



A 120 - point thesis submitted to the Victoria University of Wellington in partial fulfilment of the requirements for the degree of Master of Architecture by Suchita Jain Victoria University of Wellington, Feb 2017

## gitanjali s o n g o f f e r i n g s



## To the five years that have been-

To my lovely friends, you are the kindest bunch I know. Thank you for keeping me grounded throughout the year. Kate and Sanjana, a special thank you to you both for being my anchors;

To the artists in architecture school, thank you for your continued passion in what you do and inspiring me with your thoughts;

To the people I call home, my beautiful family, without you I wouldn't have come this far. Thank you for your tireless belief in my work;

To Jaqueline, thank you for your immense support.and insightful comments;

To Prof. Regan, my supervisor, thank you for your guidance.



## PREFACE

The intention of this research was to resolve a problem for Wellington, my home for the last six years as a way of giving back, after my time residing in this unique and shaky capital.

Searching for vulnerabilities to address within a larger earthquake prone context- the fragile state of the city's water supply was highlighted in a report by Wellington Water that reveals some suburbs could be disconnected for months<sup>1</sup>.

Under the supervision of Prof. Regan Potangaroa I visited Nokonoko, Fiji a small village facing the disastrous consequences of Cyclone Winston. Here, seeing the unrealised value of water and the potential of architecture in humanitarian aidmy concern for the future of Wellington and its fragile water supply became a motivation for this architectural thesis.

Resilience as a recurrent and critical idea for this research is defined and developed through different theoretical and practical frameworks. The aim for me was to prove the unwavering relevance of architecture as a medium for resilience by acknowledging and strengthening social, infrastructural, cultural, urban, contextual

1 (Maxwell)

relationships amongst other contributing factors.

Ending my last year of the 5 years I have been at Victoria University, this research feels like a full circle bringing formal and literary studies together to a singular design outcome; seeing resilient architecture as a generic urban condition and further expanding on it through formal design strategies towards a site-specific design in the other.

Lastly, woven into my thesis is the exploration of the parallels drawn in an anthology of poems I grew up with- Geetanjali- Also the title of this thesis. The narrative of the poem springs from the idea of rejoicing the divine gifts (interpreted as the qualities of water for this site specific design outcome) through man's journey to this divine power (self-actualisation). It will become apparent that this has a distinct parallel with the path to instilling resilience. Geetanjali or song offerings; this idealistic research is my metaphorical offering to the vulnerable communities of Miramar Peninsula, Wellington to demonstrate the instrumentality of architecture as a medium of their resilience, or at least start a dialogue about its potential.

## ABSTRACT

New Zealand lies on the Pacific Ring of Fire – the belt of vulnerable, unpredictable fault lines which are the primary cause for earthquakes in this country. Most recently, as evident in the aftermath of the 2011 Christchurch earthquake -the destruction of the city centre led to the emergence of sub centres in different parts of the city each with different, desperate needs. The lack of preparedness in the wake of an earthquake hence, exacerbated this destitution.

This research explores architecture's role in the sub-centre. How can architecture facilitate resilience through this decentralised typology?

The design-led approach critiques the implications of architecture as a tool for resilience whilst highlighting the desperate need for the engagement of architecture in planning before a disaster strikes. The resulting response explores resilience through an architectural lens that has a wider infrastructural, contextual and user-focussed need.



F1 Sub-centre diagram further elaborated on in the next section.

## CONTENTS

| Introduction   | 9   |
|--|-----|
| CHAPTER I: Site specific Research                        |     |
| 1. A Resilient Site?- Mount Crawford Prison              | 17  |
| 2. Architecture and Water- Case Studies                  | 31  |
| 3. Design Experiments                                    | 43  |
| CHAPTER II: The discursive argument                      |     |
| 4. Architectural Agency in Resilience- Literature Review | 59  |
| 5. Programme Analysis                                    | 75  |
| 6. Design Experiments                                    | 93  |
| CHAPTER III: Design Outcome                              |     |
| 7. A Place for Bathing                                   | 115 |
|  |     |
| Conclusion   | 157 |
| Bibliography   | 166 |
| List of Figures  | 169 |
| Appendix   | 174 |



F2 Example of a Collective Centre- A big shed has been transformed into a housing facility through the use of temporary partitions allowing the privacy of users.

## BACKGROUND

New Zealand sits on the south-west end of the Pacific Ring of Fire making it very vulnerable to the unpredictable consequences of disastrous earthquakes.

In an architectural premise, currently, any lack of preparedness is addressed after an earthquake through the adaptive re-use of existing buildings as a temporary solution for any exposed vulnerabilities (be it shelter, food, etc.). This new urban condition also called- Collective Centres is one with obvious potential in the wake of an earthquake. Unlike individual shelter units, disaster victims are highly concentrated in collective centres in relatively smaller areas. The UNHCR defines them as- "pre-existing buildings and structures where a large group of displaced people find shelter for a short time while pursuing durable solutions. Collective centres could be - community centres, town halls, hotels, gymnasiums, warehouses, unfinished buildings, unused factories (See F2)<sup>2</sup>." This study aims to expand on this idea of 'collective centres' with a particular purpose to firstly strengthen and adapt an otherwise vulnerable infrastructural system (be it shelter, water or food, etc.) and secondly increase a community's resilience.

To address resilience, the response to a disaster should come before the earthquake as a means of preparedness. Building adaptation is not a new concept. However, it has recently become a focus of interest in architecture for resilience; the need to address designing buildings prepared for adaptive re-use before a disaster is critical to the process of mitigating its risk<sup>3</sup>. This adaptive re-use can be a relatively low-cost, rapid or perhaps the single available alternative after an earthquake, especially in a highly populated urban area offering satisfactory temporary solutions. To plan the adaptive reuse ahead of time gives a salient advantage to the affected community.

2 (UNHCR)

<sup>3 (</sup>Idemen, Sener and Acar)



F3 Sub-centre blocks affecting regions within their radius proximity

## INTRODUCTION

Very recently, in the aftermath of the 2011 Christchurch earthquake- the destruction of the city centre led to the emergence of sub-centres as a decentralised typology within the city to address different desperate needs of the suburban communities(See F3)<sup>4</sup>.

This presents an opportunity to research the potential of this inevitable aftermath (sub-centre) as a tool for resilience *before* the earthquake to become a collective center *after* the earthquake. The aim here is -to strengthen the response of the communities impacted through the proposition of a 'collective sub-centre' **prior** to the disaster thereby, facilitating resilience. 'Resilience' is expanded upon as a theoretical concept based on satisfying human needs at a 3-tier scale (Physiological, Belonging and Acceptance) to devise a strategic framework formalised through a singular design outcome.

Wellington, the nation's capital has been victim to a multitude of earthquakes. Only recently the vulnerability of the water supply network has been exposed in the scenario of an anticipated disastrous earthquake with a 100-days' wait for water in almost all of the eastern suburbs.

This questions the catalytic potential of the decentralised sub-centre in facilitating resilience in disaster-prone communities like those of the Eastern suburbs of Wellington. How may then architecture be a medium for facilitating resilience through the 'sub-centre' within a disaster prone context?

## DESIGN INTENTION

The goals of this research have been divided into the overall aims of this research and aims specific to the design outcome-

#### For Research

- Exploring the instrumentality of architecture in a resilient sub centre through a site-specific design.
- Expanding on the potential of architecture as a political tool.

#### For Design Outcome

- Strengthening the response to a disaster through a catalytic intervention (facilitate resilience)
- Reactivate the context as a new opportunity post-disaster.

## OBJECTIVES

 Addressing the lack of resilience from the 3 scales – physiological needs, sense of belonging and need for acceptance -in disaster prone communities. Resilient architecture doesn't just encompass the immediate infrastructural needs; it includes people's and the community's needs, also in terms of preparedness. Finally, the marriage of the latter intentions through acceptance of local context and designing for flexible infrastructure for the community.

4 (Hoare and Webby 31)

• Reflect upon the design outcome against discursive argument to expose the limitations and implications of the architecture of the resilient sub-centre.

Gitanjali- or song offerings- Also the title of this thesis is an anthology of poems which plays a ubiquitous role in the narrative of the design outcome to instil resilience, thereby aiding the aim of this research. The narrative of the poems unfolds as man's journey to the divine creator.

#### METHODOLOGY

The method behind the investigations is dominantly that of 'research by design'(See F4). This is a non-linear process that combines a multitude of approaches, such as the analysis of building, theoretical thought and design experiments, and together generating critical, analytical and propositional work. Although theory and design are intertwined, they should not necessarily be understood as the direct consequence of each other. Design always follows the requirements of its own complex nature. Therefore a design proposition is more than just the literal application and materialization of a theorized thought. Throughout the process it becomes clear that the methodology of research by design resembles a surgical act where a 'body of work is being gradually designed, constructed and subjected to continuous operations: opened, dissected, old parts removed, new parts added and later stitched together. In conceptual terms such a process challenged the argument of Manfredo Tafuri that architects can be differentiated by their nature into either magicians or surgeons. Research by design is different from other research because it is by the default the product of both a surgeon and magician simultaneously, that is to say the result of analytical/ invasive (theoretically and academically rigorous) and propositional/ formative (creative and artistic) work that is gradually assembled and intertwined until it grows together<sup>5</sup>.

The research is presented accordingly, design experiments first, a broader argument second, design informed by this broader argument and then a critical reflection of the process. Hereby, the methodology begins as design-led-research then research-led-design and then returns back to research-through-design.

## SCOPE

This design investigation is limited to the context of Mount Crawford Prison. It tests the research question against conceptual experiments using the prison as a site for speculative endeavour. It presents a set of experiments and processes that investigate architectural methods to strengthen a disaster response within the affected community. The literary component addresses the resilient subcentre as a wider urban condition. A wider scope means the research may have wider implications, but also limited in the amount of depth that it can be studied as assumptions and generalisations have been made. There is an emphasis on a formal response to the research problem for the design outcome. This project addresses one of the many ways of facilitating dialogue about this issue. In totality, the project is limited to the scope of a masters design-led thesis.

5 (Cruz 28-29)



F4 Diagram illustrating methodology for thesis research. It begins from the concept of resilience and studies it through an architectural lens to arrive at a site-specific design output.

#### STRUCTURE OF THESIS

The proposition of this research shifts from a broad research problem to a site specific investigation and then back to a broader argument about the instrumentality of architecture in a disaster-prone context. This book has been divided into six distinct chapters that follow a similar process to the way this research was conducted. The chapters have been organised in a way that uses design as a primary tool of investigation constantly shifting between theoretical and formative work (See F5)-

**Chapter One** - exploring the site-specific context to further narrow down the addressed problem to the need for a stronger water supply infrastructure within an architectural premise.

**Chapter Two** - critiques the agenda of architecture studying existing buildings that integrate water and architecture through a formal response.

**Chapter Three** - presents a set of design experiments that were conducted to critique the latter strategies produced situated on the idea of integration of water and architecture as a catalyst for resilience.

**Chapter Four** - where a theoretical framework is structured based on the *need* to strengthen one's attachment to 'place' by creating a legible image of this 'place'. This discourse is developed to be applied to the idea of a resilient sub-centre. It identifies the sub-centre as a generic urban condition and expands on the idea of its latent potential to be a catalyst for resilience *prior* to a disaster. Here, the original proposition of the integration of water and architecture for resilience shifts to a much broader idea of the sub-centre - enabling resilience by meeting one's needs.

**Chapter Five** - details a more resolute designing process based on the structured framework developed from the previous studies conducted around the idea of the sub-centre and the implications of architecture in strengthening infrastructure (water in their case).

**Chapter Six** - presents an architectural response to this process of framing the sub-centre as an opportunity for enabling resilience. It acknowledges the potential of a Thermal Spa and Pools on the chosen decommissioned Mt. Crawford Prison site, which then adapts to the need for a Place of Bathing in the wake of an earthquake. It shows a body of work that is a speculative response to architecture for the resilient sub-centre.





