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CHANGING TIDES

How architecture can create a confluence of coastal activities so that our
experience of movement is enhanced within the marine environment

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ABSTRACT

New Zealand has the tenth longest coastline in the world; however, the relationship contemporary coastal architecture has with the sea is hesitant. Coastal architecture forms a medium in the littoral zone between land and sea, where the confluence of both recreational and commercial coastal activities occur. The majority of New Zealand coastlines are protected by reserves and prescriptive setbacks, although there are private and commercial examples of architecture breaching this foreshore boundary. This is exemplified primarily by boatsheds along the edges of sheltered bays, rivers and estuaries as well as ports and ferry terminals in urban areas.

This proposal focuses on how architecture can create a confluence of coastal activities so that our experience of movement is enhanced within the marine environment. Considering Auckland as a water city, this proposal at Granger Point in Auckland's Tamaki River, addresses the confluence of activities that occur in the littoral zone, architecture beyond the edge as well as the experience of movement created between land and sea by utilising the natural tidal system. The result is a bolder form of coastal architecture, a kind of contemporary boatshed.

Figure 1.0 (above): Vernacular boat shed Sloane Bay. Mark Tatton, "Building Beyond the Edge".

Figure 1.1 (right): Marine Centre Platform. North West elevation from the Tamaki River of the final proposal for the Marine Centre at Granger Point (mid tide). Sam Baxter, 2012



CONTENTS

ABSTRACT	6	3. CONTEXTUALISING AUCKLAND’S COASTAL ENVIRONMENT	32
1. INTRODUCTION	10	3.1 Edge Structure	32
1.1 Context	10	3.2 Littoral	34
1.2 Aim of Research	12	3.3 Ocean and Tide	36
1.3 Site	14	3.4 Mobility	38
1.4 Thesis Structure	15	3.4.1 Māori Occupation	38
2. CONTEXTUALISING COASTAL ARCHITECTURE THEORY	16	3.5.2 European Arrival and 19th Century Occupation	38
2.1 Connection	16	3.6.3 20th Century and Contemporary Auckland	40
2.1.1 Connective Formalities	18	4. CONTEXTUALISING THE TAMAKI RIVER	42
2.1.2 Access to Water	20	4.1 Tamaki River	42
2.2 Identity	22	4.2 Coastal Activities	46
2.2.1 Materiality	22	4.2.1 The Public	46
2.2.2 Structure	22	4.2.2 Public Maritime Activities	48
2.3 Case Studies	24	4.2.3 Commercial Maritime Activities	50
2.3.1 Boat Sheds	24	4.3 Identity	52
2.3.2 Kastrup Sea Bath	26	4.3.1 Materiality	52
2.3.3 Maritime Youth House	28	4.3.2 Mechanisms for Movement	54
2.3.4 Half Moon Bay Marina	30		

5. SITE PARAMETERS - GRANGER POINT	56	7. FORMATION OF DESIGN ON SITE	90
5.1 History	56	7.1 Confluence of Activities	90
5.2 Physical Parameters	58	7.1.1 Placement	90
		7.2 Experience of Movement	96
6. PROJECT CONCEPTS	62	7.2.1 Movement of Activities	96
6.1 Placement	62	7.2.2 Tidal Movement	100
6.2 Connection	64	7.2.3 Pedestrian Experience	104
6.3 Access to Water	64	7.3 Form	106
6.4 Perpendicular to the edge	64	7.4 Identity	108
6.5 Edge Perimeter	66	7.4.1 Materiality	108
6.6 Node Points	66	7.4.2 Construction	110
6.7 Pathways	68	7.5 Marine Environment	112
6.8 Form	68		
6.9 Investigations by Design	70	8. CONCLUSION	114
6.9.1 Conceptual Scheme 1	70		
6.9.2 Conceptual Scheme 2	72	9. BIBLIOGRAPHY	116
6.9.3 Conceptual Scheme 3	78		
6.9.4 Conceptual Scheme 4	82	10. LIST OF FIGURES	124
6.9.5 Conceptual Scheme 5	86		
		11. APPENDICES	134

1. INTRODUCTION

1.1 Context

Coastal facilities are primarily built to accommodate singular activities with limited acknowledgement given to the wider public experience of the environment. Coastal activities that occur in the littoral zone are rarely combined to achieve something beyond a functional facility. These singular functions put increased pressure on the coastal environment in order to support a variety of separate coastal interactions. Marinas are good examples of this with a variety of buildings and facilities often sprawled across reclaimed land. Instead of big facilities, which are spread apart from one another, this thesis proposes smaller nodes where facilities are combined in more frequent points across the coast.

The littoral zone in the coastal environment is stringently regulated by Government departments through prescriptive regulations such as the Coastal Policy. This has led to a hesitant approach towards new coastal developments. Developments within the littoral zone are required by policy to be ‘comprising of open space and recreational values of the coastal environment, including [having] the potential for permanent and physically accessible walking public access to and along the coastal marine area’¹. Coastal architecture in this sense, therefore, needs to accommodate both the function of the coastal activities and the access that pedestrians’ have to the site.

In exploring the coastal environment, Richard Toy’s theory of Auckland as the water city² suggests the water filled hollows of the Waitemata Harbour and Hauraki Gulf are more than playgrounds for recreational activities but also a key resource in developing a water transport network. This 1970’s theory remains significant today as Auckland continues to look for public transport solutions and ways of alleviating increasing pressure on the coastal environment from population growth.

¹ Department of Conservation. New Zealand Coastal Policy Statement. Government policy, Wellington: Department of Conservation, (2010). 6

² Richard Toy suggests; “There are something over one thousand miles of internal coastline on the Waitemata, Manakau and Kaipara harbours and the firth of Thames. If one third of this is developed at an average of 4 houses per acre and for an average depth of one mile (pedestrian scale) leaving the remainder for headlands, nature reserves, quiet spots, water bases industries etc; a population of about three million can be accommodated”.

Figure 1.2 (right): Tahuna Torea sandspit. Taken east at low tide towards Granger Point, Tahuna Torea spit is subject to the greatest surface exposure in the Tamaki River. Photographed by Sam Baxter, 2012.



1.2 Aim of Research

This thesis addresses how architecture can create a confluence of coastal activities so that our experience of movement is enhanced within the marine environment.

Few examples support the congregation of conflicting activities and the use of architecture as a medium to create harmony. Through research, this thesis aims to develop an effective way of bringing together coastal activities to allow the public to experience the natural movements of the coast and maritime activity. Understanding the experience of movement is important to the integration of coastal interactions.

This form of architecture aims to enhance the littoral zone by incorporating the coastal environment into the design. The form of the building must respect and enhance the coastal environment.

As well as this, the design aims to provide a platform to encourage water mobility as a public transport solution to population growth. The overall concept of the public boatshed is for the design to be one of multiple nodes throughout Auckland to develop a water transport network. Ferries will run like buses using these nodes as connective stops, opposed to an airport analogy where ferry terminals are direct linear connections between origin and destination.

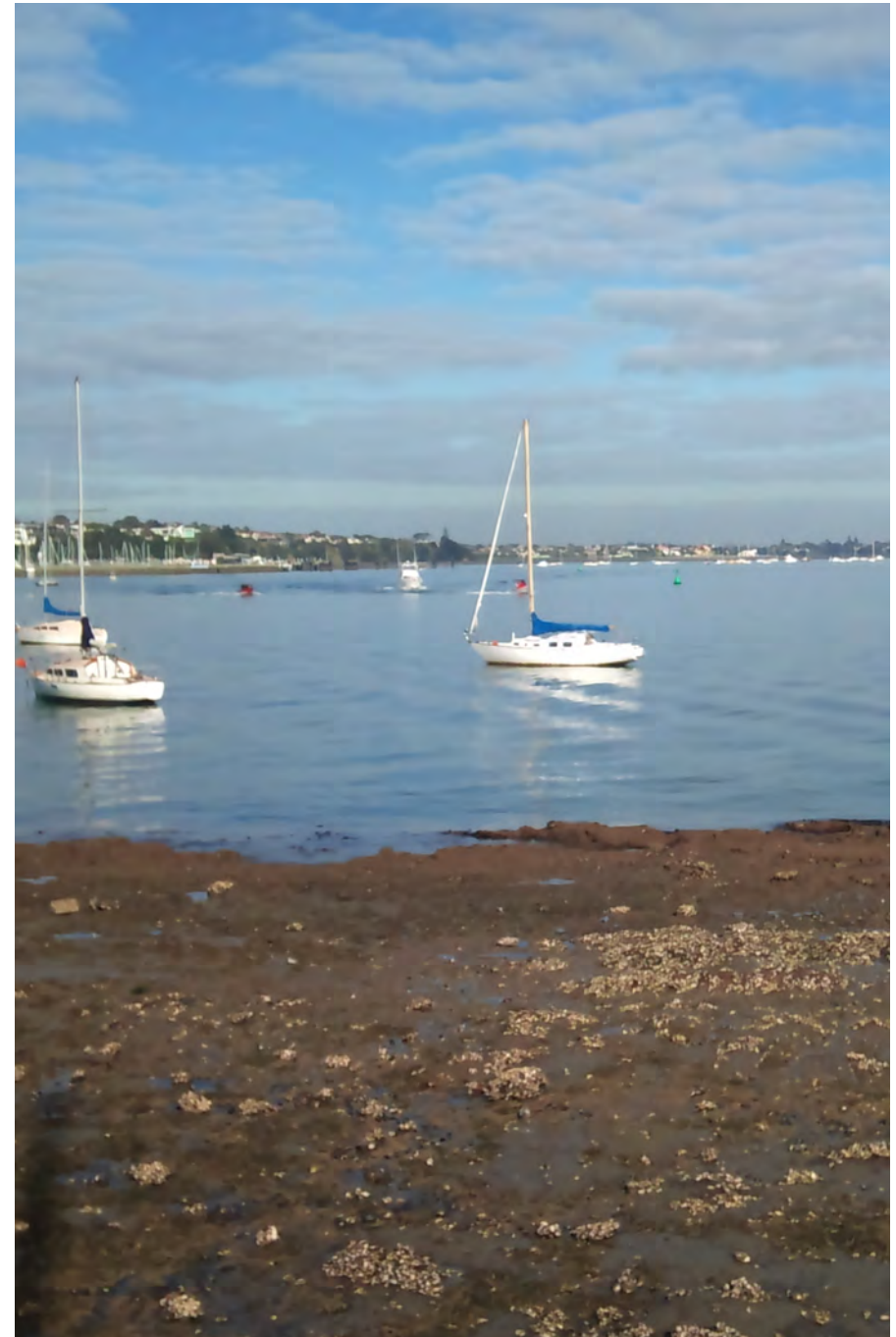


Figure 1.3 (left): Granger Point
Reef at low tide. Photographed
by Sam Baxter, 2012

1.3 Site

This thesis develops one site to develop as an example of an approach that can be repeated in modified form elsewhere.

The site location is key to any design proposal based around accommodating a confluence of coastal activities. The Hauraki Gulf and Waitemata Harbour are filled with numerous dramatic landforms as a result of the volcanic nature of Auckland. The Tamaki River is one of two main estuaries that penetrate west across the Auckland isthmus to form the narrowest portage crossing between the east and west coast of the North Island. The chosen site is Granger Point in the Tamaki River due to the multitude of recreational and commercial activities the Tamaki River hosts.

The architectural proposal at the site of Granger point will accommodate:

- Recreational trailer boats 5.5 to 8.5 metres
- Hard stand facilities for the maintenance of moored yachts between 9 to 15 metres
- A commuter ferry terminal for the 22m long Fullers ferry
- A clubroom and dingy storage facility for the Bucklands Beach Yacht Club (currently located at Granger Point).
- An accessible edge for small water craft of kayaks, sail boats and kite boarders

A secondary function is to accommodate a public experience of movement through these activities. All functions are enriched by the connection with tidal movement.

1.4 Thesis Structure

This thesis will firstly highlight key coastal architecture theories and relevant case studies.

Both the Auckland waterways and Tamaki River in general will be contextualised, before focussing specifically on the site parameters of Granger Point.

The theoretical approach to the site of Granger Point will be described, followed by a description of the design itself.

2. CONTEXTUALISING COASTAL ARCHITECTURE THEORY

2.1 Connection

Coastal architecture relies on a variety of connective formalities where it bridges the gap between land and sea. The connection architecture shares with both the land and sea is subject to a variety of fluid conditions associated with the coastal environment, combined with the density of coastal activities that occur on the edge. The use of connective formalities needs to change depending on the ebbs and flows of the tide through the coast. This architectural proposal requires a response that is physically acceptable in the littoral zone, while creating a facility that is occupationally rich, expressive and aware of the environment. It needs to 'recognise the need to maintain and enhance the public open space and recreation qualities and values of the coastal marine area'³.



Figure 2.1 (top right): Suspended dock within the upper Tamaki River - Image shows the contrast in materiality between the weathered timber from tidal movement and anodised aluminium. Photographed by Sam Baxter, 2012



Figure 2.2 (bottom right): Private boatshed, Panmure - Image highlights the variety of private structures that exist within the river. This private site shows both a stilted shed above the water as well as a private ramp which is submerged for the haulage of a boat. Photographed by Sam Baxter, 2012

2.1.1 Connective Formalities

The fit between architecture and landscape has always been a subjective issue. Reuben Rainey suggests;

'A given landscape confronts a designer with a vast array of constraints and opportunities that must be addressed with clarity and decisiveness if architecture work is to respond successfully to basic human needs and embody fundamental cultural values.'⁴

Like the wider discourse of architecture, the examination of coastal architecture suggests that there are three basic modes of architecture which exist in the relationship with the landscape; contrast, merger and reciprocity. Contrast juxtaposes architecture, where a site remains relative untouched by the building, therefore the building forms a strong contrast to its surroundings which is often further exaggerated by forms and materiality⁵. In the case of coastal Auckland, it can be argued that the traditional suspended boatsheds, using the stilted like piles to hover over the water, suspend themselves from the land edge⁶. Boatsheds allow the natural edge of the water to exist below where the movement of tide against a fixed structure exemplifies the segregation.

In comparison, merger is where a building is made to appear an integral part of the natural and cultural landscape. This very rarely appears in a pure form, as the introduction of any built form conflicts this idea⁷. In many cases in the coastal environment, merger has formed a role of assistance, supporting coastal activities. This typology forms some of the oldest architecture in New Zealand such as Māori adopting wooden skids across the natural topography of the land for portage⁸. This idea has evolved in contemporary society to form boat ramps and haulage facilities. It can be argued that concrete boat ramps are infrastructure rather than architecture; however, boat ramps form functional elements that allow society to advance on the coast. The natural environment is invited to exist, beyond, around and over the boat ramps, which nature accepts through materiality, weathering and silting across the tidal platform.

4 Reuben Rainey. "Architecture and Landscape: Three Modes of Relationship." *Places* 4, no. 4 (1988).

5 Ibid

6 Tatton. *The Boatshed and Living Beyond the Edge*. 75

7 Ibid

8 Best. *The Maori Canoe*. 64

Figure 2.3 (above right): Dingy launching Ramp - Halfmoon Bay Marina showing coastal structures that assist with the movement and transition of coastal activities. Photographed by Sam Baxter

Figure 2.4 (below right): Hauling the Canoe. The process to which the ropes were attached down the inside of the Hull, Cited: A.H. Messenger, Fig.29 in *The Maori Canoe* by Eldson Best



The final and most common strategy employed is reciprocity, where both the building and the landscape modify one another to some degree⁹. As a result the building and the landscape become somewhat reflective of one another¹⁰, allowing a functional occupation of a site. Coastal reclamation sits within this area, modifying the natural coastal edge with built mediums which offer access to desired sea bed depth to create marinas and ports. Rainey suggests;

‘The contrast, tension and ambiguities brought about by combining these various three modes enhance the appearance of [architecture] but also allow it to embody a rich complexity of meaning.’¹¹

The coast is an area that relies on this rich complexity and understanding of connection for design. Building cannot be avoided here but there is a choice of how to build.

9 Rainey. “Architecture and Landscape: Three Modes of Relationship.”

10 Ibid

11 Ibid

2.1.2 Access to Water

As the coastline abuts the boundless horizon and is associated with recreation, it seems to express a feeling of freedom. The beach is a platform for access which allows a connection to the water. This access, shown in Figure 2.5, provides a safe transitional gradient from land to sea¹². This safe gradient which exists in the littoral zone creates an open edge with open access from the land to sea.

It is important that this architectural proposal considers public access to, along and adjacent to the coastal marine area. There is a 'public expectation of and need for walking access to and along the coast'¹³. Figure 2.6 suggests that the land immediately adjacent to the edge should be preserved for common use. Structures built along the coast line need to still provide open space and public access to water. Figure 2.7 shows the how the form of the bay and headland allow limitless pathways for pedestrians to access water at all tides.

As outlined in the New Zealand Coastal Policy, there is a need for;

'public open space within and adjacent to the coastal marine area, for public use and appreciation including active and passive recreation... ensuring that the location and treatment of public open space is compatible with the natural character, natural features and landscapes, and amenity values of the coastal environment...[while] maintaining and enhancing walking access linkages between public open space areas in the coastal environment'¹⁴.

This proposal suggests that architecture can be a threshold to accommodate coastal activities, while at the same time satisfying the human desire to maintain a physical connection to the edge¹⁵.



Figure 2.5 (above): The natural coastal edge provides a slow and safe transition into the water

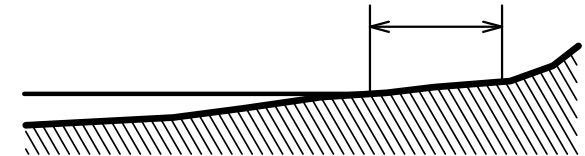


Figure 2.6 (above): Land adjacent to the water edge is to be preserved for common public use

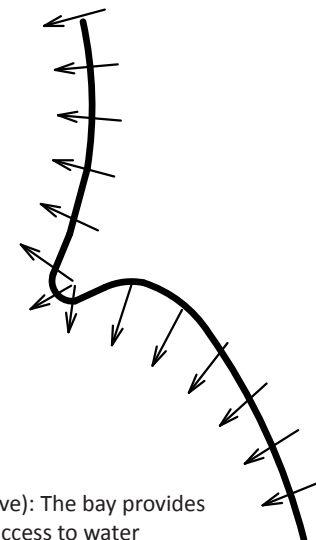


Figure 2.7 (above): The bay provides unobstructed access to water

12 Alexander, Ishikawa, and Silverstein. *A pattern language*, 360

13 Department of Conservation. *New Zealand Coastal Policy Statement*. 2

14 Ibid. 20

15 Alexander, Ishikawa, and Silverstein. *A pattern language*, 136

2.2 Identity

Architecture that exists beyond the edge should invest in the processes of the environment to accommodate function creating a unique architectural identity expressive of the environment.

2.2.1 Materiality

Coastal architecture, exposed to the elements within the sheltered waterways of Auckland use a fairly small palette of materials: weathered timber, treated timbers, plastic or concrete and steel¹⁶. What characterises this type of building is the expression of material patina and decay from the harsh environment. Timber piles within the tidal height often display colour variation from moisture and attract seaweeds, molluscs and lichens. Tatton recognises that many of the decisions made around material selection in boat sheds' were cost dependent hence vernacular boatsheds appear somewhat patched together with recycled material¹⁷.

2.2.2 Structure

Void space beneath coastal structures is a quality that can assist architecture in maintaining the natural edge. Such space forms a tethered connection between architecture and landscape creating a spatial element expressive of movement and transition¹⁸. Functional coastal structures appear in two types; those that are buoyant and those that are suspended¹⁹. Buoyant structures offer a more intimate experience of transparency because of the direct connection between the built and natural elements. Suspended or stilted structures rely on tidal movement offering a more distant connection of transparency expressive of movement via negative space. As shown in Figure 2.12, it appears that newer constructions beyond the edge tend to be buoyant.

16 Tatton. *The Boatshed and Living Beyond the Edge*. 60

17 Ibid, 59

18 Ibid, 74

19 Ibid, 80





Figure 2.11 (above): Coastal Protection. This image shows the informal covering of a private trailer boat. Photographed by Sam Baxter, 2012



Figure 2.12 (above): Contemporary marine docks in the Upper Tamaki River. Photographed by Sam Baxter, 2012

Figure 2.9 (above): Railway tracks for private boat cradles extend from the front of a traditional boatshed to the water. Mark Tatton, "Building Beyond the Edge".

Figure 2.8 (left): Private Boat storage shed, Panmure, Upper Tamaki River- Translucent facade encloses a simple timber framed construction.

Figure 2.10 (above): Material and construction beneath a traditional boat shed. Mark Tatton, "Building Beyond the Edge".

2.3 Case Studies

2.3.1 Boat Sheds

Boat sheds are one of the most widely recognisable vernacular forms of coastal architecture in the Auckland region. There are three types of boatshed built in New Zealand; on top of the water with no floor, on low lying flat land and beyond the edge on stilts over water. Tatton suggests that it is the relationship to the 'landscape that allows the introduction of a powerful architectural form that enhances the environment rather than detracts from it'²⁰.

The form of a boat shed is essentially a relationship between openness, closure and directionality. While this relationship is modified by the opening and closing of solid doors, axially results in an overall linear form. Ramps, platforms or rails projecting from the front of the building reinforce the spatial continuity by disappearing into the water and creating a link to what lies beyond the edge of the structure²¹. This is the same relationship as that of a beach which extends out into and under the harbour. However, the connection boatsheds share with the environment does not enhance human occupation and connection to the water in the same priority. They are not a public space to inhabit on the edge; they are strictly a means of storage. A boatshed's function is driven characterised by its rectangular floor plan, with a length: width ratio of 2:1, and gable roof²². As a single spatial environment only devoted to the storage, maintenance and protection of boats; it can be considered to be very simplistic compared with later precedents which incorporate more complex occupations. While the boatshed is rather primitive, there are very few other examples of architecture that successfully adapt and express the movement of tide.

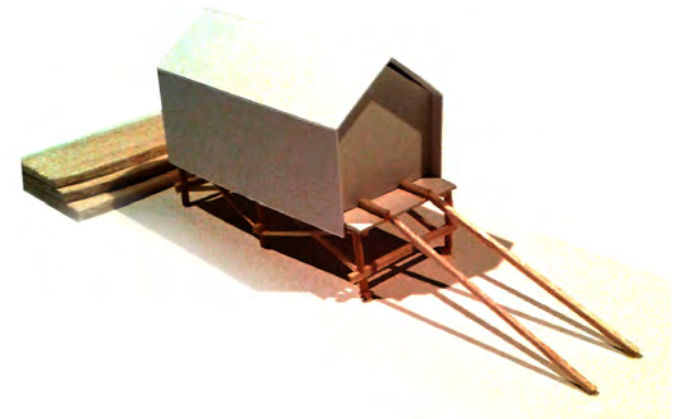


Figure 2.13 (above): Conceptual model of the vernacular boatshed.

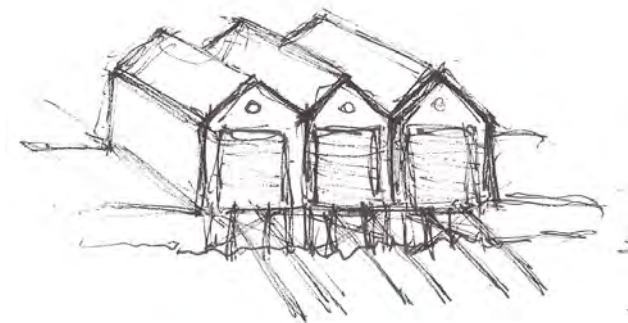


Figure 2.14 (above): Conceptual sketches of the Ngapipi Road boatshed in Orakei exemplifying the linear arrangements of building beyond the edge.

20 Tatton. *The Boatshed and Living Beyond the Edge*. 80

21 Ibid

22 Ibid

Figure 2.15 (above): Tradition boat shed ramp in Herne Bay, Auckland. Mark Tatton, "Building Beyond the Edge".

Figure 2.16 (above): Interior of a boat shed in Ngapipi Road, Auckland. Mark Tatton, "Building Beyond the Edge".

Figure 2.17 (above): Tradition boat shed Sloane Bay. Mark Tatton, "Building Beyond the Edge".

Figure 2.18 (right): *'History III' - Ngapipi Rd, Orakei boatsheds*. Lucy G Design, <http://www.lucygdesign.com/images/gallery/landscapes/22histIIIcolNL.jpg>

2.3.2 Kastrup Sea Bath

Kastrup Sea Bath is a public swim platform that sits beyond the edge. It is an architectural landmark highlighted by its position in sea with a view towards Oresund and Sweden. Isitt suggests that the sea bath expresses itself in freedom due to the lack of reference points on the surrounding edge²³. The form is like that of a shell; light and smooth on the inside where the bathers congregate, and rough on the inaccessible exterior facade²⁴. The semi-transparent facade that encloses the bath house alters the occupants' visual connection with the beach. By extending beyond the shore, the sea bath creates a bridge for people to occupy an area of water that would otherwise be neglected. Its sculptural presence attracts interest, however, more importantly; its functional response serves as a guard to the winds and swells of the coastal environment. The sea bath exemplifies a successful transition from land to sea extending along the drawn-out platform. The length of the pier overcomes tidal effect and compels visitors to engage in a journey where the destination is one of architectural excitement as well as a bathing opportunity.

23 Mark Isitt. *White Green 10*. (London: Laurence King Publishing, 2011). 83
24 Isitt. *White Green 10*. 86

Figure 2.19 (top right): Early sketch of the building's principal elements- the 100 metre bridge, circular screen wall, and the spiralling route to the five-metre platform. Isitt, Mark. *White Green 10*. London: Laurence King Publishing, 2011. 83

Figure 2.20 (above): Kastrup Sea Bath by Ole Haupt, White Arkitekter
<http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/attachment/0061/>

Figure 2.21 (above): Kastrup Sea Bath by Ole Haupt, White Arkitekter
<http://ad009cdnb.archdaily.net/wp-content/uploads/2008/06/7439-f7.jpg>

Figure 2.22(above): Kastrup Sea Bath - Reaching out from Oresund from Kastrup Strandpark in Kastrup the sea bath forms an integral part of the sea front by Ole Haupt, White Arkitekter
<http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/>

Figure 2.23 (above): Perpendicular boardwalk from the land to the Kastrup Sea Bath by Ole Haupt, White Arkitekter.
<http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/attachment/0141/>

Figure 2.24 (above): Kastrup Sea Bath by White Arkitekter.
<http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/img-3628/>

2.3.3 Maritime Youth House

The Maritime Youth House is a dual purpose coastal building in Copenhagen designed by PLOT group architects in 2004. His design was an outcome of two clients with opposite desires²⁵, a youth house requiring outdoor spaces for kids to play and a sailing club that needed the site to park boats. The design developed as a result of negotiations between these demands, in which the outcome is a relatively simple solution that has an inseparable connection to the occupation and users. The deck becomes an animated wooden landscape forming both the roof and floor as it wraps over interior glazed spaces and boat racks that sit beneath. Thus is expressive of coastal wind shaped dunes of the Danish coast or an upside down ship hull. The timber materiality offers an association with sailing ships, while the delicate selection of stainless steel hints at the craft of a luxury sailing yacht²⁶. The combination of materiality and negotiation of space is crucial in forming responsive coastal architecture that has the ability to accommodate multitudes of activities.

25 Architect: PLOT. Maritime Youth House, Copenhagen, Denmark 2004. *A + U: architecture and urbanism* 4, no. 415 (April 2005): 82-85.

26 Tom Vanderbilt. "Safe harbor: young Danish architects create a wavy structure that reclaims a polluted waterfront site for the community." *Metropolis* 24, no. 8 (April 2005): 44.

Figure 2.25 (above): Maritime Youth House - Boat storage for the sailing club beneath the timber decks by Johan Van Mol and Evelyne Justens
http://www.danda.be/gallery/maritime_youth_house_plot/7/

Figure 2.26 (above): Maritime Youth House by Julien de Smedt
http://ad009cdnb.archdaily.net/wp-content/uploads/2009/01/167023821_plot-mar-11-photo-julien-de-smedt.jpg

Figure 2.27 (right): Maritime Youth House by JCarlos Lanuza, 8 April 2009
<http://static.urbarama.com/photos/original/2783.jpg>

2.3.4 Half Moon Bay Marina

Halfmoon Bay is a large coastal facility combining multiple coastal activities covering an area of nearly 2km². It was built in 1978 on reclaimed marsh land and hosts over seven hundred privately owned boats in two marinas, twenty three separate commercial companies and a six lane boat ramp²⁷. In addition, it serves as a ferry terminal for the Fuller's commuter network and Sealink car ferry to Waiheke Island. To accommodate these demands, car parking is provided for approximately five hundred cars or trailers. This development is an oversized carpark on a reclaimed coastal edge, with little natural relationship to the bay form.

Recently, an Auckland Transport proposal recommended a new reclaimed landmass to segregate trailer boat traffic from ferry commuters²⁸. The existing parking expressed a tension between ferry users and recreational boating, exemplified by the weekday commuter car parking and recreational boat trailers on weekends. Vary rarely do these occupations cross over, except Friday afternoons in summer. On these occasions, cars and trailers begin to park on hills, banks, grass verges, sprawling around the streets of Halfmoon Bay. This exemplifies the need for more car parking on our coastal edge or coastal facilities that are scaled appropriately.

Halfmoon Bay has a lot of activities side by side in a large scale facility where this thesis proposes smaller facilities in larger quantities. This will allow the combination and occurrence of the confluence of activities in a more architecturally rich way, replacing the park and ride water network with a walk and ride water network.



Figure 2.28 (above): Halfmoon Bay. The three rows of jetties form the lanes for the six boat ramps at Halfmoon Bay. In the Background the Sealink car ferry is docked on the concrete ramp at Susbrisky's Point. Photographed by Sam Baxter, 2012.

²⁷ New Zealand Herald. "Half Moon Bay's rising star."

²⁸ Dawson, Joe. "End of free ramp?"



Figure 2.29 (above): Halfmoon Bay haulage boat haulage within the marina. Photographed by Sam Baxter, 2012.



Figure 2.30 (top right): Piles for the car ferry at Susbrisky's Point. Gabled building in the left of the image is the new Bucklands Beach Yacht Club that replaced the facilities at Granger Point. Photographed by Sam Baxter, 2012.



Figure 2.31 (bottom right): Aerial photograph of the extensive marine facilities at Halfmoon Bay. Flown July 2012 by Wade Malcolm and photographed by Sam Baxter, 2012.

3. CONTEXTUALISING AUCKLAND'S COASTAL ENVIRONMENT

The edge where land meets sea is a complex environment formed through a variety of natural processes. The Auckland harbour has a broad intertidal shore platform with rocky reefs, headlands, tidal inlets, sandy beaches and coastal cliffs²⁹. Protected from large seas swells by a series of islands, there are many low energy silty rivers in the Auckland region.

3.1 Edge Structure

The Auckland edge continues to be considered a desirable place of inhabitation³⁰. As the place of arrival for the first people in New Zealand, Māori used the protection of the bay and built settlements that tapped into the natural resources of both land and sea simultaneously³¹. The coastal edge can create a strong sense of belonging as people use bays and headlands orientate themselves. The bay structure, creates an atmosphere of comfort and belonging³² in which the more enclosed the bay structure is the greater sense of space it creates. The bay remains a crucial visual focal point in contemporary occupation of the coast as well as a sanctuary of rest and replenishment. Architecture should aim to enhance the natural structure of the bay form, by reinforcing the natural boundaries. Sitting architecture on headlands and natural extrusions of the coast avoids awkward moments where the built environment segregates the continuity of the bays. The headland has a natural prominence, which allows ferries and other large maritime activities to touch lightly on the edge, rather than divert into the personal space of the bay occupied by swimmers and small watercraft.

-
- 29 Auckland Regional Council. Appendix 1: Description of geographical and biota features of coastal units within the Hauraki Gulf, derived from INMARC. State of Environment Report, Auckland: Auckland Regional Council (2004), 202-224.
- 30 R.H Toy. *Auckland: Water City of the South Pacific*. Auckland: New Zealand Architecture Collection, (1975).
- 31 Toy. *Auckland: Water City of the South Pacific*.
- 32 Toy. *Auckland: Water City of the South Pacific*.

Figure 3.1 (right): Granger Point at low tide showing the extensive reef. Image is taken looking north towards Big Bucklands Beach. Photographed by Sam Baxter, 2012



3.2 Littoral

The littoral zone, also known as the intertidal zone stretches from the spring high water to neap low water line³³. This area is the most exposed to turbulence and wave action creating one of the most concentrated habitats because the physical change between high tide and low tide is so steep³⁴.

‘It is recognised by ecologists that the interface between two eco systems represent a third, more complex system which combines both. At interfaces species from both systems can exist and the edge also supports its own species in many cases.’³⁵

Much like the natural organism, the littoral attracts humans as a destination to experience the intersection of land and sea. This transitional space serves as a place where we get our feet wet while the transfer of coastal activities occur.

Figure 3.2 (right): Granger Point at low tide. Image is taken from Little Bucklands Beach, west towards the Tamaki River. Stone wall forms the south edge of the Granger Point hardstand in which yachts are balanced on the concrete blocks and fixed to the piles for cleaning. Photographed by Sam Baxter, 2012.

33 Morton and Cometti. *Margins of the Sea*. 13

34 Ibid

35 Tatton. *The Boatshed and Living Beyond the Edge*. 13



3.3 Ocean and Tide

The ocean has a distinct presence in Auckland engaging with the land to create a water filled landscape. However, it is the oceans ability to modify the coastal landscape which has resulted in architecture's hesitant approach to building on or beyond the edge³⁶. The ocean effects are localised and dependent on various factors relating to location, geology structure, profile, material, and surrounding occupation of land. Architecture should not be used as a force to resist the natural processes of the coast but to create a dynamic relationship with the edge that allows the natural equilibrium to continue.

The Auckland Harbour is subject to a substantial tidal change that exposes a platform rich in resources. Tide is the most influential flow responsible for the formation of the littoral zone. A tidal cycle is just over six hours and the tidal variations have two extreme points know as neap tides and spring tides³⁷, which are about a fortnight apart generated by the monthly conjunction of the sun and moon. Tides are a global occurrence; however, New Zealand is subject to a significantly larger tidal range compared to the rest of the world of up to 3.5 metres. While tidal movement adds to the complexity for accommodating coastal activities, it also offers great opportunity for an architectural response which is expressive and functional via this natural system.

36 Lange. Coastal Erosion: Shifting Sands.

37 Neap tides are when the tide is neither fully in or out, occur when the attractive forces of the moon and sun act at right angles to the water. Spring tides, extreme high tides and extreme low tides, occur when the forces of the moon and sun align and exaggerate effects on the water

Figure 3.3 (top right): Halfmoon Bay Marina during the record high tide on January 23rd 2011. Halfmoon Bay Marina. *Docklines*. Newsletter, Auckland: Halfmoon Bay Marina, Autumn 2011.

Figure 3.4 (bottom right): Breakwater at Halfmoon Bay Marina during the record high tide on January 23rd 2011. Halfmoon Bay Marina. *Docklines*. Newsletter, Auckland: Halfmoon Bay Marina, Autumn 2011.

3.4 Mobility

Auckland's settlement has evolved with and through a preoccupation with mobility. To understand how coastal architecture can assist coastal mobility, it is important to understand the role coastal mobility plays in Auckland.

3.4.1 Māori Occupation

Māori valued Auckland for its waterscape which sustained mobility, allowing them to access the vast resources of Auckland, many of which were also marine based. This waterscape also enabled Māori to maintain the cultural ideals of living on the edge that had come from their sea faring and island heritage. This natural network accessed the majority of land and also provided a main arterial route to travel between east to west and north to south coasts. Māori mobilised themselves with waka which had evolved from the outrigger canoes of migration. Māori first settled in the outer islands of the Gulf before moving inland as resources became less available. For these reasons Auckland was highly contested by iwi as reflected by the isthmus' name Tamaki Makau Rau (Isthmus of one hundred lovers).

3.5.2 European Arrival and 19th Century Occupation

Maintaining connection and control over the coast was essential for European settlement. Firstly, because the coast assisted in integrating Westernised trading and logistics³⁸, and secondly, because waterways provided access to launch an attack on Auckland. Like their predecessors, Pakeha relied heavily on water transport for movement, surveying and settlement of the Auckland region. The mouth of the Waitemata harbour provided a deep channel as well as high gradient bays which allowed ships to come in close proximity to the land³⁹. Towards the 1850's, road infrastructure had been laid over most of the isthmus, but navigable waterways assisted by portages at Riverhead, the Whau, Blockhouse Bay, Otahuhu and Waiuku remained the most important links to outlying settlements.

38 R.C.J Stone. *Logan Campbell's Auckland, Tales from the early years*. (Auckland: Auckland University Press, 2007). 5

39 Auckland Regional Council. *A Brief History of Auckland's Urban Form*. Research, Auckland: Social and Economic Research and Monitoring Team (April, 2010), 5

Figure 3.5 (above): "Hauling the Canoe", Poles lashed onto the fore and aft enabled me to steady it as the canoe was dragged. Cited: Miss.E. Richardson, Fig.28 in *The Maori Canoe* by Eldson Best

Figure 3.6 (right): "Historic Urbanisation 1842 - 2008 of the Auckland Region".

This map show the way in which Auckland settlement has developed along and around the water ways of Auckland.

Auckland Regional Council. A Brief History of Auckland's Urban Form. Research, Auckland: Social and Economic Research and Monitoring Team, April, 2010.

3.6.3 20th Century and Contemporary Auckland

The 20th Century saw car ownership and the construction of all-weather bitumen highways which supported growth and offered almost unrestricted individual mobility around Auckland. It was in the 1950's when the decision was made to develop Auckland's mobility on a motorway system opposed to a comprehensive public network transport⁴⁰. Due to this decision, Auckland has now reached a threshold at which roading is near to full capacity. The increased pressures placed on the roading network have prompted commuters to look at alternate modes of transport. As of July 2012, buses accounted for 73.8% of public transport, trains 18.5% and ferries 7.7%⁴¹. While buses and trains are the favoured alternative, the use of coastal architecture can promote a greater use of the harbour for public transport. With ferry terminals placed more regularly, water can assist as a medium for transport in Auckland. This thesis proposes smaller facilities at more regular nodes. This will reduce the use of cars and parking resulting in a walk and ride water network.

