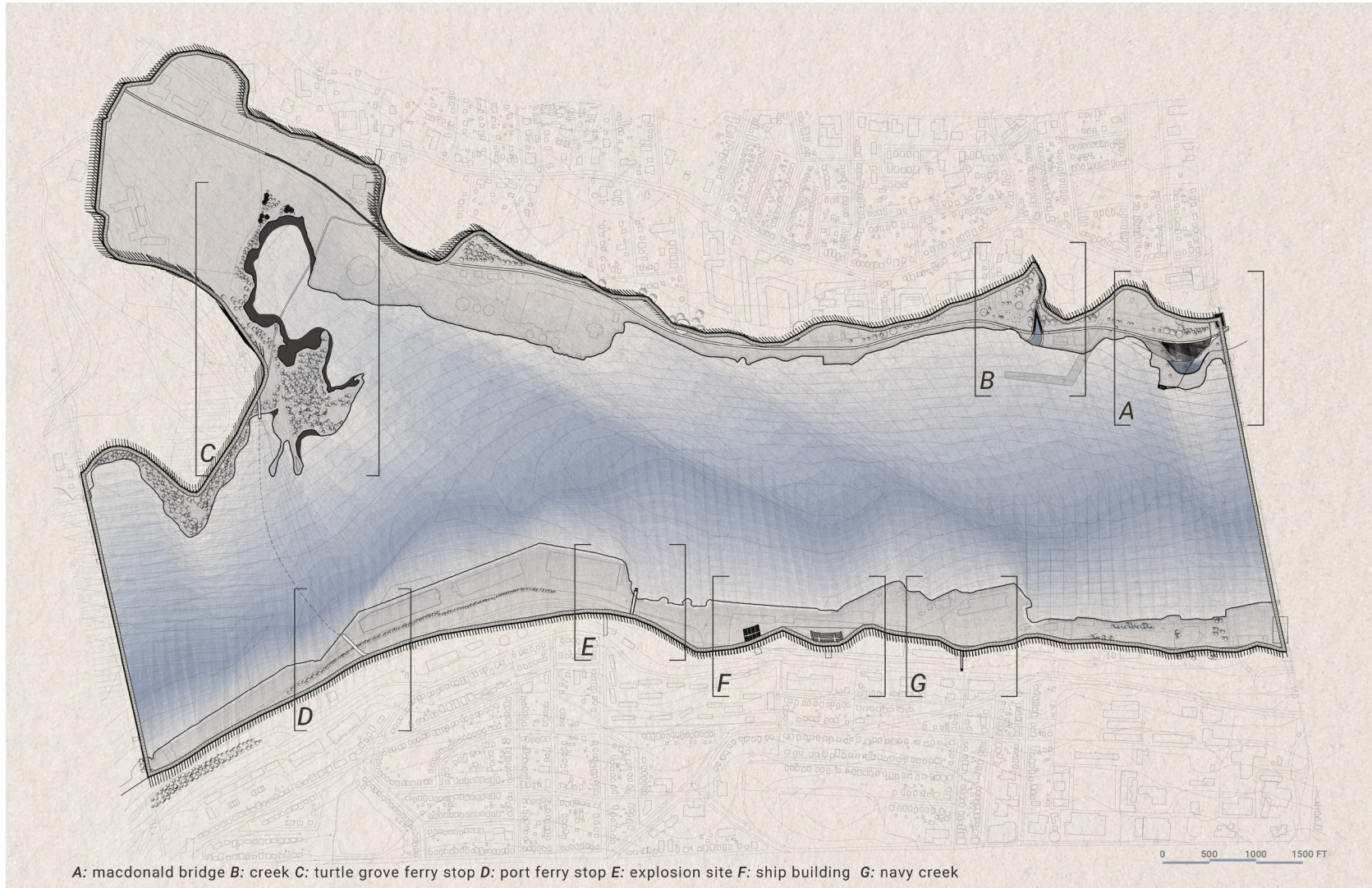
programme, space and circulation. At the scale of inhabitation, characters representing the environmental and cultural stories are framed, highlighting the genius loci discussed by Saskia de Wit. The event tests Kevin Lynch's methods of representing and emphasizing change over time.

Chapter 4: Design

The methods of interpreting the harbour form as a stage, its history and surroundings as characters, layering and abstracting maps and framing with materials and spatial sequences resulted in an architecture developed in three temporal scales: ritual, chance, and event. Ritual, a repeated action that demarcates the passage of time, represents the daily commuter or regular visitor to the site. Ritual is manifested in a looped path surrounding the harbour. Chance represents a spontaneous visit to the water, linking the water to critical junctions of the city. Chance spaces are measuring devices, follies, paths and stands within the littoral zone. The event is an annual commemoration performance held to trace the harbour's geological history and future. Stands overlap with the path and support this event. The harbour was first interpreted formally as elements of a theatrical production: the stage, script and characters. The stage and script combined led to the event's choreography. The reinterpretation of characters led to programmatic and spatial directions through the observation, action and transformation matrix. The architectural solutions used generated grids that reflect physical hydrological, cultural and temporal conditions to push forth the solutions produced by the matrix. At the inhabitant scale, materials reflective of the site and the relationship between locals and the water are used to frame and emphasize the view of the water. Time is emphasized in the construction of the event and in measuring devices.

Ritual: Path

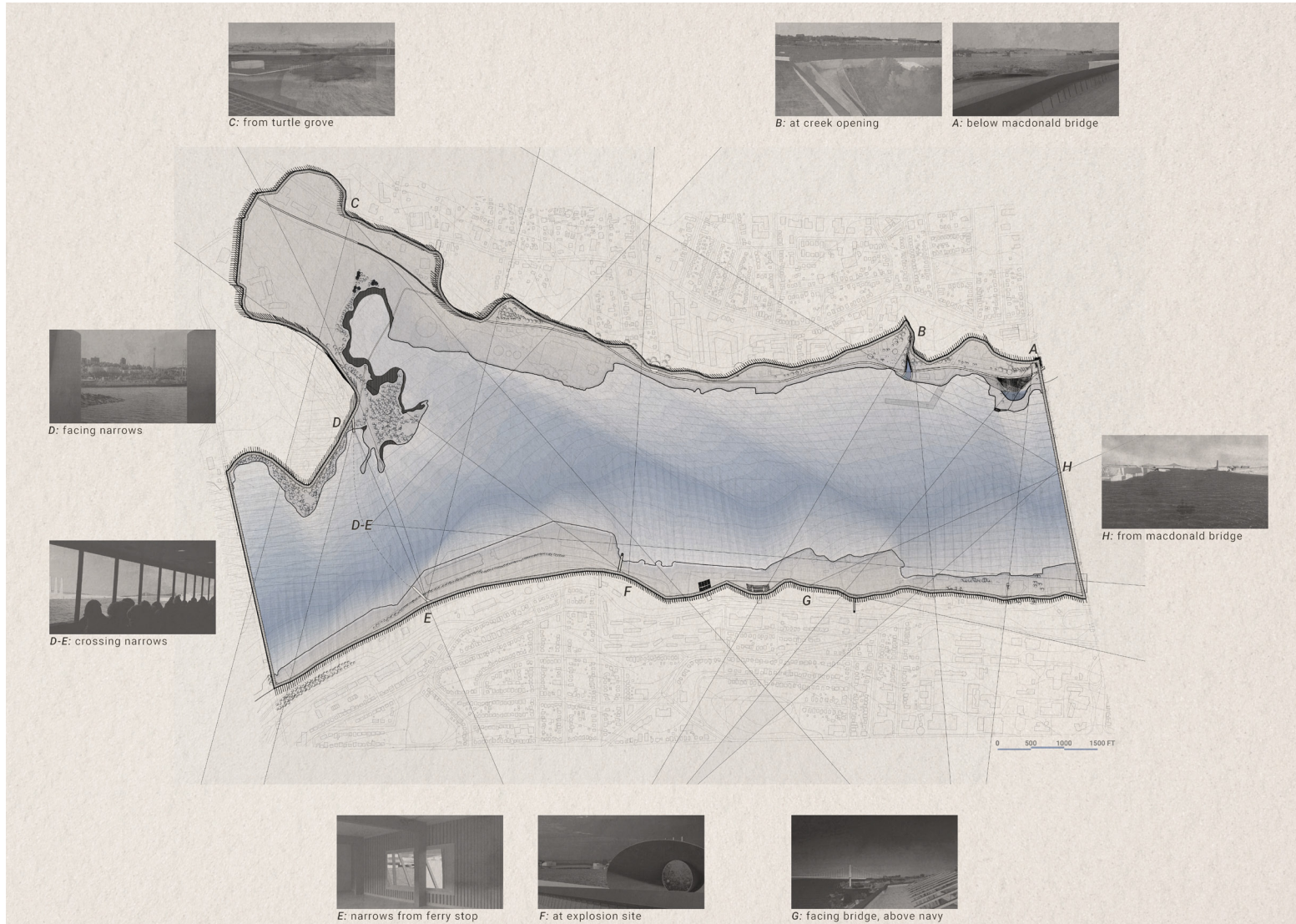
Ritual is a path, allowing continuous water visibility around the north of the harbour. 'Ritual' describes the rhythmic



Characters and access informed the sites of intervention. A, B, and C all had existing access by vehicle or by traversing rocky land. Sites D, E, F, and G lack public access but are visually striking and block views of the water.

nature of moving around a looped path. The space of the path remains the same within a dynamic environment: the path is open to the elements, and views are focused on the water in flux. The path location was determined by the projected future coastline, based on the city's topography lines. The path is divided into a continuous set of 15-metre square units. The future coast grid determined the format of the units. The path units are 1 metre deep, allowing for plants to grow through. The path elevation was determined by visibility toward the origin point of the harbour, where much of the event takes place. The path's height undulates between possible future water levels: moving from the 5m benchmark to a potential 11m future storm surge height. The vertical structure was determined by the vector relationship between the future coast and the centreline of the old river. The path contacts the existing city grid at existing street junctions and bridges with ramps and elevators, allowing people to move on and off the path where it is convenient and provides a new, public-facing link between the city and the water. The elevated path frames the water and connects it to its surroundings with a raised water trough at ground level and a polished, reflective cladding facing the water. Walking by vertical members spaced 15 metres apart creates a sequential feeling.

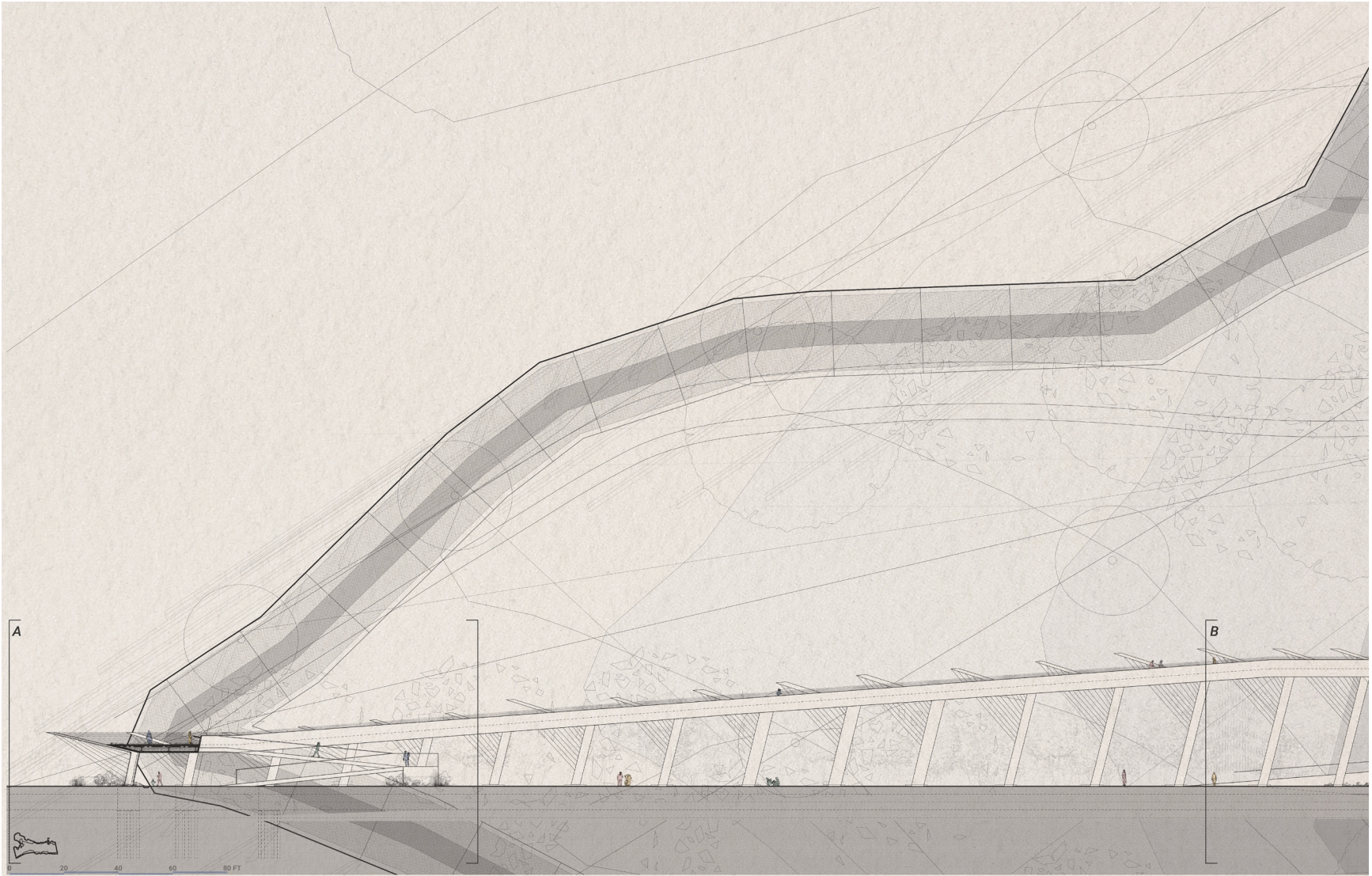
With material language reminiscent of boardwalks, bridges, and Nova Scotia's coarse coast, the path functions as the future infrastructure of piers and points of entry and departure by water. Under one's feet are porous pavers that allow for grass to pop through, mimicking a coastal ground condition of sparse grass among rocks. The railing is clad with treated wood, reflecting the construction of piers by the ocean, so weathered they feel like felt. The shape of the railing, like