F6 Illustrated journey of Gitanjali's narrative- The journey begins from the Receiving of gifts from the Divine, through to the Union with the Divine and then eventually returning home in a closed loop journey. It is a celebration of life that ends at the acceptance of inevitable death only to begin with life again.

## GITANJALI

"Gitanjali is a collection of over 100 poems, full of life, full of inspiration and full of color composed by Sir Rabindranath Tagore, a renowned Indian poet. Gitanjali speaks of birth of life, to the death, the nature and man's quest for answers from the divine power<sup>6</sup>." The word Gitanjali means the anjali of geets- the offering of songs. It is an homage of poems/ songs dedicated to the divine power who is the creator, preserver and destroyer. It is through feeling emotions and lyrical overflows that turn the work into Gitanjali. The book is as much a visual as well as a poetic delight<sup>7</sup>.

To translate the narrative into an architectural context the narrative of this poem must first be understood (See F6). The first poem begins with celebrating the givings of the divine power – the many 'infinite gifts' that are accepted by Tagore with admiration. The melodies take the singer far and he even forgets the existential things bothering him. Almost suddenly he breaks out of this trance and through the course of the poems realises that the holy-spirit he has been praying to is not before him. The third part of the journey begins with him searching for this holy-spirit realising that it is not present merely in devotion but is to be found. So Tagore begins on his journey to search for the divine power's companionship. This search leads him to humble corners of the world where when he is finally united in its presence-it is through humility and submission. Union to whispers to home.

This narrative is about the author's celebration of life, his devotion to the divine power and his relationship with this power followed by a humble acceptance of death/ loss. Within the context of resilience and earthquakes it is imperative that disaster affected victims have hope for a positive future ahead having accepted the losses incurred. Using this journey as a narrative of acceptance of loss- the architecture aims to instil hope through the experience of the spaces, thereby facilitating resilience in an architecture of poetry for the user.

6 (Deshpande)

<sup>7 (</sup>Mukherjhee)





# 01

## A RESILIENT SITE

The aim of this section is to situate and develop the research problem in a real and current context that desperately needs the attention of architecture's resolve. It defines strategies for a site-specific outcome. Wellington, New Zealand is an earthquake-prone city. Hence, preparedness in the wake of an earthquake is in dire need. Within a New Zealand context, following the 2011 Christchurch earthquake the city went into a polycentric state with a decentralised sub-centre typology<sup>8</sup>.

This chapter looks at first identifying a potential site for a discernible sub-centre within Wellington -exploring its potential to enable resilience within the communities affected. By choosing Wellington, this research acknowledges the vulnerability of the city's fragile water supply network as a problem at a macro scale to the need for enabling attachment to place on a smaller scale. Narrowing down the wider context of a vulnerable Wellington the decommissioned site of Mt. Crawford Prison presents itself as an indisputable sub-centre of the future and as an opportunity for resilience now.

8 (Hoare and Webby 3)



## Wellington

The wider context

Lying on the Pacific Ring of Fire, New Zealand is a vulnerable island country that is prone to disastrous earthquakes. "Urban Wellington Region is vulnerable to large earthquakes. Significant active faults bisect it, and after a major earthquake any one of them could become isolated because any supplies transported along a small number of lifelines are prone to earthquake damage<sup>9</sup>." (See F2)



F2 Simplified map highlighting the vulnerabilities of the road network overlapping the fault lines and water supply network to point out two distinct areas that will be affected.

WATER IN WELLINGTON

A recent stuff article highlighted inevitable damage a the catastrophic earthquake would have on the water supply in the area rendering the eastern suburbs of Wellington waterless for longer than 100 days<sup>10</sup>. Wellington's water supply coinciding with the numerous active fault lines in the region draws attention to the discernible need for a secondary source of water supply in the suburbs farthest away from the direct source.

Moreover, regardless of the desperate post-earthquake



F3 Population count for Eastern suburbs affected by the overlap of the fragile water supply network and fault lines.

9 (CAE) 10 (Maxwell) need, there is a modelled growth in water use set to surpass the present system's sustainable yield within a few years, options for new sources including storage dams. "A new dam, however, is not a certainty since smaller scale options may defer this for some time, by when options like desalination may be affordable and acceptable<sup>11</sup>."

#### DECENTRALISATION AS A RESILIENCE TACTIC

Using architecture to address this issue through an autonomous sub-centre before an earthquake decentralises this water supply. It will decrease the dependability on the far-situated fragile system of water supply. This facilitates discussion regarding the instrumentality of architecture in a majorly, what could be referred to as an infrastructural problem. It gives architecture the tools to be relevant, pertinent and imperative for the resilience of resources and people hereby, achieving the aim of this research.

11 (Greater Wellington Regional Council)



## Miramar

The suburban context

#### RELEVANCE AND BACKGROUND

Miramar is the farthest suburb from the existing Kaitoke Bulk water supply network. According to the GNS report in 2012, there would be approximately 15,000 people without access to emergency water for up to 43 days following a massive earthquake on the Wellington Fault (assuming a consumption rate of 20 litres per person per day<sup>12</sup>.

12 (Cousins 2)

This problem has further exacerbated with Stuff.com claiming up to a 100 day wait for a water supply in vulnerable communities such as Miramar's<sup>13</sup>.

Miramar, meaning 'Behold the Sea', is a name suitable to the geography and history of the locality<sup>14</sup>. Surrounded by views of the sea on all sides, this mountainous suburb is underutilised for the architectural opportunities it offers. This connection with water hence becomes an active driver for design.

Maori oral history reported by Best records that when the Maori first visited the Wellington area, Miramar Peninsula was an island and a waterway (See F5) extended across part of a Rongotai Isthmus<sup>15</sup>. In 1855 the Wellington region was dramatically affected by a large earthquake which caused uplift of about 2 metres, further elevating the Rongotai Isthmus<sup>16</sup>.

RONGOTAL STRATHMORE PARK SCALE

F5 The Rongotai Isthmus originally used to be underwater and the Miramar Peninsula was an island - Motukairangi until 1855 when an earthquake caused an uplift of about 2 metres.

F6 Diagram illustrating the Liquefaction potential of the land from Low to none (in the middle area) because of the mountainous soil typology.

<sup>13 (</sup>Maxwell 3) 14 (Crawford 396)

<sup>15 (</sup>Pillans and Huber 1) 16 Ibid 2

With a strong connection to water and as a site having responded to earthquakes previously, this site becomes an opportunity for exploring architecture's instrumentality in aiding resilience.

#### AFTER AN EARTHQUAKE

In Kaikoura, New Zealand a tsunami warning was issued soon after the 7.8 magnitude quake on the 14th of November 2016 where "people close to the coast were urged to evacuate and head to higher ground...<sup>17"</sup> A tsunami seems to be a common occurrence after significant earthquakes, and a site on higher ground with an open area around it would be critical for the safety of the suburban community.

AN OPPORTUNITY FOR RESILIENCE:

"Because of the physical and visual prominence of the site and its landscape, cultural and heritage significance, any development of the site will have to be sympathetic to the existing landscape and multiple heritage values<sup>18</sup>."

18 (Blaschke & Rutherford Environmental Consultants; Paos Limited; TRC Tourism Limited 34) A feasibility report drawn out to propose future developments on the Miramar Peninsula emphasises on initiating an immediate programme to increase recreational activities as a means of revenue generation<sup>19</sup>. Hence, Miramar reveals a design opportunity for a recreational destination for its visitors with an adaptive use of water-related services in the wake of a disaster.



F7 Wind analysis showing that throughout the year the Northerlies and Southerlies are dominant.

19 Ibid 35

<sup>17 (</sup>Burrows)

## MOUNT CRAWFORD PRISON



F8 Aerial view of Mount Crawford Prison, the highest point on the Miramar Peninsula as a site of resilience.

## **Mount Crawford Prison**

The immediate context

The highest point on the Miramar Peninsula at Mt. Crawford is named after early settler James Crawford<sup>20</sup>. In the 1920s male prisoners started building Mt Crawford Prison using concrete blocks made with sand from Wellington's South coast<sup>21</sup>. "After 85 years in operation, the now outdated facilities at Mt. Crawford have decommissioned<sup>22</sup>." been It is the most visibly prominent area of the peninsula being the highest point at 163m with an intimate relationship with the rest of the Miramar Peninsula. The landscape is highly visible in its wider context. The visual catchment includes to the north, Wadestown, Kaiwharawhara, Khandallah, Central Ngaio, Wellington, the western slopes of Mt. Victoria and Brooklyn.

## A RESILIENT SUB- SITE

The site is quiet, surrounded by sea, natural qualities dominate, the usual sounds of the city are distant and masked by the wind in the trees, and at night the site is dark and unlit. In human terms, it remains tangible- but formally and informally- "a place of life and death, war and peace<sup>23</sup>," and therefore, a site of resilience whose use befits and demands respect from all who visit. An opportunity is available to protect the site with the challenge to frame that opportunity and restore its many values. Architecture then becomes a medium of healing and regenerating the site. The existing built form on the site itself has been deemed structurally unstable. However, the land itself stands proud of its strength (low liquefaction threat) and easy access amongst other illustrated opportunities. On visiting the outside of the prison, a constraint of the existing built form is the immense nature of it. The colossal structure demands a forced respect and stands tall as a representation of its old institutional purpose.

#### FOR THE PEOPLE

Protests dating back to 2013 show that the people of Miramar are unhappy if the site is not retained for the public and sold off to private investors for gated communities. "It is understood plans by the Todd Property Group to construct a housing subdivision at Shelly Bay are now on hold<sup>24</sup>." In 2013, the Dominion Post reported on a "group of guerrilla gardeners" who were battling to save the 13 hectare site from wealthy developers and turn it into a public reserve<sup>25</sup>. It is important to acknowledge these views of the community that occupies the neighbouring suburban land to reinforce their attachment to place. Resilience herein arises from not only meeting the infrastructural needs but also the needs of the communities affected, arguably from a *sub-urban* scale.

<sup>20 (</sup>Stewart)

<sup>21</sup> Ibid

<sup>22 (</sup>Crossley)

<sup>23 (</sup>Blaschke & Rutherford Environmental Consultants; Paos Limited; TRC Tourism Limited 12)

<sup>24 (</sup>Easton) 25 (Stewart)



F9 Images of the interior and exterior of Mount Crawford Prison structurall unsafe and yet to be demolished.


### CONCLUSION

"A Wellington Fault Earthquake has the potential to become one of New Zealand's greatest disasters, not so much from damage and immediate casualties, as from shortfalls of water in Wellington<sup>26</sup>." "The potential for total loss of water and food supplies is real and without mitigation could render large areas uninhabitable for weeks to months<sup>27</sup>." By decentralising this water supply, it provides a resilient infrastructure that is reliable in the wake of an earthquake. Architecture within the context of Mt. Crawford Prison can play an instrumental role in addressing this problem.

The critical issues with the site that will inform design decisions are:

Disregard of history and ecology of site with proposals for gated communities or commercial projects as a lack of contextual/ communal resilience.

• Structural instability of existing Prison building

The design strategies arising from this chapter include:

- Being sympathetic to the existing landscape rather than imposing on it.
- Relationship of the built form to a human scale
- Sense of healing as a regenerative aspect to address the violent prison past and the inevitable consequences of a disastrous quake in the future at a personal and communal scale.
- Incorporating recreational activities as a part of the programme of the proposed resilient sub-centre to boost revenue generation
- Maximising on the natural component of the site as triggers for senses- sight, sound, smell, touch.

Hence, Mt. Crawford Prison presents an indispensable opportunity that begs the attention of architecture towards its vulnerabilities with the total loss of water in the wake of a catastrophic earthquake.