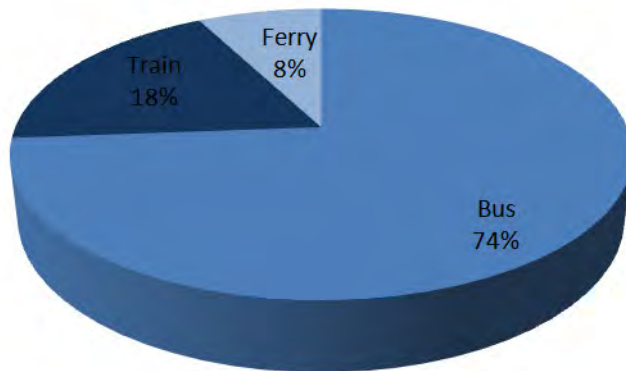
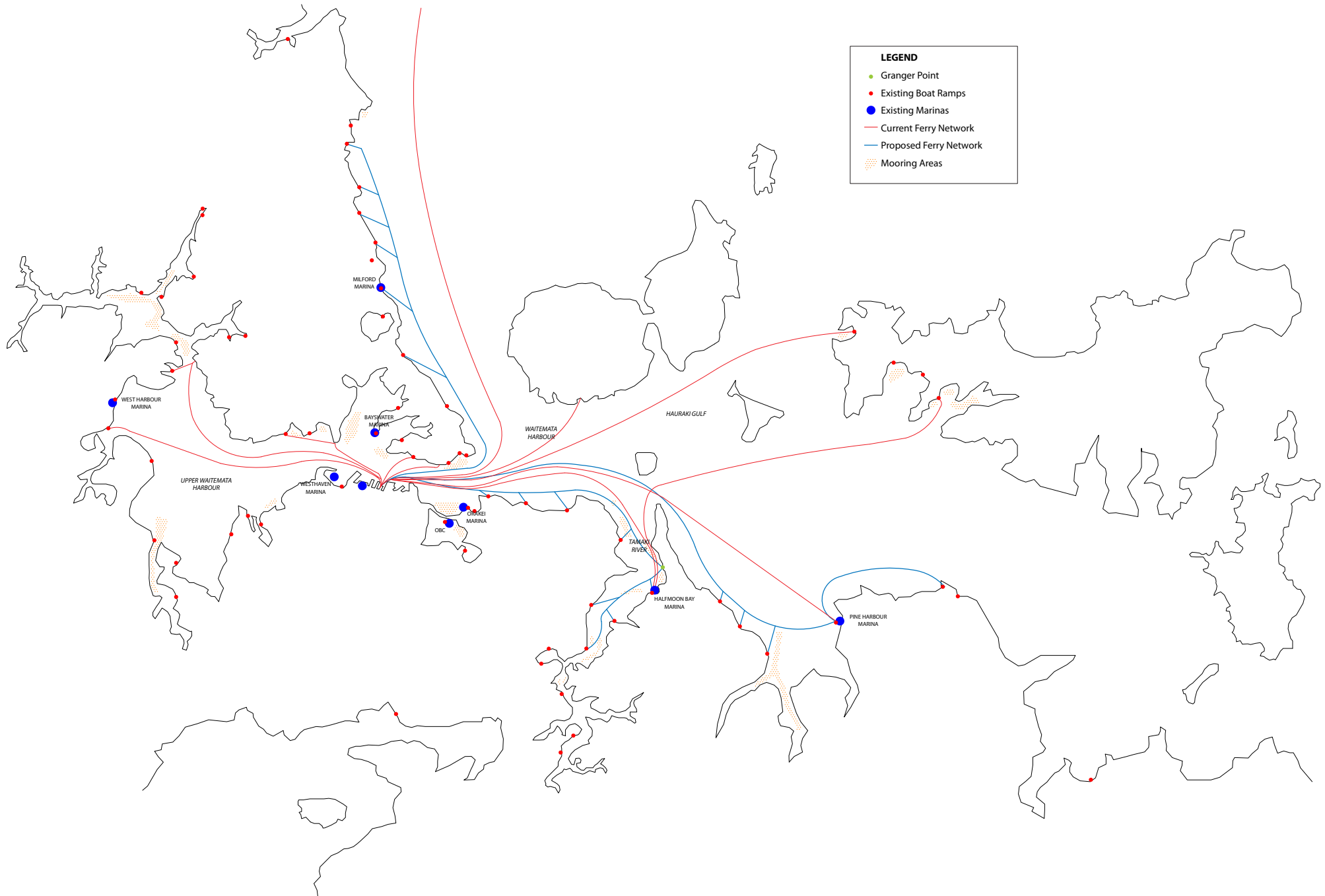


Figure 3.7 (left): Auckland Public Transport usage July 2012.

Figure 3.8 (right): Auckland public transport water network. This map denotes both Ferry terminals and major marina facilities in Auckland along with the existing ferry pathways and proposed new pathways.

⁴⁰ Ibid, 15

⁴¹ Auckland Transport. *Statistics Report July*. Statistics Report, Auckland: Auckland Council, (2012), 2-3.



4. CONTEXTUALISING THE TAMAKI RIVER

4.1 Tamaki River

The Tamaki River is one of two major water inlets into the Auckland Isthmus bringing the east coast closer to the west coast. The river is navigable for eleven kilometres from Musick Point, bordered mainly by residential suburbs, coastal reserves, industrial areas and wharfs in the upper reaches⁴². The physical flux of water and sediment through tidal ebb and flow formed the Tamaki River. The river is under continuous sediment excavation⁴³, which has been enhanced in recent times by development; most notably an increase in surface runoff from infrastructure at Highbrook.

The most valuable potential energy of the Tamaki River is the vertical displacement of tide that varies in a range between 2.8m above chart datum (in neap tides) and 3.2 m above chart datum (in spring tides)⁴⁴. Only occasionally, on a king tide, do tides reach above this range. The tidal stream in the Tamaki River follows the direction of the channel at speeds up to 2 knots, increasing up to 4 knots in certain areas⁴⁵. The transitional nature of the foreshore of the Tamaki River is revealed with the tidal movement, as the surface area of the river doubles from low tide to high tide due to the shallow nature of the foreshore. The most extreme exposure is noticeable at Tahuna Torea, opposite Granger Point (see Figure 4.3).

New Zealand is still to harness energy through tidal movement⁴⁶. We are aware of how to move with the tide in accommodating activities such as pontoon structures, but we are yet to consider the conversion of this potential energy into functional secondary movement that can drive moment within a structure.

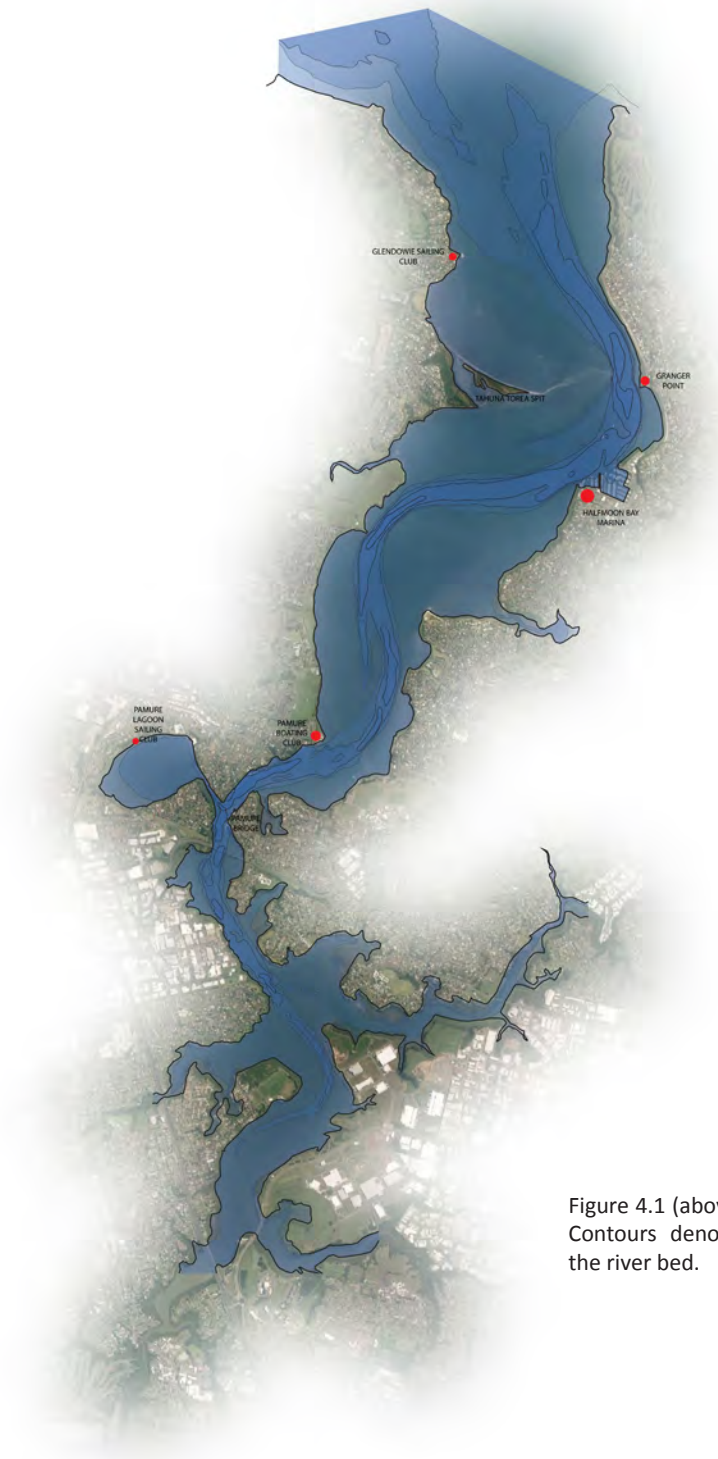


Figure 4.1 (above): Tamaki River-Contours denote the depth of the river bed.

⁴² Ibid, 7

⁴³ Russell. "Pakuranga- Tamaki River Catchments Comprehensive Catchment Discharge Consent Application."

⁴⁴ Swiftsure. *Marine Operations on the Tamaki River*. 24

⁴⁵ Ibid, 24

⁴⁶ ECCA (Energy Efficiency and Conservation Authority). *Marine Energy*, accessed August 25, 2012. <http://www.eeca.govt.nz/efficient-and-renewable-energy/renewable-energy/marine-energy>.



Figure 4.2 (top): Moored boat of the Tamaki River. Image shows the adjoining residential sites and private wharfs along the river bank. Photo from the Panmure Bridge. Author Unknown, http://commons.wikimedia.org/wiki/File:Tamaki_River_Estuary_Sailing_Yachts.jpg

Figure 4.3 (bottom): Tahuna Torea sandspit within the Tamaki River, looking east toward Mt Wellington. Photographed by Sam Baxter, 2012.



Figure 4.4 (above): Aerial photograph of the Bucklands Beach Peninsula approaching the Tamaki River from the North-East. Flown July 2012 by Wade Malcolm and photographed by Sam Baxter

Figure 4.5 (left): *Tamaki River*, Maritime Chart 5325 of the Tamaki River. NZ Charts <http://www.nzcharts.co.nz/Chart/5325>

4.2 Coastal Activities

4.2.1 *The Public*

Everyday occupation of the Tamaki River involves a variety of personal activities such walking, swimming, cycling, picnicking or viewing. In exploring how the edge accommodates these activities, it is clear that a lineal access and natural gradient are the most significant features in providing access to water. The accommodation of the body across the edge is not about what ways architecture can assist but ensuring architecture does not deteriorate the relationship people share across and along the edge.



Figure 4.6 (left): Reef fishing from Granger Point. Photographed by Sam Baxter, 2012

Figure 4.7 (right): Optimist learn to sail
program at Little Bucklands Beach.
Whale Oil 16/06/2011. [http://images.
instagram.com/media/2011/10/15/
fc1ee08cc7e648b69d30f-
3528c28ee83_7.jpg](http://images.instagram.com/media/2011/10/15/fc1ee08cc7e648b69d30f-3528c28ee83_7.jpg)

4.2.2 Public Maritime Activities

The Tamaki River plays host to a wide variety of activities that are situated along the river⁴⁷. As well as casual private boating use, three main club sports have a presence there; rowing (Auckland Rowing Club), sailing (Panmure Lagoon Sailing Club, Glendowie Sailing Club, Bucklands Beach Yacht Club) and waka/outrigger canoeing (Auckland Outrigger Canoe Association)^{48 49}.

The river moors almost two thousand recreational craft. Six hundred boats in the Halfmoon Bay Marina and two hundred boats in the Bucklands Beach Yacht Club Marina.⁵⁰ Boats are birthed permanently in linear piers and maintained annually on a travel lift assisted hard stands for maintenance. Swing and pole moorings are positioned throughout the river accommodating the additional thousand craft, accessed via dinghies kept in storage on the edge. These mooring areas use haulage facilities at either the Bucklands Beach Yacht Club or Panmure Boat and Yachting Club. As of March 2008; Bucklands Beach Yacht Club in the lower river supported 195 swing moorings at Glendowie and 326 swing moorings at Bucklands Beach⁵¹.

The Tamaki River also accommodates informal water sports. The entrance to the river is popular with wind surfers and kite boarders who commonly launch at Granger Point to use the shallows west of the channel. The abundance of marine life in the river often sees the fringes dotted with fisherman and, in more recent times, kayak fishermen. The largest recreational group are trailer boats. There are eight ramps which line the river, in which Halfmoon Bay is the largest and busiest in Auckland, where over 250 trailer boats are launched and retrieved daily⁵². In addition to the main ramps along the river, there are also several private ramps in the region.



Figure 4.8 (above): Swing Pile Moorings. Photographed by Sam Baxter, 2012

47 Swiftsure. *Marine Operations on the Tamaki River*.

48 Swiftsure. *Marine Operations on the Tamaki River*. 32

49 Ibid

50 Swiftsure. *Marine Operations on the Tamaki River*. 31

51 Auckland Regional Council. Schedule 5: Mooring Management Areas, Auckland Regional Council, (March 2008), 3-4.

52 Ibid, 31



Figure 4.9 (above): Dingy stand at Halfmoon Bay. These racks provide the storage for owners of moored boats to store their dingy's. Photographed by Sam Baxter, 2012



Figure 4.10 (above): Panmure Sailing Club haulage facility and hardstand. Photographed by Sam Baxter, 2012

4.2.3 Commercial Maritime Activities

There are currently two companies running regular ferry services out of the Tamaki River. Sea-link and Fullers are responsible for approximately 500,000 passengers and 40,000 vehicle movements per annum⁵³. Sea Link operate combined passenger and car ferries, and Fullers operate a variety of mono-hull and catamaran passenger ferries across greater Auckland. Fullers run thirteen sailings daily to Auckland City, providing transport for over four hundred commuters on three early morning voyages⁵⁴. The singular terminal at Halfmoon Bay supports the entirety of eastern water public transport. There are also a number of commercial barges that run infrequently out of the industrial area at Gabour Place to transport chemical and building materials.

Figure 4.11 (above): Halfmoon Bay ferry terminal for the Fullers ferry. Photographed by Lloyd Weeber. <http://mw2.google.com/mw-panoramio/photos/medium/19831635.jpg>

53 Ibid, 26

54 New Zealand Herald. "Half Moon Bay's rising star." *NZ Herald*. August 11, 2007. accessed March 2, 2012, <http://www.nzherald.co.nz/bucklands-beach/news/article.cfm?id=369&objectid=10456867>[3/2/2012 1:36:08 PM] ().

Figure 4.12 (right): Commercial Activities in Gabor Place (Upper Tamaki River). Photographed by Sam Baxter, 2012



4.3 Identity

4.3.1 Materiality

From a contextual study of the Tamaki River by boat, the materials of new and old structures were compared. Newer structures, such as floating docks, consist of buoyant anodised aluminium, concrete (Figure 4.13) or plastic structures that float and move with the tide. In comparison, older fixed structures are characterised by weathered timber and steel. These appear to accept the harsh coastal conditions compensated by utilizing oversized members that function after considerable rust and decay (see Figure 4.16).



Figure 4.13 (left): Removed pontoons from the Halfmoon Bay boat ramp showing the growth of marine life on the submerged sections. Photographed by Sam Baxter, 2012.



Figure 4.14 (top right): Timber on the wharf at Halfmoon Bay showing the weathering of the tide and the exposed fixings. Photographed by Sam Baxter, 2012.



Figure 4.15 (bottom right): Junction of materials between the fixed timber wharf and moving metal bridge. Photographed by Sam Baxter, 2012.



Figure 4.16 (far top right): Break water and piers for the ferry to dock. Image shows the rust on the steel members from being exposed to the saline environment. Photographed by Sam Baxter, 2012.



Figure 4.17 (far bottom right): Haulage rails at Granger Point fixed into the asphalt ramp. Photographed by Sam Baxter, 2012.

4.3.2 Mechanisms for Movement

A surprising number of mechanisms in the Tamaki River play a role in the function of coastal activities. The most prominent European structure that still remains is the rotating section of the first Panmure Bridge, built in 1866. The bridge had a 40 foot navigational section that swivelled via the use of gears and a hand operated winch⁵⁵ (see Figure 4.18). This allowed large ships and sail boats to continue into the upper reaches of the river. Today, only the rotating section of the bridge remains where the gears can be seen beneath the Marine Ship Chandlery store that was built above (see Figure 4.20).

The concrete ramps into the river at Granger Point and Panmure Boating Club provide vital access for boat haulage. The ramps with recessed rails provide a platform for boats to be removed from the water by carts to the hardstand. The carts consist of steel wheel trucks which assist this movement (see Figure 4.23). On a smaller scale, wheel trucks and rails are also used on a number of floating docks, where the trucks allow horizontal displacement caused by the vertical movement of tide to occur (see Figure 4.21). Other notable mechanisms of movement are glides which fix piers to allow only vertical movement. This methodology is present in pile moorings in the upper river and the concrete piers at Halfmoon Bay Marina (see Figure 4.22).

55

La Roche. Grey's Folly. 239

Figure 4.18 (left): First Panmure Bridge with the eight metre swinging section open to allow maritime vessels to pass through. <http://www.panmure.net.nz/Heritage/Gallery.htm>

Figure 4.19 (top right): 1866 First bridge across the Tamaki River at Panmure. <http://www.panmure.net.nz/Heritage/Gallery.htm>

Figure 4.20 (below): Rotating section of the original Panmure bridge remains beneath the Marine Ship Chandlery store.



Figure 4.21 (bottom left): sliding ramp at Halfmoon bay that moves horizontally as the tides fluctuates. Photographed by Sam Baxter, 2012.

Figure 4.22 (top right): Timber guides for the floating pontoons at Halfmoon Bay. Photographed by Sam Baxter, 2012.

Figure 4.23 (bottom right): Steel trucks of the haulage cart at Granger Point. Photographed by Sam Baxter, 2012.

5. SITE PARAMETERS - GRANGER POINT

5.1 History

Granger Point sits wedged between Little and Big Bucklands Beaches on the western shore of the Bucklands Beach Peninsula. The European history dates from the mid 19th century when missionary William Fairburn took over the land from the Tamaki River to the Wairoa River to prevent Māori intertribal warfare⁵⁶. The land was sold on to Alfred Buckland⁵⁷, who built the first of two wharfs on Bucklands Beach in 1865, which he used to unload cattle⁵⁸. A brickworks was set up at what is now known as Granger Point, exporting bricks to Auckland from a small jetty off Bucklands Beach. Today, chips of orange and red bricks are still found along the shore.

In 1916, a second all tide wharf was constructed at Bucklands Beach by the Devonport Steamship Company allowing visitors to travel by boat⁵⁹. The Buckland farm continued to be subdivided and new facilities and sports clubs were established. Of note is the formation of the Bucklands Beach Yacht Club in 1949, which sailed off the main beach⁶⁰. The first clubhouse was a portable 8ft by 6ft box which was stored behind the wharf road shops and carried out on race days. In the 1950's, the portable box was abandoned for a new clubhouse and haulout facilities⁶¹. Since then, Granger Point has remained relatively unchanged with the clubrooms still sitting there today.



Figure 5.1 (top): Bucklands Beach Yacht Club at Granger Point looking from Little Bucklands Beach. Photographed by Sam Baxter, 2012.

Figure 5.2 (bottom): *The Wakatere ferry bringing excursionists to Bucklands Beach wharf in 1920.* Alexander Turnbull Library Wellington, 1283

56 La Roche. *Grey's Folly*. 133

57 Ibid, 134

58 Ibid

59 Ibid, 137

60 Bucklands Beach Yacht Club. *About BBYC*. <http://www.bbyc.org.nz/About-BBYC/> (accessed July 25, 2012).

61 Ibid

Figure 5.3 (right): Aerial photograph of Granger Point. Flown July 2012 by Wade Malcolm and photographed by Sam Baxter, 2012.



5.2 Physical Parameters

The site is made up of a reef and headland on the eastern edge of the Tamaki River. Granger Point and the sand spit of Tahuna Torea sit almost aligned on opposite river banks, each stretching towards the centre of the channel. These two distinctive land features form the narrowest point of the lower Tamaki River, where at low tide the width is reduced to 230 metres. The channel adjacent to the site also forms one of three trenches in the river bed greater than 10 metres below chart datum. This is also the busiest section of the Tamaki River in terms of marine traffic.

The reef at Granger Point extends 84m beyond The Parade. This road sits 5.0 meters above zero chart datum height, 1.5 metre above Spring Mean High Water. The reef falls 2.6 metres over the length, meaning its entirety is exposed at low tide while high tide sees it completely submerged. At present, the reef is partially covered by a concrete platform which serves as a boat haulage ramp on the eastern edge, adjoining the road. On the landward side of the site, residential houses run along the road with a small village centre very close by including a dairy, restaurant, cafes, real estate agency and a public hall.

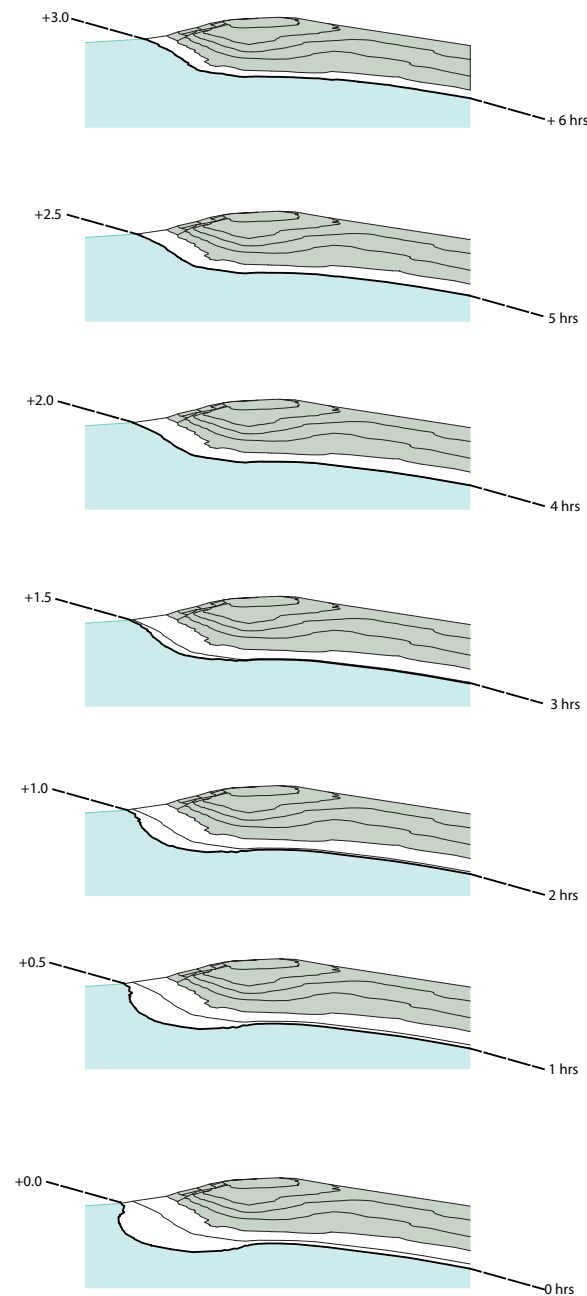


Figure 5.4 (right): Tidal study of the Granger Point Reef at 0.5 meter intervals.



Figure 5.5 (above): Granger Point Context. Aerial Photos courtesy of Auckland Council GIS Viewer.



Figure 5.6 (top right): Granger Point from Little Bucklands Beach at high tide. Photograph by Sam Baxter, 2012.



Figure 5.7 (middle right): Granger Point from Big Bucklands Beach at low tide. Photograph by Sam Baxter, 2012.



Figure 5.8 (bottom right): Southern edge of Granger Point at low tide. Photograph by Sam Baxter, 2012.

Figure 5.9 (above): Granger Point Aerial Photograph at low tide, 2006. Scale 1:1000. Image courtesy of Auckland Council GIS Viewer.



Figure 5.10 (above): Granger Point from the Tamaki River at high tide. Photographed by Sam Baxter, 2012

6. Project Concepts

The New Zealand coastline is approximately 15,134km made up of infinite fractals that are continually in flux with the natural ebbs and flows of tide. The coastal edge has a significant meaning to New Zealanders, although development of this edge is unavoidable in order to accommodate coastal activities. In approaching the site at Granger Point, this thesis explores the accommodation of coastal activities through a process of research by design. Over the year, through five conceptual proposals for accommodating coastal activities on site, I was able to manifest variety of theories through which the final proposal was resolved.

6.1 Placement

The placement of architecture within the coastal environment requires a hesitant approach. This thesis began with the concept of building beyond the edge, in the form of the boat house and throughout the process of research and design has progressed in a circular direction returning to the concept of architecture placement beyond the edge. The Tamaki River is made up of headlands, spits and bays where convex and concave landscapes form the coastal edge. Concerned with the occupation of the littoral zone, mapping the coastal facility of Halfmoon Bay enabled the understanding of how coastal facilities occupied the bay form. Considering the reclamation and natural site of Halfmoon Bay (see Conceptual Scheme 1, page 72-73), it was determined that architecture or reclamation within a bay did not enhance the natural coastal edge. It was at this point the initial site of Halfmoon Bay was changed to Granger Point, where architecture could occupy a headland enhancing the shape of the coast.

The initial concepts presented for Granger Point were formed through a hesitation to build beyond the edge resulting in a scheme occupying the land adjacent (see Conceptual Scheme 2, page 74-79). Elaborating on the demands of the coastal activities, Figure 6.1 was derived to express an architectural connection between land and sea that could accommodate this transition. In primary form, it suggests that coastal architecture, which provides this connection, exists beyond and gesture backwards to create a connection to land. The natural parameter of Granger Point and its headland, characterised by a protruding reef, invited a functional occupation that was fitting of

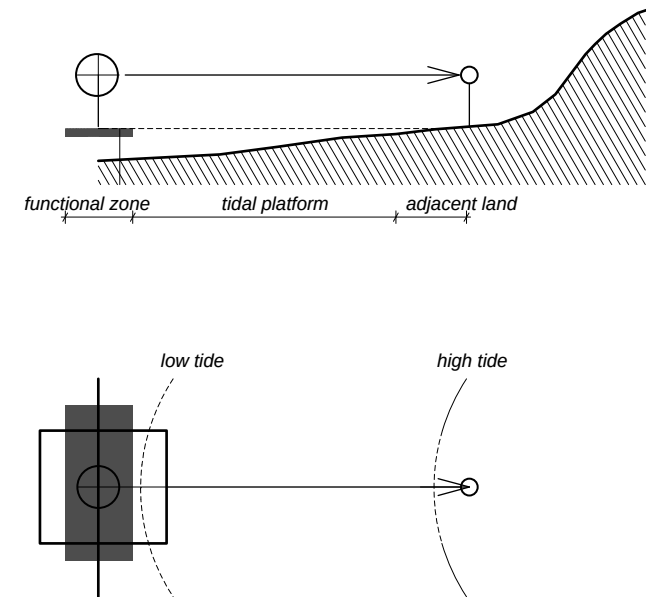


Figure 6.1 (above - section / plan): Site placement- for architecture to accommodate the movement of coastal activities, it must connect to the functional zone of water.



Figure 6.2 (above): Multiple coastal facilities in parallel across the edge (boatshed arrangement)



Figure 6.3 (above): Singular coastal facility before the edge (Existing Yacht Club at Granger Point)

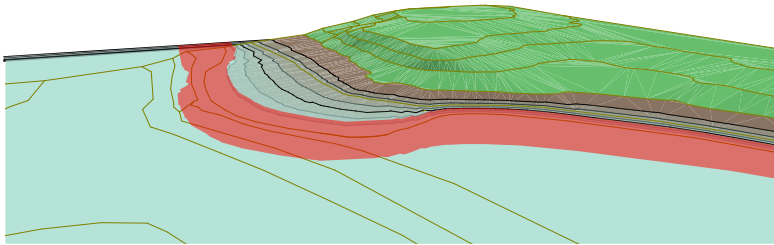


Figure 6.4 (above): Function Perimeter of the Granger Point site. Red shading denotes the functional zone of 1.5 metres minimum depth below low tide.

the confluence of coastal activities. This reef forms a natural secondary edge where the seabed material forms an edge between the rock and sediment. This secondary edge became the most critical natural feature of planning as it bound a functional zone for coastal activities.

Coastal architecture is one where orientation should follow function⁶². Orientation is expressive of lineal movement across a site where activities are transferred between functional land based occupations to functional water based occupations. To create architecture in the littoral zone that accommodates a confluence of activities, the proposal must express an internal connection where the transfer from land to sea can exist. In approaching the site of Granger Point, this thesis proposes that the placement of architecture follows the natural topography of the site in order to provide functional access to accommodate coastal activities. A functional perimeter forms around the edge of the proposed site, expressed in Figure 6.2, which determines a non-tidal zone for the range of coastal activities. This gives the site both orientation and potential boundaries.

62

Tatton. *The Boatshed and Living Beyond the Edge*.⁷³



Figure 6.5 (above): Building before the edge with a connection beyond the edge (Conceptual Scheme 2)



Figure 6.6 (above): Building beyond the edge with a connection back to the land (Conceptual Scheme 3 and 5)

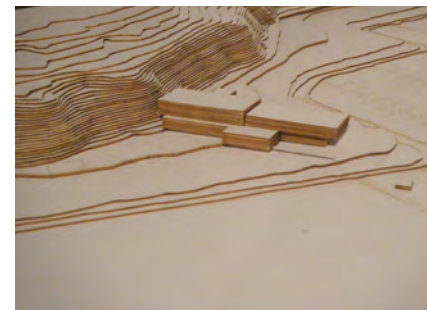


Figure 6.7 (above): Building across the entirety of the edge (Conceptual Scheme 4)



Figure 6.8 (above): Building before and beyond the edge exaggerating the connection between (Concept Scheme 6)

6.2 Connection

Architecture beyond the edge should exaggerate the natural form of the bay and headland in both plan and section. In occupying a region such as this, any artificial connection has the ability to deform not only physical qualities of a site but spatial and emotional qualities of the wider area. Figure 6.9 shows the shape of the coastline in plan where the arrows express the continuation of the concavity of the bay form. In Figure 6.9, the section show the vertical exaggeration of the headland beyond the edge.

Architecture within the littoral should exaggerate the natural landscape so that the connection between land and sea can be experienced. It is important that any architectural introduction to the littoral zone must be tentative as it is a zone that is vulnerable to the complexity of movement and change. Suspending architecture within this environment allows the natural dense rock structure of the river to continue beneath. By tip-toeing on stilts in the littoral zone, rather than building walls and barriers, the adjacent bays are able to absorb the energy of sea.

6.3 Access to Water

The coastal edge should be preserved for common use and provide unobstructed access to water. It is important when occupying a space beyond the edge that pedestrians can experience the connection both at the edge and beyond the edge. The Marine Centre accommodates pedestrians across the entirety of the ground floor to maintain this connection to the edge. Architecture should assist in creating an unobstructed, safe, continuous edge, as well as extending the edge to create a density of functional occupation. Figure 6.10 shows the natural coastal edge being preserved for common use to allow the public to maintain unobstructed access to water. This thesis suggests that a common edge should be incorporated in architecture beyond the edge.

6.4 Perpendicular to the edge

Architecture on the edge should extend perpendicular to the coastline. Creating perpendicular connections to the edge minimises the impact along the littoral, interruption to pedestrian access and enhances the experience of the transition across the edge. In the conceptual investigations at Granger Point, this is explored through a number of variations of gantry walkways that stretch perpendicularly across the edge to join architecture to the land (see Figure 6.11).

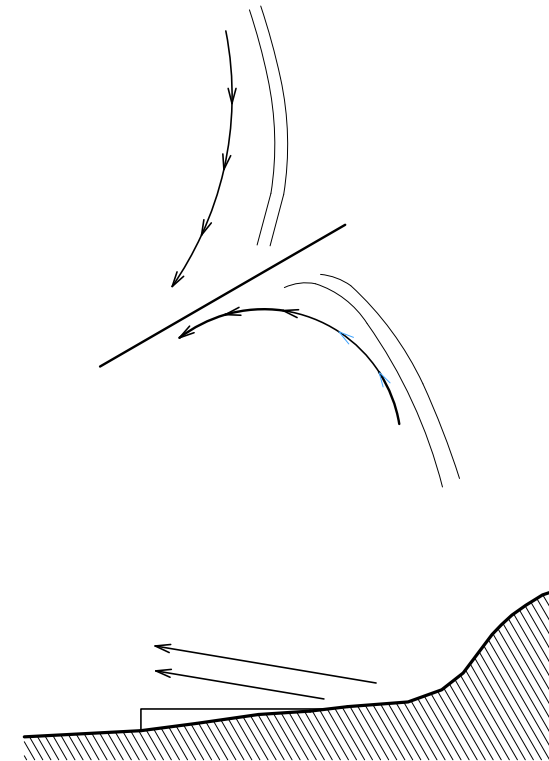


Figure 6.9 (above - plan / section): Architectural Connection. Architecture beyond the edge should exaggerate the natural form of the bay and headland in both plan and section. Arrows indicate the direction architecture should take to reinforce the natural structure.

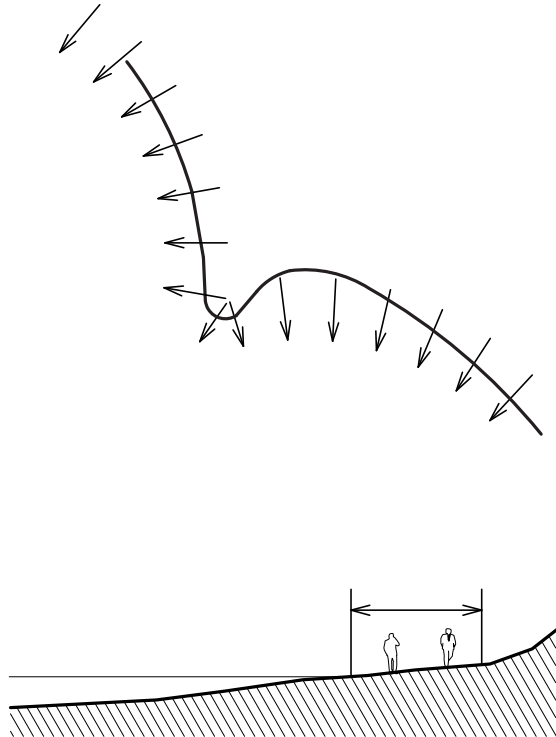


Figure 6.10 (above - plan / section): Diagram of access to water. The coastal edge should be preserved for common use and provide unobstructed access to water.

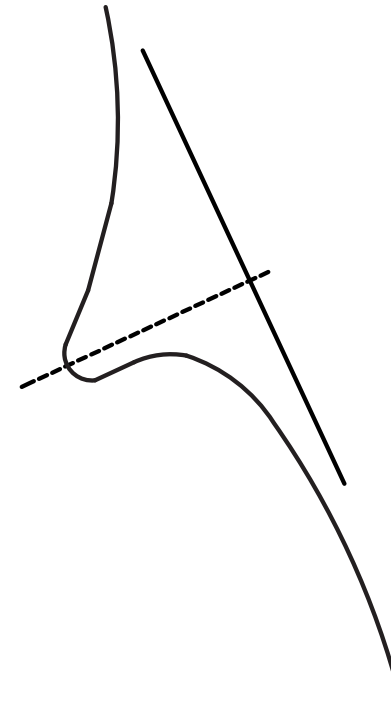


Figure 6.11 (above): Architecture on the edge- Architecture on the coast should be orientated perpendicular to the edge minimise the affected perimeter.

6.5 Edge Perimeter

Presently, coastal activities act in parallel along the edge, limiting pedestrian access to these zones. This is common practice in large coastal facilities such as marinas. Figure 6.12 shows the existing framework for accommodating coastal activities on edge where each coastal activity is given an independent pathway between land and sea. In comparison, the theoretical approach to the proposed site of Granger Point is one where coastal activities are accommodated across a secondary edge where pedestrian access to the natural coast can be maintain. As shown in Figure 6.13, the coastal perimeter is achieved by building beyond the edge in which “z” denotes the edges for coastal activities, “y” the natural edge affected by this connection and “x” the length of coastline that is maintained for public access.

6.6 Node Points

This thesis is intent on bringing together coastal activities in confluence. Through the exploration of Granger Point, the confluence was tested through a series of designs. Initially, activities were confined together in multifunctional arrangements where activities would intersect with one another. However, through the critical analysis of these design, I concluded that the variety of complexity and scale intersecting one another restricted the functional operation. It became apparent that in creating a confluence experience at Granger Point, the activities should connect together through a common node before the transitioning across the edge. Therefore, Figure 6.14 shows a singular pathway which is shared across the edge that connects to a central node. This creates a confluence of activities which, upon reaching the central node, each diverges outwards to function, strengthening the pedestrian experience between land, sea and architecture across the littoral.

