

Play, Learn, Inspire: Hawai'i Children's Discovery Center of Nature

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A thesis
submitted in partial fulfillment of the
requirements for the degree of

Master of Architecture

University of Washington
2011

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Program Authorized to Offer Degree:
Architecture

TABLE OF CONTENTS

| | |
|--|-----|
| List of Figures..... | vi |
| Preface..... | vii |
| Chapter 1 - Introduction..... | 1 |
| Chapter 2 - Theoretical Framework..... | 18 |
| Environmental Education..... | 18 |
| Environmental Education in Hawai'i..... | 18 |
| The Role of Play in Early Childhood Education..... | 19 |
| Play and development..... | 20 |
| Using Nature to Promote Environmental Awareness..... | 20 |
| Architecture and Playful Learning..... | 20 |
| Using Architecture to Promote Environmental Awareness..... | 21 |
| Architecture and Meaning..... | 23 |
| Architecture and Experience..... | 23 |
| Architecture and Eco-Inspiration..... | 23 |
| Case Studies..... | 23 |
| Conclusions..... | 24 |
| Chapter 3 - Methods..... | 26 |
| Site Analysis: Kaka'ako Waterfront, Honolulu, Oahu, Hawaii..... | 27 |
| Existing Urban Area..... | 27 |
| Program..... | 33 |
| Chapter 4 - Design..... | 35 |
| Urban Design Strategy..... | 38 |
| Urban Design..... | 40 |
| Hawai'i Children's Discovery Center of Nature: Strategy..... | 42 |
| Hawai'i Children's Discovery Center of Nature: Site Planning..... | 44 |
| Hawai'i Children's Discovery Center of Nature: Architectural Expression..... | 46 |
| Biotopes..... | 52 |
| Environmental Education and Play..... | 56 |
| Experience..... | 56 |
| Conclusions..... | 64 |
| Endnotes..... | 65 |
| Bibliography..... | 67 |
| Appendix A: Final Presentation Drawings..... | 71 |
| Appendix B: Program Areas..... | 72 |

LIST OF FIGURES

| | |
|--|------|
| 1. View of downtown Honolulu..... | vi |
| 2. View of Hawaiian rainforest..... | vii |
| 3. Initial concept image..... | viii |
| 4. World Pacific diagram..... | 2 |
| 5. Major Hawaiian Islands diagram..... | 3 |
| 6. Island of Oahu diagram..... | 4 |
| 7. Hawaiian Monk Seal..... | 6 |
| 8. Hawaiian Green Sea Turtle..... | 7 |
| 9. Hawaiian Transect..... | 5 |
| 10. Three pillars of sustainability..... | 8 |
| 11. Ahupua'a..... | 9 |
| 12. Ko'olau Mountain range..... | 9 |
| 13. Lo'i (Taro fields)..... | 9 |
| 14. Menehune Fish Pond..... | 9 |
| 15. Honolulu city grid..... | 10 |
| 16. Waikiki Skyline..... | 11 |
| 17. Children, Environment, Sustainability..... | 13 |
| 18. Kaka'ako skyline..... | 15 |
| 19. Environmental Education diagram..... | 17 |
| 20. 2050 Sustainability Plan..... | 19 |
| 21. Environmental sustainability Hawai'i..... | 19 |
| 22. Children playing..... | 21 |
| 23. Children in Streets..... | 21 |
| 24. Children in playing nature..... | 21 |
| 25. Children playing at the Hawai'i Children's Museum..... | 22 |
| 26. York Cathedral..... | 24 |
| 27. Toyo Ito's Grin Grin project..... | 24 |
| 28. Olympic Sculpture Park, WiessManfredi..... | 25 |
| 29. Hands-On Children's Museum, The Portico Group..... | 25 |
| 30. Seattle Central Waterfront, James Corner Field Operations..... | 25 |
| 31. Architectural weave diagram..... | 28 |
| 32. City of Honolulu Diagram..... | 29 |
| 33. District of Kaka'ako..... | 30 |
| 34. District of Kaka'ako diagram..... | 31 |
| 35. The Hawai'i Children's Museum Exterior..... | 33 |
| 36. The Hawai'i Children's Museum Interior..... | 33 |
| 37. Aerial view of Kaka'ako..... | 34 |
| 38. Informal Dwelling Units in Kaka'ako..... | 35 |
| 39. John A. Burns School of Medicine..... | 35 |
| 40. Existing urban condition diagrams..... | 36 |
| 41. Friends of Kewalo..... | 37 |
| 42. Friends of Kewalo's Kaka'ako Masterplan..... | 37 |
| 43. Inspiration diagram..... | 39 |
| 44. Urban design considerations diagrams..... | 41 |
| 45. Before & After..... | 43 |