26 (Cousins 51) 27 Ibid 1







# What was done? ARCHITECTURE + WATER- CASE STUDIES

Based on the site analysis, the research problem is further refined here from the wider sub-centre condition to the particular need for water in the wake of an earthquake in Wellington. This section looks at the current, existing approaches to integrating architecture and water as a premise for a resilient response to an earthquake. The following text studies three important examples of contemporary architecture that are relevant to the latter argument. While one explores the architectural qualities of water creating an active spatial experience, the other is effective in architectural delight and sustainable systems. The refining of these works into a strengths and weaknesses format explores resilience through the integration of water and architecture.



# OMEGA CENTRE FOR SUSTAINABLE LIVING BNIM ARCHITECTS

Rhinebeck, New York

As a part of an overhaul project for the Omega Center for Sustainable Living (OCSL)'s current wastewater disposal system- BNIM architects and Omega decided to showcase the system in a building that houses both the primary wastewater filtration facility and a classroom/ laboratory. In addition to using the treated water for garden irrigation and in a greywater recovery system, Omega will use the system and building as a teaching tool in their educational program designed around the ecological impact of their campus. These classes are offered to campus visitors, area school children, university students and other local communities<sup>28</sup>. Potable water comes from private wells located within the Omega Campus. After use, this water is passed through to an Eco Machine system for treatment and eventually returned to the ground via subsurface dispersal. Furthermore, rainwater from the building roof is collected in an underground cistern which is sized to provide adequate reserve for 100 percent of non-potable water use through-out the year.

28 (Living Future Institute)

On demand, water is pumped from the cistern to a holding tank and UV sterilizer. From the holding tank, rain-water is distributed to its usage location. After use, this water is passed through to the Eco Machine system for treatment and eventually returned to the ground via subsurface dispersal. As part of a larger effort to educate Omega Institute visitors, staff and local community on innovative wastewater strategies, Omega showcases the system in a building that houses both the primary treatment cells and a classroom/laboratory. (See F1)Collaboration lies at the heart of this project. The process heavily relies on a highly collaborative team of experts in wastewater, civil, landscape, mechanical and structural design with a history of working together on high-performance buildings<sup>29</sup>.

# STRENGTHS

While the function of the facility has merely upgraded to a more sustainable filtration facility, it is clear that adding an educational aspect to it further reiterates the emphasis on educational value for Omega.

The building owner has implemented a "green cleaning" program to use healthier, less toxic cleaners. The focus on the wellbeing of the user hence brings an overall positive experience in Omega which is healthy and effectively connects with the context of the educational institute.

Furthermore, the Omega Centre is constructed on land that was previously a burial spot for solid debris from years of operation with the previous owner. Also, the original fill material was removed and sold, dating back to sometime in the 1950s. The connection with its site history is evident. What was previously a burial for debris is now a filtration facility as though following a circle of its life and purifying itself in the process.

To achieve the client's vision for the project, the design team first sought to reduce energy and water requirements throughout the core design of the building and then to embrace appropriate technologies to reduce or eliminate adverse environmental impact from the required loads. The team accomplished this primarily by integrating collaborative solutions between all the design and engineering disciplines as a means of infrastructural resilience.

# WEAKNESSESS

The almost clinical design approach for this intervention lacks an experiential approach which impacts the user's perception of the space as institutional and sterile.



areas as shown in section.

<sup>29 (</sup>Living Future Institute)



# SAYAMAIKE HISTORICAL MUSEUM

# TADAO ANDO

### Osaka, Japan

After a series of archaeological excavations in the lake Sayamaike the remains of a historical dam were discovered. Other excavations exposed some of the engineering works in Japan. The Sayamaike Museum is an exhibit of these historical pieces which respects a careful integration of the site's connection with water into its architecture.

"The museum is a large rectangular box and a

small box surrounded by a rectangular square of water which forms the heart of the building. The two rectangular shapes are connected by a circular shape (See F4) as a part of the rich sequence space inside the museum. The triple height of the main exhibition hall was determined by the top level of the river at 15 metres tall when a section 62 meters long was dug through the old dam.

A ramp attached to a high wall dug in their triple height, leading visitors to other exhibitions of the museum.



The openings at the top level also show the excavation. The exhibition halls are halfunderground such that they have a continuity with the bank<sup>30</sup>." The overarching themes for this project are simple volumes, concrete/ stone, ramps and stairs, wood, iron and glass, water and light.

#### STRENGTHS

There is a careful integration of the surrounding environment with the architecture to create "a place appropriate to the history that Sayamaike embraces, where the environment itself becomes a museum<sup>31</sup>."

Consequently, the journey through this building proudly endorses the marriage between the engineering and architecture of the museum.

F4 Exploded geometries of Sayamaike Museum as sketched by the architect, Tadao Ando.

Mere exposure to engineering services in a building is not satisfactory for an active experience of this relationship. The design explores the spatial qualities of the relics and engineering as an aspect of strengthening infrastructural resilience. For example, the triple-height ceiling to cater to the engineering and local context.

Ando recognises water as a material for architecture and utilises it for its design potential. Falling water not only separates spaces but also stimulates the senses through its sound and visual qualities. Through this approach, the architecture not only situates itself as a memorable experience but reinforces its strong relationship with its context-The connection of water and Sayamaike.

# WEAKNESSES

Due to the simplicity of the project and limited research available about this building, it would be useful to see the design explorations that were conducted to derive the final form.

F5 The use of water as an architectural feature in this museum



<sup>30 (</sup>Thuroczy)

<sup>31 (</sup>Arcspace)



# THERME VALS, GRAUBUNDEN CANTON, SWITZERLAND ARCHITECT- PETER ZUMTHOR

Resonant with an elemental materiality and full of myriad therapeutic delights, Peter Zumthor's thermal baths at Vals are conceived as cavernous, labyrinthine haven devoted to a design for the senses<sup>32</sup>.

32 (Ryan)



Zumthor's work mainly explores the tactile and sensory qualities of space and materials. It is a free-standing building, a so-called "solitary" structure, however, built into the slope in front of the hotel and loosely connected with it33. The intervention although 'loosely connected' stands as though it relates to the topography and geology of the location. Built out of stone and into stone the Therme Vals "respond to the stone masses of Vals Valley, pressed, faulted, folded and sometimes broken into thousands of plates<sup>34</sup>," with this creating a strong attachment to its context.

#### STRENGTHS

Overcomes the difficulty of exploring sensuous, experiential qualities through expressive 2d design drawings to instantiate Zumthor's objectives facilitating intimate human and spatial interaction in a built environment. There is evidence of vigorous design explorations to maximise the comfort of the user in this space in a sustainable way- maximising on natural light, etc.

The idea of the 'meander'- the designed negative space between the blocks of the building which acts as a space that connects everything as it flows throughout the entire building, creates a peaceful narrative of space for the user to follow. "You are walking as if in the woods. Everyone there is looking for a path of their own<sup>35</sup>."

# WEAKNESSES

Therme Vals has a recurring motif of concealment in which Zumthor purposefully hides the service systems from the view of the bathers. This denies the services of their architectural potential especially with a sensual, fluid material like water.

<sup>33 (</sup>Hauser, Peter Zumthor Therme Vals 23)

<sup>34 (</sup>Hauser and Zumthor, Peter Zumthor: Therme Vals 23)

<sup>35 (</sup>ArchDaily)

In conclusion of this section, the case studies highlighted recurring formal and spatial gestures that experiment with the integration of water and architecture amongst other design decisions. The use of solid masses in close proximity separated by the 'meander' in Zumthor's Therme Vals and the Sayamaike Museum questions the legibility of the architecture and how it is perceived in plan vs how it is experienced in person. Furthermore, a stabilised interior would be crucial to the development of a resilient design outcome as a formal representation of strength. The tall exhibition hall in the Museum acts as the stabilised core that the remainder spaces are designed around. The use of water in various formsstill, falling etc. in the museum further maximises on the architectural quality of water bringing a sense of calm to the spatial experience. Moreover, Omega Centre's strong contextual relationship heavily contributes to the resilience of the filtration facility as a sustainable design. The Therme Vals is deeply embedded into the rocky site built from the same rock effectively situating it within its context. These observed recurrent ideas (see adjacent image) are developed in the next section to understand what makes these case studies successful and then derive sketch iterations for Miramar's resilient sub-centre.







# DESIGN EXPERIMENTS (1)

This section shows experiments conducted through an intuitive design approach aligned to a set of formal strategies for an architecture of resilience. These strategies were devised by a subjective study of the architectural examples reviewed in the previous chapter. During the yearlong research, the work was critiqued at three formal design reviews organised by the school where international and national practitioners and professors of architecture were present to comment on the student work. This unbiased critique gave direction to this design process, one that wasn't subjective purely to the likes of the author/designer. At this stage, the design problem is addressed still as strictly specific to the integration of water and architecture through a site-specific approach and a narrative for resilience (Geetanjali).



F1 Sketched analysis of the Mt Crawford Prison site showing access, views, shaded areas of land for a multi-programme proposition and exploring the connection between these areas.



 $\ensuremath{\text{F2}}$  3-D mass model to represent where the proposed programmes would be placed on the 13 hectares land.

For the first review, the site of Mount Crawford was analysed and presented as a proposal for resilience. Since the site is a vast 12.5 hectares in area, a proposal for an array of programmes was presented. These programmes together would house adaptable functions which would be flexible in the wake of an earthquake.

At the first presentation, the reviewers identified that the scope of the project at this stage was too broad- hence, focussing on designing a simpler programme was advised. The use of water, being key to the idea of resilience for this site, made the thermal baths a clear choice of focus. Coupled with a rehabilitation centre to aid those in need of professional mental care before the quake and alternatively also as a reprieve for those mentally impacted by the consequences of a catastrophic earthquake- the proposed intervention hence, presented itself as an opportunity for resilience.

Moving forward, the Design Matrix was implemented to refine the form of this thermal baths and Rehabilitation Centre.

# INDIVIDUAL TO MULTIPLE MASSING

Massing studies drew from the surrounding context maximising on the views and other qualities of the site. This was to consider the architecture as not just an object on site but also an embedded part of the surrounding context by experimenting with cutting into and extruding out of the site. A key focus in the massing studies was of tying in the narrative of Geetanjali to condition the users' experience within and through the various spaces.







F3 Massing experiments to experiment with a singular mass or multiple masses scattered on the site to create a journey inspired from that of Gitanjali. The yellow path here was an effort to understand how the masses would be connected. A singular mass was decided upon for this design experiment section.





# PROGRAMMATIC MASSING STUDIES

A singular structure was designed as a means to connect all the various functions. The narrative, in this case, is to be developed upon through the access in the architecture and the journey into and of the spaces within this singular mass. Moving on, programmatic massing studies explore the relationship between the various functions of the intervention and how different layouts simulate different functional relationships. With a nascent need for a strong core that was visible from the exterior of the building the selected outcome condenses the programme to a simpler stacked mass after pushing, pulling and extruding these functional spaces. F4 Programmatic Massing studies exploring the stratification of programmes. This step pushed forward the idea of a singular mass by breaking down the programmes within it and pushing and pulling them to create a dynamic form, the cantilevered form on the bottom right was chosen for providing a structural challenge and being a symbol for resilience in the process.



#### STABILISING INTERIOR

As a means to visually reiterate the idea of resilience through strength, the potential of a strong core/ center was explored through formal iterations. This was initially strongly dictated by the programmatic massing studies developed earlier.

With the introduction of two big water tanks in the centre of the architecture for the storage of waterthe functionality evidently dictates the form- and gives room to develop the narrative around it. The water tanks here, in plan, become the focal point for the architecture- which aligns itself to face desirable views on-site. The architecture moves around and over these tanks to push the stability that this interior provides besides purely on its function.



F5 Sketch experiments embedding the building into the ground so only the cantilevered part is exposed to the user. Furthermore, two tall water storage tanks were placed in the centre of the design inspired by Tadao Ando's use of clashing geometries. This acts as a means of stabilising the interior with two strong cores to the then develop the form around it.