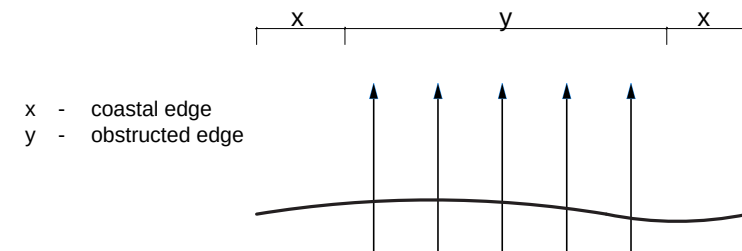


Figure 6.12 (above): Diagram of existing edge perimeter - Coastal activities across the edge perimeter in parallel.

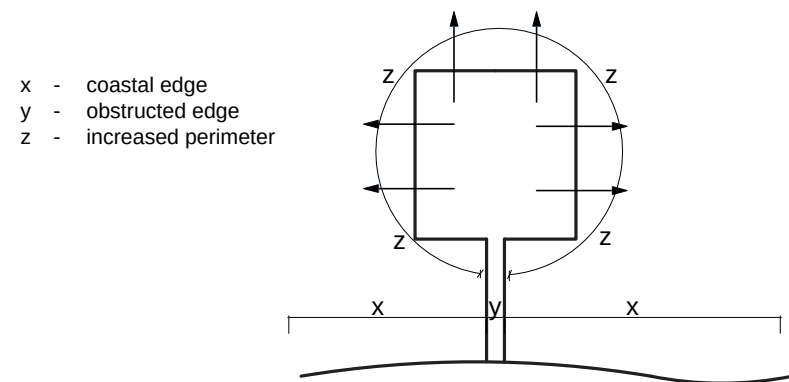


Figure 6.13 (above): Diagram of proposed edge perimeter - Creating a new edge perimeter allows coastal activities to occur with minimal effects on natural coastal edge.

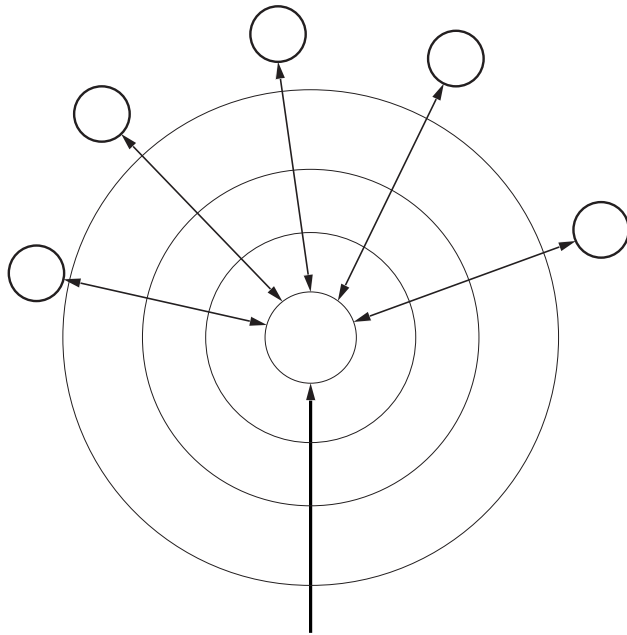


Figure 6.14 (above): Diagram of node points - Pedestrians share common pathways of movement between coastal activities, in comparison to the movement of coastal activities which function across separate pathways parallel to one another.

6.7 Pathways

Coastal activities form pathways based on functional need for movement. This thesis suggests that the accommodation and movement of coastal activities is an environment that should be a shared by the public. In achieving a pedestrian experience, the approach to Granger Point was to create a medium to accommodate a variety of pedestrian velocities; from commuters in a rush to catch the ferry, to public spectators engaging in the observation of coastal activities. Figure 6.15 refers to creating strong axial paths that are dissected with infinite secondary pathways. Denoted in Figure 6.15, the pathway between “a” and “b” indicates the need for high velocity and direct pathway to accommodate commuters.

Enhancing the pedestrian experience through the site meant having strong perpendicular axes maintained in negotiation with coastal activities. The result become a trial and error process in the orientation and placement of activities derived from hierarchy. The hierarchy was determined by the size (the overall scale space internally and externally each activity requires⁶³), mobility (the pathway of each activity as they enter, transfer and leave the site) and interaction (the role each activity shares internally with the site and with other activities) each activity share between one another. More flexible activities, such as the sailing club, were manipulated around the fixed activities, such as the commercial ferry.

6.8 Form

The key theoretical approach, in generating a site form, was one that was expressive of coastal activity and the surrounding landscape. Internally form is generated as a secondary response to the main pedestrian axes and activities that exist. In the plan, the coastal activities function in a confined space across the site where the form expresses the tension of occupation. Tension creates internal pedestrian spaces reflectant of the confluence of activities. It can be suggested that form follows function as architecture is manipulated to capture each activity. Externally, the form expresses the site and the surrounding landscape it is occupying. The placement and the scale of architecture becomes expressive of the headland projecting out, further enhancing the enclosure of both Big Bucklands Beach and Little Bucklands Beach. Its placement on the boundary of the bay enhances the bay as a focal point as referred to in Toys idea of the bay as a natural courtyard. Building within a sensitive zone should share a connection to the land, one that expresses what is happening in and around it.

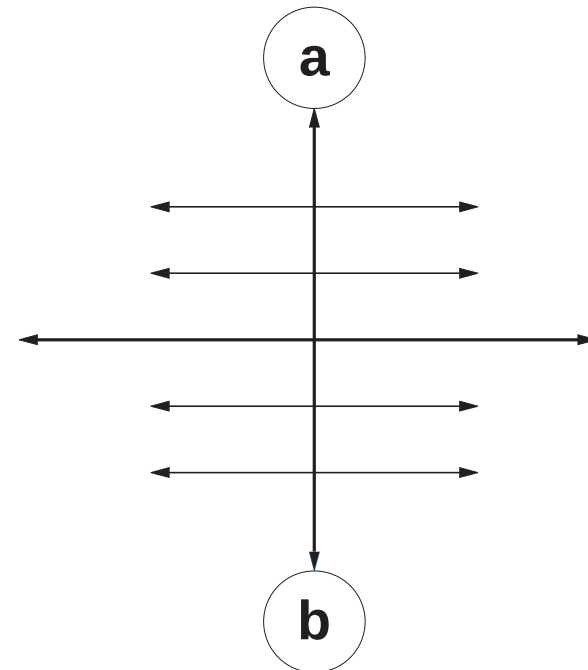


Figure 6.15 (above): Diagram of Pathways - Primary pathway accommodates the velocity of commuters, which is supported by infinite secondary pathways. Point ‘a’ ‘b’ denote the main path through a coastal site.

63

Bloomer and Moore. *Body, Memory, and Architecture*, 1979. 57

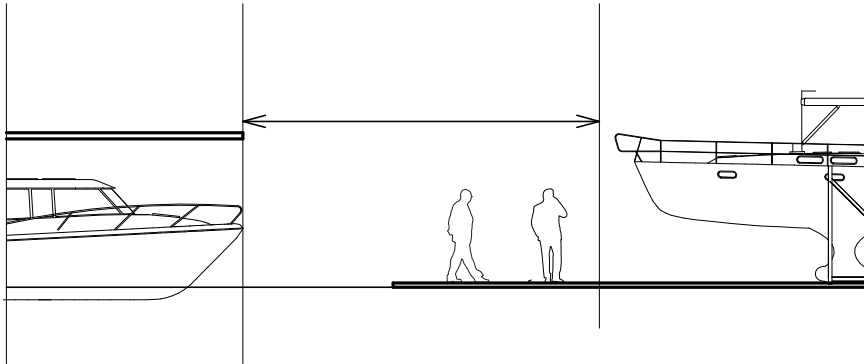


Figure 6.16 (above): Form is expressive of tension. Tension creates internal pedestrian spaces (shown by arrow) experiential of the confluence of activities.

6.9 Investigation by Design

6.9.1 Conceptual Scheme 1

Halfmoon Bay Marina

Notes from critique;

Pros :

-Worked to enhance an existing coastal facility

Cons:

-Did not enhance the structure of the bay

-Did not increase Auckland as a Water City

-Not a sustainable direction for accommodating coastal activities

-The natural environment was compromised by function. Function was compromised by the natural environment.

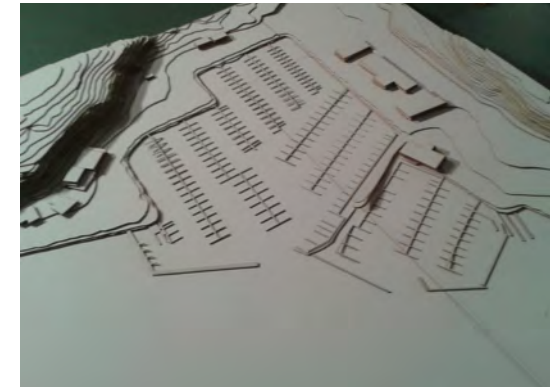


Figure 6.17 (above): Physical model of Halfmoon Bay Marina

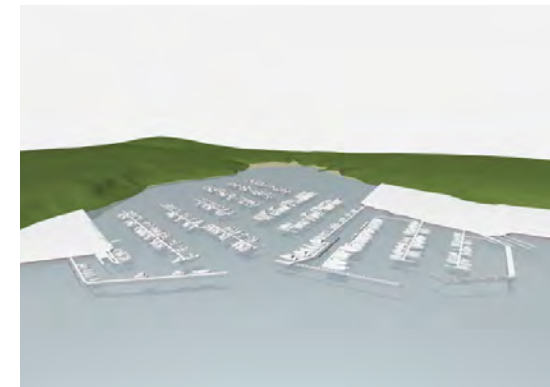


Figure 6.18 (above): 3D modelling of Halfmoon Bay Marina - exploring the removal of sections of the existing reclaimed land to expose the natural edge. Image shown at high tide.

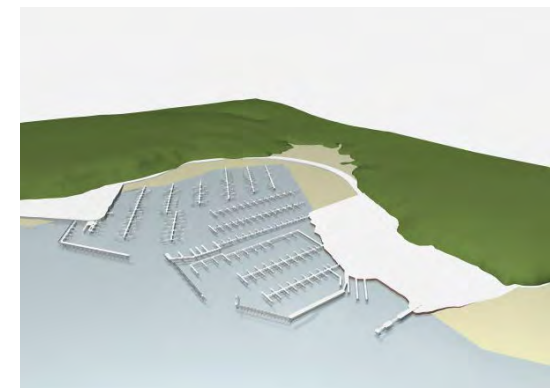


Figure 6.19 (above): 3D modelling of Halfmoon Bay Marina - exploring the removal sections of the existing reclaimed land to expose the natural edge. Image shown at low tide.

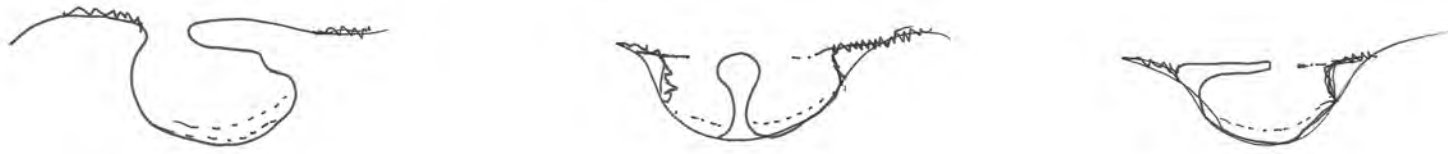


Figure 6.20 (above): Early sketches of architecture placement within the bay.

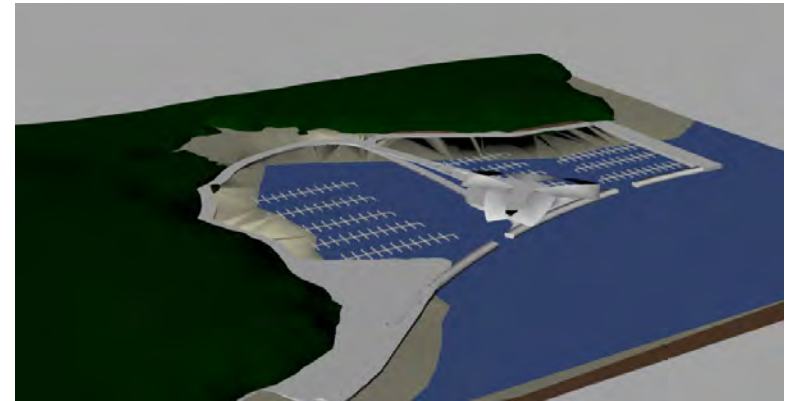


Figure 6.21 (left): Occupying the bay form. Initial manifestation for the developing of Halfmoon Bay

Figure 6.22 (top right) : Scheme 1 conceptual test at Halfmoon Bay.

6.9.2 Conceptual Scheme 2

Notes from critique;

Pros :

-Enhanced the natural landscape through a form expressive of the headland before the edge.

Cons:

-Eccentric form lacked connection to the identity of the boatshed

-Lacked pedestrian access through the site and across the edge

-Form was not expressive of coastal activities

-A hesitant approach and lacked confidence to build beyond the existing Granger Point Platform.

-Not expressive or inviting of the environment into the site.

-Lacked the tethered aesthetic of coastal architecture.

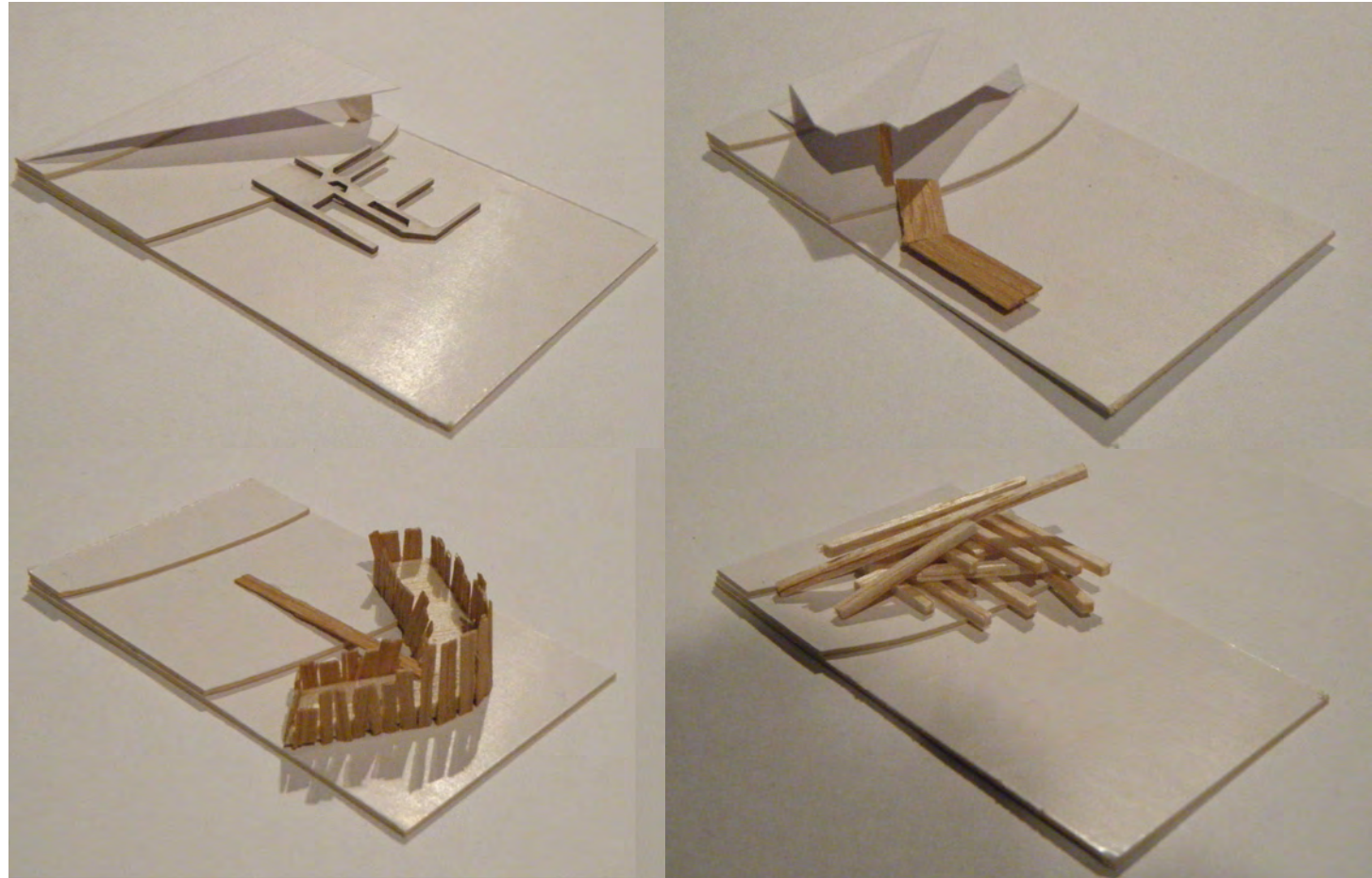


Figure 6.23 (left): Preliminary investigations of coastal architecture on a point.

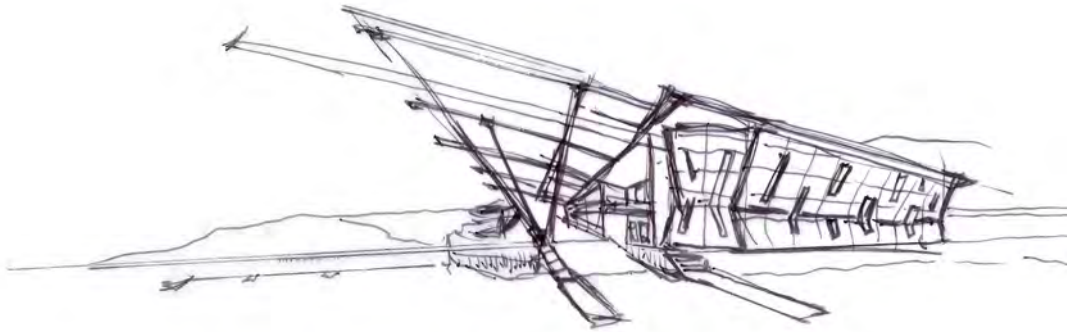


Figure 6.24 (above): Conceptual investigations of architecture which exaggerated the vertical headland form. View from the Tamaki River towards Granger Point

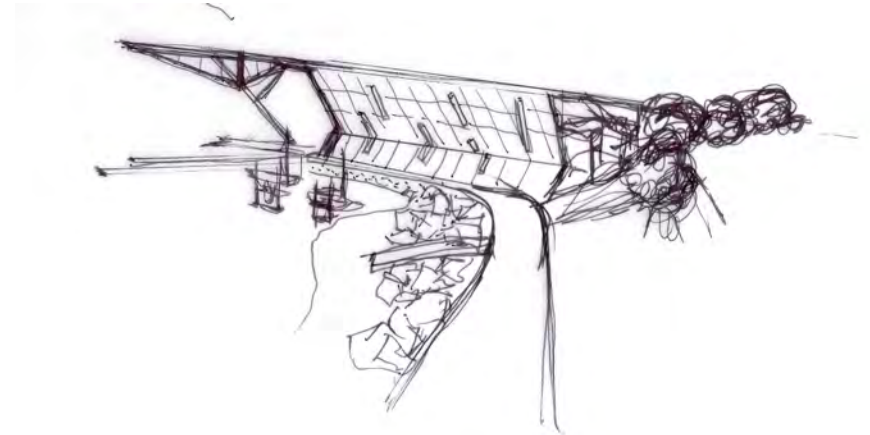
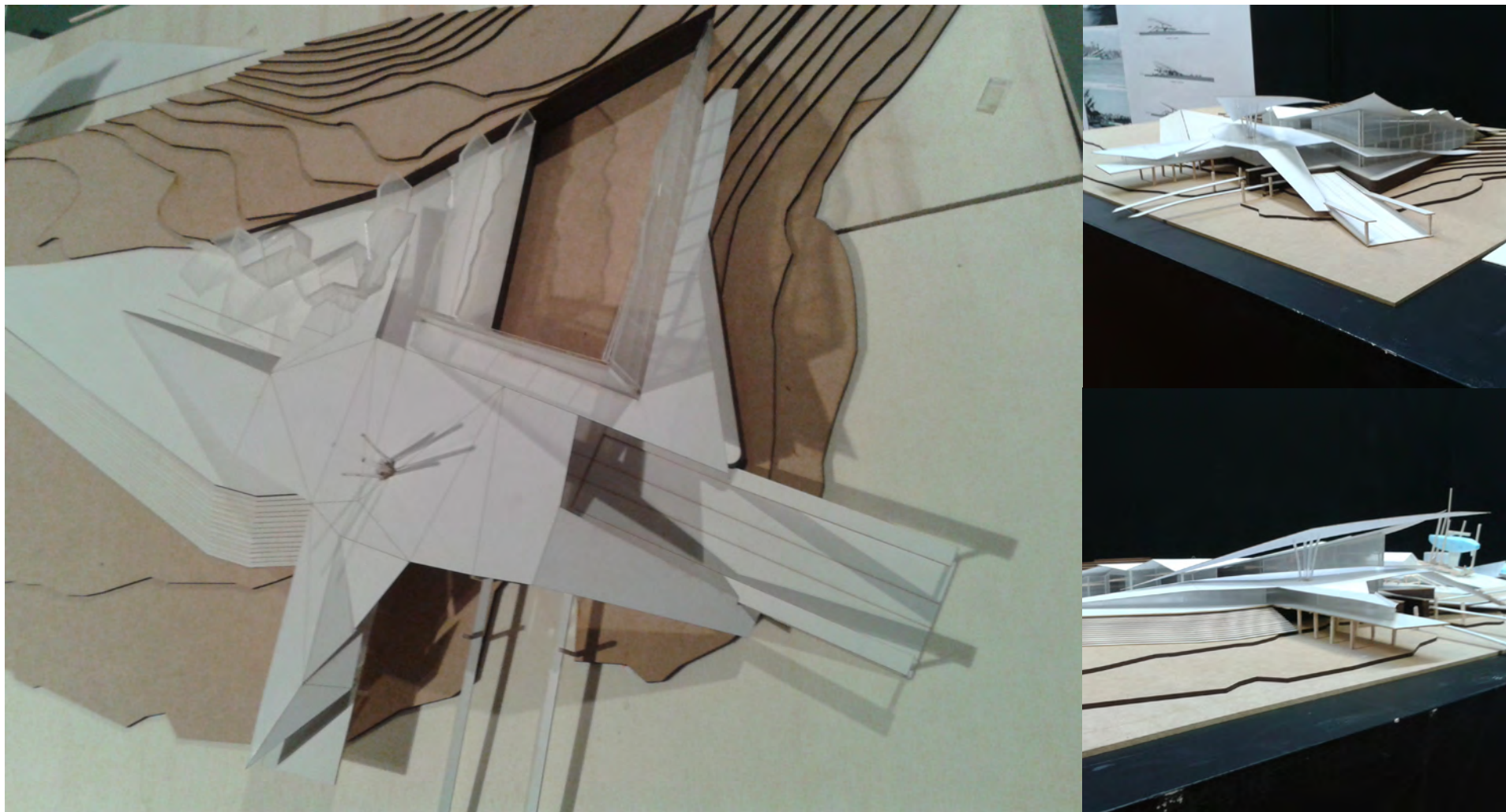


Figure 6.25 (right): View from the Little Buckland Beach towards the headland.



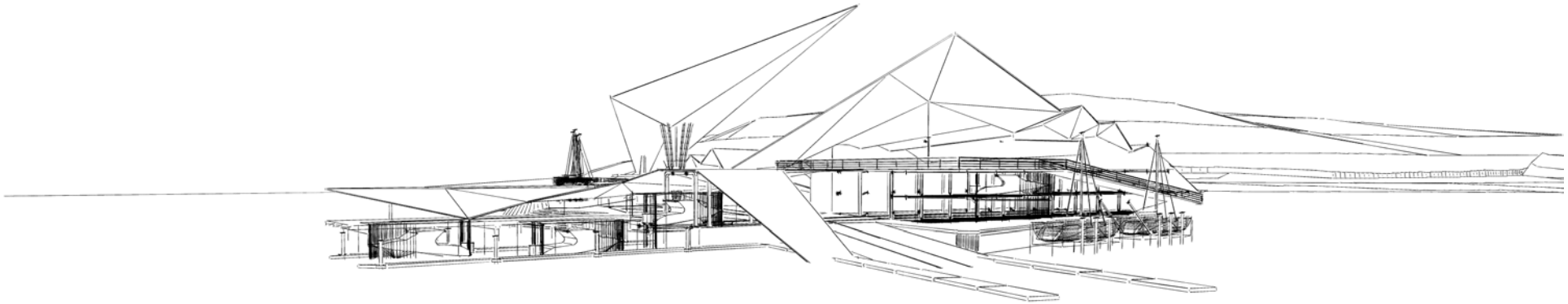


Figure 6.26 (left): Conceptual Scheme 2 physical model. This concept explores architecture before the edge where function follows form to enhance the natural shape of the coastline.

Figure 6.27 (right): Conceptual Scheme 2

Figure 6.28 (below): Exploded Axonometric of Conceptual Scheme 2

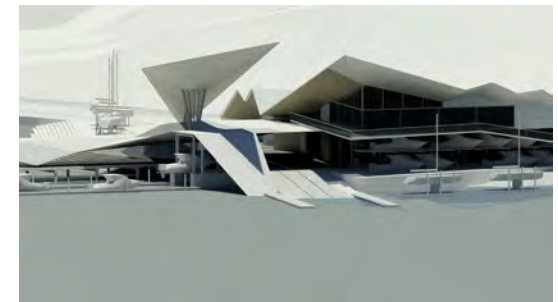
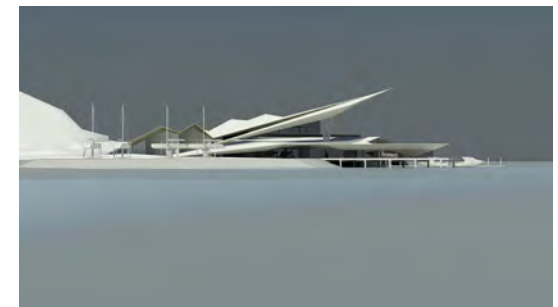
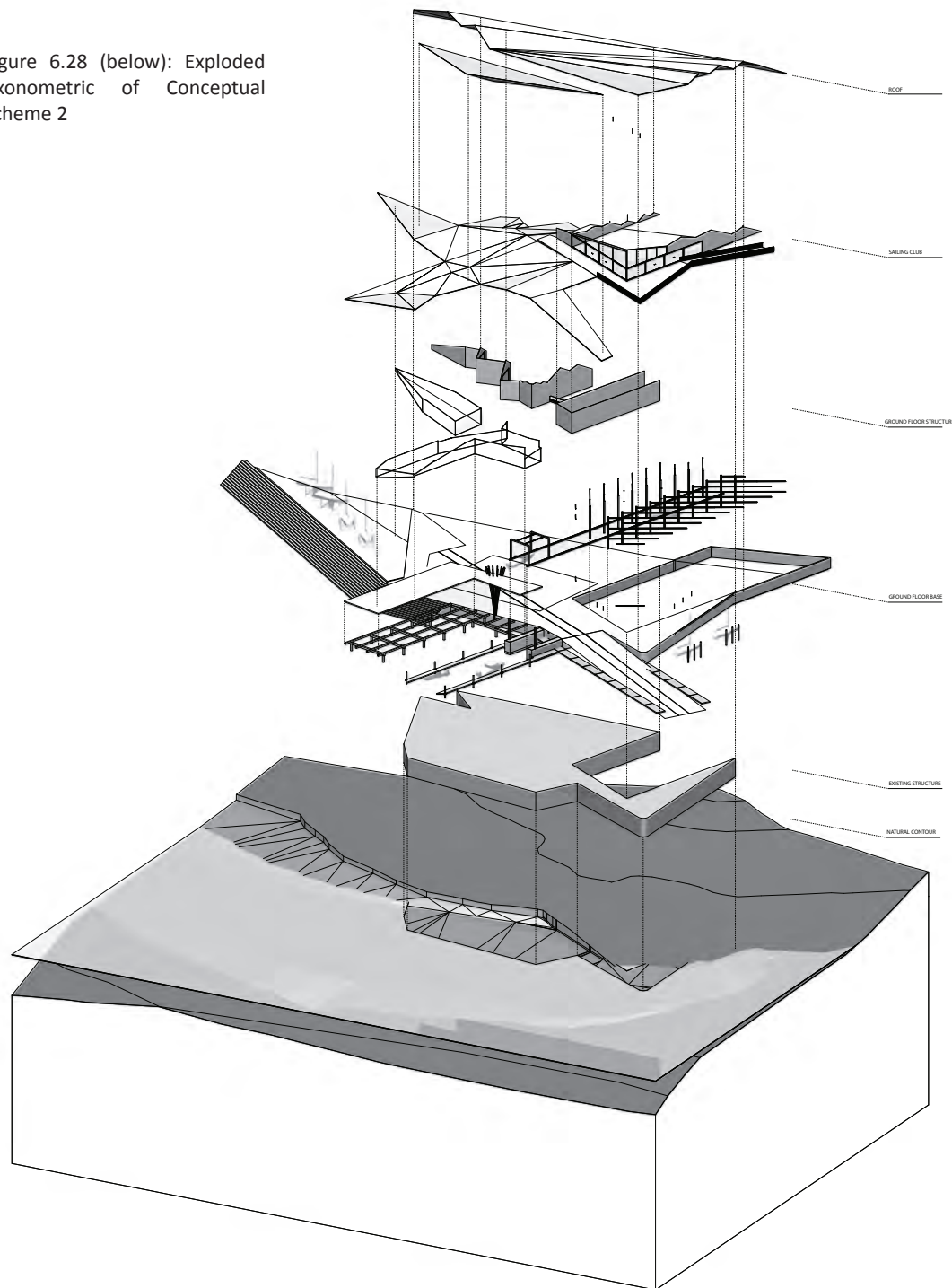
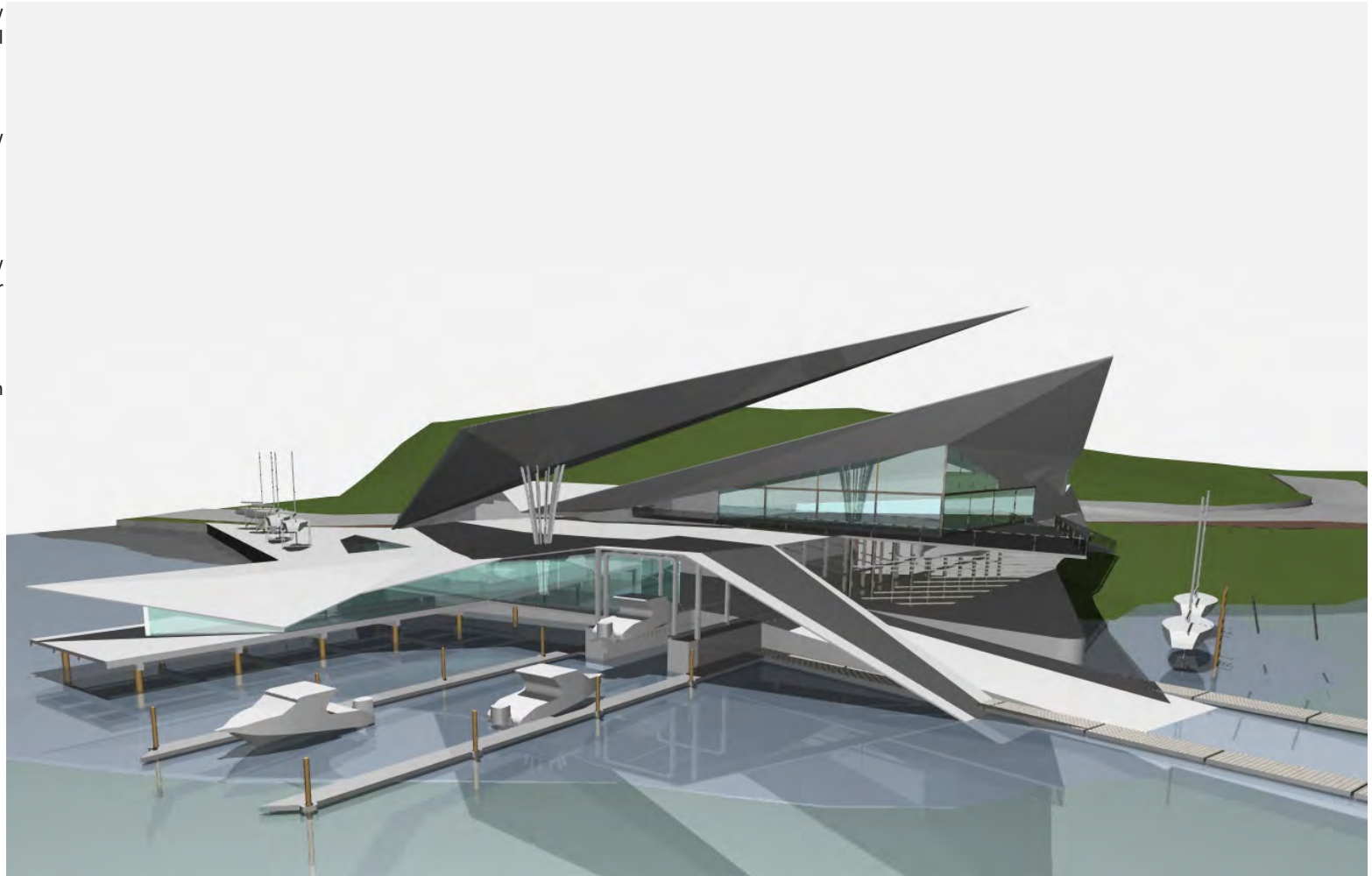


Figure 6.29 (top left): View from The Parade of Conceptual Scheme 2

Figure 6.30 (middle left): View south from the Tamaki River

Figure 6.31 (bottom left): View north east from the Tamaki River

Figure 6.32 (right): View north east from the Tamaki River



6.9.3 Conceptual Scheme 3

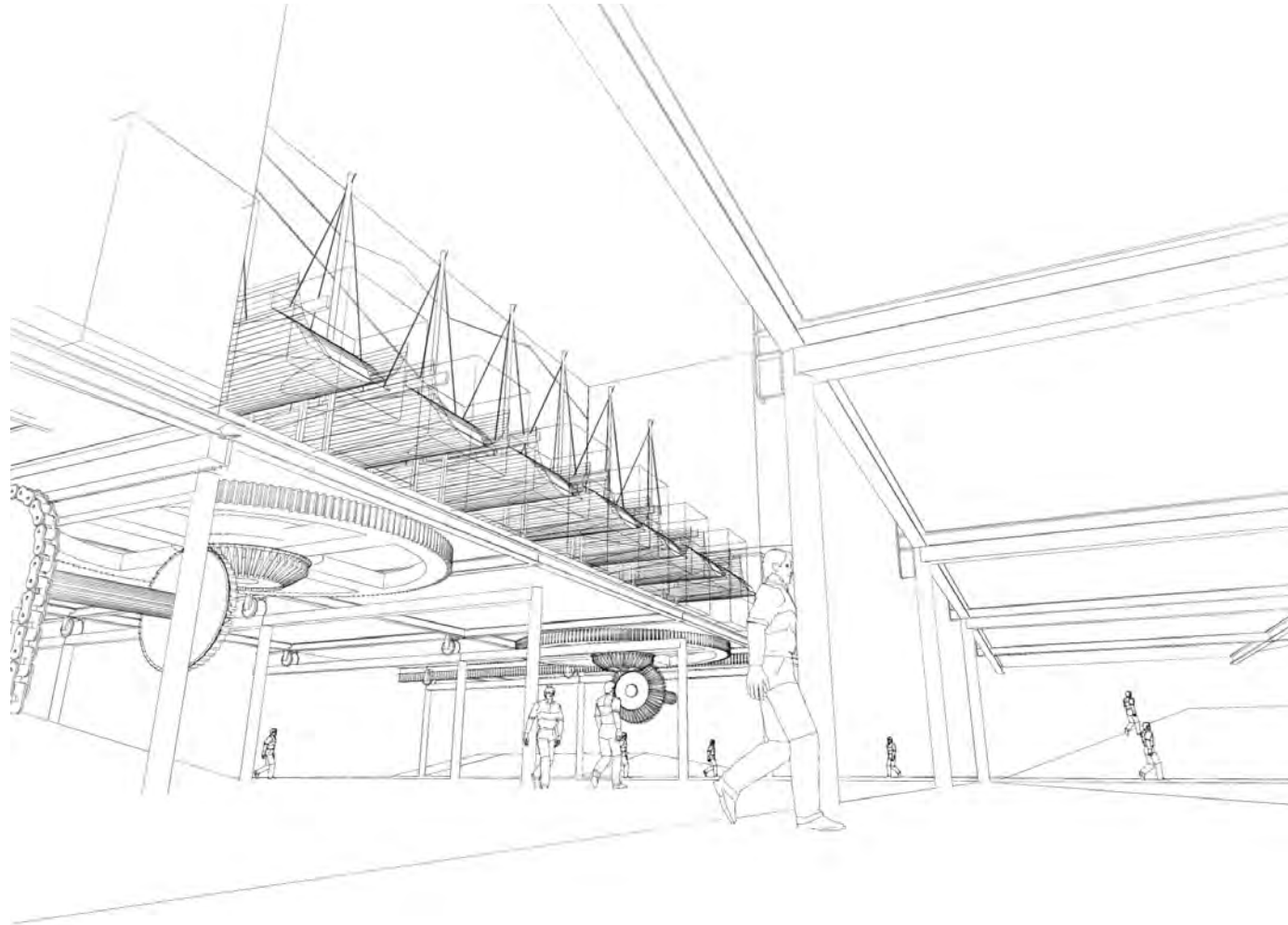
Notes from critique;

Pros :

- Expressive of the natural movement and tide
- Created a variety of pedestrian pathways through the site and access across the edge
- Expressive of coastal function
- Fixed and floating sections of the proposal allowed the variety of ebbs and flows to be expressed through spatial change
- The movement of coastal mechanisms could be experienced by pedestrians
- A strong sense of coastal identity was created through the choice of materials, mechanisms and enclosure

Cons:

- Not sympathetic to the surrounding environment and wider landscape in both form and scale
- Offered limited connection to the reef below
- The entry to the marine centre lacked a strong connection between land and sea for pedestrians to experience
- The main axis of the moving section created confused pedestrian pathways through the site
- The arrangement of some activities compromised function



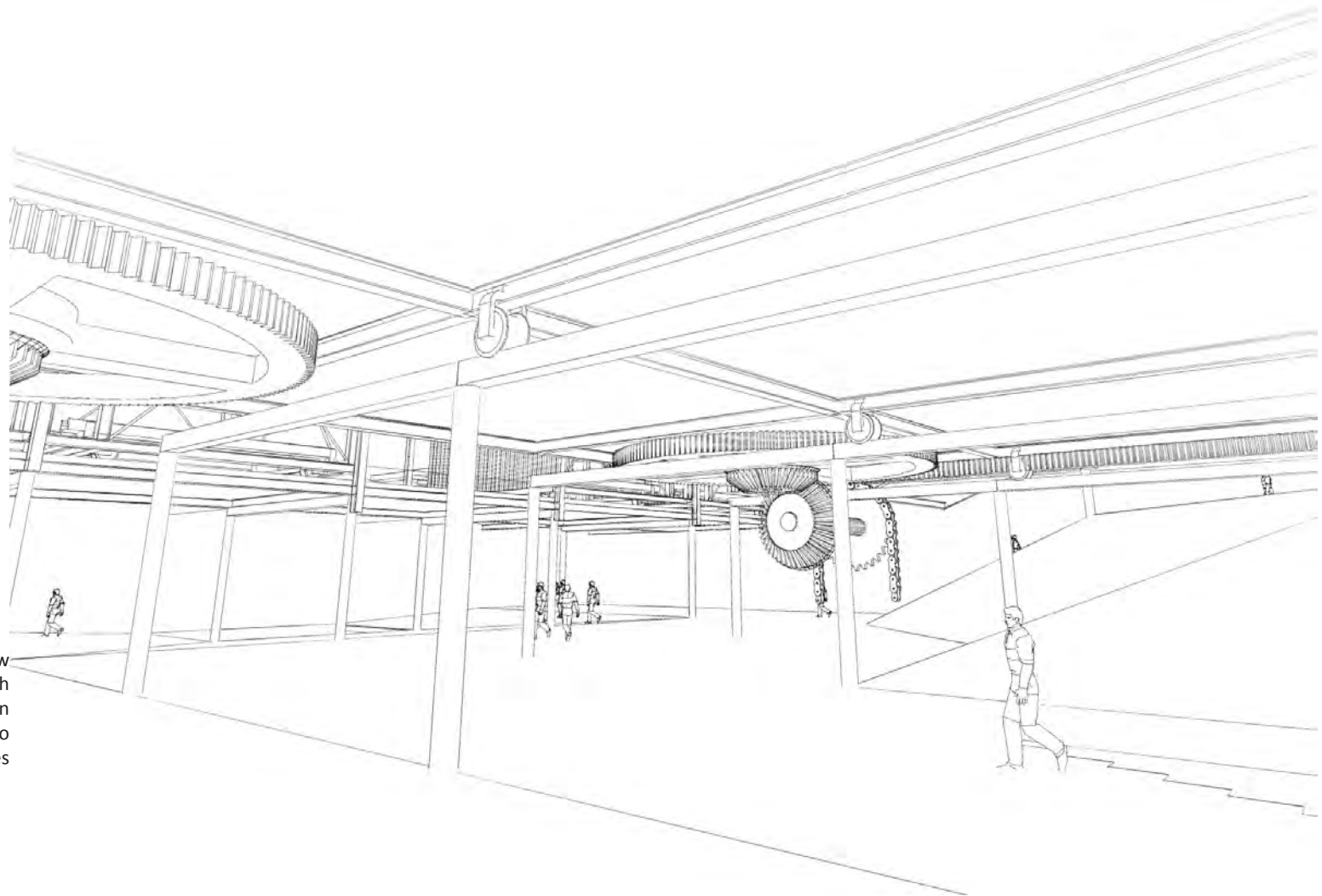


Figure 6.33 (left): Internal view of Conceptual Scheme 3 at high tide. This concept focused on using the movement of tide to accommodate coastal activities via a number of mechanisms.