LIST OF FIGURES - continued

| | |
|--|----|
| 46. Site strategy diagrams..... | 45 |
| 47. Site Plan..... | 47 |
| 48. Perspective of exhibit space..... | 49 |
| 49. Perspective of water's edge..... | 51 |
| 50. Overall Aerial view..... | 53 |
| 51. Strategies in 3D..... | 54 |
| 52. Aerial view of site..... | 55 |
| 53. Biotopes & Cross sections..... | 57 |
| 54. Perspective of wetlands and Hula Theater beyond..... | 59 |
| 55. Perspective of forest | 61 |
| 56. Perspective towards city..... | 63 |
| 57. Elevation..... | 56 |
| A1. Presentation drawings..... | 71 |



Figure 1 | View of downtown Honolulu

PREFACE

My interest in the connection between the natural and the built environment stemmed from my childhood experiences in Honolulu, Hawai'i. There I was exposed to a dichotomy of environments: on one end of the island was the concrete jungle of a high-density city; on the other end, the serenity of the Hawaiian rain forest (Figure 1 & 2). The lessons I learned from both environments left poignant memories that have lasted a lifetime. As a young designer, these memories continually shape who I am. I have become increasingly sensitive to my environment, and to the people around me. My hope is to be able to use these lessons to educate others through design about the beauty of the natural and built environments.



Figure 2 | View of Hawaiian rainforest



HAWAI'I CHILDREN'S DISCOVERY
CENTER OF NATURE

by AJ TAACA

play
learn
inspire

Figure 3 | Initial concept image

CHAPTER 1 : INTRODUCTION

Once an ecological utopia, the islands of Hawai'i were home to hundreds of endemic birds and plants. Since the arrival of the first Polynesians and subsequent discovery by the Europeans, its ecology has suffered a tremendous loss of native species. The dire circumstances of Hawai'i's ecology require a place of intervention to education about the importance of sustainability (Figure 3). The nine major islands of the Hawaiian archipelago are located in the middle of the North Pacific Ocean, the nexus between the eastern and western hemispheres (Figure 4). While most volcanoes were formed from tectonic movement around the Pacific Ring of Fire, the islands of Hawai'i were created over 70 million years of a combined process of magma formation, volcanic eruption, and tectonic plate movement over a geologic hot spot (Figure 5).

The site is located on the island of Oahu in the middle of the Hawaiian island chain. Oahu was formed by two volcanic ranges, the Waianae mountain range on the

leeward side and the Ko'olau mountain range on the windward side of the islands (Figure 6). What makes the islands of Hawai'i so special is the diversity of the food web that inhabits the islands. For example, the Hawaiian monk seal, humpback whale and green sea turtle reside in the open ocean, while bats, crows, and hawks reside in the aviary in the mountains (Figure 7 & 8). A typical transect through an island reveals a dynamic mix of five ecological zones that range from the ocean, grasslands, and forest to wetlands and intertidal habitat (Figure 9). This unique ecological condition is threatened by many factors that include pollution, destruction of natural habitat, and the growing number of invasive plant and animal species that have colonized the islands.