# RELATIONSHIP WITH LANDSCAPE

Access into and out of the site was developed through exploring the relationship that the architecture shared with the surrounding landscape. The design iterations hence, questioned the role of architecture as one that imposes itself on the site or sits within it embracing the folds of the mountainous terrain. The resulting response was one that cut into the site, having the landscape seamlessly grow into the architecture. While embedding itself into the land, the architecture also imposes itself on the site through a tall structure that situates itself around the two water tanks forming the core of the architecture; the height maximising on the views all around the site. The narrative of Geetanjali hereby, enforced through the close connection with the land and the height of the structure as a connection to the sky/ self-actualisation.



F6 Detailed sketch interpretation of the experiential journey through the entrance into the Bath house and how that may impact the exterior form and its relationship with the surrounding context.



F7 Sketched outcome for mental rehabiliation retreat that is embedded into the ground however, it still stands tall as a dominant structure especially through the use of the tall water tanks.

At the final review, the theoretical reasoning behind the formal strategies undertaken was challenged. A mere interpretation of formal strategies from the case studies examined wasn't a conscientious approach to deliver a convincing argument for an architecture of resilience. A stronger theoretical grounding with a reasoned framework would support the formal strategies adopted effectively.

Furthermore, since the architectural form wasn't concretely decided upon at any stage to develop further, the links between the formal strategies seem blurred. The form adapts to one strategy and disconnects from the other; it then adapts to the other strategy and disconnects from the formal moves made in the first. A step forward would be to strictly adhere to the formal moves adopted in a strategy and then develop them further rather than changing them entirely.

In the presented outcome of the design experiments- The water tanks were domineering and not perceived as a convincing formal move. The storage of water could be done in a subtler manner that had a stronger contextual relationship.

A critical comment on the scope of the project was that it was still too wide and moving forward the thermal baths would be an adequate architectural proposition for this project. The narrative of Geetanjali is clearly important to this project and rather than just limiting it to the journey through the architecture – it would be interesting to see how the architecture presents this narrative additionally through its ageing- the before and after stages of the earthquake being designed for.

These suggestions were utilised through firstly, undertaking a theoretical review of the idea of resilience and understanding a broader argument for architecture's agency in humanitarian aid.







What was said?

# THE DISCURSIVE ARGUMENT ARCHITECTURAL AGENCY IN RESILIENCE

"Architects are considered by society as the last responders to disasters (Lee 2013, 482)."

This chapter looks at the reasoning (current discourse) around the past and current need for architectural agency of a resilient sub-centre. Here the research argues that architecture is a necessary medium to achieve resilience satisfying basic human needs with a strong focus on establishing a sense of belonging to place for the user. This section serves as a theoretical grounding to the previous design experiments and enabling a more structured design process moving forward. The sub-centre is an urban condition rich in architectural potential- which is expanded upon through the review of current discourse on urban design theory and place-making. The idea is to derive a process based on sound reasoning that formalises design strategies for a resilient sub-centre. Here the focus shifted from the integration of water and architecture to purely architecture's instrumentality in resilience.

"Space and society are clearly related: it is difficult to conceive of 'space' as being without social content and, equally, of society without a spatial component<sup>36</sup>."

# **RESILIENCE- AS A DESIGN CONCEPT**

"Resilience is the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance. It is the capacity to bounce back after a disturbance or interruption<sup>37</sup>." As per the Resilient Design Institute (RDI), a non-profit organisation dedicated to advancing resilient design in buildings and communities- Resilient Design entails the "intentional design of buildings, landscapes, communities, and regions in response to these vulnerabilities<sup>38</sup>." Amongst the top two RDI principles for resilient design one relevant to the scope of this research is - "Resilient Systems provide for basic human needs<sup>39</sup>." This research expands on the idea of human needs to deliver a resilient design outcome for the sub-centre condition. "Despite the individualistic and complex nature of human values, goals and aspirations, a number of authors have proposed an over-arching hierarchy of human needs. Such hierarchies often derive from Maslow's original work on human motivations which identifies a five-stage hierarchy of basic human needs<sup>40</sup>."

#### PSYCHOLOGY BEHIND HUMAN NEEDS

Based on Maslow's hierarchy diagram (See F1) on the fulfilment of a person's needs for their wellbeing there is a clear need for architecture to intervene at a similar scale<sup>41</sup>. "The most basic

human physiological needs have to be satisfied before progress can be made to the higher order needs<sup>42</sup>." Looking first at the physiological need of water through providing decentralised water filtration and wastewater systems this pyramid shows the need to build a communal environment for the user to feel a sense of belonging and protection; lastly the need for self-actualization through spirituality and acceptance of facts. This is directly applicable especially to a post-disaster environment when the user is faced with chaos and undue stress and hence, their needs heighten.



F1 Maslow's Hierarchy of Needs based on the Physiological Needs being of utmost importance before any other needs can be fulfilled.

#### LIMITATIONS OF MASLOW

The most significant limitation of Maslow's theory, however, concerns his methodology. Maslow formulated the characteristics of self-actualized individuals by undertaking a qualitative method called biographical analysis. He looked at the biographies and writings of 18 people he identified as being self-actualized. From these sources, he developed a list of qualities that seemed characteristic of this specific group of people.

<sup>36 (</sup>Heath, et al. 2011, 133)

<sup>37 (</sup>American Psychological Association

<sup>2016)</sup> 

<sup>38 (</sup>Resilient Design Institute 2013)

<sup>39 (</sup>Resilient Design Institute 2013)

<sup>40 (</sup>Heath, et al. 2011, 134)

<sup>41 (</sup>Maslow 1968)

<sup>42 (</sup>Heath, et al. 2011, 134)

From a scientific perspective, there are numerous problems with this approach. Biographical analysis as a method is subjective as it is based entirely on the opinion of the researcher. Personal opinion is always prone to bias, which reduces the validity of any data obtained. Therefore Maslow's operational definition of self-actualization must not be blindly accepted as scientific fact<sup>43</sup>.

Taking this critique into account the design process will be focussing on meeting the needs based on the pyramid- up till the relationship of the user with the environment or the relationship of the user with 'place' hence, inspiring a strong sense of belonging.

### SENSE OF PLACE AND ITS VALUE

Sense of place is subjective in nature. The way that one experiences place and their connection to a place can be understood as a "sense of place". It is considered a romantic, nostalgic approach towards identity formation of a space<sup>44</sup>. "Concepts of place often emphasise the importance of a sense of belonging and of emotional attachment<sup>45</sup>." "The value of this perceptual dimension of urban design is the emphasis placed on people and how they perceive value and both draw meaning from and add meaning," to the place<sup>46</sup>.

Furthermore, addressing the past local context of the community is pivotal for the resilience of the community. Places and place-making are significant notions in current environmental and architectural literature. Place as a concept integrates natural personal and cultural dimensions of the environment into one experiential whole<sup>47</sup>. Through identification and appreciation of its context, the architecture becomes more than just a symbol of resilience for the community.

# THE SOCIABLE SIDE OF ARCHITECTURAL PRACTICE

As earlier evidenced, for the resilient sub-centre to be meaningful to the community, it is vital that it addresses its local context. Architecture can no longer be viewed as mere fluff around the edges. A building is not an object distinct from its immediate environment. The perception of architecture as an 'object' shares its roots at the very crux of Western architectural history. In his book, De Architectura, Vitruvius famously asserted that the fundamental components of architecture are- firmitas, utilitas, venustas- solidity, functionality and beauty. For too long Vitruvius' definition of architecture has been considered the manifesto for good architecture. We can no longer solely rely upon the tangible qualities of solidity, functionality and beauty as the key pillars of architecture<sup>48</sup>. What Vitruvius' definition failed to recognise is that Architecture is a social act. Architecture has a direct impact on its environment - it influences the way we behave and the way we interact with each other. For architecture to be resilient it must recognise that it shares a symbiotic relationship with its environment<sup>49</sup>.

48 (Vitruvius, Pollio and M H. 1960) 49 (Rosmarin 2015, 44-45)

<sup>43 (</sup>McLeod 2007)

<sup>44 (</sup>Mahyar 1999)

<sup>45 (</sup>Heath, et al. 2011, 120)

<sup>46 (</sup>Heath, et al. 2011, 132)

<sup>47 (</sup>Coates and Seamons 1984, 9)

# THE PEAS APPROACH- PLACEMAKING THROUGH ARCHITECTURE

Nabeel Hamdi, in his many written works about Place, develops the concept of Placemaking through his PEAS approach- Providing is the act of delivering access to opportunities for the community rather than access to assets<sup>50</sup>. Furthermore, a skilled community planner should also perform as an enabler to build people's capacities for generating opportunities in adaptive and transformative ways. Hence, enabling implies cultivating places and processes that liberate the resourcefulness of people and place; as a result, promoting change and sustaining resilience for lasting development. "Sustainability, the fourth component of PEAS, is by now already largely defined, implicit in all of PEAS: the importance of providing catalysts and the many forms this can take, physical, spatial and monetary or indeed in services and capacity building<sup>51</sup>." In summary, the PEAS approach looks at providing and enabling the capacity to adapt and be sustainable for a resilient design outcome. "Methodologically, the author's analysis provides the reader with a clear understanding of concepts and practical applications..." through his project experiences to enhance attachment to place for effective place-making<sup>52</sup>. However, "while the richness of Hamdi's experiences contributes in many ways to the strength of the book, the wide range of cases results in narratives that are compromised in terms of depth, contextual information, and analytical detail<sup>53</sup>." Although Hamdi is a strong advocate of applying this framework to a participatory approach the application of the PEAS approach

- 52 (Dio 2012, 159-161)
- 53 (David 2012, 246-247)

for the purposes of this brief research will be limited to giving direction to an analogue design process which potentially risks deterring from the authenticity of his framework's application. Moving forward, for the purposes of design decision-making, how may the concept of placemaking and attachment be interpreted in a visual dimension? How may the provision and enabling of adaptability and sustainability be visualised for the resilient sub-centre?

# THE DIMENSIONS OF URBAN DESIGN

Morphological Perceptual Social Visual Functional Temporal

F2 Understanding the various dimensions of place.

# LYNCH'S COMPONENTS OF IMAGE OF PLACE

Kevin Lynch's image of place lies at the threshold of the perceptual and visual dimension of urban design. He summarises the basic elements of the image of place and reveals an approach of how to improve the user's connection with it. Through his research, Lynch found the minor theme of orientation through legibility grew into the major theme of the city's mental image.

|                | Morphological |
|----------------|---------------|
| IMAGE OF PLACE | Perceptual    |
|                | Social        |
|                | Visual        |
|                | Functional    |
|                | Temporal      |
|                |               |

F3 The various dimensions of urban design of which two are applicable to the Image of Place- a concept explored further in this chapter.

<sup>50 (</sup>Hamdi 2010, 141-152)

<sup>51</sup> Ibid 151
Observing that cities had districts, landmarks and paths that were easily identifiable and easily grouped into an overall pattern lead to what he called 'imageability': '...that quality in a physical object which gives it a high probability of evoking a strong image in any given observer<sup>54</sup>.' Accepting that images could vary significantly between



F4 Diagram simplifying Kevin Lynch's theory for an Image of Place.

different observers, in his research Lynch sought to identify a public or city image. Lynch argued that 'workable' environmental images required three attributes:

• **Identity** - an object's distinction from other things and its recognition as a separable entity (e.g. a door).

• **Structure** - the object's spatial relation to the observer and to other objects (the door's position).

• **Meaning** - the object must have some meaning for the observer, whether practical or

54 (Lynch 1960, 9)

emotional (recognition of a 'door' as a hole for getting out) $^{55}$ .

These attributes are applicable to not just the broader urban design of the city but also the architectural context of the sub-centre. Lynch's original study and its method have been replicated in various contexts. Lynch contended that in 'every case' the basic ideas had held, '... with the important limitation that images are much modified by culture and familiarity<sup>56</sup>.' He noted that the existence of the basic elements of the city image '...seem astonishingly similar in some very diverse cultures and places. We were lucky<sup>57</sup>.' Nevertheless, some of the work following on from Lynch was highly critical of his findings and his methods- though, to some extent, this is unfair because Lynch had explicitly offered it as a 'first initial sketch'.