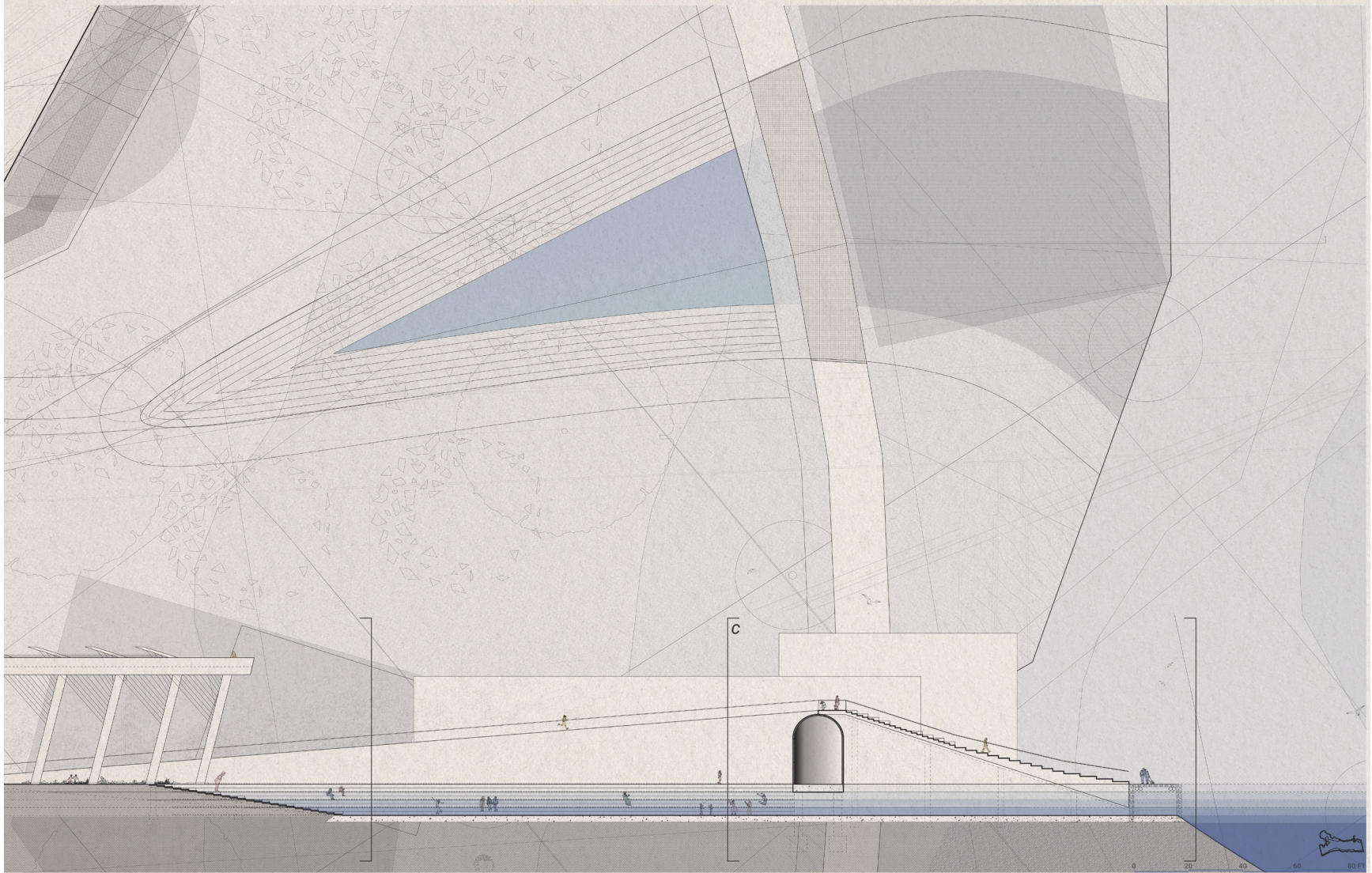
The proposed path weaves through wooded residential, industrial and military areas.

the vertical structure, is directly related to the relationship between the locations of the old river and the future coastline. It follows the past to the future grid, ignoring the present to emphasize the temporality of the present fleeting moment. The variety of the vector relationship between past and future means that the railing shape, at its scale, works as a gutter for rainwater pooling to allow people to touch the water. A reveal at the intersection of planes allows for water to move through continuously and the railing to stay dry. The vertical members bring water down from the path into the ground with an exposed system, gutter and culvert, allowing additional physical contact and visibility of the water at the ground level. Raised platforms pass over the culvert, which frames the space underneath the path.

A walk around the path would take about 90 to 120 minutes: a suitable length of time for an extended weekend hike. As one moves along the path, a montage of water views, tree-shaded single-family dwellings, infrastructure, and port and military complexes plays out. The path touches down at significant intersections such as the two bridges, main roads, and former locations of tertiary waterways. The path is a new ground plane, an elevated form of the projected future coastline from a future sea level that serves as a pedestrian artery around the North Harbour that anticipates gradual retreat from the coastline while acknowledging the present conditions. The path makes use of the grid of the future coast, generated by connections between the future water level and the path of the old river: distant future and distant past.



Head of the creek and intersection with the surrounding neighborhood



Layering of former creek at path and culvert; former coast at stair boundary present coast at water's edge; and future coast at elevated path.

Chance: Intersections

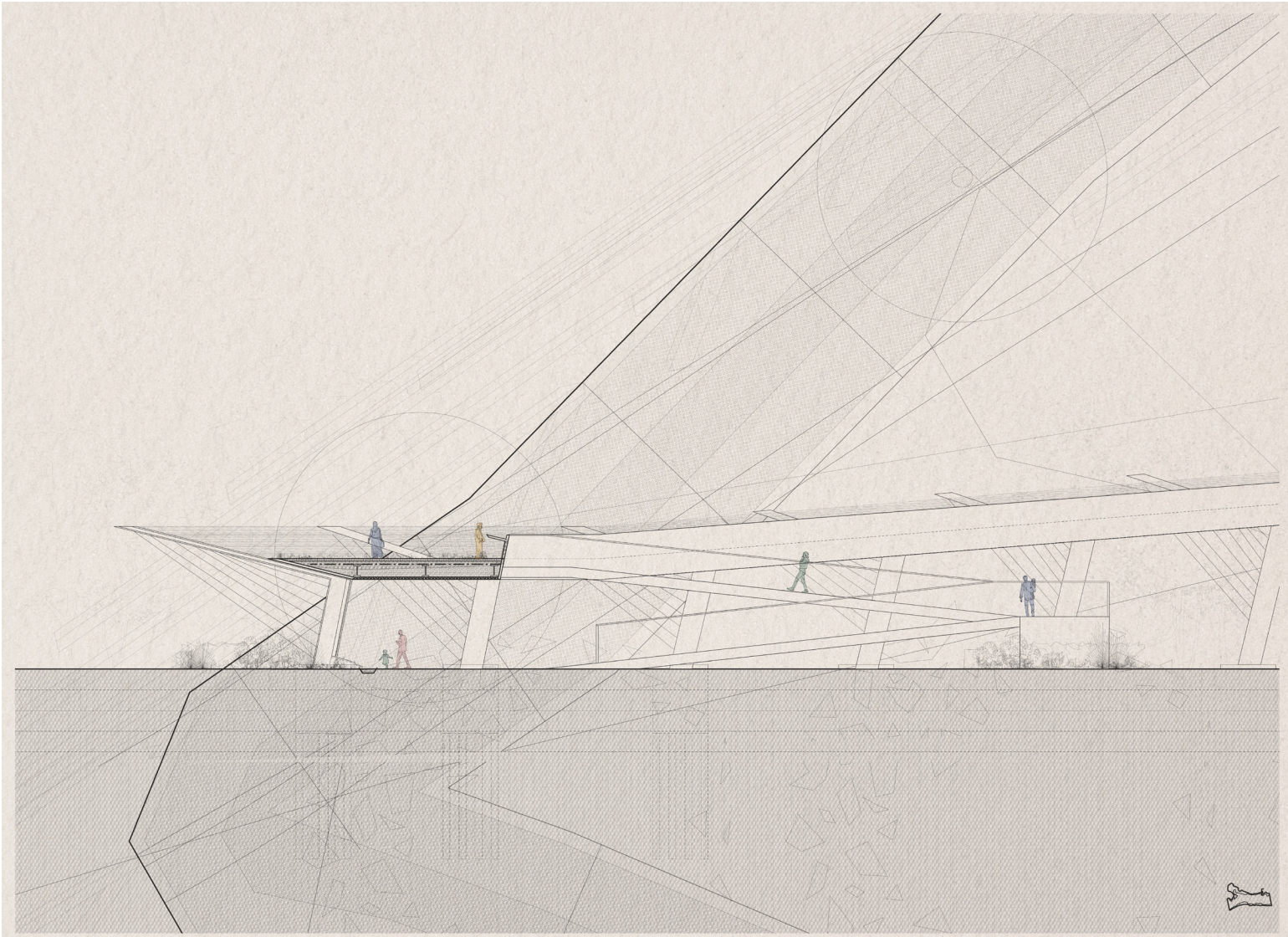
On one side, in an empty area between a navy complex and apartment buildings, a tide pool is dug at an old creek, creating an amphitheatre that follows the former coastline. The railroad is covered with a tunnel that creates a berm condition that people can traverse.

The tunnel is raised, and its supports allow water to pass through and fill the stands over time. The amphitheatre is clad with a porous paver that supports saltwater flora when full of water. Stand seating facing the harbour abuts the tunnel. The amphitheatre steps are notched with sea-level heights so visitors can measure and visualize the changing water level. People can gather, perform, and organize in the amphitheatre concurrently while others watch the water or the event on the stands, making the tunnel work as both a back of stage and back of the theatre.

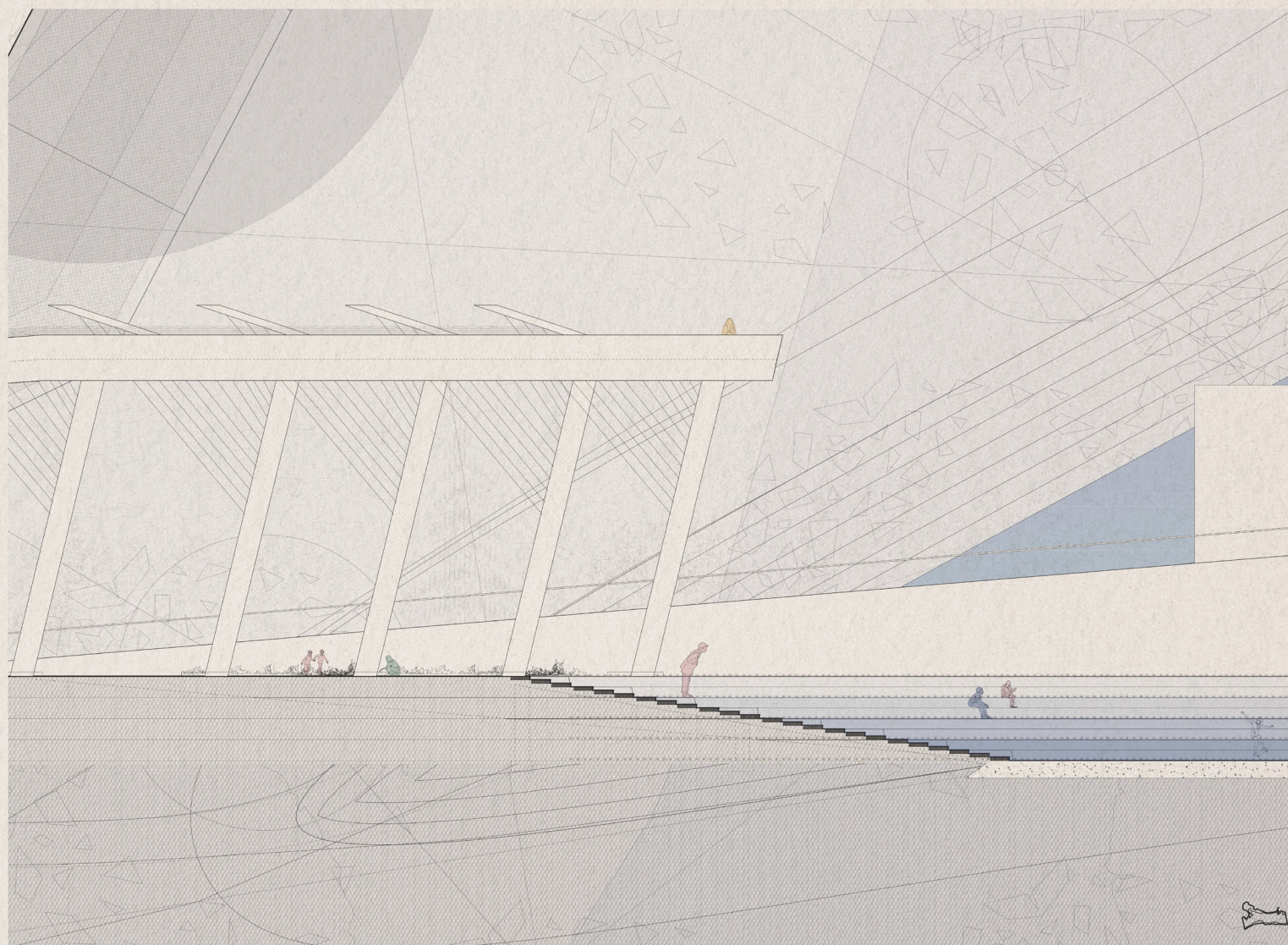
The path of the old creek is traced beyond the perimeter of the amphitheatre. A culvert is dug, and a footpath follows the same line, bringing people from the path, which touches down with a ramp to the stage.

On the opposite side, among navy buildings and at the terminus of the main road, a column is dug into the saltwater aquifer using a passive artesian well system. The well serves as a beacon, a visual indicator of the water level from the city. It pairs with an elevator so that visitors can follow along with the changing elevation.