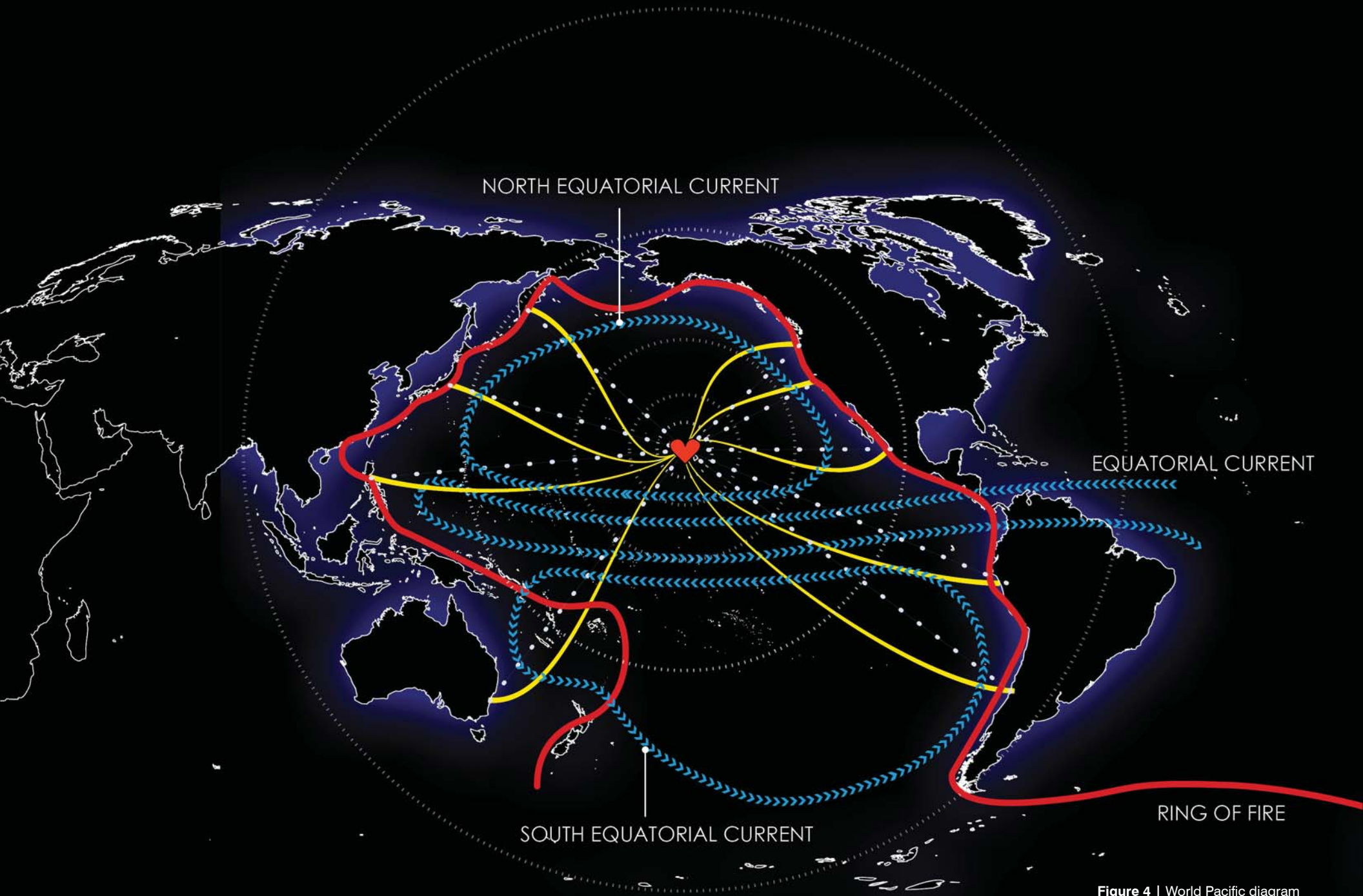


Figure 4 | World Pacific diagram

