

Tales of the Maunsell Sea Forts

A Philosophy of Making in the Anthropocene

by

Felix Kwan-Cheong Cheong

A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Architecture

Waterloo, Ontario, Canada, 2017
© Felix Kwan-Cheong Cheong 2017

AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis.
This is a true copy of the thesis, including any required
final revisions as accepted by my examiners.

I understand that my thesis may be made electronically
available to the public.

ABSTRACT

The Age of the Anthropocene is marked by a shift in power between the relationship of nature and man. For the first time in human history we are actively shaping the environmental systems around us on a planetary scale, causing repercussions beyond our scope of understanding. As such the implications for how we as a species should live in this paradoxical age of scarcity and abundance are undefined. Although mention of the Anthropocene has pervaded into popular culture in recent years, the study of this geological era is still in its infancy.

Elsewhere, in the Thames Estuary twelve miles off the nearest coast, a collection of peculiar structures can be found. They are the Maunsell Sea Forts; a series of abandoned military installations created during World War II. Primarily constructed out of steel and concrete the towers seemingly appear out of the water. These outposts had a successful career defending the United Kingdom against German air-raids throughout the war until they were later decommissioned, stripped of their armaments, and left to the elements. Since then, the towers have been sporadically appropriated for a variety of different purposes while steadily falling into ruination. With an aesthetic almost as fantastic as their history, the Maunsell Sea Forts have a unique ability to capture the imagination.

Utilizing the Anthropocene as the backdrop, the Maunsell Sea Forts as the protagonist, and fictional tales as the vehicle, this thesis investigates what it means to be a designer and builder in the current global context. It explores concepts surrounding transformative use, material realities, and productive ruination in order to develop a philosophy of making founded on an acceptance of impermanence. Told through a mixture of essays, stories, and illustrations, this thesis creates a platform to speculate at the role of the architect for the modern age.

ACKNOWLEDGEMENTS

I would like to thank my supervisor, Andrew Levitt, for his kindness, guidance, and wisdom since the very beginning of this endeavour. I would also like to thank my committee members, Rick Andrighetti and Jane Hutton, for their invaluable advice that enriched all aspects of this work.

Thank you to all my friends who took time to talk, eat, and laugh with me. I am grateful to have you all in my life.

Most importantly I would like to thank my mom and dad whose constant love and support made this possible.

Thank you.

TABLE OF CONTENTS

| | |
|---|---|
| ix | List of Illustrations |
| xix | Foreword |
| PROLOGUE : CONTEXT | |
| 3 | Welcome to the Anthropocene - <i>The Role of Makers in the 'Age of Humans'</i> |
| 10 | History of the Maunsell Sea Forts |
| ACT I : TRANSFORMATIVE USE | |
| 51 | Object Identity & Impermanence - <i>A Look into Transformative Yet Connected Identities</i> |
| 56 | Fishermen & Seafort |
| ACT II : MATERIAL REALITIES | |
| 73 | The Upcycling Revolution - <i>Forays into Found Object Design</i> |
| 78 | Salvagers & Seafort |
| ACT III : PRODUCTIVE RUINATION | |
| 95 | The Beauty of Death & Decay - <i>Architecture as a Means of Storytelling</i> |
| 100 | Mollusks & Seafort |
| EPILOGUE : THOUGHTS & OTHERS | |
| 117 | Afterword |
| 123 | Bibliography |
| 131 | Appendices |
| 132 | Appendix A - <i>Beam Hangers to Coffee Table Partnering Rachel Cohen-Murison</i> |
| 138 | Appendix B - <i>Studio Chair Retrofit Partnering Rachel Cohen-Murison</i> |
| 143 | Glossary |

LIST OF ILLUSTRATIONS

Foreword

- xxi 0.1 "Floating Forts"
by Author

PROLOGUE : CONTEXT

- 11 0.2 "Stukas in formation in April 1940."
Digital image. History Germany bombs British towns and cities. Accessed February 13, 2017. http://www.bbc.co.uk/history/events/germany_bombs_british_towns_and_cities.
- 12 0.21 "German parachute mine at Clydebank."
Digital image. The Clydebank Blitz and the Polish Navy. Accessed February 13, 2017. http://polishscottishheritage.co.uk/?heritage_item=the-clydebank-blitz-and-the-polish-navy.
- 12 0.22 "A trio of pigeon cameras."
Digital image. It's Not the Camera, It's the Pigeon. December 29, 2012. Accessed February 13, 2017. http://www.slate.com/blogs/ behold/2012/10/29/julius_neubronner_and_the_amazing_world_of_pigeon_photography.html.
- 13 0.23 "Luftwaffe Map to London"
by Author
- 15 0.3 Red Sands Army Forts Under Construction.
Digital image. WW2 forts built to protect Kent coast from Nazi attack to be turned into a luxury resort, complete with executive apartments, a helipad and a spa at sea. May 28, 2015. Accessed February 14, 2017. http://www.dailymail.co.uk/travel/travel_news/article-3100633/WW2-forts-built-protect-Kent-coast-Nazi-attack-turned-luxury-resort-complete-executive-apartments-helipad-spa-sea.html.
- 16 0.31 "Daily Graphic."
Digital image. Naval Sea Forts. November 21, 2010. Accessed February 14, 2017. <http://www.kenthistoryforum.co.uk/index.php?topic=6079.0>.
- 16 0.32 Project Redsand. "The huge metal Maunsell gun towers - also known as Red Sands."
Digital image. WW2 forts built to protect Kent coast from Nazi attack to be turned into a luxury resort, complete with executive apartments, a helipad and a spa at sea. May 28, 2015. Accessed February 14, 2017. http://www.dailymail.co.uk/travel/travel_news/article-3100633/WW2-forts-built-protect-Kent-coast-Nazi-attack-turned-luxury-resort-complete-executive-apartments-helipad-spa-sea.html.

- 17 0.33 "Maunsell Sea Forts 2nd Generation Army Forts Plan (Thames)"
by Author
- 18 0.34 "Ebb and Flow Zones Site Plan"
by Author
- 18 0.35 "Shellfish Harvest Zones Site Plan"
by Author
- 18 0.36 "Mollusk Habitat Zones Site Plan"
by Author
- 19 0.37 "Maunsell Sea Forts Site Plan"
by Author
- 21 0.4 "Maunsell Forts."
Digital image. Maunsell Forts. Accessed February 15, 2017. <http://histografy.pl/forty-maunsella/>.
- 22 0.41 "Allied forces manning an anti-aircraft gun on Maunsell Forts."
Digital image. Maunsell Forts of the World War 2. September 15, 2009. Accessed February 15, 2017. <http://www.amusingplanet.com/2009/09/maunsell-forts-of-world-war-2.html>.
- 22 0.42 Sarasota Herald Tribune. "Thames Forts Did The Job Against Nazis."
Digital image. Fort Fax. January 25, 2017. Accessed February 15, 2017. <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.
- 23 0.43 "40MM Bofors Anti-Aircraft Gun Plan & Elevation"
by Author
- 25 0.5 Vessel approaching Maunsell Sea Forts.
Digital image. Segunda Guerra Mundial Fuerte Locura imagenes inéditas. Accessed February 16, 2017. <http://www.taringa.net/posts/imagenes/7937945/Segunda-Guerra-Mundial-Fuerte-Locura-imagenes-ineditas.html>.
- 26 0.51 "Heavy Anti-Aircraft 3.7" Gun ready to fire."
Digital image. The Great Nore Tower. December 15, 2016. Accessed February 16, 2017. <http://www.bobleroi.co.uk/ScrapBook/GreatNore/GreatNore.html>.
- 26 0.52 "Shivering Sands in 1977."
Digital image. The Anorak's Photo Collection. Accessed February 16, 2017. <http://www.offshore-radio.de/collection.htm>.
- 27 0.53 "Thames Army Forts Demolition Tracking Axonometric"
by Author

- 28 0.54 "Supply vessel alongside the Bofors Tower."
Digital image. The Great Nore Tower. December 15, 2016. Accessed February 16, 2017. <http://www.bobleroi.co.uk/ScrapBook/GreatNore/GreatNore.html>.
- 28 0.55 "A reinforced steel cage fabricated on-site around damaged area."
Digital image. The Great Nore Tower. December 15, 2016. Accessed February 16, 2017. <http://www.bobleroi.co.uk/ScrapBook/GreatNore/GreatNore.html>.
- 28 0.56 "Swim ended work boats appear to be a clinker built fisherman & lifeboat."
Ibid.
- 29 0.57 Lorenc, Marzena G. Maunsell Sea Fort Cladding.
Digital image. The crumbling giants of the seas: Eerie images of the abandoned coastal forts built 70 years ago to protect London during the Second World War. August 9, 2016. Accessed February 16, 2017. <http://www.dailymail.co.uk/news/article-3731706/The-crumbling-giants-seas-Eerie-images-abandoned-coastal-forts-built-70-years-ago-protect-London-Second-World-War.html>.
- 31 0.6 "Shivering Sands Sea Fort: Radio Sutch / Radio City (1964 – 1967)."
Digital image. Petitions, Paint and Rock 'n Roll – How Saving The Red Sands Sea Forts With Street Art Has Been Stalled. April 1, 2016. Accessed February 17, 2017. <http://bnigateway.org/2016/04/01/petitions-paint-and-rock-n-roll-how-saving-the-red-sands-sea-forts-with-street-art-has-been-stalled-skye-wellington/>.
- 32 0.61 Screaming Lord Sutch broadcasting from Maunsell Sea Forts.
Digital image. Lord Sutch. Accessed February 17, 2017. <http://www.offshoreechos.com/Lord%20Sutch.htm>.
- 32 0.62 Cole, Edward. "Meal-time on Radio 390."
Digital image. Edward Cole's Radio 390 photo album - part four. Accessed February 17, 2017. <http://www.offshoreradio.co.uk/album31.htm>.
- 33 0.63 Jameson, Peter . "Radio City rate card, front."
Digital image. Peter Jameson's radio memorabilia. Accessed February 17, 2017. <http://www.offshoreradio.co.uk/album108.htm>.
- 34 0.64 Cole, Edward. "Engineer at work."
Digital image. Edward Cole's Radio 390 photo album - part four. Accessed February 17, 2017. <http://www.offshoreradio.co.uk/album31.htm>.
- 34 0.65 Reg Calvert.
Digital image. Photos and History. Accessed February 17, 2017. <http://www.regcalvert-plays.co.uk/reg-calvert---photos-and-history.php>.
- 35 0.66 Schagen, Linda. "Radio City – Sea Raid – 1966."
Digital image. Radio City (1964-1967). Accessed February 17, 2017. <http://www.bookamook.com/kaleidoscope/ships-radio-pirates-various/radio-city/>.

- 37 0.7 "Abandoned Buildings From Around The World."
Digital image. Herne Bay Forts. Accessed February 18, 2017. <http://www.keywordsking.com/aGVybmUgYmF5IGZvcnRz/>.
- 38 0.71 Travis. "Large groups of blue mussels attach themselves to rocky areas."
Digital image. INVERTEBRATES. December 5, 2014. Accessed February 18, 2017. <http://mainemarineanimals.weebly.com/invertebrates.html>.
- 38 0.72 "Fresh Clams."
Digital image. Sneads Ferry Community Council Home of the Shrimp Festival. Accessed February 18, 2017. <http://www.sneadsferrynorthcarolina.com/shrimp-and-fish-houses/>.
- 38 0.73 Wood, Jenny. "Manila clams waiting to be packed for shipment."
Digital image. Altered Waters: Ocean Acidification Leads Shellfish Growers to Adapt for Survival. April 14, 2015. Accessed February 18, 2017. <https://earthzine.org/2015/04/14/altered-waters-ocean-acidification-leads-shellfish-growers-to-adapt-for-survival/>.
- 38 0.74 NOAA. "Pacific oysters."
Digital image. Oysters may struggle to build shells as carbon dioxide rises. June 17, 2013. Accessed February 18, 2017. <https://www.sciencenews.org/article/oysters-may-struggle-build-shells-carbon-dioxide-rises>.
- 39 0.75 Patterson, Seth. "Barnacle encrusted pipes of an old oil platform."
Digital image. South Padre Island Artificial Reef & Port Mansfield Liberty Ships Reef. August 29, 2014. Accessed February 18, 2017. <https://www.scubaboard.com/community/threads/south-padre-island-artificial-reef-port-mansfield-liberty-ships-reef.490808/>.
- 40 0.76 "Thames Army Fort Tidal Elevation"
by Author
- 40 0.77 "Thames Army Fort Mollusk Depth Elevation"
by Author
- 42 0.8 "Mubarak Oil Field, Persian Gulf."
Digital image. July 5, 2011. Accessed February 19, 2017. <http://www.panoramio.com/photo/55259889>.
- 42 0.81 SBS. "A look at the variety of boats used by the SBS."
Digital image. Special Boat Service (SBS). Accessed February 19, 2017. <http://www.eliteukforces.info/special-boat-service/>.
- 43 0.82 "Diving off WW2 Forts - Red Bull Cliff Diving World Series 2012."
Digital image. September 6, 2012. Accessed February 19, 2017. <https://www.youtube.com/watch?v=0ExIdjw0tpo>.

- 44 0.83 "Self Portrait of Stephen Turner."
Digital image. Stephen Turner - Seafort Project. Accessed February 20, 2017.
<http://www.bobleroi.co.uk/ScrapBook/SeafortProject/Seafort.html>.
- 44 0.84 DJToad. "Doctor Who Fury From the Deep Region 1 DVD Cover."
Digital image. Designs & Interfaces / DVD Covers. Accessed February 20, 2017.
<http://djtoad.deviantart.com/art/Doctor-Who-Fury-From-the-Deep-Region-1-DVD-Cover-519694098>.
- 45 0.85 Museum of London. "Neighbour, Stephen Turner."
Digital image. Estuary English. October 4, 2013. Accessed February 20, 2017.
<https://suburbancitizen.wordpress.com/page/4/>.

ACT I : TRANSFORMATIVE USE

- 57 1.1 "UK vs. EU Territorial Waters Map"
by Author
- 59 1.2 "UK vs. EU Annual North Sea Fishing Quotas - Illustrated Poster"
by Author
- 61 1.3 "Platform Tower Storage"
by Author
- 62 1.4 "Floating Market"
by Author
- 65 1.5 "Command Center Interior"
by Author
- 67 1.6 "Marine Monitoring Outpost"
by Author
- 69 1.7 "Shivering Sands Seafort Marine Monitoring Station - Illustrated Plan"
by Author

ACT II : MATERIAL REALITIES

- 79 2.1 "Material & Craft"
by Author
- 81 2.2 "Harvest Plots"
by Author
- 83 2.3 "Sea Forts Material Salvage"
by Author

- 85 2.4 "Facade to Door/ Beam to Bench"
by Author
- 87 2.5 "Kintsugi Slab"
by Author
- 89 2.6 "Handrails Rack/ Bicycle Study"
by Author
- 91 2.7 "Depleted Plot"
by Author

ACT III : PRODUCTIVE RUINATION

- 101 3.1 "Ecological Ruins"
by Author
- 103 3.2 "Looking Out"
by Author
- 105 3.3 "Mollusks as Environmental Indicators"
by Author
- 107 3.4 "Marine Research Facility Plan Sketch"
by Author
- 109 3.5 "Mollusks Stratification Detail"
by Author
- 111 3.6 "Shell Archives"
by Author
- 113 3.7 "Storytelling"
by Author

EPILOGUE : THOUGHTS & OTHERS

Afterword

- 116 4.0 "Fort Tower Elevation - Pen"
by Author

APPENDICES

Appendix A - Beam Hangers to Coffee Table Partnering Rachel Cohen-Murison

- 132 4.1a "Found Beam Hangers"
by Author

- 132 4.2a "Coffee Table Kit of Parts"
 by Author
- 133 4.3a "Hangers and Leg Assembly"
 by Author
- 133 4.4a "Cross Bracing Detail"
 by Author
- 134 4.5a "Full Table Frame"
 by Author
- 135 4.6a "Glass Top Contact Detail"
 by Author
- 136 4.7a "Found Object Coffee Table"
 by Author

Appendix B - Studio Chair Retrofit Partnering Rachel Cohen-Murison

- 138 4.1b "Studio Chair Scrap"
 by Author
- 139 4.2b "CNC Formwork"
 by Author
- 139 4.3b "Chair Back Laminations"
 by Author
- 140 4.4b "Back Connection Detail"
 by Author
- 141 4.5b "Studio Chair Retrofit"
 by Author

Glossary

- 144 5.1 Sake maker stands over fermenting rice.
 Digital image. Le saké tente de retrouver le feu sacré à l'étranger. December
 19, 2014. Accessed September 23, 2016. [https://www.lesechos.fr/19/12/2014/
 LesEchos/21839-050-ECH_le-sake-tente-de-retrouver-le-feu-sacre-a-l-etranger.
 htm.](https://www.lesechos.fr/19/12/2014/LesEchos/21839-050-ECH_le-sake-tente-de-retrouver-le-feu-sacre-a-l-etranger.htm)
- 145 5.11 "Choreographed Decay Cycle"
 by Author

- 146 5.2 Motorcycle in workshop.
Digital image. Chief Blackhawk Antique Motorcycle Club Renews Sponsorship Support of Museum's "Motorcycle Shop" Exhibition. Accessed September 23, 2016. <http://www.nationalmcmuseum.org/chief-blackhawk-antique-motorcycle-club-renews-sponsorship-support-of-museums-motorcycle-shop-exhibition/>.
- 147 5.21 "Maintenance Cycle"
by Author
- 148 5.3 Tomlinson, Dean. "Contemporary art conservator Sherry Phillips at work on Simon Starling's Infestation Piece."
Digital image. Saving Starling. Accessed September 23, 2017. <http://www.magentafoundation.org/magazine/saving-starling/>.
- 149 5.31 "Preservation Cycle"
by Author
- 150 5.4 Maize.
Digital image. Colombia: Identifican siete nuevas razas de maíces. May 15, 2015. Accessed September 23, 2016. <http://agricultureros.com/colombia-identifican-siete-nuevas-razas-de-maices/>.
- 151 5.41 "Progressive Use Cycle"
by Author
- 152 5.5 Soda Can Stack.
Digital image. Sugary Drinks Linked To Cell Aging: Soda May Age You as Much as Smoking. October 20, 2014. Accessed September 23, 2016. <https://futurism.com/sugary-drinks-linked-cell-aging-soda-may-age-much-smoking/>.
- 153 5.51 "Recycling Cycle"
by Author
- 154 5.6 Boro Cloth.
Digital image. Gem Club on Japanese Boro. January 10, 2012. Accessed September 23, 2016. <http://stadiumsandshrines.com/gem-club-on-japanese-boro/>.
- 155 5.61 "Repair Cycle"
by Author
- 156 5.7 Barn Door Desk.
Digital image. Ideas DIY para reciclar puertas viejas de madera . Accessed September 23, 2017. <https://www.habitissimo.es/ideas/ideas-para-reciclar-puertas-viejas>.
- 157 5.71 "Repurpose Cycle"
by Author

- 158 5.8 Kemps, Renee. "Sourdough Starter."
Digital image. August 18, 2015. Accessed September 23, 2016. <https://www.flickr.com/photos/133338166@N08/20933707799/>.
- 159 5.81 "Reuse Cycle"
by Author

FOREWORD

During the early stages of my explorations, when aspirations and ideas were beginning to coalesce into the semblance of a thesis topic, my focus had been to investigate the use of built objects beyond their designed lifespans. This approach advocated ideologies of social and environmental responsibility through the lens of architectural ingenuity. It seemed like a solid foundation on which to build the rest of my academic inquiries, and as such I dove into my research in earnest. However I soon found myself sidetracked by peripherally related topics that appeared to have overlapping yet disjointed themes. Research on abandoned architectural sites and adaptive reuse projects transitioned into investigations concerning the ruination and weathering of built forms. This then migrated to philosophical texts that debated aesthetic theories involving the unfinished object and the identity of physical matter through time. From there I found myself looking into the impacts of mass manufacturing, the role of craft in the modern age, and issues surrounding designed obsolescence. Going down this rabbit hole left me disoriented, as I seemed to have drifted away from my initial argument. Each stream of thought branched off into many other avenues of research that answered aspects regarding the same question in various ways; a question which I could not quite reach. I was moving in slow circles around an unknown centre whose presence was felt through the influence it exerted on these other bodies. As I continued my explorations I came to the realization that this thesis wasn't answerable by posing a single question because it was describing a phenomenon that could only be understood through a series of interdependent concepts. This collection of disparate yet related nodes of

information were breadcrumbs that led me to a way of thinking about materials, objects, and craft in the modern age – a philosophy of making.

Making – it is a simple word, one that is used often in a variety of settings, yet its implications are deceptively vast. A sense of its complexity can be glimpsed when one looks up the definition for the term.

*“Making: The process of making or producing something”
(Oxford Dictionaries).¹*

This entry does not offer much by way of a proper explanation since it is self-referential; making is the process of making. However if the concept is not so easily described through words then what is the best way to come to know it? In working on this thesis I have begun to see the act of making as encompassing a mindset, whose development is built upon a culmination of experiences and inquiries in the many fields that interact with it. Over time this mindset becomes a way of understanding our position within the world at large. As architects we have a uniquely intimate relationship with the many facets of making. From conceptual design, to fabrication, to the real world impacts beyond, architects play a role throughout each stage and touch on all aspects associated with the process. As such we are ideally situated in this theoretical landscape, and must assume responsibility for the development of a perspective in design and fabrication that is in pursuit of the most good.

As designers we often prefer problems to be solved in a clean and decisive manner. At times we fall into the trap of wanting well organized solutions, adopting themes and prescribed methods to tackle problems because there is a pristineness to it. More often than not the world does not follow these rules.

¹ Oxford Dictionaries, “Making,” Oxford University Press, accessed March 7, 2017, <https://en.oxforddictionaries.com/definition/making>.

It is a messy, chaotic, and ever changing place, meaning that a silver bullet does not exist. I prefer to approach the interrelated issues associated with making in the same way. Looking at the topic from a multitude of different angles that aren't limited by boundaries, and do not always conform to a specific theme. The following thesis freely explores a philosophy of making in this manner, through the speculative reimagining of a strange set of architectural artifacts.

Hidden behind the thinning fog in the Thames Estuary, twelve miles off the nearest coast, The Maunsell Sea Forts can be found. Most don't know the history behind this series of peculiar structures. They tower some four stories over the water; legs constructed out of concrete, main building and platforms clad in semi rusted steel. Stoic and unmoving, they stand vigil at the mouth of the Thames. The rich materials, complex territory, and accrued history of these forts provide a kaleidoscope through which to analyze making within the context of the Anthropocene. An age where human processes shape the world we live in, where our actions as a species have ramifications well beyond our lifetimes, and where our attitudes towards material culture, waste, manufacturing, and the treatment of built objects are dangerously unfit for the realities of this era.

This thesis does not adhere to the traditional structure of an academic document which recommends a beginning, middle, and end. Rather it is presented as a compendium of affiliated essays and short stories, with associated projects and precedents attached. The sections are separated into acts that explore distinct yet intersecting concepts which speak to, and build upon each other. Each piece of work in isolation can provide insight into a specific aspect of craft or material theory, however when consumed as a whole they begin to suggest something bigger; a holistic way of thinking about

making; and subsequently what it means to be a maker in the modern age.

One final word on the intents of this thesis. In the process of doing research about the many crises plaguing this consumption driven era, I have come across a plethora of intimidating articles. Their tone is often laced with a panicked urgency, riddled with sensational statistics that casually mention units in the millions or billions. This strategy is meant to either astound or scare readers into taking action, but they can leave people feeling disheartened. What I found myself most drawn to were tales told from personal experiences about individual struggles and triumphs in the Anthropocene. Rather than using fear as a tool, these stories galvanize people. I want this body of work to have a similar effect by talking about solutions and problems in a way that is relatable on a person to person basis; motivating people to take action through a materials perspective for the dawn of a new age that is fundamentally and emphatically human.

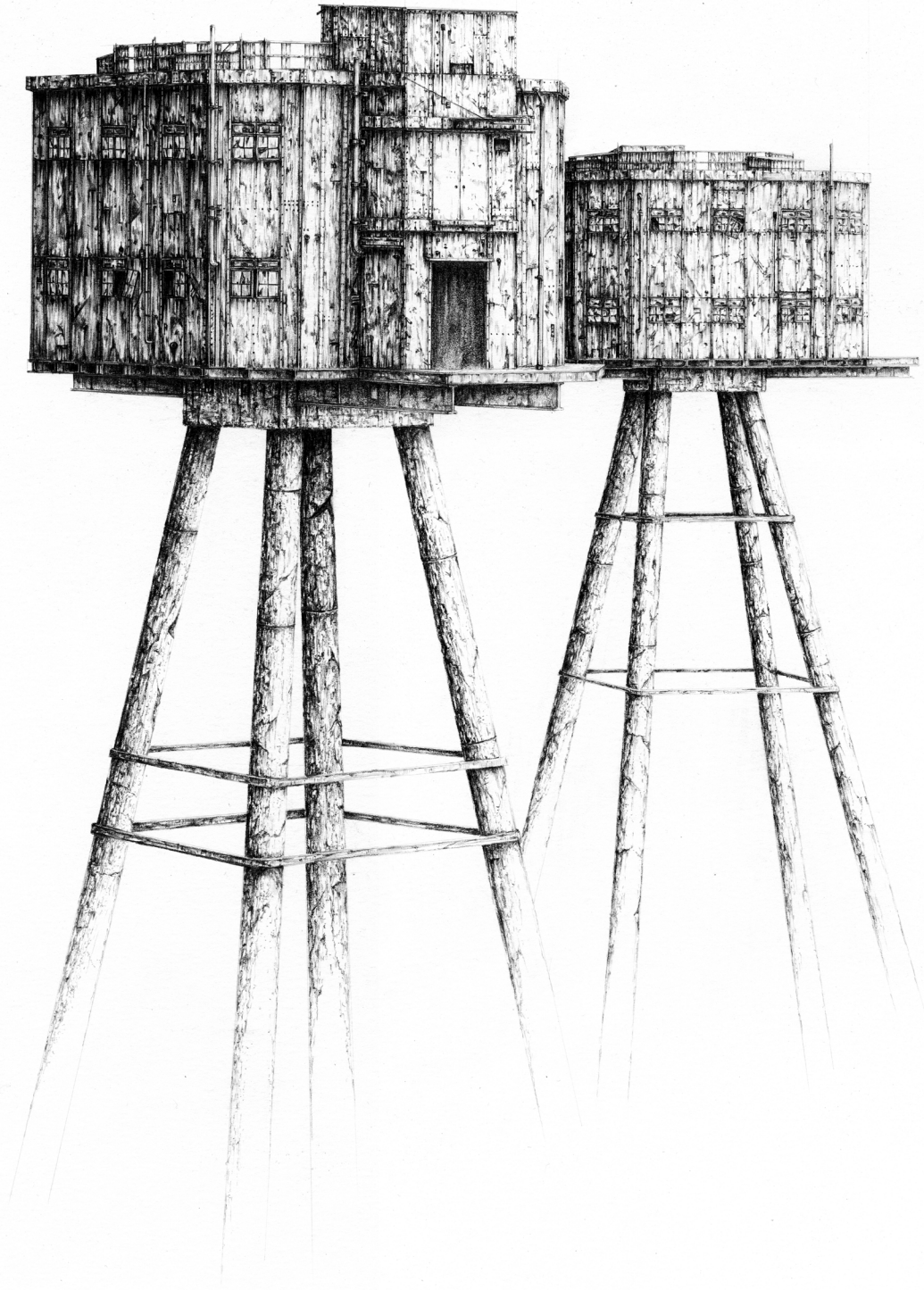


Fig 0.1 Floating Forts

PROLOGUE

Context

WELCOME TO THE ANTHROPOCENE

THE ROLE OF MAKERS IN THE 'AGE OF HUMANS'

Since the turn of the 20th century the human population has exploded, jumping from 1.5 billion in 1900 to over 7 billion today. This was made possible through the discovery of fossil fuels as an abundant energy source, the industrialization of agriculture, the advent of automated mass manufacturing, and huge leaps forward in the fields of medicine and technology. These astonishing human achievements which led to the urbanization of over half the world's population have become known as *The Great Acceleration*. However our rapid advancements fuelled by the plundering of Earth's resources have resulted in a cascading network of environmental and ecological disasters.

The carbon dioxide released during the industrial revolution, coupled with massive deforestations have caused an increase in global temperatures of 0.7°C in the last century, ten times faster than the recorded norm.¹ Mean sea levels have risen approximately 8 inches during the same period, with scientists unable to accurately predict future trends. Some say it is entirely possible that water levels will rise another 7 meters in the next century, enough to engulf major coastal cities.² The need to keep up with food production for our ever increasing population has given birth to intensive farming practices, causing soil erosion and desertification. Advancements in technologies have allowed humans to build at a scale never before imagined. In China, dams which are being constructed to provide hydroelectricity

have been linked as major causes of earthquakes and droughts.³ Although the Earth has gone through climatic, geological, and ecological changes in the past, this is the first time that they have been instigated by a single lifeform. These unprecedented global fallouts as a result of human activities have effectively shifted our role on this planet from the scale of an individual species to that of an elemental force. It was in consideration of these massive changes that Nobel laureate Paul Crutzen first coined the term Anthropocene in 2000, in an attempt to delineate our departure from the Holocene.⁴ *Anthropo* meaning "man" and *Cene* meaning "new" stands for a new age where human beings have become the main driver in shaping the Earth's future – for better or for worse – welcome to the Anthropocene.

As humanity's needs for material goods have grown, so our production capacities and extraction methods have evolved to keep up with demand.

"We have carved and collected rocks for tools and building materials, burrowed into the ground for metals and fuels. We have prized the useful metals, like iron and tin, but attached more value to the useless: decorative inert metals like gold or crystals like diamond, whose worth has been the source of empires and of wars. The Anthropocene has been built by disembowelling the Earth" (Vince 2014, 299-300).⁵

¹ "How is Today's Warming Different from the Past?" NASA Earth Observatory, accessed January 16, 2017, <http://earthobservatory.nasa.gov/Features/GlobalWarming/page3.php>.

² "Sea Level Rise," National Geographic, accessed January 16, 2017, <http://www.nationalgeographic.com/environment/global-warming/sea-level-rise/>.

³ Adam Minter, "Are China's Dams Causing Quakes?" Bloomberg View, October 9, 2014, accessed January 16, 2017, <https://www.bloomberg.com/view/articles/2014-10-09/are-china-s-dams-causing-quakes>.

⁴ Paul J. Crutzen, "Geology of Mankind." *Nature* 415 (2002), 23. doi:10.1038/415023a

⁵ Gaia Vince, *Adventures in the Anthropocene: A Journey to the Heart of the Planet We Made* (Minneapolis: Milkweed Editions, 2014), 299-300.

Keeping this in mind, I propose to look at the Anthropocene through the lens of a maker. *Maintenance, preservation, repair, reuse, recycle, repurpose, progressive use, choreographed decay*; these are all technical tools and theories that contemporary makers have at their disposal to combat the material realities shaping this era (See Glossary). The entire scope of these processes will be explored and critiqued through both explicit definitions and implicit narratives in the pages to come. In order to fully understand the implications and opportunities within the current landscape of making, a more immense temporal viewpoint must be adopted. Considering the perpetually evolving nature of design and fabrication, these approaches have to be addressed in a manner that embraces the inevitability of change; one that takes into consideration traditional, developing, and speculative points of view concerning materials, use, manufacturing, and craft.

From another perspective the idea of making, as defined within the framework of this thesis, encompasses many diverse fields, carrying with it an ecosystem of issues, methodologies, and solutions. In its most basic form making is a physical act rooted within the processes of design and production; it is a craft and a practice. This practice of making transitions into studies of the material world, concerned with how resources are consumed to produce goods, and how those goods later become material waste. Moving laterally, these concerns have implications on the global economy and environment, affecting the standard of living for citizens around the world. By grounding ourselves within this narrative we can more readily connect with the world around us in

this age of resource depletion, excess consumption, material mismanagement, and waste surplus. All of these related fields must be considered holistically in order to gain a better understanding of the leadership role that architects must play in the Anthropocene; developing a philosophy of making best suited for modern times.

In 2012 more than 60 million automobiles were mass-produced, the highest in recorded history.⁶ Two years later over 1 billion mobile phones were manufactured, resulting in more phones to be in circulation than the number of people alive on Earth.⁷ Each year an estimated 50 billion plastic water bottles are sold worldwide, requiring 17 million barrels of oil to produce.⁸ With the advent of mass manufacturing and global urbanization human beings have consumed natural resources at an unprecedented rate, currently using 30% more than the planet can replenish annually. The demand for the production of goods has become so great that in a single generation our species has more than tripled its extraction of fossil fuels, metal ores, biomass, and minerals.