EXPANDING ON THE VISUAL IMAGE OF MEANING OF PLACE-

While Lynch focused on the structure of people's mental images, others argued more attention needed to be paid to the 'meaning' and 'affective' dimensions of environmental perception - what the urban environment meant to people and how they felt about it<sup>58</sup>. Appleyard (1980) extended Lynch's work by identifying four ways in which buildings and other urban elements were known (See F6):

By their imageability or distinctiveness of form;

By their visibility as people move around the city;

By their role as a setting for activity; and

By the significance of their role in society<sup>59</sup>.

55 (Lynch 1960, 8) 56 (Lynch 1984, 249) 57 (Lynch 1984, 249) 58 (Heath, et al. 2011, 116)

59 (Appleyard 1969, 131-156)



The Chichu Art Museum in Naoshima Japan, creates meaningful space through the assemblage of objects rather than the presence of a singular form. The space between the objects is what is important- rather than the object itself. This example questions how one perceives the architectureis it as one distinct form with many different experiences within it or is it as many scattered forms with a unified experience through it? F5 Tadao Ando's Chichu Art Museum, Japan



 ${\rm F6}$  Diagram development of literature based around the meaning of image of place.

For Norberg-Schulz 'to be inside' was '... the primary intention behind the place concept<sup>60</sup>.' Similarly, for Edward Relph, the 'essence of place' lay in the - perhaps unconscious but frequently conscious - experience of an 'inside' that is distinct from an 'outside'. He distinguished types of identity of place based on notions of 'insiders' and 'outsiders<sup>61</sup>.' Furthermore, as per Schulz three main principles about place that create meaning and a strong sense of place are – Typology, Topology and Morphology<sup>62</sup>(See F7).

Typology expands on the interactions in place categorised by mood, dialogue, understanding of the environment etc. This refers back to Lynch's idea of the Identity and Structure of the city/ place.

Topology investigates the properties of the inhabited space. This can further be utilised by

the Gestalt principles of visual perception which engages in formal moves that impact one's visual perception of a space. These are elaborated in the next section.

Lastly, Morphology refers to, as previously mentioned, being in and out of the place. It is explored through the relationship between the inside and outside space, equality with the environment space and the feeling of being surrounded<sup>63</sup>.



F7 Diagram development of theory showing what aspects will be applied to this architectural research highlighted in black on the right.

<sup>60 (</sup>Norberg-Schulz 1979, 41)

<sup>61 (</sup>Relph 1976, 111)

<sup>62 (</sup>Norberg-Schulz 1985, 30)

<sup>63 (</sup>Norberg-Schulz 1985, 29)



F8 Gestalt's theories of visual perception and their definitions

## GESTALT THEORY OF VISUAL PERCEPTION *As a formal move*

Expanding on the previous idea of Topology -the properties of space that identify place this section expands on the Gestalt theory of visual perception to decipher an ordering system of the components of the image of place. Gestalt's theory is a set of principles that argue that aesthetic order and coherence comes from the grouping and recognition of patterns, and that people use principles of organisation or grouping to make environments more coherent visuallysingleness vs wholeness<sup>64</sup>. We always experience the 'whole' rather than any single part in isolation. Fundamental 'factors of coherence' or principles of grouping have been identified (see F8).

Lynch used the Gestalt theory as a guiding principle of the 'image of the city.' In this book he even uses Gestalt phraseology such as 'form qualities' and 'figure-background clarity<sup>65</sup>.' Based on the same gestalt psychological theory employed by Lynch, Schulz explores the character of places on the ground and their meanings for people<sup>66</sup>, although Lynch ignored meanings and focused on structure and identity. "Schulz's discussion of perception was largely influenced by Gestalt psychology, to which were also added the socialization of perception and the process of "schematization", that is the way in which perception leads to the construction of an understanding of the world<sup>67</sup>..."

Pure situations are rare, and in most environments several principles come into play simultaneously, though one principle may often be dominant<sup>68</sup>. An overarching issue in Gestalt theory however, is

the apparent need for balance between order and complexity in environments, which changes over time and with familiarity. Within this context of ordered environments- reflecting on his concept of legibility Lynch argued the 'valuable' city was not an ordered one, but one that could be ordered - that is, with a 'complexity that unfolds as one experiences it'<sup>69</sup>.

69 (Lynch 1984, 252)

<sup>64 (</sup>Miess 1990, 80-89)

<sup>65 (</sup>Lynch 1960, 102)

<sup>66 (</sup>Norberg-Schulz 1979, 28)

<sup>67 (</sup>Habib and Sahhaf 2013, 46)

<sup>68 (</sup>Heath, et al. 2011, 170)

#### APPLICATION TO RESEARCH- FINAL STRATEGIES

The task here for architecture to be resilient is to activate the user's sense of place by developing these principles into formal strategies.

Hamdi and Lynch's formulation of the concept of place is expanded for two purposes-

- Hamdi's PEAS Approach for the pragmatic/ purpose of the resilient sub-centre to fulfil the most basic human need for water through an adaptable and sustainable water filtration system specific to the Wellington Case study.
- Lynch and Schulz's approach for the design process and developing the perception of sense of place for the sub-centre purely through formal strategies-

## **IDENTITY**

• Distinction from surrounding context whilst embedded within urban fabric (Distinction vs. Embeddedness)-Relationship with landscape

## **STRUCTURE**

• Spatial Relation to user

### <u>MEANING</u>

- Formal engagement of place through typological references- Imageability
- Insideness vs. Outsideness

The process here being to push these strategies using the **Gestalt principles** to order the image of place and its visual elements.



F9 Image of Design Strategies developed in this section

## DISCUSSION

This study shows that whilst there is a wealth of knowledge about what constitutes the idea of place or a sense of belonging to place- there are still many constraints around how the latter devised frameworks can be applied within different contexts. While useful in simplifying and organising our notion of place and sense of place we must also be careful not to simplify or reduce the concept of place- "real places are complex and messy<sup>70</sup>." Moving forward, the formulated framework is utilised in an analogue design process to arrive at a design outcome specific to the context of Mt. Crawford Prison, Wellington.

70 (Heath, et al. 2011, 122)





## iv

## **PROGRAMME ANALYSIS**

Here Hamdi's PEAS approach is expanded upon to get a brief understanding of the kinds of water storage and filtration systems that will be designed for in the Bath House to meet the needs of the Miramar community. Peter Zumthor's Therme Vals project is further analysed beyond its formal gestures to decipher spatial layout and requirements of a Bath House accommodating for thermal pools and spas. The narrative of Gitanjali develops the spatial layout of the resulting programme to influence the user's journey through the Bath House for an uplifting experience. The findings from this section are then applied in combination with the strategies devised in the previous Literature Review section to develop a set of grounded design iterations. The PEAS approach<sup>71</sup> -detailed in the last section -is utilised for a resilient design by addressing this need of adaptability through the provision of sustainable infrastructural systems that are selfsufficient and adapt based on the user's need to minimise any disturbance to the communities affected by a disaster.

#### SOME TYPES OF WATER COLLECTION SYSTEMS-

## 1. RAINWATER HARVESTING

"In New Zealand, over 10% of New Zealand households... rely on roof-collected rainwater systems. However, studies commissioned by Greater Wellington Regional Council indicate that installation of rainwater tanks for non-potable uses (toilet flushing and outdoor usage) would not make a significant contribution to reduce water demand in Wellington City during dry summers. Furthermore, it would be difficult to justify on economic grounds as installation costs substantially outweigh savings in water charges. An important issue is that space is typically very limited in urban areas. Thus installation of sizeable (5,000L or 10,000L) water tanks may be challenging and expensive for many properties<sup>72</sup>."

#### 2. DESALINATION

Assuming power could be found to run them, 3 desalination plants producing 1 million litres/ day each would suffice. Disadvantages include cost at about \$2 million each, power requirements at about 200kW each and most serious procurement time at about 3 months<sup>73</sup>. A more economical solution would be preferable.

#### 71 (Hamdi 141-152)

- 72 (Beban, Johnston and Stewart 15)
- 73 (Cousins 53)

## 3. WATER RE-USE- INTEGRATED WATER MANAGEMENT AND FILTRATION

Within a water-related vulnerability – water filtration system- methods and practices that borrow from the model of the waste and resource cycles we see in stable ecosystems are most effective. There is no waste- the outputs of one organism or function are the inputs of another. The results are systems that are resilient, stable and low energy- offering the best chance of sustainability and even thriveability<sup>74</sup>. Furthermore, the water filtration system presents itself as an opportunity for an integrated spatial design where resilience comes from the intertwined relationship of architecture with the services of the building.

Increasing costs of water and wastewater treatment infrastructure are driving interest in integrated water management, which calls for combining grey water infrastructure and treated waste-water. Currently these services are managed by separate utilities in different parts of most cities. Since the reuse of wastewater is not an ideal option for consumption, however clean it may be, this system will only be utilised once the water storage has crossed its maximum capacity to meet the new increased demand.

Decentralisation through resilient sub-centres in small communities hence, offers better water security in the event of natural disasters. When the central city treatment plant goes down, it goes down for a whole region. When water and wastewater treatment is decentralised, a calamity does not affect the entire region<sup>75</sup>.

74 (Steinfield and Porto, 12-13) 75 Ibid 62-64



F1 Sketched Explorations for adaptable use of spaces in Bathing House. Sliding wall partitions in previously open pool spaces to create privatised shower areas in the wake of a disaster.

Since the scope of the research was limited to a year's time the focus of this research was on developing the recreational aspect of the programme rather than the industrial aspect of water filtration. Having said this however, basic processes of water filtration and storage quantities based on the need for water in a single household in New Zealand have been considered to gauge the spatial requirements of these services (See Appendix). The site analysis for Wellington revealed the opportunity for a recreational use of water through the programme of the proposed sub-centre. This study explores the programme of the Therme Vals (earlier looked at in Chapter 1) as a precedent for a Bath House.

## THERME VALS Precedent study



F2 Plans of Therme Vals detailing the functions of the various spaces.

This intervention was designed for visitors to luxuriate and rediscover the ancient benefits of bathing. Based on typological references to the stone blocks of the Vals- the plan of this intervention reads as a pertinent solid-void relationship. Here the composition and orientation of the solid is just as important as of the void. It is surrounded by this void, also referred to as the meandering simulates a journey of getting lost in the architecture for the user similar to getting lost in a forest. The underlying informal layout of this internal void is a carefully modelled path of circulation which leads bathers to certain predetermined points but lets them explore other areas for themselves. Furthermore, Zumthor uses the composition of the solids to conceal and reveal a planned perspective. The lack of visual connection however, isolates the user to experience a lonely journey through these intimate spaces. Ever since its completion in 1996, travellers from all over the world have visited Therme Vals for its restorative experience and health benefits. Over 40,000 people come every year<sup>76</sup>.