Figure 6.34 (right): Internal view of Conceptual Scheme 3.

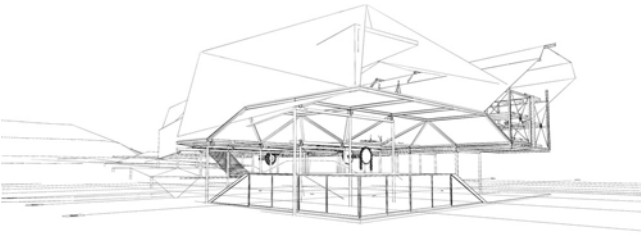


Figure 6.35: North West Elevation at low tide

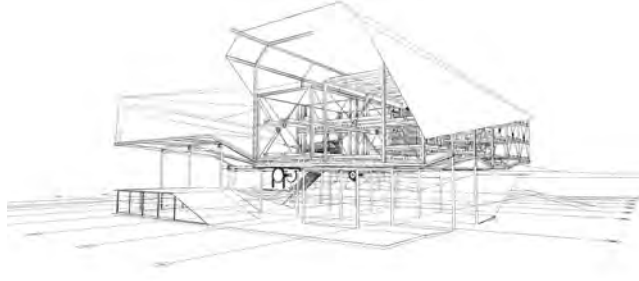


Figure 6.37: West Elevation at low tide

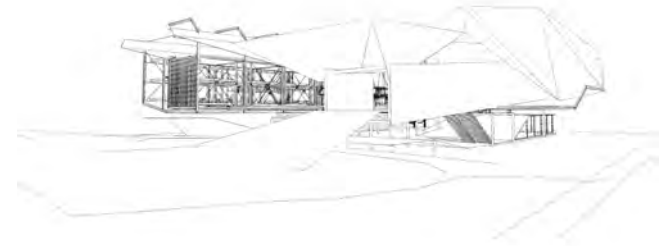


Figure 6.39: North East Elevation at high tide

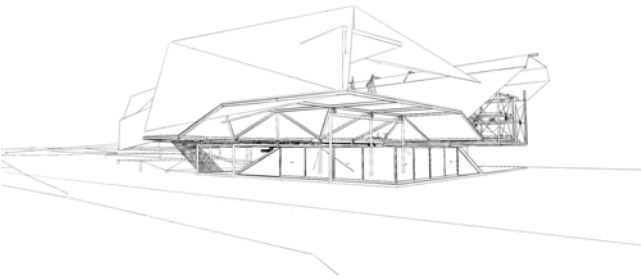


Figure 6.36: North West Elevation at high tide

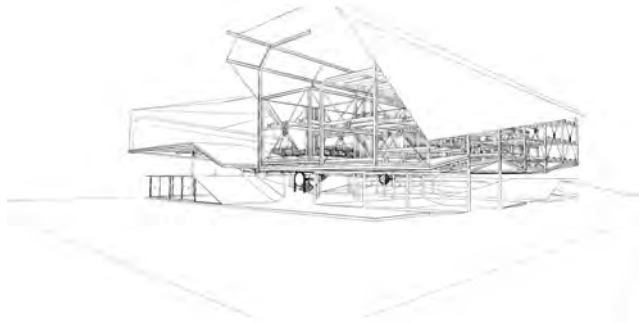


Figure 6.38: West Elevation at high tide

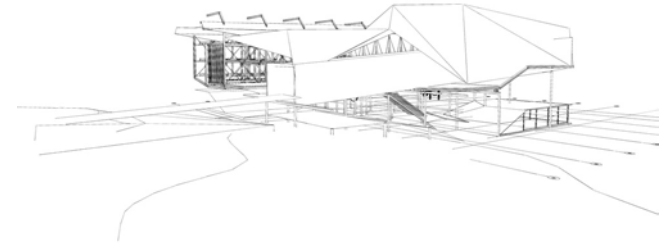


Figure 6.40: North East Elevation at low tide

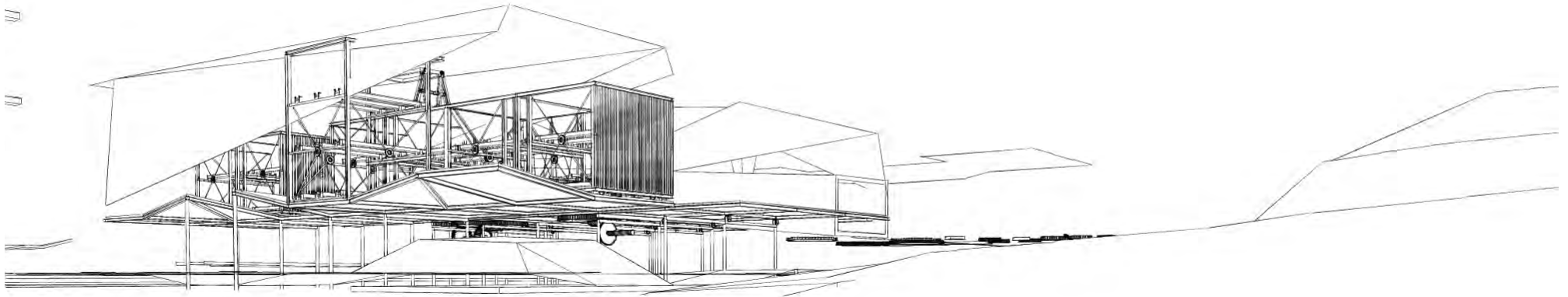


Figure 6.41: South East Elevation at high tide

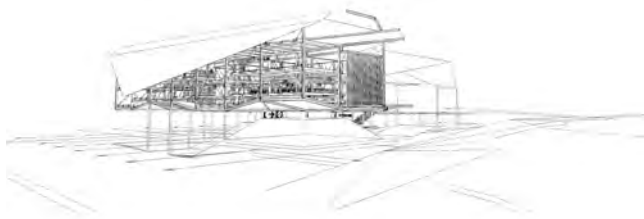


Figure 6.42: South East Elevation at low tide

6.9.4 Conceptual Scheme 4

Notes from critique;

Pros :

-Form was sympathetic to the surrounding environment and wider landscape. It exaggerated the shape of the natural edge and headland in both plan, section and scale

-The entry to the marine centre created a strong perpendicular connection between land and sea for pedestrians to experience

Cons:

-Too simplistic; a big shed (airport like) not expressive of the diversity of activities

-Offered limited connection to the reef below and the littoral environment

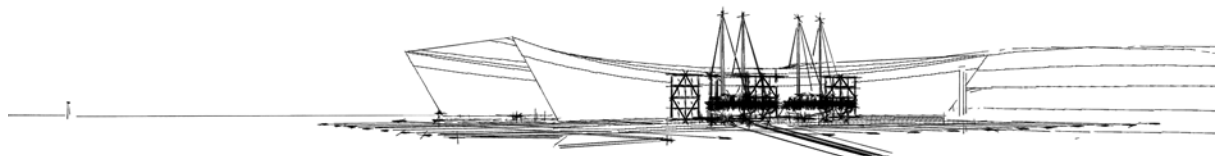
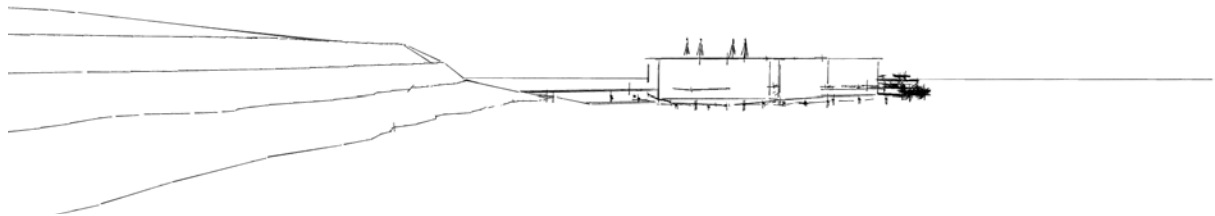
-Coastal mechanisms were not present for pedestrians to experience the natural movement of tide

-The form compromised the function of larger coastal activities such as the drystake

-Limited attention was given to expressing the ebbs and flows to create unique spatial changes

-Not expressive of coastal function

-Offered limited pedestrian pathways through the site and access across the edge



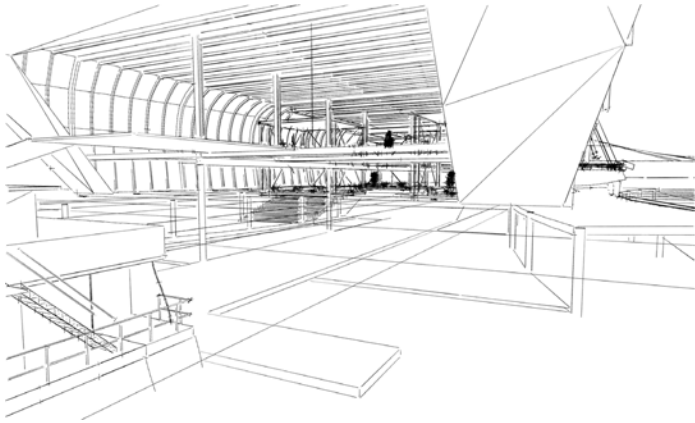


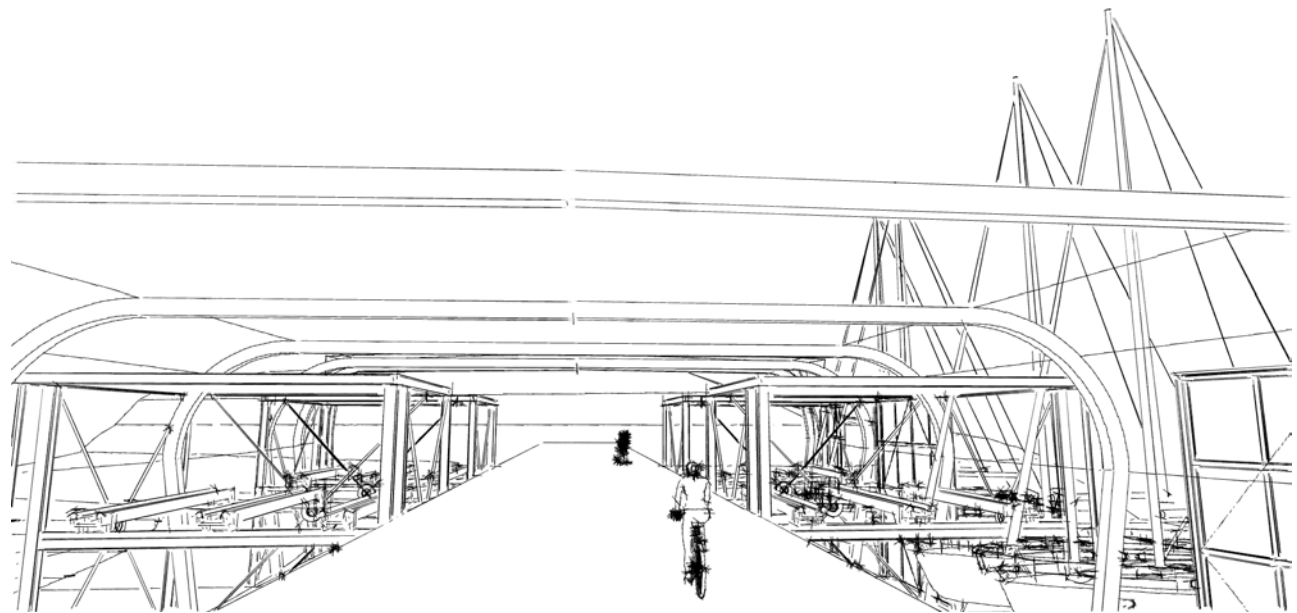
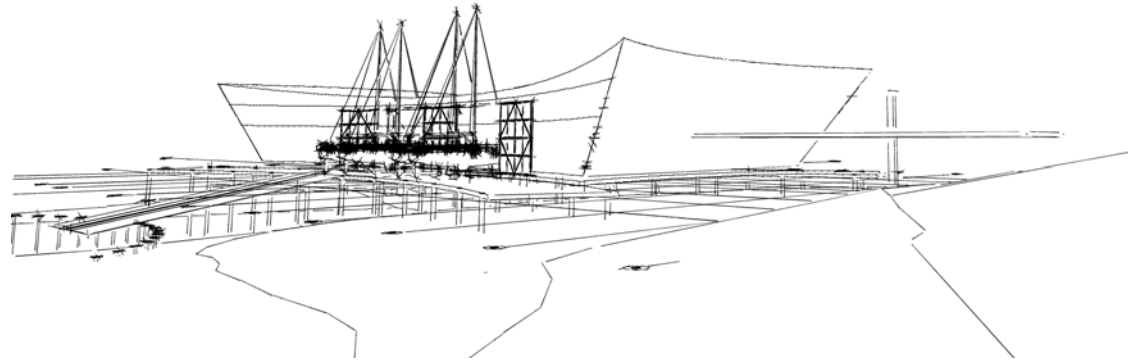
Figure 6.43 (top left): Floor plan of Conceptual Scheme 4 - Investigating how architecture can exaggerate the form of the headland beyond the edge.

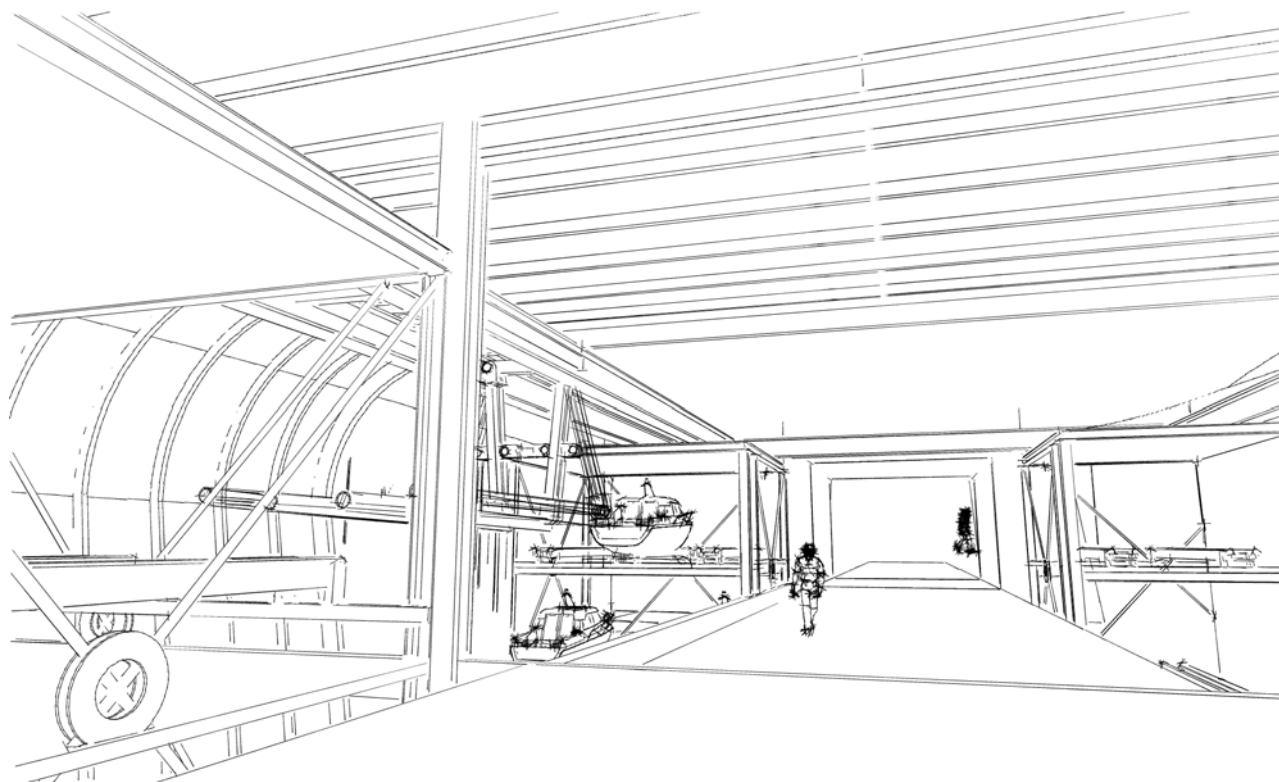
Figure 6.44 (left): Exploring architectural form the exaggerates the headland.

Figure 6.45 (above): Ferry terminal entrance

Figure 6.46 (bottom right): Pedestrian pathway through the coastal activities.

Figure 6.47 (top right): View from Little Bucklands Beach at Low Tide





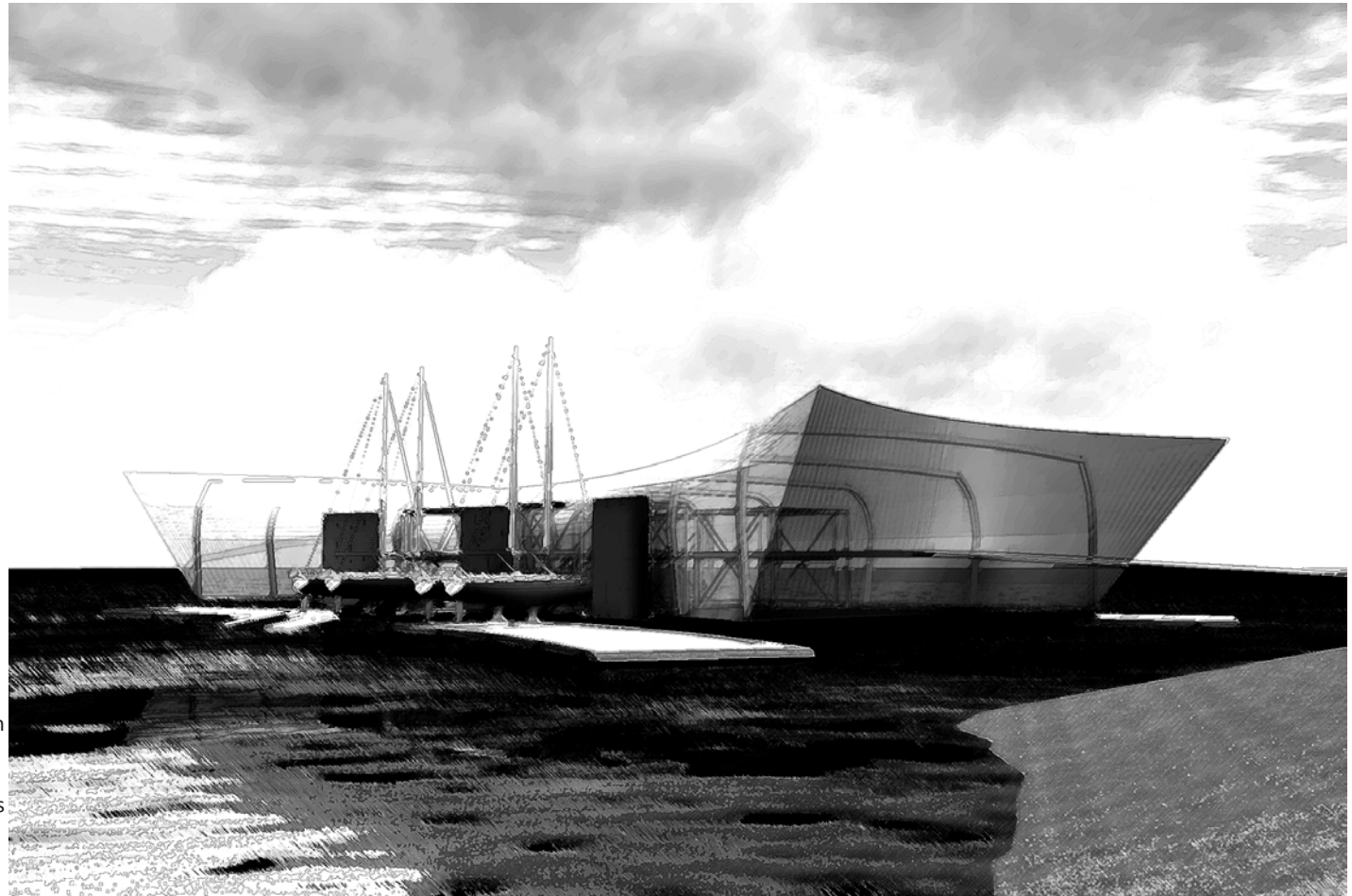


Figure 6.48 (left): Pedestrian pathway through the coastal activities.

Figure 6.49 (right): View from Little Bucklands Beach at high tide

6.9.5 Conceptual Scheme 5

Notes from critique;

Pros :

-Form was sympathetic to the surrounding environment and wider landscape

-The entry created a strong perpendicular connection between land and sea for pedestrians to experience

-Offered infinite pedestrian pathways through the site and access across the edge

-Form was expressive of confluence and functioning of coastal activities.

-Pedestrian are given an enhanced experience of marine movement

-Moving sections of the Marine Centre express the ebbs and flows through spatial change

-Coastal mechanisms were present for pedestrians to experience the natural movement of tide

Cons:

-Needs to elaborate further on the expression of the natural environment that exists beneath the building

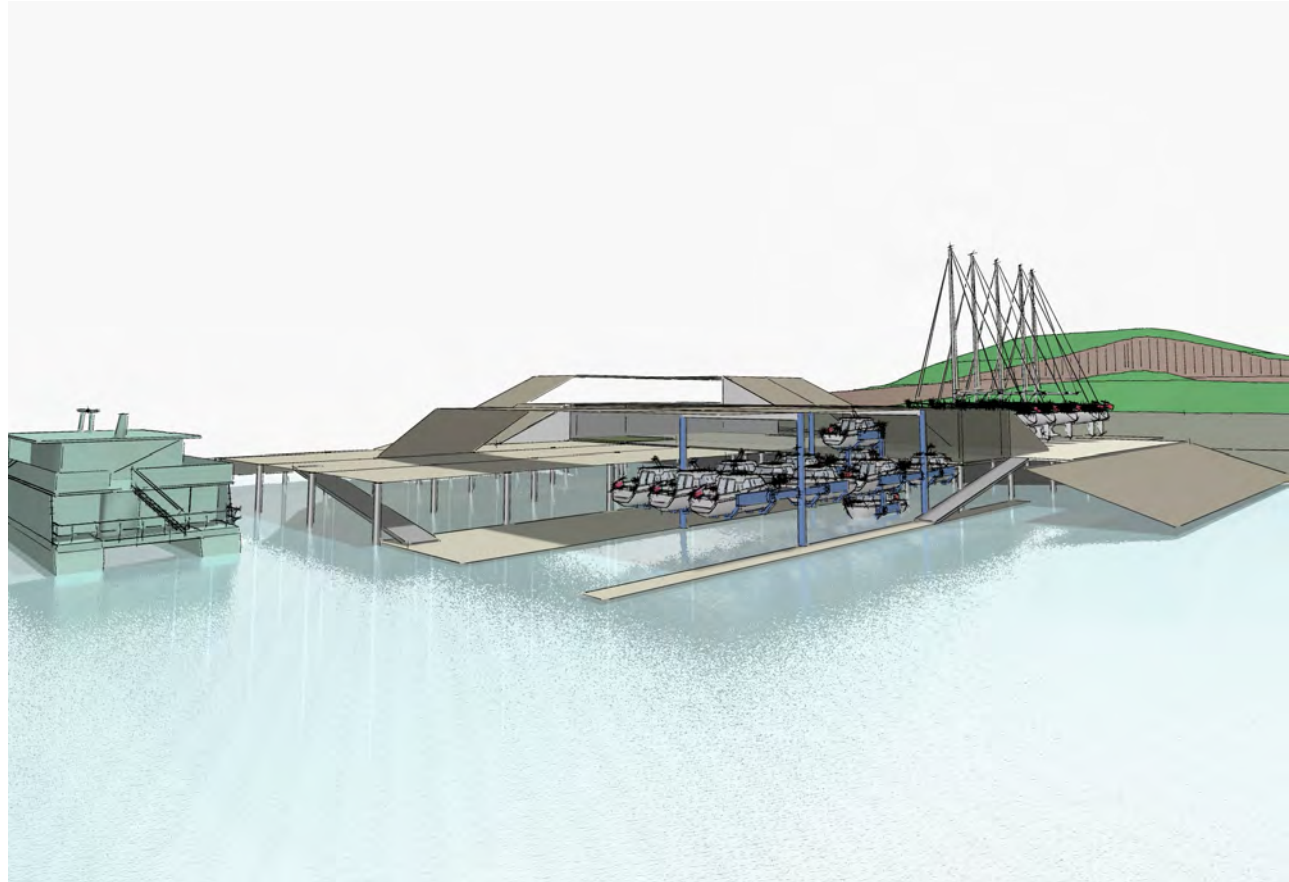
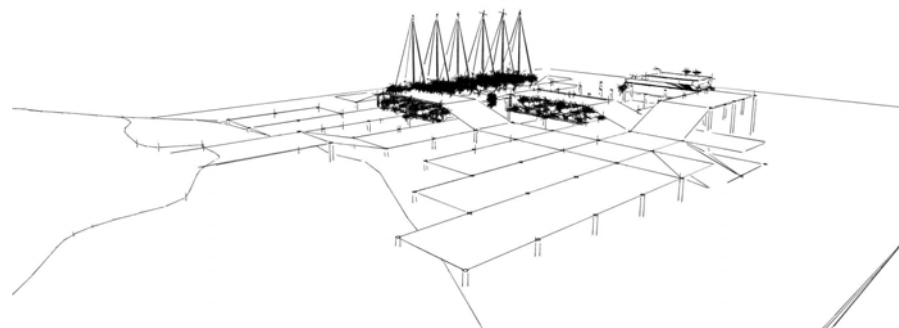
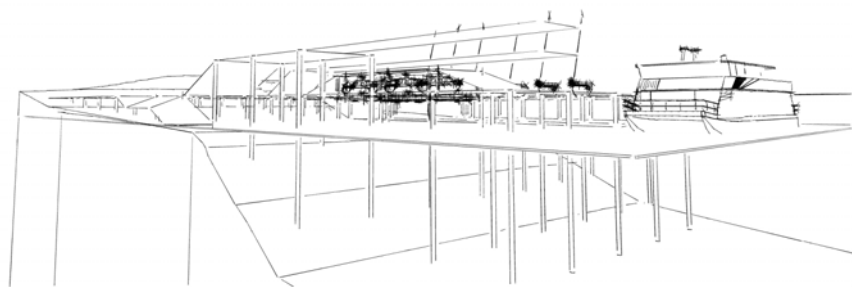
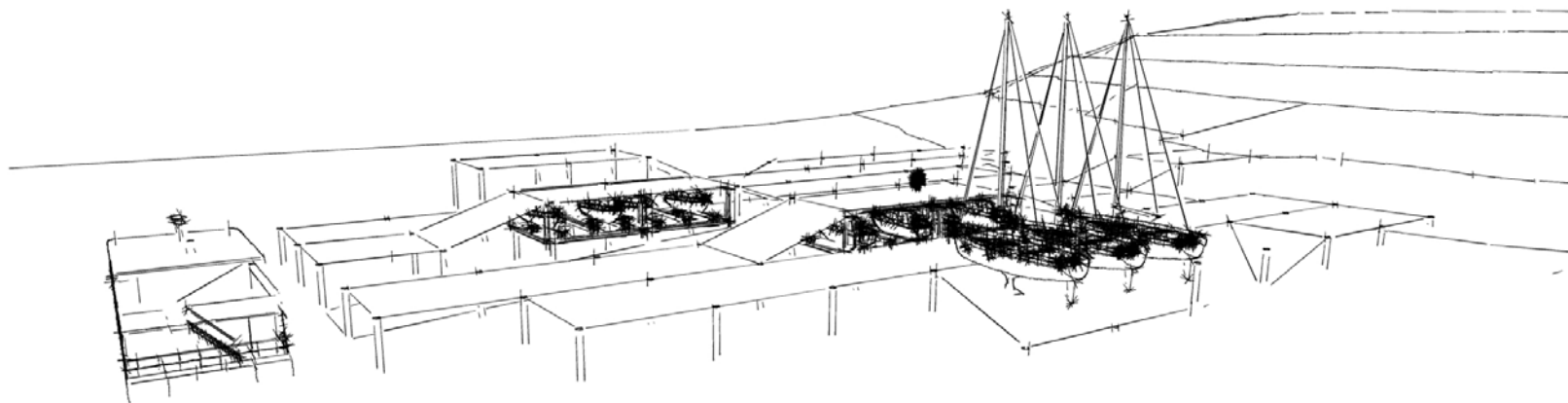


Figure 6.50-6.53 (right and left): Early conceptual models creating an architectural form expressive of tension.



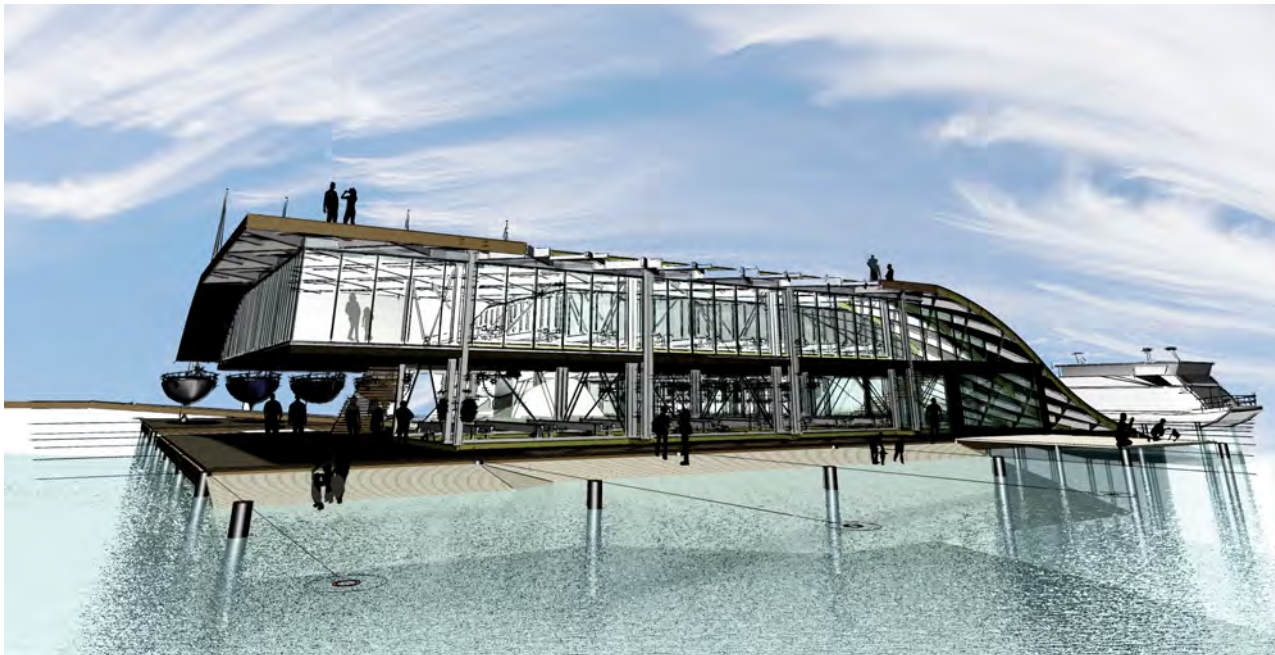
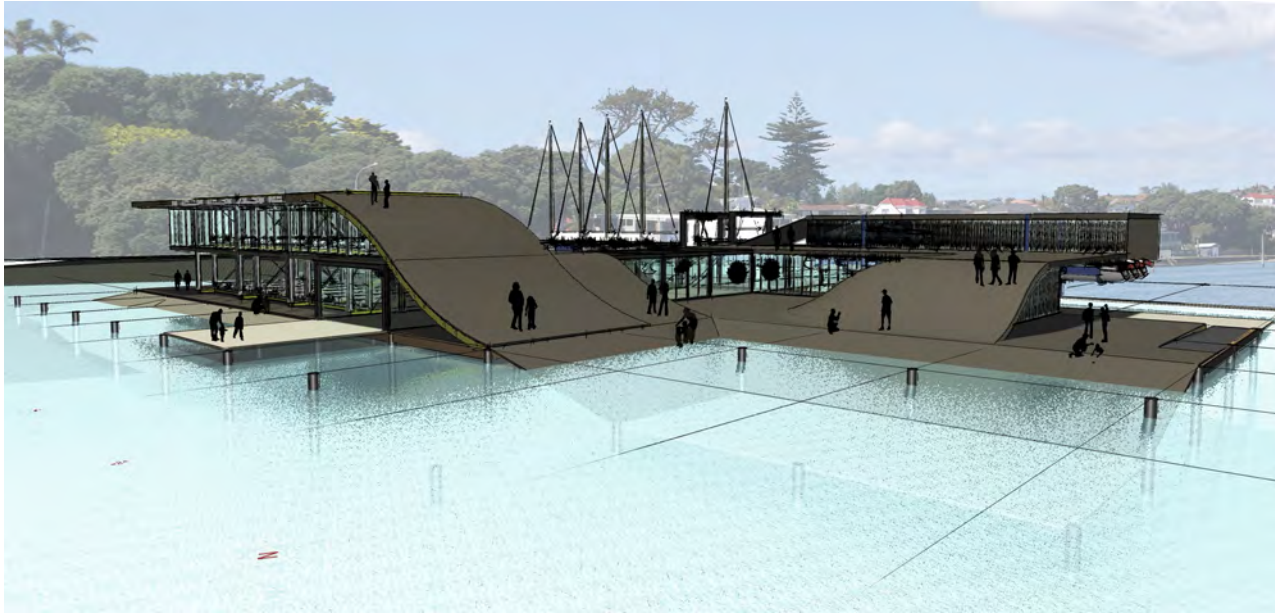


Figure 6.54 (top left): View from the Tamaki River of the conceptual design of the final proposal

Figure 6.55 (bottom left): View from the Big Bucklands Beach of the conceptual design of the final proposal

7. FORMATION OF DESIGN ON SITE

The formation of the final design has been derived from the architectural theories that have been developed through the process of conceptual investigation. In applying these theories to site, the final proposal of the Marine Centre is one that brings together the confluence of coastal activities and the experience of movement through the site. The end product is expressive of coastal movement and identity that amplifies the space beyond the edge, yet has a scale and character suitable to its location - a kind of contemporary boatshed.