“Humanity now uses roughly half of global natural production. Every other species that achieves this level of ‘success’, from bacteria to rats, reaches a tipping point at which its population size outstrips its ability to feed itself... The crash could be far more severe for us” (Vince 2014, 318).⁹

A report commissioned by the UN’s International Resource Panel estimates that developed nations on average consume ten times as much natural resources as their developing counterparts.¹⁰ As more countries struggle to

⁶ “Cars Produced this Year,” Worldometers, accessed January 18, 2017, <http://www.worldometers.info/cars/>.

⁷ Laurence Goasduff, “Gartner Says Smartphone Sales Surpassed One Billion Units in 2014,” Gartner, March 3, 2015, accessed January 18, 2017, <http://www.gartner.com/newsroom/id/2996817>.

⁸ Petz Scholtus, “The US Consumes 1500 Plastic Water Bottles Every Second, a fact by Watershed,” Treehugger, October 15, 2009, accessed January 18, 2017, <http://www.treehugger.com/clean-water/the-us-consumes-1500-plastic-water-bottles-every-second-a-fact-by-watershed.html>.

⁹ Gaia Vince, *Adventures in the Anthropocene: A Journey to the Heart of the Planet We Made* (Minneapolis: Milkweed Editions, 2014), 318.

¹⁰ Alex Kirby, “Human Consumption of Earth’s Natural Resources Has Tripled in 40 Years,” EcoWatch, July 25, 2016, accessed January 18, 2017, <http://www.ecowatch.com/humans-consumption-of-earths-natural-resources-tripled-in-40-years-1943126747.html>.

enter the developed world, consumption will continue to rise well beyond what is globally tenable. In order to keep up with ever growing demands we have increasingly relied on faster and cheaper construction methods; typically utilizing artificially generated, non-biodegradable, non-renewable substances. From a material's perspective the Anthropocene is defined by the proliferation of synthetic materials like plastics and aluminum; with concrete standing head and shoulders above the rest as the most widely used building material to date.

"We have now produced about 50 billion tonnes of the stuff (concrete)– enough to spread a kilogram on every square metre of Earth – and more than half of that was made in the last 20 years" (New Scientist, 2016).¹¹

Humanity has currently been able to sidestep issues of resource depletion through aggressive developments in extraction methods. In this 'Age of Man' we have discovered ways to move mountains for rare minerals, tunnel ever deeper into the Earth's crust for fossil fuels, and clear cut entire forests for biomass. However, no matter how prodigious our abilities to access these natural resources become they are still finite, and will eventually run out. Rather than investing in the exploitation of raw materials we should be looking into how existing material streams can be reimagined for continuous use.

One would think that with natural resources stretched so thin we as a species would have learned how to design better, creating goods that are more durable, have longer lifespans, and are more flexible for adaptation; after all humanity is known for its innovation. Traditional Japanese carpenters employ construction techniques that do not require the use of fasteners such as nails,

screws, or adhesives. They developed a style of joinery which ensures the strength and durability of a structure while only utilizing sustainable materials, with some of these techniques dating back to the 16th century.¹² Five hundred years later our technological developments should have made sustainable fabrication methods like this more efficient and easily accessible, so why have they not pervaded throughout this dire age of resource scarcity? The simple yet convoluted answer is because it is not profitable. Instead of utilizing design and fabrication techniques that can ensure quality goods which lasts longer, large scale businesses have decided to go in the opposite direction, practicing a business and manufacturing policy known as planned obsolescence. Planned obsolescence is a production model which artificially restricts the lifespan of the goods being produced, designing objects with set expiration dates well below their material and technological limits in order to guarantee continued sales and high turnover rates.

The birth of planned obsolescence can be traced back to December of 1924 with the meeting of an internationally renowned group of businessmen in the forefront of lightbulb manufacturing. Some noteworthy names include Philips, General Electric, and Osram. Together they founded a cartel with the intent of driving up the global incandescent lightbulb market by shortening their lifespans from a previously accepted 2,000 hours of illumination to a standardized 1,000 hours worldwide. These new bulbs would burn out faster while costing more, artificially boosting prices and demand. This event later became known as 'The Great Lightbulb Conspiracy'.¹³ It gave rise to the global phenomenon of planned obsolescence that has become a cornerstone of many industries today.

¹¹ Sam Wong, "Marks of the Anthropocene: 7 signs we have made our own epoch." New Scientist, January 7, 2016, accessed January 18, 2017, <https://www.newscientist.com/article/dn28741-marks-of-the-anthropocene-7-signs-we-have-made-our-own-epoch/>.

¹² Blaine Brownell, "A History of Wood and Craft in Japanese Design," The Journal of the American Institute of Architects, June 16, 2016, accessed January 17, 2017, http://www.architectmagazine.com/technology/the-history-of-wood-and-craft-in-japanese-design_o.

¹³ Markus Krajewski, "The Great Lightbulb Conspiracy," IEEE Spectrum, September 24, 2014, accessed January 17, 2017, <http://spectrum.ieee.org/geek-life/history/the-great-lightbulb-conspiracy>.

“A classic case of planned obsolescence was the nylon stocking. The inevitable “laddering” of stockings made consumers buy new ones and for years discouraged manufacturers from looking for a fibre that did not ladder.” (The Economist, 2009)¹⁴

Planned obsolescence is not limited to designing for failure. Companies practicing this business model use a combination of methods including the withholding of service manuals, ceasing production of vital parts to specific models, hyper-customization of components, and targeted marketing, in order to force consumers into repeated sales. Oddly enough this means that the newer the product, the quicker they will need to be replaced.

“This sort of camera cannot be repaired, the man tells me. It’s ‘too new’. Thirty years ago, just a handful of camera models would have been around each year, service and repair manuals and spare parts would have been available for each one, as well as a thriving repair industry. But things have changed. Like the majority of consumer electronics, my camera has not been designed to be easily repairable, and the manufacturer no longer releases repair manuals” (Vince 2014, 311).¹⁵

This system of manipulated demand has become so engrained into modern society that it has created the so-called ‘Throwaway Culture’ we are accustomed to today. People no longer spend the time or energy to repair and maintain products since they know that a newer, better model will come out right away. Some even choose to discard products before they become worn out in an attempt to keep up with current trends. Planned obsolescence is a model that cannot function in the Anthropocene for both environmental and economic reasons. As resources become exhausted the cost of materials will continue to rise, cutting

into profits. Paradoxically it is the developed world that is the most plagued by this problematic mindset.

“From India to Ethiopia, I have had no trouble finding someone who can repair what is broken or find an ingenious way of side stepping the issue. In rich countries, such items would be thrown away and replaced with new, but the developing world is full of menders, make-doers, inspired users of others’ scrap” (Vince 2014, 310).¹⁶

As consumer goods become more sophisticated they require a plethora of rare elements to be extracted in order to fabricate them. If the product isn’t designed for maintenance or disassembly not only will resources be depleted at an exponential rate, but the materials trapped within these objects will be rendered useless. The makers of this new age must adopt a ‘mender and make-doer’ attitude towards design and manufacturing, seeking the hidden potential in objects that modern society dismisses as fodder for the scrap heap.

In the Anthropocene the concept of waste has become a distasteful topic that people try to ignore, constantly pushed to the periphery of societal awareness. In wealthy nations garbage is disposed of in neat packages, collected by specified individuals, and taken away from functional society. This has created a mindset that suggests materials simply vanish from the physical world once they become undesirable. Although most people know that factually this is not the case they are still mentally detached from the processes of waste management. This disconnect results in a lack of urgency to rethink our attitudes towards the treatment and care of manufactured goods.

The opposite can be said for citizens of the developing world where waste has become an everyday reality. A major cause of this imbalance

¹⁴ “Planned Obsolescence,” The Economist, March 23, 2009, accessed January 17, 2017, <http://www.economist.com/node/13354332>.

¹⁵ Gaia Vince, *Adventures in the Anthropocene: A Journey to the Heart of the Planet We Made* (Minneapolis: Milkweed Editions, 2014), 311.

¹⁶ *Ibid.*, 310.

is due to the fact that wealthy nations are using their less well-off neighbours as illegal dumping grounds. The European Environmental Agency reports that between 250,000 to 1.3 million tonnes of e-waste gets shipped from the EU to developing West African or Asian countries every year.¹⁷ These shipments which are disguised as reusable products are often filled with toxic debris that end up getting processed in exploitative conditions, endangering the health of the local people and their environment. Although these incidents may reveal the darker side of waste disposal there is room for hope. As makers, we have a responsibility to change societal views towards waste management by assimilating it as a natural part of the fabrication process; taking ownership of these products even as they transition into what is currently seen as unwanted materials. There is already evidence of this paradigm shift happening in developing nations that are more exposed to the concept of waste as a resource rather than a detriment.

“In poor countries, as it should be everywhere, recycling is a matter of common sense – there is almost nothing that cannot be reused or have some further value eked out of it, whether that be feeding it to a cow or having its materials disassembled and sold on by waste-pickers”
(Vince 2014, 351).¹⁸

In the developing world waste-picking is a common activity practiced by millions of people. It is typically seen as a last resort profession relegated to those of low standing and poor circumstances; but in reality it plays a vital role in urban upkeep. Waste-picking improves material use efficiency, creates better sanitary conditions, and reduces energy consumption. Rather than perceiving it as an unsavory act performed by

the destitute, we should begin recognizing it as a much needed public service. Considering the amount of rubbish being generated globally we as a species need to start reevaluating what constitutes waste in the modern age.

Ironically it is the abundance of these unwanted materials that may provide an official boundary which defines the Anthropocene. Since Paul Crutzen established the term almost two decades ago, ‘*The Anthropocene*’ has gained increasing usage in scientific circles, eventually spreading into popular culture. However, even as we discuss its issues within the framework of this introduction, it has yet to be recognized as an accepted geological era. There is clearly plenty of evidence that supports the argument that we have departed from the Holocene and entered into a human-centric age; then why has the Anthropocene not already been legitimized in the annals of geological history? The reason for this is because its formal acceptance hinges on a fundamentally materials based position rather than a theoretical one.

In order to officially declare a new geological epoch there must be physical evidence embedded in the Earth’s crust that coincide with these claims. The layering of materials in the planet’s strata can be read like a timeline, with specific bands acting as markers for the delineation between eras. For instance the end of the Cretaceous epoch – the age of the dinosaurs – over 66 million years ago manifests as a distinctive layer of iridium, which was dispersed globally from the meteorite that crash landed on Earth. Similarly the beginning of the Holocene some 55 million years later is demarcated by two glacial layers, remnants from the last ice age.¹⁹ These material boundaries represent specific events that significantly impacted the history of the planet. Stratigraphers

¹⁷ John Vidal, “Toxic E-Waste Dumped in Poor Nations, Says United Nations,” Our World, December 16, 2013, accessed January 19, 2017, <https://ourworld.unu.edu/en/toxic-e-waste-dumped-in-poor-nations-says-united-nations>.

¹⁸ Gaia Vince, *Adventures in the Anthropocene: A Journey to the Heart of the Planet We Made* (Minneapolis: Milkweed Editions, 2014), 351.

¹⁹ Damian Carrington, “The Anthropocene epoch: scientists declare dawn of human-influenced age,” The Guardian, August 29, 2016, accessed January 20, 2017, <https://www.theguardian.com/environment/2016/aug/29/declare-anthropocene-epoch-experts-urge-geological-congress-human-impact-earth>.

are presently trying to pinpoint what this defining geological factor should be for the Anthropocene. Some potential candidates include radioactive elements from nuclear weapons testing, high levels of nitrogen and phosphate particles left behind by artificial fertilizers, and funnily enough fossils of the modern day chicken, which have been factory farmed en masse to become the world's most common bird.²⁰ Unfortunately the prime contender so far is the profusion of material waste from plastics, aluminum, and concrete that have been buried over the last century. These types of physical debris are considered ideal markers not only for their sheer volume, but because the exact same materials are distributed worldwide, creating a tangible layer in the Earth's crust. Poetically the 'Age of Humans' may be empirically defined by our abuse of material resources.

The crux of this thesis is centered on these material realities which have come to characterize the Anthropocene. Tackling concerns of resource depletion, management, and waste as an interconnected process which will impact makers in this new epoch; an epoch where humanity has to assume responsibility for the changes that shape the Earth. The concepts being discussed are vast, requiring a perspectival scope that physically encompasses the entire planet and temporally spans geological eras. Additionally it calls for an appreciation of the issues involved past the barrage of raw quantitative data being generated, asking instead for an empathetic approach that challenges previously accepted notions of craft and design. The investigation of these interdependent fields will lead to a philosophy that informs the modern generation's relationship with the material world, and an understanding of their role as makers within the context of the Anthropocene. One goal of this thesis is to create a means of exploring the concepts being presented from a more intimate perspective.

"If you give people facts without a story, they will explain it within their existing belief system. The best way to promote a new or different belief is not with facts but with a story" (Gray 2016, 124).²¹

Stories will become the main vehicle for communicating this new mode of thought. Similar to how stratigraphers read layers of minerals as a condensed representation of the Earth's history, this thesis will attempt to translate immense ideas into works of fiction. The scale and complexity of the concepts being discussed are arguably too great for practical human understanding; however stories have an astounding ability to create a platform through which these multifaceted issues can be investigated.

It is said that great writing is like an iceberg. Storytellers use the limited spaces between covers to build a world, inviting readers to fill in the blanks beyond what is written. Concurrently stories cannot help but immerse readers into their universe, providing a place to speculate on and explore the intricacies of that reality.

"If a writer of prose knows enough about what he is writing about, he may omit things that he knows and the reader, if the writer is writing truly enough, will have a feeling of those things as strongly as though the writer had stated them. The dignity of movement of an iceberg is due to only one-eighth of it being above water" – Ernest Hemingway.

Although the words on the page never change, great works of fiction have a way of revealing new information, concepts, and points of view each time they are read; revealing the seven-eighths hidden below the surface. Furthermore they have the potential to adapt past the confines of the

²⁰ Damian Carrington, "The Anthropocene epoch: scientists declare dawn of human-influenced age," The Guardian, August 29, 2016, accessed January 20, 2017, <https://www.theguardian.com/environment/2016/aug/29/declare-anthropocene-epoch-experts-urge-geological-congress-human-impact-earth>.

²¹ David Gray, *Liminal Thinking: Create the Change you want by Changing the way you Think* (Brooklyn: Two Waves Books, 2016), 124.

era from which they were conceived, creating allowances for interpretations beyond even the author's imagination. It is my firm belief that complex knowledge can only be intimated rather than explicitly explained. I hope that these stories can serve as guideposts to a philosophy of making that encompasses all the themes being presented, while allowing room for individual insight. As for the subject of these writings, they will revolve around a very unique piece of architecture that embodies the global climate in the production and use of objects prevalent in the Anthropocene – the Maunsell Sea Forts.

The unbelievable history of these abandoned military forts are a distilled manifestation of the material attitudes and approaches that were mentioned throughout this introduction. Since their initial construction these structures have been constantly repurposed owing to ambiguous ownership and undefined use. Each life cycle calls for an application of the arsenal of technical tools mentioned previously, and exemplifies a 'mender and make-doer' attitude towards design. Had it not been for a series of unusual circumstances resulting in an unwillingness to demolish these towers, the forts would have been relegated to scrap metal and rubble long ago. Fortunately their continued existence provides us with a unique opportunity to study their story, representative of the struggles, but more importantly the potentials of making within the current zeitgeist. Using this as a departure point, the speculative futures of these installations become a playground to explore various directions and implications in the progression of design and fabrication. The three fictional tales in this thesis act as allegories that inform us how to be responsible makers for the coming times. However, before we look forward let us begin by looking back, to September of 1939, at the start of World War II and the origins of the Maunsell Sea Forts.

1939 HISTORY OF THE MAUNSELL SEA FORTS

WWII LONDON BOMBINGS

Fig 0.2 Stukas in formation in April 1940





Fig 0.21 March 1941 Soldiers standing over magnetic influence mine recovered in Clydebank UK during the Blitz.



Fig 0.22 Conceived by German apothecary Julius Neubronner in 1907 the pigeon camera was used during WWII for aerial and spy photography.

World War II began on September 1, 1939. At its outbreak the Greater London Area and the shipping routes surrounding the Thames quickly became a high level target for German attacks. The Port of London was considered to be the most prosperous shipping port in the world at the time, providing supplies for a large portion of the United Kingdom.¹ In order to gain a strategic foothold in the war Nazi Germany invested a great deal of effort into securing and restricting the trade routes along the Thames. This was done through the use of magnetic influence mines which the Luftwaffe dropped during periodic raids. These mines would become activated when in close proximity with certain metal alloys such as those found in steel-hulled ships. This strategy proved to be effective as it managed to sink over a hundred vessels in the Thames Estuary within their first few months of deployment.²

Besides interfering with supply routes, Nazi Germany also sought to disrupt British economy and industry by bombing major populated areas in the UK. 'The Blitz' was an aerial bombing campaign that began in September of 1940. The Luftwaffe would follow the River Thames into London to conduct these raids. The city proper was attacked a total of 71 times, resulting in the destruction of over 1 million homes and an estimated 40,000 civilian casualties.³ In retaliation the British military requisitioned old wooden steamers and retrofitted them with 40mm Bofors Guns.⁴ These vessels would patrol the waters in an attempt to shoot down hostile warplanes. However this was a short term solution, a much more permanent deterrent would have to be developed in order to protect the Thames and the City of London from further attacks.

¹ Frank R. Turner, "The Maunsell Forts of the Thames Estuary," *Project Red Sands*, 2006, accessed February 13, 2017, <http://www.project-redsand.com/history.htm>.

² Ibid.

³ Mark Prigg, "The astonishing interactive map that shows EVERY German bomb dropped on London during WW2 Blitz," *Mail Online*, December 7, 2012, accessed February 13, 2017, <http://www.dailymail.co.uk/sciencetech/article-2243951/The-astonishing-interactive-map-EVERY-bomb-dropped-London-Blitz.html>.

⁴ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 13, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.



Fig 0.23 Luftwaffe Map to London

1941 - 1943

SEA FORTS CONSTRUCTION



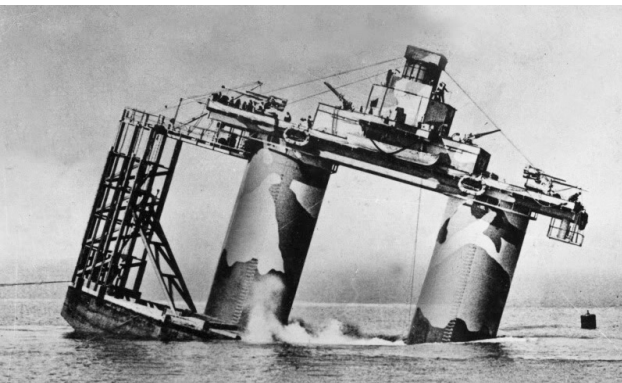


Fig 0.31 1942 First generation Naval Sea Fort being towed out and sunk into the Thames Estuary.



Fig 0.32 1942 Red Sands second generation Army Forts construction.

In early 1941 civil engineer Guy Maunsell was contacted by the British Admiralty to come up with plans for combatting the German bombing campaign. He sketched out designs for the construction of 4 offshore naval defense structures with living quarters and fitted armaments meant for the sole purpose of shooting down German warplanes. The **HM Fort Roughs**, **Sunk Head Tower**, **Tongue Sands Fort**, and **Knock John Fort** would later become known as the first generation of Maunsell Sea Forts. These first generation forts were designed with 7 storey tall, 24' diameter wide hollow concrete legs which housed approximately 120 men. Resting on top of these legs was a 110' x 32' deck at 75' above sea level. At an estimated 4,500 tons, these massive structures were built on land then towed out to be sunk at sea.⁵

During this initial construction period Maunsell had already begun the design for his second generation forts. These newer forts would be built as a cluster of 7 interconnected structures comprised of 1 central command tower, 1 searchlight tower, 1 Bofors Gun Tower, and 4 3.7" Gun Towers. Each tower would have a 36' x 36' steel hold that housed 265 men. This hold was supported by four 3' diameter concrete legs that gave the towers a total height of 117'. Weighing in at an estimated 580 tons, the towers were built on land and towed out by two tug boats to be lowered onto the seabed. They became known as the **Great Nore**, **Red Sands** and **Shivering Sands Army Forts**.⁶ For the purposes of this thesis I will be mainly focusing on these second generation forts.

⁵ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 14, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

⁶ Ibid.

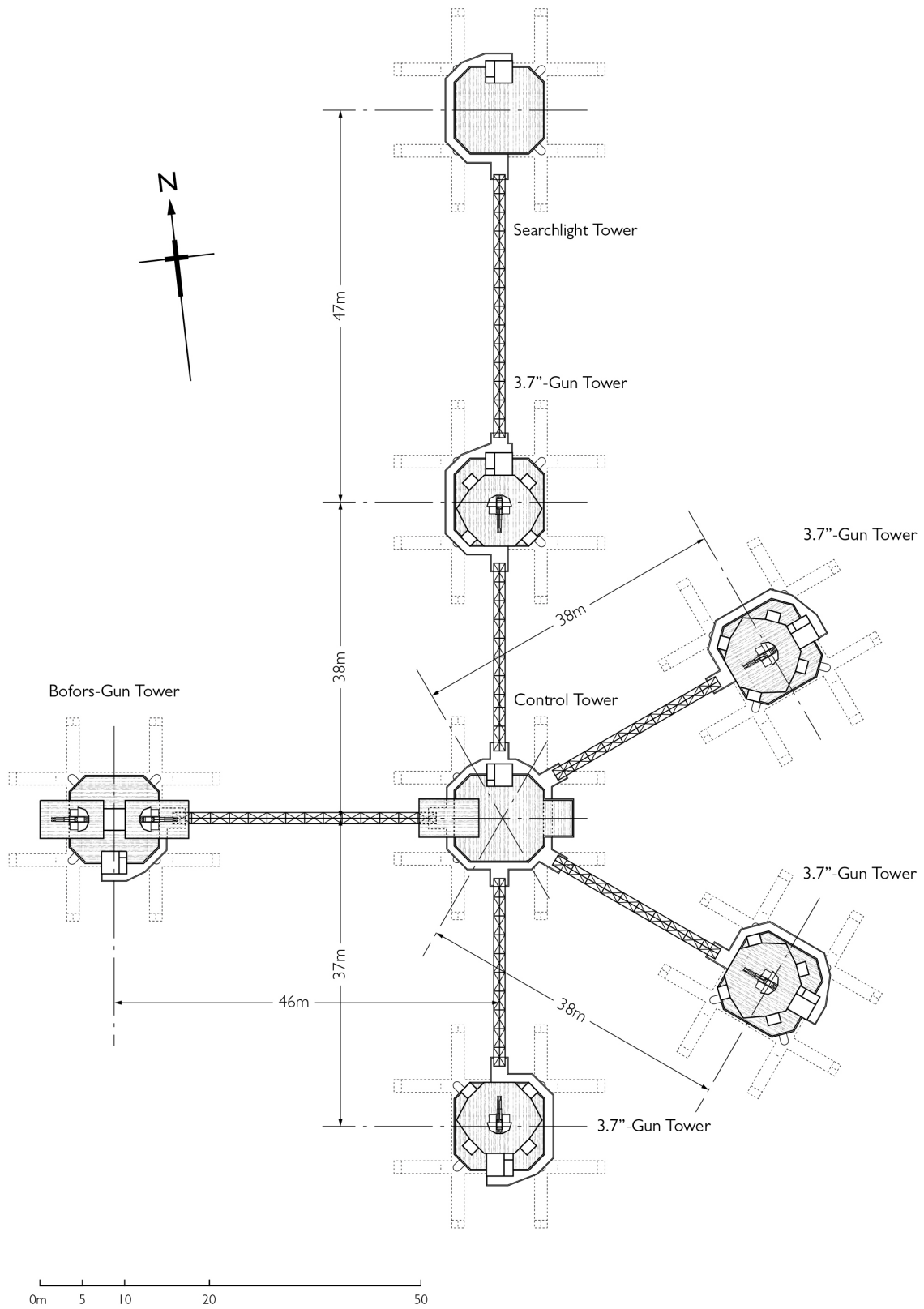


Fig 0.33 Maunsell Sea Forts 2nd Generation Army Forts Plan (Thames)

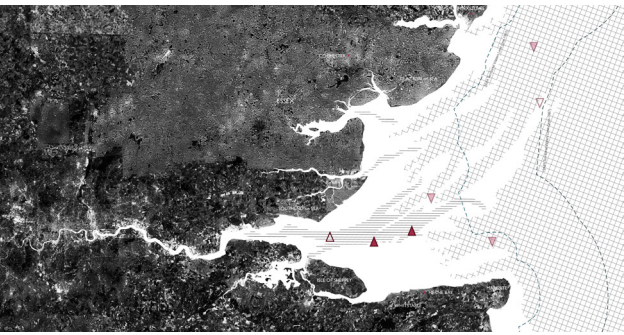


Fig 0.34 Ebb and flood zones in Thames Estuary in relation to Maunsell Sea Forts.

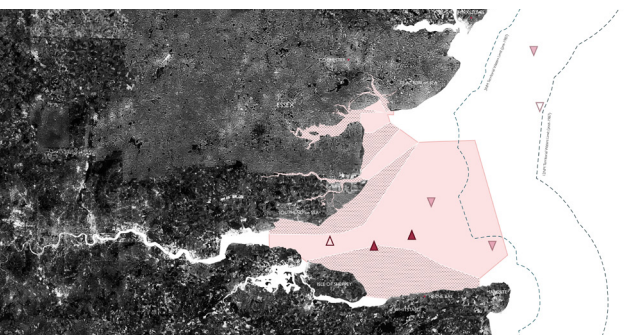


Fig 0.35 Shellfish waters and mollusk harvesting zones in Thames Estuary in relation to Maunsell Sea Forts.

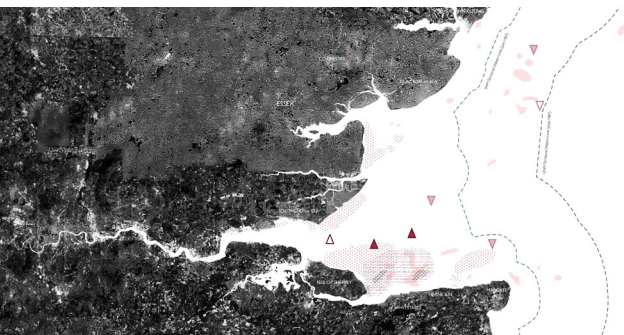


Fig 0.36 Mollusk species habitat in Thames Estuary in relation to Maunsell Sea Forts.

The first generation naval defense towers were placed in the outer estuary between February and June of 1942.⁷ Two of the towers which included the HM Fort Roughs and Sunk Head Tower were situated beyond British Territorial waters at the time.

The second generation army forts were placed in the estuary close to Mersey Bay between October 1942 and February 1943.⁸ Manned by the British Army they were purposely situated at the mouth of the river in an attempt to break up bombers that used the Thames as a navigational aid to reach London. As it currently stands, all the forts are within British Territorial Waters since the limits extended from 3 nautical miles to 12 nautical miles in 1987.⁹

The Thames Estuary where the second generation army forts are situated is also now classified as a Special Protection Area (SPA) due to its unique range of wildlife and migratory species that are scarcely found in other regions. These include migratory birds, fish, and mollusk species.¹⁰ Unfortunately 2 of the forts have collapsed since their initial construction; The Great Nore Fort and Sunk Head Fort no longer exist today.

LEGEND

- | | |
|------------------------|-------------------------|
| ▲ Existing Army Forts | △ Destroyed Army Forts |
| ▼ Existing Navy Forts | ▽ Destroyed Navy Forts |
| ≡ Ebb Dominated Waters | ⌘ Flow Dominated Waters |
| ■ Shellfish Waters | ⊞ Mollusk Harvest Zones |
| ● Reef Habitats | |
| ⊘ Cockle | ⊙ Oyster |
| ⊚ Mussel | ● Clam |

⁷ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 14, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

⁸ Ibid.

⁹ Bob Le-Roi, "Radio Sutch & City in Pictures & Audio Part 1," *Fort Fanatics*, February 12, 2017, accessed February 14, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

¹⁰ "Main Biodiversity Resources in the Tidal Thames - Sites and Habitats," *Port of London Authority*, accessed February 14, 2017, <https://www.pla.co.uk/Environment/Main-Biodiversity-Resources-in-the-tidal-Thames-Sites-and-Habitats>.

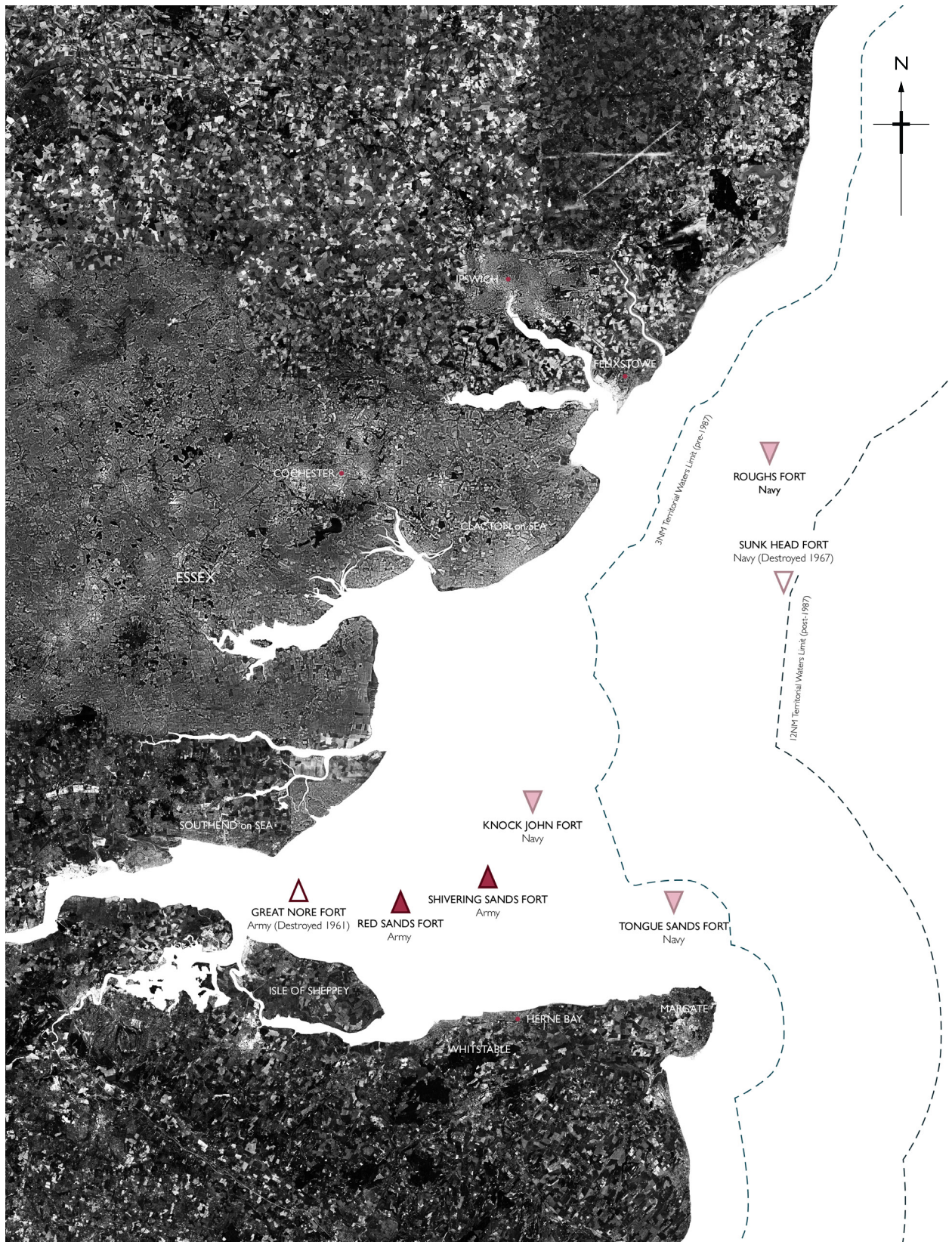


Fig 0.37 Maunsell Sea Forts Site Plan

1942 - 1945

THAMES FORTS WWII COMBAT





Fig 0.41 Allied forces manning an anti-aircraft gun on Maunsell Forts.

Thames Forts Did The Job Against Nazis

LONDON, Oct. 2—(P)—The government revealed today that seven forts bristling with guns, built on concrete stilts above the water in the Thames Estuary, have been guarding the strategic sea-borne supply route to London since 1942.

It was from these forts that Hitler's planes, attempting to sow mines in the estuary in an effort to cut off London from sea-borne supplies during the early blitz, met a terrific barrage of ack-ack fire.

The forts' guns successfully fought off German planes planting acoustic and magnetic mines and broke up E-boat attacks on assembling coastal convoys. Later they whipped up effective fire against the robot bombs and also were used as bases for sea rescue boats. Each outpost is manned by 60 to 120 men.

Fig 0.42 October 2nd, 1944 Sarasota Herald Tribune News Clipping. "Thames Forts Did The Job Against Nazis."