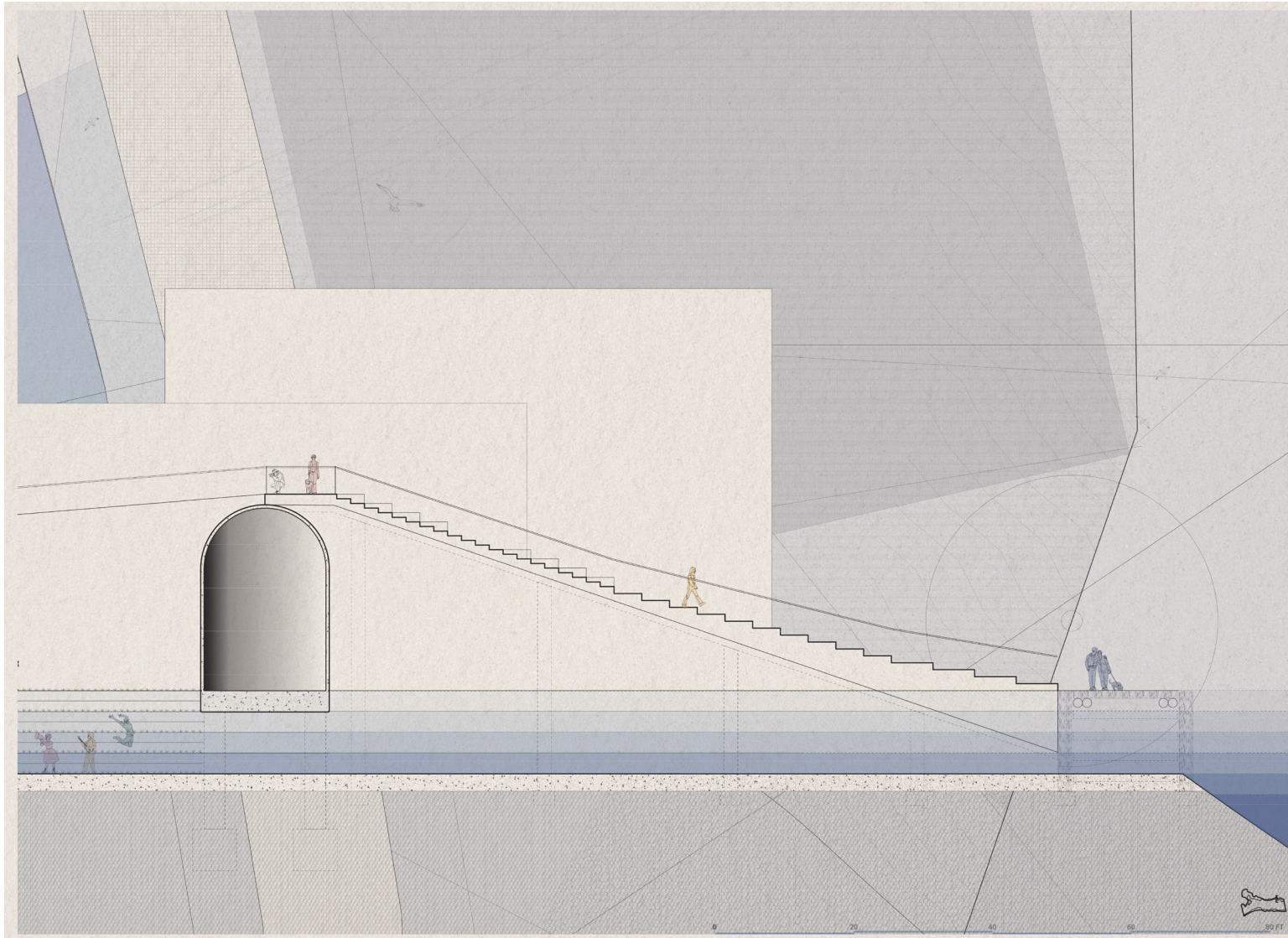
Bridges are connected to the path with ramps and elevators. The ramp connects the bridge's pedestrian path to the raised path and the ground at the Macdonald bridge. The ramp stems off and connects to the rail tunnel-berm, joining



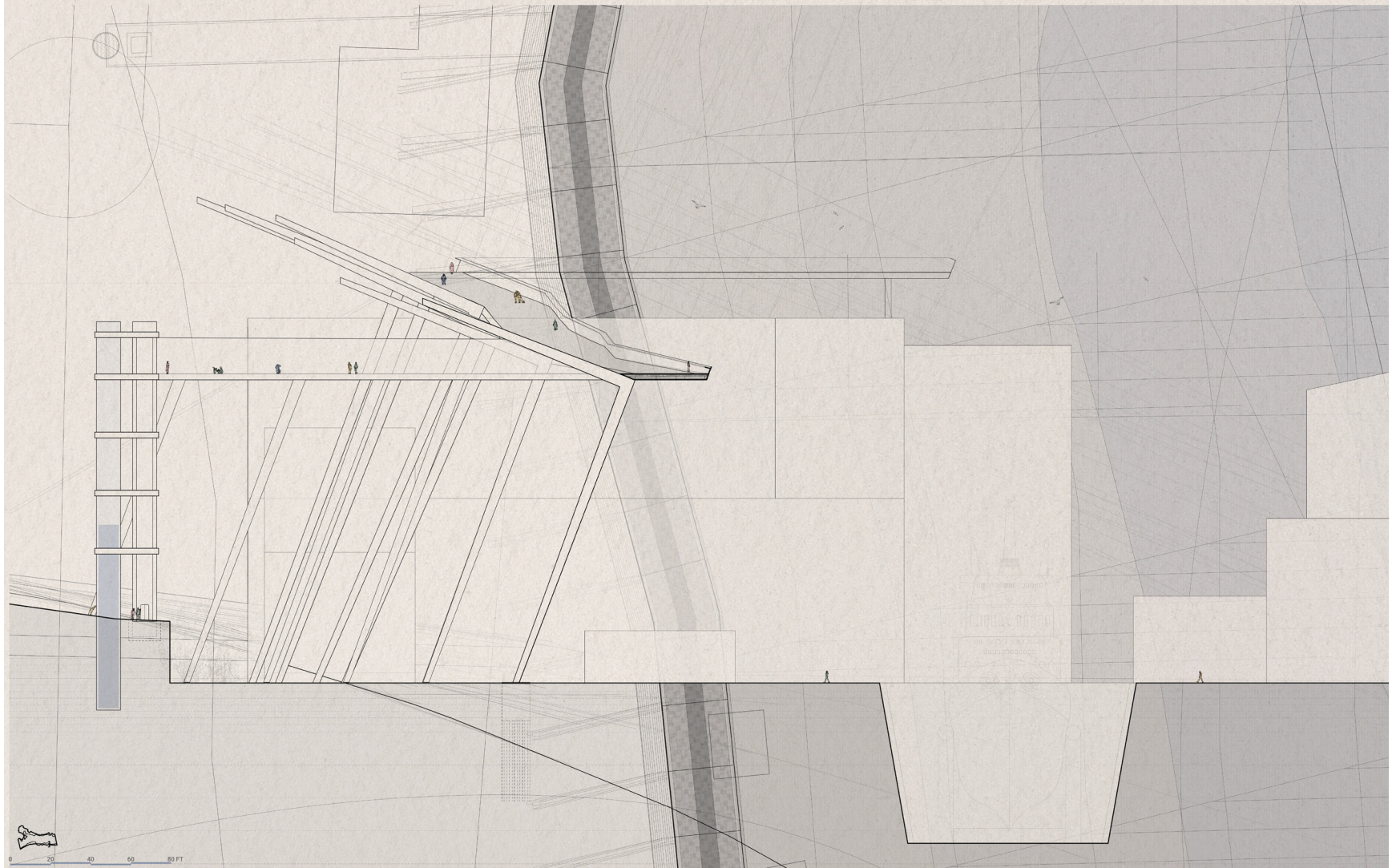
The path touches down at the intersection of the former creek and future coastline to connect with the city.



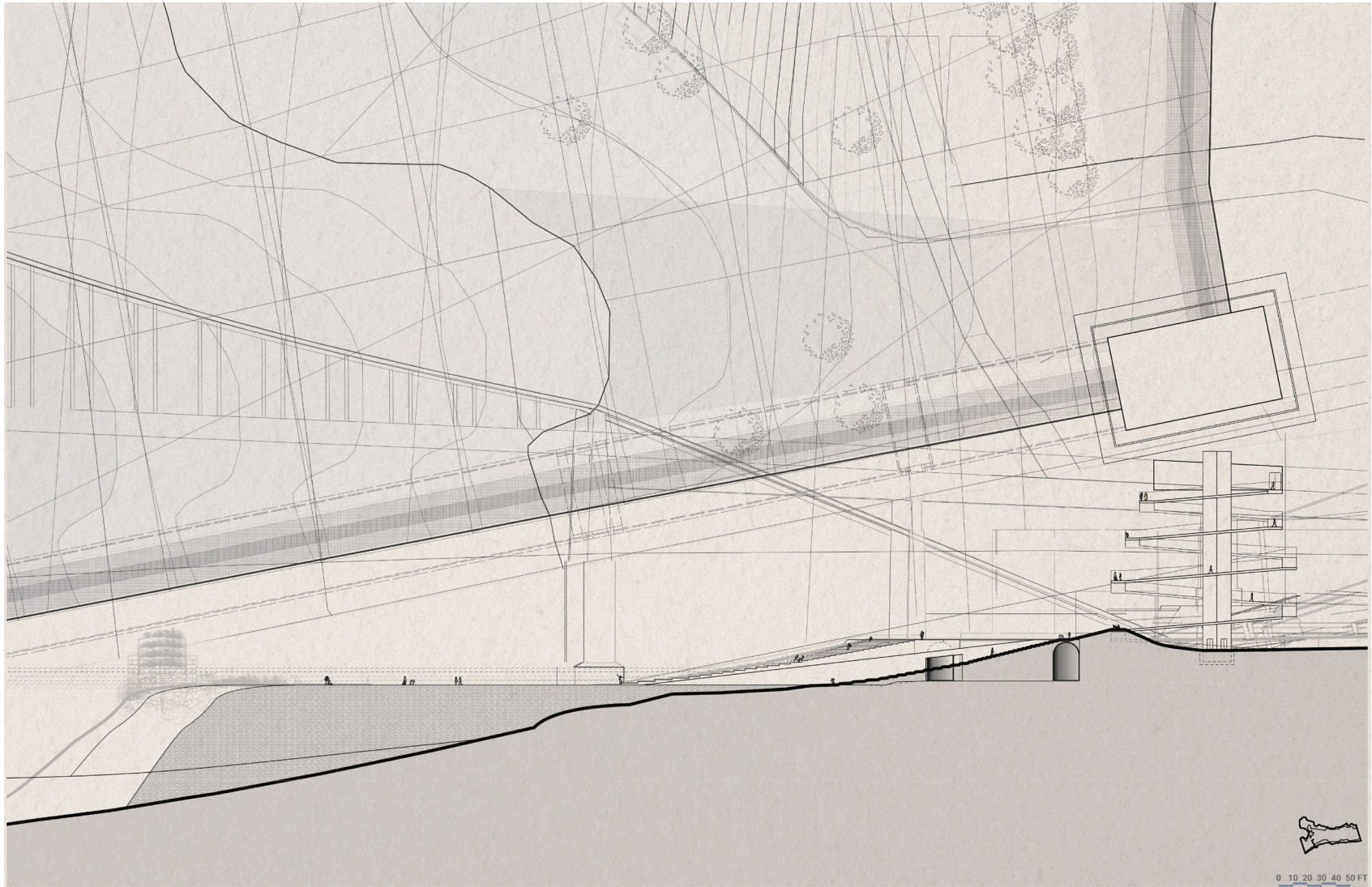
Now infilled, the old creek's path becomes a culvert and a path leading to excavated stands in the bounds of the former coastline.



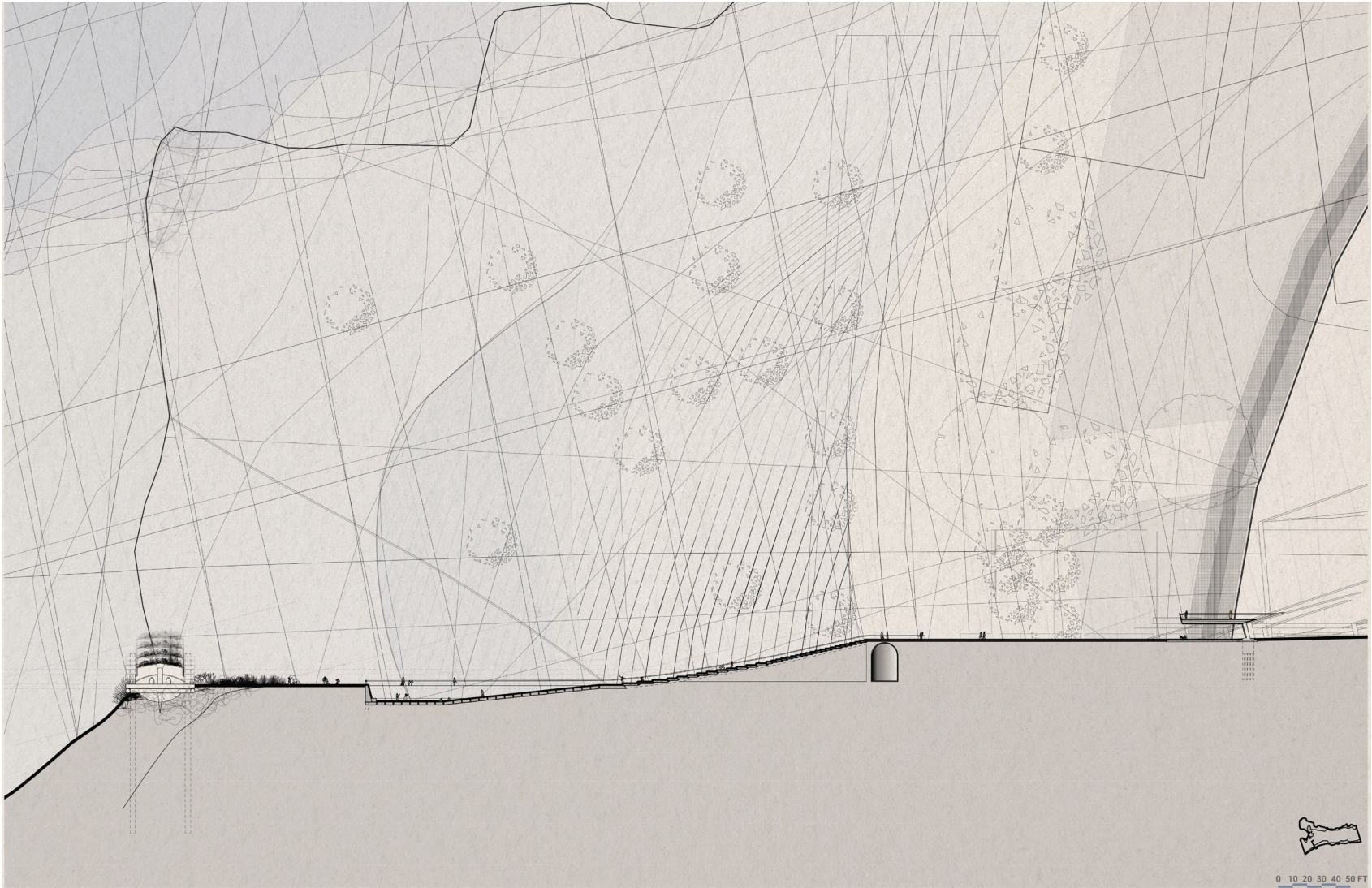
The railroad intersects the site, allowing water to pass through and serving as both a backdrop for performances and a berm.



An artesian well measures the changing water level and marks the intersection between a former creek, now expressed as a dry dock, and the coastline prior to infilling.



A series of ramps connect the bridge to the ground, the path, and the railroad tunnel berm.