7.1 Confluence of Activities

The Marine Centre is a building that combines the sailing club, ferry terminal, drystack and hard stand boat parking together in one facility. Each activity uses the coastal edge to merge in a common space. The composition of the Marine Centre is the result of a dialogue between section and plan where activities are induced across the edge in a functional arrangement.

7.1.1 Placement

The strongest relationship the Marine Centre has is with the environment; most specifically the edge. This proposal is situated on the reef at Granger Point and utilises this natural platform to make the deep edge accessible to coastal activities. The building chooses to preserve the internal edge of the land rather than protrude across it, creating an additional perimeter. The use of the platform increases the spatial edge which accommodates multiple activities while only having a small effect on the coastal edge. The building suspends above the rich natural environment that is formed by the reef occupying an area of the coast with the greatest depth access. The fixed platforms across the eastern edge express the movement of tide through spatial change. The western edge has a direct connection to the sea, moving with the tide on floating pontoons.

Coastal activities typically exist independently in parallel across the edge and do not integrate despite the use of common space. The occupation of a single common space at Granger Point created a tension between the coastal activities which was addressed by arranging the activities in a hierarchy considering; scale, velocity, magnitude, and functional access to water.

- HARD STAND (25-50 ft MARINE CRAFT)
- DRY STACK PARKING (18-27 ft POWERBOATS)
- FERRY CIRCULATION PATH
- FERRY TERMINAL
- FERRY DOCKING
- SMALL WATER CRAFT
- SAILING CLUB BOAT STORAGE
- EDGE TERMINAL
- BUCKLANDS BEACH SAILING CLUB

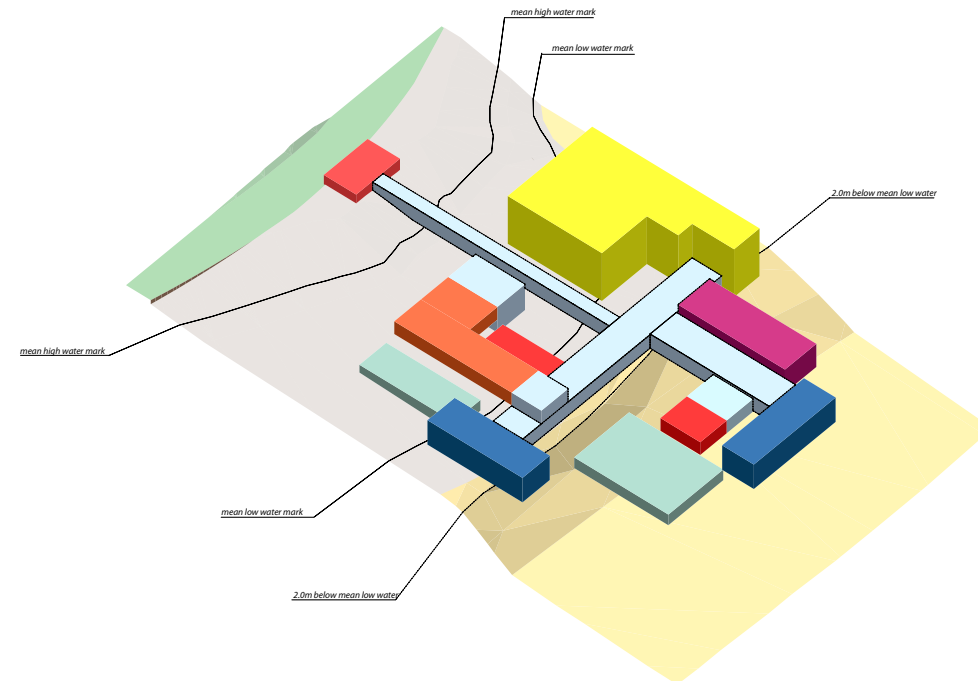
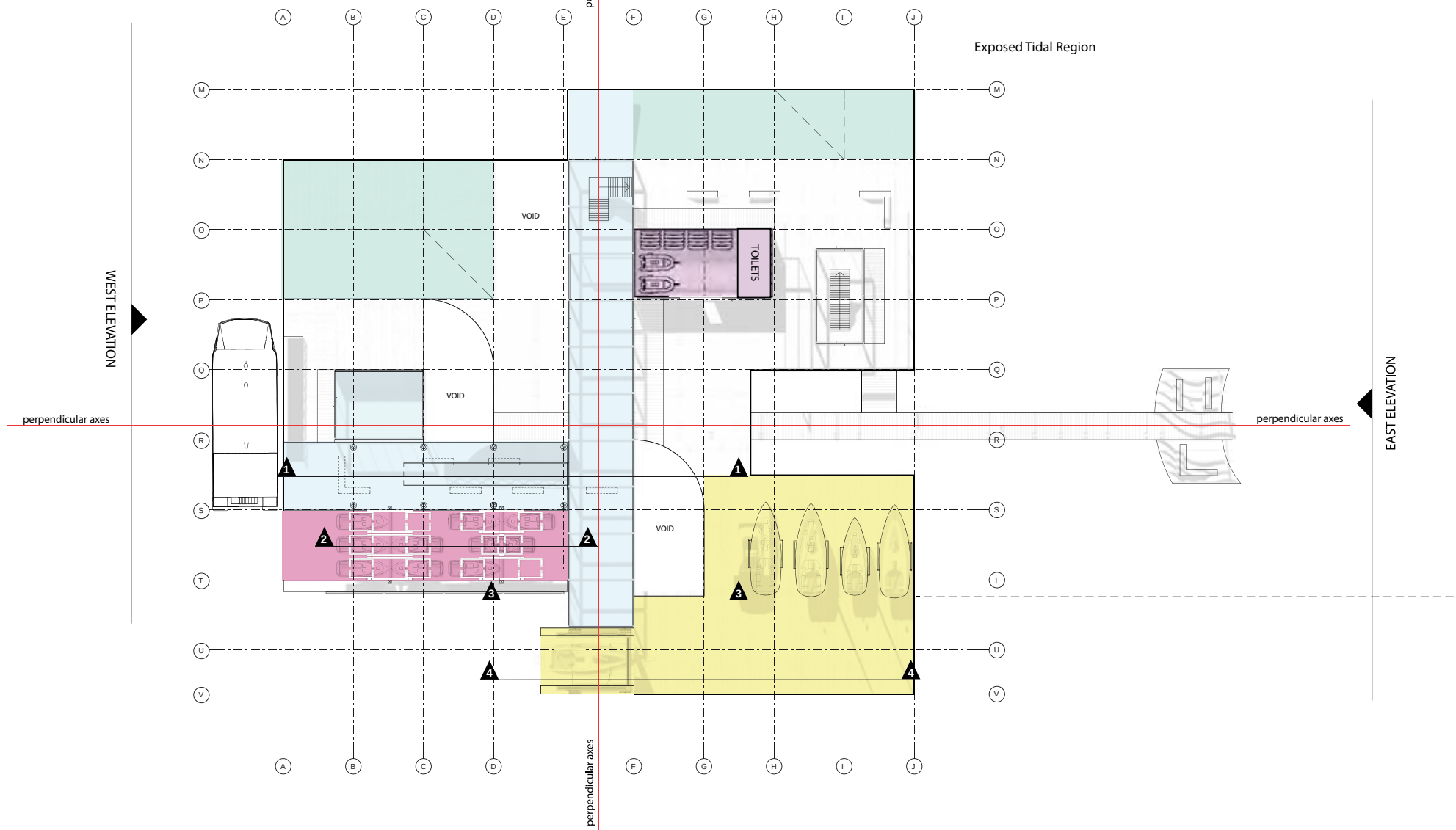




Figure 7.1 (Left): Bulk and location plan of the placement of activities onsite



Age Group	Number of people
13-17	1
18-24	2
25-34	5
35-44	10
45-54	20
55-64	35
65-74	20
75-84	10
85+	5

SOUTH ELEVATION

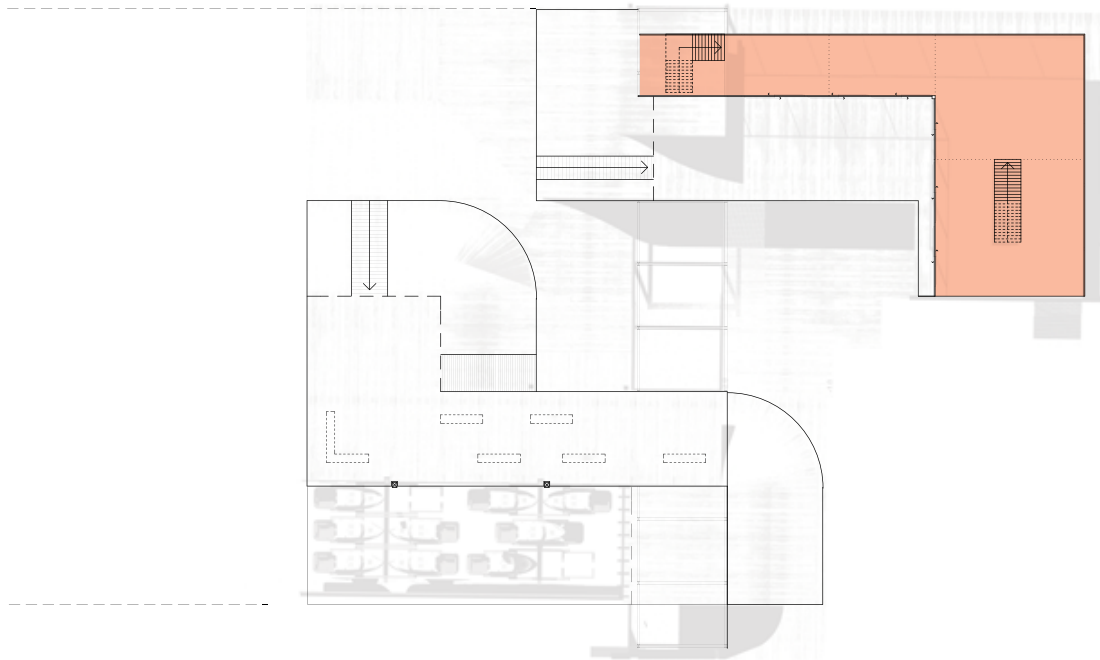


Figure 7.3 (left): Ground Floor Plan

Figure 7.4 (above): First Floor and Roof Plan

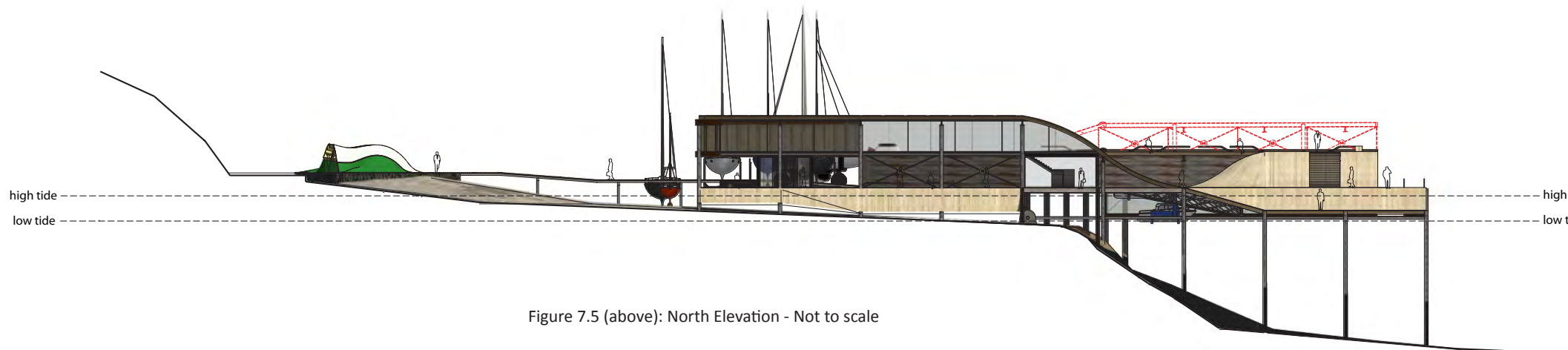


Figure 7.5 (above): North Elevation - Not to scale

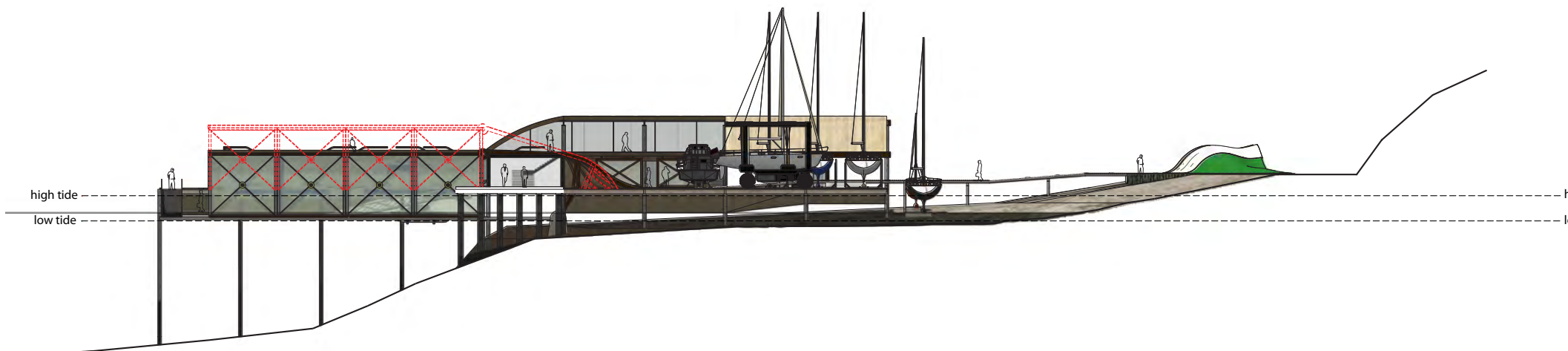


Figure 7.6 (above): South Elevation - Not to scale

**Note - dashed red lines indicate the moving section of the centre

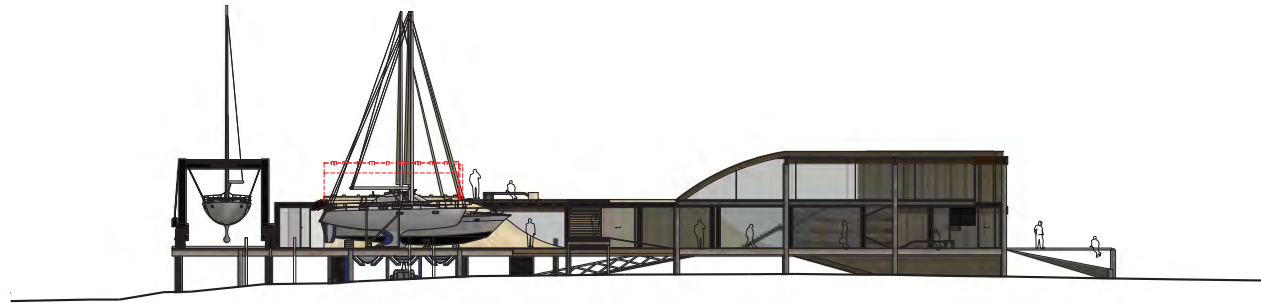


Figure 7.7 (above): East Elevation - Not to scale

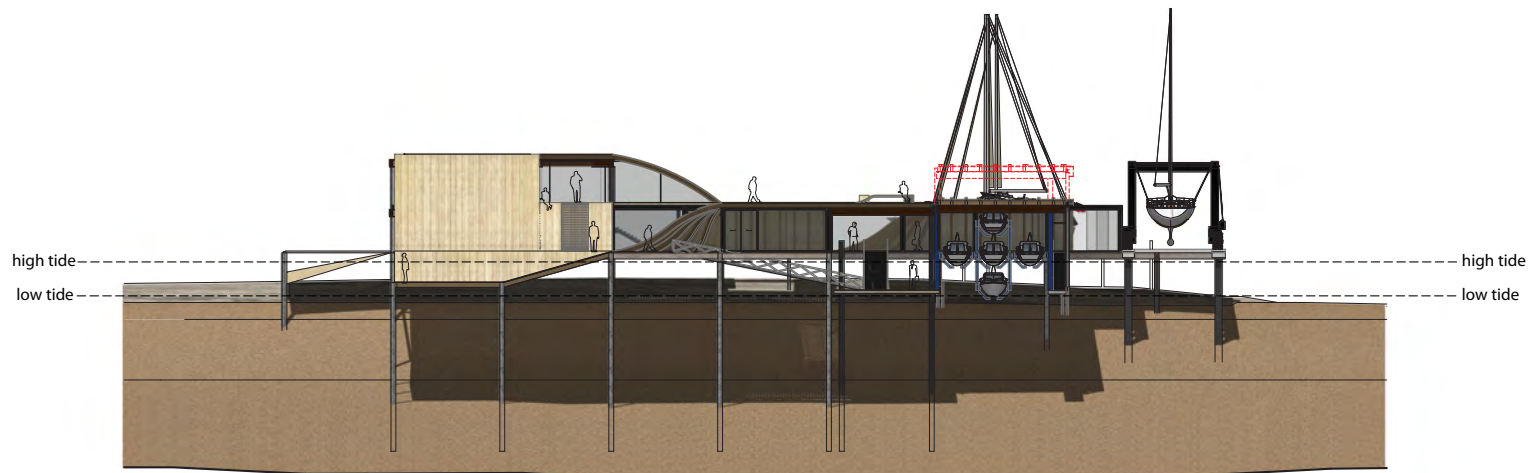


Figure 7.8 (above): West Elevation - Not to scale

7.2 Experience of Movement

The experience of movement through the site is exemplified via the movement of activities, tide, and pedestrians.

7.2.1 Movement of Activities

The ferry is the predominant activity accommodated within the Marine Centre. As the largest of the marine craft on the site, the ferry is also the main contributor to pedestrian traffic through the site. There are two main docking points at the centre. The main terminal, on the western edge, is accessible from a floating pier at all tides while the secondary terminal, on the northern edge, is accessible only at high tide. The ferry approaches the main terminal touching on the building as a connectional node rather than berthing as a destination (Figure 7.9).

Dry stacking was an influential function in providing mobility in the wider concept of transport in the water city. This activity took a prominent position throughout the majority of design schemes in both circulation requirements and storage. Through the exploration of a number of stacking systems including travel hoists, marine fork hoists and gantry cranes, the final outcome was a custom design system generated from the principles of the Falkirk wheel (see Figure 7.10 and 7.12). By using a balanced rotating arm, boats are able to be rotated and elevated from the water then stored using a singular mechanical system. The rotating arm rotates 90 degrees allowing the empty cradle to submerge in the water where the boat can be aligned on the skids. The rotating arm is then returned to its horizontal position elevating the craft from the water in the stored position. This is more efficient and compact than providing circulation pathways used in traditional dry stacking methods. Dry stacking is important to the wider outcome of increasing mobility for Auckland through a water transport network.

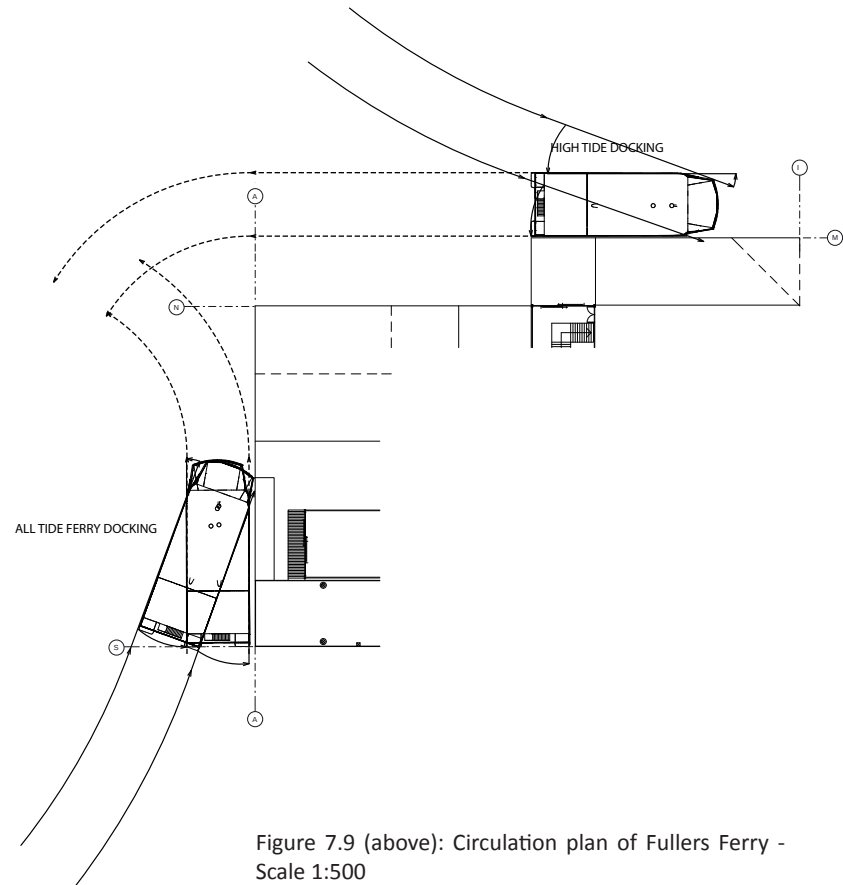
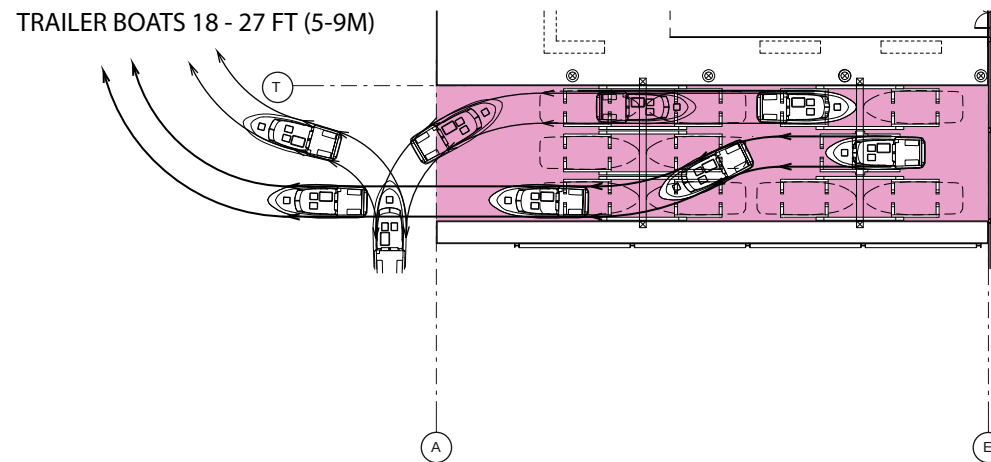
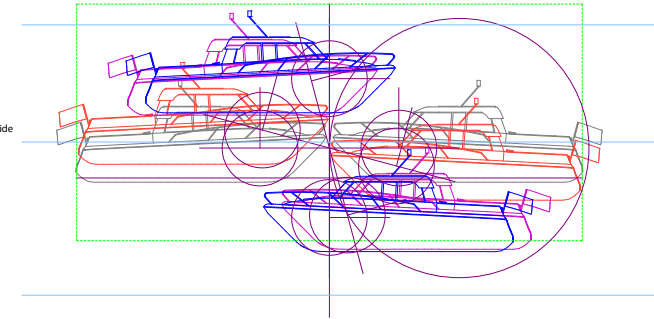
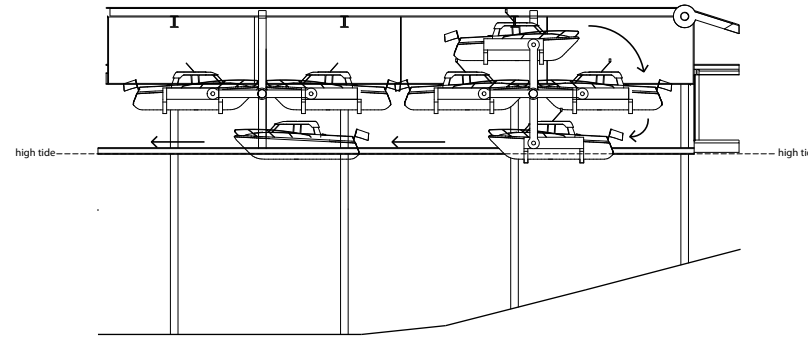


Figure 7.9 (above): Circulation plan of Fullers Ferry - Scale 1:500

Figure 7.10 (Right): Sectional Diagram 2'2" of modified Falkirk stacking system for boats- Scale 1:250

Figure 7.11 (Below): Circulation plan of the Drystack boat parking- Scale 1:250

Figure 7.12 (bottom right): Falkirk Wheel, photographed by Sean Mack, http://upload.wikimedia.org/wikipedia/commons/c/cd/FalkirkWheel-Side_2004_SeanMcClean.jpg



Boats are removed from the water by a marine hoist to be placed on the hardstand. This creates a vertical movement, before horizontally transferring the craft to the hardstand platform. The boats are arranged on cradles allowing maintenance (Figure 7.15 and 7.16).

The sailing club consists of a large garage that accommodates a number of optimists used for the Learn to Sail education program, along with inflatable control boats, which remain on site. In addition to storage; the proposal includes a pavilion layout on the second floor which the sailing club can occupy for training, regatta briefings and functions. The platform creates multiple rigging spaces where a glazed pavilion runs perpendicular through the building providing shelter from prevailing winds. The rigging area is connected to two launching areas, with all-tide timber ramps projecting under water to allow launching and docking throughout the day. (Figure 7.13).

The Marine Centre is designed to allow for the accommodation of small water craft through non-prescriptive pathways. Casual users with kayaks, kite boards and windsurfers are able set out and retrieve their craft from the sailing timber ramps located on the northern edge. (Figure 7.14).

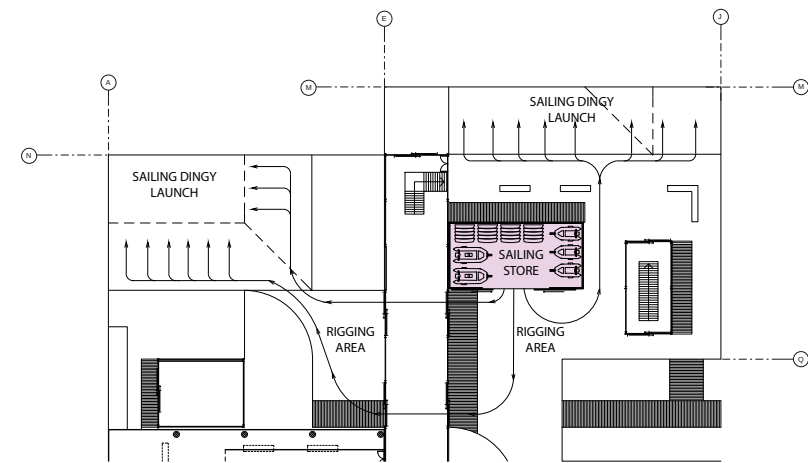


Figure 7.13 (above): Circulation plan of the Sailing Club
- Scale 1:500

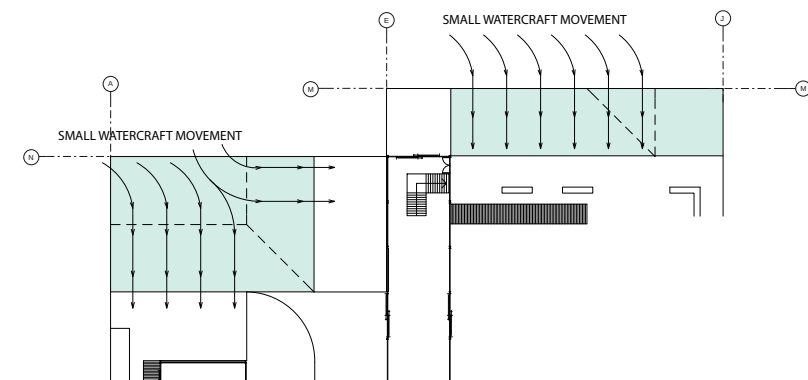


Figure 7.14 (above): Circulation plan of small water
craft - Scale 1:500

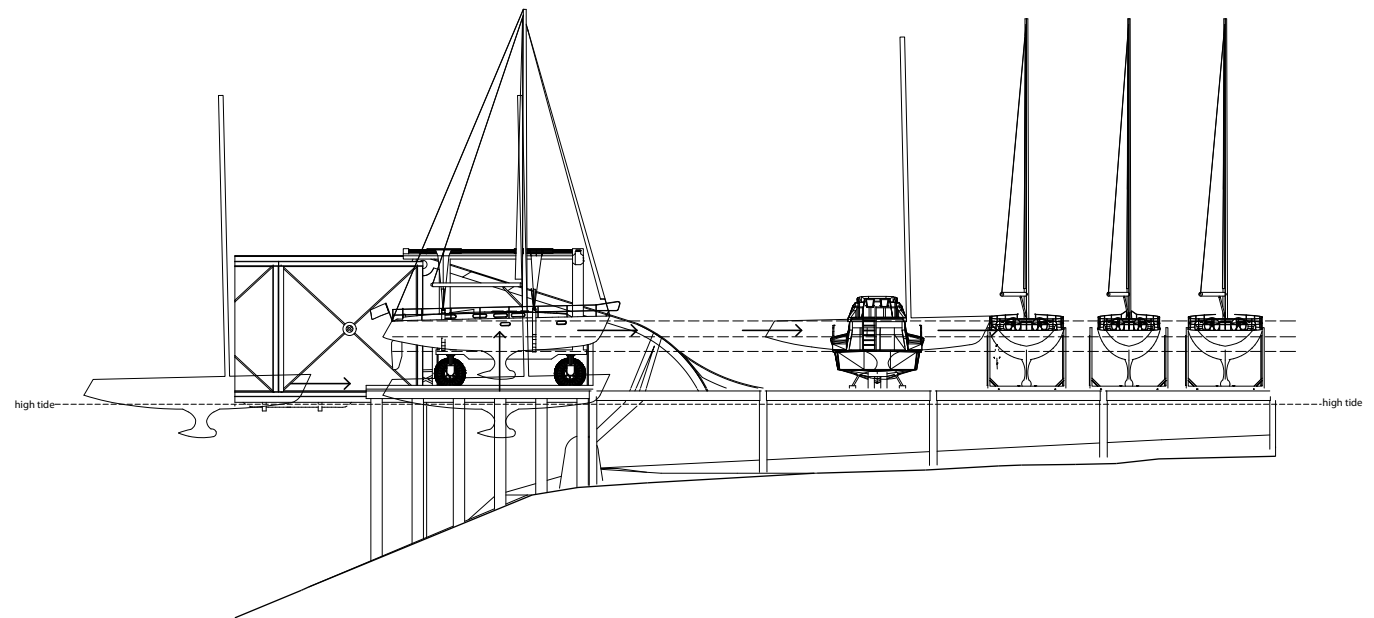


Figure 7.15 (top right): Sectional Diagram 4'4' of the vertical and horizontal movement of a marine travel lift to remove marine craft from the water to the hardstand - Scale 1:250

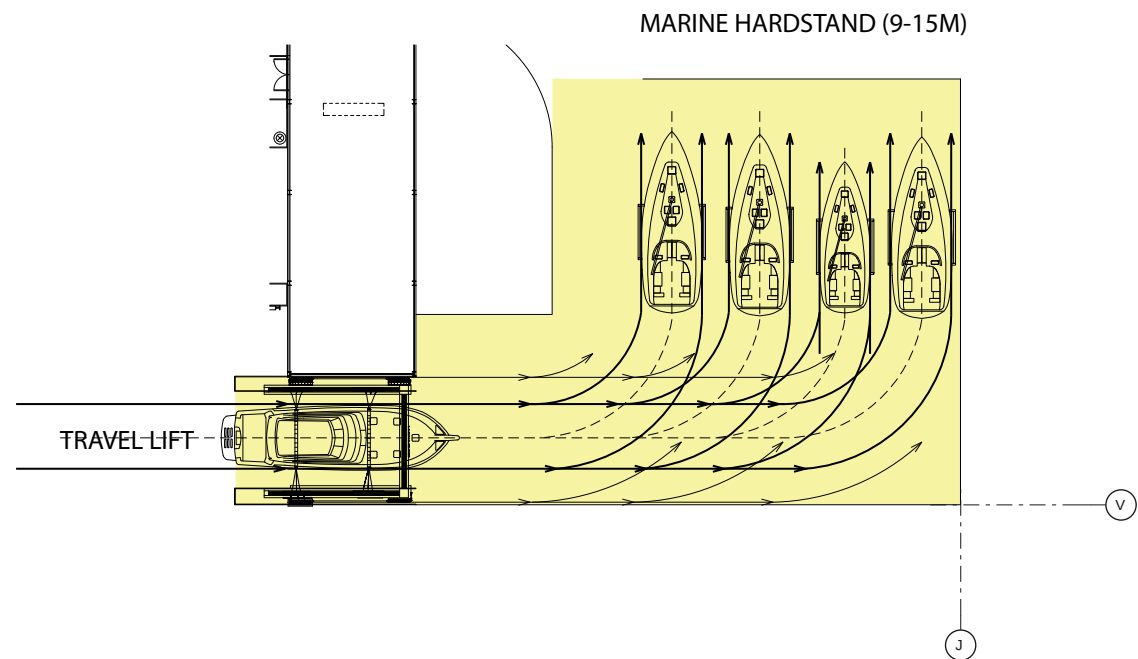


Figure 7.16 (right): Circulation plan of the marine travel lift through the hardstand - Scale 1:250

7.2.2 Tidal Movement

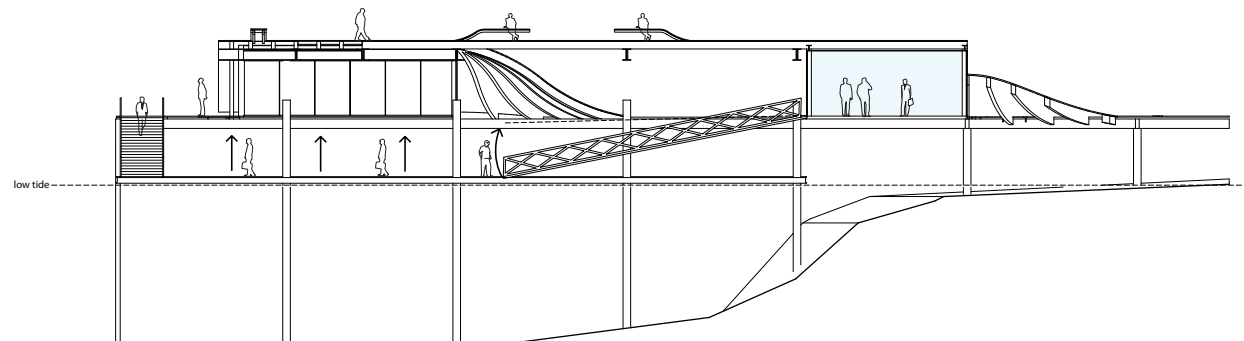
Floating piers in the marine environment have a sole purpose to operate functionally with the displacement of tide. The Marine Centre accommodates the movement of tide with architecture to create a variety of spaces that capture the potential of the tide. This occurs in four elements across the Marine Centre;

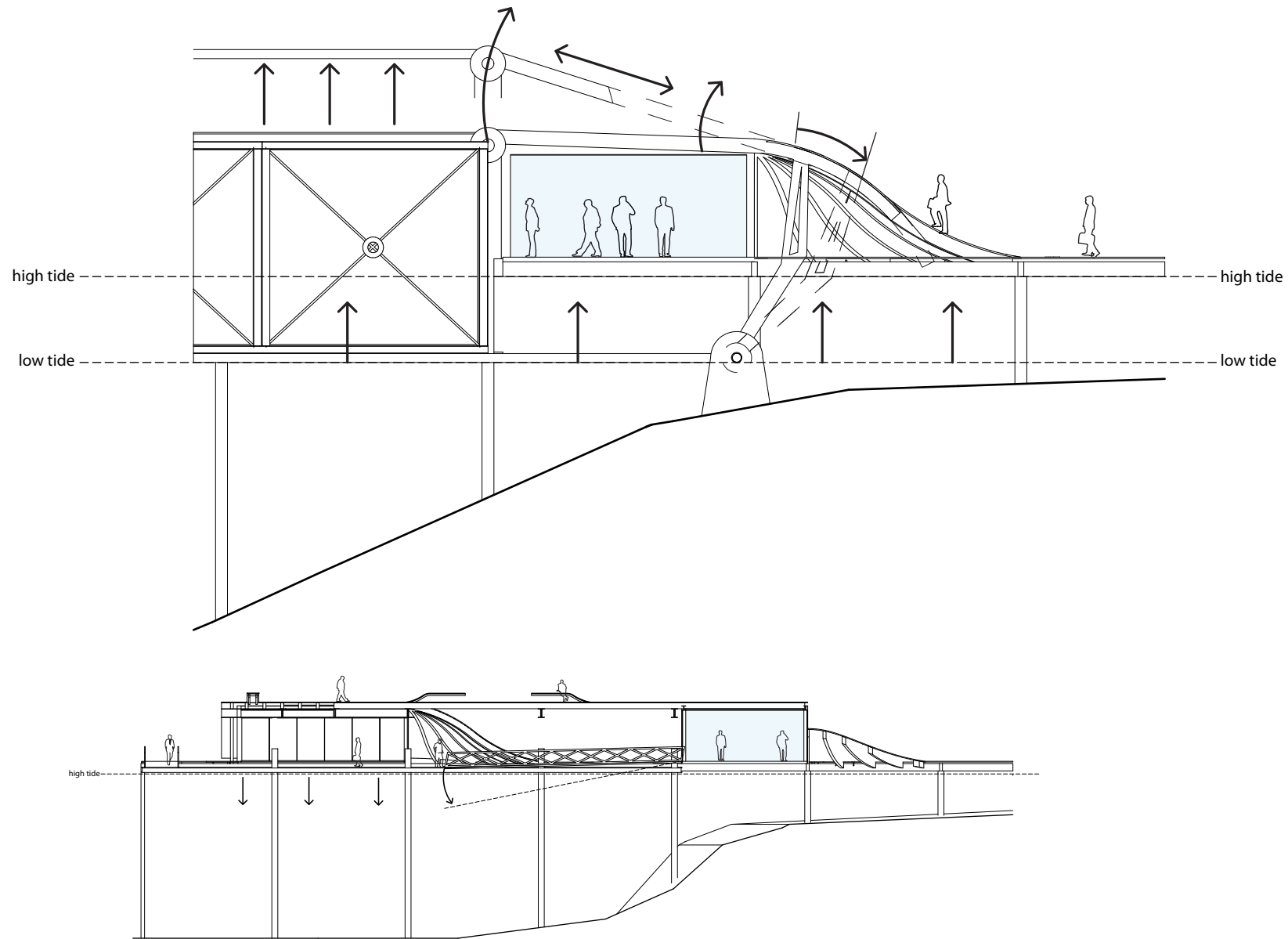
- the tide falls to expose the suspended fixed structure of the platform
- a variety of fixed gradient edges form fractals with the tidal movement
- the floating ferry terminal pier moves vertically within the fixed envelope of the Centre to change ceiling height in relation to tide
- a moving section of the dry stack travels vertically with the tidal movement, manipulating the elevation of the southern and western sides of the building

Figure 7.17 (right): Section 3'3' - Illustrating the moving mechanism of the south west section of the Marine Centre. Arrows indicate the path of movement from low tide to high tide - Scale 1:200

Figure 7.18 (below): Section 1'1' Low tide - Illustrating the spatial change in the floating section of the building - Scale 1:400

Figure 7.19 (bottom right): Section 1'1' High tide - Scale 1:400





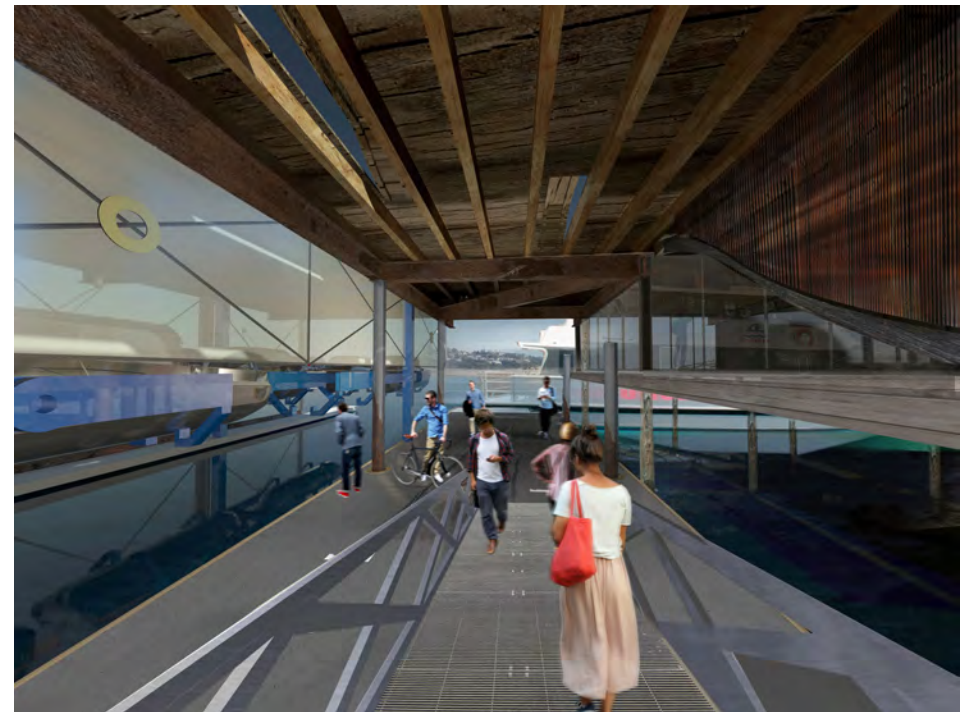
The movement of the building is in rhythm with the natural environment. At low tide, the horizontal space in the Marine Centre is vertically extended, however as the tide rises, the platform moves up so the internal space is condensed. Compressing the ceiling height directs the visual attention of the public outwards. The rotating roof creates a continuous platform while there is a tethered aesthetic to the edge as the expansion allows the reef platform beneath to be exposed. The expansion of the building encourages light to bounce off the sea to create a variety of lighting conditions within the space.