In their 3 years of operation during World War II the Maunsell Sea Forts were instrumental in the defence of the Thames Estuary and the Greater London Area; protecting its supply routes and combatting The Blitz. The second generation Great Nore, Red Sands, and Shivering Sands Forts armed with their 40MM Bofors and MK6 3.7 Inch Anti-Aircraft Guns became a significant deterrent against the German Luftwaffe. At the height of the war crews spent one month stationed out at sea followed by two weeks ashore. During this time the forts managed to cumulatively shoot down 22 German warplanes, 30 flying bombs, and one German E-Boat before V.E Day on May 8th 1945.¹¹

¹¹ Frank R. Turner, "The Maunsell Forts of the Thames Estuary," *Project Red Sands*, 2006, accessed February 15, 2017, <http://www.project-redsand.com/history.htm>.

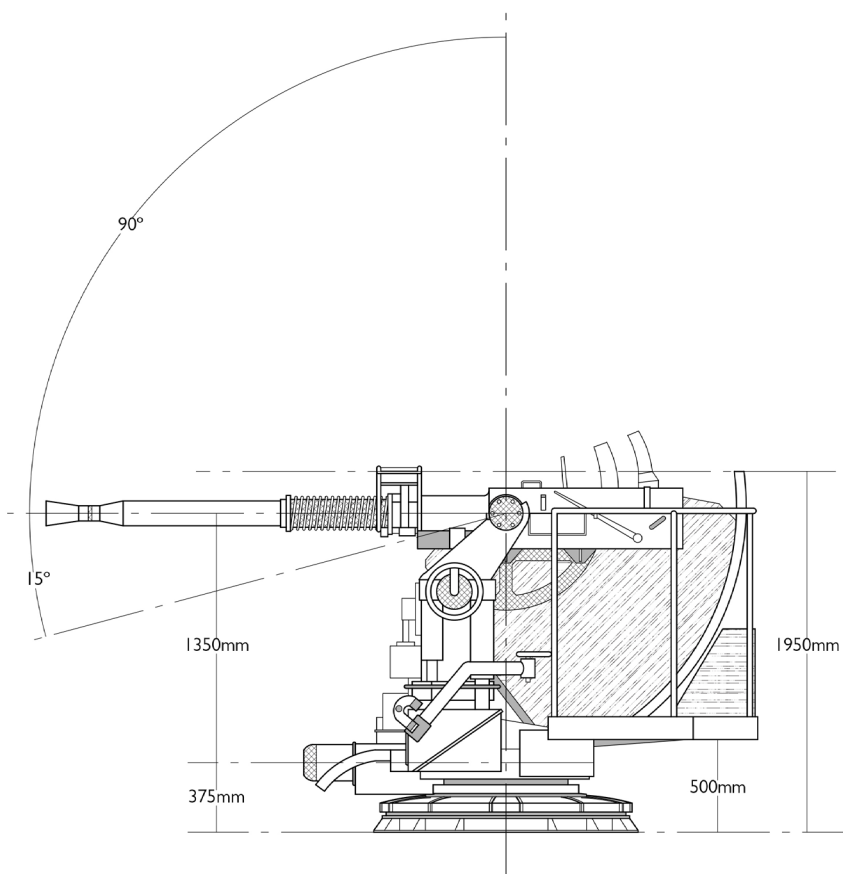
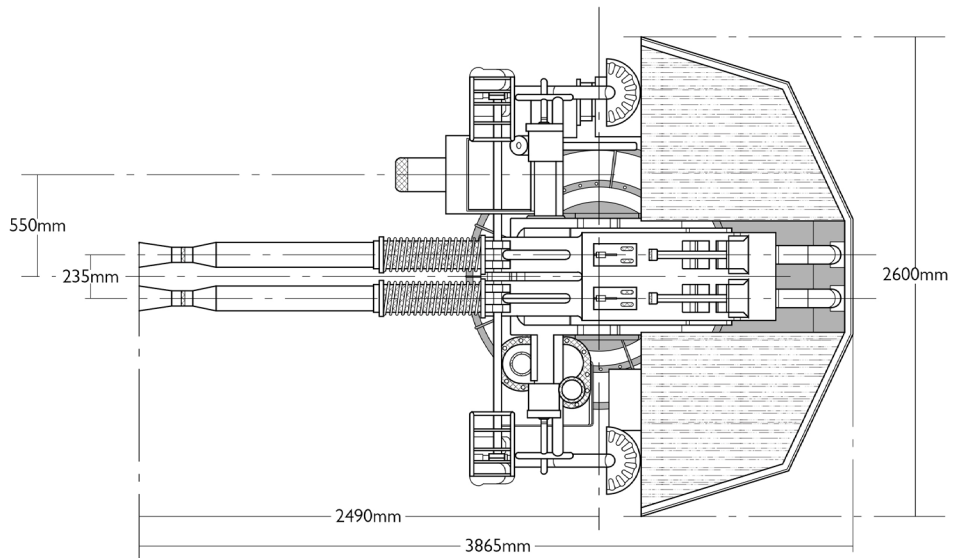


Fig 0.43 40MM Bofors Anti-Aircraft Gun Plan & Elevation

1950s - 1960s

DISMANTLING & SCAVENGING





Fig 0.51 MK6 3.7 Inch Anti-Aircraft Gun mounted on the Army Forts being utilized during WWII.

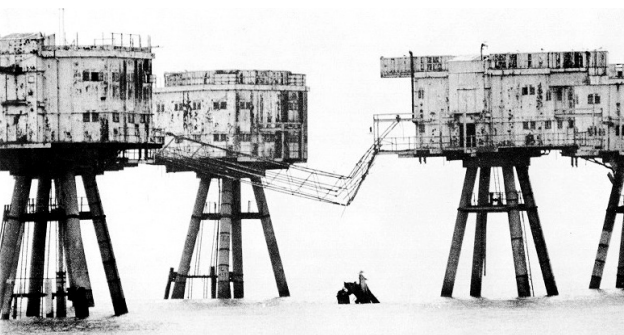


Fig 0.52 Catwalks collapsing before being removed by the MoD in the 1970s.

Post World War II the forts were removed from active duty and placed on 'care and maintenance' by the Ministry of Defence (MoD). Various proposals for their repurposing were considered in the following years, such as adding towers for further military use, retrofitting them as offshore lighthouses, and equipping them with wind and tide gauges for weather tracking.¹² However all plans were eventually rejected due to cost and feasibility. In 1956 the MoD began to remove all the military equipment from the forts which included their anti-aircraft guns, artillery, searchlights, radar, and communications technology. All the forts were declared officially decommissioned by 1958 and abandoned by the military.¹³ In the mid-1970s the Port of London Authority decided to destroy the remaining catwalks that connected the army forts in order to prevent unwanted visitors from inhabiting the structures.¹⁴

On March 1st 1953, an unfortunate accident happened as a Swedish ship collided with the Great Nore's Bofors Tower, killing 4 of its crew members and severely damaging the tower's structure. Another crash occurred in 1954 as the 'Mairoula' hit one of the fort's concrete legs. Due to these incidents and because of the fact that the Great Nore Forts were situated in one of the Thames' most used shipping routes the government decided to dismantle the entire installation in 1959.¹⁵ Therefore of the 3 second generation army forts that were originally constructed only the Red Sands and Shivering Sands Forts currently remain standing.

Similarly in August of 1967 the military issued orders to demolish the first generation Sunk Head Fort since it was situated too close to contested waters.¹⁶

¹² Frank R. Turner, "The Maunsell Forts of the Thames Estuary," *Project Red Sands*, 2006, accessed February 15, 2017, <http://www.project-redsand.com/history.htm>.

¹³ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 15, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

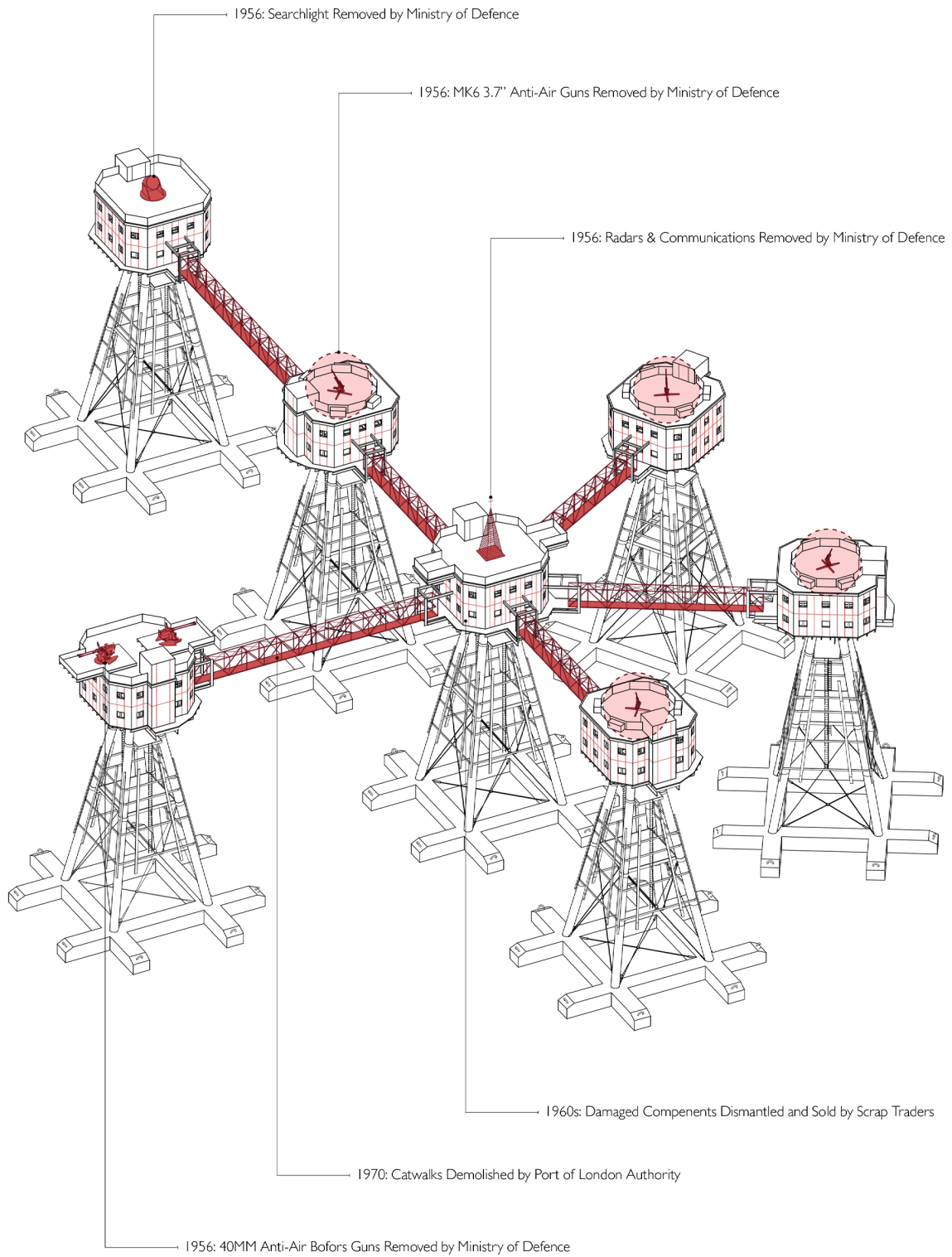


Fig 0.53 Thames Army Forts Demolition Tracking Axonometric

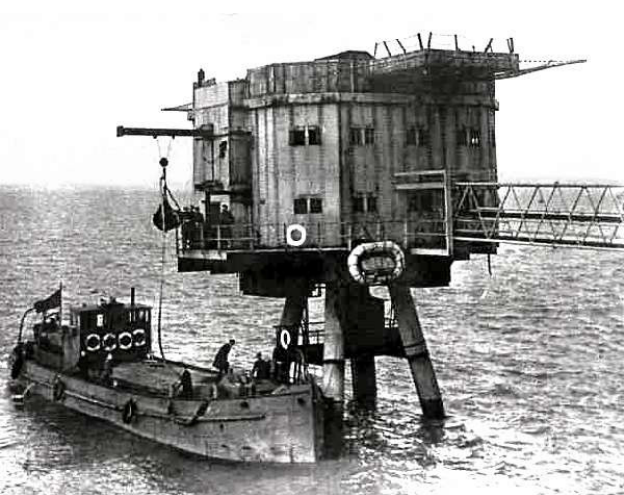


Fig 0.54 Supply vessel boarding sea forts and lowering down materials from pulleys.

After the sea forts were abandoned by the military, fishermen and metal traders would periodically scavenge the structures for materials or useful components. They would either trade the scrap for money or repurpose the metals to fabricate their own products. The steel cladding, fasteners, brass portholes, and fittings became prime targets to be harvested. When the Great Nore Fort was set to be completely dismantled in 1959 the steel holds were sold off to Matthew Lynch & Son Ltd as scrap. At a point in the 1960s the scavenging became so prolific that it began to compromise the structural integrity of the towers. This led the government to remove the entryway ladders and catwalks that connected the towers in order to prevent people from venturing into the forts.¹⁷



Fig 0.55 Fisherman building cage around damaged structure.



0.56 Fisherman scavenging for materials off sea forts.

¹⁷ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 15, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.



Fig 0.57 Maunsell Sea Fort Cladding.

1964 - 1967

PIRATE RADIO BROADCASTING

Fig 0.6 Shivering Sands Sea Fort: Radio Sutch / Radio City (1964 – 1967)



RADIO SUTCH



Fig 0.61 May 21st, 1964 Screaming Lord Sutch conducting his pirate radio broadcast from Shivering Sands Sea Fort.



Fig 0.62 Meal time for crew of Radio 390 atop the Red Sands Sea Fort.
Photographer: Edward Cole

The trend of appropriating the Maunsell Sea Forts as sites for pirate radio broadcasting began with Radio Caroline. Moored around the Roughs Fort outside of UK territorial waters, Radio Caroline began transmissions from their vessel in 1964.¹⁸ Other pirate radio stations quickly followed suit. Since the forts had been abandoned by the military a decade ago the radio crews could squat in the structures, taking advantage of the ambiguous territorial boundaries in which they were situated to skirt government censorships and regulations.

In May of 1964 David “Screaming” Lord Sutch took over the Shivering Sands Forts to establish Radio Sutch mainly as a publicity stunt. However the enterprise got transferred over to his manager Reg Calvert in September of the same year and became a long term broadcasting station known as Radio City.¹⁹ Concurrently Radio Invicta began testing from the Red Sands Fort in June of 1964. After some fine-tuning and repair they officially started transmissions in September of 1965, changing their name to Radio 390.²⁰

During this time the pirate radio crews partially renovated the steel housing originally used by the soldiers during World War II. Aside from bringing in the sound studio equipment they also refurbished the living quarters since they would frequently eat and sleep in the forts.

¹⁸ Frank R. Turner, “The Maunsell Forts of the Thames Estuary,” *Project Red Sands*, 2006, accessed February 16, 2017, <http://www.project-redsand.com/history.htm>.

¹⁹ Pierre Perrone, “Obituary: Screaming Lord Sutch,” *Independent UK*, June 18, 1999, accessed February 16, 2017, <http://www.independent.co.uk/arts-entertainment/obituary-screaming-lord-sutch-1100942.html>.

²⁰ Bob Le-Roi, “Fort Fax,” *Fort Fanatics*, January 25, 2017, accessed February 16, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

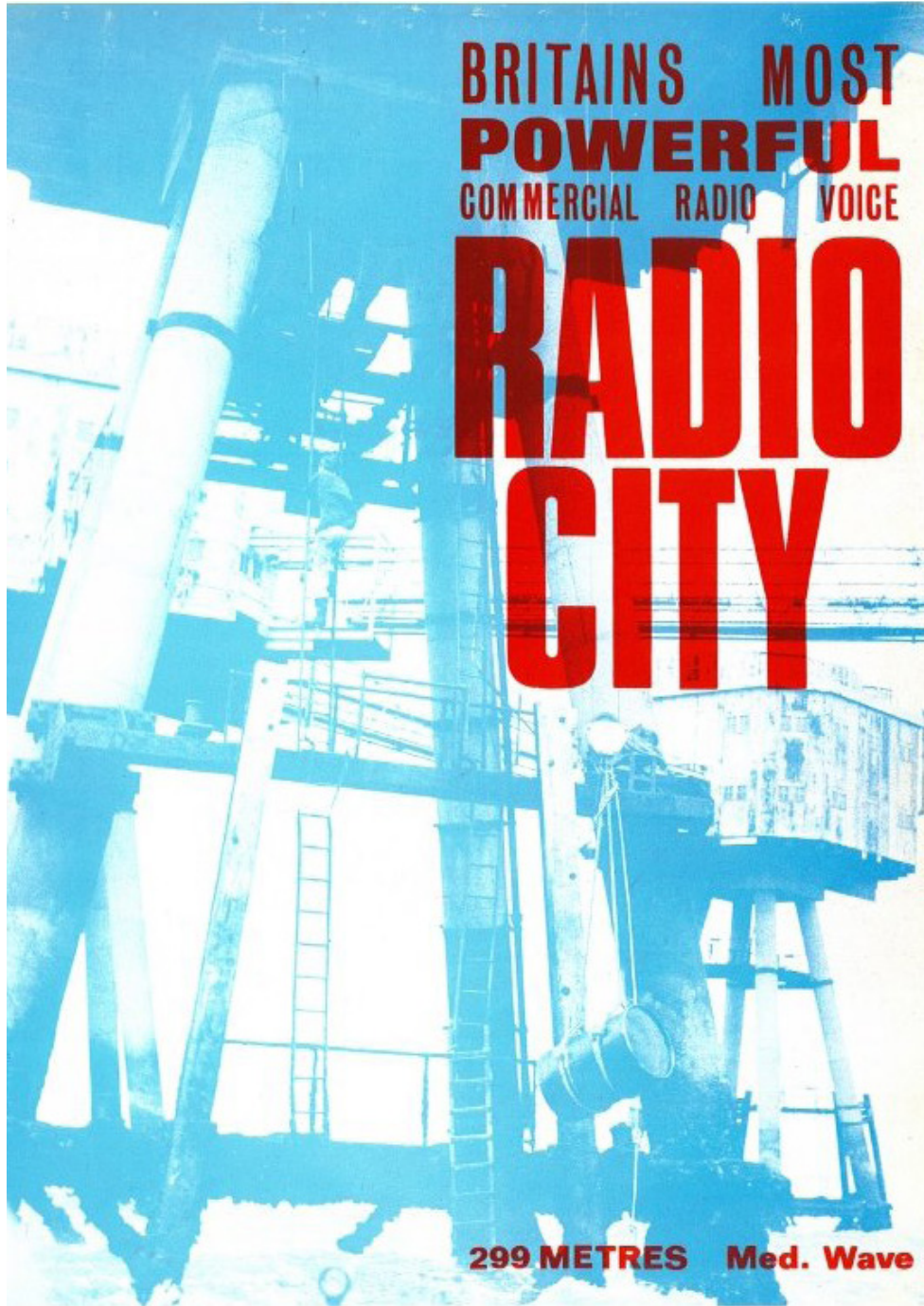


Fig 0.63 Radio City Poster



Fig 0.64 Engineer at work in Red Sands Sea Fort during Radio 390 occupation.
Photographer: Martin Stevens



Fig 0.65 Reg Calvert

The government eventually took notice of these illegal broadcasts and tightened up their regulations, prosecuting the stations and bringing the forts under British territorial control. Between 1966 and 1967 there were several altercations in which the military tried to shut down the pirate radio groups. They would board the towers, confiscate equipment, and ban personnel from operations, to only have them broadcasting again shortly after.²¹ This culminated in the death of Reg Calvert who was shot dead at the hands of rival pirate station owner, and retired Army Major, Oliver Smedley on June 21st 1966. Smedley was later acquitted on self-defence claims, but rumours of cover-ups circulated since the government had been struggling to shut down the pirate groups for some time. This ultimately led to the creation of the Marine Broadcasting Offences Act in August of 1967 resulting in the closure of all the broadcasting stations.²²

²¹ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 16, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

²² Andrew Hirst, "Amazing story of pop band and pirate radio station manager Reg Calvert who was shot dead in 1966," *The Huddersfield Daily Examiner*, October 8, 2014, accessed February 16, 2017, <http://www.examiner.co.uk/lifestyle/nostalgia/amazing-story-pop-band-pirate-7891237>

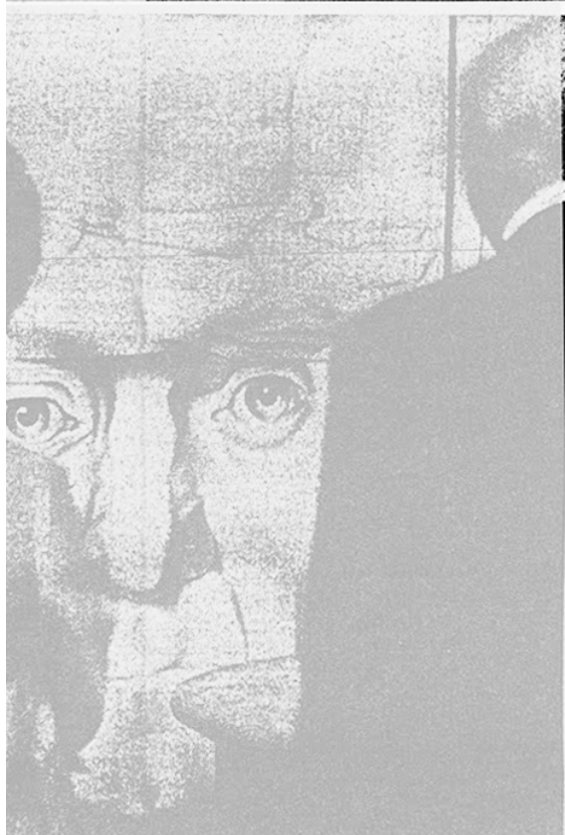
ly
ror

Police probe 'Commando' swoop on Radio City

66 No. 19,438

ts
nions
ee page six

SEA RAIDERS CAPTURE POP PIRATE RADIO



By JAMES WILSON
A BOARDING party of ten men and a girl have captured a pop pirate radio station in an amazing Commando-style raid.

Last night the station's staff of ten — engineers and disc jockeys — were said to be held as hostages.

The station is Radio City, based in a wartime fort on the Silvering Sands in the Thames Estuary twelve miles from Whitstable, Kent.

It went off the air on Sunday night and did not resume broadcasting.

Mrs. Dorothy Calvert, 38, wife of Radio City's owner, Mr. Reg Calvert, said last night that her husband was later told he could have the fort back—in return for half the profits.

"We have no intention of being black-mailed like this," she said.

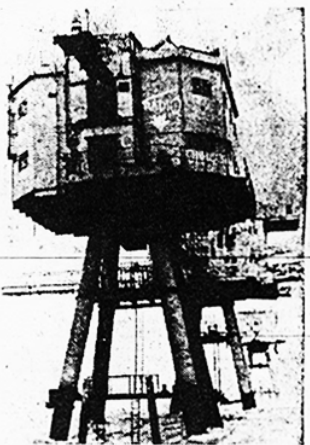
Mr. Calvert had a phone call from a man earlier this week asking him to go to a meeting in a London office.

Also asked was Mr. Phillip Birch, managing director of Radlon, the organisation handling advertising from Radio London and Radio UKGM — which was due to take over Radio City next month.

At the meeting, a man made separate offers to Mr. Calvert and Mr. Birch.

Profits

Mr. Birch had been told of the meeting by a man who arrived at his garden gate on Monday as he was taking his children to school.
Mr. Birch said last night:



Radio City . . . it is based in this fort in the Thames Estuary.

DISC JOCKEYS HELD HOSTAGE

said UKGM could have the station back for £5,000 and half the profits, or £5,000 and 30 per cent of the gross."

He added: "But we have no intention of dealing with an organisation which has taken over the fort by threat or force."

Mrs. Calvert said: "I understand that the occupants of the fort are quite safe."

me and asked to hire my own boat, but I refused because he wouldn't tell me what the job was."

Mr. Fred Downes, 36-year-old skipper of Radio City's supply ship, said: "A horde of strong-arm men pounced on the fort in the middle of Sunday night."

"I saw them this afternoon when I took the boat out to the fort with sup-

Fig 0.66 Radio City - Sea Raid - 1966

1960s - PRESENT

MISCELLANEOUS USE

Fig 0.7 Abandoned condition of Maunsell Sea Forts.





Fig 0.71 Blue Mussel

Blue Mussel

Temperature:
5 - 20°C

Spawning Temp:
10 - 20°C

Water Depth:
5.0 - 10.0m



Fig 0.72 Common Cockle

Common Cockle

Temperature:
7 - 34°C

Spawning Temp:
13 - 34°C

Water Depth:
1 - 48m



Fig 0.73 Manila Clam

Manila Clam

Temperature:
10 - 24.5°C

Spawning Temp:
20 - 24.5°C

Water Depth:
0 - 58.5m



Fig 0.74 Pacific Oyster

Pacific Oyster

Temperature:
-2 - 35°C

Spawning Temp:
20 - 35°C

Water Depth:
0.75 - 6.5m

ECOLOGICAL APPROPRIATION

After the era of pirate radio broadcasting came to an end the Thames Army Forts took on a variety of miscellaneous uses throughout the decades. One such use was their appropriation as a shellfish habitat for the native species of mollusks indigenous to the Thames Estuary. As mentioned previously the Thames and Outer Thames Estuary are classified as Special Protection Areas (SPA) due to their unique range of wildlife and migratory species that are scarcely found in other regions.²³

Located in the southern part of the North Sea at the mouth of the Thames River the estuary is home to 4 major mollusk species: the blue mussel, the native pacific oyster, the common cockle, and the manila clam.²⁴ All of these mollusks develop by grafting on to physical structures, and the concrete legs of the forts have become an ideal substrate for their inhabitation. Each of these species have varying optimal conditions for growth, therefore different sections of the forts have been colonized by each mollusk type. This has in effect transformed the concrete legs into a stratified vertical substrate that supports the survival of local marine ecologies.

²³ "Main Biodiversity Resources in the Tidal Thames - Sites and Habitats," *Port of London Authority*, accessed February 18, 2017, <https://www.pla.co.uk/Environment/Main-Biodiversity-Resources-in-the-tidal-Thames-Sites-and-Habitats>.

²⁴ David Walker, Rachel Parks, Fiona Vogt, Owen Morgan, and Alastair Cook, *Classification of Bivalve Mollusc Production Areas in England and Wales* (Cefas, 2013), <https://www.cefas.co.uk/media/41358/swale-sanitary-survey-2013-final-low-res.pdf>.



Fig 0.75 Colony of Mollusks Growing off of a Sunken Oil Platform

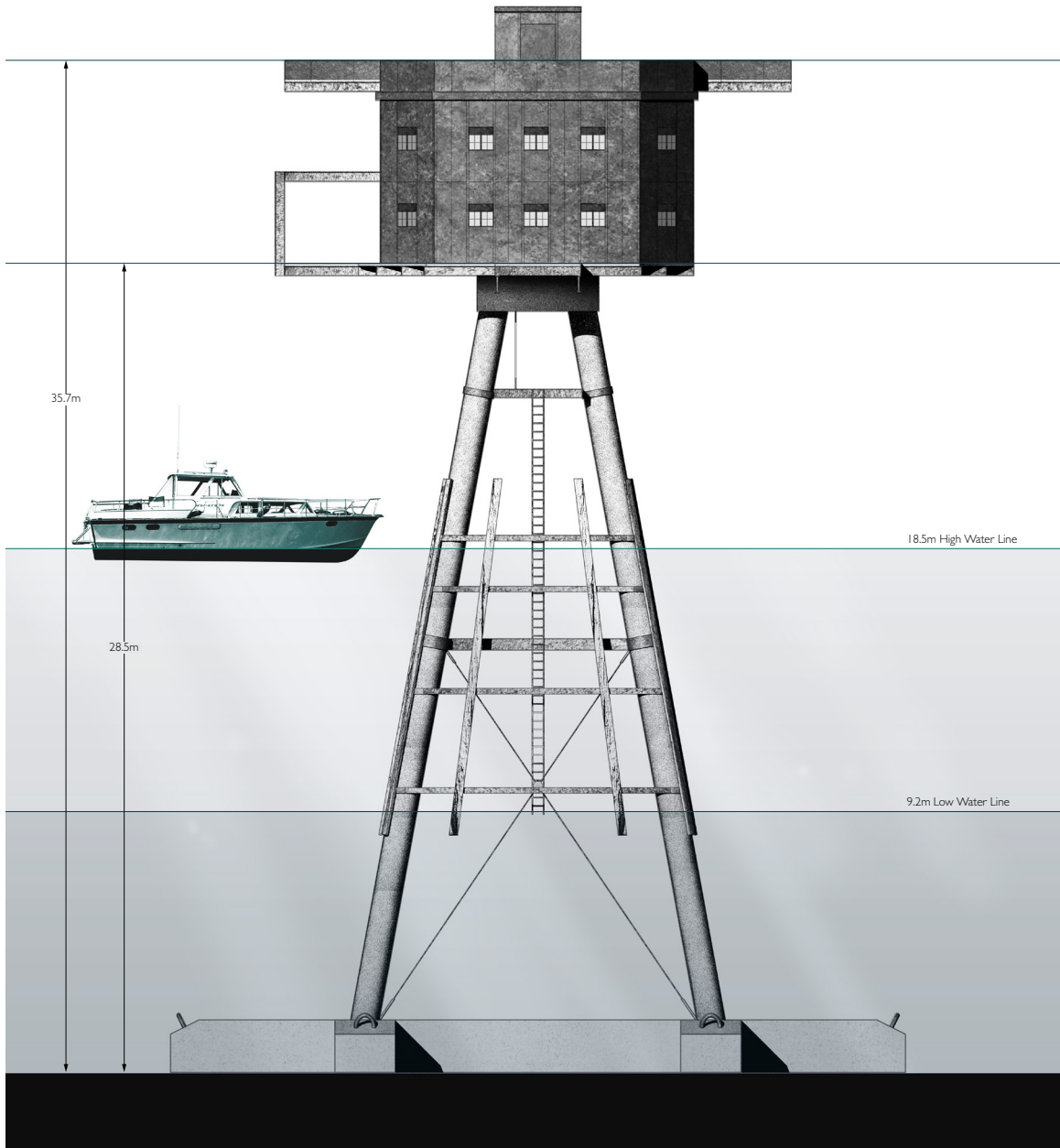


Fig 0.76 Thames Army Fort Tidal Elevation

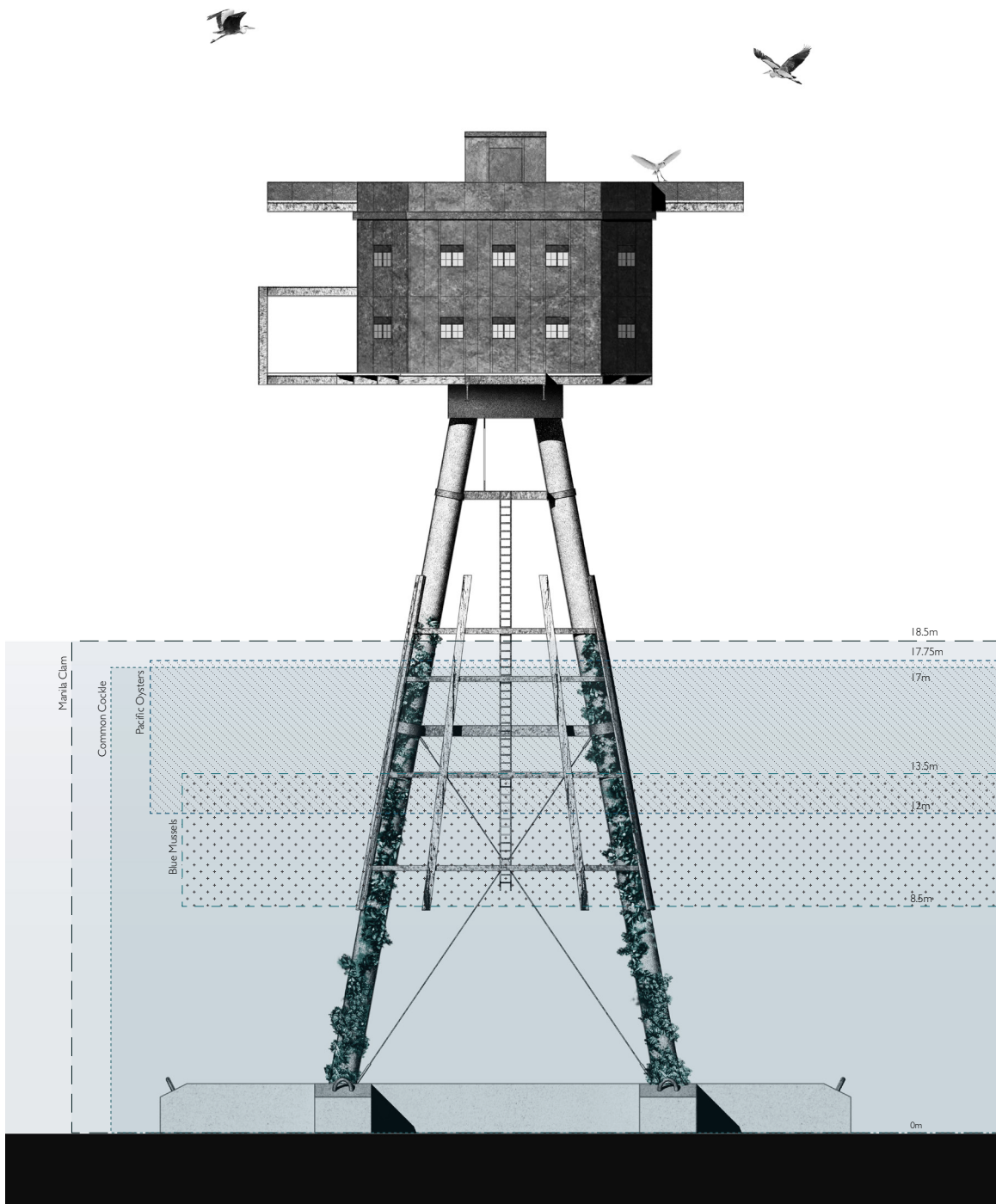


Fig 0.77 Thames Army Fort Mollusk Depth Elevation



Fig 0.8 Offshore oil platform designs inspired by the Maunsell Sea Forts.