76 (Hauser 20)



| BATHING              | AREA   | SERVICES               | AREA  |
|----------------------|--------|------------------------|-------|
| Sweat Stone          | 144m2  | Showers                | 16m2  |
| Outdoor Bath         | 180m2  | W/Cs                   | 12m2  |
| Stone Island         | 27m2   | Drinking Stone         | 9m2   |
| Rock Terrace         | 48m2   | W/C Disabled           | 6m2   |
| Fire Bath            | 15m2   | First Aid              | 9m2   |
| Cold Bath            | 4m2    | Laundry                | 10m2  |
| Sounding Stone       | 12m2   | Chemicals              | 24m2  |
| Indoor Bath          | 64m2   | Water Treatment        | 250m2 |
| Outdoor Shower Stone | 20m2   | Sanitation Plant       | 75m2  |
| Flower Bath          | 15m2   | Air Conditioning Plant | 125m2 |
|                      |        | Carbonic Acid          | 25m2  |
|                      |        | Fire Bath Plant        | 70m2  |
|                      |        | Ozone Treatment        | 100m2 |
|                      |        | Secondary Sanitation   | 100m2 |
|                      |        | Freshwater Tank        | 225m2 |
|                      |        | Wastewater Tank        | 480m2 |
| THERAPY              | AREA   | ADDITIONAL SPACES      | AREA  |
| Massage              | 16m2   | Cleaner's Storeroom    | 8m2   |
| Physio Room          | 27.5m2 | Makeup Room            | 21m2  |
| Underwater Massage   | 25m2   | Changing Room          | 15m2  |
| Orthopaedic Room     | 12m2   | Rest Space             | 21m2  |
| Medicinal Bath       | 12m2   | Disabled Cloaks        | 9m2   |
| Aquatherapy          | 70m2   | Disabled Access        | Open  |
|                      |        | Waiting Areas          | Open  |
|                      |        | Storeroom              | 10m2  |

F4 Tabulated programme spaces in the Therme Vals against their occupied areas This study hence, highlights key concerns regarding a bath house to be as follows-

- The programme must accommodate for adaptability in the wake of an earthquake. Adaptability for a bath house would entail draining out pools to create room for private bathing spaces as per the needs of the users.
- Exploring the opportunities for families to share pools or for a single user to have an isolated intimate experience.
- Consider need for additional space for staff and store rooms.
- The blocks in the Therme Vals are derived from the rock terrain of the Vals as a typological reference so how will the context of Miramar impact the typology of the bath house there or the composition of the programme elements?



## **RESULTING PROGRAMME**

| BATHING              | SERVICES               |
|----------------------|------------------------|
| Sweat Stone          | Showers                |
| Outdoor Bath         | W/Cs                   |
| Shared Thermal Pools | Drinking Stone         |
| Heated Foot Bath     | W/C Disabled           |
| Hot Bath             | Greywater Tanks        |
| Cold Bath            | Laundry                |
| Sound Bath           | Chemicals              |
| Indoor Bath          | Water Treatment        |
| Flower Bath          | Sanitation Plant       |
| Light Bath           | Air Conditioning Plant |
| Dark Bath            | Carbonic Acid          |
|                      | Fire Bath Plant        |
|                      | Ozone Treatment        |
|                      | Secondary Sanitation   |
|                      | Freshwater Tanks       |
|                      | Wastewater Tanks       |
| THERAPY              | ADDITIONAL SPACES      |
| Aquatherapy          | Cleaner's Storeroom    |
|                      | Disabled Access        |
|                      | Changing Room          |
|                      | Rest Space             |

F5 Tabulated resulting programme based on the spaces required for proposed Bathing House F6 Using the proposed programme spaces to analyse their Private vs. Semi Public vs. Public Space requirements drawn against their visual or accessible connection to the outdoors.

## PRIVATE

CLEANER'S STOREROOM CARBONIC ACID CHANGING ROOM W/C LAUNDRY LAUNDRY CHEMICALS FIRE BATH PLANT GREYWATER TANKS FRESHWATER TANKS WATER TREATMENT SANITATION PLANT SECONDARY SANITATION WASTEWATER TANKS AIR CONDITIONING PLANT SHOWERS

# DIRECT CONNECTION



## SEMI-PUBLIC





F7 Arranging the programme spaces into an organised journey that reads as a metaphorical journey of Gitanjali to achieve self-actualisation/ acceptance for the user in the chaos of a disaster and bring an experiential quality to the architecture

## DISCUSSION

The aims of the design outcome are to:

- Strengthen the response to a disaster through a catalytic intervention- Through the introduction of an adaptive function that is sustainable along with a recreational purpose -the Bath house will work towards a resilient response to an earthquake in Miramar.
- **Reactivate the context as a new opportunity post-disaster.** The Bath House will function as a recreational intervention before an earthquake and a hub that provides water for basic drinking and bathing after the earthquake. With an adaptive function based on this need of the user-the intervention aims to reactivate the context along with the community for the purpose of resilience.

The objectives for the programme of the Bath House are to-

- Place importance on recreational aspects of bathing and the use of interstitial spaces for the narrative of Gitanjali directing the user to the various bathing spaces.
- Consider the additional storage areas required along with the need for space for staff- cleaners.
- Take the opportunity services offer to become architectural tools.
- Provide quality shared spaces that can adapt itself to private bathing spaces as required.
- Separate and integrate public and private bathing areas and spaces.
- Allow for the ability to accommodate mass arrivals especially in the wake of an earthquake.

The following chapter entails the design explorations that develop the strategies devised in this part of the research.





# DESIGN EXPERIMENTS (2)

Here, it is evident that the development of design experiments after grounding the research in past and current theory is more resolute. This section is a written and visual discussion of the series of design experiments conducted to explore an architectural response to a resilient sub-centre- in the form of an adaptable bath house - through the design framework developed. The intention here is to provide a critical and informed understanding of the project (somewhat objective). A series of design strategies are discussed here arranged not in a chronological order but instead based on their effect on the final outcome. After the programme analysis, the preconceived layout of spaces is expanded upon through these formal strategies. Through the identification of these objectives a critical understanding of the house's role in offering a sense of belonging can be gained in four ways using the Gestalt theories of visual perception.

## GESTALT THEORIES OF VISUAL PERCEPTION



SPATIAL RELATION TO USER



TYPOLOGICAL IMAGEABILITY



RELATIONSHIP WITH LANDSCAPE





## SPATIAL RELATION TO USER

This strategy book-ends the rest of the process as it studies the design explorations starting from a wider urban scale to a loosely personal spatial scale. Figure- Ground studies were utilised to experiment with the footprint of the previous prison building on-site in a deliberate effort to fragment the building so it occupies the surrounding context as both-object and fabric. These were then converted into spatial masses that were formally developed through the use of Gestalt Principles of Visual Perception to enhance the spatial journey through the building as a Geetanjali to the user.

The access or the connecting spaces are critical in developing this narrative/ experience of the bathers. These experiments utilise sinuous geometries to gradually move the user through the spaces and develops the journey further based on the formal/ visual interpretation of Geetanjali. Inevitably, the structure here becomes an architectural tool changing heights, thickness and materiality for weight and light to tie in with the narrative of the spaces.







F2 Experimenting with 3d geometries from the previous explorations to spatialise the massing.



F3 Creating two distinct geometries from what previously used to be the Prison building (on the left) and the Print Shop (on the right). Then exploring how these are connected influenced by geometries of Tadao Ando's plans



F4 Pushing and pulling the masses in elevation to explore how that may affect the journey to the programmes. A higher space may impose as a more sacred space than one embedded in the ground.



F5 Using the connecting pathway as a ramp to simulate an experience of walking closer to the divine as one proceeds towards the second building for a more 'sacred'/ reflective experience of bathing.



F7 Further experimenting with the connecting pathways using Gestalt - Similarity and Continuity. The sketches explore the idea of repetition of similar geometries through the pathway as a means of creating an experiential journey. Movement through a closed to an open space through the spacing of building elements.



F6 Variable spacing between the building elements here, is seen as a desirable outcome to give glimpses into and out of the building as one proceeds towards the second structure(on the left).



F8 A circular structure on the right ties in the geometries in a better sense and gives a different spatial relation compared to the block like solid on the left. It almost seems as though the circular structure has been carved out of the main building(on the left) creating a visual connection- hence, reading as one entire building.



F9 Next, the roofing was experimented with to create a light wooden framework that would radiate outwards from the centre of the main building.




F11 Using the roof and wall as one structure that the user can also interact with as seating. Walls separate to the roofs or ones that were just functioning as partitions lost their relationship with the architecture and the user .

F10 Exploring variable heights of the spaces in section to affect the spatial experience for the user. Taller spaces would simulate a different experience to shorter -more intimate spaces.







F12 Here the typology of Roman Baths was briefly studied to understand that the outdoor baths were surrounded by columns on all sides.

## TYPOLOGICAL IMAGEABILITY

Much like the previous formal strategy to have a strong contextual relationship- the surrounding site is of vital importance to deliver a resilient architecture respectful of the site. A dichotomy between the typology of surrounding gun emplacements(neighbouring to Mt. Crawford Prison) and the typology of baths was the subject of development in this section working on combining the two to read as a unified formal gesture. Differing to the last design logic for achieving height in the architecture as a desirable outcome- the development through the typology of embedded gun emplacements dictated the form to root itself into the land. The narrative for the spaces again strongly resonates in the process of embedding, pulling and extruding the architecture from the land to the sky as the narrative demands.

> F13 Using the column idea in the previous set of images; this set looks at exploring that further through the use of gun emplacement typology where the roof, columns and internal walls usually extrude above the level of the perimeter walls embedded in the ground.













F15 3d digital models experimenting with the access into and out of the secondary structure (previous print shop). Developing the middle core into a circular form to further tie in the geometries together.

### **RELATIONSHIP WITH LANDSCAPE**

In contrast to the previous preliminary design studies where the height of the building was deemed important to portray it as a beacon of hope- Here, the formal relationship of the building with its landscape was carefully considered to study how it sits within it. The form is cut, layered, lifted to sit naturally within the surrounding landscape and avoid imposing itself. As a means to formally engage the site- this section also experimented with columns to formally reflect the lush greenery and tall trees that surrounded the building- in an effort to strengthen the relationship with the landscape, whilst encompassing the previous typologies explored.



F16 Exterior form experiments that respond to the hilly forms of the site while tying in with the poetic narrative of Gitanjali lifting the user into the higher spaces.







F17 Further experimenting with the exterior form to create smooth geometries reminiscent of the hills of the Miramar Peninsula.









F18 Looking at the previously derived wooden framework for the roof and tying that in with the gun emplacement typology to create a roof that looks very similar to the canopy formed by trees surrounding the chosen site.

F19 Here Interior columns are developed to mimic surrounding trees to blur the lines between the inside and outside as a means to formally engage the site.







## INSIDENESS VS. OUTSIDENESS

As a crucial formal gesture based on excluding or including the user, this series of experiments is a formal play with the perception of *public* and private, exposed and hidden spaces. It separates, integrates and divides these spaces critically exploring the tensions between the two. It formalises inclusiveness by testing Gestalt's theory of - Common Ground, Closure and Proximity to question the inside, the outside and the threshold between them. The legibility of these spaces hence, changes between plans, sections and spatial perspectives. The intention here is to be equal with the surrounding environment- Much like Zumthor's 'meander' allowing the user to be 'outside' yet 'inside and 'inside' yet 'outside' discovering his own journey.



F20 Digital model working with a roof structure that separates the public and private functions of the Bathing House as a means of defining the inside and the outside.



F21 Sketched explorations of Gitanjali's narrative being designed through the 'public' and 'private' parts of the plan. Further section sketches exploring how the inside and outside are separated through the use of architectural elements and visual connections.





F24 By removing the solid architectural elements sheltering the pathway and making an open ramp the visual interaction with the design is higher. This further reiterated the gun emplacement typology where the user can see the pathways as exposed however, the structures are somewhat covered.

F22 Shaded out the pathway connections through the Bathing House. Here the arrows show the direction the design is to be interacted with.





F23 <sup>A</sup>Sketch diagrams to consider how the inter storey relationships will come to play in high ceiling spaces. Perhaps through the use of translucent glass to limit interaction between private and public spaces.

F25 <sup>≤</sup>The use of columns at the entrance to not only act as formal motifs of the surrounding landscape but also to create a feeling of openness and closedness or inside/ outside. However, since the interior columns have already explored this idea having them at the entrance as well may seem to be a bit of an overkill.





F26 Experiments with roof structure- extruding, pushing and pulling to create interesting forms that respond to the site and also work along side the gun emplacement typology previously explored as one of the formal strategies.





F27 Designing the exterior columns as trees to appear as though the Bathing House emerges from the site as its own. Since they are very complex forms however, it may be more effective to position them on the inside of the intervention.