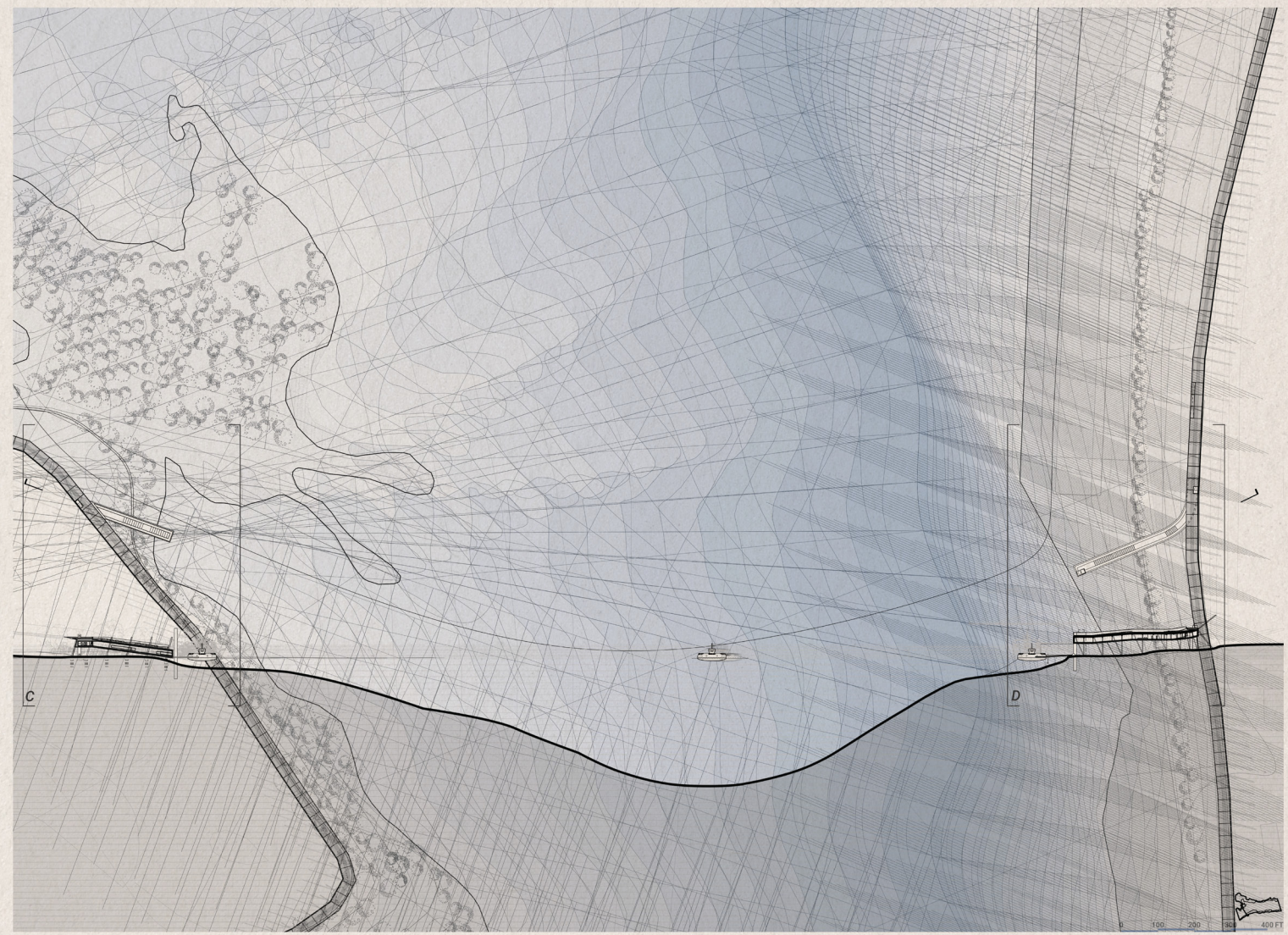


Steps bury the railroad tunnel and continue to a dug stage and seating area, inside of the former coastline. *SS Daisy* is dislodged from the shore and allowed to float with the changing water level.

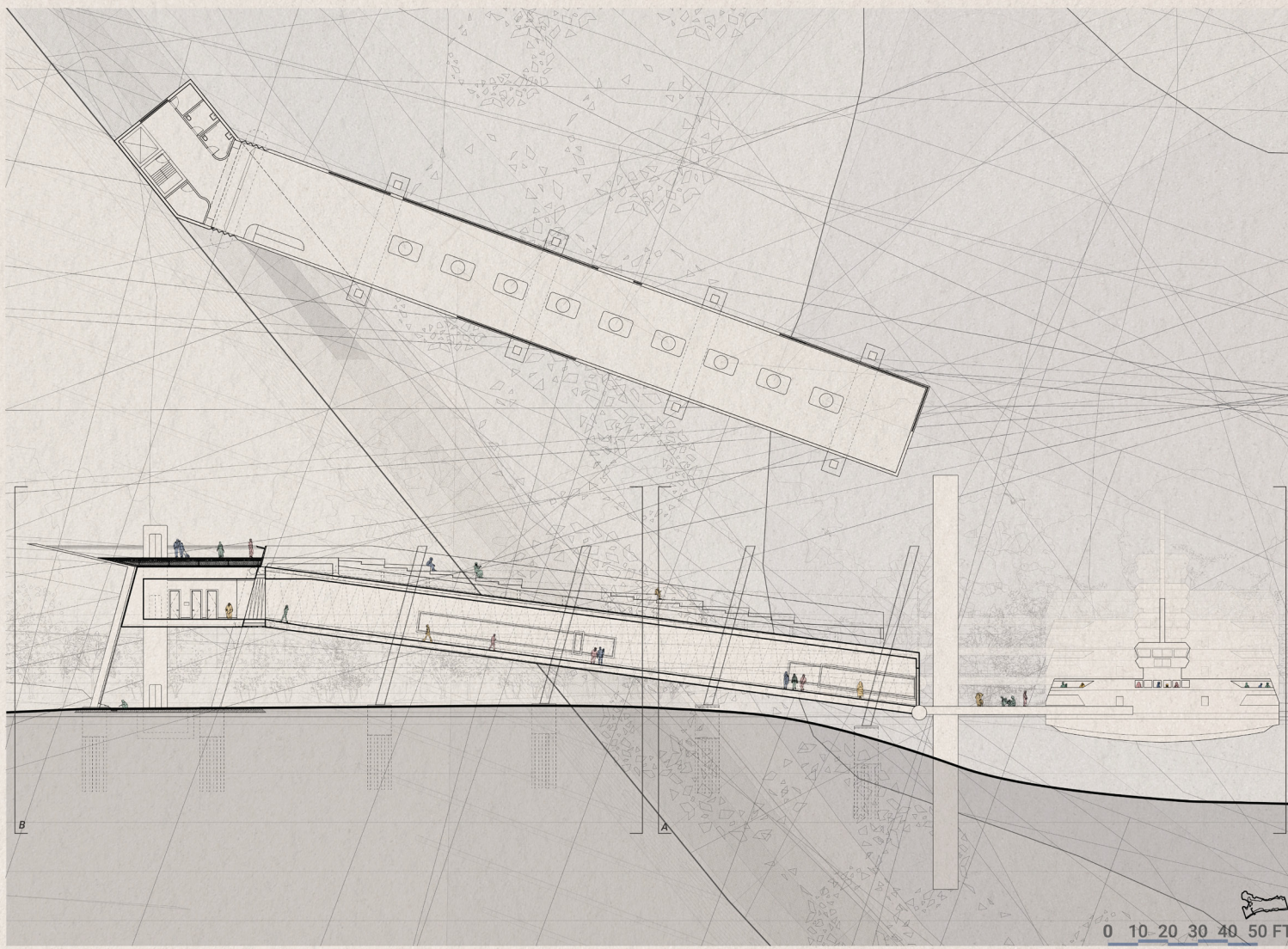
two steeply linked ground planes with a gentler slope. The ramp leads to stands also abutting the tunnel, which utilizes the past-future grid, facing a sunken stage condition that inverts the former coastline.

At the former land bridge connecting the two, now separated, sides of the harbour zone, two ferry stops are proposed that add to the city's ferry system. The path of the former land and railroad bridge determines the orientation of the ferry stops, which are used to link the community to the water and activate the former harbour connection of the land and rail bridges at the narrows. The building pivots from the path on the west, with both the stop and pathway floating within the trees. The building slopes down to connect the path to the water, connected by hinges to adjust to the changing water level. As one moves along the path, a stair or elevator connects the ferry stop to the path and ground level. Alternatively, one can walk directly from the path onto the roof, supporting seasonal stand seating to watch the water and the annual event. As one moves from the path toward the water, cased openings frame views of symbols of the various eras of the harbour's existence. On the same side of the water, known as Turtle Grove, this land is lower and bears the brunt of wave action, so salt marshes provide added protection for the coast.

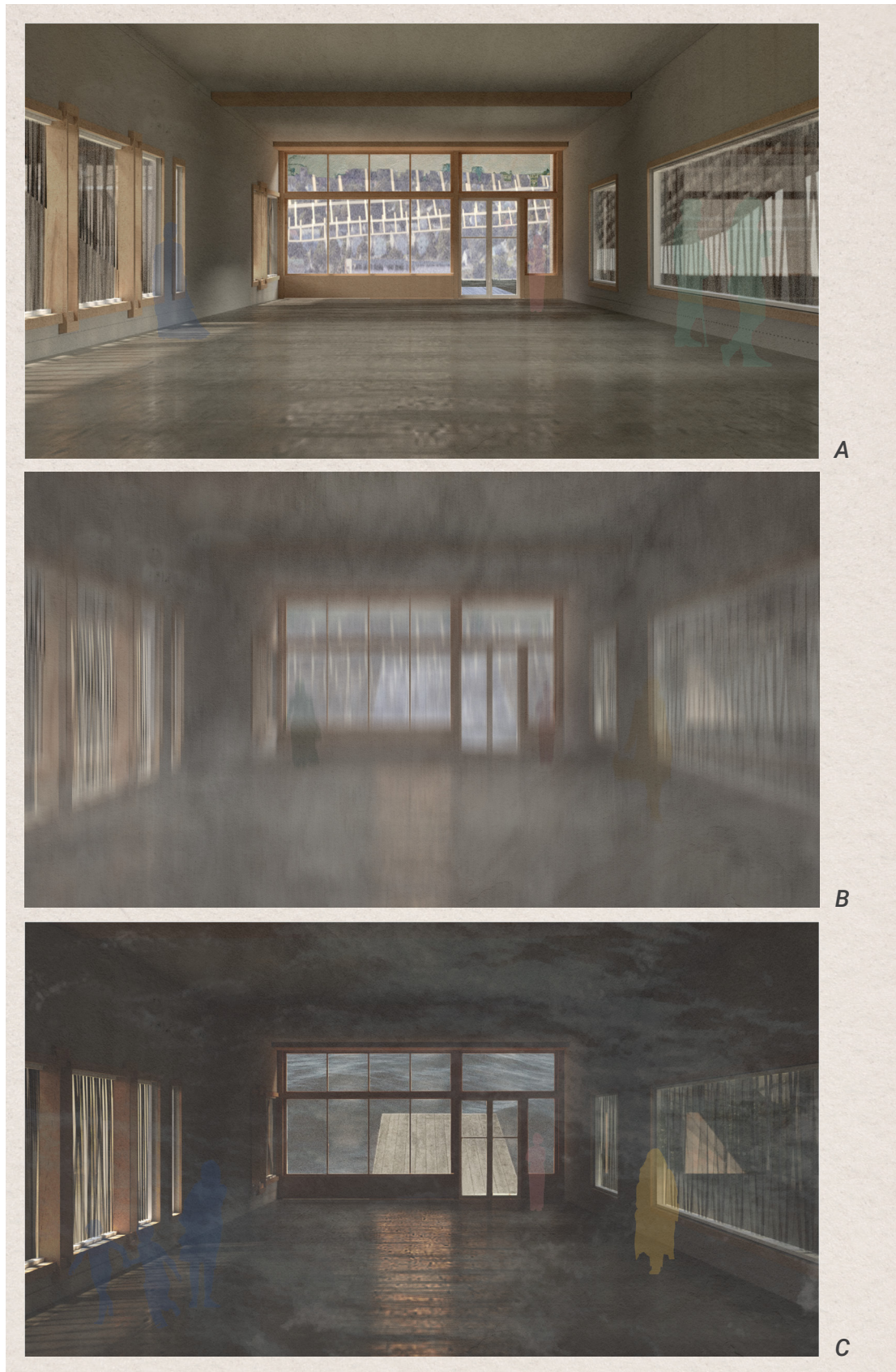
On the east side, one can take a ramp from the city or the path to get to the ferry stop. The building slopes toward the water to meet the artificial coastline. The stop follows the path of the old rail bridge and the orientation of the old land bridge. In the summer months, one can sit on the roof to take in the harbour and the event. Characters symbolizing the eras of the harbour's story are made vivid and framed with fixed seating and cased windows. Vertical wood strips



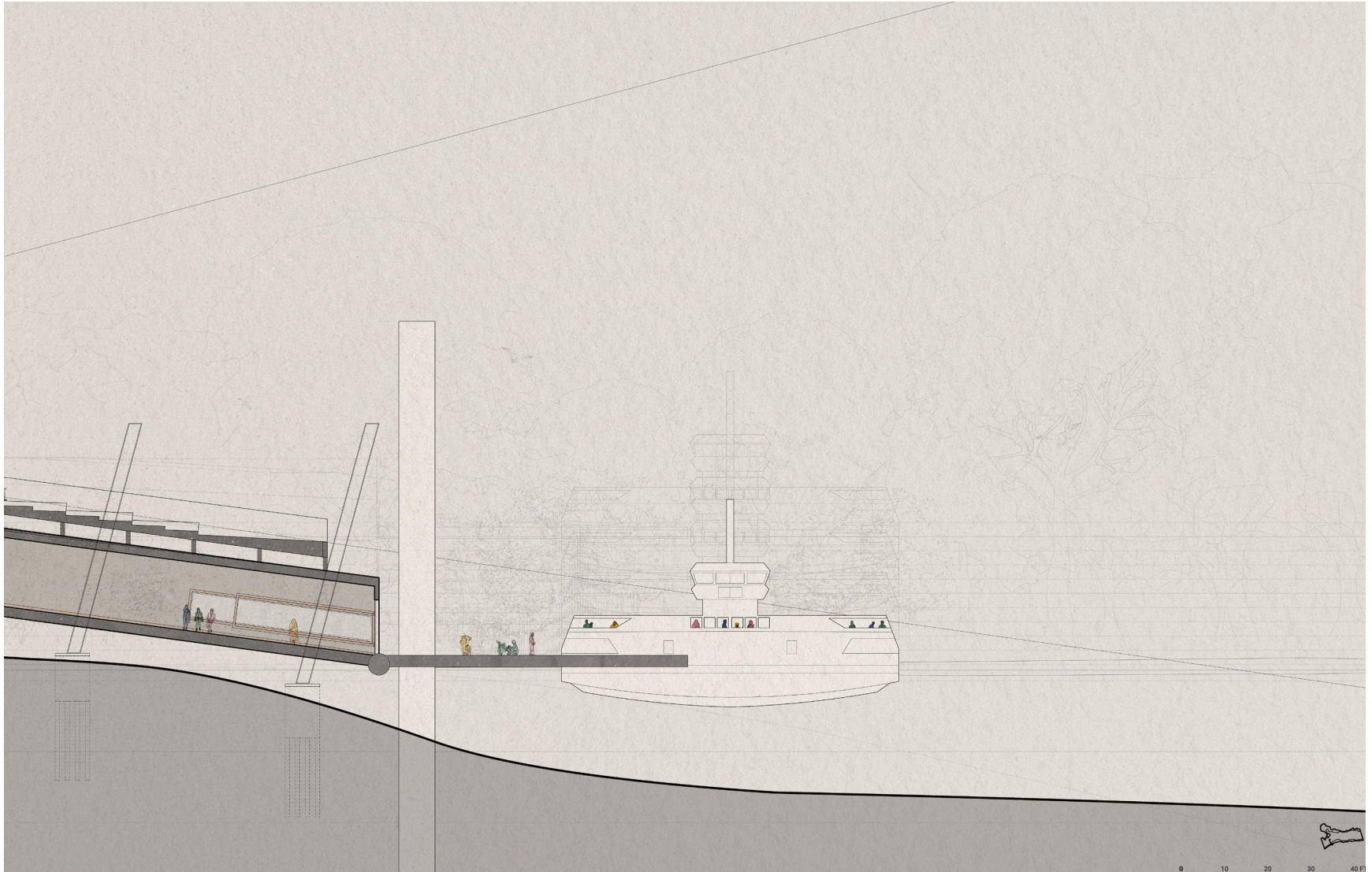
Two ferry stops face each other at the old land and rail bridges, linking public access at the two North Ends.