Fig 0.81 British Special Boat Services training on the Thames and Special Forces conducting oil rig assault training.

TRAINING & RECREATION

In the 1950s the designs for the Maunsell Sea Forts became the inspiration for prototypes of early offshore oil platforms. This led to them being utilized by the British Special Air Services (SAS) and Special Boat Services (SBS) as sites for offshore oil rig assault training since the 1960s.²⁵ In these training exercises military teams would practice climbing and boarding the towers from the water, or dropping in from helicopters onto the steel decks.

There have also been documented cases of divers using the forts as diving platforms, either as a publicity stunt or for recreational purposes. This type of activity would typically be done during high tide where the drop is around 18 meters in height.²⁶

²⁵ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 18, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

²⁶ "Diving off WW2 Forts - Red Bull Cliff Diving World Series 2012," *Red Bull*, September 6, 2012, accessed February 18, 2017, <https://www.youtube.com/watch?v=0ExIdjw0tpo>.



Fig 0.82 Cliff divers Gary Hunt & Blake Aldridge
September 2012 - Red Sands



Fig 0.83 Artish Stephen Turner



Fig 0.84 BBC's Doctor Who episode 'Fury from the Deep' with the Red Sands Sea Forts featured on the dvd cover.

ART & FILM

Throughout the years the forts have been used as backdrops for various film and media outlets. In 1968 the Red Sands Sea Fort appeared in BBC's Doctor Who TV series, in an episode entitled 'Fury from the Deep'. In the episode the forts played the role of offshore gas drilling platforms sited close to where the Tardis lands in the North Sea.²⁷ In 2008 they were featured in a music video by The Prodigy, and most recently Lost Rivers Brewing Company partnered with pro skateboarder Ben Grove to produce a marketing video for their brand.²⁸ In the video Grove is seen skateboarding on the ruins of the Red Sands.

In his 'Seafort Project' artist Stephen Turner chose to inhabit the searchlight tower of the Shivering Sands Fort from August 4th until September 9th of 2005. This exploratory piece investigated how a person experiences time when in isolation and separated from society. His decision to stay on the forts for a total of 36 days was a nod to the army servicemen whose tours during WWII were approximately the same length. His insights and experiences while residing on the former military installation were documented and made into a book entitled 'Seafort'.²⁹

²⁷ Bob Le-Roi, "Fort Fax," *Fort Fanatics*, January 25, 2017, accessed February 18, 2017, <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.

²⁸ "From half-pipes to gun turrets, skateboarder goes on a mission," *Aol News*, December 19, 2016, accessed February 18, 2017, <https://www.aol.com/article/news/2016/12/19/from-half-pipes-to-gun-turrets-skateboarder-goes-on-a-mission/21631184/>.

²⁹ Stephen Turner, "The Seafort Project," Seafort Project, September 2005, accessed February 18, 2017, <http://www.seafort.org/theproject.html>.



Fig 0.85 Stephen Turner's 'Seafort Project'
August 2005 - Shivering Sands

The Maunsell Sea Forts have changed drastically since their initial conception as offshore defense outposts. They have been decommissioned, scavenged, and overtaken for a myriad of different purposes throughout the years. The forts could have easily been cast aside at the end of their active military career, but instead they were repurposed again and again. The many identities they have adopted were made possible through a mixture of circumstance, ambiguous ownership, and human ingenuity. They are an architectural manifestation of the potential for the transformative use of objects beyond their initial designed lifespan, exemplifying the philosophy of making necessary in the Anthropocene.

Using the Shivering Sands Army Forts as the main protagonist, the following body of work will explore this theory of making and transformative use beyond the present conditions of the architecture. Each of the three tales focuses the forts through a specific lens in the treatment of built objects. The first speculates on an adaptation of use based on shifting cultural identities in a time of political unrest; the second is set in an era driven solely by material worth and resource commodity; and the third rethinks the value of built forms as they fall into states of ruination. These fictional tales invite us into potential futures that challenge our preconceptions associated with the perception of objects through time, while asking us to embrace the opportunities that reside in designing for continual change.

ACT I

Transformative Use

OBJECT IDENTITY & IMPERMANENCE

A LOOK INTO TRANSFORMATIVE YET CONNECTED IDENTITIES

The modern age of production is paradoxically characterized by both abundance and scarcity; an oversaturation of manufactured goods leading to a shortage of natural resources. The root of the problem can arguably be traced back to how we perceive and understand object identity through time. Manufactured goods tend to be designed for specific use, and once this use runs its course the object is discarded as waste. This predisposition to view things as having one defined purpose makes it difficult to imagine an object beyond its original design intent. In this scenario clinging to a static notion of identity is a detriment. Considering the issues of resource management and scarcity plaguing this era we must begin to reevaluate our attitudes towards fixed notions of self in order to open up opportunities in use. However adopting a shifting view of object identity gives rise to other potential problems. The more easily products are allowed to transition from one identity to another the less precious they become. The result is a personal, historical, and cultural detachment from the object, as each change in identity necessitates a shedding of those ties. This leads to a decline in maintenance, care, and overall longevity of manufactured products. In order to design for effective transformative use we must reconcile these opposing views of shifting and persistent identities. It is vital that an object is given the flexibility to change while retaining its historical significance. I believe this perspective is fundamental to the development of a philosophy in making for the Anthropocene.

Impermanence is an inherent property in all things. It can be perceived in both the living and

non-living, in unseen forces, and in phenomena big and small. No matter the rate of change, everything that exists is in a constant state of flux, being propelled forward through time. In a world governed by this fundamental law why is it that we have such difficulties processing changes to our perceptions of object identity? This stream of thought poses a series of interconnected questions. The most basic of which being what are the factors that constitute identity to begin with? This exploration focuses on identity in relation to objects, thus it is important to dissect the terminology within this given context in order to create a framework from which to build off of. From there the next logical question becomes; what does a sense of identity mean for objects over time? As objects change what aspects can be shed while retaining its perceived identity and what aspects cannot? Identities are important because they define how we view and treat the objects to which they are associated. Humans are a mnemonic species, the only one on Earth that records our own histories.¹ We have an inclination to value things with legacies, or to put it into other words, things with persisting identities. Keeping this in mind the final question becomes how can we adopt a transient outlook in regards to object identity while retaining the values offered through persistence? Is it possible for an object to be defined through the perception of individual instances, and concurrently be understood as a palimpsest of amalgamated moments to form a combined essence of the whole self? These questions touch on issues involving persistence and continuity in a world of impermanence, bringing into focus concerns regarding current

¹ David Christian, "How We Chronicle the Past," Khan Academy, accessed April 15, 2016, <https://www.khanacademy.org/partner-content/big-history-project/agriculture-civilization/first-cities-appear/a/recordkeeping-and-history>.

attitudes towards object identities, which in turn have implications on our views involving production and waste.

The concept of object identity has been investigated thoroughly within the field of philosophy by many prominent thinkers in the past. Throughout this line of inquiry the main subject of interest is what defines an object at its core? What indivisible characteristics of a thing make it what it is? There are various theories within this debate. One such school contends that the substance from which an object is made in conjunction with its form becomes the identifier of the thing itself. Their underlying belief is that identity is rooted within an object's physical characteristics, or assemblage of parts.² Conversely, an opposing theoretical position suggests that object identity, especially within the context of human understanding, is based on an individual's relationship with an object. This means that identity relies on how something is viewed by a person separate from its physical attributes.³

“...a valued heirloom wristwatch may be strikingly different from that of a wristwatch carrying no sentimental value. What makes the heirloom watch the watch it is, in your regard, is the fact that your father personally engraved a message on the back of the watch on the occasion of your twenty-first birthday. Were the back of the watchcase to be destroyed, or replaced, indeed even replaced by a qualitatively identical part complete with a copy of the original engraving, the resulting watch might, as far as you were concerned, simply no longer be worthy of being regarded as the same watch” (Swartz 2001, 355-356).⁴

In this scenario the core of the object is defined by its sentimental history, making its physical characteristics irrelevant as an identifier. Both these schools of thought have their benefits and flaws, and there is no conclusive answer as to which is more correct than the other. However working with this framework as a basis we will begin to investigate our perceptions of shifting and static identities in order to understand what it means for something to transform or persist through time.

Identity in the face of change is a difficult notion to reconcile. In the previous section two schools of thought were discussed. The first believed that the identity of an object is tied to basic physical relations. A being is defined by its physical persistence, being of the same form, composed of the same stuff. Its identity solely resides within the physical confines of our world. This is known as the brute-physical view and we will focus on this theory as a framework for developing an acceptance of transformative use through shifts in an object's physical identity.⁵ As architects we build with specific purpose; however we often forget that our designs exist within a physical world that molds and transforms our creations. There is an inherent stubbornness for us to see objects as static even though they have changed drastically since their initial conception. This potential for physical change calls for a deeper understanding in the way our species perceives identity through time. Depending on how one defines selfhood, a transformation in one physical aspect can still allow the essence of an object to remain intact. Then at what point does the perceived identity change after its characteristics have been altered? In a brute-physical view this becomes challenging to delineate, as demonstrated

² Andre Gallois, “Identity Over Time,” Stanford Encyclopedia of Philosophy, March 18, 2005, accessed April 16, 2016, <https://plato.stanford.edu/entries/identity-time/>.

³ Ibid.

⁴ Norman Swartz, *Beyond Experience: Metaphysical Theories and Philosophical Constraints*, Second Edition (Burnaby, British Columbia: Norman Swartz, 2001), 355-356.

⁵ Andre Gallois, “Identity Over Time,” Stanford Encyclopedia of Philosophy, March 18, 2005, accessed April 16, 2016, <https://plato.stanford.edu/entries/identity-time/>.

by Hume below.

“suppose any mass of matter to be plac’d before us . . . supposing some smaller inconsiderable part to be added to the mass, or subtracted from it; tho’ this absolutely destroys the identity of the whole, strictly speaking; yet as we seldom think so accurately, we scruple not to pronounce a mass of matter the same, where we find so trivial an alteration . . . and are apt to imagine that ’tis nothing but a continu’d survey of the same object” (Hume 2014, 167).⁶

In his example Hume states that although something may be physically altered through time, human beings have a tendency to consider objects to have a persisting identity so long as the change is gradual and slight. The issue is that gradual change will eventually amount to significant change over time. This view must be corrected in order to restructure our thinking towards a fluid sense of self. I propose that an object’s identity should be considered changed once its physical attributes have been altered to the point where a new use or function can be applied. Concurrently a new adaptation of use will confirm a shift in object identity. This scenario advocates for an awareness of the physical transience in things, reminding us to constantly reevaluate our static and at times stagnant views towards manufactured goods.

A redefined brute-physical view opens up opportunities for transformative object identities, but what of the second school of thought? As previously stated this school believes that identity resides in a human-object relationship outside of the physical realm, dealing primarily with sentiment or perception. This is predominantly known as the psychological continuity view. Psychological identities have a tendency to persist since they are associated with the origins and

histories of the object itself. These attributes may be forgotten but not so easily changed. This type of object identity can remain constant even through a series of physical alterations.⁷ Although psychological continuity seems to work against the idea of transformative use, an argument can be made that it in fact gives us the ability to retain the value of an object overtime in spite of continually evolving identities. In this era of mass manufacturing and production, it is common for products to be copies of each other; however people tend to identify and place value on things which they have unique relationships with. Basic human behaviour suggests that we offer better treatment to objects with a persisting history or psychological identity. We require this constant as an anchor to imbue both cultural and personal responsibility to an object, acting as a counter balance to the effects of the brute-physical view. Utilizing both these outlooks we can begin to theorize an approach to how manufactured goods can transform over time while retaining values inherent in persistence.

The Maunsell Sea Forts have undergone many physical transformations over the past seventy odd years; each transition has created a vastly different stage in the building’s life. Referring back to the two schools of thought concerning the nature of identity in relation to impermanence, we will adopt an amalgamated approach when considering these objects in the Anthropocene. As the decades have passed the forts have lost their wartime identities, no longer acting as the guardians of the Thames. The motivations of each era along with the transformation of physical attributes have imbued new meaning to the structures. However, although the physical presence of the forts have changed over time their psychological identities still remain. This persisting identity is carried within the architecture, overlaid on top of each subsequent transformation to create a palimpsest of the self. Their presence during World War II

⁶David Hume and Dave Fate Norton, *A Treatise of Human Nature: A Critical Edition* (Oxford: Clarendon, 2014), 167.

⁷Harold Noonan, *Personal Identity* Second edition (New York: Routledge, 2003), 10.

can be seen by the bullet holes left in the armour and the faded shadows of where the bofors-guns used to stand. The missing pieces of metal and hardware are a reminder of the fishermen who used to scavenge the site for parts. Inside the towers, the old couches, frayed rugs, and broken record players speak to their time commanding the airwaves as pirate radio stations. And lastly the rusted cladding, collapsed towers, and weathered exterior are proud indicators of their struggle against the natural elements. Even though the identity of the forts have changed the materials hold a record of their past, an encoded textural history, allowing for a connected identity to emerge.

This concept of a transformative yet connected identity has implications for what constitutes the self by pulling together both the brute-physical and psychological schools of thought, creating a paradigm shift in the way we perceive the life cycle of built forms. Most people define the self in restrictive boundaries, only focusing on one segment of an object's life at a time. However if looked at outside of time the Maunsell Sea Forts have taken on a number of different identities, none of which in isolation can express the entirety of what the forts are. One cannot currently say they are military installations because that statement would by definition be false. However saying that they are solely abandoned artifacts of World War II would be denying them their rich history, and not taking into consideration the totality of their existence. The self therefore must be understood through this concept of a connected identity. This is where the notion of temporal parts comes into play. On the physical plane it is possible for one entity to have many spatial parts. For example a person consists of arms, legs, fingers, and toes. These spatial parts allow someone to extend through space, essentially existing in multiple spatial zones across the physical plane, but it is the

composite of all of these parts that constitutes a physical person. Similarly temporal parts can be understood as moments that stretch out across time.⁸ Each moment consists of a physical plane, the combination of these planes in theory creates a temporal part, and it is the totality of these temporal parts that constitutes the self. Working within this spectrum of thought, if one refers to the Maunsell Sea Forts in consideration of the whole self they are in fact referring to a quarter century long spatial-temporal existence. This version of the self consists of all the stages within the fort's lifespan. Impermanence in this case does not make it more difficult to understand the self; it is in fact a part of what constructs it to begin with.

This exploration into the notion of identity and selfhood holds potential for how the modern world can begin to reinterpret waste and resources in the Anthropocene. The concept of a static identity is outdated. Rather than fabricating new material goods out of finite resources we need to rethink the transient and impermanent nature of existing products. We must learn to reevaluate objects and their potentials for change while retaining the values inherent in each of their unique histories. This calls for an amalgamation of the brute-physical and psychological views to create a transformative yet connected sense of object identity. Furthermore an adherence to these concepts reveals an expanded understanding of what constitutes the self through time, leading to a social accountability which takes ownership of manufactured goods over evolving lifecycles. As architects this not only holds implications for how we design, but also gives insight into the trajectory of our profession in the coming generations. Architecture will become less about designing from a tabula rasa, but will instead be about the reinvention of already existing objects. The aesthetics of our physical world will change as well. Pristine and virgin materials will be replaced

⁸ Katherine Hawley, "Temporal Parts," Stanford Encyclopedia of Philosophy, February 01, 2004, accessed April 17, 2016. <https://plato.stanford.edu/entries/temporal-parts/>.

by worn textures, rich with physical-material histories. From this perspective the Anthropocene becomes an age of vigilance, giving rise to unique design challenges and even more innovative ideas that call for the creativity necessary to constantly overturn the stagnation of our material world.

FISHERMEN & SEAFORTS

Following a referendum held in the summer of 2016 the United Kingdom began its official process of withdrawal from the European Union; this historical shift would later be colloquially known as Brexit. It pulled at an interconnected system of geopolitical threads that would have to be examined, rebuilt, and restructured in order for Britain to leave the EU. One such thread in this complex tapestry was the UK's release from the Common Fisheries Policy, and entangled within is a series of events involving some fishermen and a particular set of sea forts.

Fish are said to be migratory creatures, moving through different habitats from season to season. Of course their movements and tendencies ranged between different species, but no matter what others may say we English fishermen know that any fish from the North Sea down to the Channel have always been, and will always remain, undoubtedly British. My father used to tell me stories of his youth when catches were so big the boats nearly sunk from the weight, but that ended when the Common Fisheries Policy came into effect.

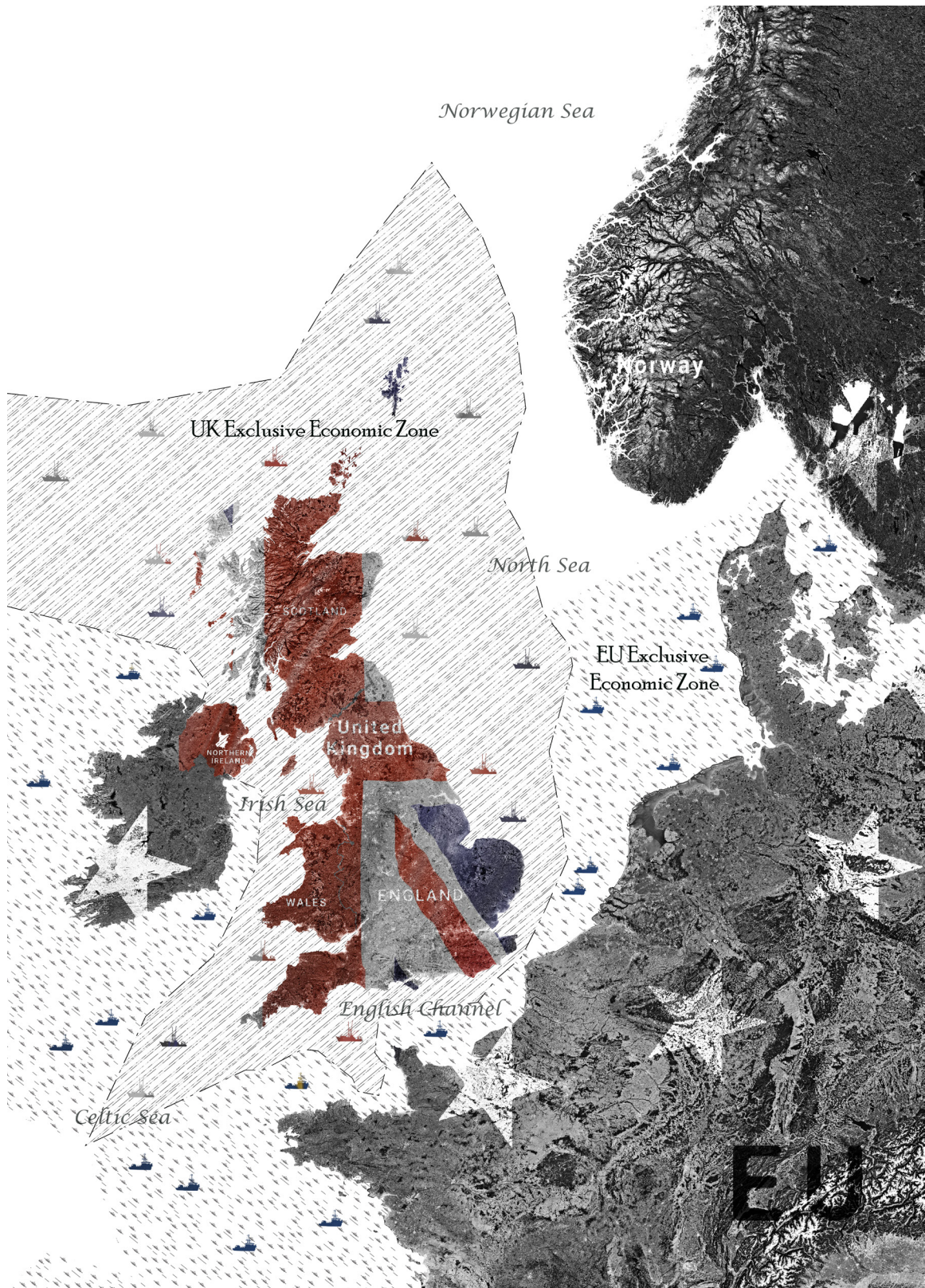


Fig 1.1 UK vs. EU Territorial Waters Map

The Common Fisheries Policy designated that all European fleets had unrestricted access throughout EU waters, at the same time assigning quotas of fish stocks for each individual nation. This meant foreign vessels were granted rights to fish that had historically belonged to the UK while our catches were restricted within our own borders; shackled by regulations that were imposed upon us.

I was barely a teenager at the time, but I remember that summer very clearly; the summer of the referendum. There was electricity in the air as we campaigned to leave the EU. Cries of outrage from unjust treatment rang out from the fishing community. My father was one voice amongst the many that called for change, or to be more accurate, called for a return to the way that things once were. On June 23rd, 2016 those cries were answered as we collectively voted to leave the European Union. I stood by my father as the results came in and saw his look of triumph, a look that said we had finally reclaimed what was rightfully ours. I had expected an immediate impact after that. Unfortunately change would not come as fast or as easily as we had hoped.

Britain's release from the Common Fisheries Policy meant that officially EU fishing fleets no longer had the right to move freely in British waters. In reality, the government lacked the resources necessary to invest in the control of alien vessels. Immediately post Brexit, funding for the Marine Management Organization (MMO) – the governing body in charge of marine monitoring and control – was cut. Additionally, the UK wanted to use fishing rights as a bargaining chip with neighbouring nations to renegotiate trade agreements after the referendum. This drawn out process of setting up treaties with so many different countries had made the regulations surrounding illegal fishing ambiguous and difficult to enforce, leading to numerous fleets constantly trespassing into British waters. Outraged and not seeing much action from the government to manage the situation, men like my father decided to take matters into their own hands. It was shortly after that I first heard mention of the Shivering Sands Sea Forts.

UK vs. EU

Annual Fishing Quotas

NORTH SEA - Common Fisheries Policy



Fig 1.2 UK vs. EU Annual North Sea Fishing Quotas - Illustrated Poster

On a cool fall morning my father brought me to participate in an organized protest against foreign fleets. I had been to smaller rallies before held at public venues or neighbourhood haunts. They mostly consisted of old men drinking too much. This one was different. We went out by boat into the Thames Estuary and headed east for some time. For a while I remembered thinking we were going to cross the North Sea and take the fight straight to Belgium; then I saw them. The Shivering Sands Sea Forts, one military installation out of the few remaining that defended the Thames against German air-raids during World War II. Being easily recognizable, and a cultural landmark reminiscent of triumph against oppression, fishermen had decided that the towers functioned effectively as rallying points for protests. I remembered seeing dozens of ships as we approached, most were fishing vessels but some held film crews. They were idly bobbing on the waves amongst the backdrop of the resolute towers, a sight which I will never forget.

In time, people started venturing into the structures themselves. During one winter there had been a ten day hunger strike, held in the towers to draw awareness to our cause. In the following summer there was an incident where several French vessels were caught trespassing into our territory. We barred them from access and blocked their retreat into French waters with our own fleets. The standoff had lasted nearly a week until the government intervened. We had used the sea forts as a base of operations throughout that time to supply our vessels, show support, and provide public broadcasts.

This was around the period when makeshift platforms were constructed by various crews and attached to the base of the towers for docking. Fishermen cooked food, maintained their ships, and stored equipment on those spaces. As the years passed concrete and wooden piles were driven into the seabed at various distances from the towers to be used as anchors for new platforms to latch onto. Relying on this system the area organically developed into a floating market for both the fishing community and the public. The market never stayed the same though. When the seas were rough the barges would get pushed into different positions or be washed away. New configurations would frequently be arranged to accommodate. Some of the more popular stalls grew into permanent establishments interspersed amongst the imposing forts. During heavy storms these stalls would be dismantled and hung to the base of the towers in order to protect them from the waves. Fishermen sporadically constructed new additions to the main structures as well, so the forts would change and expand from season to season. The installation became an offshore outpost for demonstrations and the trade of both material goods and information alike, but most importantly they were a symbol of us taking back control of our waters.

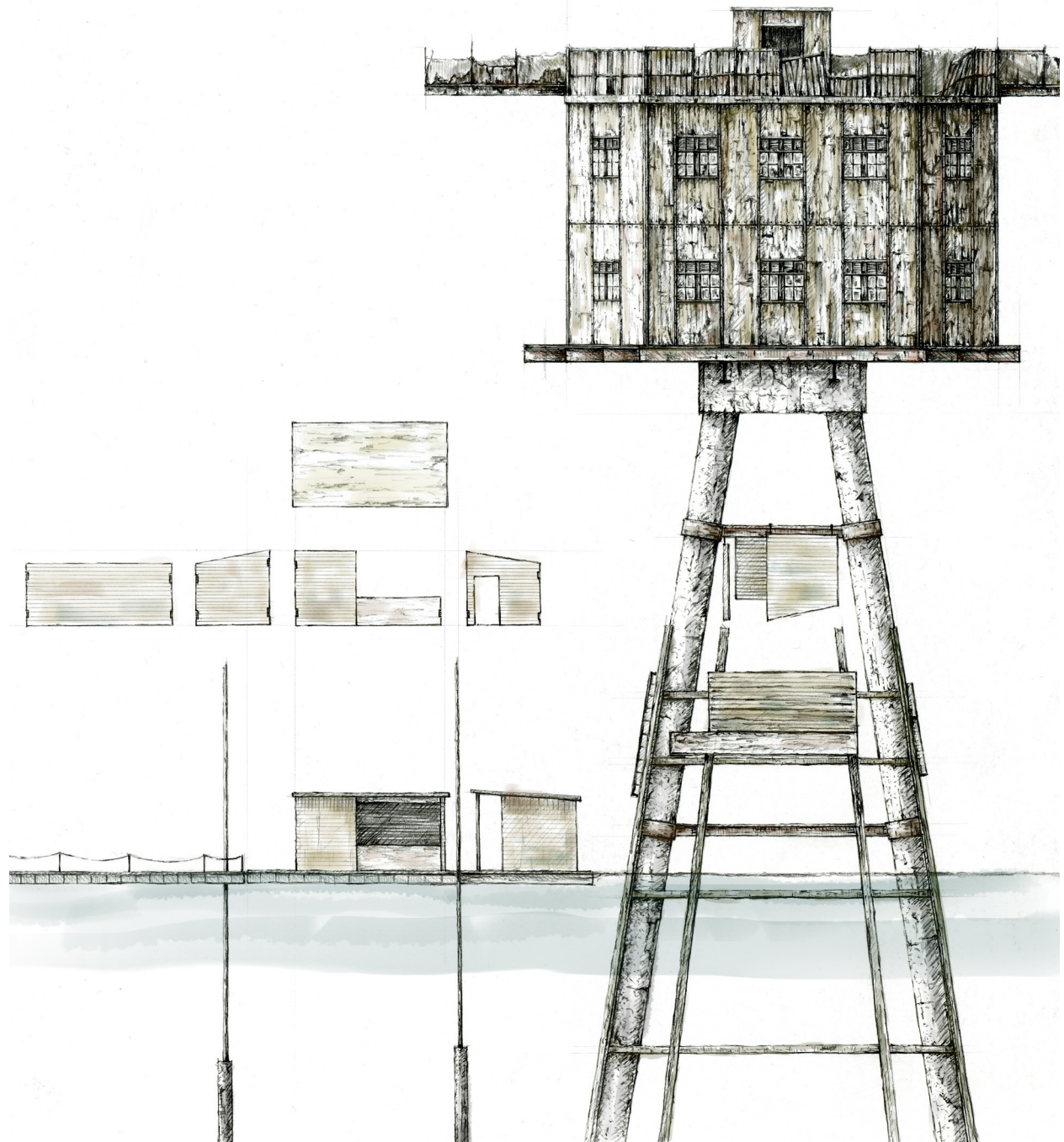


Fig 1.3 Platform Tower Storage

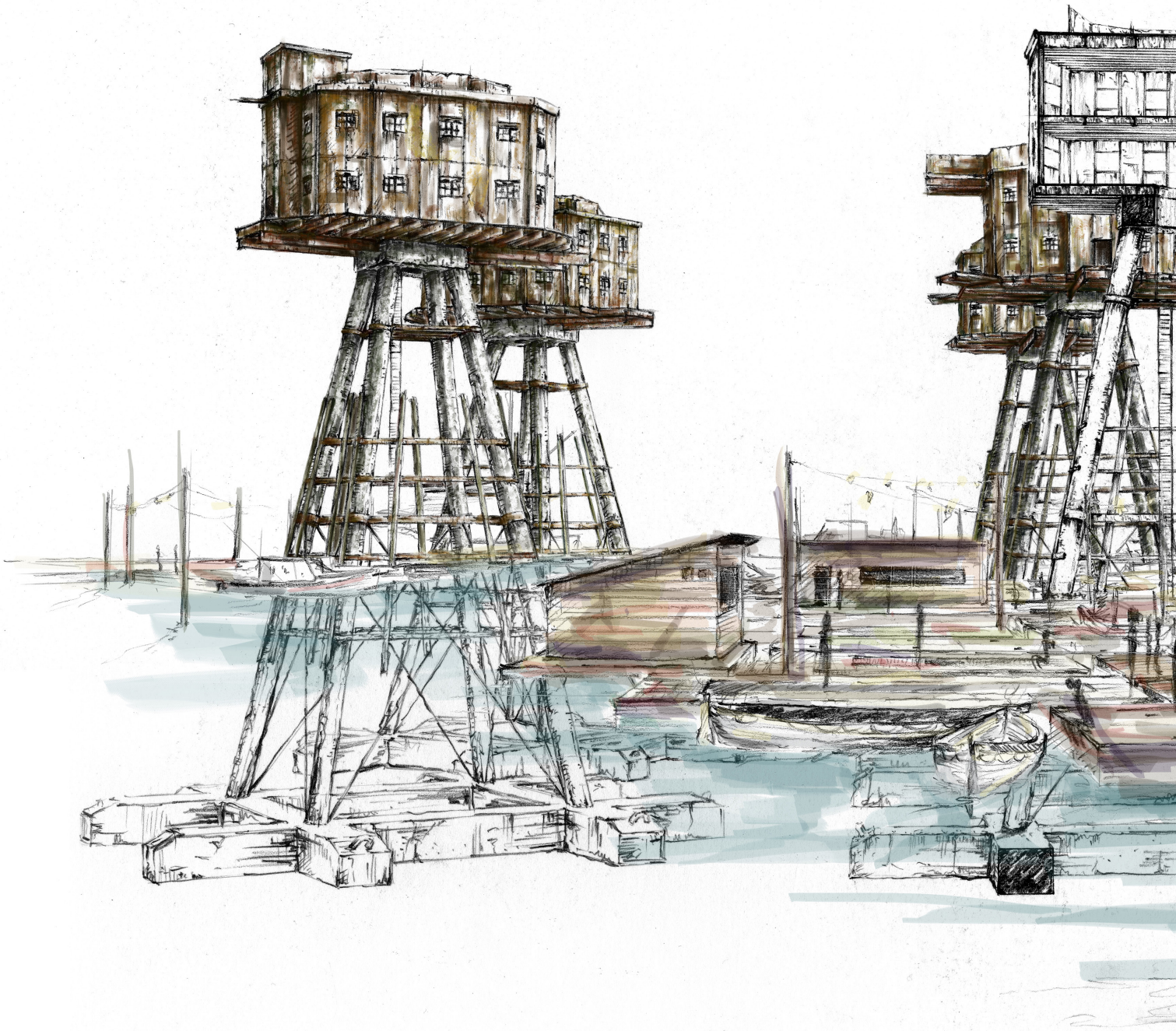
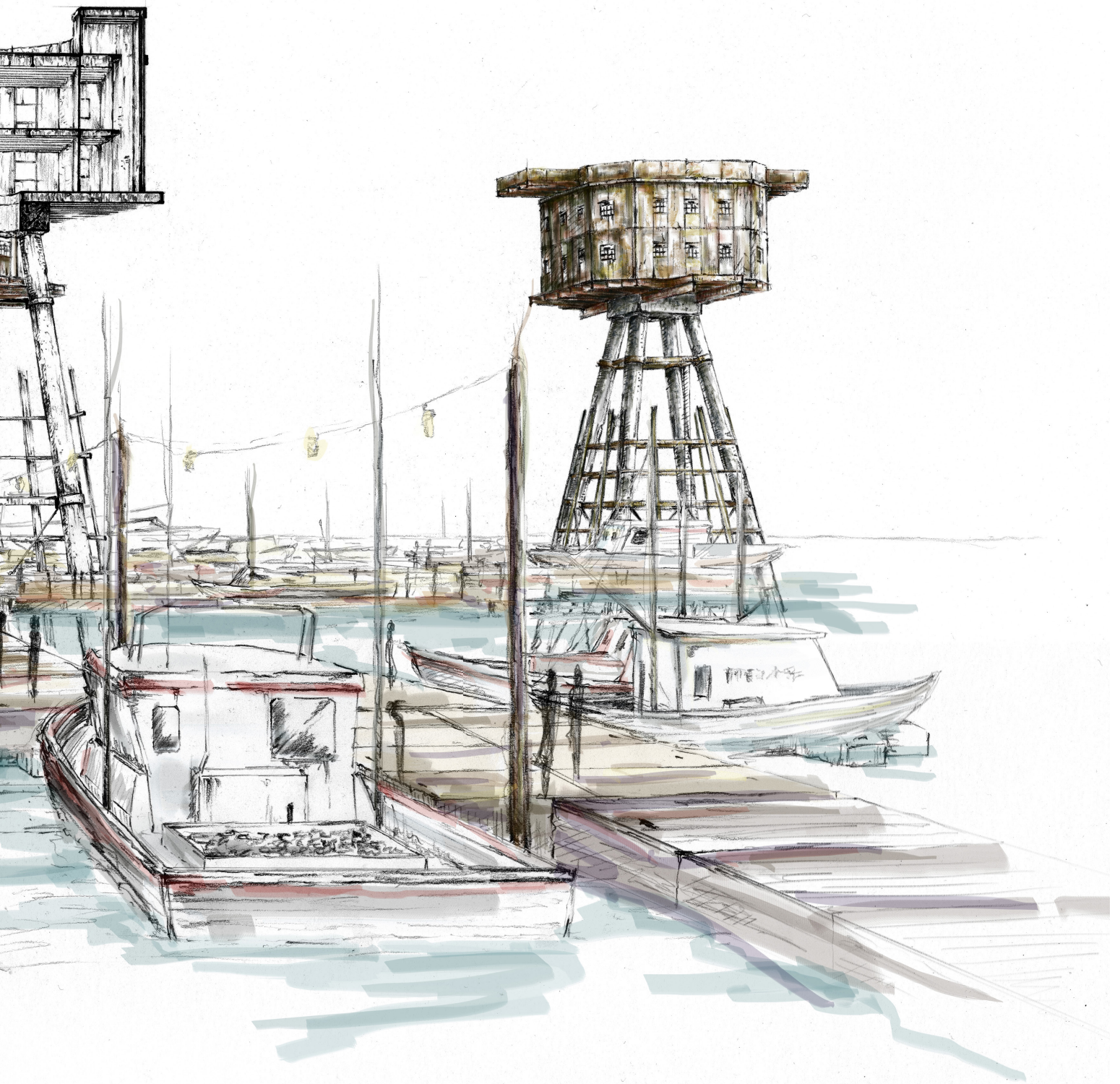


Fig 1.4 Floating Market



Unfortunately we soon realized that demonstrations and small scale attempts at controlling foreign fishing weren't producing the desired impact we had hoped for. The government didn't get involved with any long term solutions and our efforts didn't leave any lasting results. At that time I was one of the youngest members in the Fishermen's Union and wanted to help by bringing in solutions from my generation. Back then the technology for the tracking and identification of ships was already easily accessible, but we lacked the organization to effectively maneuver boats to intercept other ships, or consolidate barricades to protest against foreign fleets. However, working with this idea in mind a couple of friends and I brought my father's extra marine radar and a laptop with satellite internet connection into one of the towers. By hooking the equipment up to a projection system everyone was able to see the shipping traffic conditions within the North Sea live. It was a crude setup, but using long range radios we started directing British ships to monitor foreign vessels close to our territorial boundaries. The information from the marine radar was supplemented by online AIS tracking systems, which was further supported by real time reports from the crews out at sea, producing amazing results.