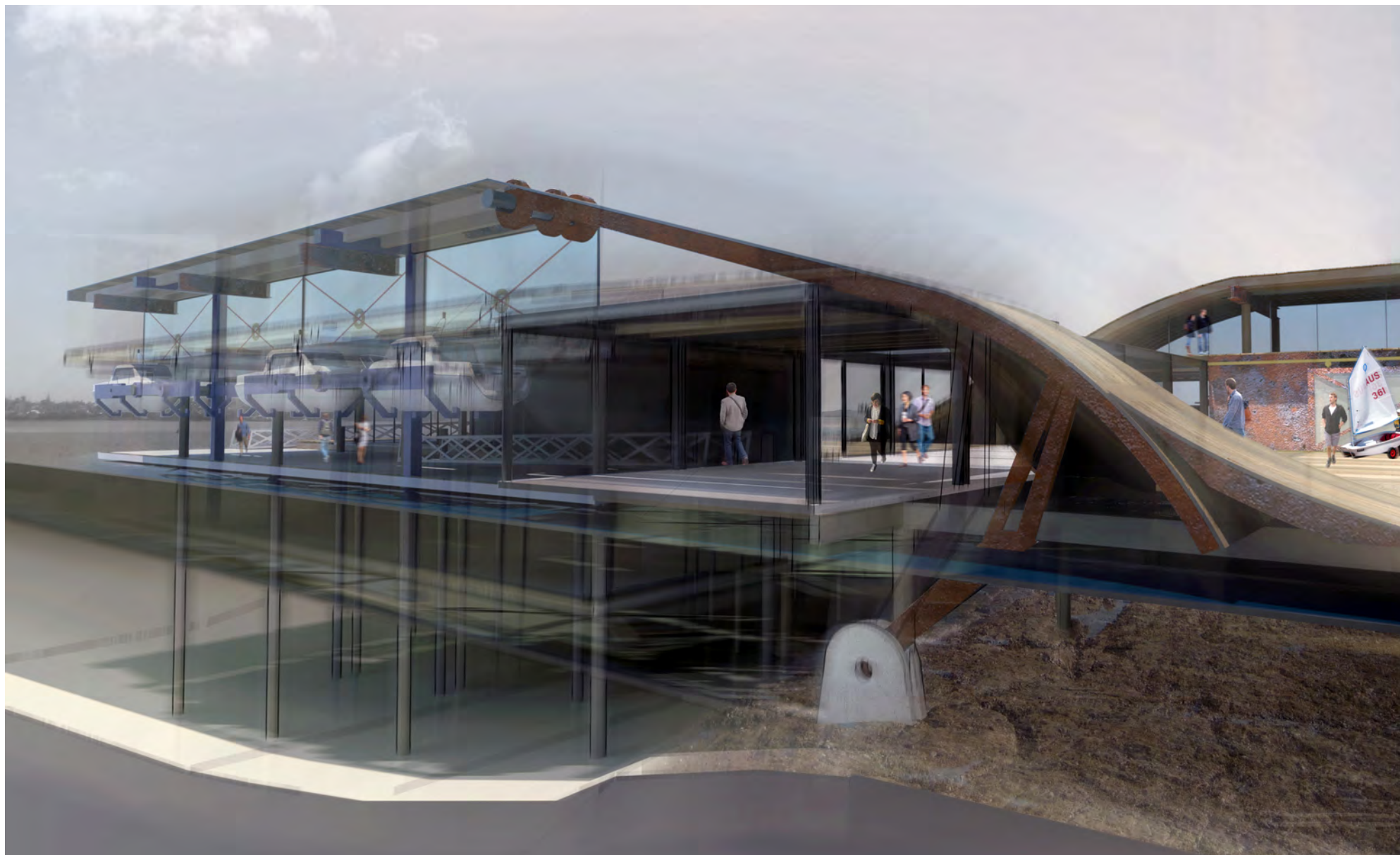
Internally, the movement of the building with the tide creates a variable environment exposing the piles and structure at low tide. The exposure of the structure beneath creates an internal connection to the materiality of the building where the natural weathering of the timber is visible. Also exposed are the buildings' mechanisms for the moving ramps where the steel wheels of boat trucks are highlighted as representative of cradle haulage facilities. Metals and fixings are left to rust to express the saline conditions and a green gradient of algae is left to grow across the inter-tidal height to show the vertical displacement of the tide. The division line between the fixed suspended platform and floating platform is divided by a spliced ramp that slides apart expressing the change of tidal height. The sliding columns of the floating section of the Marine Centre are also used to gauge the vertical displacement of tide.

Externally, the building becomes part of a tidal display from both Big and Little Bucklands Beaches as it moves up and down with the tide. The building sits suspended above the littoral so the occupation and movement of water across the site can be experienced. This visual experience of tidal movement is also evident on the ramp access to the Marine Centre as the ramp is marked with measures of chart datum heights.

Figure 7.20 (below): Pedestrian pier to the ferry.

Figure 7.21 (right): Sectional perspective of the drystack





7.2.3 Pedestrian Experience

The Marine Centre allows pedestrians to enjoy their own experiences and connection to the site via a variety of pathways. The entry bridge allows them to experience movement through the inter-tidal zone on their journey to the platform. Pedestrians are invited to engage in each of the activities on site through the two main perpendicular pathways that are intersected by numerous secondary pathways. These perpendicular axes define a strong connection to the land adjacent and provide high velocity routes through the site while informal pathways provide low velocity routes through the site.

The direct, high velocity routes have been arranged for commuters to make the transition from land to the ferry docking. While commuters focus on their destination, the ferry, they become part of the overall experience of marine movement for other pedestrians. Commencing from the edge they are brought together with pedestrians from other activities as they make the transition along the entry bridge. On the most direct path, they pass the hardstand on the left before diverting into the glazed gantry. Ahead the river wash breaks over the submerged platform, as they turn left and right through the dog leg in the pathway they see the travel hoist and Little Bucklands Beach. Upon transitioning along the ramp of the floating pier to the ferry, this moving section of the building provides a variety of conditions that are in flux with the tide. On the left the rotating dry stacking suspends boats above the water, to the right the water of the Tamaki River breaks beneath the stilts of the building and across the Granger Point reef. Commuters are given this intimate connection to the marine environment before boarding the ferry to their destination.

The informal, low velocity routes overlay the Marine Centre for those pedestrians who have more time to experience and connect to the site. Like the beach, the public can travel freely across the site while activities occur around them. Multiple benches stretch out of the main plain of the building to provide a place of rest, while the numerous curves and stairs provide an informal grandstand for spectators to observe the river. The platform creates a safe access to water as people are able to walk along the edge ankle deep, where at low tide the ramps on the northern edge invite the public to walk onto the reef, beneath and between the stilts supporting the centre.

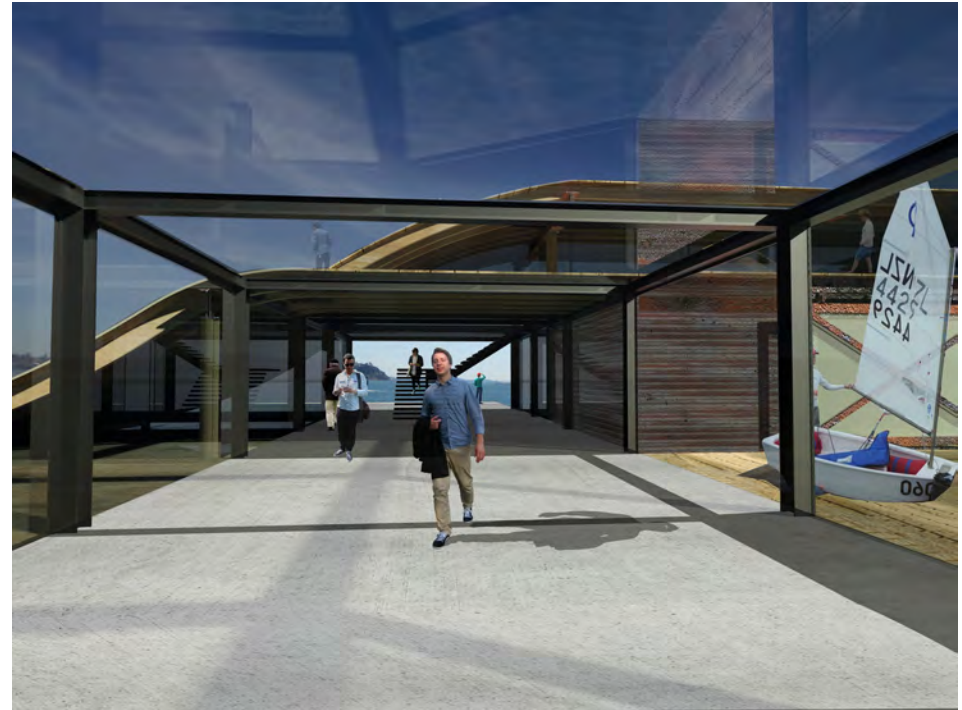


Figure 7.22 (above): Horizontal pedestrian pathway through the site. The glazed gantry provides a sheltered pedestrian pathway between the coastal activities.

Figure 7.23 (right): Perpendicular entry across the littoral zone at high tide.



7.3 Form

Coastal activities play the most defining role in defining the Marine Centre and this form is representative of the activities which are occurring within it. This occurs most expressively with the ground floor platform, which is manipulated by the occupation of activities to create a variety of tethered edge conditions. Like the vernacular boatshed, the Marine Centre is a land based architecture form that is projected beyond the edge to create a functional connection for coastal activities. Therefore, the outcome is a building where form follows function. The complexity of activity occupation is confined in high density creating the need for architecture beyond the edge. This is unlike other precedents in coastal infrastructure where activities act across a common node rather than in parallel. The main node point where the coastal activities divert has no architectural expression as it is the movement of pedestrians to each activity that creates this point of centrality. This proposal considers not only the movement of coastal activities horizontally in plan but also the movement of coastal activities vertically in section. The tension created between the confluence of activities creates a plot in which activities are arranged into a dense environment based on hierarchy.

As a result of the confluence of activities within a confined region, a unique platform undulates above and below each activity. The undulating roof creates the experience of tension between the activities as well as providing a platform for pedestrians to walk across. The form is similar to that of beaches and sand-dunes where pedestrians can walk freely over the terrain of the site.

The architecture exaggerates the natural form and shape of the bay both vertically and horizontally. Expressing sculptural qualities, it enhances the headland to reinforce the natural bay structure. Translating this experience of the bay into architecture on the headland is important so that pedestrians are able to gain a similar experience of the beach in safe connection to water. The building does this by creating a series of ramps that become submerged during the tidal cycle. In addition, the curved form of the platform creates not only a roof but a pathway of connections through the site. The architecture creates a controlled connection in which the view to beyond is withheld to draw attention to the transition across the littoral zone. Upon reaching the Marine Centre, the outer edge shares this connection to the beyond where the internal spaces focus on what lies beneath. This is exemplified by the spaced decking that forms features across the platform, allowing light to penetrate down to the reef and pedestrians to view the natural environment.

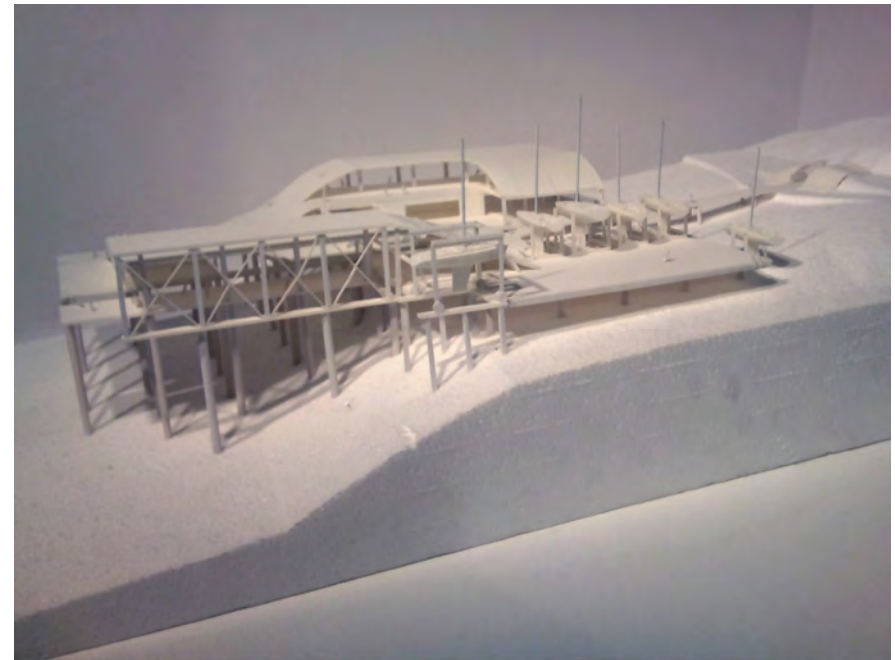


Figure 7.24 (above): Physical model of final proposal. South West Elevation

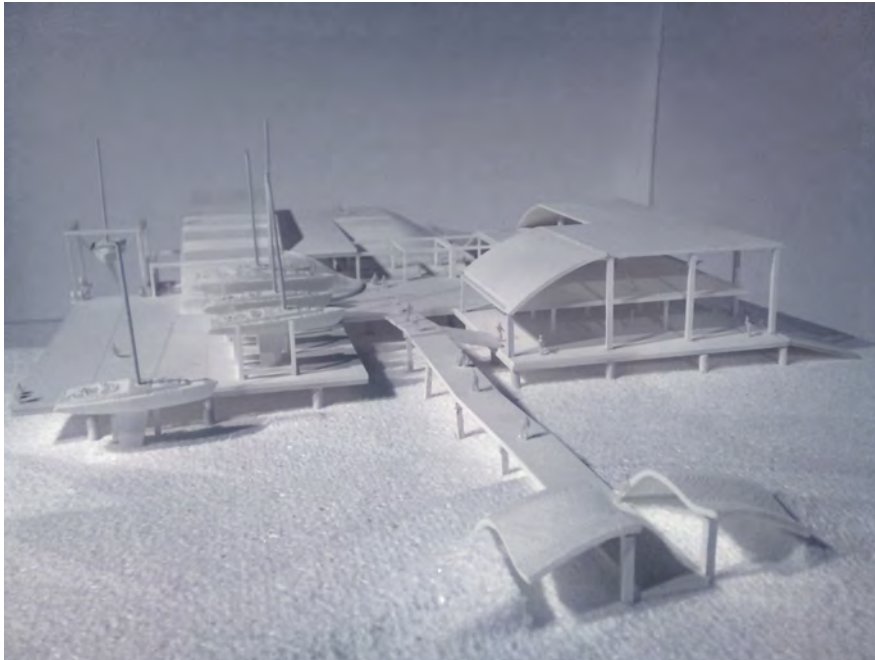


Figure 7.25 (above): Physical model of final proposal. East Elevation



Figure 7.26 (above): Physical model of final proposal. West Elevation

7.4 Identity

The Marine Centre does not copy existing architecture within the Tamaki River but achieves a symbolic identity of building on the edge.

7.4.1 Materiality

Developing an identity on the edge has resulted in materiality choices of oversized structure to mitigate the erosive and corrosive elements of the environment. Concrete and timber are able to naturally age, weather and partially decay expressing the harshness of the coastal environment while still serving their primary function. Like the boatshed, as parts of the building degrade, sections will be repaired and replaced creating a record representative of time passing.

The internal space on the ground floor exposes the large steel elements and working mechanics that move the floor above. The steel structure incorporates oversized members, allowing for the saline environment to degrade the outer layer of steel with rust.

The glazed pavilion through the central axis provides a visual connection to the area beyond the edge and the translucent external panels of the dry stacking, allowing light into the space and displaying the movement of the drystack rotation. The design includes a number of spaced timber panels and gaps in the deck which allow light to penetrate through the floor and roofs of the building to the reef below.

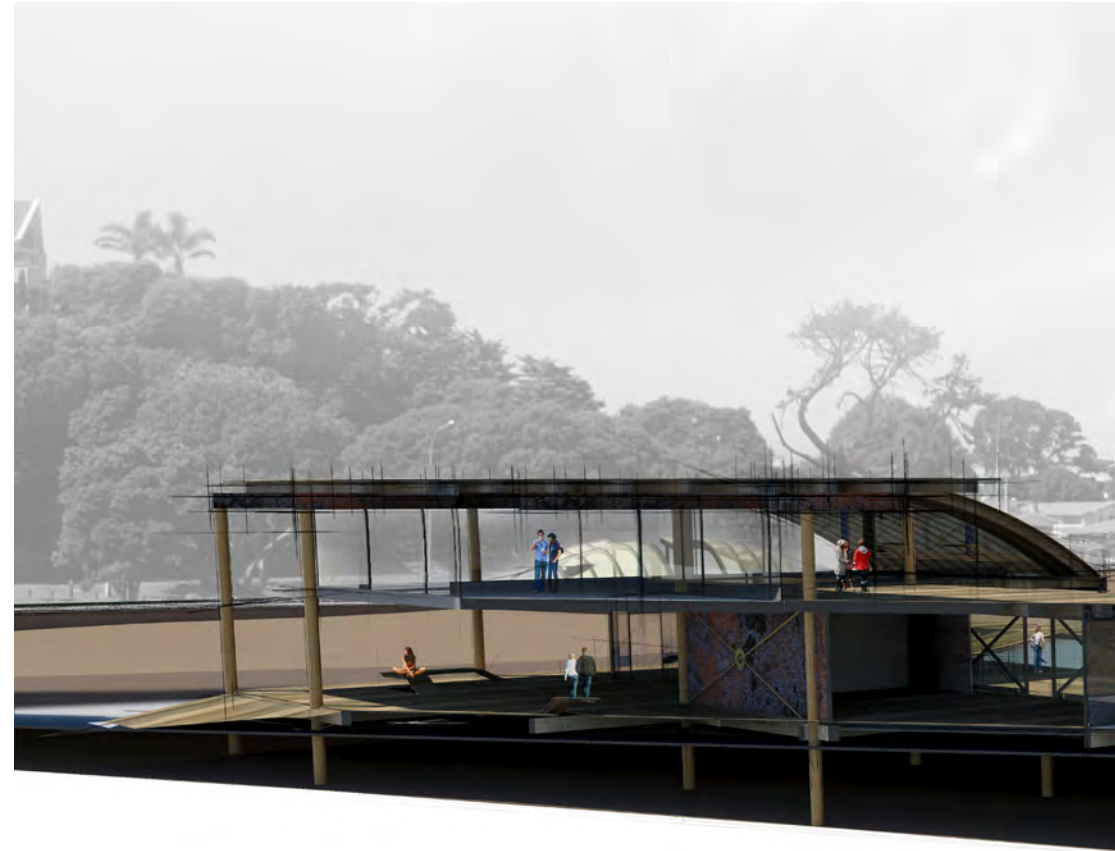
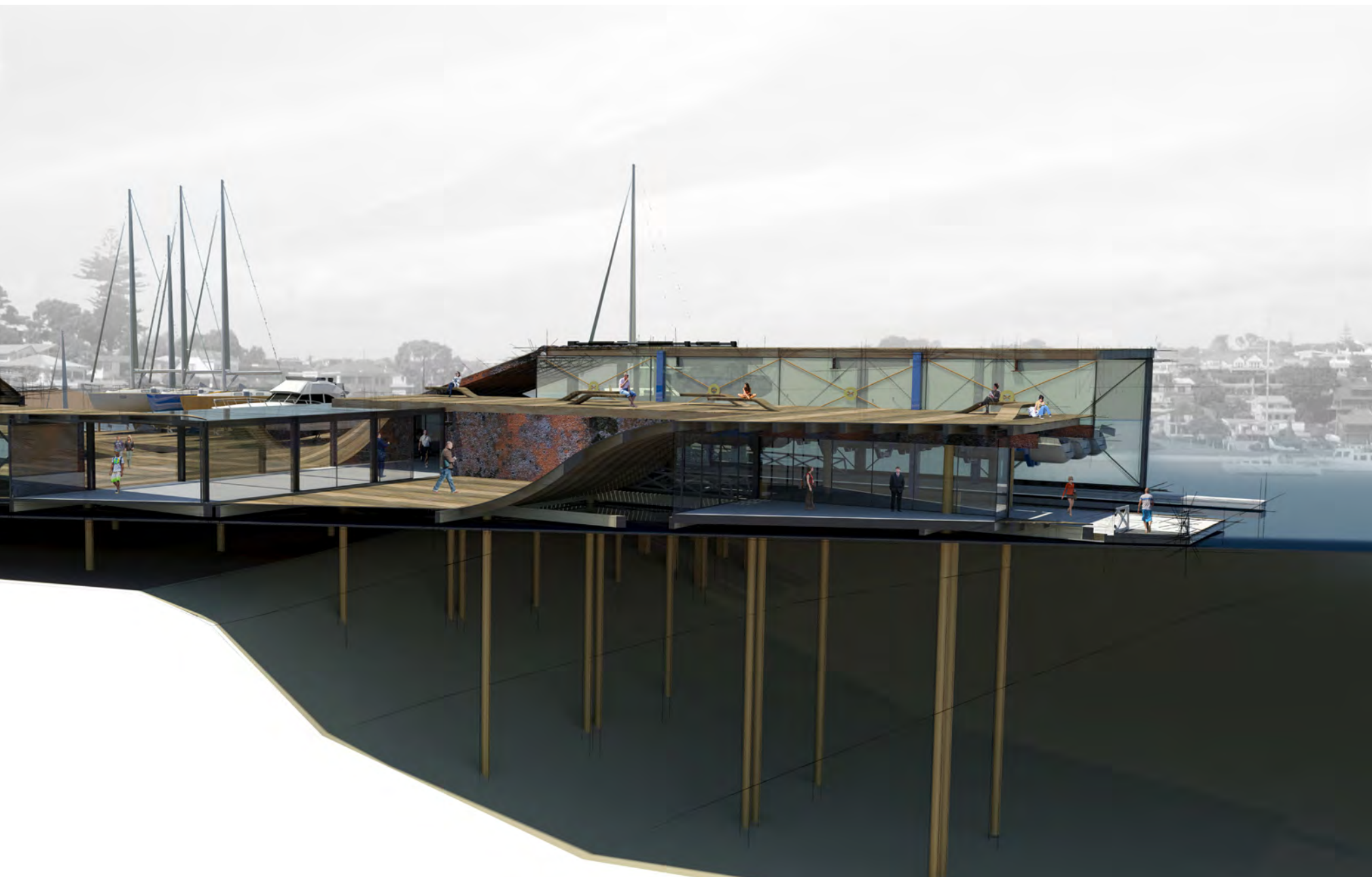


Figure 7.27 (above): Section Perspective of the Marine Centre



7.4.2 Construction

The Marine Centre sits suspended above the reef, maintaining a void space beneath like the vernacular boatshed. At low tide, a negative space exists where pedestrians can see through the structure of the building. Working at an operative level the structure is functionally set up at nine metre centres forming a horizontal grid of activities within each plane. The multitude of planes creates an abundance of space which is subject to a variety of spatial conditions from the movement of occupants and the animation of the building with the tide. While creating this sculptural outcome, it is important to create a strong base that expresses how all is fixed together.

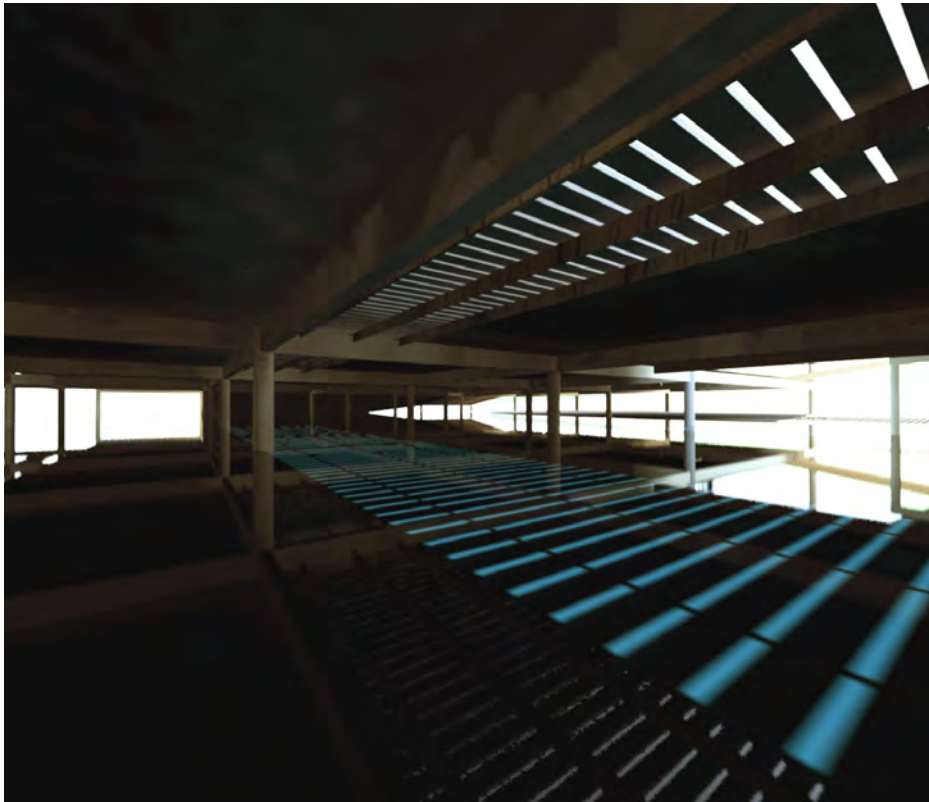
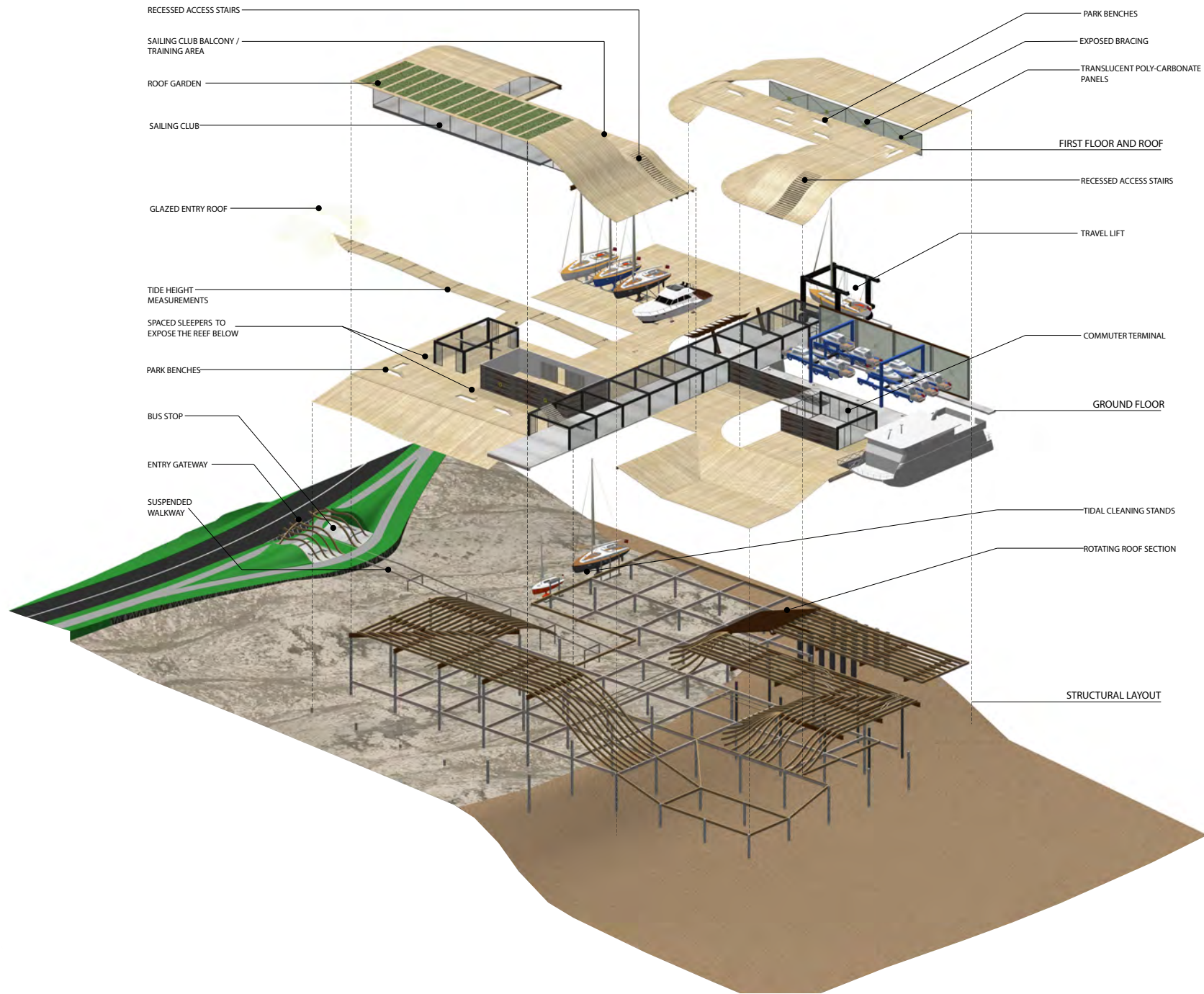


Figure 7.28 (left): Beneath the Marine centre the tethered aesthetic of construction, in conjunction with the void spaces, form an environment of scattered light.

Figure 7.29 (right): Exploded Axonometric of the Marine Centre



7.5 Marine Environment

The separation of the platform from the land edge on stilts not only emphasises the pedestrian transition but binds a space where two natural elements already exist, to create a third new environment. The bridge is important in expressing the transition across this zone as well as creating a perpendicular connection to edge. While the building penetrates the reef environment which is rich in life, the stilts create a further habitat for marine life. Similar to shipwrecks and wharves, the stilts will become part of the environment over time and sea life such as mussels, oysters, algae and seaweed will become attached and encourage further growth. The timber piles allow the flows of the river to exist around, feeding the shellfish that attach themselves to the structure in contrast to reclamation which creates a singular bounded edge. The algae, seaweed and shellfish will intern attract larger fish to the reef environment. The floor print of the proposal is perforated with holes and gaps that allow shafts of natural light to reach the reef below and pedestrians to look down. The tethered aesthetic of construction, in conjunction with the void spaces, form an environment of scattered light (see Figure 7.28). In addition to direct light penetrating through the building, the water reflects direct sunlight back up into the building.



Figure 7.30 (Top Right): Sectional model through the sailing club.

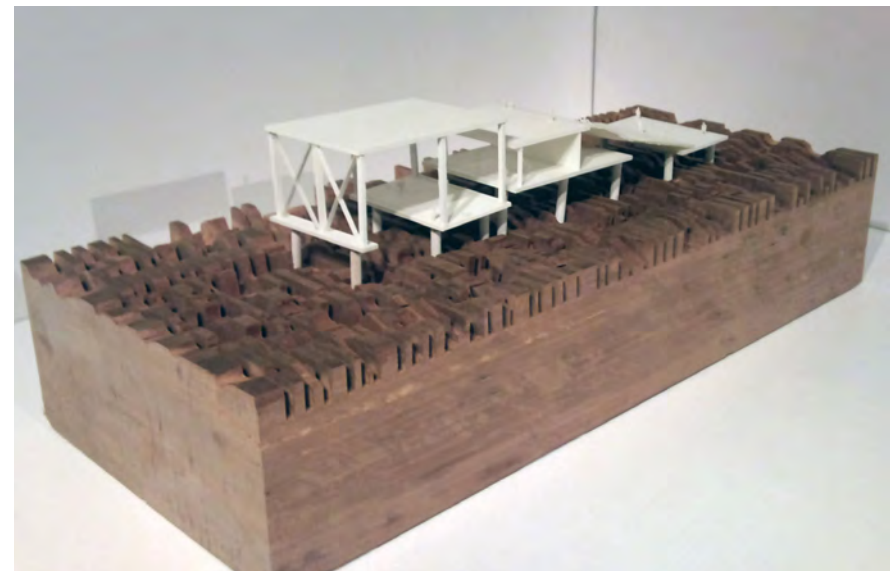


Figure 7.31 (Bottom Right): Sectional model through the ferry terminal and drystack

Figure 7.32 (Far Right): View of the Marine Centre from Big Buckland Beach



8. CONCLUSION

Through a hesitant approach to architecture beyond the edge, this thesis has evolved through several designs to explore how architecture can create a confluence of coastal activities so that our experience of movement is enhanced within the marine environment.

This architectural development of a marine complex exemplifies a series of architectural principles that have been discovered and have the potential to contribute to a new form of contemporary boat shed enriches the idea of Auckland as a water city. With the application of this concept of the public boatshed as one of many nodes throughout Auckland; ferries can run like buses using these nodes as connective stops, in contrast to the airport analogy of fewer, larger facilities. This proposal is a model for the idea of numerous facilities spread across Auckland's headlands. This is architecture on a community scale, rather than a regional scale, where it becomes a walk and ride opposed to a park and ride. The Marine Centre is an architectural adaption of Richard Toy's water city theory which can initiate a public transport solution as a way of alleviating pressure on land transport.

On an architectural scale, the Marine Centre presents new ideas towards the accommodation of coastal activities with the integration of ways the public are able to experience movement. This expression of the headland through architecture sets up a destination experience, as the public are projected a point beyond the linear coastline. The congregation of coastal activities into one facility enriches the public experience of movement. The complex extends this experience of movement through the natural ebbs and flows of water and tide. These are incorporated through into the final concept with the Marine Centre utilising the energy of tides to create moving architecture with partially submerged edges.