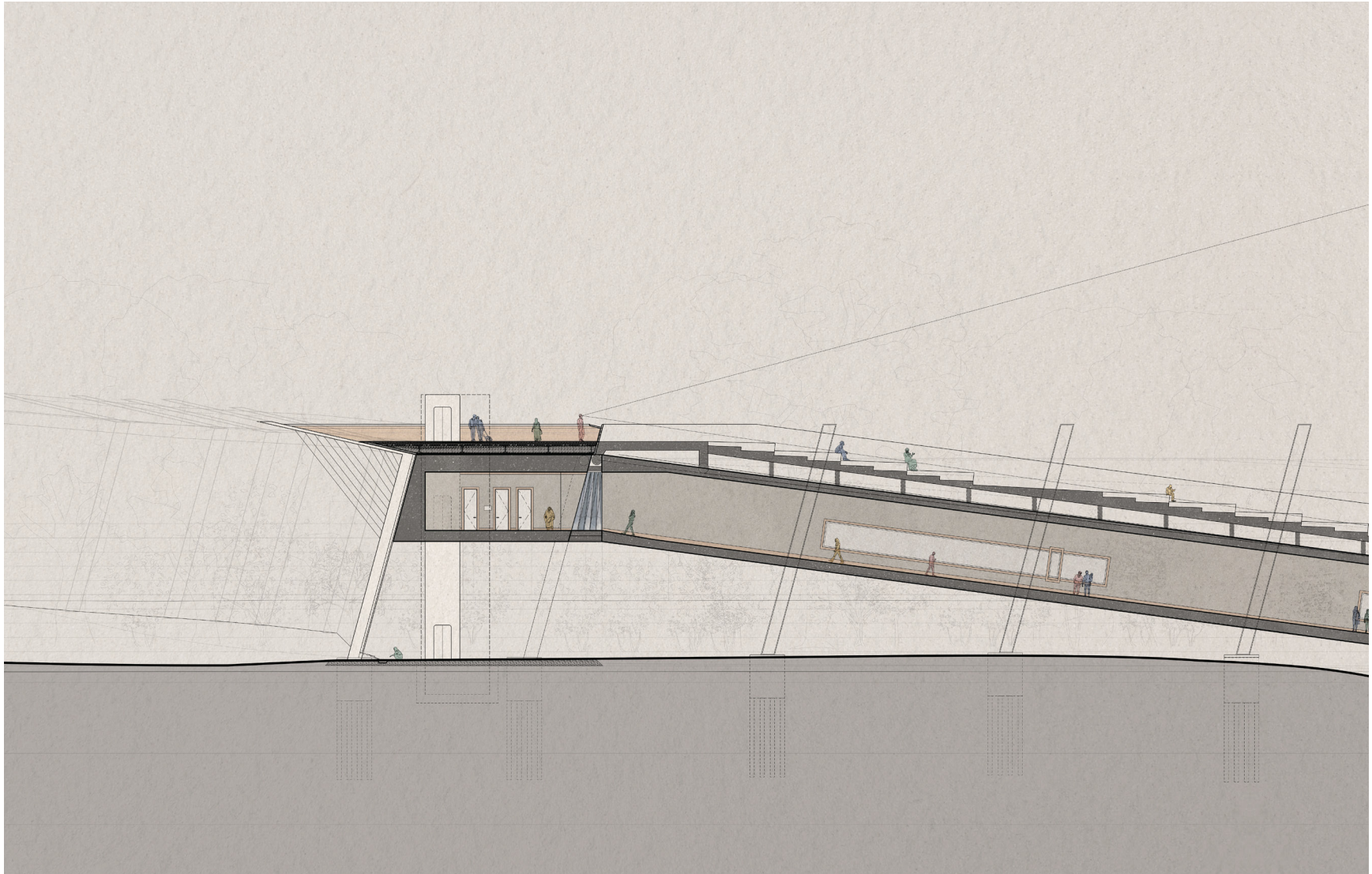
The ferry stop pivots from the path toward the water with the changing sea level. Cased openings frame surrounding characters.



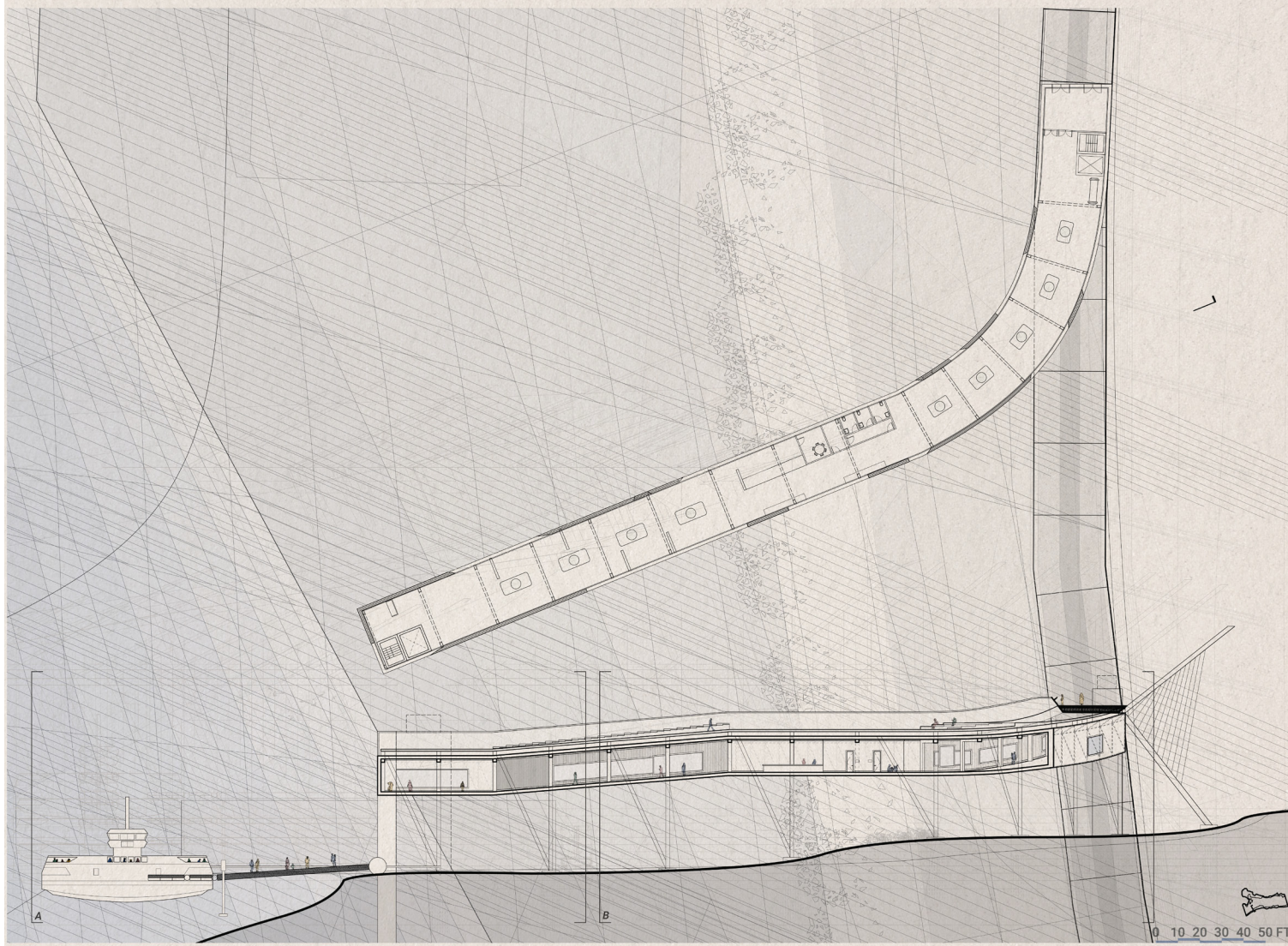
Ferry stop motion sequence: A: +5-metre mean sea level; B: in motion; C: current sea level



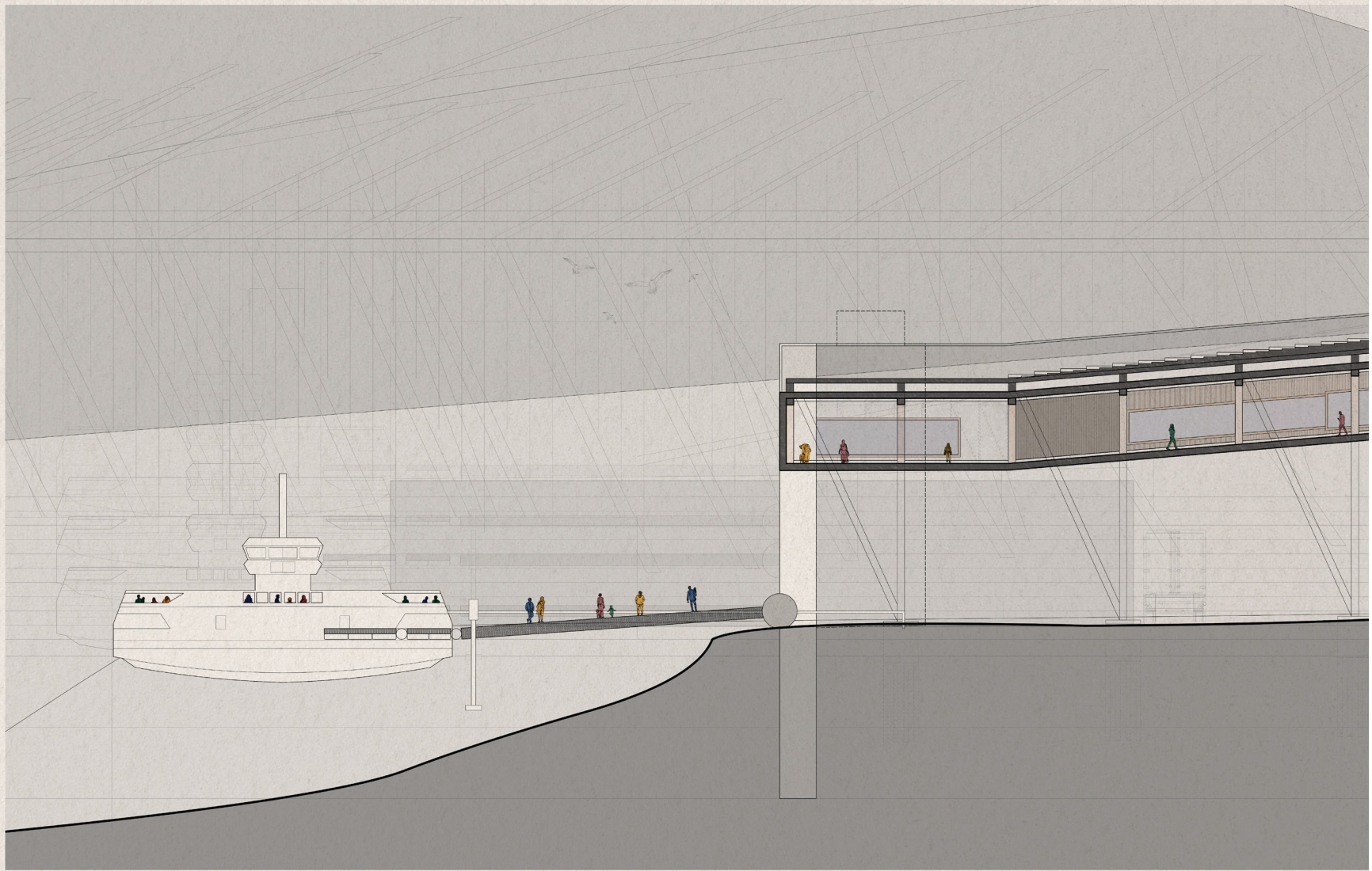
Ferry entry and exit; stands on the roof face the water.