The trend caught on quickly as other fishermen started to supply more equipment to the hub. Schedules got drawn up to organize shifts, which inevitably became a weekly staffing chart for the tower. Against the backdrop of the rusted metal walls, mended windows, and three foot beams stood old screens, white boards, and a mishmash of technology from three different decades. Over the constant chatter of the radios everyone moved with purpose. I had not felt that type of excitement up until that point in my young life. This was the beginnings of the monitoring station's command center.



Fig 1.5 Command Center Interior

Within two months of the initial setup foreign vessels were successfully being repelled from British waters, and our catches had never been higher. By this point most people had heard about the floating market that had sprung up in the middle of the Thames Estuary, and the government began to take notice of our other activities. It wasn't long before they stepped in to maintain friendly relations with the EU.

A partnership was formed between the MMO and the Fishermen's Union to ensure governmental oversight of the forts, while providing the group some much needed funding. This effectively legitimized the operation and the MMO began renovations on the forts in earnest at a much larger scale than we could have ever hoped to attempt on our own. The structural members were assessed and reinforced, new satellite and long range tracking equipment was integrated into the towers, security features were added to limit access, and in some cases an extra floor was constructed for additional program. Although the installation was now under government regulation they retained some members in the union as liaisons and coordinators, I was one of the few they invited to stay. This was around the time when the Shivering Sands Sea Forts officially became known as the S.S.S Marine Monitoring Station.



Fig 1.6 Marine Monitoring Outpost

I am thinking about this now ten years later, still managing operations from atop the same towers. While some may say that much has changed I feel that much has remained the same. Looking out I see the same array of barges that make up the floating market. Branching out from them are the wooden walkways and docks, all of which are framed by the imposing architecture of the forts. In the middle of nowhere, belonging to no one, and built out of materials and technologies spanning the better part of a century.

Admittedly times have gotten tougher over the last few years. It's true the industry has dipped a bit, but I believe we'll bounce back. Certain crews have begun pushing into EU waters in order to survive since decent catches have become increasingly scarce. It's not entirely ethical but I track those ships on our equipment sometimes, and try to warn them if I see hostile vessels approaching. Ironically the system functions even better at helping us evade foreign authorities than at keeping neighbouring fleets at bay. I find myself running interference and directing them into safe zones outside our jurisdiction more and more often these days. There have been rumours floating around claiming France and Belgium are both building offshore monitoring stations like this one in order to keep us out. There isn't much need for them to trespass into our waters now anyways. Many ecological experts believe we have fished our stocks past the point of sustainability after our release from the Common Fisheries Policy. Others attest that the native species of mackerel, herring, and cod have migrated further north, beyond our territorial borders due to global climatic shifts. I think that's all a load of rubbish, they'll come back. No matter what others may claim we English fishermen know that any fish from the North Sea down to the Channel have always been, and will always remain, undoubtedly British.



Fig 1.7 Shivering Sands Seafort Marine Monitoring Station - Illustrated Plan

ACT II

Material Realities

THE UPCYCLING REVOLUTION

FORAYS INTO FOUND OBJECT DESIGN

Found object design is a trend that began to gain traction in mainstream culture at the beginning of the 21st century. The idea behind it is to repurpose unwanted objects into viable goods through an addition of parts, refurbishment, and craft. As described by its name these objects can be taken from anywhere so long as they have been discarded by their original owners or lay unclaimed. They consist of a vast and eclectic assortment of things ranging from manmade goods such as appliances and vehicles, to naturally occurring objects such as driftwood or boulders. These objects are in turn transformed into unique products that are worth more than the items in their found state. In a sense anything can be incorporated into found object design.

This movement can trace its origins to the concept of 'upcycling'. The term was first introduced by German engineer Reiner Pilz in 1994 during an interview regarding European waste management in which he aptly described the issues of devaluation inherent in anything that gets recycled.

"Recycling? I call it down-cycling. They smash bricks, they smash everything. What we need is upcycling, where old products are given more value, not less" (Pilz 1994, 14).¹

Almost a decade later this approach to the treatment of waste materials would again be advocated by William McDonough and Michael Braungart in their book '*Cradle to Cradle – Remaking the Way we Make Things*'. A large portion of their design principles were influenced

by the philosophies of upcycling. They espoused similar concerns towards recycling as Pilz did and pushed for a less wasteful and more effective method of dealing with unwanted objects.

"What about recycling? As we have noted, most recycling is actually downcycling; it reduces the quality of a material over time. When plastics other than those found in soda and water bottles are recycled, they are mixed with different plastics to produce a hybrid of lower quality" (McDonough and Braungart 2002, 56).²

When speaking about the difference between recycling and upcycling this becomes the key point. The focus of upcycling is to always conceive of products beyond their initial lifespan and to sustain or increase the value of objects overtime; going from a 'Cradle-to-Grave' model of fabrication to a close-looped 'Cradle-to-Cradle' system.

"Books become books become books over and over again, each incarnation a sparkling new vehicle for fresh images and ideas" (McDonough and Braungart 2002, 71).³

If this system of design and fabrication functioned properly it would feed into what McDonough and Braungart describes as the 'biological and technical metabolism' of the planet, allowing manufactured products and materials to continuously and productively become the nourishment for something new.⁴ Their book which was published in 2002 brought this concept of upcycling into

¹ "Reiner Pilz," *Salvo Monthly*, October 11, 1994, 14.

² William McDonough and Michael Braungart, *Cradle to Cradle remaking the way we make things* (New York City, NY: North Point Press, 2002), 56.

³ *Ibid.*, 71.

⁴ *Ibid.*, 104.

mainstream societal consciousness and became the catalyst for a new generation of thinking in the realm of physical design.

McDonough and Braungart's doctrine of creating products meant to be continuously upcycled is a huge leap forward in the field of manufacturing. However their theories mainly dealt with ways in which new products should be conceived in order to be reintroduced into the biological and technical metabolism. They fail to effectively address already existing waste streams. In their book they state that many products and materials are too harmful to be repurposed or upcycled, and propose alternate methods for their safeguard in the foreseeable future. Unfortunately these solutions are not feasible beyond the theoretical realm.

"Some materials do not fit into either the organic or technical metabolism because they are hazardous. We call them unmarketables... They can be stored in "parking lots" – safe repositories that the producer of the material either maintains or pays a storage fee to use. Current unmarketables can be recalled for safe storage, until they can be detoxified and returned as valuable molecules to a safe human use" (McDonough and Braungart 2002, 116).⁵

McDonough and Braungart's classification of hazardous materials is vast, making up a majority of products existing in the world today. Although their solution may be the most suitable from an environmental perspective, it is not practical in the real world. Companies are not going to spend money and cut profits in order to recall their products and store them in valuable real-estate indefinitely; this is not a viable option. We must

look to creative methods of keeping these existing products and potential waste streams productive in the technical metabolism until they can be safely dealt with in the future. This is the role that upcycling has to play within the modern context of making.

Although Pilz may have introduced and coined the term 'upcycling' in the late 20th century, the notion of repurposing discarded objects for further use isn't anything new. Dating back before the 1800s, Native American tribes would upcycle the cast-off carcasses of bison after they were initially consumed for nourishment. Skeletons would be used as building materials for shelters and tools, hides adapted as containers for a wide range of purposes, and tendons remade into ties, bowstrings, and fasteners; the list goes on.⁶ There is almost no part of the remains that does not find new life as another useful object. Another instance of historical upcycling can be witnessed in Japanese-American internment camps during World War II. This form of upcycling was called 'Gaman' which roughly translates into 'accepting what is with patience and dignity'. While the circumstances in this case were vastly different than the previous example, the spirit behind their act of repurposing was the same.

"People headed straight to the scrap lumber pile to lay first claim on usable boards. Despite the use of knot-riddled boards and pieced-together scraps, many managed to produce an amazing array of functional objects -- chairs, wardrobes, dressers, baby cribs, tables and hutches" (Hirasuna 2005, 24).⁷

The people interned in these camps lacked the use of everyday items such as utensils, clothing, and furniture, and began appropriating scraps

⁵William McDonough and Michael Braungart, *Cradle to Cradle remaking the way we make things* (New York City, NY: North Point Press, 2002), 116.

⁶"American Bison and American Indian Nations," Smithsonian National Zoological Park Conservation Biology Institute, 2014, accessed February 22, 2017, <http://americanbison.si.edu/american-bison-and-american-indian-nations/>.

⁷Delphine Hirasuna, *The Art of Gaman arts and crafts from the Japanese American internment camps 1942-1946* (Berkeley: Ten Speed Press, 2005), 24.

from garbage and discard piles to craft products out of necessity. In many cases the materials they scavenged were not ideal and they did not have the necessary tools to build, but makers used their ingenuity and skill to overcome these obstacles, crafting amazing pieces reflective of these trying times.⁸

Similar to how upcycling is based on these historical examples in the industrious repurposing of scrap – of which there are many – found object design is concurrently an offshoot of the modern upcycling revolution. The momentum which this movement has gained in the past couple of decades can be attributed to several different factors. The first is a shift in perspective of how the modern generation understands social class. Up until the mid to late 1900s the predominant view by society was that the use of discarded or waste materials was a last resort, indicating poverty or low social standing. Hence the ownership of products made from ‘virgin materials’ became the norm.⁹ Today the connotations brought about by the repurposing of unwanted products has drastically changed. If done well it is now seen as a display of intelligence, resourcefulness, and social responsibility, which bleeds into my next point. The popularity of upcycling has a direct relationship to the rise of environmental consciousness. The dire straits of humanity in the wake of the modern environmental crisis has become apparent in recent times. One aspect of the problem is the depletion of natural resources and accumulation of waste, stemming from current production processes. The practice of found object design is a way for common citizens to counteract these issues in an attainable manner, while also allowing them to be economical.¹⁰ Ironically resource scarcity is in part a result of the innovations in fabrication that were brought about during the industrial revolution, the main culprit

of which was mass manufacturing. Although this discovery made goods many times more affordable, it also caused an exponential spike in resource consumption. Another by-product of mass manufacturing was the standardization of parts. This was seen as a symbol of technological advancement at the time but has slowly evolved in the minds of contemporary citizens as a representation of conformity and lack of individuality. Upcycling and found object design became a rejection of these connotations, giving people an outlet for creative expression and an opportunity to experience the history inherent in used objects.

The examples of upcycling mentioned previously can be considered practices isolated within pockets of society, but consider for a moment the implications if this method of making was to be adopted on a massive scale. In the case of ‘*Gaman*’ the scraps being repurposed were found out of happenstance, and quickly appropriated for the most immediate needs. The conditions in the internment camps were far from ideal and people did the best they could to get by. However if upcycling fabrication principles were to be implemented globally without limitations this could allow for a level of materials management to take place; an optimization of resources. Instead of prioritizing the use of found objects based on the most immediate human needs they could be arranged and catalogued based on their most appropriate use for different types of projects. This builds another layer of intelligence into found object design. In McDonough and Braungart’s follow-up book entitled ‘*The Upcycle*’ they proposed a similar concept for the manufacturing industry which they referred to as ‘Intelligent Materials Pooling’.

“The principle behind the IMP is that

⁸ Claudia Mazzie-Ballheim, “Upcycling in history -- the art of ‘Gaman’ in Japanese-American internment camps during WW2,” Creative Upcycling & Mixed Media, August 18, 2013, accessed February 22, 2017, <http://creativeupcycling.blogspot.ca/2013/08/upcycling-in-history-art-of-gaman-in.html>.

⁹ Katy Sanders, “We did that in the war, too,” Upcycled, January 8, 2013, accessed February 22, 2017, <http://www.upcycledonline.com/words/category/historical>.

¹⁰ “What is Upcycling?” Gumtree, accessed February 22, 2017, <https://www.gumtree.com/content/upcycling-hub/what-is-upcycling/>.

technical materials – what we call technical nutrition – can be endlessly reused. If businesses collaborated to reclaim the high-quality raw technical nutrients from each other, they would be incentivized to use the highest-quality substances. . . Intelligent materials pooling, a collaborative business-to-business management system for the technical metabolism – in short, a Materials Bank” (McDonough and Braungart 2013, 166-167).¹¹

Again their concepts mainly revolve around a circulation of new materials produced to meet ‘Cradle-to-Cradle’ standards of reuse. I envision this idea of a ‘Materials Bank’ being implemented for objects already within the current (less ideal) technical metabolism, functioning beyond an industrial setting and proliferating into communities for individual use. People can drop off unwanted objects into specified collection hubs and retrieve wanted components from distribution centers, creating an upcycling system. Even the notion of waste-picking that was mentioned in the introduction of this thesis changes within this context.

“It has been posited that the part of the Indian population derogatorily termed ragpickers, who scavenge the dumps and the road litter for useful “garbage,” actually performs a serious good for the country. They put 100,000 tons of ‘garbage’ into the cycle of reuse every single day. Their economic value to India is more than 280 million a year” (McDonough and Braungart 2013, 178).¹²

This new system of found object circulation puts the responsibilities of materials salvaging onto society as a whole, allowing everyone to contribute to this once underappreciated profession. In effect this practice restructures our traditional understanding of materials management, waste,

and the concept of making into a mindset founded on the principles of upcycling.

In order for this shift in materials perspective to take place people must be introduced to this new way of thinking within their daily lives, and that transition inevitably begins with designers. Based off my own explorations into found object design I have experienced the opportunities and obstacles in this style of making firsthand (See Appendix A & B). In traditional projects the maker comes up with a plan, working drawings, and list of raw materials before beginning the build. The whole design process is generally front loaded and under the control of the maker. They are the ones who unilaterally drive the design forward. The opposite is true when it comes to found object construction. A plan of action cannot be made in advance due to the non-standardized nature of the materials involved. The situation changes throughout the construction process, requiring a constant dialogue between the materials and the craftsman. Concurrently this type of fabrication also necessitates the utilization of tools that may not be regularly relied upon throughout a typical construction process. Most shop tools and machinery today are built to work with virgin materials that have plains of reference, right angles, and standardized dimensions; or alternately work to reduce raw materials to fit them into these pre-set boundaries. Found object design leans towards the use of flexible tools that can adapt to unique situations, one example of which are hand-tools. In an age where automated machine manufacturing and digital fabrication are becoming the dominant modes of making it is ironic that upcycling, which I feel will increase in prevalence in the near future, puts an emphasis on the skills of the craftsman rather than the tool.

In the architectural field today most design methodologies are founded on the reliance of virgin materials and standardized parts. I

¹¹ William McDonough and Michael Braungart, *The Upcycle* (New York City, NY: North Point Press, 2013), 166-167.

¹² *Ibid.*, 178.

believe there will soon come a time when found objects and second-hand components become a significant resource within professional practice. Aspiring designers need to be exposed to these types of materials in order to understand the difference in design thinking and craft necessary for this form of fabrication and reuse, versus traditional manufacturing methods going forward.

SALVAGERS & SEAFORTS

There are many names for what people like me do. Officially we are known as resource salvage specialists. Arguably it's the most correct designation for our profession, but I, like many others see it as a way of life. We 'mine' materials from disused or discarded objects such as buildings, furniture, art, and infrastructure. Really anything you can think of so long as it is no longer needed, and salvage the materials to repurpose for better use. Some refer to us as patchworkers since most of the jobs that come around involve reworking perpetually repaired objects. It's surprisingly fitting. A majority who salvage go on to construct their own projects from the materials. I, like others in my trade, own a mobile workshop which I take to my salvage plots, making it easier to build while on site. Historically there was a time when this profession was seen as desperate or vulgar, performed by the outcasts of society; I can't imagine that now. There are some fanatics today that go so far as to consider resource salvaging a calling, reserved for only the elite or the chosen. Recently there have been concerns that salvaging might run into hard times again as the economy moves steadily towards a market driven by physical resources, causing a drop in the value of craft services. I don't foresee any huge problems yet. Mining and patchworking conditions vary drastically from site to site, it necessitates the skills of a craftsman even with the integration of digital imaging and A.I assisted machinery. However, the newer generation coming into the trade prefer only to salvage and process the materials, choosing to forego constructing projects themselves. They elect to ship off the resources to government regulated agencies or reputable corporations to be worked on. I feel we have to take our next steps carefully and promote the craft in order to avoid relegating our trade to that of menial labour. Recently I managed to get my hands on a few salvage plots that will hopefully do just that.

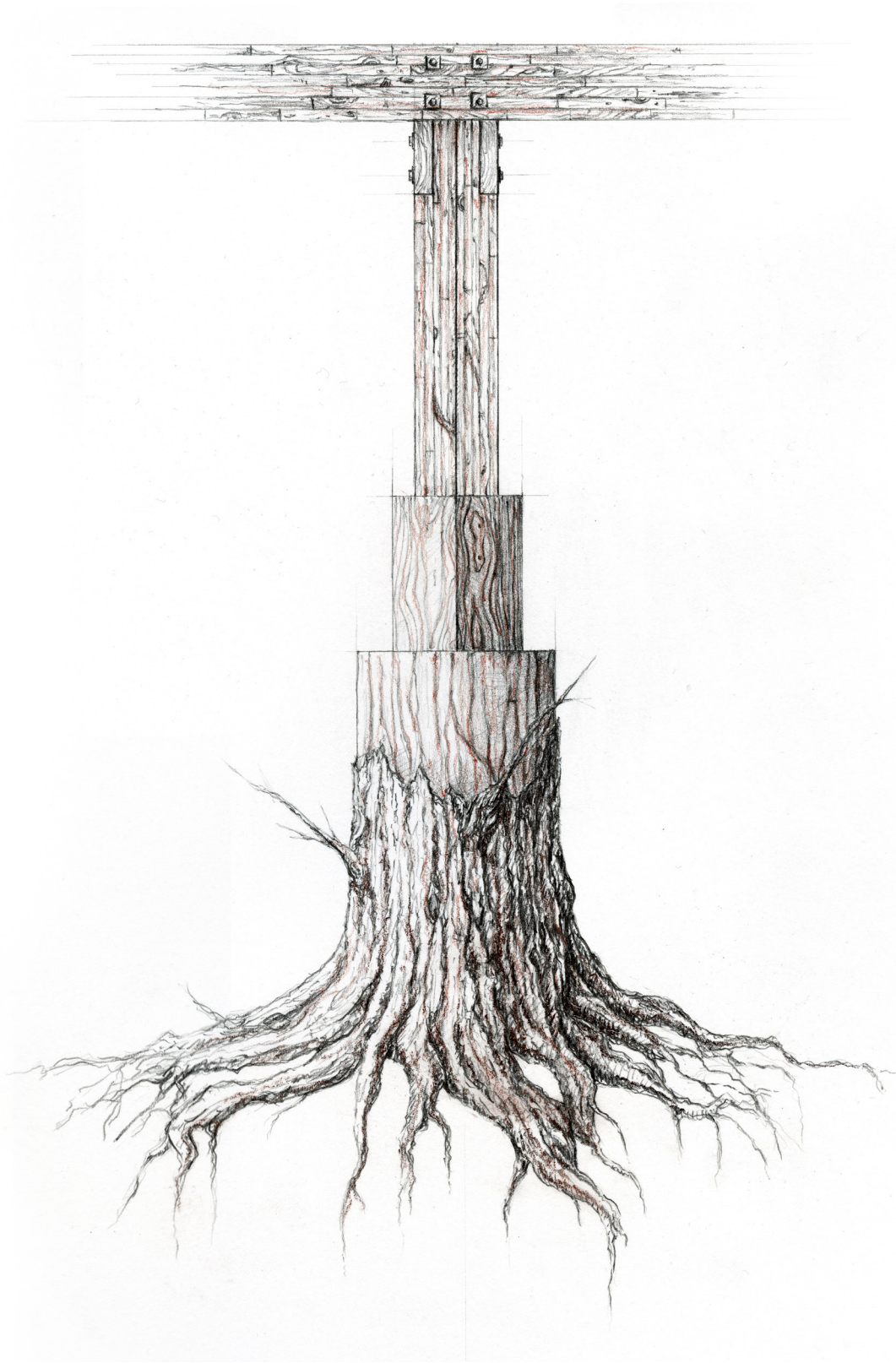


Fig 2.1 Material & Craft

A month ago a government source leaked rumours about a salvage plot that was slated to go on auction. Word spread quickly amongst the community that the plot was going to be an N-class with A1 grade materials. This meant the object was on the scale of buildings, and the materials had never been repurposed previously. Resources of this grade and magnitude were rarely found anymore, and it drew a great deal of interest. In the modern age where all circulating materials come with lineage records and pedigrees, A1 was as close to raw resources as it was going to get. No one knew exactly what or where this plot was, but almost every single patchworker I knew – and some that I didn't – showed up to the auction.

The size of the crowd was going to hike up prices to several times their actual worth, which was probably the goal to begin with. I didn't think I would have much of a chance at winning the bid, that was until they revealed the plot; an offshore outpost in the Thames Estuary historically used for marine monitoring. The structure was composed primarily of concrete, steel, brass, and iron, amongst other elements; a treasure-trove of premium resources. I had seen the tower before during my boating trips and recalled that there were six others clustered around it on the site. Since nobody had stripped them clean I had always assumed they were contaminated materials. Interestingly the auctioneers were bidding off just one tower as an individual plot. If they were planning on bidding out all seven separately I saw a potential scenario play out where everybody would bid high on the first few plots, leaving the latter half open to be taken at much lower prices. Through some strategic bidding, some borrowing, and some luck, I was able to win the last two towers at a fraction of the price the first five went for.

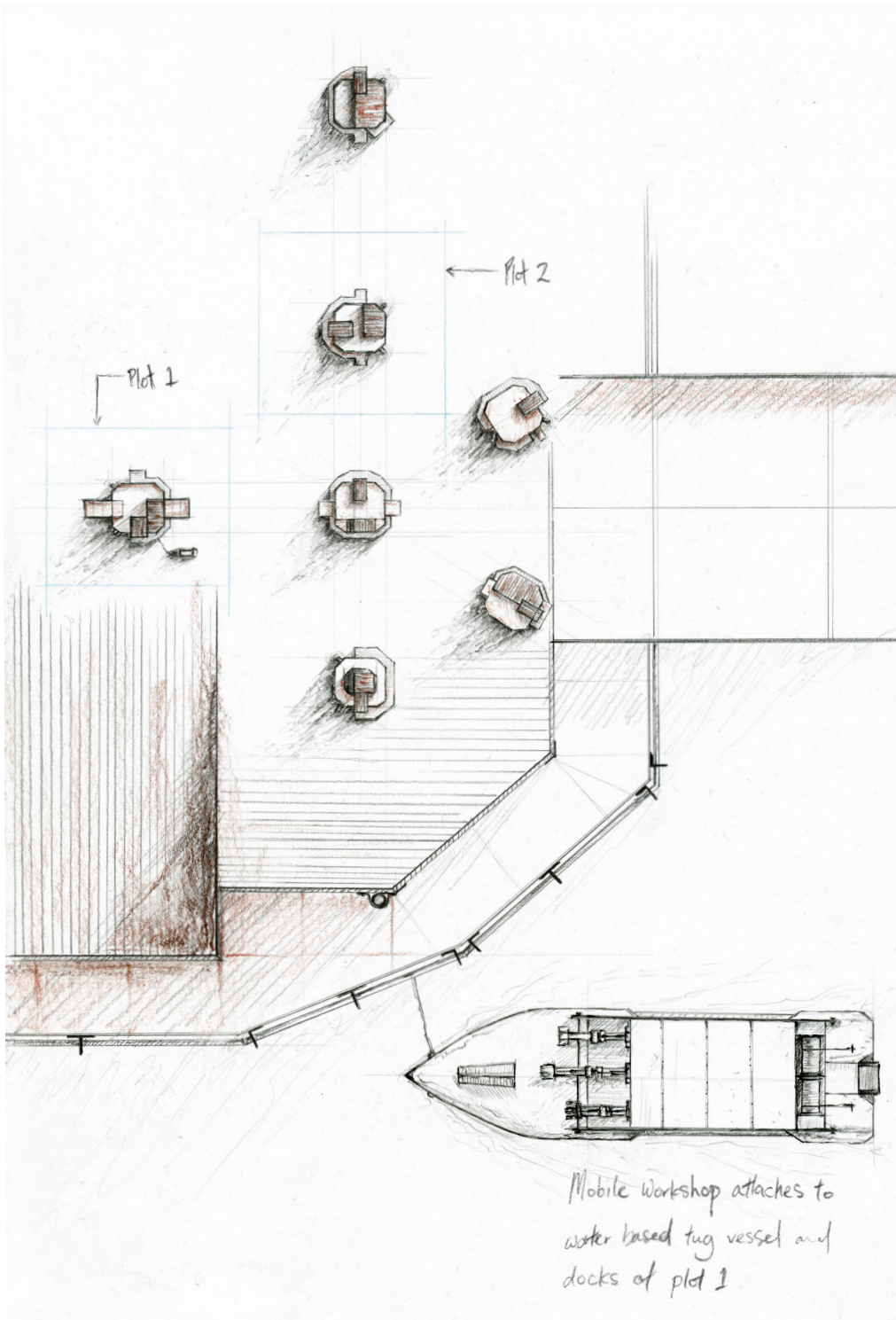


Fig 2.2 Harvest Plots

Instantly after the auction requests came flooding in from clients about potential commissions, trying to schedule site visits in order to get first picks at the premium stock. However before anything could be arranged I had to inspect the structures and subdivide the materials into their proper use categories along with establishing their material pedigrees. Early the next morning I set out in my mobile workshop and headed towards the Thames Estuary to begin the tedious yet exciting process of parsing out my future profits from this unexpected windfall.

There are three main types of commissions that patchworkers generally receive from any potential harvest. The use categories are employed to separate the resources best suited for each of these functions. This determines a broad price range for the different parcels of material, which are further narrowed down by the scarcity of the elements, quantity of resources being consumed, and material lineages within each project.

The first type of work involves the processing of materials into their purest form. These stocks are to be sold off in units and worked on by others. Out of the three use categories this has the highest price range. That's because the refinement process typically consumes the most energy and physical matter depending on the raw material that the client is looking for. The second use category takes the parsed material as is and incorporates other components in order to transform them into new products. Larger uninterrupted pieces of material are grouped into this category and have a mid-level price range. Finally any unwanted pieces and offcuts are placed in the last category, used to repair or alter patchwork objects. These objects don't call for materials with good pedigrees since they have already been mended many times before. Commissions like this have the lowest profit margin but arguably require the most creative energy and craft. Components have to be applied efficiently, and synthesized creatively to optimize use. Each category is marked with an additional 'S' after the grade designation. So A1-SSS would be the lowest of the A1 grade uses, transitioning through to A1-S which would indicate the highest.

It took a whole day to catalogue every parcel on the plot. A majority of the materials were A1-S and A1-SS grade. Their lineages were concise and pure due to the fact that the towers had been built while natural resources were still available, meaning minimal pre-circulation. The large variety of components in the structures also meant there would be opportunities for interesting patchwork projects. Overall a great haul. Prospective clients were invited to come out to the site the next day to look things over.