F28 Rough render of the interior pool space to use the columns for not just their structural purpose but also as a piping supply that is connected directly into the roof. Here the perimeter columns have been simplified.

### CONCLUSION

In this section, the application of the devised design framework was tested on a site-responsive design for the sub-centre. This was just one of the many ways of interpreting and designing for this project's take on Image of Place. The experiments attempt to evoke the user's sense of belonging to the place by manipulating perception of the identified visual components of place. It is evident that each experimental strategy here contributes to a homogenous design process where each is inevitably intertwined with the rest and neither can be applied autonomously. Following on, this body of work created is presented as a finalised outcome – an initial developed proposition for a resilient sub-centre- A Bath House for Miramar.





# **GITANJALI - A PLACE FOR BATHING**

This project intends to repurpose the dilapidated Mount Crawford Prison site as a resilient recreational centre for Miramar. The design harnesses and exploits the spatial, formal and programmatic opportunities of a Bath House to deliver Mount Crawford with a new - inclusive, restorative and flexible infrastructure (for the provision of water) within its immediate and wider context. As an urban and architectural gesture, this Gitanjali acts as a catalyst for resilience in the wake of an imminent earthquake transforming Miramar from a suburb to an emergent sub-centre. It preemptively addresses the aftermath of a disastrous quake through the adaptability of the Bath House's offering (anjali) as a place for bathing to Miramar. It asks **how can architecture be a medium for facilitating resilience through the sub-centre within a disaster prone context**?



F1 Longitudinal Section of building looking North-east





















16 Male Changing Room 17 Male W/C 18 Outdoor Bath



19 Rest Space 20 Hot Bath 21 Cold Bath 22 Cleaner's Storeroom

23 Aquatherapy 24 Female W/C 25 Male W/C



26 Entrance/Reception 27 Shower Space 28 Shared Thermal Pools 29 Light Bath

30 Dark Bath 31 Sound Bath 32 Flower Bath 33 Warm Bath

34 Shared Thermal Pools 35 Sweat Stone

THE SECOND FLOOR





36 Female Showers 37 Indoor Bath 38 Rest Space 39 Male Showers40 Heated Foot Bath41 Skylight roof





The design repurposes the Mt. Crawford Prison site into an urban project especially useful in the wake of an earthquake. Figure studies ground sympathetic to the existing built form propose a bathing house that is embedded in the site and grows out of it to provide the user with a wide range of bathing experiences - some situated deep in the ground whilst some at an elevated height. From a wider scale, the design responds to the hilltop to also capitalise on the marvellous sea views of the site.

Careful consideration is given to the edges of the Bath House – what separates the inside and the outside and where those thresholds can be blurred (using translucent glass as a material of partial concealment). With the embedded typology of the gun emplacements the walkability of the site increases. One can interact with the entire Bath House from most points of the site (if not directly accessible then it is still mostly visually connected).

The materiality of the design plays a key role in its legibility. The distinctiveness of the form hereby is perceived as a solid or a 'tangible hollow' through the use of materials in various places. Wood on one side gives it a hollow light framework appearance whilst translucent glass makes it look like a dense yet pervious solid. It is an architecture of exclusiveness and inclusiveness. The translucent glass draws the user in with an element of mystery however, excluding them as an outsider in the process. On the contrary, the wood through its repetitive panels that are equally spaces gives the user limited views into and out of the Bathing House, thereby providing a sense of

F4 Figure Ground Study Diagrams from previous explorations F5 Exterior Render showing translucent glass as a means of exclusiveness.

inclusion. The embedded nature of the 'outside' of the design further blurs the line between this edge- seating it within the site yet open to the public. This distinctiveness of public/ private, exposed/ sheltered, inside/ outside is left open to each user's interpretation based on their own personal journey through the design.





Overall the Bathing House reads as a unified architecture – the geometries fitting together like a scattered puzzle through the implied Gestalt theory of visual perception. The different geometries read as one due to their close proximity to each other along with their face edges responding to each other.





F7 Programmatic diagram in Section as a spatial reference to the changing heights between the various functions. The accessways that are narrow in plan are high in section creating a different experience altogether as per the narrative. The integration of services with the architecture is clearer here-Rainwater is collected through the column-like pipes that deliver it from the roof system through the pools to its respective filtration tanks underground.

1 Sound Bath 2 Light Bath 3 Walkway into the pools 4 Rest Space 5 Entrance/ Ramp 6 Outdoor Bath 7 Exterior of changing rooms



8 Accessible green roof of the changing rooms level with the surrounding context 9 Fire Bath Plant 10 Wastewater Tanks

11 Ramp access to Second Floor 12 Grey water Tanks 13 Air Conditioning Plant 14 Heated Foot Spa with an open walkway behind it

15 Aquatherapy 16 Male W/C 17 Rest Space



## SERENITY IN AUSTERITY

F8 Exterior Image of the building showing the face of the building as a defined edge however, the use of materiality to draw the user into the mystery of the inside. A somewhat manipulative take on insideness vs outsideness however, engaging the landscape through the use of structural columns derived from the natural forms surriounding the Bath house.

Gitanjali - A Place for Bathing

The Bath House creates a sensation of being in a forest of tall trees through its wooden columns. The idea of the general subtle form is that the surrounding ecology will eventually conceal the sides of the building making the Bath House

primarily a container for the events

inside.


F9 The stark contrast between the outside and inside of the building is apparent here- An austere linear wooden hollow inside for the more playful spaces -carved out of the landscape against a glowing solid form on the outside face as a subtle formal gesture for serenity for the peaceful bathing spaces.







F10 Connection spaces to the outdoor bath embedded into the site.





F11 The walkways are accessible from the level of the surrounding landscape similar to a gun emplacement typology- a key driver of this site responsive design.





# RESPECTS THE LOCAL CONTEXT



The Bath House provides flexible infrastructure for the community. It is sympathetic to the chosen site, embedded into the ground instead of imposing itself on the surrounding ecology. Here the Bath house grows out of the site as though, healing it in the process. It welcomes all people of the community to reactivate the site into its new recreational function.



F12 Looking up to the entrance of the Bath house as a subtle entrance and exit from the pavillion similar to the journey in Gitanjali where Tagore's journey does not start or end ceremoniously, rather in peace.

Gitanjali - A Place for Bathing







F15 The threshold space between the inside and the outside. Here the space transitions from the open outdoor bathing space to a more sheltered, darker internal bathing space preparing the user for the 'meander'.



F16 View from the upper storey of the Bath house looking outwards towards everyone moving about on their individual journeys through their intervention- some frolicking in the outdoor bath, whilst some finding their way around the pavillion.



F17 View into the buried walkway similar to that of the gun emplacement typology utilised as a formal gesture in the design process. One can see the shifted geometries of the ramp on the left that takes the user up into the highest point of this Bath House.



F18 External render of eastern pavillion of the Bath House growing out of the site maximising on the hilltop views.





F19 Interior render of Bathing spaces showing divided pools in a shared space. Here it is clear how the design maximises on the architectural potential of the piping infrastructure by including them in this space as an interactive tree structure. The translucent glass blurs the connection with the outside.

ADAPTIVE VISION FOR THE FUTURE

The outcome integrates and celebrates the infrastructure with the architecture. This involves the use of water pipes as architectural tools to experiment with hiding or exposing these infrastructural elements. This had the effect of spatialising infrastructure as a means for the bather to interact with the architecture. Additionally, visual or physical connections integrate the experience of various spaces enabling new shared experiences. The adaptive re-use of spaces is designed for future need- testing how this might lead to a distinct, dynamic and flexible architecture that changes its narrative as it adapts to the need for more bathing spaces- what sort of spaces will result from it; and what this will mean for the building as an entirety.







F20 Render of Internal Bathing spaces where the partitons rise up in the wake of an earthquake for private bathing spaces. Alternatively the water could also be drained out to further save on water depending on the need along with the addition of more partitions to welcome more users.



F21 Longitudinal section illustrating water use before and after an earthquake strikes and the vulnerability increases.

Gitanjali - A Place for Bathing



Conclusively, returning back to the initial wider aim of this research- exploring the instrumentality of architecture in fostering resilience within a disaster prone context. This presented the sub-centre as an emergent urban condition of latent potential in facilitating resilience prior to a disaster. Through the provision of architecture that provides water in a necessary and recreational way this Gitanjali aims to significantly reduce the vulnerability of the Miramar community in the wake of a disaster.



F1 Reflection framework of what was learnt from the thesis research.

# **REFLECTION // CONCLUSION**

It is evident in the development of this research that resilience is a complex issue. The aim of this research was to cast an architectural lens on resilience at the three scales of Physiological needs, a sense of belonging and the need for self acceptance. This approach is just one of the many responses that may be devised around this issues and it is by no means, the perfect solution- if there is such a thing. This chapter identifies the strengths, weaknesses, opportunities and threats that this project presents for a resilient architecture of the sub-centre to reflect upon the research as a whole.

Having its constraints in place, the broader aim for this design-led-research was to address the criticality for an architecture of resilience through the sub-centre. This was tested through visual and spatial moves. Reflecting on these formal strategies in retrospect, it is evident that the site's context and site conditions dictated the typological advance, establishing the narrative through the architecture, integration of spaces and designing the structure as architecture. These formal moves operate in relation to the wider urban scale as they do in the immediate site as well. Through its testing the project has engaged not only the immediate Mt. Crawford Prison site, to a degree, but also the sub-centre as an architectural opportunity at a wider urban and political scale- relating to Miramar as a densifying suburb, a vulnerable yet golden opportunity, an emerging flexible infrastructure for the community.

However, this by no means suggests that this

Anjali(offering) is a finite solution or an embodiment of resilience (if there were such a thing) and it is merely one of the many ways to address this issue. Hence here I point out some limitations within the project-

The open scope of the thesis research may be considered its downfall. Beginning with a wide scope and limiting it slowly resulted in a body of design work that is presented in a finalised format however, is not resolved completely against the formal constraints. Through rigorous constraints and tests a response that was restrained by more than just its formal moves could have been developed. A careful and deeper consideration of the programme and other pragmatics of the design, for example, would have further challenged the project to make room for new opportunities resulting in a more informed outcome. Moreover, the immediate site conditions probably had a significant influence on the resulting body of work in addition to the sub-conscious desire to relate materially and aesthetically to the existing mountainous context. Whilst these contextual derivations help situate the design, it also explicitly engages the project with its wider urban context in an embodied sense. Moving forward, it may be interesting to see how these strategies would be challenged in a different context- one more sheltered perhaps. And most importantly, my own personal bias as a designer undeniably had a vivid role to play in the design outcome- to say it is an objective outcome addressing this idea of resilience would be naïve.

The iterative nature of design testing resulted in multiple predominantly sketch explorations. The design testing is divided into two chapters to convey the methodology that lacked theoretical reasoning in one and followed a developed theoretical framework in the other. Without saying the two are disengaged, the strategies developed in both processes are discernibly similar in purpose however, the second process having more constraints provides a more rigorously explored body of work. Originally looked at as a purely infrastructural problem, for example, after the review of current discourse led to a broader and general set of strategies that could be formalised to address a varying problem of resilience.

Despite these limitations, moving forward- the development of resilience through the architecture of the sub-centre may be tested with more constraints and detail into the three scales of resilience. The proposal of thermal baths opens an opportunity for the 13 hectare land to be an urban precinct for Miramar- one that houses multiple adaptable functions. Current breakthrough research in technologically driven architecture offers new opportunities for the adaptability of the functions contained within the architecture. Further inquiries into the project could include- exploring water as an architectural tool- aesthetically and spatially. A resilient architecture hence, calls for a necessity of a design approach that equally prioritises a wider urban scale, a systems scale and an end -user scale.