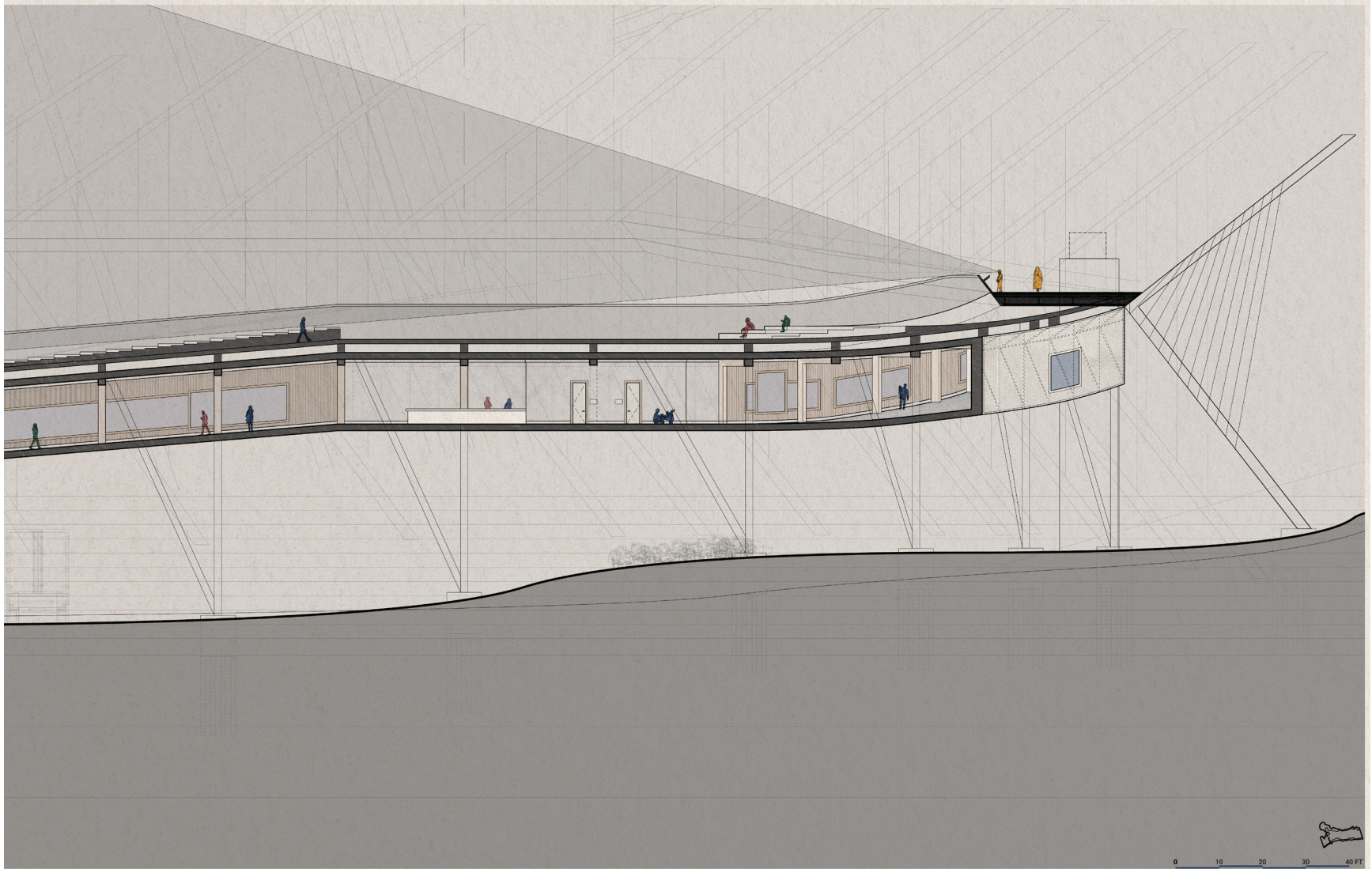
Stairs and an elevator lead visitors from the path to the ferry stop or the ground.



The ferry stop peels down from the path over industrial buildings and infilled docks.



The dock measures with a tide gauge and moves with the water level, eventually meeting the elevation of the stop's finish floor height.

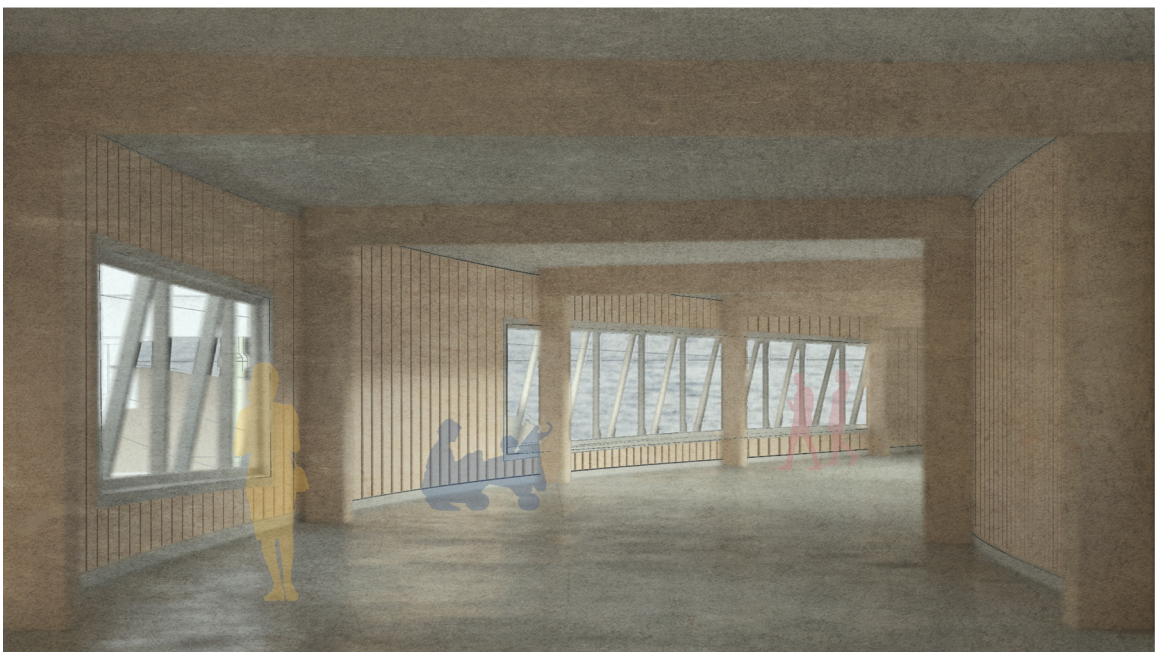


Roof stands support water observers. Openings below frame views that symbolize sequential eras in the harbour's lifespan.

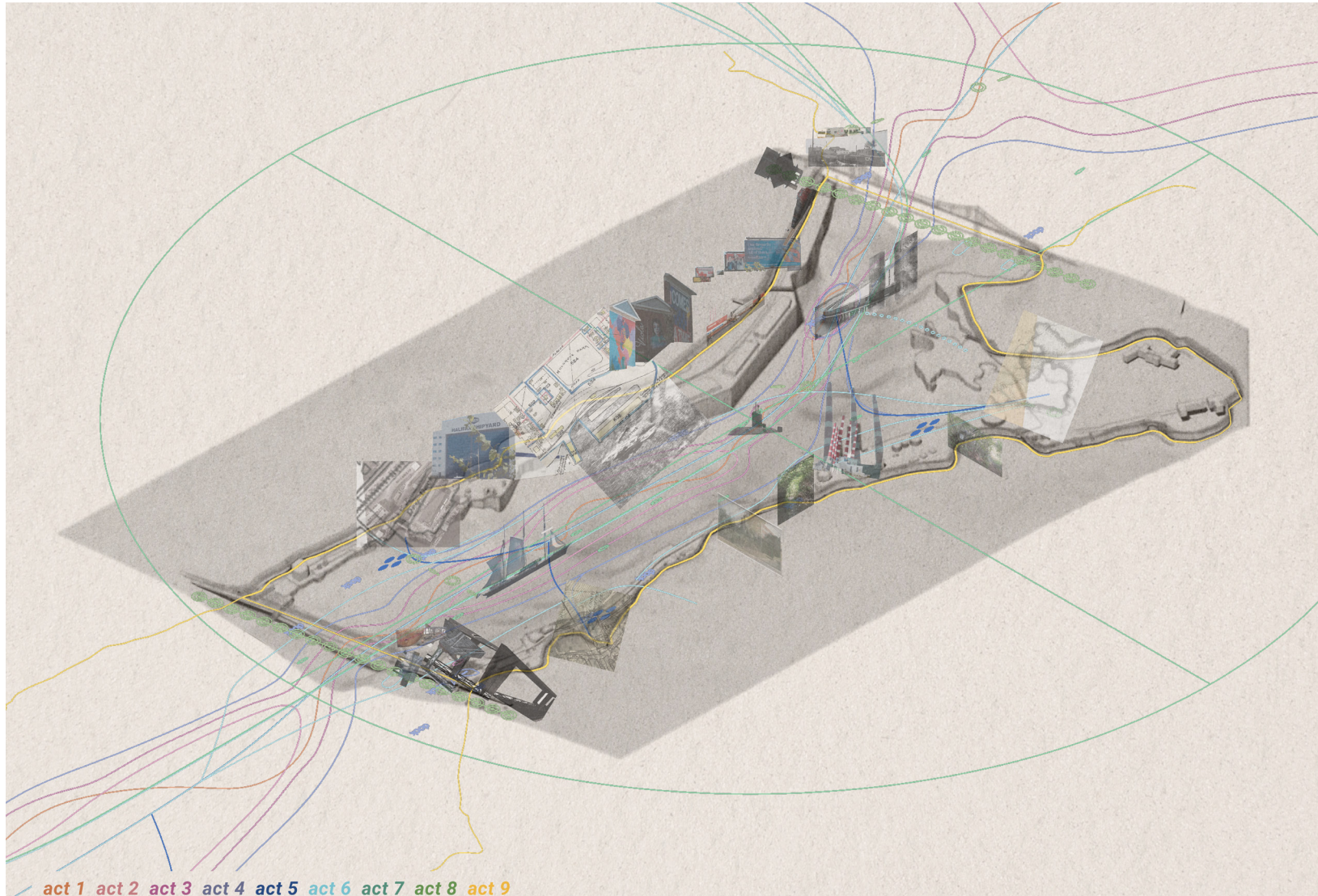
clad the interior, corresponding to amounts of years to emphasize various scales of time, giving a pattern to long-range change. Combined with the openings, visitors can touch and see various stages of the harbour's growth as they move through the ferry stops from the projected future coastline toward the coastline of the past. The old coastline is highlighted with a split in the industrial infill landscape, allowing the growth of saltwater vegetation.

Event

Dotted on the path are stands that support an event that compresses and traces the human and nonhuman stories in the harbour. The event commemorates and describes the human interaction with the waterway as it evolves. The path height was determined so that the event could be viewed from any point, and stand seating juts out from the path into the littoral zone. The timeline of the harbour is acted out at one-to-one in nine stages. People and boats perform the event on the summer solstice. Boats, groups of people of



Vertical wood paneling and columns demarcate time and simulate movement through frames.



Former coastlines as boat paths in the event, surrounded by characters

different scales, and lights act out the choreography. The performers activate the paths of former coastlines and the harbour characters. The presence, or lack of, people represent the human role in the evolution of the harbour. The acts of the event begin at 8:00 am and end at 8:00 pm.

Act 1: Old River

Early in the morning, small vessels, linked by buoys, begin at the mouth of the Sackville River and move south along the path of the old harbour river. Few people are visible, and the boats move slowly, increasing speed as they approach the outer harbour.

Act 2: Lakes

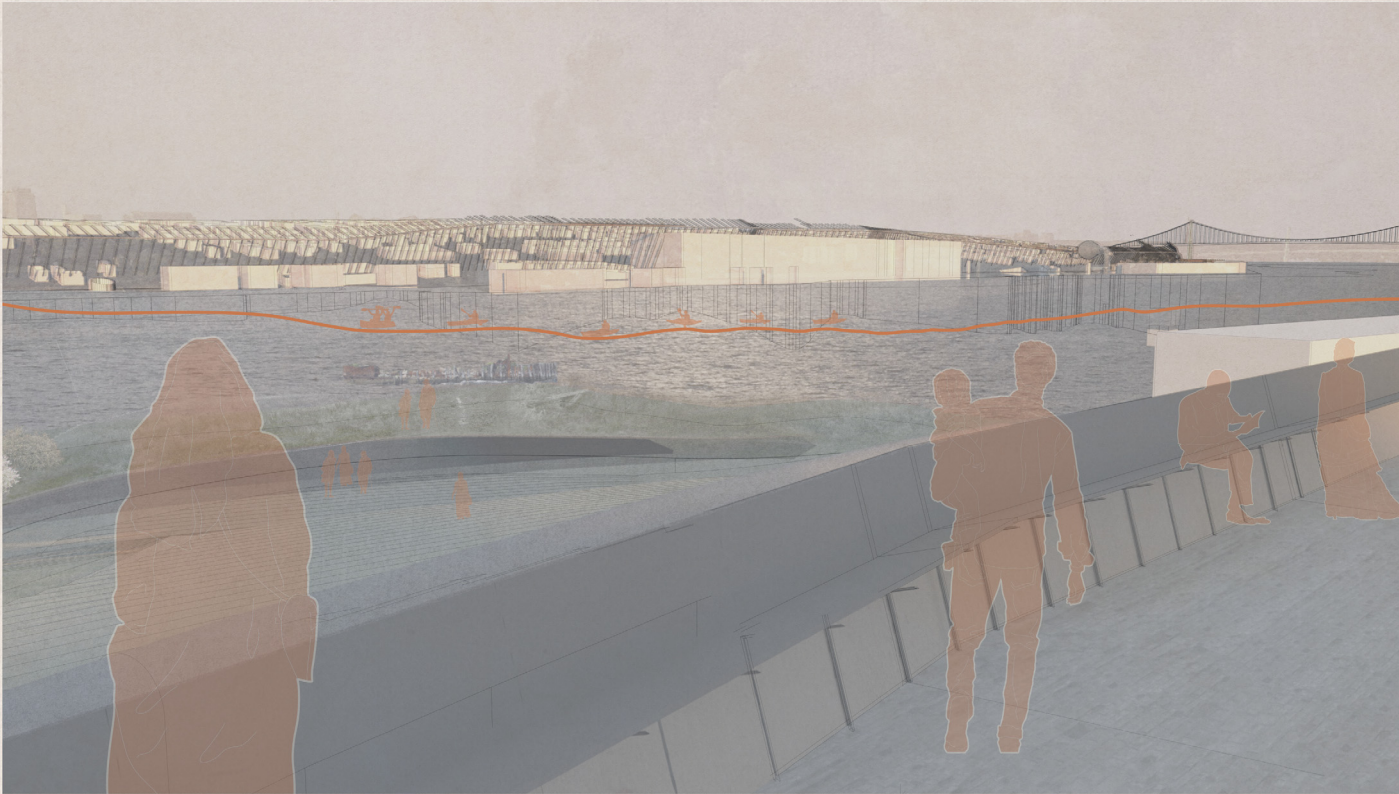
Following Act 1, more boats and people join the group from Act 1 and begin the path at the peninsula's southern tip. This group follows the path of the perimeters of the old lake system, lingering along the river between lakes. The undulation in speed represents the abundance of life and use of the land between lakes.

Act 3: Breach

At noon, small, motor-powered boats join the others from docks around the harbour. This act represents the increase in water in the harbour and the breach of the narrows. Boats rush towards the narrows; a crowd forms.

Act 4: Dispersion

Immediately following, boats head into Turtle Grove, travelling in larger groups now.