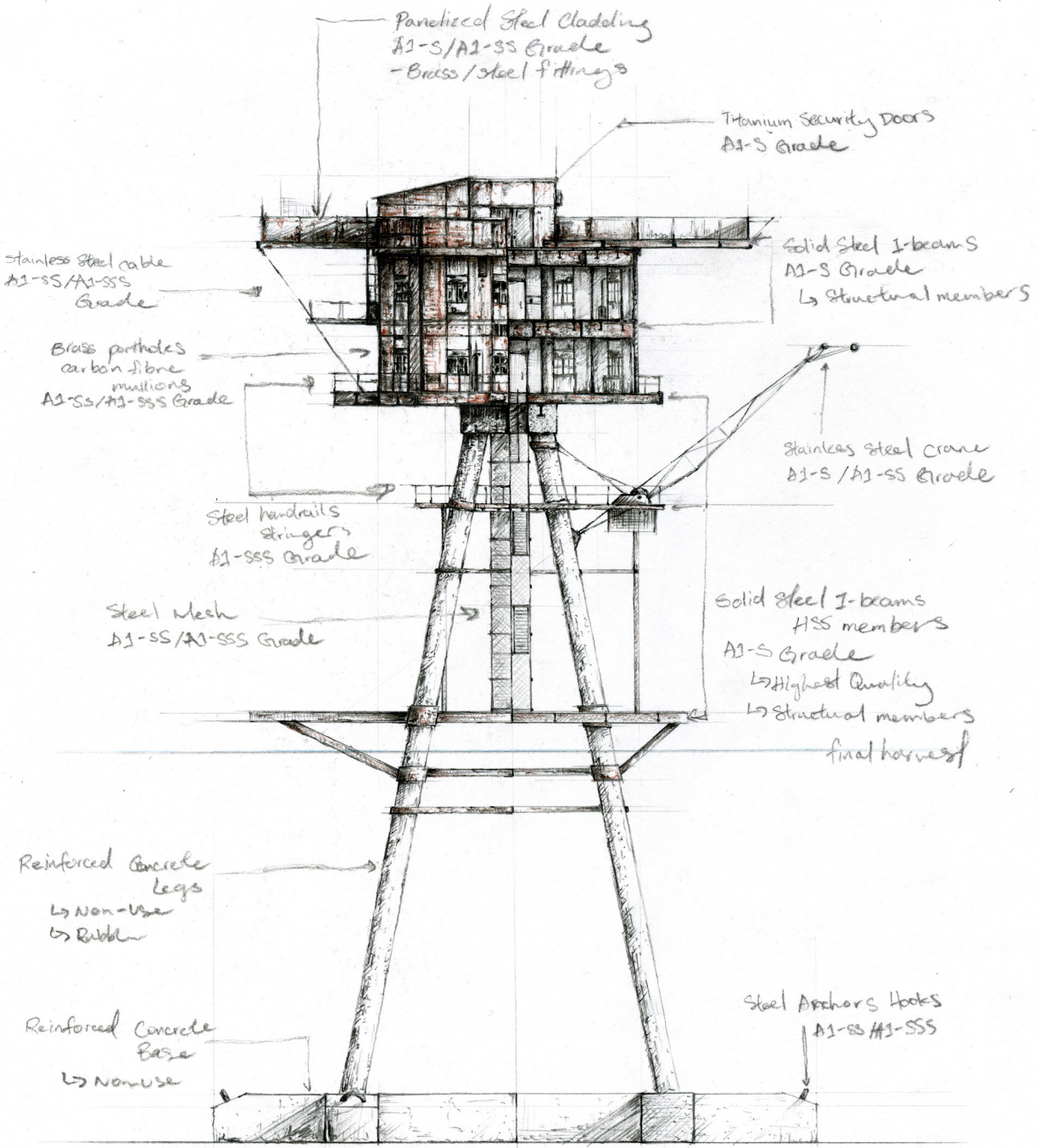


Fig 2.3 Sea Forts Material Salvage

Each day of viewing only entertains one type of client for large plots like this. The first day was for A1-SS commissions. A handful of corporate representatives and high society figures came out to stake their claims on the materials. Most don't actually have any idea what they want to make yet but know they have to reserve quality parcels for a later date before they run out. Some treat this as an investment opportunity; putting holds on the resources then trading them off later for a higher price. This practice is commonly referred to as resource flipping.

Two large projects were finalized on the spot though. One was for a corporate client who bought out two faces of the exterior steel cladding. They wanted to construct interior sliding partitions and doors out of them for their head office. The second commission was for a curator who wanted a large entry bench and shoe rack to be made for her museum gallery's reception. Typically structural members would be designated for 'S' use due to their material purity but I reserved a few of the exposed I-Beams for 'SS' commissions. The long-bench will be constructed out of one of the central beams and she will be paying a premium in material and fabrication costs.

Tomorrow I will go pick up some building materials to get started on these commissions before the viewing for A1-S clients in the afternoon. In the case of 'SS' projects that fabricate new products out of the existing conditions of the parcels, more materials have to be added during the construction process. These extra components usually come from disassembling lower grade patchworked goods, feeding them back into the technical nutrients stream. In a sense the sliding partitions and bench that I am making now will one day end up as components to help construct other products.



Fig 2.4 Facade to Door/ Beam to Bench

The A1-S viewings mainly involve various parties bidding on resources. Discussions concerning details in design or construction aren't necessary for this use category, only technical specifications and prices are deliberated. The clientele mostly consisted of scientific facilities or energy suppliers that use the raw materials for research. However there was one man that had an unusual request which I found quite interesting.

He approached me before the bidding began with images of a shattered granite slab. He tells me that it's an heirloom which had been passed down in his family for many generations. It had broken years ago and he wanted me to repair the slab with a resin made from the melted brass or steel found in the tower. I told him that I had never heard of a process like this before and wasn't sure if the repairs could be done in this way. He assured me that they could, and that this was a traditional practice in his culture known as 'Kintsugi' which translates into 'Golden Joinery'. The man even told me he had a historical document about it from the 21th century if I wanted to look through it for reference. After talking it over we came to the conclusion that the material and work would be too expensive for him, so instead we struck a deal in which I would take on the project for free in exchange for the text he mentioned.

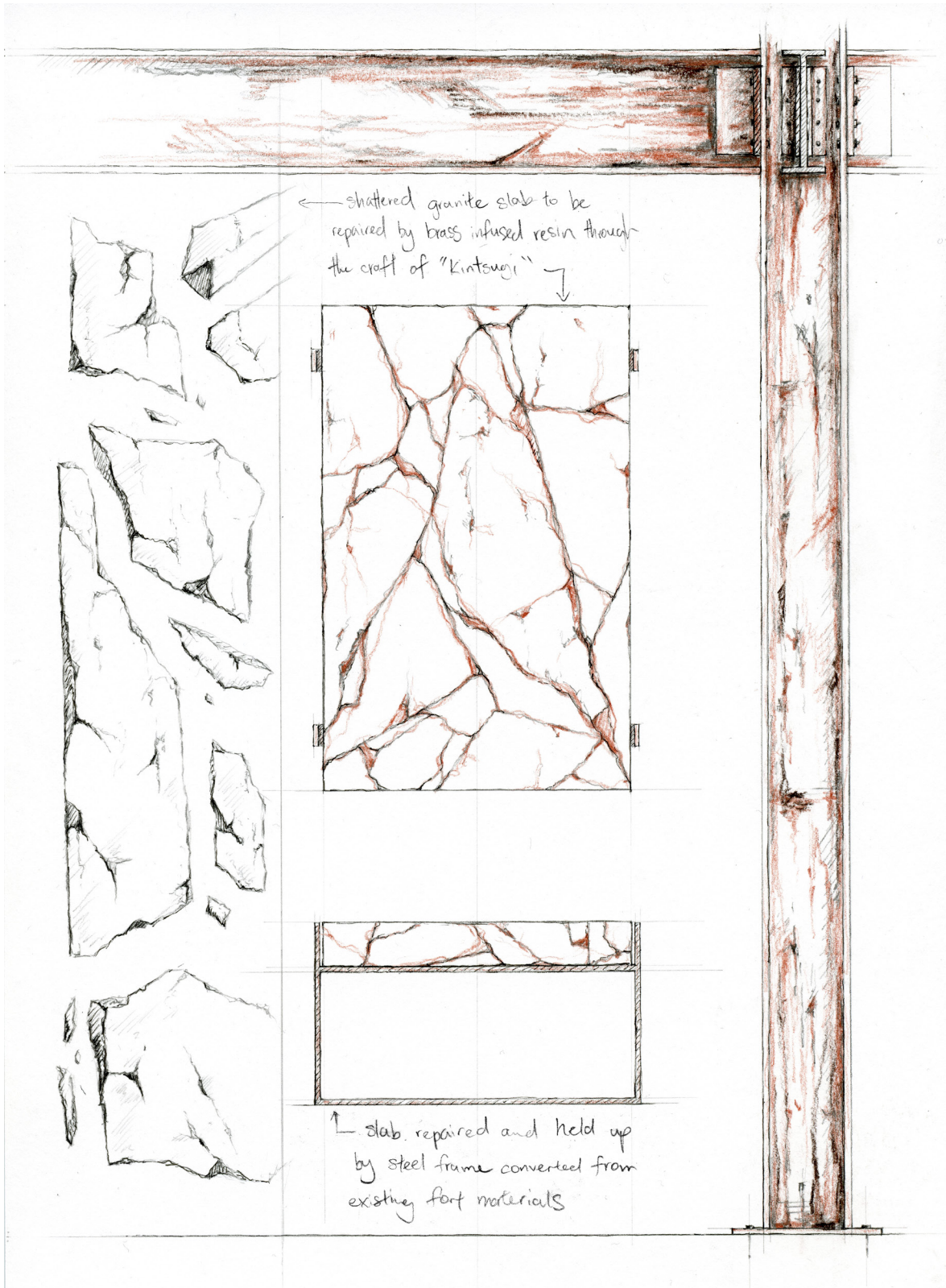


Fig 2.5 Kintsugi Slab

On the third day I opened the plot up for patchwork commissions. Most of them were fairly common fixes, and the towers had a selection of handrails and mullions that I reserved specifically for these projects. In most patchwork pieces the largest contributing factor to a good build is the suitability and fit of the components in relation to the existing object. This rule was demonstrated in a commission from a couple that requested the repair and alteration of a display rack. This was a multipurpose wall-mounted system which got modified depending on the next item they wanted to put up. It was a mishmash of materials and components that expanded out in a sprawling array of directions.

The item that they were looking to display was a vintage bicycle which they had recently acquired. It needed repairs done on it as well. From the model they brought it looked like the top tube and forks were badly damaged, and the handle bars were missing. The couple wanted the bike to be easily attached and removed from the rack since they were planning on riding it once it was functional. I suggested incorporating the mounting system primarily into the top tube in order to keep the rack simple, while providing the support they needed. We quickly sketched out how the mechanics of it would work and where the expansion of the rack would be placed on the wall. I told them I would need to see the bike before we finalized anything so they scheduled an appointment to bring it over in the following week.

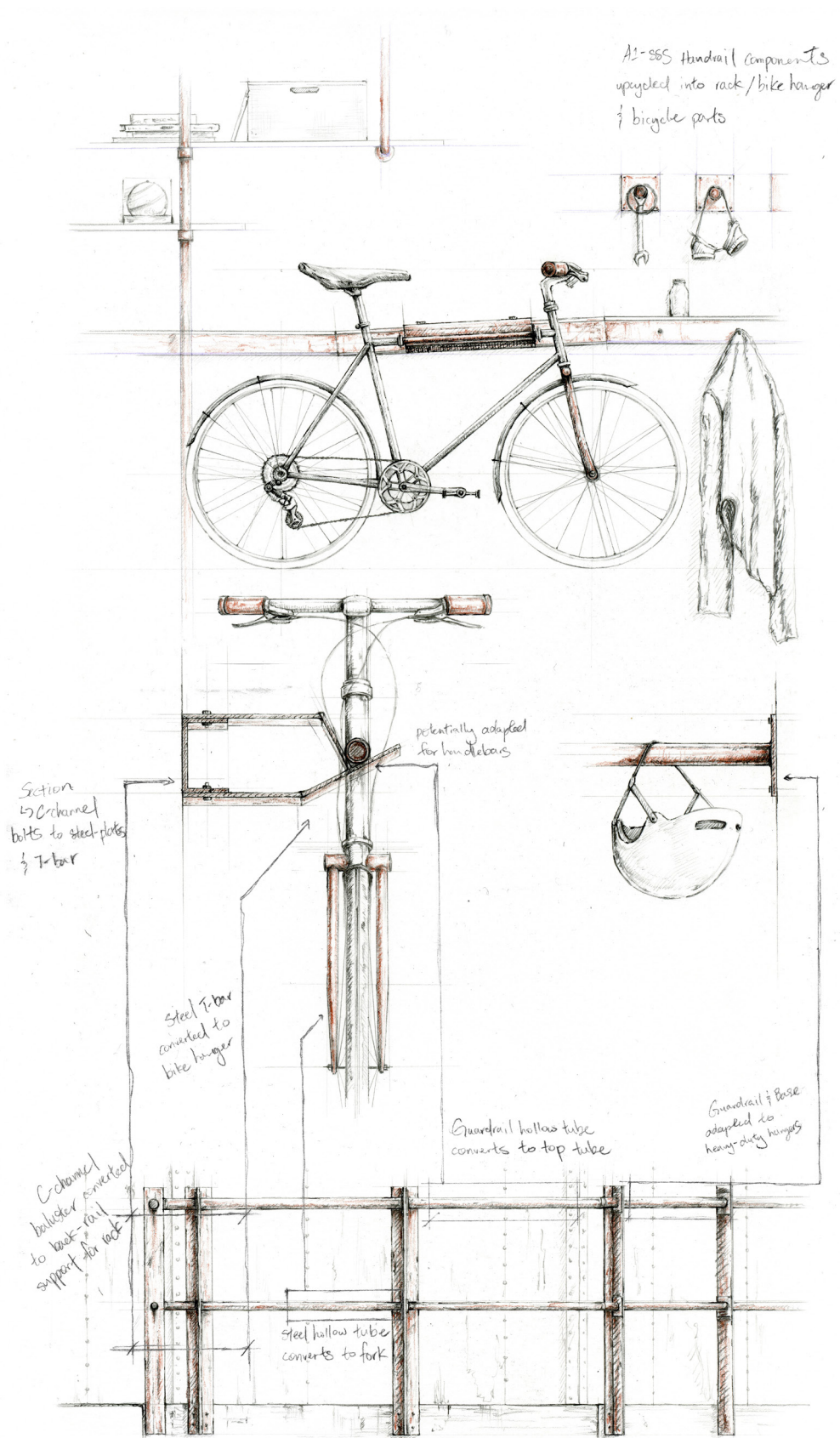


Fig 2.6 Handrails Rack/ Bicycle Study

After the first three days of viewings I had over a dozen commissions scheduled spanning the next six months. All of the A1-S resources had been claimed. Most of the A1-SS parcels were sorted or had holds placed on them to be revisited at a later date. The only materials left from the salvage were some potential patchwork components and whatever offcuts I'll end up with after my builds. Some of these excess parts will be incorporated into my current pieces and others I will save for future commissions. The entire plot will be mined dry within the next year.

I'm not sure when this phenomenon began but at some point society started perceiving objects not as what they were built to be, but rather as material deposits to be harvested. When I look at the towers I don't see them as historical monitoring outposts. I see a mixture of metals, minerals, and elements that are temporarily shaped into the form of a structure. Those materials will then become available resources in the stream of physical matter that gets assembled, destroyed, and rebuilt into a multitude of different objects. This world has become driven by the material potentials contained within things. On the one hand this can be seen as a positive mindset since we are constantly reimagining ways to repurpose materials for better use, so not to repeat the global resource crisis in the past. On the other hand we shouldn't forget about the value in craft, and the meaning embodied in objects beyond their immediate material worth. I pondered the pros and cons of this argument in my mind as I left the remains of plot one behind, making my way slowly over to begin harvesting plot two.

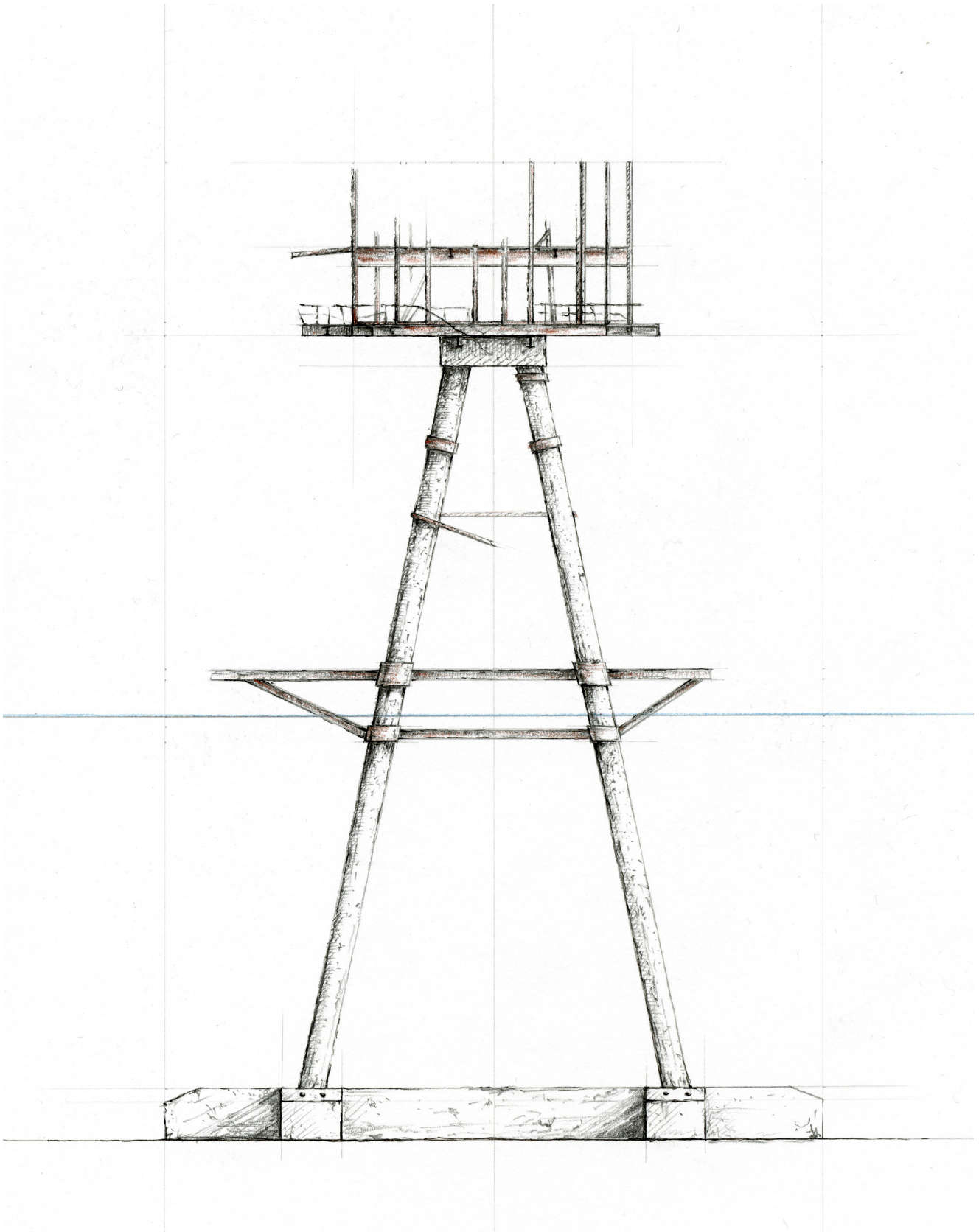


Fig 2.7 Depleted Plot

ACT III

Productive Ruination

THE BEAUTY OF DEATH & DECAY

ARCHITECTURE AS A MEANS OF STORYTELLING

All things in their due course move towards inevitable entropy. It is universally accepted that in time things begin, change, end, and begin anew again. In Native American cultures the use of maize embodies this philosophy. Seeds carried in baskets are sown throughout the fields. Leaves sprout and stalks emerge. Days pass as ears of corn form and grow. Green is the time for harvesting sweet and milky maize, eaten raw around an open fire. Gold is the time for harvesting maize full of starch for syrups, puddings, and breads. Brown is the time for drying maize to keep over the long winter months. As the plant's life ends the stalks are hollowed out as containers, the husks weaved into baskets, and the cobs used as fuel to burn.¹ In the next season the cycle begins anew as seeds carried in baskets are sown again. Maize plants transform through time, each stage in their lives are different from beginning until the end, and each stage is embraced for its unique worth even in death. This model of valuation is rare in modern society where worth only exists within what is considered the prime stage of an objects life. According to Oxford Dictionaries the word prime can be defined as “*of first importance or of the best possible quality*”, while the idiom to be in one’s prime is taken to mean “*the state or time of greatest vigour or success in one’s life/ the most productive stage*” (Oxford Dictionaries).² We hear this phrase used quite often in a wide range of circumstances across a myriad of fields, but no matter the context, it connotes the same thing; a sense of worth.

“The middle stage is life’s pinnacle, and in relation to it the other two stages constitute either preparation or decline. The complete life has a rounded shape, a trajectory, but its stages of preparation and decline take their significance primarily from that prime of life when we are at the peak of our powers...this prime of life that shows us what a human being is at his best, a truly flourishing man or woman...” (Meilaender 2013, 94).³

This concept of the prime state sets forth a model of assigned worth based on vague and narrow notions of success and productivity. It implies that things are only of value during limited periods of existence within a specific stage of life, and when that period ends it can be said that something is past its prime or without value. Mass-production and technology have bolstered these views. Increasingly rapid rates of production have made it commonplace for things to be rendered redundant; replaced on a whim when they move into states of decay.⁴ For Native American cultures the maize does not have this period of ideal productivity, rather each stage has worth and is uniquely suited for a different purpose. They accept the inevitable movement of time and the progression of all things towards entropy.

Modern society’s subconscious fears of decay, and subsequently death, are directly related to their perceptions of usefulness and the prime state of being. Decay is not an event that occurs once objects reach a specific point in their lives; it is

¹ William Weaver, “Heirloom Corn Varieties,” Mother Earth News, July 18, 2013, accessed June 2, 2016, <http://www.motherearthnews.com/organic-gardening/heirloom-corn-varieties-zewz1307zpit.aspx>.

² Oxford Dictionaries, “Prime,” Oxford University Press, accessed June 2, 2016, <http://www.oxforddictionaries.com/definition/english/prime>.

³ Gilbert Meilaender, *Should We Live Forever? The Ethical Ambiguities of Aging* (Cambridge: WM. B. Eerdmans Publishing Co., 2013), 94.

⁴ Bjørnar Olsen, and Þóra Pétursdóttir, *Ruin Memories: Materiality, Aesthetics and the Archaeology of the Recent past* (London: Routledge/Taylor & Francis Group, 2014), 3.

a gradual process that transpires overtime. From the moment something comes into existence it is exposed to external forces that cause change, leading to cycles of death and rebirth. However in the contemporary psyche to decay means to decline, to lose value, and to inevitably be discarded. This innate desire to remain useful and defy the existence of time has developed into a rejection of what modern society considers to be unproductive objects.

“Things are not considered valuable in and of themselves but because they work properly, give us pleasure, can be appropriated and possessed, and therefore have use value for us; whereas waste, broken or destroyed things are, generally, valueless and thus subjected to disposal and cleansed away from our appropriately functioning habitual surroundings” (Olsen 2014, 14).⁵

As a response to this fear there is an increasing desire to keep things from changing in today's world. With extraordinary measures people search for ways to stave off the effects of time, or even attempt to reverse them to an almost obsessive degree. Maintenance, repair, preservation, and rejuvenation are all used to counter instances of decay, ruination, aging, and inevitably death. These terms imply the possibility of freezing something at its so called peak performance. Although they seem to suggest a positive attitude towards the care and longevity of an object they are all still concepts driven by the fear of decay, grounded in the notion that there is one stage in life with the most worth. In our contemporary, zeitgeist natural progression is no longer understood as a continuous endeavour, but has become linear and broken in the wake of the philosophy of the prime lifespan. What we must remember is that cycles of decay are nature's way of evolving, learning, and growing.

“Perhaps we should have been looking at breakdown and failure as no longer atypical and therefore only worth addressing if they result in catastrophe, and instead, at breakdown and failure as the means by which societies learn and learn to re-produce” (Graham & Thrift 2007, 5).⁶

Winemaking is one particular field where the outlook regarding aging and decay runs counter to the typical discourse. The process of fermentation is a type of decay where bacteria and yeast break down the sugars in grapes in order to produce alcohol. Decay is welcomed here rather than avoided, and aging becomes an important factor in winemaking required to produce desirable aromas. In this case the subsequent aging and death of the grape becomes valuable, some may even say more valuable than when it was at the peak of its vitality.

“Many reactions occur during the maturing and aging phase which lead to significant changes in the composition of the wine... The grape-derived aromas fade, and more complex and pleasing aromas develop. The taste of the wine also changes. Astringent and harsh tastes are replaced by smoother, rounder tastes. The various taste and aroma components integrate, yielding complex, rich, and delicious wines” (Dharmadhikari 1991).⁷

Contemporary well-intentioned ideals of preservation pave the way for stagnation. Instead of trying to keep decay from occurring what would happen if we took advantage of the opportunities that age and even death brings? In order to achieve this there must first be a shift in our societal views concerning how we measure and understand the idea of worth in different stages of life. This is especially important for states of decay that connote a sense of taboo, where society's first

⁵ Bjørnar Olsen, and Þóra Pétursdóttir, *Ruin Memories: Materiality, Aesthetics and the Archaeology of the Recent Past* (London: Routledge/Taylor & Francis Group, 2014), 14.

⁶ Graham, S., and N. Thrift. *Out of Order: Understanding Repair and Maintenance* (Theory, Culture & Society 24, no. 3, 2007), 5.

⁷ Dr. Murli Dharmadhikari, “Wine Aging,” Iowa State University, 1991, accessed June 5, 2016, <http://www.extension.iastate.edu/wine/w-aging>.

instinct is to abandon, reject, or ignore objects in this stage of development. This reappraisal makes it possible to explore the value of things as they transform. It can remind us of the positive implications for decay which we seem to have forgotten, allowing for a rediscovery of unique possibilities.

In Japanese culture there exists a philosophy of aesthetics and metaphysics running parallel to these concepts that pertain to the field of design, craft, and architecture. It is known as wabi-sabi. This school of thought promotes an appreciation for the beauty found in decay and impermanence. It views the world through the understanding of three simple rules:

All things are impermanent

“All comes to nothing in the end. Everything wears down. The planets and stars, and even intangible things like reputation, family heritage, historical memory, scientific theorems, mathematical proofs, great art and literature (even in digital form)-all eventually fade into oblivion and nonexistence” (Koren 1994, 49).⁸

All things are imperfect

“Every craftsman knows the limits of perfection: the imperfections glare back. And as things begin to break down and approach the primordial state, they become even less perfect, more irregular” (Koren 1994, 49).⁹

All things are incomplete

“All things, including the universe itself, are in a constant, never-ending state of becoming or dissolving. Often we arbitrarily designate

moments, points along the way, as “finished” or “complete.” But when does something’s destiny finally come to fruition? Is the plant complete when it flowers? When it goes to seed? When the seeds sprout? When everything turns into compost? The notion of completion has no basis in wabi-sabi” (Koren 1994, 50).¹⁰

These three principles set the groundwork for a way of perceiving the world that embraces the effects of time. It teaches an acceptance of the inevitable, of the change that comes with age, and of the potential for things to acquire meaning as they continually transition through phases of incompleteness. In wabi-sabi the idea of beauty can be seen through an accumulation of experiences that stem from the inevitable and continuous process of decay and rebirth, as opposed to the widely accepted definition of beauty that comes from the vigour found in the early or peak stages of life. When applied to the practice of architecture it translates to an appreciation for the repurposing of buildings and the beauty of ruination.

“The outcome is a modern ruin landscape of closed shopping malls, abandoned military sites, industrial wastelands, derelict amusement parks, empty apartment houses, withering capitalist and communist monuments. A ghostly world of decaying modern debris that for long was left out of academic concerns and conventional histories – and also considered too recent, too grim and too repulsive to be embraced as heritage” (Olsen 2014, 3).¹¹

We tend to value the photographs of newly minted structures as the ideal of a project, depicting the architecture in its untouched and pristine form. Contrary to this, the philosophies

⁸ Leonard Koren, *Wabi-Sabi for Artists, Designers, Poets & Philosophers* (Berkeley: Stone Bridge Press, 1994), 49.

⁹ Ibid.

¹⁰ Ibid., 50.

¹¹ Bjørnar Olsen, and Þóra Pétursdóttir, *Ruin Memories: Materiality, Aesthetics and the Archaeology of the Recent past* (London: Routledge/Taylor & Francis Group, 2014), 3.

drawn from wabi-sabi teaches us that all things, including architecture, are in a constant state of becoming. Buildings are meant to be inhabited. They mature through use and reuse, and as the use or context changes the purpose of the building must change along with it; always in a state of development. The same can be said for the process of ruination. Instead of trying to preserve the built form through continual maintenance wabi-sabi's approach is to let the building transform in conjunction, and as a result of, its setting and use. Wabi-sabi welcomes the invasion of the natural, seeing an aesthetic pleasure as the structure begins to surrender itself to overgrowth and other instances of decay. In this instance the pristine is seen as sterile and lacking in character. This style of material aesthetic and philosophy of perpetual development shows us that the prime state is both illusory and impermanent. It exemplifies the notion that all stages of life have worth, and challenges our preconceptions of what constitutes beauty beyond the narrow scope accepted as the norm in society.

Wabi-sabi's outlook relating to the physical transformation of the built form through time can be further explored within the framework of weathering. Weathering can be understood as a specific form of physical decay, a breaking down of materials through elemental exposure and use. The theory surrounding weathering has various overlapping elements that can be traced back to the principles proposed in wabi-sabi, but one idea of importance is the palimpsestic characteristics created through the weathering of matter. There is a definition of palimpsest which provides an intriguing peripheral analogy.

“Palimpsest: A manuscript or piece of writing material on which later writing has been superimposed on effaced earlier writing”
(Oxford Dictionaries).¹²

This has a clear connection pertaining to the concepts of transformative yet connected identities that were discussed previously. It refers to an act of recording, a method of storytelling. The architecture becomes the medium through which a narrative is being played out, constantly edited as a result of material aging and decay.

“Events in the past—at least our feelings, thoughts, tastes, and so on about them—mark the memory, like a signet on a ‘good thick slab of wax’ said Socrates in Theaetetus. What remains from the past is a trace or impression of an event, not the thing itself as it existed when present” (Mostafavi & Leatherbarrow 1993, 116).¹³

The imperfections brought on by these processes of weathering and aging, along with the wear and tear of inhabitation remain as a sign of the building's history, a physical manifestation of its past. Any one period does not just represent that one time, rather it is the summation of all that came before it. The end contains within it the birth, the prime, and the decay of an object, while the beginning originates from the legacy of another; resulting in a cyclical story of life.

“Every piece of furniture and object told a story, all together they narrated family history. As a result, the house was never finished, ‘it grew along with us and we grew within it’”
(Mostafavi & Leatherbarrow 1993, 80).¹⁴

In current architectural practice we often design against the flow of entropy, treating the effects of weathering as flaws that require removal or maintenance. Ironically the more effort we put into keeping these natural progressions at bay the more obvious their traces become. Instead of using half-measures to hide the inevitable, we should be looking for a new perspective to

¹² Oxford Dictionaries, “Palimpsest,” Oxford University Press, accessed June 8, 2016, <http://www.oxforddictionaries.com/definition/english/palimpsest>.

¹³ Mohsen Mostafavi, and David Leatherbarrow, *On Weathering: The Life of Buildings In Time* (Cambridge: The MIT Press, 2001), 116

¹⁴ *Ibid.*, 80.

understanding their inherent beauty. When put in this light what were once considered obstacles to be designed around now become potential features to be incorporated. This was the approach Carlos Scarpa took for many of his built works.

“In the Brion Cemetery, the tall, blank exterior wall of the chapel has become a setting for showing the effects of weathering in a dramatic manner. Scarpa interrupted the horizontal run of the stepped parapet with a gap that has allowed the rainwater to seep through, leaving a black stain in the middle of the wall. This marking reveals, through weathering, nature’s temporality; the beginning and end of things” (Mostafavi & Leatherbarrow 1993, 98).¹⁵

Scarpa not only accepted these so called imperfections into his designs, he embraced them, making it a key element in his architecture that celebrated the possibilities found in processes of decay and impermanence. His use of details to showcase weathering transforms the built object into an instrument for recording time through material endurance. This ability that architecture has to bear witness to history relies on its capacity to age naturally, free from superficial human interventions. Great architecture can span generations. By constantly trying to keep things in their prime state, or discarding those that have passed it, we are in fact obscuring historical narratives and losing a connection with our past. The weathering of materials that comes with age has an impact not just on the built structure, but on everything that comes into contact with it. Its intrinsic worth extends beyond simple aesthetics and into the ephemeral realm of storytelling.

In the previous acts we’ve explored the implications of transformative identities and the craft of upcycling. Both are based on the concept of revitalizing built forms through creative ingenuity, allowing for new life cycles and uses

to emerge. This in effect generates a different prime state each time an object transitions from one identity to another. However all things reach their material limits at some point. *‘All things come to nothing in the end. Everything wears down.’* This was one of the precepts espoused by Wabi-sabi. In order to truly develop a philosophy of making fit for current times it is essential that a new system of valuation be introduced. We must not only recognize the worth in all stages of existence but also learn to accept the inevitable progression of all things towards a state of entropy. A larger cycle can be experienced on this stage, beyond the reimagining of material and use; one that understands decay and death as transient junctures, no different than those that came before them; leading to the inevitable threshold of rebirth where things can begin anew.

¹⁵ Mohsen Mostafavi, and David Leatherbarrow, *On Weathering: The Life of Buildings In Time* (Cambridge: The MIT Press, 2001), 98.

MOLLUSKS & SEAFORTS

To read; it means to comprehend through the interpretation of visual matter. The connotation drawn by most when referring to the act of reading would be the reading of text, composed of a plethora of languages, forming an infinite combination of utterances. But in truth most things can be read, if one looked hard enough, and understood the purpose for which they were reading.