In conclusion, this project aims to reveal latent potential, within a derelict site like Mt Crawford Prison's through the sub-centre condition that could redirect critical infrastructure and generate awareness about the densifying suburb. The proposition of an Architecture of Thermal Baths is based on the unique connection of the immediate site with water, through its strengths and vulnerabilities, and addressing these through formal strategies hereby enabling resilience and regeneration in the architectural outcome. Resilience thinking offers clues to a positive future vision for architecture that can evolve and inspire the building practice to sustain crucial systems and communities before AND after a catastrophic earthquake.



"We shape our buildings; thereafter they shape us." -Winston Churchill

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# LIST OF FIGURES

**F1** *Sub-centre diagram further elaborated on in the next section.* Author's own image.

F2 Example of a Collective Centre- A big shed has been transformed into a housing facility through the use of temporary partitions allowing the privacy of users. Source: Idemen, A. Esra, S. Mert Sener and Emrah Acar. "Assessing the adaptive re-use potential of buildings in emergencies: Analysis of architectural design factors." Architecture in Emergency: Rethinking the Refugee crisis. *Research Gate*, 2016. Web. <www.researchgate.net/profile/ Ayse\_Idemen/publication/309126777\_ Assessing\_the\_adaptive\_re-use\_of\_

### SITE CHAPTER

**F1** Map of Wellington illustrating the overlap of its water supply with the fault lines. Author's own image.

F2 Simplified map highlighting the vulnerabilities of the road network overlapping the fault lines and water supply network to point out two distinct areas that will be affected. Author's own image.

**F3** *Population count for Eastern suburbs.* Author's own image.

**F4** Map of Miramar Peninsula highlighting its hilly topography along with the views it provides towards the sea. Author's own image.

**F5** The Rongotai Isthmus originally used to be underwater and the Miramar Peninsula was an island - Motukairangi until 1855 buildings\_in\_emergencies\_Analysis\_ of\_architectural\_design\_factors/ link/5838915c08aef00f3bfa35db.pdf>. PDF.

**F3** Sub-centre blocks affecting regions within their radius proximity. Author's own image.

**F4** *Diagram illustrating methodology for thesis research.* Author's own image.

**F5** *Diagram illustrating thesis chapter layout.* Author's own image.

**F6** *Illustrated journey of Gitanjali's narrative.* Author's own image.

when an earthquake caused an uplift of about 2 metres. Source: Eileen McSaveney, "Historic earthquakes - Earthquakes in Māori tradition". *Te Ara - the Encyclopedia* of New Zealand. 12 June 2006. Web. 30 March 2016.<http://www.TeAra.govt.nz/ en/photograph/4383/wellington-harbourbefore-the-haowhenua-earthquake.>

**F6** Diagram illustrating the Liquefaction potential of the land from Low to none (in the middle area) because of the mountainous soil typology. Author's own image.

**F7** Wind analysis showing that throughout the year the Northerlies and Southerlies are dominant. Source: Marine Weather. "Wind Report for Wellington". Marine Weather. Web. 30 March 2016. < http://www. marineweather.co.nz/wind>. **F8** Aerial view of Mount Crawford Prison, the highest point on the Miramar Peninsula as a site of resilience. Author's own image. Mount Crawford Prison structurally unsafe and yet to be demolished. Author's own image.

**F9** Images of the interior and exterior of

# CASE STUDY ANALYSIS

F1 Interior of Omega showing aerobic lagoon spaces that the students can interact with. Source: The American Institute of Architects. "Omega Center for Sustainable Living". AIA Top Ten. 15 May 2016. Web. < http://www.aiatopten.org/ node/109>.

**F2** Diagram of various water collection and filtration areas as shown in section. Source: Ibid.

F3 Sayamaike Historical Museum-Unique use of water falling on one side of the walkway as a visual barrier with experiential qualities. Source: Arcspace. "Sayamaike Historical Museum. Arcspace. Oct 2003. Web. 3 September 2016. <http://www.arcspace.com/features/ tadao-ando/sayamaike-historical-

### **DESIGN EXPERIMENTS (1)**

**F1** Sketched analysis of the Mt Crawford Prison site. Author's own image.

**F2** 3-D mass model to represent where the proposed programmes would be placed on the 13 hectares land. Author's own image.

**F3** Massing experiments. Author's own image.

**F4** *Programmatic Massing studies exploring the stratification of programmes.* Author's museum/>.

F4 Exploded geometries of Sayamaike Museum as sketched by the architect, Tadao Ando. Source: Ibid.

**F5** The use of water as an architectural feature in this museum. Source: Ibid.

**F6** Interior built of stone looking out into the mountaineous typology surrounding the Therme Vals. Source: ArchDaily. "The Therme Vals / Peter Zumthor." *Archdaily*. 11 Feb 2009. Web. 23 Jan 2017. http:// www.archdaily.com/13358/the-thermevals.

**F7** Image illustrating the concept of water meets stone meets mountain. Source: Ibid.

**F8** View of the Therme Vals from a surrounding hill. Source: Ibid.

own image.

**F5** Sketch experiments embedding the building into the ground so only the cantilevered part is exposed to the user. Author's own image.

**F6** Detailed sketch interpretation of the experiential journey. Author's own image.

**F7** *Sketched outcome for mental rehabiliation retreat*. Author's own image.

### LITERATURE REVIEW

F1 Maslow's Hierarchy of Needs based on the Physiological Needs being of utmost importance before any other needs can be fulfilled. Source: Maslow, A.H. Towards a Psychology of Being. New York: D. Van Nostrand Company, 1968. Print.

**F2** Understanding the various dimensions of place. Source: Heath, Tim, et al. *Public Places: Urban Spaces.* Hoboken: Taylor and Francis: Routledge, 2012. Print.

**F3** The various dimensions of urban design of which two are applicable to the Image of Place- a concept explored further in this chapter. Author's own image.

**F4** *Diagram simplifying Kevin Lynch's theory for an Image of Place.* Author's own image.

F5 Tadao Ando's Chichu Art Museum, Japan. Source: Flickr. Web. 23 November

# **PROGRAMME ANALYSIS**

**F1** Sketched Explorations for adaptable use of spaces in Bathing House. Author's own image.

F2 Plans of Therme Vals detailing the functions of the various spaces. Source: Einnemee. "Therme Vals, Peter Zumthor." *Lizzie's Blog.* 6 December 2014. Web. 30 March 2016. <https://einnemee. wordpress.com/2014/12/06/precedentstudy-therme-vals-peter-zumthor/>

**F3** Exploded view of the Therme Vals showing the solid massing of the interior pool spaces and the meandering in between. 2016. < https://farm5.staticflickr. com/4020/4586466084\_fbbcc49c61\_b. jpg>.

**F6** Diagram development of literature based around the meaning of image of place. Author's own image.

**F7** Diagram development of theory showing what aspects will be applied to this architectural research highlighted in black on the right. Author's own image.

**F8** Gestalt's theories of visual perception and their definitions. Source: Heath, Tim, et al. *Public Places: Urban Spaces.* Hoboken: Taylor and Francis: Routledge, 2012. Print.

**F9** Image of Design Strategies developed in this section. Author's own image.

**F4** Tabulated programme spaces in the Therme Vals against their occupied areas. Author's own image.

**F5** Tabulated resulting programme based on the spaces required for proposed Bathing House. Author's own image.

**F6** Using the proposed programme spaces to analyse their Private vs. Semi Public vs. Public Space requirements. Author's own image.

**F7** Arranging the programme spaces into an organised journey. Author's own image.

#### **DESIGN EXPERIMENTS (2)**

**F1** *Figure-Ground study.* Author's own image.

**F1** *Experimenting with 3d geometries.* Author's own image.

**F2** Creating two distinct geometries. Author's own image.

**F3** *Pushing and pulling the masses.* Author's own image.

**F4** Using the connecting pathway as a ramp. Author's own image.

**F5** Further experimenting with the connecting pathways. Author's own image.

**F6** *A circular structure*. Author's own image.

**F7** Variable spacing between the building elements. Author's own image.

**F8** *Next, the roofing was experimented with.* Author's own image.

**F9** Using the roof and wall as one structure. Author's own image.

**F10** *Exploring variable heights of the spaces in section.* Author's own image.

**F11** Here the typology of Roman Baths was briefly studied. Author's own image.

**F12** Using the column idea. Author's own image.

**F13** *Pulling and Pushing the various spaces.* Author's own image.

F14 3d digital models. Author's own image.

**F15** *Exterior form experiments*. Author's own image.

**F16** Further experimenting with the exterior form. Author's own image.

**F17** Looking at the previously derived wooden framework for the roof. Author's own image..

**F18** Here Interior columns are developed. Author's own image.

**F19** *Digital model working with a roof structure.* Author's own image.

**F20** Sketched explorations of Gitanjali's narrative. Author's own image.

**F21** Shaded out the pathway connections through the Bathing House. Author's own image.

**F22** By removing the solid architectural elements. Author's own image.

**F23** Sketch diagrams to consider how the inter storey relationships will come to play. Author's own image.

**F24** The use of columns at the entrance. Author's own image.

**F25** *Experiments with roof structure.* Author's own image.

**F26** Designing the exterior columns as trees. Author's own image.

**F27** *Rough render of the interior pool space.* Author's own image.
### PLACE FOR BATHING

**F1** Longitudinal Section of building looking North-east. Author's own image.

**F2** Section of Western Pavillion. Author's own image.

**F3** Section of Eastern Pavillion. Author's own image.

F4 Figure Ground Study Diagrams from previous explorations. Author's own image.

F5 Exterior Render. Author's own image.

**F6** Western elevation perspective. Author's own image.

**F7** Section of the Bath House. Author's own image.

**F8** *Programmatic diagram in Section.* Author's own image.

**F9** *Exterior Image of the building.* Author's own image.

**F10** The stark contrast between the outside and inside of the building. Author's own image.

**F11** Connection spaces to the outdoor bath embedded into the site. Author's own image.

**F12** The walkways are accessible from the level of the surrounding landscape similar

### **REFLECTION/ CONCLUSION**

F1 Reflection framework of what was learnt from the thesis research. Source: Hamdi, Nabeel. The Placemaker's Guide to Building Community. London: Earthscan, 2010. Print. to a gun emplacement typology. Author's own image.

**F13** *Looking up to the entrance of the Bath house.* Author's own image.

**F14** *View from the entrance.* Author's own image.

**F15** A ramp here further pulls in the user into the various pool spaces for them to meander into. Author's own image.

**F16** The threshold space between the inside and the outside. Author's own image.

**F17** View from the upper storey of the Bath house looking outwards. Author's own image.

**F18** View into the buried walkway similar to that of the gun emplacement typology. Author's own image.

**F19** *External render of eastern pavillion of the Bath House.* Author's own image.

**F20** Interior render of Bathing spaces. Author's own image.

**F21** *Render of Internal Bathing spaces.* Author's own image.

**F22** Longitudinal section. Author's own image.

**F2** Map of potential sub-centres in different parts of Wellington catering to different needs. Author's own image.

# APPENDIX

## Household water use in Auckland

From February to September 2008, the Building Research Association of New Zealand (BRANZ) monitored the water use of 51 randomly selected households across the Auckland region.

#### Water use identified in the 2008 BRANZ study

| Season | Average residential water use | Median residential water use |
|--------|-------------------------------|------------------------------|
| Summer | 179 L/p/d                     | 143 L/p/d                    |
| Winter | 174 L/p/d                     | 130 L/p/d                    |

Overall, the highest indoor water end use was the shower, followed by the washing machine and the toilet. The figure below shows how water use changes between summer and winter.



Auckland residential water end use (2008. BRANZ study)

To estimate the need for water on a daily basis in New Zealand. Watercare. "Household water use in Auckland". *Watercare*. 2008. Web. 14 April 2016. < https://www. watercare.co.nz/community/Be%20Waterwise/Water%20use%20in%20Auckland/ Pages/Household-water-use-in-Auckland.aspx>.Deshpande, Suyog. "Review on Gitanjali - Rabindranath Tagore." *Mouthshut*. 18 Aug 2003. Web. 15 May 2016.



Narrative of Gitanjali laid out as a linear narrative. Author's own image.