OLD RIVER
2 MILLION YEARS AGO

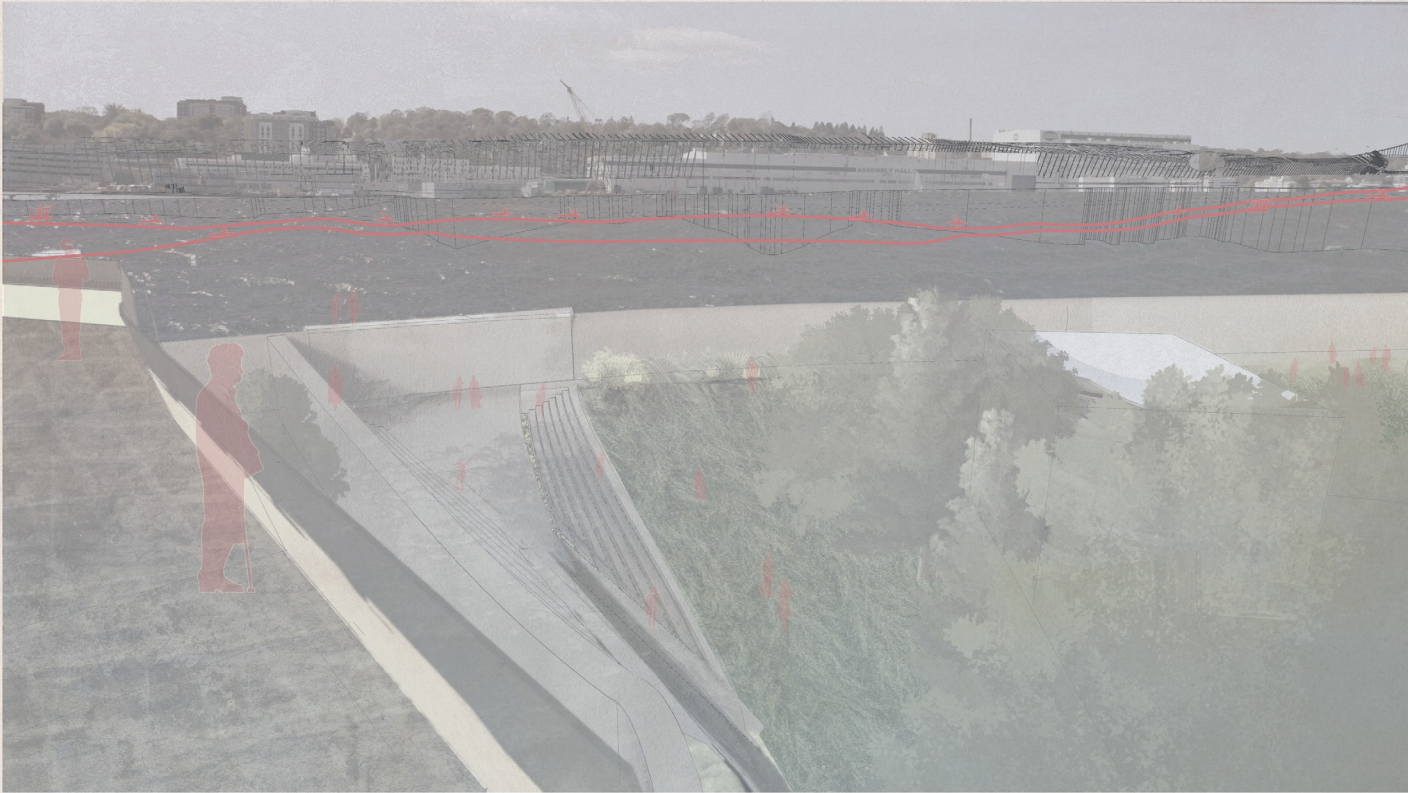
The sea level was 120 metres lower than today; the harbour was a river.

9:00AM, SUMMER SOLSTICE

Small vessels, linked by buoys, begin at the mouth of Sackville river and end at the entrance to the ocean. Few people are visible on board. Movement is slow at first, and the speed and size increase with each vessel.



Act 1: Old River

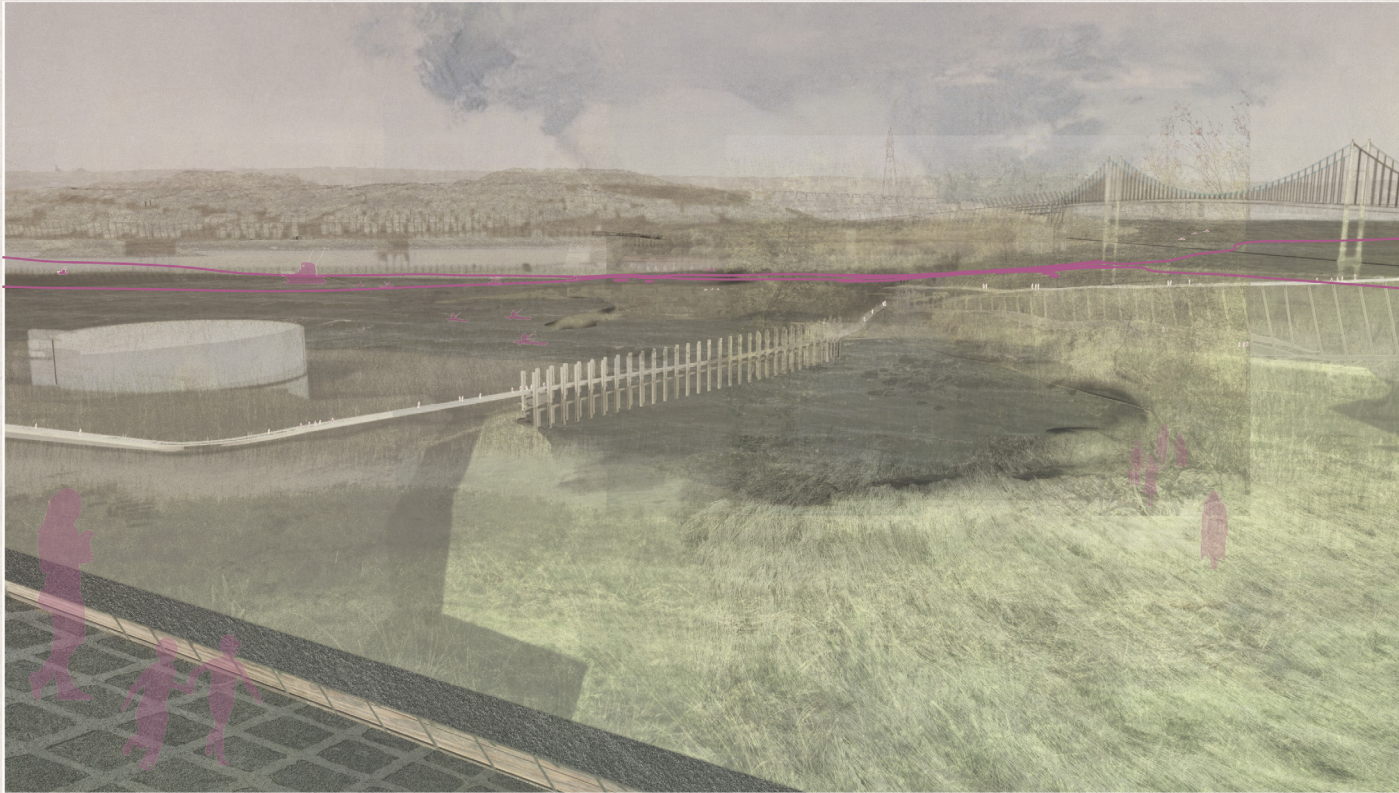


LAKES
3000-9000 YEARS AGO
 The harbour river eroded, creating a system of lakes.

10:00 AM
 Small boats take off from the southern tip of the peninsula. They move north on the harbour, this time following the perimeters of the old lake and river system. They linger between lake edges.



Act 2: Lakes



BREACH
3000 YEARS AGO

Asoqmapskiajk/bedford basin is breached: the lake is no longer fresh water.

NOON

At the noon cannon in the city, the boats powered by motors take on the boats that are human powered and rush in both directions to the narrows. A crowd is formed and then disperses.



Act 3: Breach



**DISPERSION:
3000 YEARS AGO.**

A lull follows the breach; this symbolizes nearly 3000 years prior to the colonization of the harbour.

JUST AFTER NOON

Boats travel between the new harbour shoreline and tufts cove, the shubenacadie canal, the mouth of the Sackville river, and the south end container terminal, and other sites used for fishing.



Act 4: Dispersion

A lull follows, representing an adjustment period to the growing harbour body. Boats travel between the breached harbour shoreline and the former locations of creeks.

Act 5: Military Occupation

Large wooden boats arrive from the Outer Harbour mid-afternoon, taking some smaller boats with them and docking at the Basin. Symbolizing the first contact settlers had with the harbour.

Act 6: Settlement and Port Activity

Eventually, naval boats take over the areas inhabited by the smaller boats. Finally, the smaller boats retreat; train whistles blow; the public can board the naval boats. Boats of all sizes migrate between the North and South Ports.

Act 7: Explosion

In the early evening, representing the Halifax Explosion, boats of all sizes crowd the inner harbour and stop. The citadel fires a cannon; dye is released into the narrows; stillness follows. Then, finally, the harbour fills with naval ships.

Act 8: Infrastructure and Development

As the sun sets, lanterns line the shores, and boats slowly tug them from their original locations, representing displacement. The light the lanterns create grows. The bridges are illuminated.

Act 9: Sea Level Rise

The pathway is illuminated, signifying the future coastline.

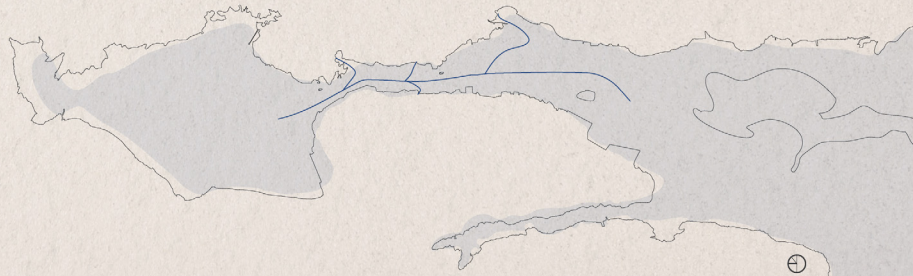


**MILITARY OCCUPATION:
300 YEARS AGO.**

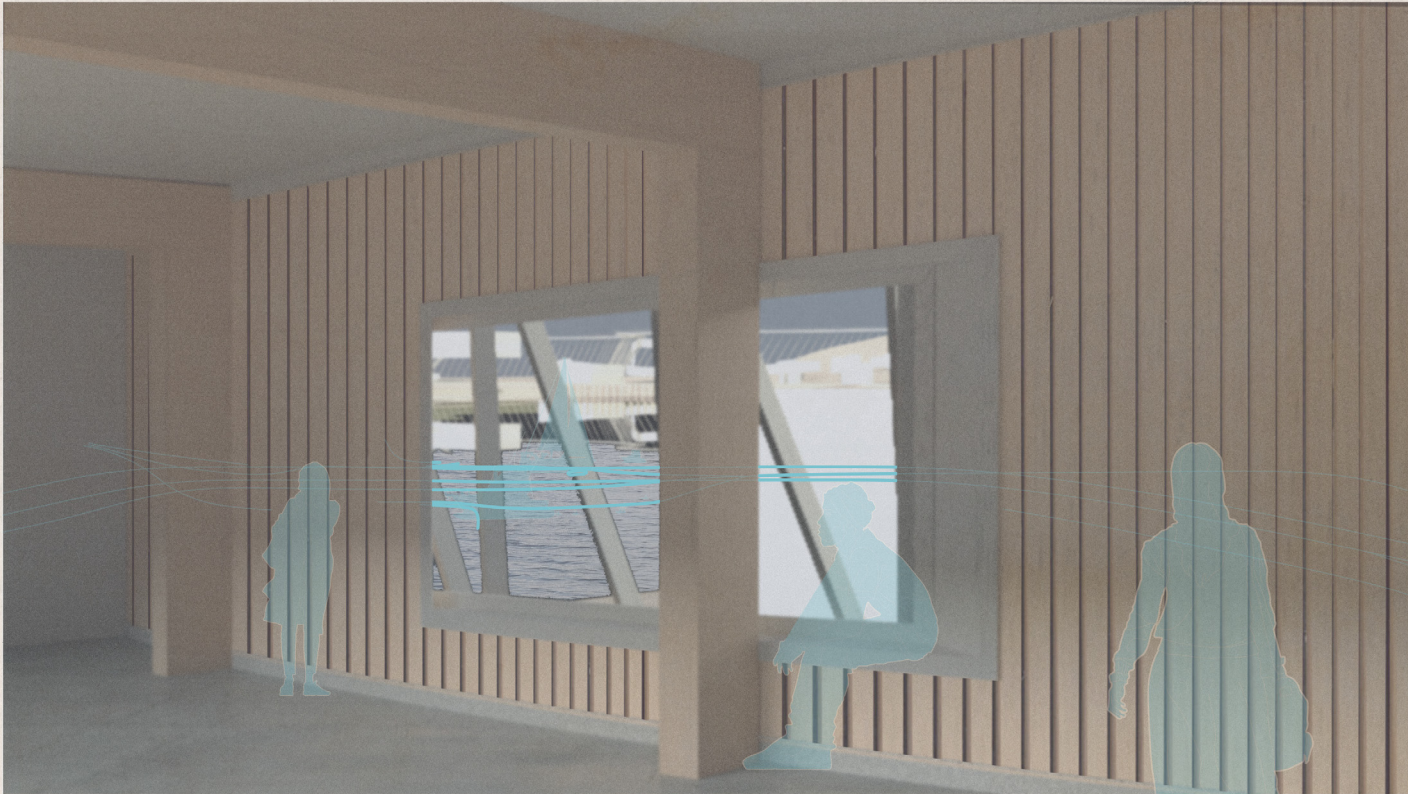
The harbour is gradually taken over by English and French settlers.

MID AFTERNOON

A large wood boat arrives from the outer harbour, taking the smaller gwinth with it. Large navy boats traveling in a pack enter from the outer harbour. Each boat takes on an area of the shoreline, and progressively the groups of small boats are displaced.