Fifteen kilometers out from the nearest coast, at the intersection of the North Sea and the Thames Estuary exists an offshore research hub dedicated to the study of mollusks in relation to oceanic climate change. Established by the former United Kingdom, the construction of this facility was predicated on the existence of seven pre-existing artifacts located on the site; a series of strange concrete pillars that jut out from the depths of the ocean floor. They now act as the backbone for the formation of shell reefs. No one knows the original purpose for these ruins; their identities have been worn away by the tides and lost to recorded history.



Fig 3.1 Ecological Ruins

A woman stands at a work bench staring intensely at the objects arrayed in front of her. They are a series of shells placed in a grid, all labeled, all spaced evenly apart on each side. She is a marine biologist by trade specializing in the research of bivalves. Every day she studies these shells trying to decode their language and uncover their secrets.

The scientist inspects each shell carefully through magnifying glasses and microscopes, then touches them with her fingers, and finally documents them with digital imagery. She uses calipers to measure sizes, and dyes to reveal contrast in the minerals. She does this each time before recording an entry into her notebook.

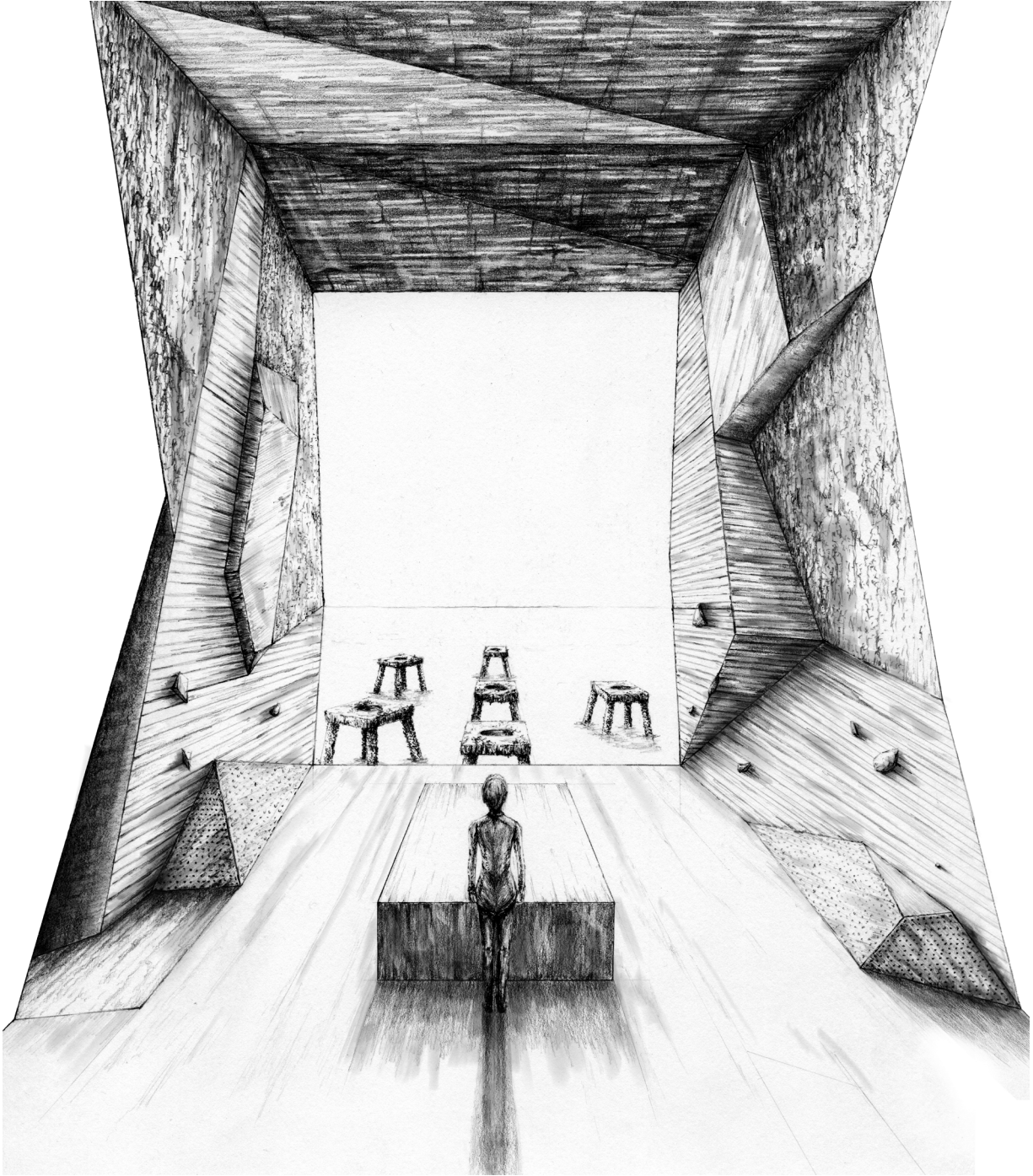


Fig 3.2 Looking Out

Sample SSS43

Site 4 - 1500 hours

Mytilus Edulis (Blue Mussel)/ 13 Year Maturation/ Depth 8.2m

Observations:

Preliminary inspection shows Sample SSS43 to have undergone 13 growth cycles separated by 12 dormancy cycles throughout its 13 year lifespan. Growth rings measure at approximately 1.5mm width at the inner ring, steadily increasing to 2.0mm width at the outer ring, indicating a lengthening of seasonal growth periods. The inverse is observed for dormancy, measuring at approximately 1.2mm width at the inner ring, steadily decreasing to 0.9mm width at the outer ring, indicating a shortening of seasonal dormancy periods. This leads to an initial hypothesis of a rise in water temperatures at site 4 of a minimum 1.8°C, and a shortening of the cooling season by 3 weeks over the last 13 years.

Contrast analysis shows the existence of mineral particulates in the growth rings consisting of chromium, copper, mercury, lead, and arsenic. Initial inspection indicates heavy metal contamination, most notably in growth years 4 and 7. Exact levels and quantities of these heavy metals to be determined by wavelength dispersive spectroscopy.

The protein fluids of the periostracum composed of calcium carbonate crystals suggest an alarmingly low concentration of carbon, nitrogen, and oxygen isotopes in site 4; concerns of oceanic dead zone present. Exact levels and quantities of these isotopes to be determined by the mass spectrometer.

Pressure test indicates shell to be brittle with a thickness measuring at 0.3mm. This points to decreased PH levels in the water due to an uptake of carbon emissions in the atmosphere, suggesting worsening of ocean acidification.

No other marine organisms visibly grafted onto shell, indicator of decrease in biodiversity at site 4.



Fig 3.3 Mollusks as Environmental Indicators Ecological Ruins

She records these observations with enthusiasm. To some they are simply bits of data to be documented, but to her they paint a vivid picture of an unfamiliar landscape. In the quiet seclusion of her lab, at this remote facility, these shells offer her a glimpse of the world from an immense scope, seen like a gallery of images through her mind's eye. Each shell tells a unique story, and from these small objects she can absorb the macro perspective of places and times that she's never experienced.

The scientist slowly gets up from her work bench to stretch, and walks towards an expansive window. She can see four of the seven reef clusters from her lab, with the North Sea stretching out into the distance. Seeing her own reflection she realizes that it's been almost a week since she's last left her quarters. She decides to go out to catalogue some of her latest specimens and get some fresh air.

Three separate towers make up this facility, designated as hubs one, two, and three. Hubs one and two are research towers, while hub three is a humidity, temperature, oxygen, and light controlled environment she likes to call The Archive. This is where the scientists house a select number of shell for reference after they have been analyzed; this is where she is headed.

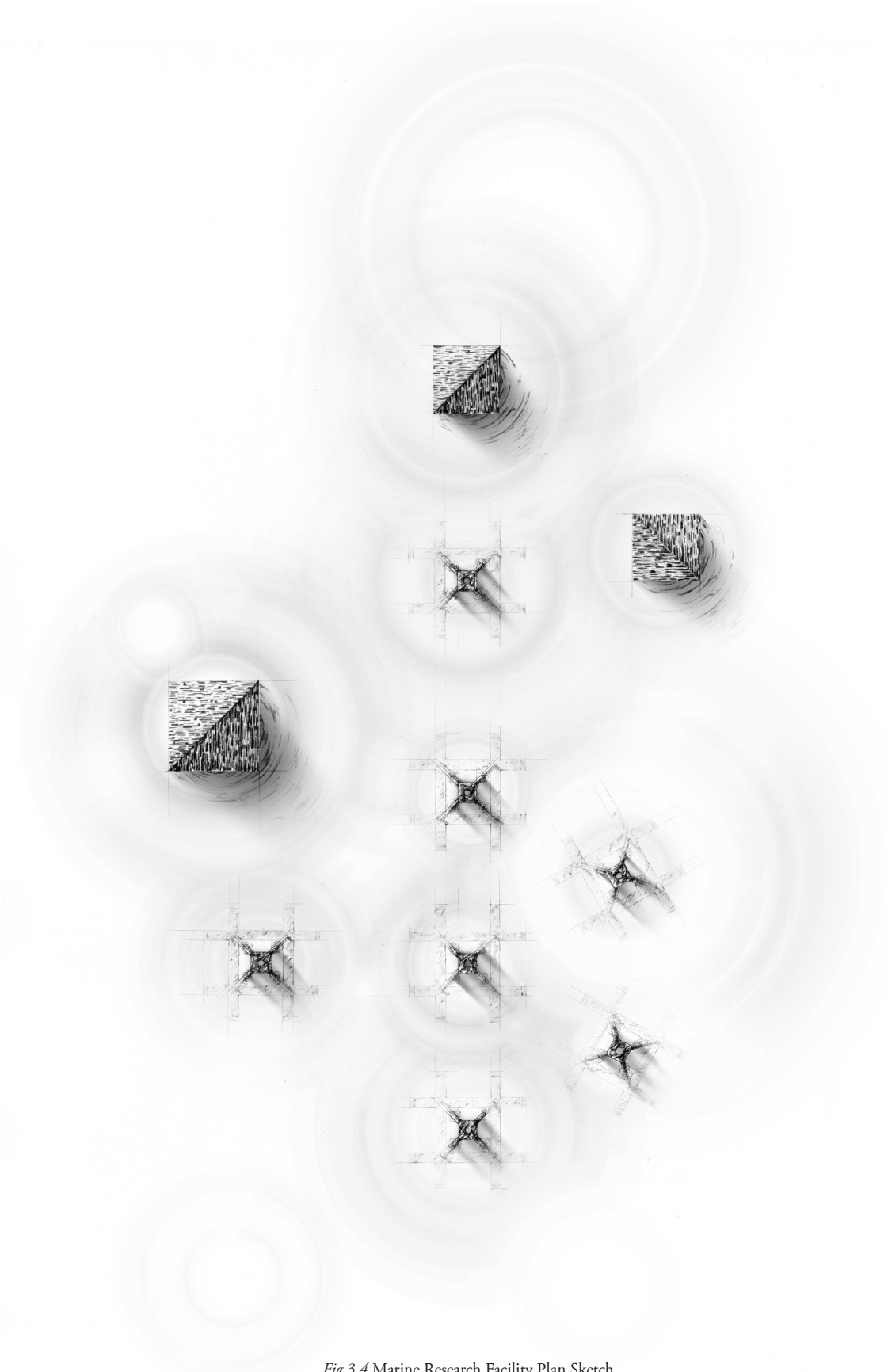


Fig 3.4 Marine Research Facility Plan Sketch

Outside the cold ocean air greets her like an unwelcome guest. She signs out a personal vessel from sub level twelve and carefully makes her way to hub three, stopping at each mollusk cluster for a cursory inspection. She passes site four slowly, weaving her way around fragments of unidentified material towards the four pillars of concrete jutting out of the water.

Since it is low tide, the structures loom over her and she can make out the stratification of mollusks as they transition along the artificial substrate. Mollusk reefs this far out from the coast have become extinct over the last century due to a drastic rise in sea levels and violent oceanic storms. The existence of these seven colonies is only made possible by the presence of the cryptic structures that make up the core of each reef. There have been many theories as to their origins, but all are conjecture, with no proof to support the claims. The only thing that can be certain is that the concrete and fallen debris created a solid foundation for the mollusks to graft onto, acting as a means of protection from the rough ocean currents. Each site is in various stages of decay, but all have the same four columns that run from the ocean floor to several storeys above sea level. She has her own guesses as to what these ruins once were, and with a little help she is getting closer to unravelling their mysteries.

Site 4 – 1600 hours

Conditions clear, 12°C, low tide, water levels during departure -15m.

Observations

Site 4 reef columns stand approximately 8m above current water levels. Visual stratification of 2 distinct mollusk species sighted. Species include: Mytilus Edulis (Blue Mussel) typical depth range 5m to 10m below sea level, and Crassostrea Gigas (Pacific Oyster) typical depth range 0.75m to 6.5m below sea level.

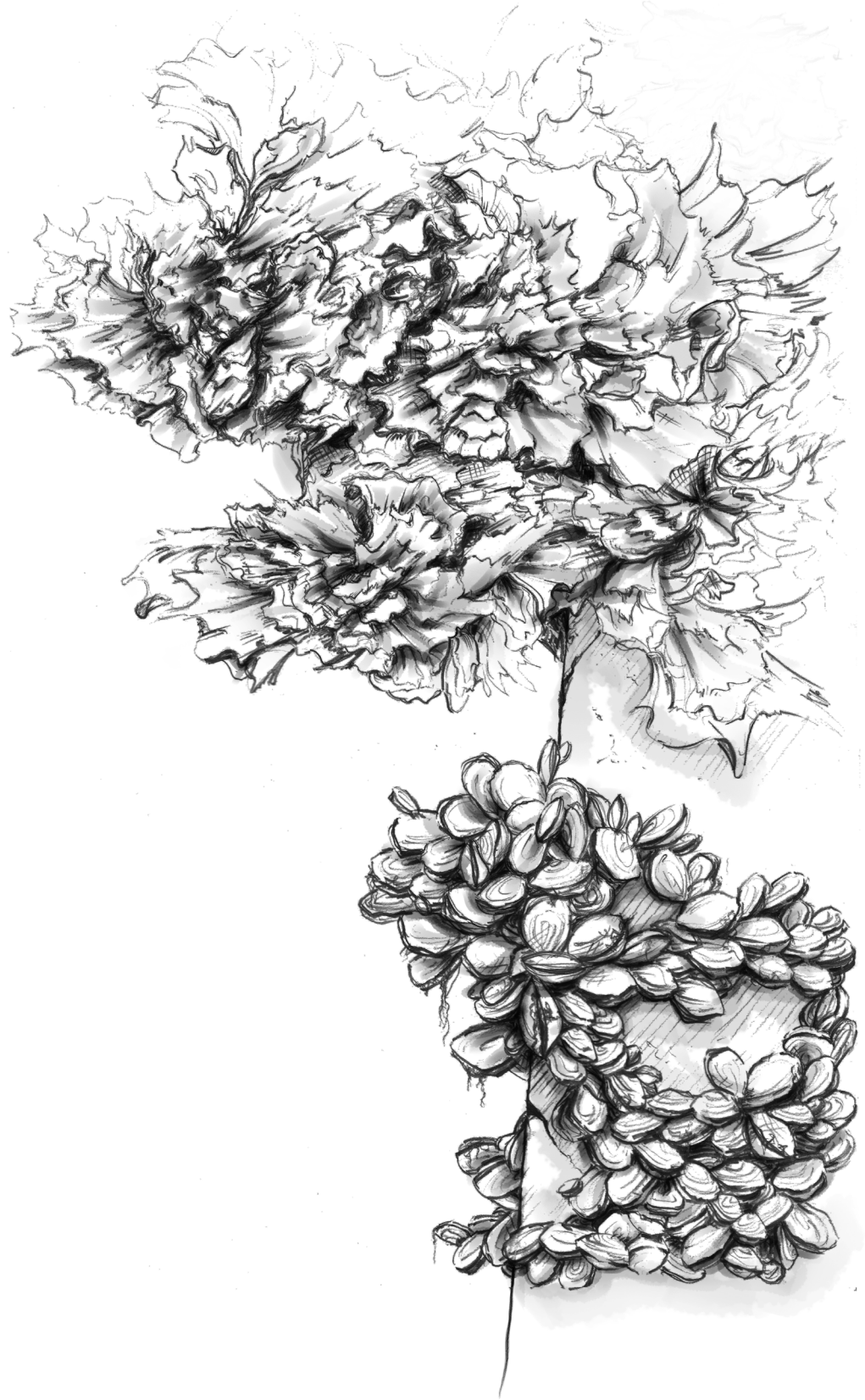


Fig 3.5 Mollusks Stratification Detail

It has been months since she's been outdoors for so long and she begins to feel lightheaded by the time she reaches hub three. Nowadays even specimen deliveries are typically done through non-human methods to minimize exposure, but as she docks her boat in the loading bay she can feel her excitement mounting at the anticipation of what is awaiting within. The loading bay is separated from the interior of the tower by an airlock. In the airlock she dons a hermetically sealed suit before entering into an elevator. It takes her up to sub level eight, which is where the shell repository begins. She steps out into a chasm that connects every floor of the tower. Above her are platforms located at the center of each floor, with the stair and elevator core acting as the vertical spine. Surrounding her are walls of shells spanning decades, and centuries. The archive is arranged so that the oldest shells are stored at the bottom and the newest at the top, with the possibility of adding floors as necessary. She stops for a minute to ponder at the multitude of stories that must be accumulated in this extraordinary place before walking over to a console in the middle of the atrium. She sits down and begins to type.

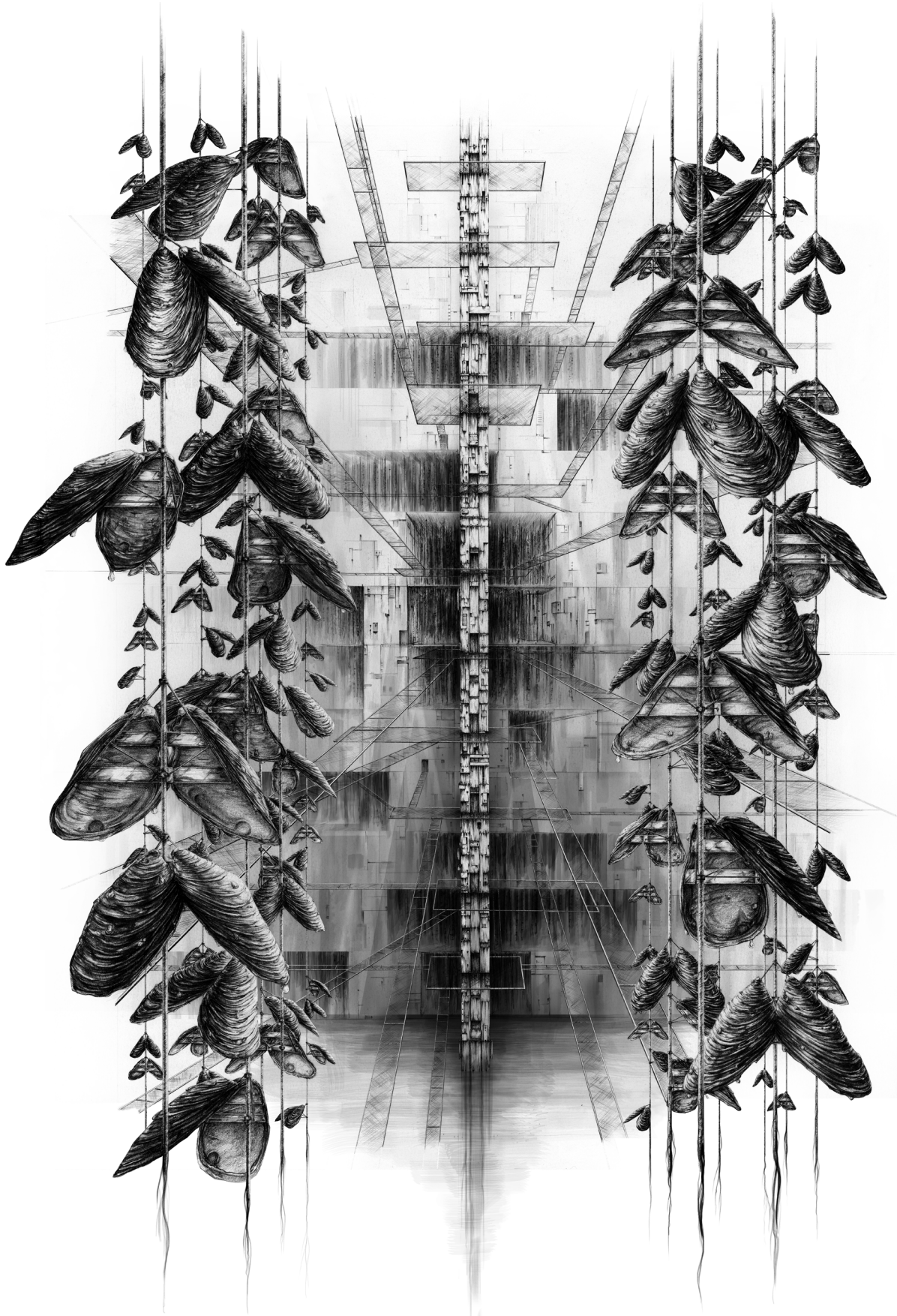


Fig 3.6 Shell Archives

Sections of the repository light up at her command, highlighting specific strains of shell samples. Each sample glides silently from their position to the center of the room. The scientist looks at each strand of mollusk carefully, tracing her way from the top to the bottom, one shell at a time. Most things can be read if one looked hard enough, and understood the purpose for which they were reading. She understands the language that the shells speak. They are revealing to her the history of the site and purpose of the artifacts within. On each shell, hidden in each ring, she can track the changing storms and seasons. She can see the rising water currents and the creatures that intersect along the way. At times if she looks hard enough, through the gunfire and smoke, she can even catch glimpses of seven forts standing vigil in the water, and hear the echoes of bofors guns going off in the night.



Fig 3.7 Storytelling

EPILOGUE

Thoughts & Others

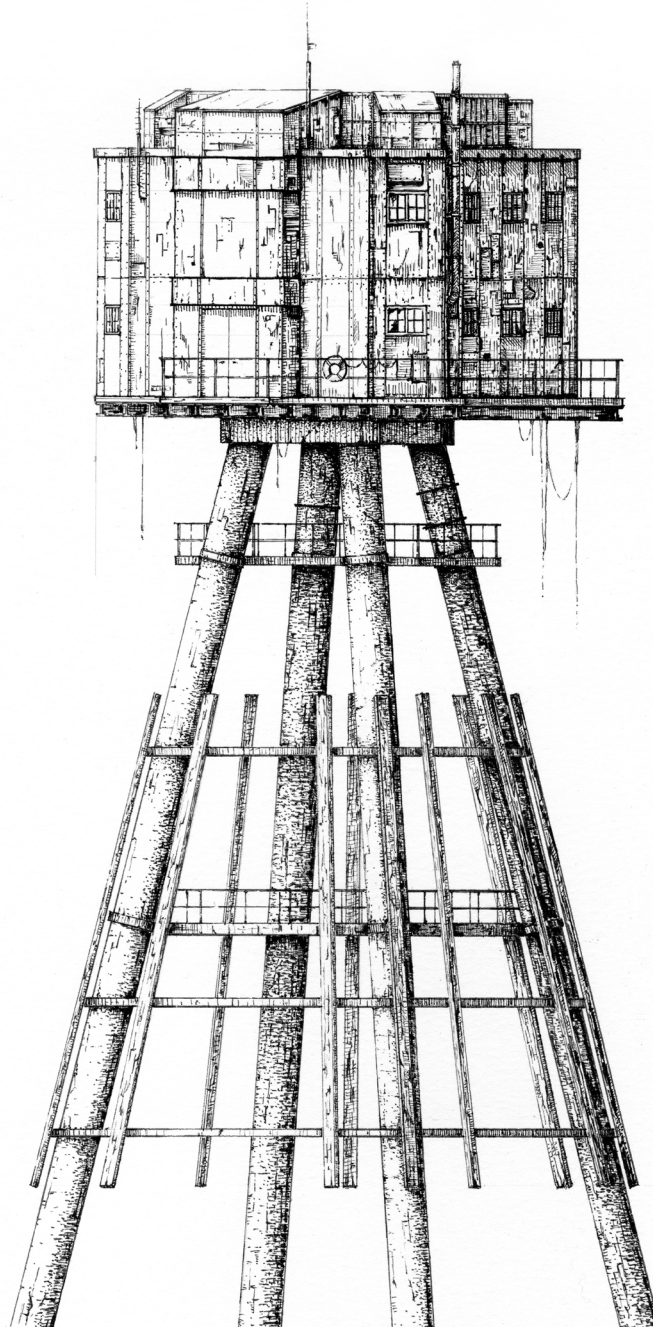


Fig 4.0 Fort Tower Elevation - Pen

AFTERWORD

There is a certain art when it comes to naming. It is a skill I do not possess, which is why I spent a disproportionately large amount of time mulling over the title of this thesis – *Tales of the Maunsell Sea Forts: A Philosophy of Making in the Anthropocene*. I would like to go back now and give my thoughts on this title.

Let's begin by unpacking the former half '*Tales of the Maunsell Sea Forts*'. First off I chose '*tales*' rather than '*stories*' because it connotes a sense of folk storytelling, reminiscent of childhood nursery rhymes or fables, crafted to suggest a hidden meaning within the events. There are three tales centered on the forts within this body of work. Having gone through the document I hope it is clear that the focus of this thesis goes beyond the forts and alludes to something deeper. These tales act as a vehicle through which the many different topics discussed, such as transformative use, found object design, and productive ruination are examined and explored. Each draws from a collection of disparate yet interrelated concepts and points to a larger theme intended to weave together the overarching narrative of this thesis; a philosophy of making in the Anthropocene.

Next come '*the Maunsell Sea Forts*'. I chose them as the titular subjects of these speculative fictions because they exist outside the awareness of the modern world; situated in a remote location, created for a purpose that is no longer relevant, abandoned for decades, and imbued with an unbelievable aesthetic. This allows readers to accept them into their imaginations while at the same time grounding them in

reality. Additionally their unlikely story can be witnessed through an encoded material history, acting as pages that exemplify the palimpsestic nature of these structures, while demonstrating the value of weathering and decay. This makes the forts uniquely suited as the protagonists of these tales. Most importantly their rich history of constant transformation is an allegory for the development of an attitude towards craft, design, and materiality that expands the current temporal scope of perceived use and vitality; asking us to consider the impacts of making beyond seasonal trends and into a planetary scale that references geological eras.

The latter half of the title *A Philosophy of Making in the Anthropocene* can be considered the core of this thesis. Having journeyed through this collection of works which intertwine with each other, the hope is that one comes out the other side with a new perspective on making. The concepts discussed are not necessarily difficult to comprehend, but the challenge lies in changing the way we instinctually react to these concepts; changing the way we want to build, design, and live. The term philosophy has two main definitions.

“1 The study of the fundamental nature of knowledge, reality, and existence, especially when considered as an academic discipline” (Oxford Dictionaries)

“2 A theory or attitude that acts as a guiding principle for behaviour” (Oxford Dictionaries)

The first means to rationally know something, the second means to empirically experience it. There is a fundamental difference between knowing and feeling, but when they resonate it becomes the true definition of a philosophy. I chose to call this a philosophy of making because it is both a code of conduct and a belief system to live by; something that is

¹ Oxford Dictionaries, “Philosophy,” Oxford University Press, accessed March 22, 2017, <https://en.oxforddictionaries.com/definition/philosophy>.

² Ibid.

understood, experienced, and felt. At the beginning of this academic endeavour I thought that by its completion I would have a profoundly different outlook on the world. However, I have come to realize that the impacts of producing a thesis do not manifest themselves in obvious ways; they creep up on you in subtle and often unexpected moments. Through the development of this philosophy I have experienced a shift in my own thinking. On a conceptual level I now contemplate design within a larger temporal framework, considering the potential futures for the projects that I conceive while accounting for the inevitability of change. On a more intimate scale it has affected my attitude concerning manufactured goods, transforming what was once apathy towards discarded products into an excitement at the opportunities these objects contain. I believe the establishment of these innate impulses are significant because they have become embedded in my day to day life and in how I see myself interacting with the built world. They have become integrated into my own philosophy of making.

Lastly the title is capped off with a mention of '*the Anthropocene*'. While researching this thesis I came across many traditions in the practice of craft and design dating back hundreds of years which appear to be relevant today. I began to ask myself why these practices weren't more frequently used, and whether this thesis was simply about migrating them into the present. I later realized that this was not a viable solution. The state of the world is vastly different today than it was even a hundred years ago. One cannot simply transfer practices from one time period to another. If an effective philosophy of making were to be developed it would have to be precisely tailored for the issues, resources, and conditions of this era – the Anthropocene. Hence the formation of the title; *Tales of the Maunsell Sea Forts: A Philosophy of Making in the Anthropocene*.

Although these handcrafted tales only give brief glimpses into the potential futures and possible worlds of the forts, I hope that they are enough to entice you into further exploration. I invite you to inhabit these structures as fishermen aboard floating markets during a time of political uncertainty, as salvagers mining for materials in the wake of global resource depletion, as scientists studying these mysterious artifacts looking for a lens into the past, and even as the mollusks that reside on their ruined shadows during the final stages of material decay. As you immerse yourself in these worlds populate them with your own stories. Play them out in your mind while asking questions about what it means to be a responsible maker within your current global context. These interludes can result in the culmination of immense theories that examine the perplexing possibility of designing for a post-human world; or perhaps the formation of policy shifts proposing an educational reform in which found object design and adaptive reuse projects are mandated into the architectural curriculum; or finer grain still, developing interventions on the scale of joinery details that have self-locking mechanisms to facilitate the disassembly and reuse of parts. These ideas will inevitably branch off into other inquiries. How can we design if not from a human-centric perspective? What are the ways that repurposed materials can be integrated with cutting edge fabrication technologies or as yet undiscovered ecosystems of design? Are there new materials being developed that open up opportunities for the continual upcycling of components? The hypothetical scenarios are endless. I hope these stories lead you down diverse and unanticipated avenues of discovery, challenging stagnant views and preconceived notions in the many fields that intersect along the way. After you finish reading through this book once I hope you find the time to go through it again, maybe following a different sequence of narratives, acquiring insights that were not there the first time around. But most of all I hope you gain an appreciation

for these strange forgotten towers that quietly exist on the periphery of societal consciousness, and enjoy living within the rich fictional universes which they have helped to create.

BIBLIOGRAPHY

- "American Bison and American Indian Nations." Smithsonian National Zoological Park Conservation Biology Institute. 2014. Accessed February 22, 2017. <http://americanbison.si.edu/american-bison-and-american-indian-nations/>.
- "Artificial Oyster Reefs." Georgia Sea Grant. Accessed November 21, 2015. https://georgiaseagrant.uga.edu/article/artificial_oyster_reefs/.
- Boffey, Daniel. "Brexit Britain: 'Foreign boats catch fish in our waters and then ship it back to us'" The Observer. May 22, 2016. Accessed October 22, 2016. <https://www.theguardian.com/politics/2016/may/22/brexit-britain-anger-in-appledore-fishing-industry-demise>.
- Brownell, Blaine. "A History of Wood and Craft in Japanese Design." The Journal of the American Institute of Architects. June 16, 2016. Accessed January 17, 2017. http://www.architectmagazine.com/technology/the-history-of-wood-and-craft-in-japanese-design_o.
- Bryce Stewart Lecturer in Marine Ecosystem Management, University of York, and Griffin Carpenter Visiting Lecturer in Environmental Economics, Oxford Brookes University. "What would Brexit really mean for the UK's fishing industry?" The Conversation. March 24, 2016. Accessed October 20, 2016. <http://theconversation.com/what-would-brexit-really-mean-for-the-uks-fishing-industry-56312>
- Carrington, Damian. "The Anthropocene Epoch: scientists declare dawn of human-influenced age." The Guardian. August 29, 2016. Accessed January 20, 2017. <https://www.theguardian.com/environment/2016/aug/29/declare-anthropocene-epoch-experts-urge-geological-congress-human-impact-earth>.
- "Cars Produced This Year." Cars produced in the world - Worldometers. Accessed January 18, 2017. <http://www.worldometers.info/cars/>.
- Chazan, David. "Brexit 'could boot French fishermen out of British waters'" The Telegraph. July 12, 2016. Accessed October 22, 2016. <http://www.telegraph.co.uk/news/2016/07/12/brexit-could-boot-french-fishermen-out-of-british-waters/>.
- Christian, David. "How We Chronicle the Past." Khan Academy. Accessed April 15, 2016. <https://www.khanacademy.org/partner-content/big-history-project/agriculture-civilization/first-cities-appear/a/recordkeeping-and-history>.
- Cook, Morgan, Parks, Vogt, and David Walker. "Classification of Bivalve Mollusc Production Areas in England and Wales." Cefas, 2013. <https://www.cefas.co.uk/media/41358/swale-sanitary-survey-2013-final-low-res.pdf>.
- Crutzen, Paul J. "Geology of mankind." Nature 415, no. 6867 (2002): 23. doi:10.1038/415023a.