Another outcome of the project is the suggestion of the sustainable direction for the development of the coastline of Auckland. The proposal forms hubs of activities rather than traditional parallel developments across the inter-tidal zone. It acts as an extension, rather than a barrier, to the coastline creating a new perimeter to accommodate function. The suspended structure allows the natural environment to exist through and around creating new habitats for marine life. The site and form of the building enhance the wider coastal landscape, as an extension of the headland

rather than filling bays. It suggests large reclaimed facilities such as Halfmoon Bay are an outmoded strategy if we want to preserve coastal Auckland.

The process of design deviated from the boat shed to explore a variety of aspects of building that accommodate coastal activities beyond the edge. Through this exploration, the proposal for Granger Point has re-emerged in the form of a contemporary boat shed, a stilted structure sitting beyond the edge. Pedestrians are invited to experience boat shed architecture, though the consideration of vernacular identity and materiality.

In combining these coastal activities in a concentrated, contemporary form of the private boatshed is able to be created where the public can experience both movement, maritime activity and connection to the edge. This contemporary boatshed is a public experience in the water city as much as it is a functional coastal facility.

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10. LIST OF FIGURES

Figure 1.0: Vernacular boat shed Sloane Bay. Mark Tatton, “Building Beyond the Edge”.

Figure 1.1: Marine Centre Platform. North West elevation from the Tamaki River of the final proposal for the Marine Centre at Granger Point (mid tide). Sam Baxter, 2012

Figure 1.2: Tahuna Torea sandspit. Taken east at low tide towards Granger Point, Tahuna Torea spit is subject to the greatest surface exposure in the Tamaki River. Photographed by Sam Baxter, 2012

Figure 1.3: Granger Point Reef at low tide. Photographed by Sam Baxter, 2012

Figure 2.1: Suspended dock within the upper Tamaki River - Image shows the contrast in materiality between the weathered timber from tidal movement and anodised aluminium. Photographed by Sam Baxter, 2012

Figure 2.2: Private boatshed, Panmure - Image highlights the variety of private structures that exist within the river. This private site shows both a stilted shed above the water as well as a private ramp which is submerged for the haulage of a boat. Photographed by Sam Baxter, 2012

Figure 2.3: Dingy launching Ramp - Halfmoon Bay Marina showing coastal structures that assist with the movement and transition of coastal activities. Photographed by Sam Baxter

Figure 2.4: Hauling the Canoe. The process to which the ropes were attached down the inside of the Hull, Cited: A.H. Messenger, Fig.29 in The Maori Canoe by Eldson Best

Figure 2.5: Safe Transition. The natural coastal edge provides a slow and safe transition into the water

Figure 2.6: Land adjacent to the water edge is to be preserved for common public use

Figure 2.7: The bay provides unobstructed access to water

Figure 2.8: Private Boat storage shed, Panmure, Upper Tamaki River- Translucent facade encloses a simple timber framed construction.

Figure 2.9: Railway tracks for private boat cradles extend from the front of a traditional boatshed to the water. Mark Tatton, “Building Beyond the Edge”.

Figure 2.10: Material and construction beneath a traditional boat shed. Mark Tatton, “Building Beyond the Edge”.

Figure 2.11: Coastal Protection. This image shows the informal covering of a private trailer boat. Photographed by Sam Baxter, 2012

Figure 2.12: Contemporary marine docks in the Upper Tamaki River. Photographed by Sam Baxter, 2012

Figure 2.13: Conceptual model of the vernacular boatshed.

Figure 2.14: Conceptual sketches of the Ngapipi Road boatshed in Orakei exemplifying the linear arrangements of building beyond the edge.

Figure 2.15: Tradition boat shed ramp in Herne Bay, Auckland. Mark Tatton, “Building Beyond the Edge”.

Figure 2.16: Interior of a boat shed in Ngapipi Road, Auckland. Mark Tatton, “Building Beyond the Edge”.

Figure 2.17: Tradition boat shed Sloane Bay. Mark Tatton, “Building Beyond the Edge”.

Figure 2.18: ‘History III’ - Ngapipi Rd, Orakei boatsheds. Lucy G Design, <http://www.lucygdsgn.com/images/gallery/landscapes/22histlllcolNL.jpg>

Figure 2.19: Early sketch of the building’s principal elements- the 100 metre bridge, circular screen wall, and the spiralling route to the five-metre platform. Isitt, Mark. White Green 10. London: Laurence King Publishing, 2011. 83

Figure 2.20: Kastrup Sea Bath by Ole Haupt, White Arkitekter, <http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/attachment/0061/>

Figure 2.21: Kastrup Sea Bath by Ole Haupt, White Arkitekter, <http://ad009cdnb.archdaily.net/wp-content/uploads/2008/06/7439-f7.jpg>

Figure 2.22: Kastrup Sea Bath - Reaching out from Oresund from Kastrup Strandpark in Kastrup the sea bath forms an integral part of the sea front by Ole Haupt, White Arkitekter, <http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/>

Figure 2.23: Perpendicular boardwalk from the land to the Kastrup Sea Bath by Ole Haupt, White Arkitekter. <http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/attachment/0141/>

Figure 2.24: Kastrup Sea Bath by White Arkitekter. <http://www.archdaily.com/2899/kastrup-sea-bath-white-arkitekter-ab/img-3628/>

Figure 2.25: Maritime Youth House - Boat storage for the sailing club beneath the timber decks by Johan Van Mol and Evelynne Justens. http://www.danda.be/gallery/maritime_youth_house_plot/7/

Figure 2.26: Maritime Youth House by Julien de Smedt http://ad009cdnb.archdaily.net/wp-content/uploads/2009/01/167023821_plot-mar-11-photo-julien-de-smedt.jpg

Figure 2.27: Maritime Youth House by JCarlos Lanuza, 8 April 2009 <http://static.urbarama.com/photos/original/2783.jpg>

Figure 2.28: Halfmoon Bay. The three rows of jetties form the lanes for the six boat ramps at Halfmoon Bay. In the Background the Sealink car ferry is docked on the concrete ramp at Susbrisky's Point. Photographed by Sam Baxter, 2012.

Figure 2.29: Halfmoon Bay haulage boat haulage within the marina. Photographed by Sam Baxter, 2012.

Figure 2.30: Piles for the car ferry at Susbrisky's Point. Gabled building in the left of the image is the new Bucklands Beach Yacht Club that replaced the facilities at Granger Point. Photographed by Sam Baxter, 2012.

Figure 2.31: Aerial photograph of the extensive marine facilities at Halfmoon Bay. Flown July 2012 by Wade Malcolm and photographed by Sam Baxter, 2012.

Figure 3.1: Granger Point at low tide showing the extensive reef. Image is taken looking north towards Big Bucklands Beach. Photographed by Sam Baxter, 2012.

Figure 3.2: Granger Point at low tide. Image is taken from Little Bucklands Beach, west towards the Tamaki River. Stone wall forms the south edge of the Granger Point hardstand in which yachts are balanced on the concrete blocks and fixed to the piles for cleaning. Photographed by Sam Baxter, 2012.

Figure 3.3: Halfmoon Bay Marina during the record high tide on January 23rd 2011. Halfmoon Bay Marina. Docklines. Newsletter, Auckland: Halfmoon Bay Marina, Autumn 2011.

Figure 3.4: Breakwater at Halfmoon Bay Marina during the record high tide on January 23rd 2011. Halfmoon Bay Marina. Docklines. Newsletter, Auckland: Halfmoon Bay Marina, Autumn 2011.

Figure 3.5: “Hauling the Canoe”, Poles lashed onto the fore and aft enabled me to steady it as the canoe was dragged. Cited: Miss.E. Richardson, Fig.28 in The Maori Canoe by Eldson Best

Figure 3.6: “Historic Urbanisation 1842 - 2008 of the Auckland Region”. This map show the way in which Auckland settlement has developed along and around the water ways of Auckland. Auckland Regional Council. A Brief History of Auckland’s Urban Form. Research, Auckland: Social and Economic Research and Monitoring Team, April, 2010.

Figure 3.7: Auckland Public Transport usage July 2012.

Figure 3.8: Auckland public transport water network. This map denotes both Ferry terminals and major marina facilities in Auckland along with the existing ferry pathways and proposed new pathways.

Figure 4.1: Tamaki River- Contours denote the depth of the river bed.

Figure 4.2: Moored boat of the Tamaki River. Image shows the adjoining residential sites and private wharfs along the river bank. Photo from the Panmure Bridge. Author Unknown, http://commons.wikimedia.org/wiki/File:Tamaki_River_Estuary_Sailing_Yachts.jpg

Figure 4.3: Tahuna Torea sandspit within the Tamaki River, looking east toward Mt Wellington. Photographed by Sam Baxter, 2012.

Figure 4.4: Aerial photograph of the Bucklands Beach Peninsula approaching the Tamaki River from the North-East. Flown July 2012 by Wade Malcolm and photographed by Sam Baxter

Figure 4.5: Tamaki River, Maritime Chart 5325 of the Tamaki River. NZ Charts<http://www.nzcharts.co.nz/Chart/5325>

Figure 4.6: Reef fishing from Granger Point. Photographed by Sam Baxter, 2012

Figure 4.7: Optimist learn to sail program at Little Bucklands Beach. Whale Oil 16/06/2011. http://images.instagram.com/media/2011/10/15/fc1ee08cc7e648b69d30f3528c28ee83_7.jpg

Figure 4.8: Swing Pile Moorings. Photographed by Sam Baxter, 2012

Figure 4.9: Dingy stand at Halfmoon Bay. These racks provide the storage for owners of moored boats to store their dingy’s. Photographed by Sam Baxter, 2012

Figure 4.10: Panmure Sailing Club haulage facility and hardstand. Photographed by Sam Baxter, 2012

Figure 4.11: Halfmoon Bay ferry terminal for the Fullers ferry. Photographed by Lloyd Weeber. <http://mw2.google.com/mw-panoramio/photos/medium/19831635.jpg>

Figure 4.12: Commercial Activities in Gabor Place (Upper Tamaki River). Photographed by Sam Baxter, 2012

Figure 4.13: Removed pontoons from the Halfmoon Bay boat ramp showing the growth of marine life on the submerged sections. Photographed by Sam Baxter, 2012.

Figure 4.14: Timber on the wharf at Halfmoon Bay showing the weathering of the tide and the exposed fixings. Photographed by Sam Baxter, 2012.

Figure 4.15: Junction of materials between the fixed timber wharf and moving metal bridge. Photographed by Sam Baxter, 2012.

Figure 4.16: Break water and piers for the ferry to dock. Image shows the rust on the steel members from being exposed to the saline environment. Photographed by Sam Baxter, 2012.

Figure 4.17: Haulage rails at Granger Point fixed into the asphalt ramp. Photographed by Sam Baxter, 2012.

Figure 4.18: First Panmure Bridge with the eight metre swinging section open to allow maritime vessels to pass through. <http://www.panmure.net.nz/Heritage/Gallery.htm>

Figure 4.19: 1866 First bridge across the Tamaki River at Panmure. <http://www.panmure.net.nz/Heritage/Gallery.htm>

Figure 4.20: Rotating section of the original Panmure bridge remains beneath the Marine Ship Chandlery store.

Figure 4.21: sliding ramp at Halfmoon bay that moves horizontally as the tides fluctuates. Photographed by Sam Baxter, 2012.

Figure 4.22: Timber guides for the floating pontoons at Halfmoon Bay. Photographed by Sam Baxter, 2012.

Figure 4.23: Steel trucks of the haulage cart at Granger Point. Photographed by Sam Baxter, 2012.

Figure 5.1: Bucklands Beach Yacht Club at Granger Point looking from Little Bucklands Beach. Photographed by Sam Baxter, 2012.

Figure 5.2: The Wakatere ferry bringing excursionists to Bucklands Beach wharf in 1920. Alexander Turnbull Library Wellington, 1283

Figure 5.3: Aerial photograph of Granger Point. Flown July 2012 by Wade Malcolm and photographed by Sam Baxter, 2012.

Figure 5.4: Tidal study of the Granger Point Reef at 0.5 meter intervals.

Figure 5.5: Granger Point Context. Aerial Photos courtesy of Auckland Council GIS Viewer.

Figure 5.6: Granger Point from Little Bucklands Beach at high tide. Photograph by Sam Baxter, 2012.

Figure 5.7: Granger Point from Big Bucklands Beach at low tide. Photograph by Sam Baxter, 2012.

Figure 5.8: Southern edge of Granger Point at low tide. Photograph by Sam Baxter, 2012.

Figure 5.9: Granger Point Aerial Photograph at low tide, 2006. Scale 1:1000. Image courtesy of Auckland Council GIS Viewer.

Figure 5.10: Granger Point from the Tamaki River at high tide. Photographed by Sam Baxter, 2012

Figure 6.1: Site placement- for architecture to accommodate the movement of coastal activities, it must connect to the functional zone of water.

Figure 6.2: Multiple coastal facilities in parallel across the edge(boatshed arrangement)

Figure 6.3: Singular coastal facility before the edge (Existing Yacht Club at Granger Point)

Figure 6.4: Function Perimeter of the Granger Point site. Red shading denotes the functional zone of 1.5 metres minimum depth below low tide.

Figure 6.5: Building before the edge with a connection beyond the edge

Figure 6.6: Building beyond the edge with a connection back to the land

Figure 6.7: Building across the entirety of the edge

Figure 6.8: Building before and beyond the edge exaggerating the connection between

Figure 6.9: Architectural Connection. Architecture beyond the edge should exaggerate the natural form of the bay and headland in both plan and section. Arrows indicate the direction architecture should take to reinforce the natural structure.

Figure 6.10: Diagram of access to water. The coastal edge should be preserved for common use and provide unobstructed access to water.

Figure 6.11: Architecture on the edge- Architecture on the coast should be orientated perpendicular to the edge minimise the affected perimeter.

Figure 6.12: Diagram of existing edge perimeter - Coastal activities across the edge perimeter in parallel.

Figure 6.13: Diagram of proposed edge perimeter - Creating a new edge perimeter allows coastal activities to occur with minimal effects on natural coastal edge.

Figure 6.14: Diagram of node points - Pedestrians share common pathways of movement between coastal activities, in comparison to the movement of coastal activities which function across separate pathways parallel to one another.

Figure 6.15: Diagram of Pathways - Primary pathway accommodates the velocity of commuters, which is supported by infinite secondary pathways. Point 'a' 'b' denote the main path through a coastal site.

Figure 6.16: Form is expressive of tension. Tension creates internal pedestrian spaces (shown by arrow) experiential of the confluence of activities.

Figure 6.17: Physical model of Halfmoon Bay Marina

Figure 6.18: 3D modelling of Halfmoon Bay Marina - exploring the removal of sections of the existing reclaimed land to expose the natural edge. Image shown at high tide.

Figure 6.19: 3D modelling of Halfmoon Bay Marina - exploring the removal sections of the existing reclaimed land to expose the natural edge. Image shown at low tide.

Figure 6.20: Early sketches of architecture placement within the bay.

Figure 6.21: Occupying the bay form. Initial manifestation for the developing of Halfmoon Bay

Figure 6.22: Scheme 1 conceptual test at Halfmoon Bay.

Figure 6.23: Preliminary investigations of coastal architecture on a point.

Figure 6.24: Conceptual investigations of architecture which exaggerated the vertical headland form. View from the Tamaki River towards Granger Point

Figure 6.25: View from the Little Buckland Beach towards the headland.

Figure 6.26: Conceptual Scheme 2 physical model. This concept explores architecture before the edge where function follows form to enhance the natural shape of the coastline.

Figure 6.27: Conceptual Scheme 2

Figure 6.28: Exploded Axonometric of Conceptual Scheme 2

Figure 6.29: View from The Parade of Conceptual Scheme 2

Figure 6.30: View south from the Tamaki River

Figure 6.31: View north east from the Tamaki River

Figure 6.32: View north east from the Tamaki River

Figure 6.33: Internal view of Conceptual Scheme 3 at high tide. This concept focused on using the movement of tide to accommodate coastal activities via a number of mechanisms.

Figure 6.34: Internal view of Conceptual Scheme 3.

Figure 6.35: North West Elevation at low tide

Figure 6.36: North West Elevation at high tide

Figure 6.37: West Elevation at low tide

Figure 6.38: West Elevation at high tide

Figure 6.39: North East Elevation at high tide

Figure 6.40: North East Elevation at low tide

Figure 6.41: South East Elevation at high tide

Figure 6.42: South East Elevation at low tide

Figure 6.43: Floor plan of Conceptual Scheme 4 - Investigating how architecture can exaggerate the form of the headland beyond the edge.

Figure 6.44: Exploring architectural form the exaggerates the headland.

Figure 6.45: Ferry terminal entrance

Figure 6.46: Pedestrian pathway through the coastal activities.

Figure 6.47: View from Little Bucklands Beach at Low Tide

Figure 6.48: Pedestrian pathway through the coastal activities.

Figure 6.49: View from Little Bucklands Beach at high tide

Figure 6.50-6.53: Early conceptual models creating an architectural form expressive of tension

Figure 6.54: View from the Tamaki River of the conceptual design of the final proposal

Figure 6.55: View from the Big Bucklands Beach of the conceptual design of the final proposal

Figure 7.1: Bulk and location plan of the placement of activities onsite

Figure 7.2: Site Plan of Granger Point - Scale 1:1000

Figure 7.3: Ground Floor Plan

Figure 7.4: First Floor and Roof Plan

Figure 7.5: North Elevation

Figure 7.6: South Elevation

Figure 7.7: East Elevation

Figure 7.8: West Elevation

Figure 7.9: Circulation plan of Fullers Ferry - Scale 1:500

Figure 7.10: Sectional Diagram 2'2' of modified Falkirk stacking system for boats- Scale 1:250

Figure 7.11: Circulation plan of the Drystack boat parking- Scale 1:250

Figure 7.12: Falkirk Wheel, photographed by Sean Mack, http://upload.wikimedia.org/wikipedia/commons/c/cd/FalkirkWheelSide_2004_SeanMcClean.jpg

Figure 7.13: Circulation plan of the Sailing Club - Scale 1:500

Figure 7.14: Circulation plan of small water craft - Scale 1:500

Figure 7.15: Sectional Diagram 4'4' of the vertical and horizontal movement of a marine travel lift to remove marine craft from the water to the hardstand - Scale 1:250

Figure 7.16: Circulation plan of the marine travel lift through the hardstand - Scale 1:250

Figure 7.17: Section 3'3' - Illustrating the moving mechanism of the south west section of the Marine Centre. Arrows indicate the path of movement from low tide to high tide - Scale 1:200

Figure 7.18: Section 1'1' Low tide - Illustrating the spatial change in the floating section of the building- Scale 1:400

Figure 7.19: Section 1'1' High tide - Scale 1:400

Figure 7.20: Pedestrian pier to the ferry

Figure 7.21: Sectional perspective of the drystack

Figure 7.22: Horizontal pedestrian pathway through the site. The glazed gantry provides a sheltered pedestrian pathway between the coastal activities.

Figure 7.23: Perpendicular entry across the littoral zone at high tide.

Figure 7.24: Physical model of final proposal. South West Elevation

Figure 7.25: Physical model of final proposal. South East Elevation

Figure 7.26: Physical model of final proposal. West Elevation

Figure 7.27: Section Perspective of the Marine Centre

Figure 7.28: Beneath the Marine centre the tethered aesthetic of construction, in conjunction with the void spaces, form an environment of scattered light.

Figure 7.29: Exploded Axonometric of the Marine Centre

Figure 7.30: Sectional model through the sailing club.

Figure 7.31: Sectional model through the ferry terminal and drystack

Figure 7.32: View of the Marine Centre from Big Buckland Beach

11. APPENDICES



Exit Show Presentation 26.10.2012



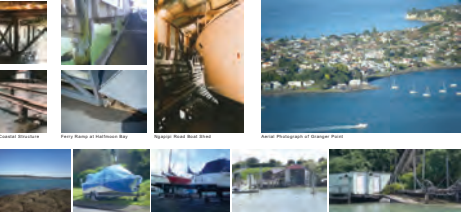
changing tides

MASTER OF ARCHITECTURE THESIS 2012

SAM BAXTER

New Zealand has the fifth longest coastline in the world. However, the relationship our contemporary coastal architecture has with the sea is tenuous. Coastal architecture forms a medium in the liminal between land and sea where the confluence of recreational and commercial coastal activities occur. A majority of New Zealand coastline are protected by reserves and prescription setbacks, although there are private and commercial examples of architecture breaching this boundary. This proposed houses on how architecture can create a confluence of coastal activities so that our experience of movement is enhanced within the marine environment. Looking at Auckland as a water city, the proposal at Granger Point in Auckland's Tamaki River, addresses the confluence of activities that occur in the littoral zone, architecture beyond the edge as well as the experience of movement created between land and sea by utilising the natural tidal system.

Coastal Architecture and Identity

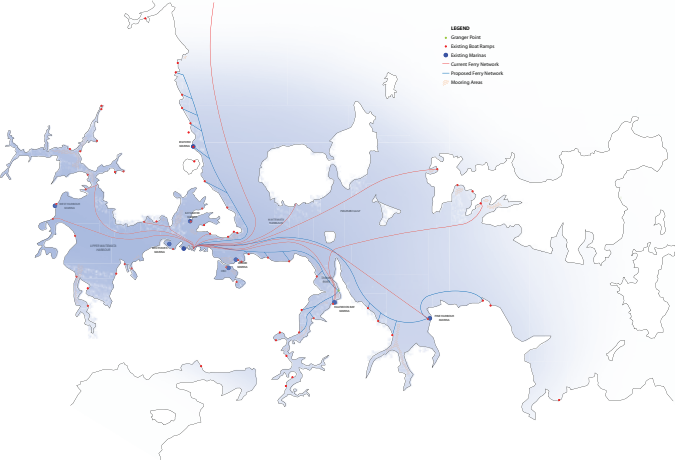


Design Process



Proposed and Existing Water Mobility Plan of Auckland Isthmus

Not to Scale

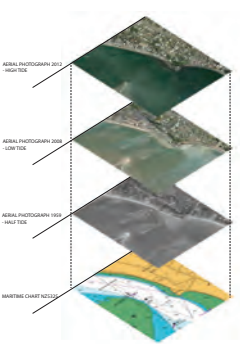


Context Plan - Tamaki River

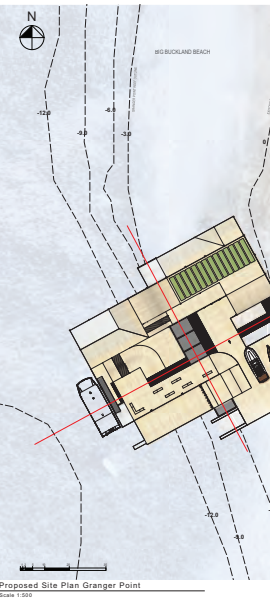
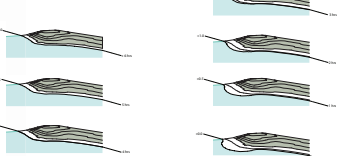
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Granger Point Site Analysis



Granger Point Tidal Analysis



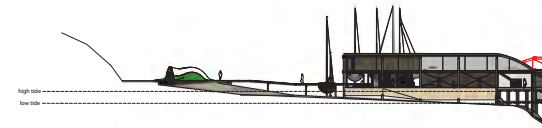
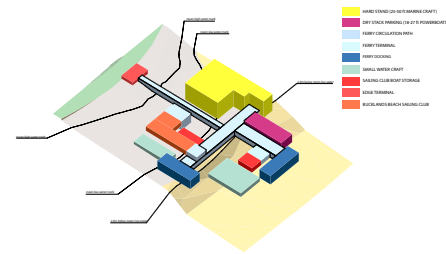
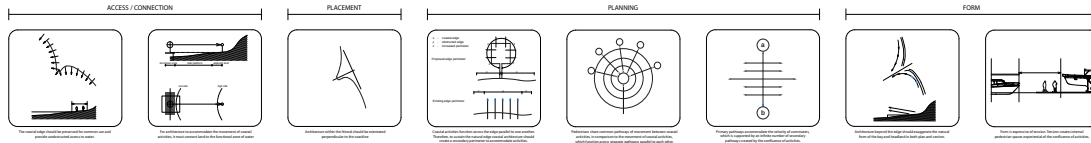
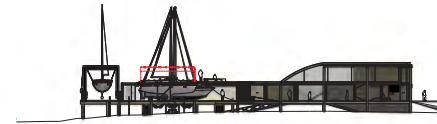
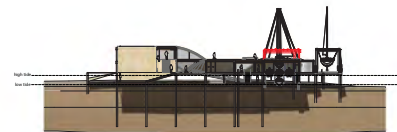
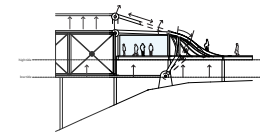
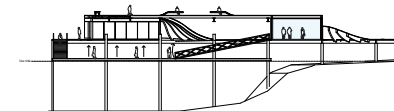
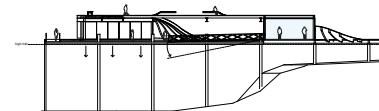
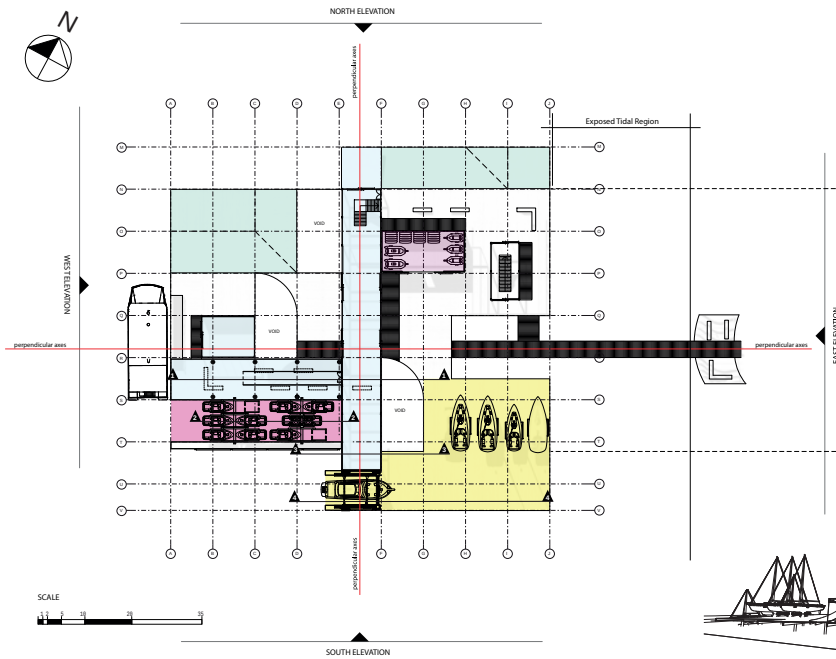
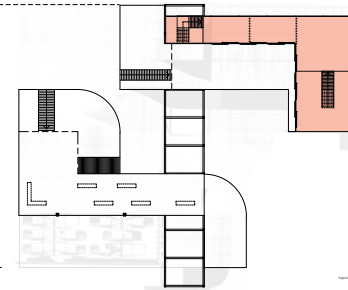
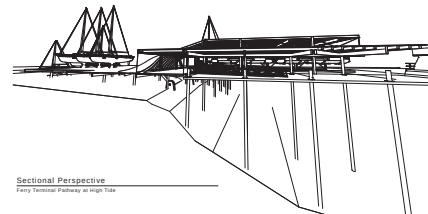


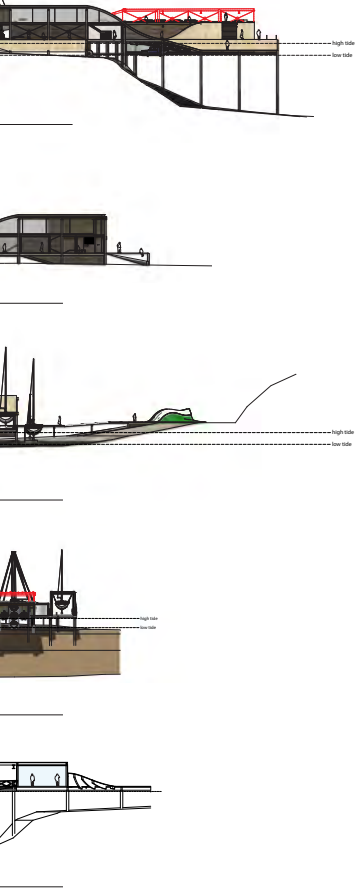
North-West Elevation from the Tamaki River - Mid Tide



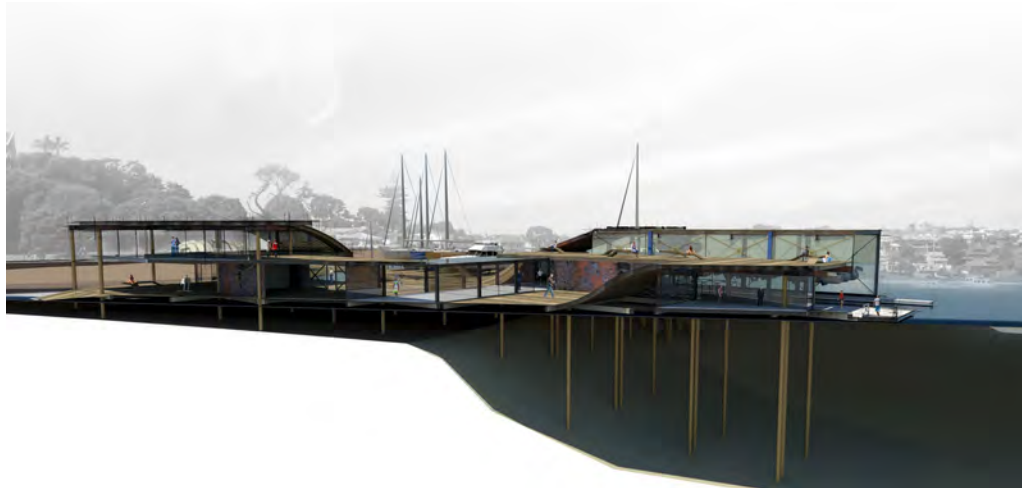
Ferry Terminal Pathway at Low Tide

Theoretical Approach to Site

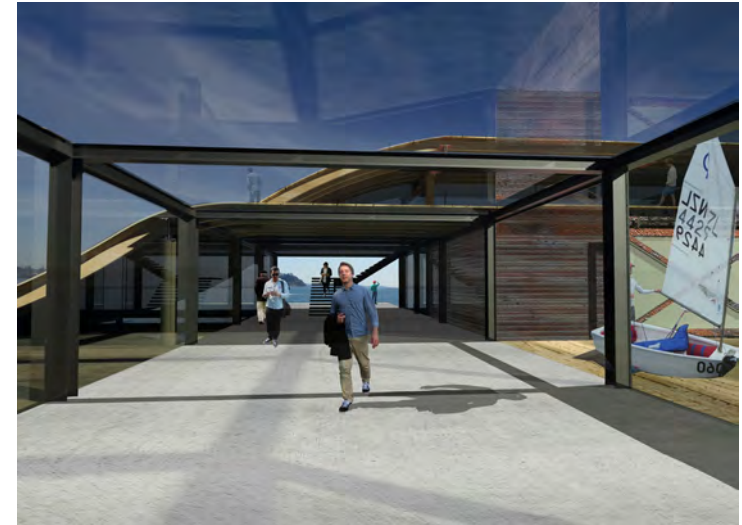
North Elevation
Scale 1:250East Elevation
Scale 1:250South Elevation
Scale 1:250West Elevation
Scale 1:250Section 3'3 - Moving Roof Section
Scale 1:250Section 1'1 Low Tide
Scale 1:250Section 1'1 High Tide
Scale 1:250Ground Floor Plan
Scale 1:250First Floor Plan
Scale 1:250Sectional Perspective
Ferry Terminal Pathway at High Tide



Perpendicular Access Across the Littoral



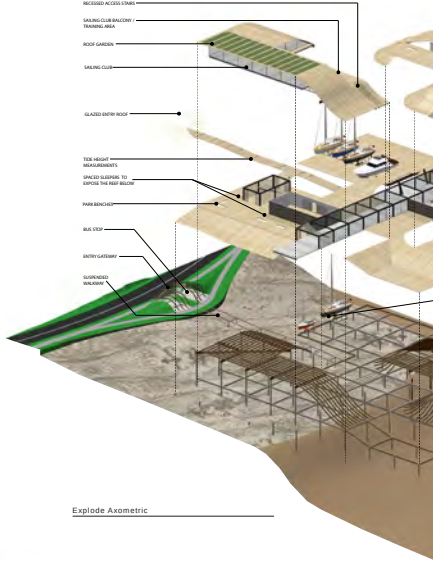
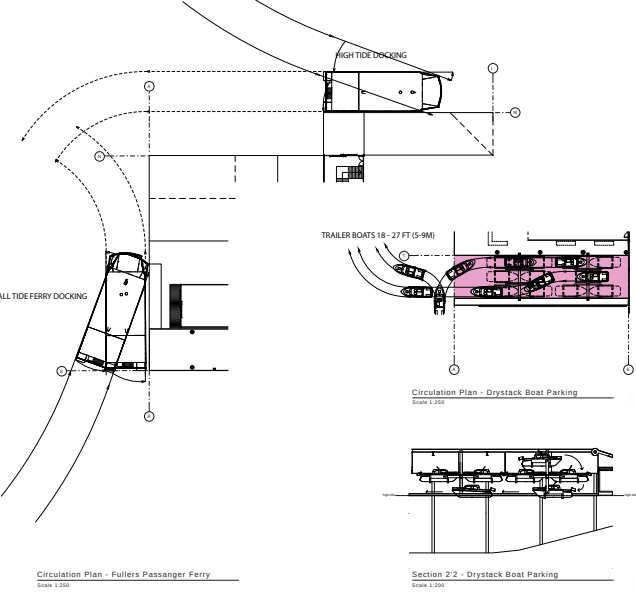
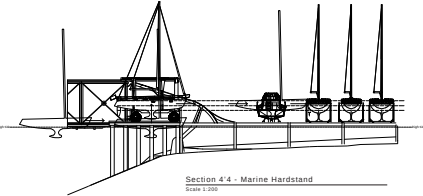
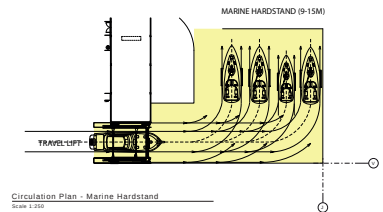
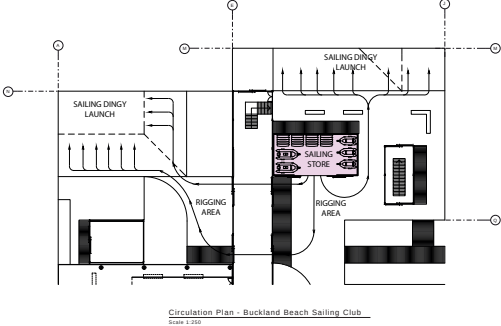
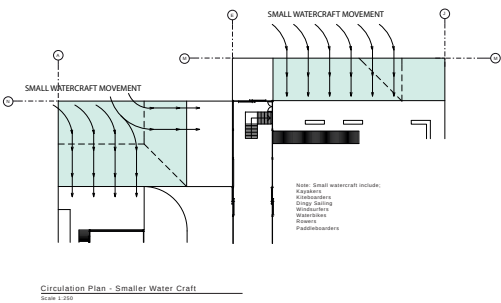
Long Section at High Tide - Maritime Confluence Centre