Act 5: Military Occupation



**SETTLEMENT AND PORT ACTIVITY:
300-100 YEARS AGO**

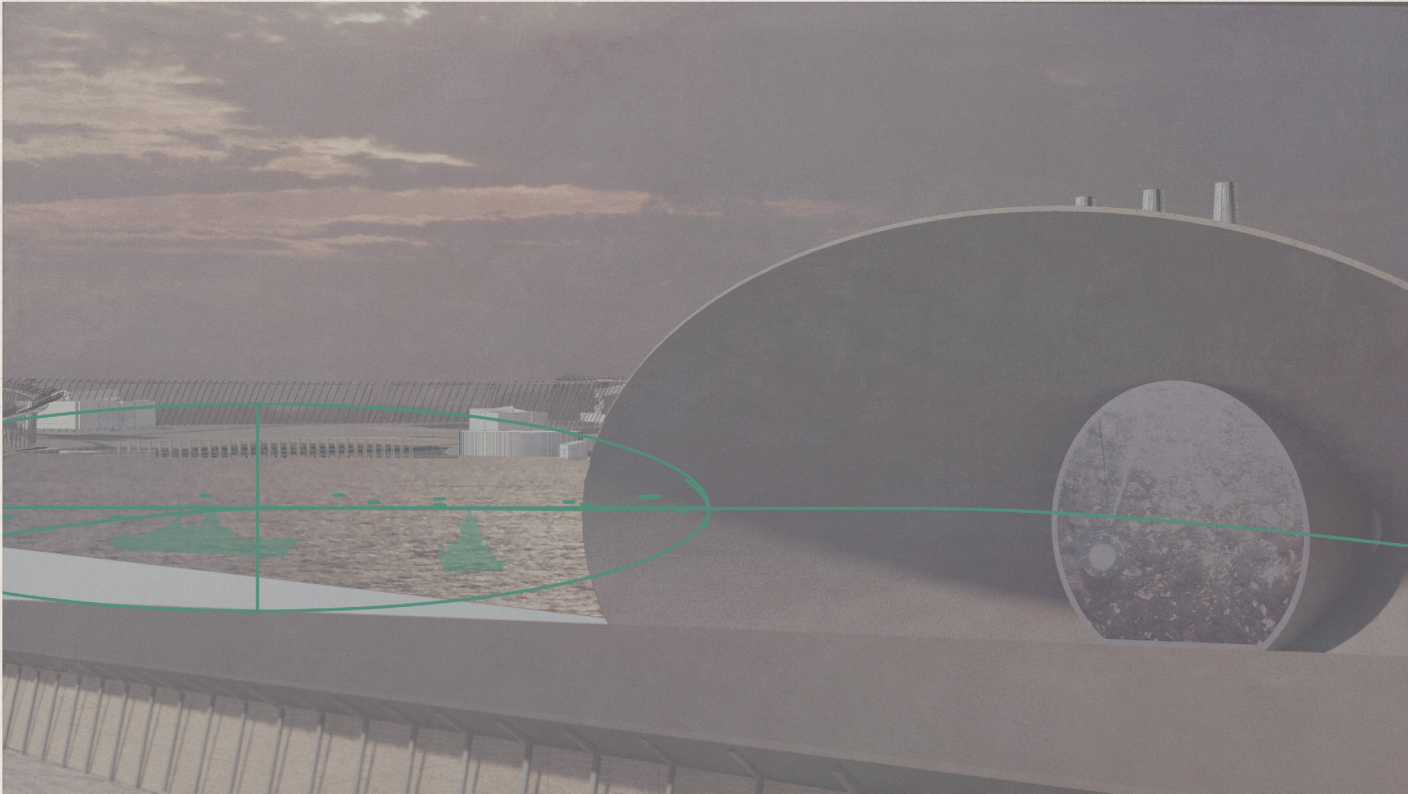
The naval base grows. The Canadian National Railway opens. Africville is settled. Halifax becomes a "free port".

LATE AFTERNOON

Eventually, the areas inhabited by the smaller, human powered boats are taken over by the naval boats. The smaller boats retreat to Tufts Cove. Train whistles blow. The general public can board the naval boats. Boats of all sizes migrate between the North and South ports.



Act 6: Settlement and Port Activity



**HALIFAX EXPLOSION
100 YEARS AGO**

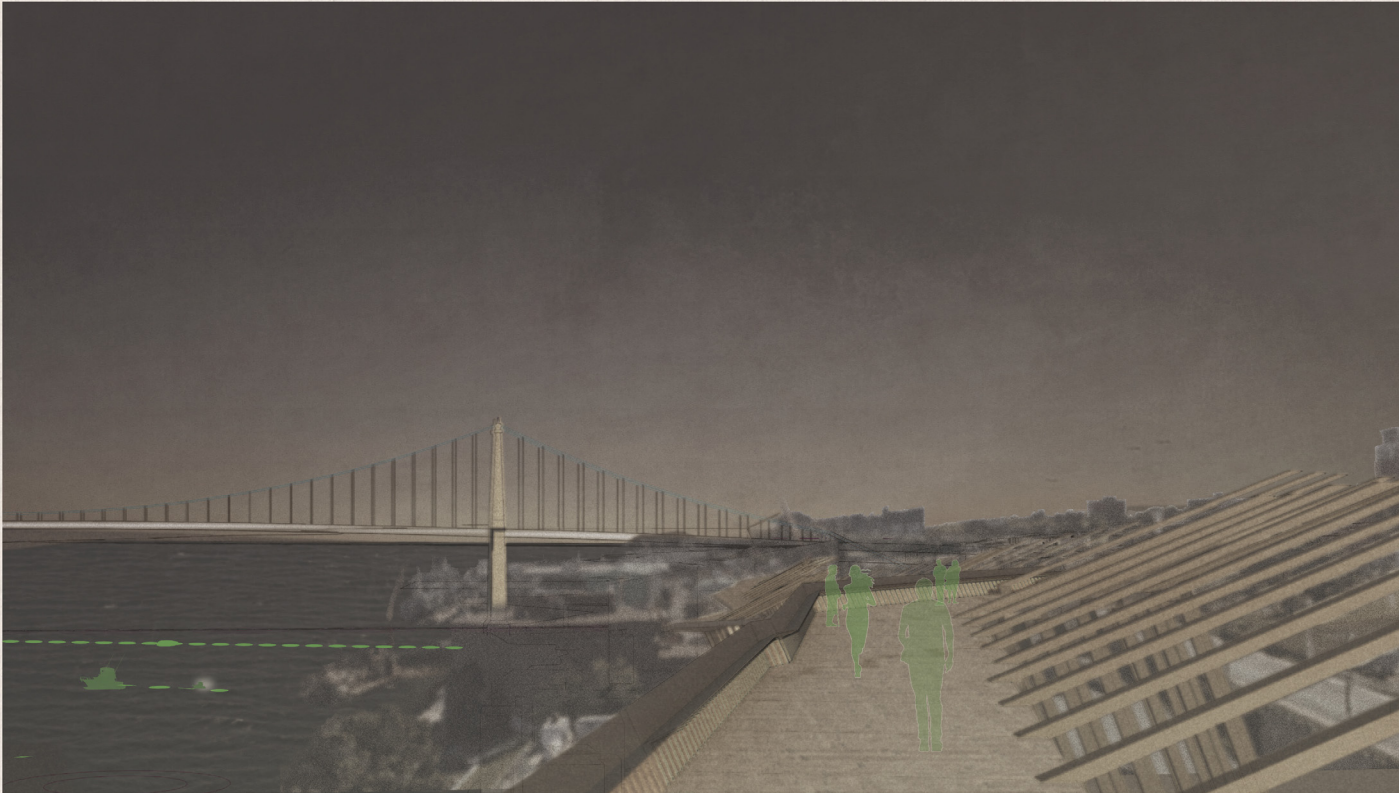
An explosion is caused by a collision of two boats at the narrows during World War I. The city is decimated and under-served communities are displaced.

EVENING

Boats of all sizes crowd the inner harbour, and stop. The citadel fires a cannon - red dye is released into the narrow; stillness and silence follow. The harbour fills with naval ships exclusively, moving to and from the container terminals.



Act 7: Halifax Explosion

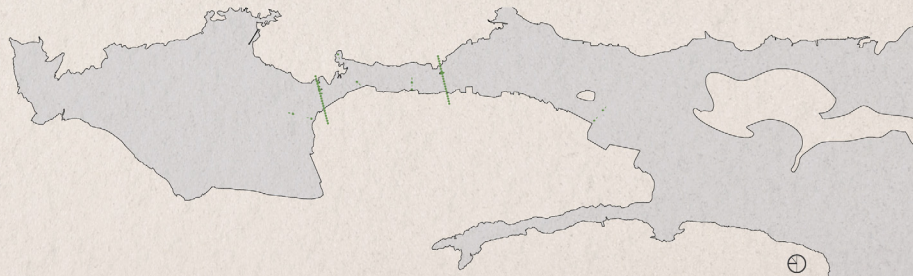


INFRASTRUCTURE AND 'DEVELOPMENT'
100 YEARS AGO TO PRESENT

Pier 21 opens to over 1 million immigrants. Africville is demolished. Bridges connecting the two sides of the harbour are built.

BRIDGES: AT GOLDEN HOUR.

Distinct lights line pier 21, Tufts Cove, and the shore of Africville. The lanterns slowly float away from their original locations. The lights they create dissipates. The bridges are illuminated.





**SEA LEVEL RISE:
100 YEARS FROM NOW.**
Sea level to increase from 4 to 8 metres from its
2020 elevation.

LATE EVENING
The pathway is lit, signifying the future coastline.



Act 9: Sea Level Rise

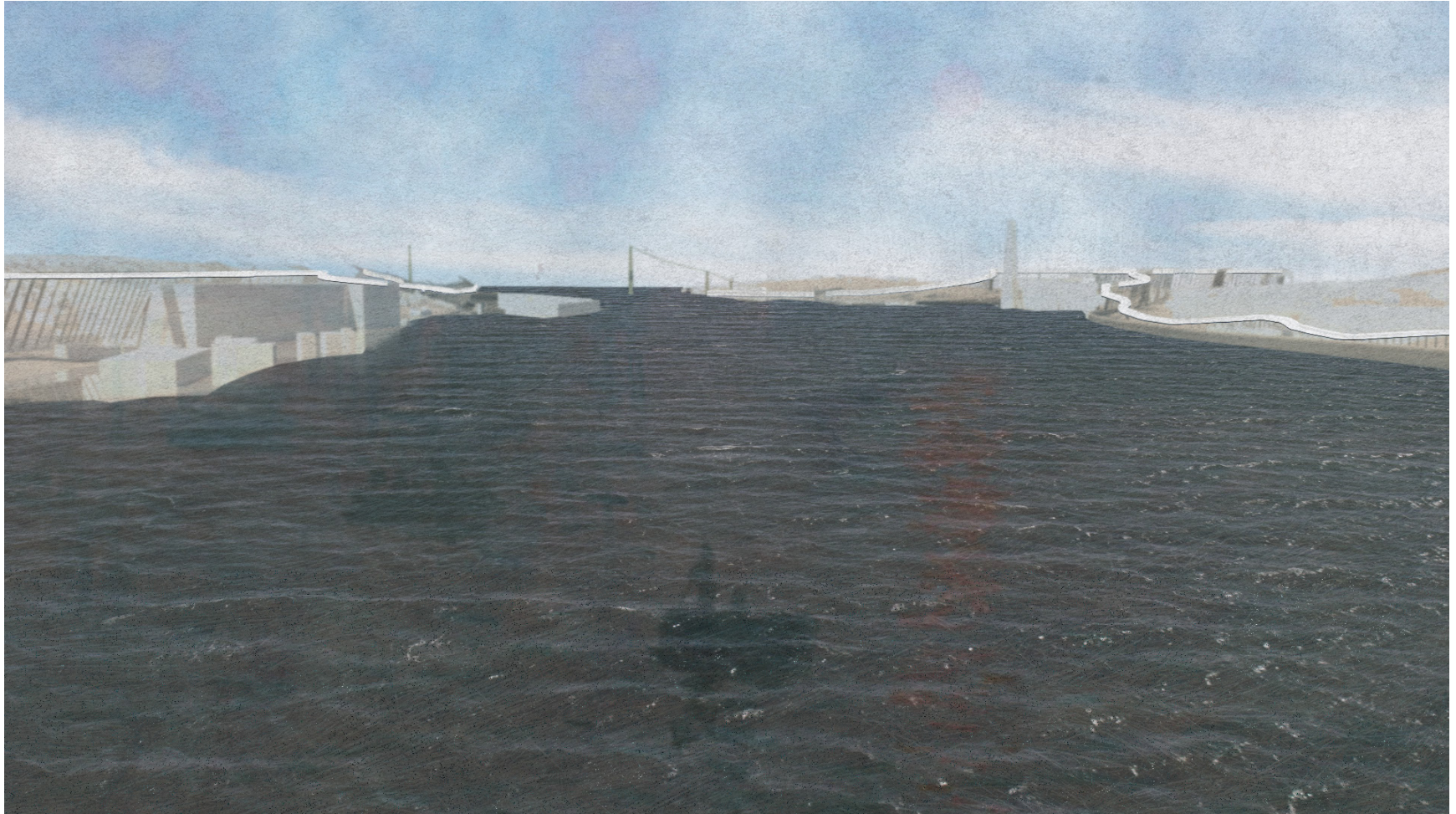
Chapter 5: Conclusion

The thesis aims to anticipate and embrace coastal change and the temporality of the waterway and make more explicit the human role in the planning of the harbour's littoral zone by reclaiming private and exclusive infrastructures that dominate the water's edge as a new common. A looped path, two ferry stops, and an annual event act together to make explicit the changing sea level and give equal access at three spatial-temporal scales: the harbour, cultural characters, and the individual. The thesis democratizes water access and activity by adding an accessible pedestrian path and two ferry stops at the North Harbour. It points toward the characters in the landscape that are the agents or recipients of sea-level change, and by viewing changes over different scales as an event compressed into a day, a heightened connection between people and the water can be achieved. The unwieldy, idealistic nature of the design speaks to the challenges faced when forging equitable change at the systemic, infrastructural scale. The thesis imagines the role of architecture as a mediator between perceived and constructed spatial-temporal changes in the landscape and actual change.

The initial aim of this thesis was to develop a holistic method of design based on local relationships with the water, articulating water as a mirror to a place and culture and a reflection of the individual. The resultant mix of methods served as a set of frames to defamiliarize and abstract the very landscape whose familiar nuances this thesis set out to express with architecture. Interpretation filtered out many existing conditions save for prominent symbols and the topography; layering focussed on the intersection between

colonial etchings of the land in maps and LiDAR-generated landforms; framing worked to connect the individual with environmental change. The results express less a familiar individual connection with one's landscape and instead create space for a new reflection on the ephemerality of the present.

The methods used were synthesized to apply to this harbour and other dynamic hydrological landscapes layered with geological, cultural, and ecological histories. Using interpretation, layering, and framing of the littoral and literal emphasizes how they are intertwined: people shift the course of the harbour, and the form of the harbour defines human activity, and the ocean and weather dominate regardless. As sea levels rise, violent storms increase, and the large-scale modification of the coastline continues, human and nonhuman traces will disappear from the permeable ground and collective memory. It will be important that everyone in a community has access to the coastline, even if in tandem with industrial zones. This way, environmental and cultural changes can be measured over time. Universal access to the natural environment, including our societal etchings in the landscape, can translate to improved individual wellbeing and agency.



The path, as seen from the Macdonald Bridge

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