- Denyer, Lucy. "Interiors: why upcycling is having its moment." *The Telegraph*. December 31, 2014. Accessed February 22, 2017. <http://www.telegraph.co.uk/lifestyle/interiors/11303428/Interiors-why-upcycling-is-having-its-moment.html>.
- Dharmadhikari, Murli, Dr. "Wine Aging." *Wine Aging | Midwest Grape and Wine Industry Institute*. 1991. Accessed June 5, 2016. <http://www.extension.iastate.edu/wine/w-aging>.
- "Diving off WW2 Forts - Red Bull Cliff Diving World Series 2012." *Red Bull*. September 6, 2012. Accessed February 18, 2017. <https://www.youtube.com/watch?v=0ExIdjw0tpo>.
- "Essex Estuaries SAC: Site Information (draft)." - GOV.UK. 2015. Accessed November 7, 2015. <https://www.gov.uk/government/publications/marine-conservation-advice-for-special-area-of-conservation-essex-estuaries-uk0013690/essex-estuaries-sac-site-information-draft>.
- Farr, Daniel. Indicator Species. in *Encyclopedia of Environmetrics* (eds. A H El-Sharaawi and W W Piegorsch), John Wiley & Sons, Ltd., 2002.
- "From half-pipes to gun turrets, skateboarder goes on a mission." *Aol News*. December 19, 2016. Accessed February 18, 2017. <https://www.aol.com/article/news/2016/12/19/from-half-pipes-to-gun-turrets-skateboarder-goes-on-a-mission/21631184/>.
- Gallois, Andre. "Identity Over Time." *Stanford Encyclopedia of Philosophy*. March 18, 2005. Accessed April 16, 2016. <https://plato.stanford.edu/entries/identity-time/>.
- Gissen, David. *Subnature: architecture's other environments*. New York: Princenton Architectural, 2009.
- Glaser, Marion. *Human-Nature Interactions in the Anthropocene: potentials of social-ecological systems analysis*. New York: Routledge, 2014.
- Goasduff, Laurence. "Gartner Says Smartphone Sales Surpassed One Billion Units in 2014." *Gartner*. March 3, 2015. Accessed January 18, 2017. <http://www.gartner.com/newsroom/id/2996817>.
- Graham, Stephen, and Nigel Thrift. "Out of Order." *Theory, Culture & Society* 24, no. 3 (2007): 1-25. doi:10.1177/0263276407075954.
- Gray, David. *Liminal Thinking: create the change you want by changing the way you think*. Brooklyn, NY: Two Waves Books, 2016.
- Greenberg, Paul. "How Mussel Farming Could Help to Clean Fouled Waters." May 9, 2013. Accessed November 20, 2015. http://e360.yale.edu/feature/how_mussel_farming_could_help_to_clean_fouled_waters/2648/.
- Hawley, Katherine. "Temporal Parts." *Stanford Encyclopedia of Philosophy*. February 01, 2004. Accessed April 17, 2016. <https://plato.stanford.edu/entries/temporal-parts/>.
- Hirasuna, Delphine, and Kit Hinrichs. *The Art of Gaman: arts and crafts from the Japanese American internment camps, 1942-1946*. Berkeley, CA: Ten Speed Press, 2005.
- Hirst, Andrew. "Amazing story of pop band and pirate radio station manager Reg Calvert who was shot dead in 1966." *The Huddersfield Daily Examiner*. October 8, 2014. Accessed February 16, 2017. <http://www.examiner.co.uk/lifestyle/nostalgia/amazing-story-pop-band-pirate-7891237>.

- "How is Today's Warming Different from the Past?" NASA Earth Observatory. Accessed January 16, 2017. <http://earthobservatory.nasa.gov/Features/GlobalWarming/page3.php>.
- Johnston Environment Correspondent, Ian . "World facing first mass extinction since the dinosaurs as wildlife populations plunge by 67 per cent in 50 years." *The Independent*. October 26, 2016. Accessed January 16, 2017. <http://www.independent.co.uk/environment/extinction-wildlife-since-dinosaurs-populations-fall-67-per-cent-wwf-zsl-a7381906.html>.
- Juniper, Andrew. *Wabi sabi: the Japanese art of impermanence*. Tokyo: Tuttle Publishing, 2010.
- Kielburger, Craig And Marc. "Canada's Dumping Its Trash in Another Country's Backyard." *The Huffington Post*. August 05, 2014. Accessed January 19, 2017. http://www.huffingtonpost.ca/craig-and-marc-kielburger/canada-manila-recycling_b_5452730.html.
- Kirby, Alex. "Human Consumption of Earth's Natural Resources Has Tripled in 40 Years." *EcoWatch*. July 25, 2016. Accessed January 18, 2017. <http://www.ecowatch.com/humans-consumption-of-earths-natural-resources-tripled-in-40-years-1943126747.html>.
- Koren, Leonard, and Yukiko Naito. *Wabi-Sabi for artists, designers, poets & philosophers*. Berkeley, CA: Stone Bridge Press, 1994.
- Krajewski, Markus. "The Great Lightbulb Conspiracy." *IEEE Spectrum: Technology, Engineering, and Science News*. September 24, 2014. Accessed January 17, 2017. <http://spectrum.ieee.org/geek-life/history/the-great-lightbulb-conspiracy>.
- Leatherbarrow, David, and Mohsen Mostafavi. *On Weathering: the life of buildings in time*. Cambridge, Mass: MIT Press, 2001.
- Le-Roi, Bob. "Fort Fax." *Fort Fanatics*. January 25, 2017. Accessed February 13, 2017. <http://www.bobleroi.co.uk/ScrapBook/CityReunion/FortFanatics.html>.
- Lichtenstein, Rachel. "The Riches of the Thames Estuary Are under Threat." *Aeon*. October 8, 2013. Accessed November 18, 2015. <https://aeon.co/essays/the-riches-of-the-thames-estuary-are-under-threat>.
- "Main Biodiversity Resources in the Tidal Thames - Sites and Habitats." *Port of London Authority*. Accessed February 14, 2017. <https://www.pla.co.uk/Environment/Main-Biodiversity-Resources-in-the-tidal-Thames-Sites-and-Habitats>.
- "Map Record Details." *Record Details*. 2015. Accessed November 7, 2015. <http://www.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=11242>.
- "Maunsell Sea Forts." *Maunsell Sea Forts*. 2015. Accessed November 8, 2015. <http://maunsellseafort.com/>.
- Mazzie-Ballheim, Claudia . "Upcycling in history -- the art of "Gaman" in Japanese-American internment camps during WW2." *Creative Upcycling and Mixed Media*. August 18, 2013. Accessed February 22, 2017. <http://creativeupcycling.blogspot.ca/2013/08/upcycling-in-history-art-of-gaman-in.html>.
- McDonough, William, and Michael Braungart. *Cradle to cradle remaking the way we make things*. New York City, NY: North Point Press, 2002.

- McDonough, William, and Michael Braungart. *The Upcycle*. New York City, NY: North Point Press, 2013.
- Meilaender, Gilbert. *Should we live forever?: the ethical ambiguities of aging*. Grand Rapids, MI: Eerdmans, 2013.
- Mills, Russ. "Portfolio." Russ Mills. Accessed October 4, 2016. <http://www.byroglyphics.co.uk/1921xrqpuh26btry7sjljjxidaoip>.
- Milmo, Dan. "How will Brexit affect Britain's trade with Europe?" *The Guardian*. June 26, 2016. Accessed October 23, 2016. <https://www.theguardian.com/business/2016/jun/26/how-will-brexit-affect-britains-trade-with-europe>.
- Minter, Adam. "Are China's Dams Causing Quakes?" *Bloomberg View*. October 09, 2014. Accessed January 16, 2017. <https://www.bloomberg.com/view/articles/2014-10-09/are-china-s-dams-causing-quakes>.
- Moss, Paul. "Scotland's fishermen look forward to EU referendum." *BBC News*. March 07, 2016. Accessed October 23, 2016. <http://www.bbc.com/news/uk-politics-eu-referendum-35746323>.
- Neslen, Arthur. "Leaving EU could end 'unfair' French fishing quotas, says minister." *The Guardian*. June 01, 2016. Accessed October 22, 2016. <https://www.theguardian.com/environment/2016/jun/01/leaving-eu-could-end-unfair-french-fishing-quotas-says-minister>.
- Noonan, Harold W. *Personal Identity*. 2nd ed. London: Routledge, 2003.
- Olsen, Bjørnar, and Þóra Pétursdóttir. *Ruin memories: materiality, aesthetics and the archaeology of the recent past*. London: Routledge/Taylor & Francis Group, 2014.
- Olson, Eric T. "Personal Identity." *Stanford Encyclopedia of Philosophy*. August 20, 2002. Accessed April 16, 2016. <https://plato.stanford.edu/entries/identity-personal/>.
- "Oxford Dictionaries - Dictionary, Thesaurus, & Grammar." *Oxford Dictionaries | English*. Accessed June 8, 2016. <https://en.oxforddictionaries.com/>.
- Patrik, Linda E. "The Aesthetic Experience of Ruins." *Husserl Studies* 3, no. 1 (1986): 31-55. doi:10.1007/bf00355426.
- Paul G Fernandes MASTS Reader in Fisheries Science, School of Biological Science, University of Aberdeen, and Bryce Stewart Lecturer in Marine Ecosystem Management, University of York. "Fact Check: is 80% of UK fish given away to the rest of Europe?" *The Conversation*. April 14, 2015. Accessed October 23, 2016. <http://theconversation.com/fact-check-is-80-of-uk-fish-given-away-to-the-rest-of-europe-39966>.
- Perrone, Pierre. "Obituary: Screaming Lord Sutch." *Independent UK*. June 18, 1999. Accessed February 16, 2017. <http://www.independent.co.uk/arts-entertainment/obituary-screaming-lord-sutch-1100942.html>.
- "Planned Obsolescence." *The Economist*. March 23, 2009. Accessed January 17, 2017. <http://www.economist.com/node/13354332>.
- Prigg, Mark. "The astonishing interactive map that shows EVERY German bomb dropped on London during WW2 Blitz." *Mail Online*. December 7, 2012. Accessed February 13, 2017. <http://www.dailymail.co.uk/sciencetech/article-2243951/The-astonishing-interactive-map-EVERY-bomb-dropped-London-Blitz.html>.

- "Reiner Pilz." *Salvo Monthly*, October 11, 1994, 23rd ed.
- Richard Barnes Professor of Law, University of Hull, and Mercedes Rosello PhD Candidate - International Fisheries Law. "Does Brexit mean plain sailing for UK fishermen ... or stormy waters?" *The Conversation*. July 1, 2016. Accessed October 23, 2016. <http://theconversation.com/does-brexit-mean-plain-sailing-for-uk-fishermen-or-stormy-waters-61784>.
- Sanders, Katy. "We did that in the war, too." *Upcycled*. January 8, 2013. Accessed February 22, 2017. <http://www.upcycledonline.com/words/category/historical>.
- Scholtus, Petz. "The US Consumes 1500 Plastic Water Bottles Every Second, a fact by Watershed." *TreeHugger*. October 15, 2009. Accessed January 18, 2017. <http://www.treehugger.com/clean-water/the-us-consumes-1500-plastic-water-bottles-every-second-a-fact-by-watershed.html>.
- "Sea Level Rise." *National Geographic*. Accessed January 16, 2017. <http://www.nationalgeographic.com/environment/global-warming/sea-level-rise/>.
- "Shellfish Sampling from the Thames." *City of London*. 2015. Accessed November 20, 2015. <https://www.cityoflondon.gov.uk/services/port-health/shellfish/Pages/Shellfish-Sampling.aspx>.
- Speaks, Jeff. "Hume on Identity over time and Persons," *University of Notre Dame*. October 3, 2006, Accessed April 20, 2016. <https://www3.nd.edu/~jspeaks/courses/2006-7/20208/hume-personal-identity.pdf>.
- Spuybroek, Lars. *Sympathy of Things: Ruskin and the Ecology of Design*. Rotterdam: V2 Publishing, 2011.
- Summers, Gill. "What impact would Brexit have on the fishing industry?" *Brodies LLP*. June 21, 2016. Accessed October 22, 2016. <http://www.brodies.com/node/7952>.
- Swartz, Norman. *Beyond Experience: Metaphysical Theories and Philosophical Constraints*. 2nd ed. Burnaby: Norman Swartz, 2001.
- "The Hidden Water in Everyday Products." *GRACE Communications Foundation*. Accessed January 18, 2017. <http://www.gracelinks.org/285/the-hidden-water-in-everyday-products>.
- "The RIBA President's Medals Student Awards." *Presidents Medals: A Defensive Architecture*. July 27, 2009. Accessed October 3, 2015. http://www.presidentsmedals.com/Project_Details.aspx?id=2428&dop=True.
- Thompson, D. *On Growth and Form*, 2nd ed. Cambridge: Cambridge University Press, 1968.
- Turner, Frank R. "The Maunsell Forts of the Thames Estuary." *Project Redsand*. 2006. Accessed April 21, 2016. <http://www.project-redsand.com/history.htm>.
- Turner, Stephen. "The Seafort Project." *Seafort Project*. September 2005. Accessed February 18, 2017. <http://www.seafort.org/theproject.html>.
- Tynan, Sarah, Steve Eggins, Les Kinsley, S.A. Welch, and Dirk Kirste. "Mussel Shells as Environmental Tracers: An Example from the Loveday Basin." *Regolith*, 2005, P.314-317.

Van de Ven, Anne-Marie. "Upcycled – waste not, want not..." Museum of Applied Arts & Sciences. March 7, 2013. Accessed February 22, 2017. <https://maas.museum/inside-the-collection/2013/03/07/waste-not-want-not/>.

Vidal, John. "Toxic E-Waste Dumped in Poor Nations, Says United Nations." Our World. December 16, 2013. Accessed January 19, 2017. <https://ourworld.unu.edu/en/toxic-e-waste-dumped-in-poor-nations-says-united-nations>.

Vince, Gaia. *Adventures in the Anthropocene: A Journey to the Heart of the Planet we Made*. Minneapolis: Milkweed Editions, 2014.

Vincent, Bernadette. *The Artificial and the Natural an Evolving Polarity*. Cambridge, Mass.: MIT Press, 2007.

Wark, McKenzie. *Molecular Red: theory for the anthropocene*. London: Verso, 2016.

Weaver, William Woys. "Heirloom Corn Varieties - Organic Gardening." *Mother Earth News*. July 18, 2013. Accessed June 2, 2016. <http://www.motherearthnews.com/organic-gardening/heirloom-corn-varieties-zewz1307zpit.aspx>.

"What Is The Upcycling Revolution?" *Gumtree*. Accessed February 22, 2017. <https://www.gumtree.com/content/upcycling-hub/what-is-upcycling/>.

Wong, Sam. "Marks of the Anthropocene: 7 signs we have made our own epoch." *New Scientist*. January 7, 2016. Accessed January 18, 2017. <https://www.newscientist.com/article/dn28741-marks-of-the-anthropocene-7-signs-we-have-made-our-own-epoch/>.

APPENDICES

APPENDIX A

BEAM HANGERS TO COFFEE TABLE PARTNERING RACHEL COHEN-MURISON



Fig 4.1a Found Beam Hangers

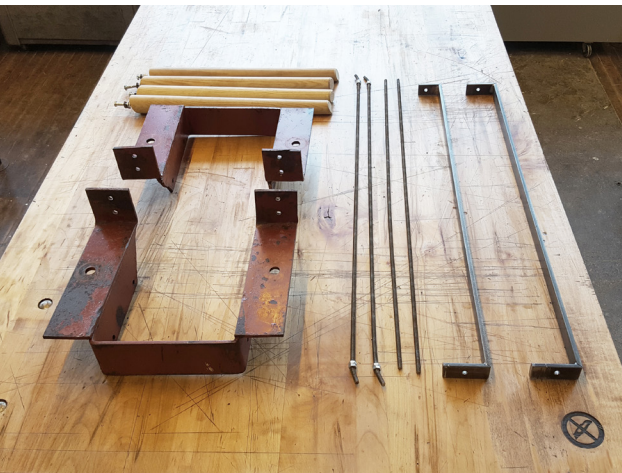


Fig 4.2a Coffee Table Kit of Parts

These 2 steel beam hangers were found discarded in the back lot behind the school dumpster. Originally they had belonged to a member of the faculty as part of a design-build installation. It had since been dismantled with pieces left in disuse to be stored indefinitely or thrown away. On closer inspection the beam hangers appeared to be slightly deformed from their standardized shape. The exterior finish had weathered and chipped from exposure and parts of the hangers were rusting out. However aside from these flaws both objects were still structurally sound. Being constructed out of 5 gauge (7/32") steel and weighing in at over 10lbs each these hangers had been designed for heavy-duty use. Their material durability, solid fabrication, and simplicity made them ideal candidates to be repurposed in another capacity. After confirming with their original owner that the hangers were to be disposed of, my design partner and I decided to appropriate them for a found object furniture project. Since the beam hangers were originally designed to be used in pairs we wanted to treat them as one object and utilize both of them together. Our final concept was to construct a coffee table around these two found objects by making them the support, and bookend connection elements for the legs and top. We designed the table to be easily disassembled and rebuilt in order to provide the opportunity for each individual component to be upcycled in the future.

Our first step was to clean the metal since it had been sitting out in the open for over a year. In doing so we noticed that the paint was chipping severely and the rust was coming off on our hands. We wanted to preserve the worn aesthetic of the object as a physical representation of its history while making it

workable. The solution was to seal the metal in Penetrol. This would halt the rusting and maintain the look that we were after. During the conceptual design phase Rachel and I established that one of our goals was to avoid physically altering the beam hangers in any way, instead challenging ourselves to plan the construction process around its existing conditions. Because of this we decided to use the holes that were predrilled into the flanges as entry points for fastening the legs and cross bracing. The number of components was kept to a minimum for simplicity and ease of maintenance. The kit of parts consisted of: 2 beam hangers, 4 tapered wooden legs, 2 1/4" diameter threaded rods, and 2 steel 'C' bars for cross bracing. All the connections were bolted in order to facilitate disassembly.

As we began working drawings for each of the members we quickly realized a significant difference between typical projects that built with components from scratch, and ones that are designed around a found object. In typical projects, materials are made to be worked with and machined. Parts are fabricated specifically to fit together. There are plains of reference, flat edges, and standardizations that prescribed a step by step method of doing things. These rules did not apply here. Due to the nature of its previous use the holes that were predrilled into the flanges were not symmetrical from side to side, and even less so from hanger to hanger. Additionally the warping which the metal had sustained throughout the years made it so that there were no right angles or level surfaces that could be used as points of reference. These problems were compounded by the fact that we were attempting to use two found objects in the same project, with the intent of leveling

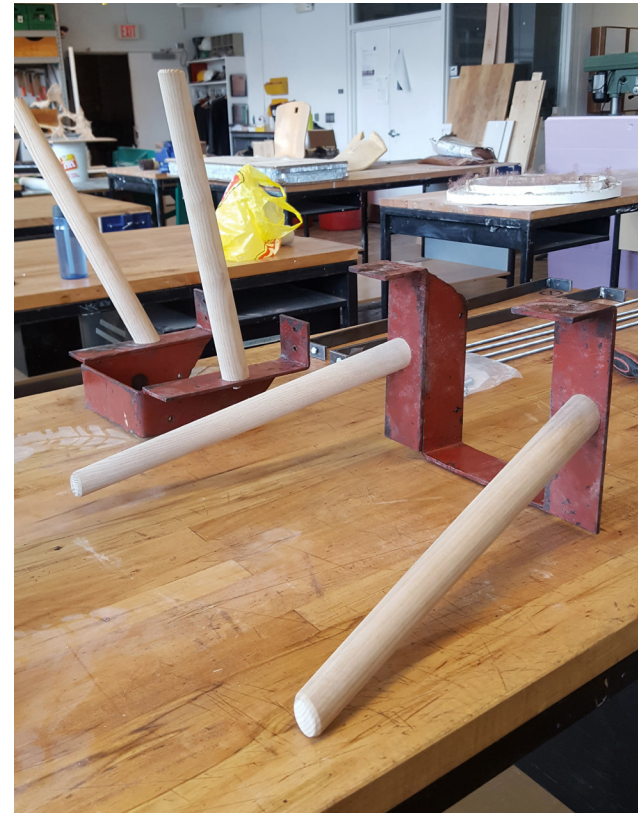


Fig 4.3a Hangers and Leg Assembly

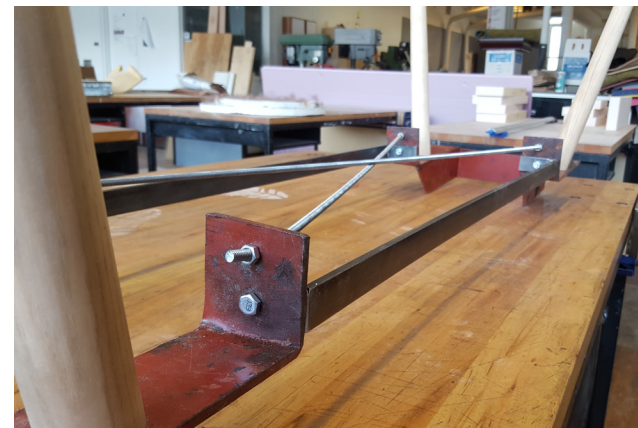


Fig 4.4a Cross Bracing Detail



Fig 4.5a Full Table Frame

them to each other. This called for a different construction approach.

Rather than planning out and fabricating all the components at the beginning we started off by producing a set of standardized legs, then adjusted the cross members to accommodate for the compounded inconsistencies. The construction process became about tinkering and troubleshooting problems as they arose. Rachel and I decided that a glass top would be the most fitting for this piece as it allowed the beam hangers to be showcased underneath. The leveling for the glass was done on the fly since this was the one component that did not have any flexibility and could not be altered. Everything else was tuned to level it out. At the end of the process almost every part had been tinkered with in one way or another to produce the final result.

This experience gave me a new appreciation for found object design and exposed me to another approach in fabrication. Not only are the final products completely original but the build becomes a unique challenge each time. It requires a different type of design thinking; one that encompasses how to transform the object in its current state while also taking responsibility for its potential in future iterations to come.



Fig 4.6a Glass Top Contact Detail



Fig 4.7a Found Object Coffee Table



APPENDIX B

STUDIO CHAIR RETROFIT PARTNERING RACHEL COHEN-MURISON



Fig 4.1b Studio Chair Scrap

During spring of 2016 the UWSA administration decided to replace all the chairs in the undergraduate studio with new ones. As such the old chairs were stripped down and scavenged for any reusable components. The parts that were deemed too damaged or worn out to be salvaged became waste materials to be thrown out or sold off as scrap. Rachel and I discovered the discarded chairs in the lobby and found that all the legs and frames were made out of high quality steel, with many of the hydraulic pistons still functional. The damaged areas were primarily concentrated on the seats and backrests. The reason the entire chair was to be discarded was because the base plates attached to the frames were custom made to only fit with those specific seats; therefore it would be more efficient to simply replace the whole chair rather than refurbishing them. Rachel and I thought that this was a huge waste of the metal stands and saw many opportunities to design a project around them. After asking the administration we were given permission to take the parts, with the intent of upcycling them for better use.

There were 86 functional stands in total consisting of a five pronged base, hydraulic column, and seat connection plate. Additionally a majority of the metal backrest connections were able to be salvaged from the dumpster. In the beginning we conceptualized the possibility of disassembling the frames to create individual projects from each component. However we soon realized that the advantage of having these readymade stands was that they were custom fabricated for chairs. Simplicity and replicability would become the main focus of this upcycling project, especially since we had so many identical components to work with. The final

design for the stands would remain as high-top chairs retrofitted with new seats and backrests made out of laminated plywood.

In order to facilitate manufacturing, wooden formwork was to be fabricated for the plywood laminations. The new parts would be made by sandwiching the plywood in between the formwork, allowing the production process to be standardized. Therefore a majority of the effort for this project was placed on the design and troubleshooting of the moulds. We had to ensure that the new seats and backrests would conform to the existing base plates and metal connection bars. Special attention was placed on the curvature of the components. The intent behind this was to try and cut down on the superfluous fixtures necessary to create a tight fit. At first we tried making the formwork by hand but found the curvature to be too uneven. In the end a digital fabrication method was adopted. Utilizing a CNC router we produced positive and negative moulds for both the seats and backrests based on a digital model. This guaranteed higher accuracy to the desired curvature and uniformity of the manufactured parts.

Five-ply curved laminations were produced from the CNC'd formwork. They were cut down and sanded after drying. Wood veneers were then adhered onto the surfaces to create an aesthetic that matched the worn and weathered metal bases. Once the new parts were finalized they were placed against the existing connection plates for the final fitting. Even with the increased accuracy afforded by machining the moulds out of a CNC router we knew they would not match perfectly with the existing connection points. That was the main

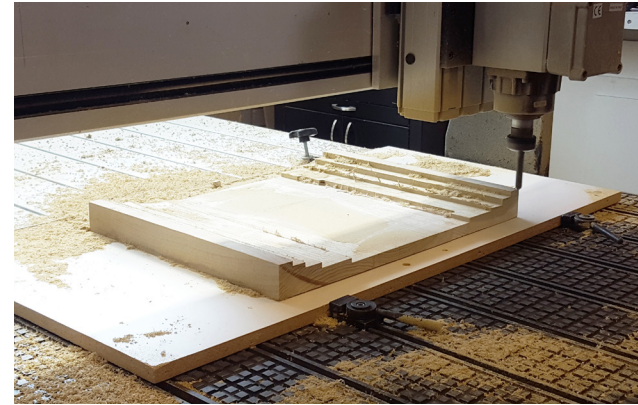


Fig 4.2b CNC Formwork



Fig 4.3b Chair Back Laminations



Fig 4.4b Back Connection Detail

reason Rachel and I chose to fabricate the seats and backrests out of plywood. The material allowed for some flexibility in terms of the final assembly either from the malleability of the ply or the ability to subtract excess material as needed. Fortunately a large portion of the inconsistencies self-corrected as the new parts were bolted into the existing stands, allowing for a decent fit.

The unique opportunities presented by this upcycling project stemmed from the large quantity of identical components that were found. This called for a design approach that focused on an effective means for the mass manufacturing of new parts, while factoring in the potential for adaptation to specific and unforeseen conditions. Material choice and fabrication techniques were crucial to the success of this project. This was reflected in the workability of the wood and the tolerances afforded by the adjustability of the curved laminations. After the completion of the first prototype Rachel and I realized that a level of customization could be integrated into the project during the cutting phase of the seats and backrests, creating slight variations for different sets of chairs produced. This project revealed considerations in the refurbishing of used objects which I had not experienced previously, and provided many opportunities to explore avenues of customization even during standardized methods of construction.



Fig 4.5b Studio Chair Retrofit

GLOSSARY



Fig 5.1 Fermentation - Rice Wine

CHOREOGRAPHED DECAY

The act of finding value from the decomposition, decay, or aging of an object. The ability to identify opportunities presented by these processes that introduce a new purpose for objects in a stage of so called 'decline'.



Fermentation is a specific type of decomposition wherein microorganisms and enzymes convert sugars into acids, gases, and alcohol. In a practiced and controlled setting it is not considered to be spoilage even though the process can involve the same organisms. In the case of rice wine the fermentation relies on the rice starch that has been transformed into sugars to produce alcohol. This process utilizes the aging and decomposition of the rice as a means of creating something for a different use.

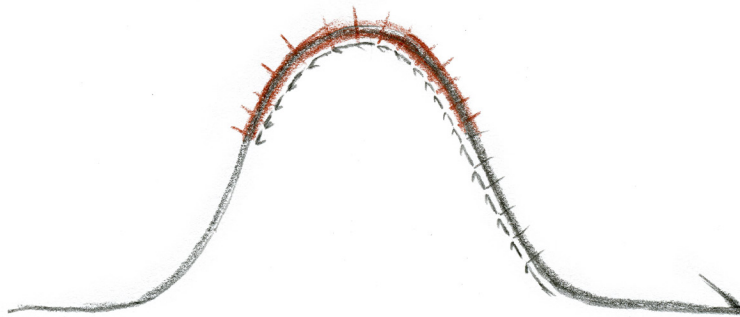
Fig 5.11 Choreographed Decay Cycle



Fig 5.2 Automotive Maintenance

MAINTENANCE

The process of keeping an object in 'good' condition. In this context good can be taken to mean functional, undamaged, productive, or in accordance with its original intent.



Automotive maintenance describes the regular inspection, testing, and servicing of an automobile in order to ensure its safety, longevity, and performance. This can also be referred to as preventative maintenance, to service components of a vehicle before they require major repair. In a sense it is providing minor habitual repairs to vehicles at set intervals. Automotive maintenance can be considered a culture in itself with communities devoted to the craft involved in upkeep.

Fig 5.21 Maintenance Cycle



Fig 5.3 Simon Starling - Infestation Piece

PRESERVATION

The act of retaining something in its original state. Halting the processes of aging or decomposition that would normally occur over time.



Simon Starling's Infestation Piece is a replica of Henry Moore's Warrior with Shield sculpture which was submerged into Lake Ontario for over a year, allowing its surface to become populated with zebra mussels. Soon after it was put on display the mussels began to decay, falling off the sculpture. In an ironic twist this art piece which was meant to draw attention to natural processes and aging had to be preserved on a regular basis in order to keep it at its current state. "And, the metal was oxidizing. It was a case of two materials reacting as they do naturally, but it was contrary to our long-term plans for preservation and presentation." - Sherry Phillips Contemporary Art Conservator

Fig 5.31 Preservation Cycle



Fig 5.4 Native American Corn Lore

PROGRESSIVE USE

To find different uses suited for various phases of an object's life as it transitions through stages of preparation, pinnacle, and decline.



In Native American corn lore the use of corn differs depending on the time of year in which it is harvested. Before ripening they are meant to be eaten raw, in season they are used for their starches to make breads and syrups, and post season they are preserved to be kept over winter. After harvesting, the stalks are hollowed out as containers, the husks weaved into baskets, and the cobs used as fuel to burn. As the corn progresses its use changes accordingly.

Fig 5.41 Progressive Use Cycle



Fig 5.5 Aluminum

RECYCLE

To convert waste products into usable materials or productive objects through the deconstruction and reconstitution of matter.



One of the most common examples of recycling today is the deconstruction of used pop cans into usable aluminum. Aluminum is ideally suited for recycling because it does not break down or lose quality during the melting process. Approximately 75% of the aluminum produced since the late 1800s is still in use today. Once the cans have been turned into its raw material the aluminum can be used to create a large variety of products ranging from bicycles to airplane components.

Fig 5.51 Recycling Cycle



Fig 5.6 Boro Cloth

REPAIR

To fix or mend something suffering from damage or fault, potentially involving a replacement of components. Over time this process of continuous repair can lead to the complete material transformation of the original object.



The Boro Cloth is a Japanese tradition based on the values of 'mottainai' or a regret concerning wastefulness. 'Boro' which translates to scraps of cloth is used to describe the process by which tattered pieces of clothing are patched many times over for continued use. These fabrics pass down the histories of a family as they get repaired and worn throughout the generations. A palimpsest.

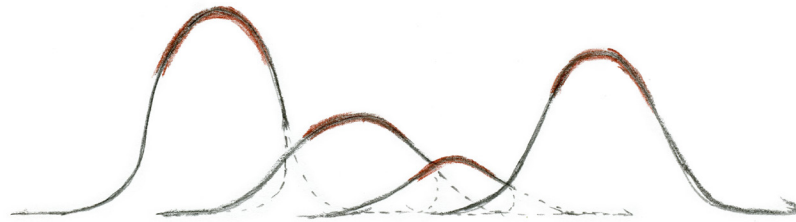
Fig 5.61 Repair Cycle



Fig 5.7 Barn Door Table

REPURPOSE

To adapt something for use in a way that diverges from its original intent. Related to progressive use but differs in that one object continually transforms throughout its life from one purpose to the next, rather than having an original object that ages and finds uniquely suited uses as it progresses.



In the field of furniture design there is currently a trend to repurpose damaged or worn out tools, fixtures, and architectural elements into revitalized pieces of furniture. One such example is the barn door table, in which old wooden doors which are past their original stage of usefulness get reimagined into table tops for further use. This act transforms the identity of the object, making them more valuable as tables in their current state than they would have been as doors.

Fig 5.71 Repurpose Cycle



Fig 5.8 Generational Sourdough Starter

REUSE

The act of using something more than once for the same purpose, and in the same fashion as its initial use.



There are lores surrounding sourdough starters that have been passed down and reused through the generations, some dating back hundreds of years. Sourdough starters are created when naturally occurring yeasts in the environment begin to feed on a mixture of flour and water that has been left out. This yeast starter can be kept over an indefinite period of time as long as the balance of yeast to flour ratio holds constant. The starter is used and reused in baking sourdough with the same strain of yeast, producing a specific flavor signature that remains unchanged over time.

Fig 5.81 Reuse Cycle