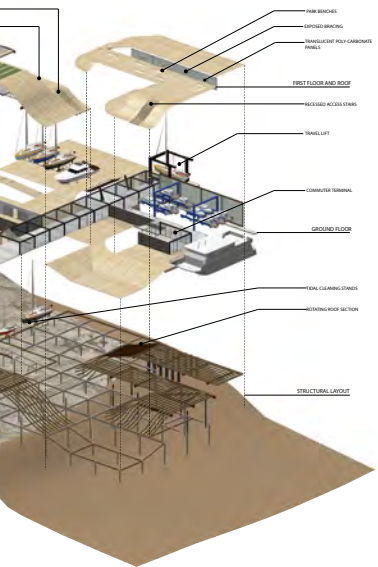


Internal Perpendicular Walkway

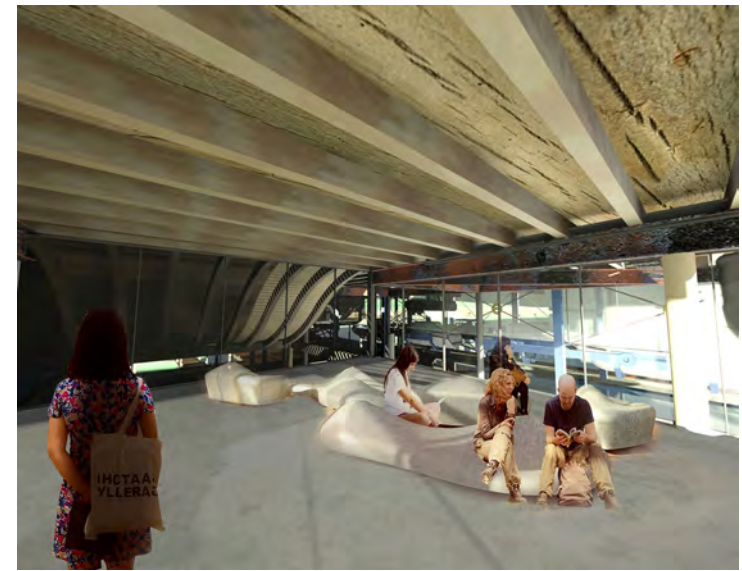


Northern Elevation from the Parade at Low Tide

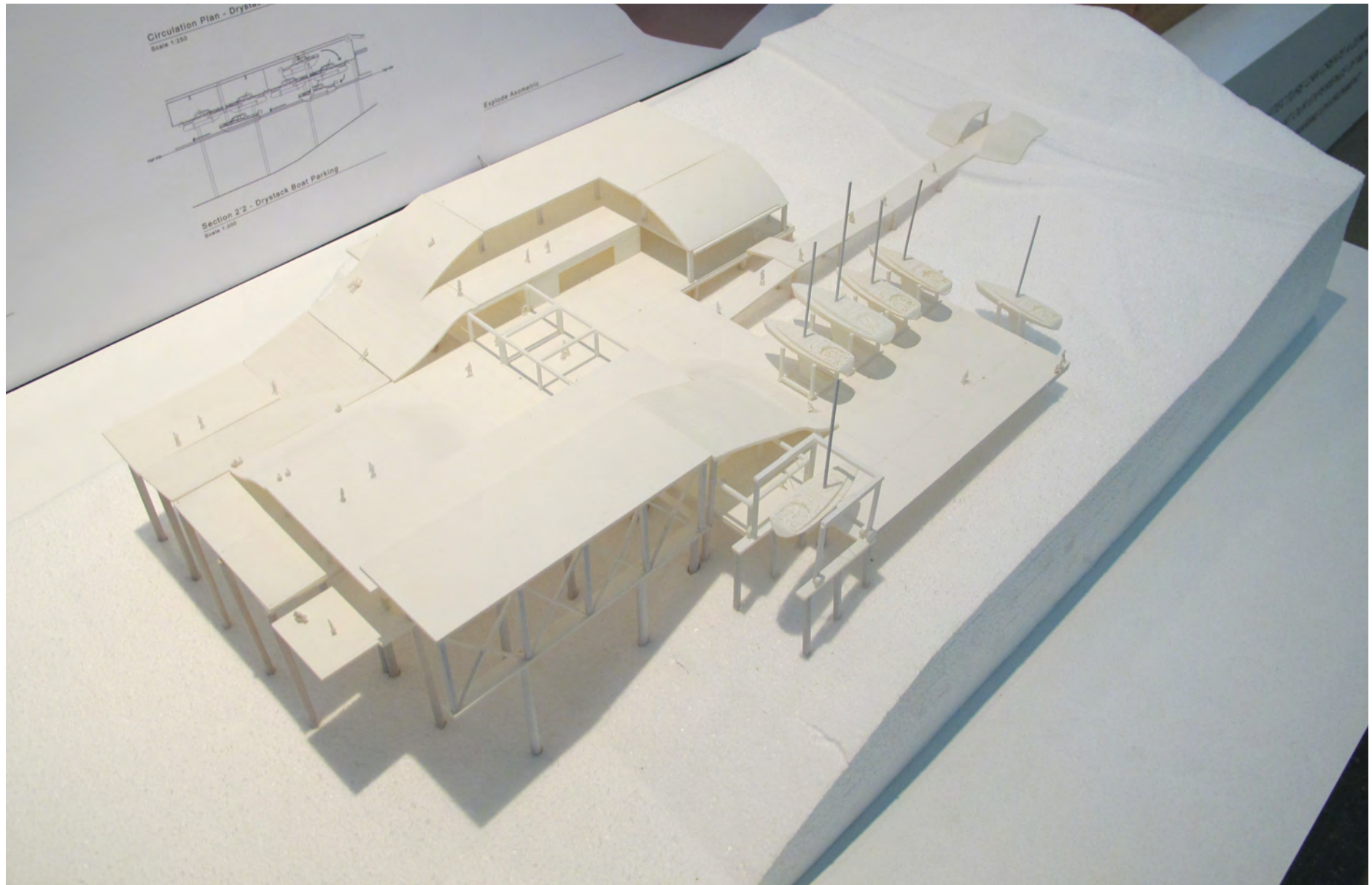




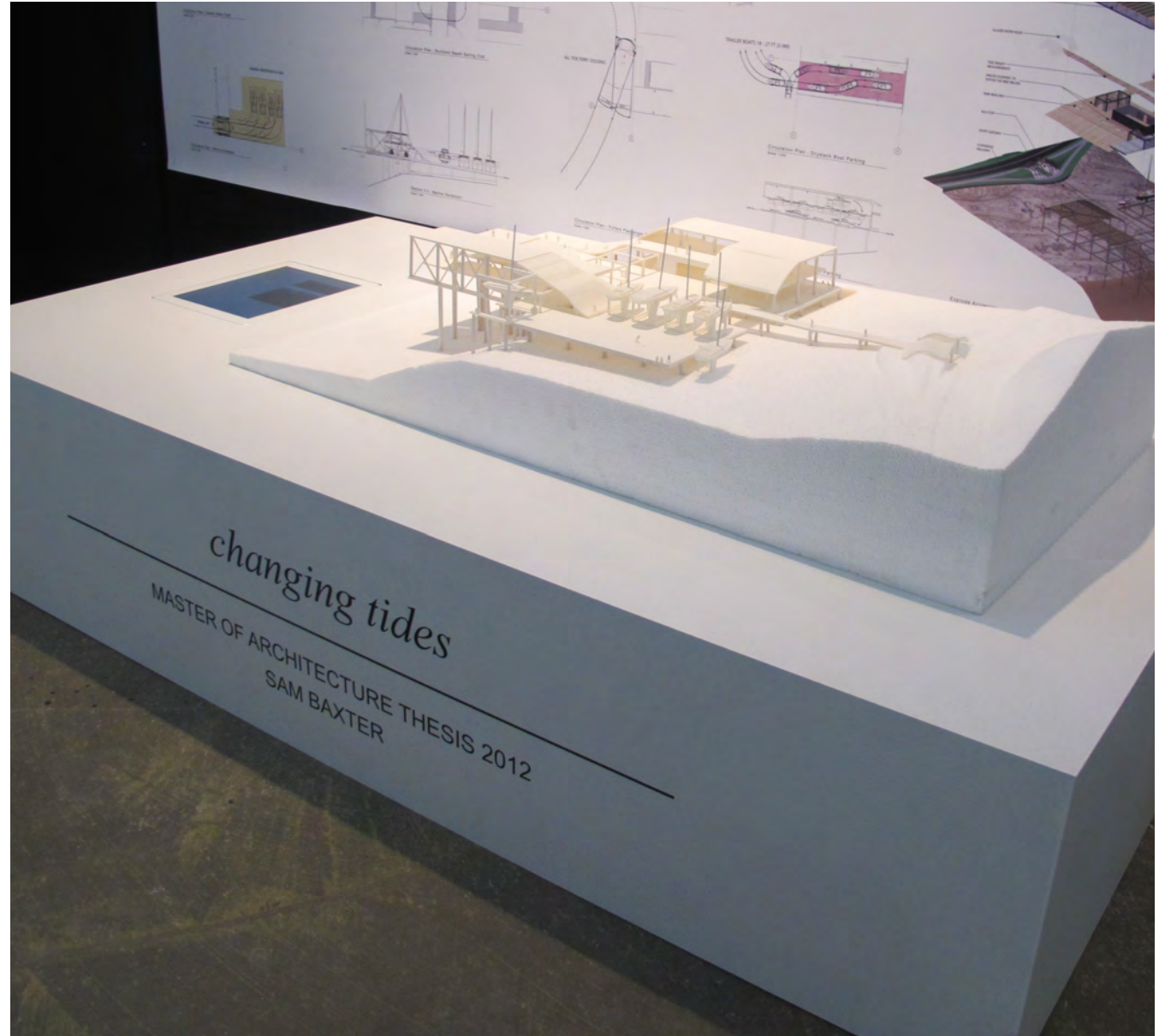
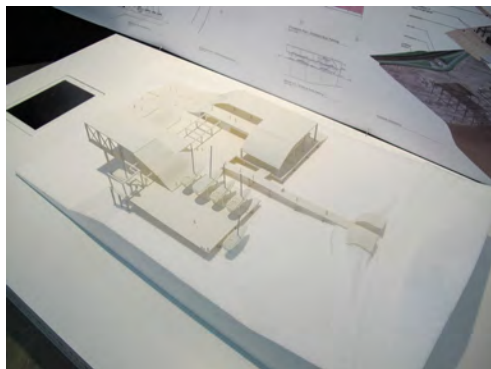
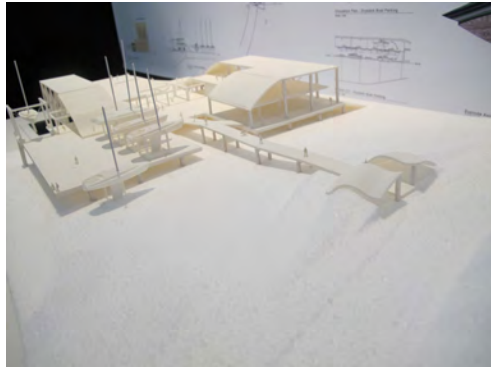
Sectional Perspective of the Moving Dry Stack Boat Parking

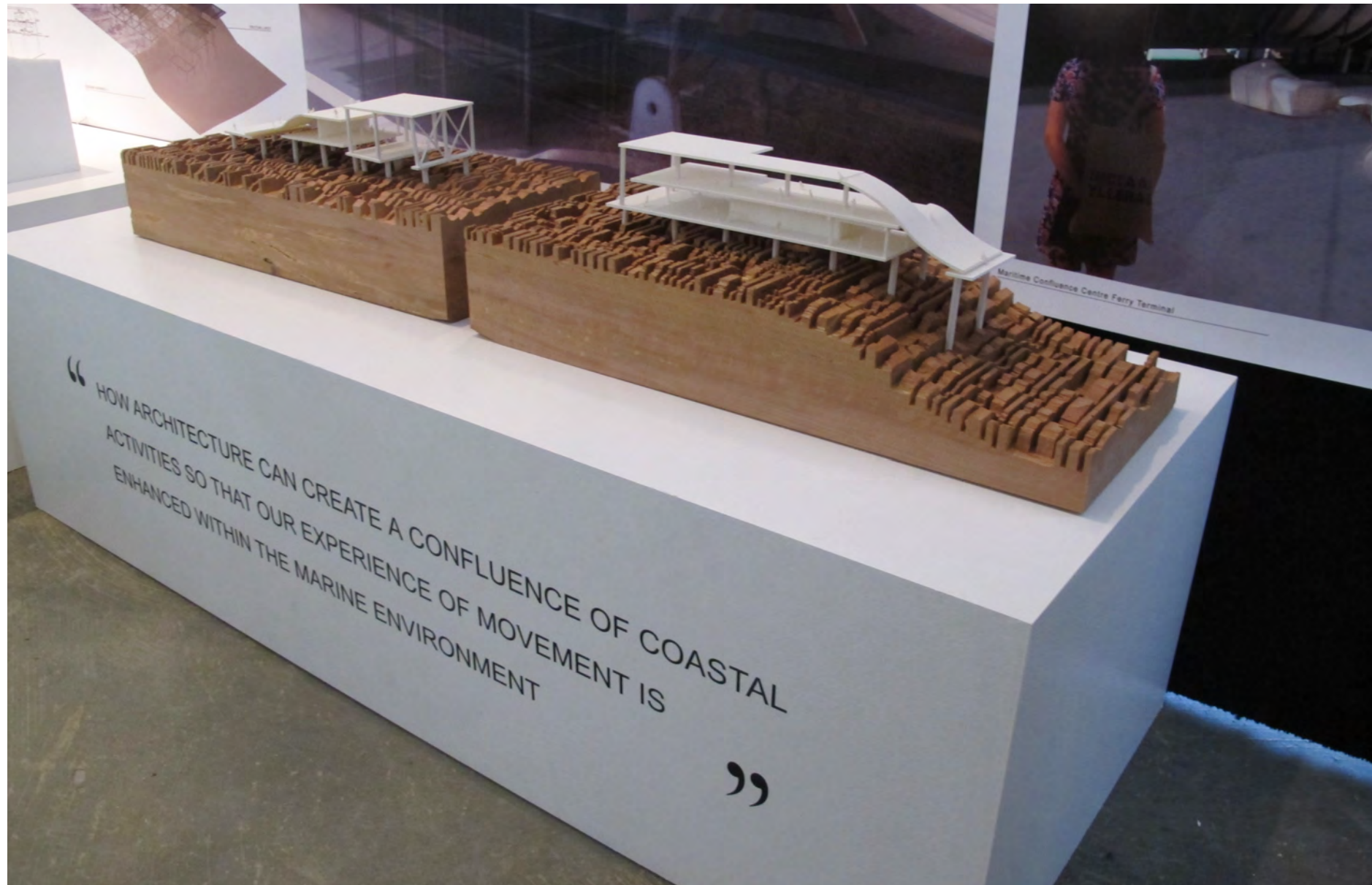


Maritime Confluence Centre Ferry Terminal



Final Presentation Model of the Marine Centre - Scale 1:200





Final Presentation of the Marine Centre - Section Models, Scale 1:200



What ways can architecture provide a medium to accommodate the confluence of coastal activities?

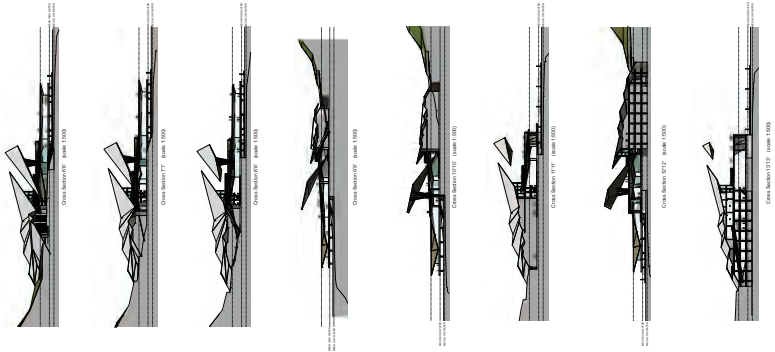
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Scale / Ground Floor Plan (scale 1 : 500)

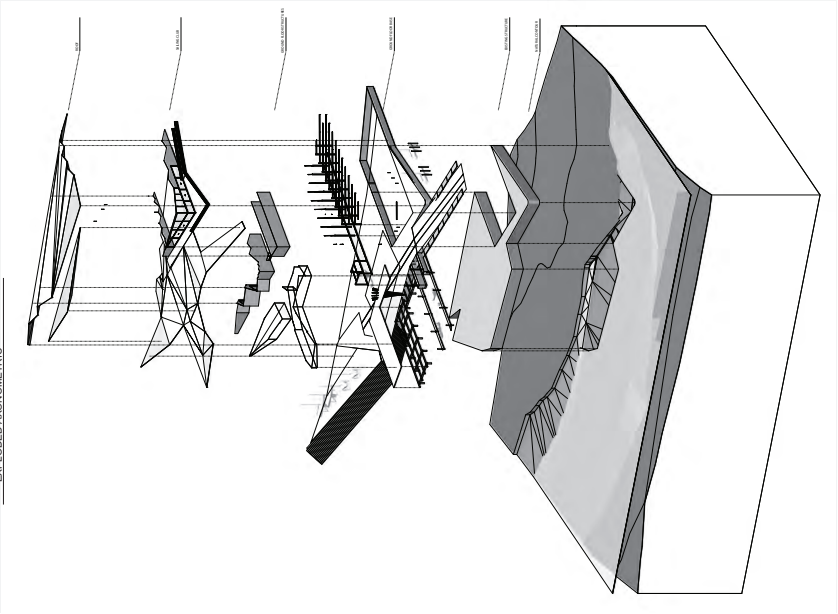


South-western elevation view. The coloured areas: landscape

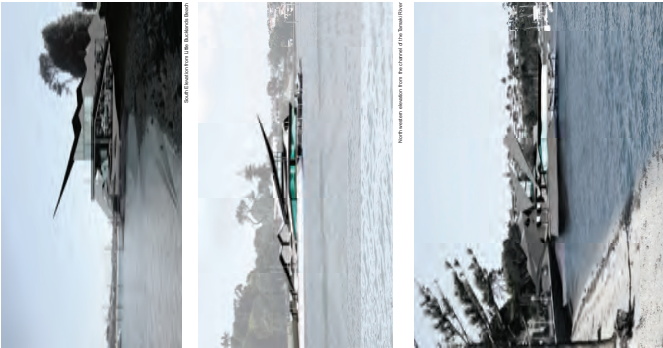
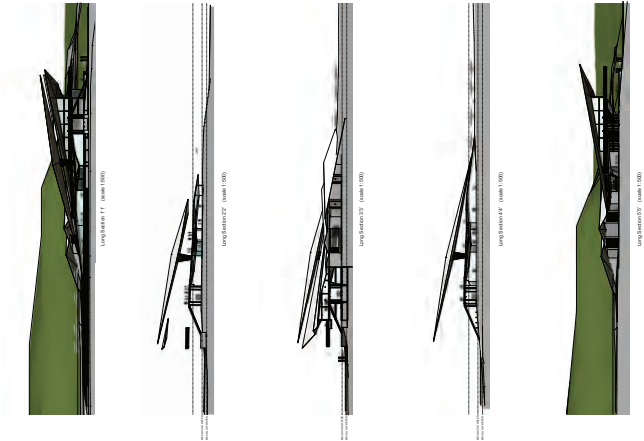
CROSS SECTIONS

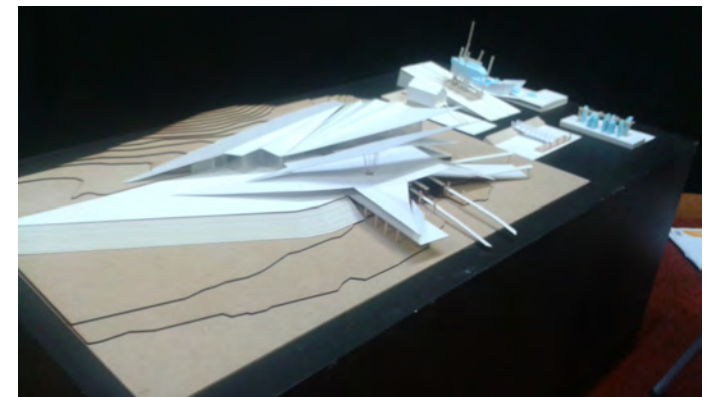
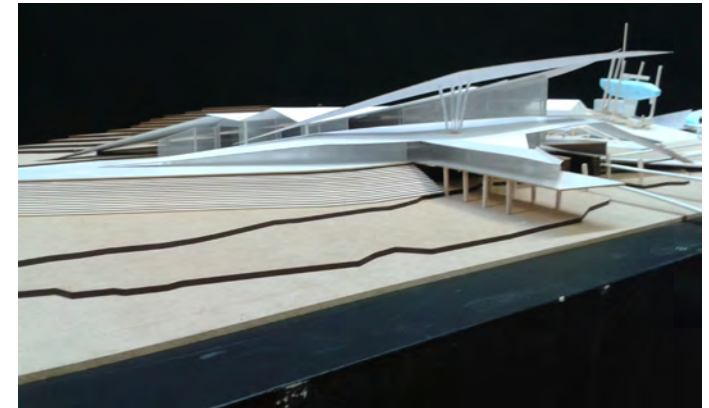
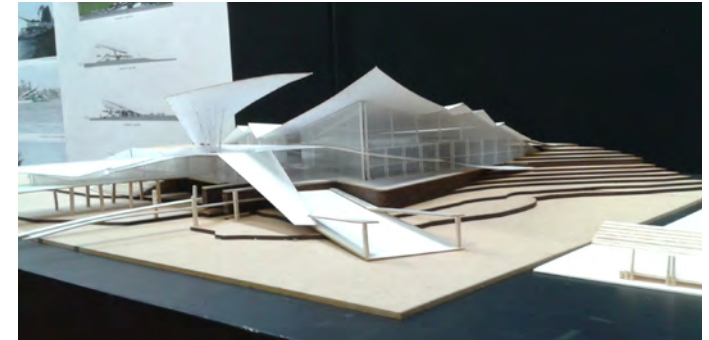
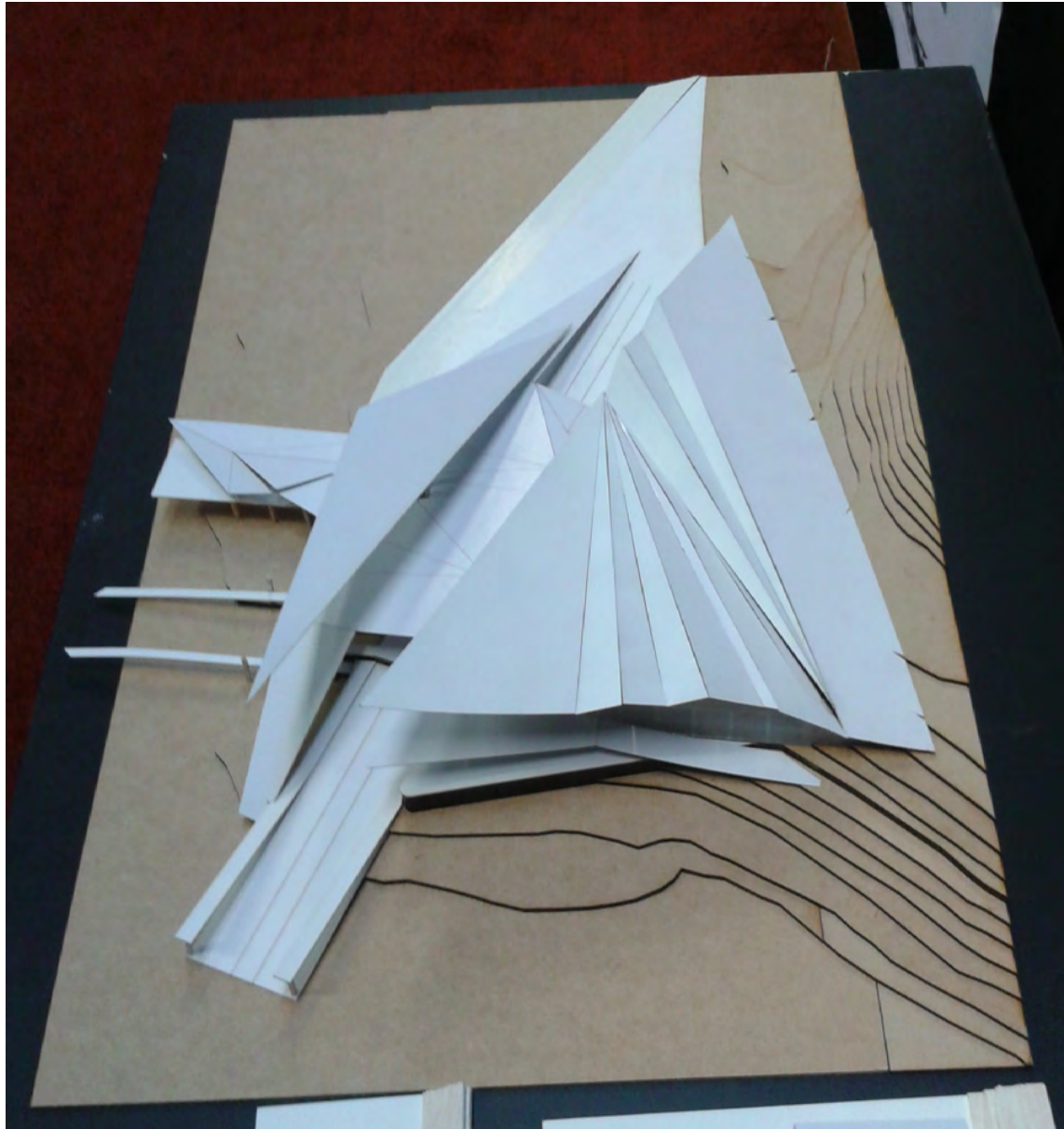


EXPLODED AXONOMETRIC

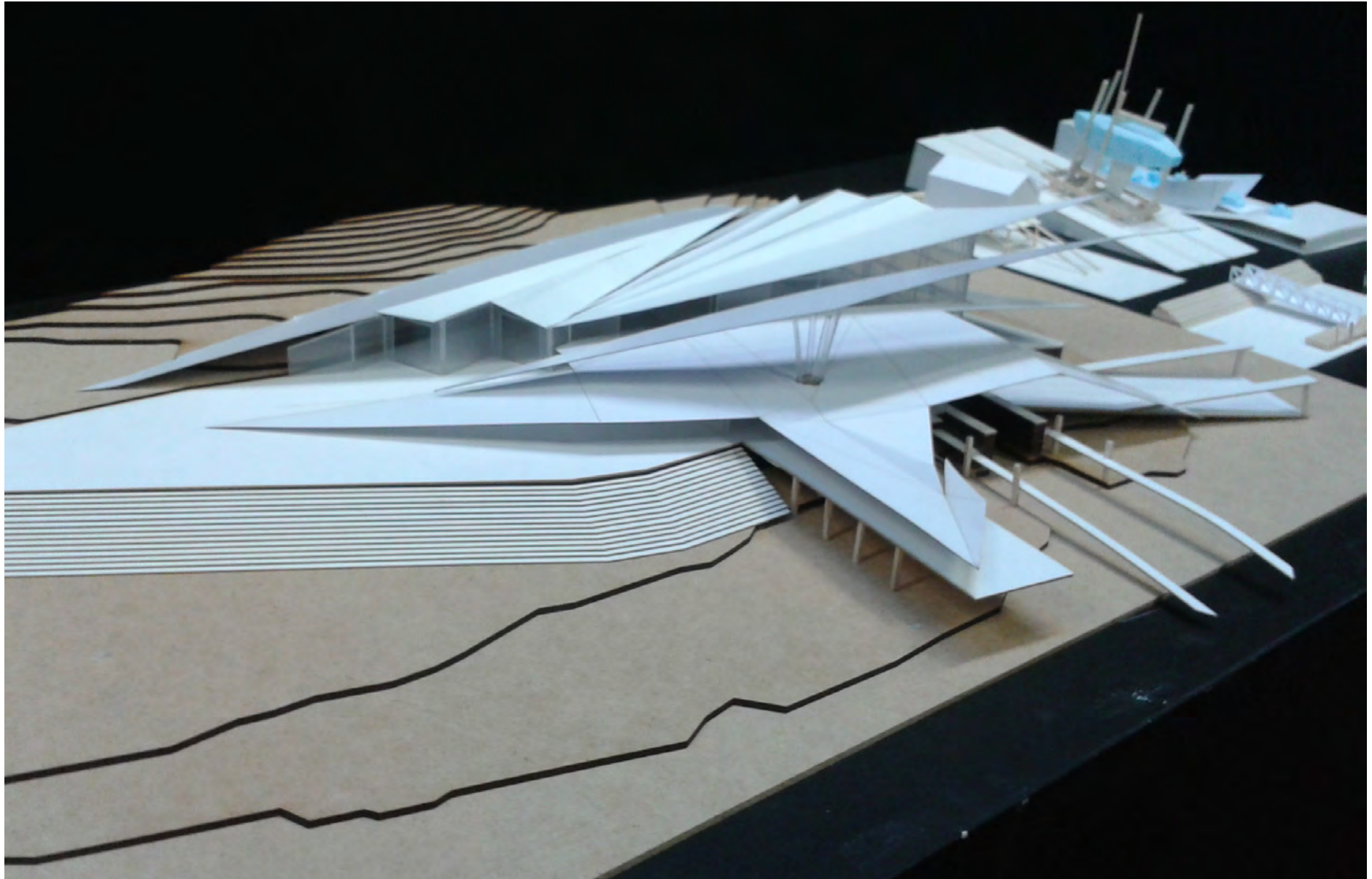


LONGITUDINAL SECTIONS





Mid-Semester Presentation Model (Conceptual Scheme 2)







Aerial Photographs from chartered flight. Flown July 2012 by Wade Malcolm and photographed by Sam Baxter.

Photograph 1: Flight Checks before take-off

Photograph 2: Cessna 172 Plane

Photograph 3: Granger Point

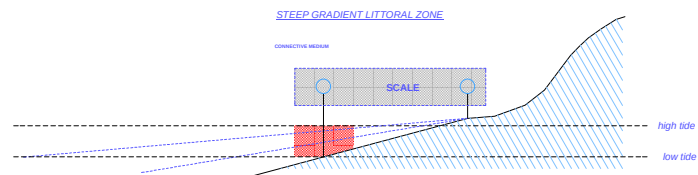
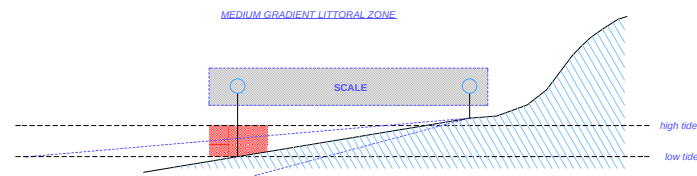
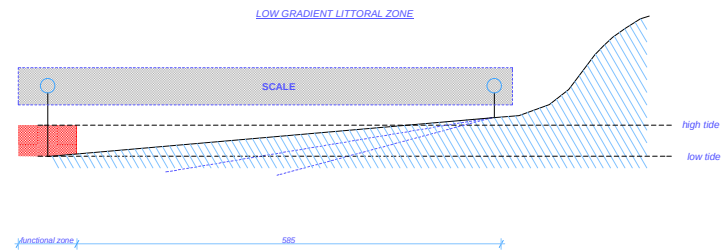
Photograph 4: Tahuna Torea Spit

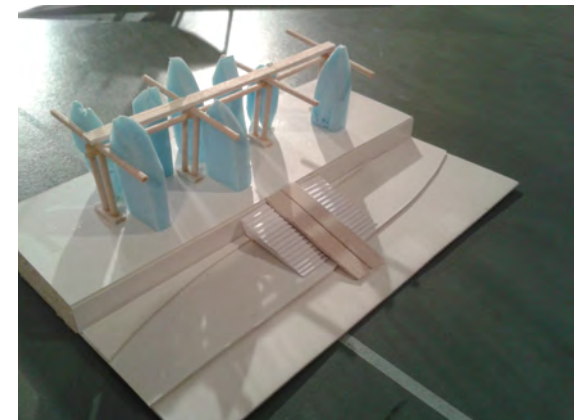
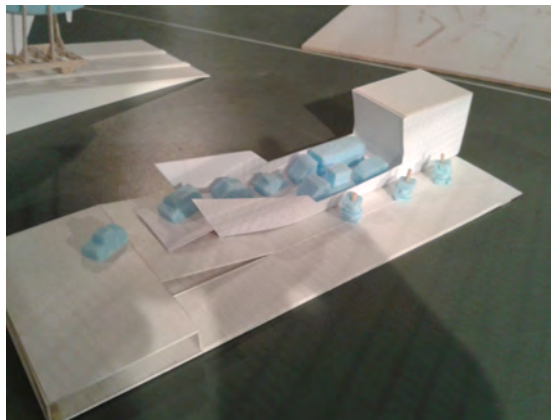
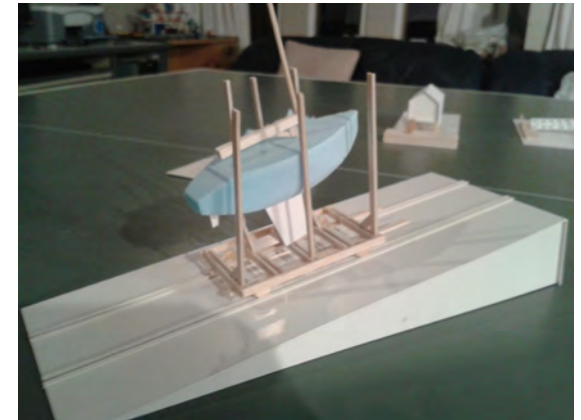
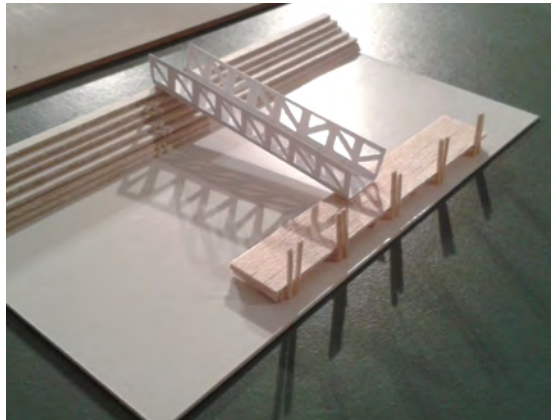
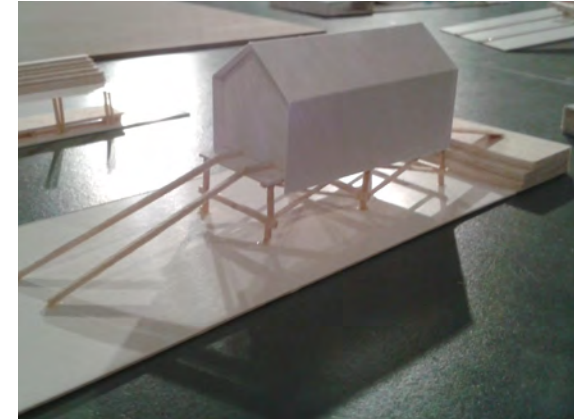
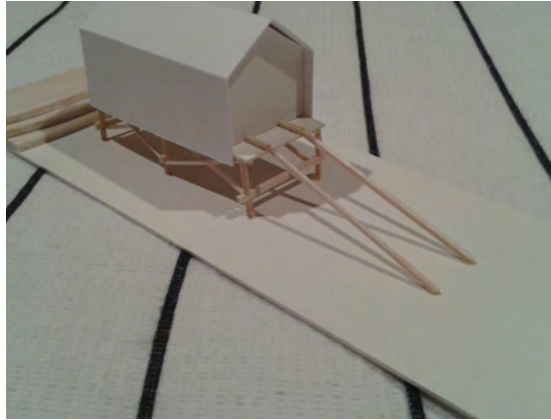
Photograph 5: Approaching the Tamaki River

Photograph 6: Kite boarders below of the Granger Point Spit

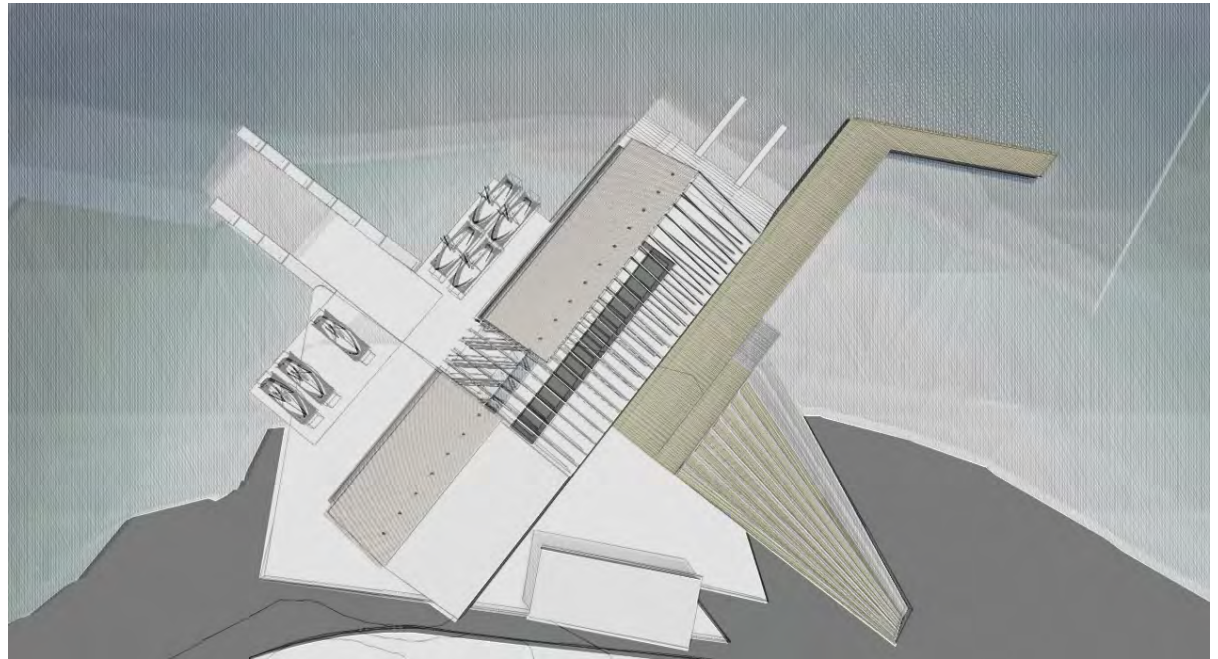
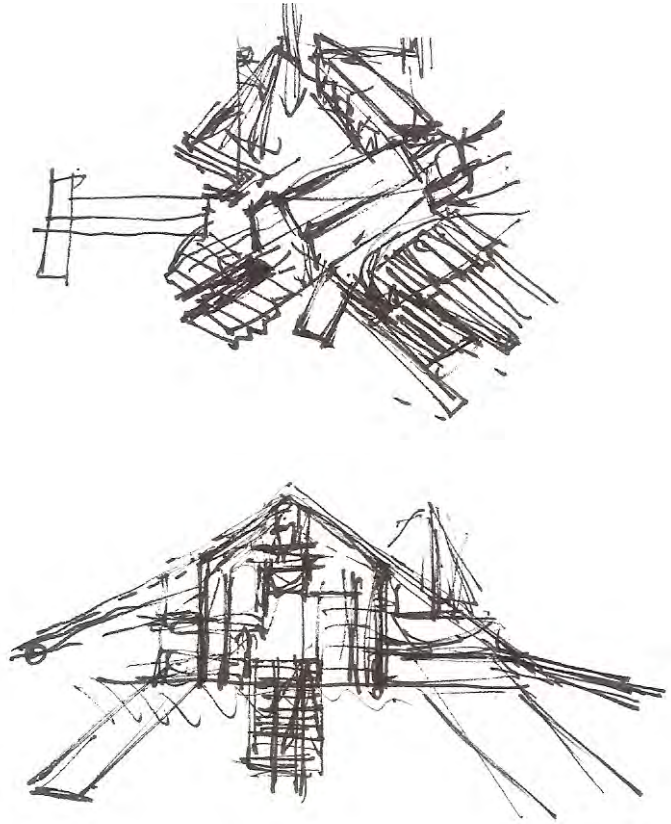
Photograph 7: Looking over the Tamaki River from above Panmure.







Right: Conceptual Models of Existing Marine Facilities



Early Conceptual Schemes at Granger Point exploring the traditional gable boatshed form.