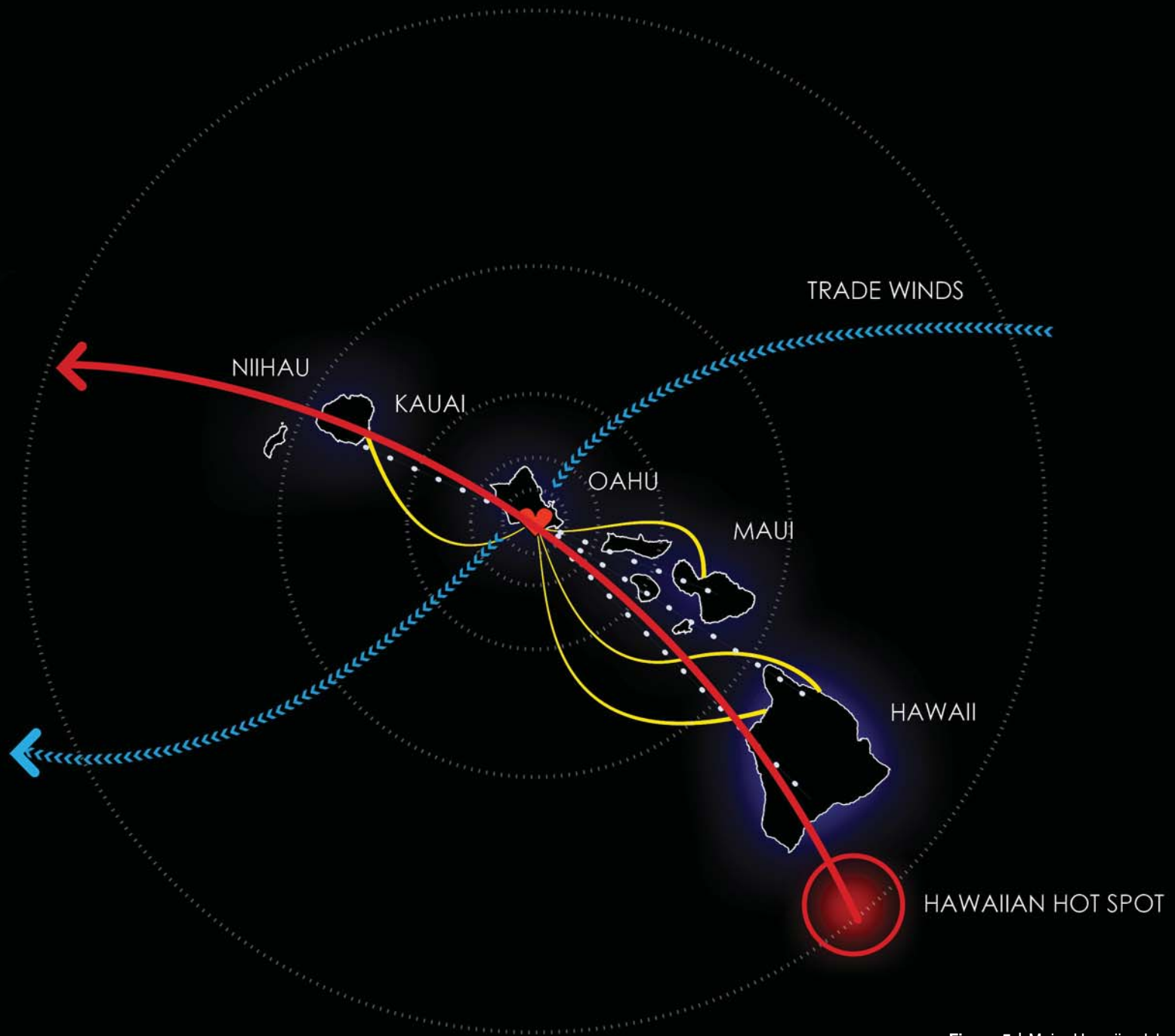


Figure 5 | Major Hawaiian Islands diagram

TECTONIC PLATE MOVEMENT

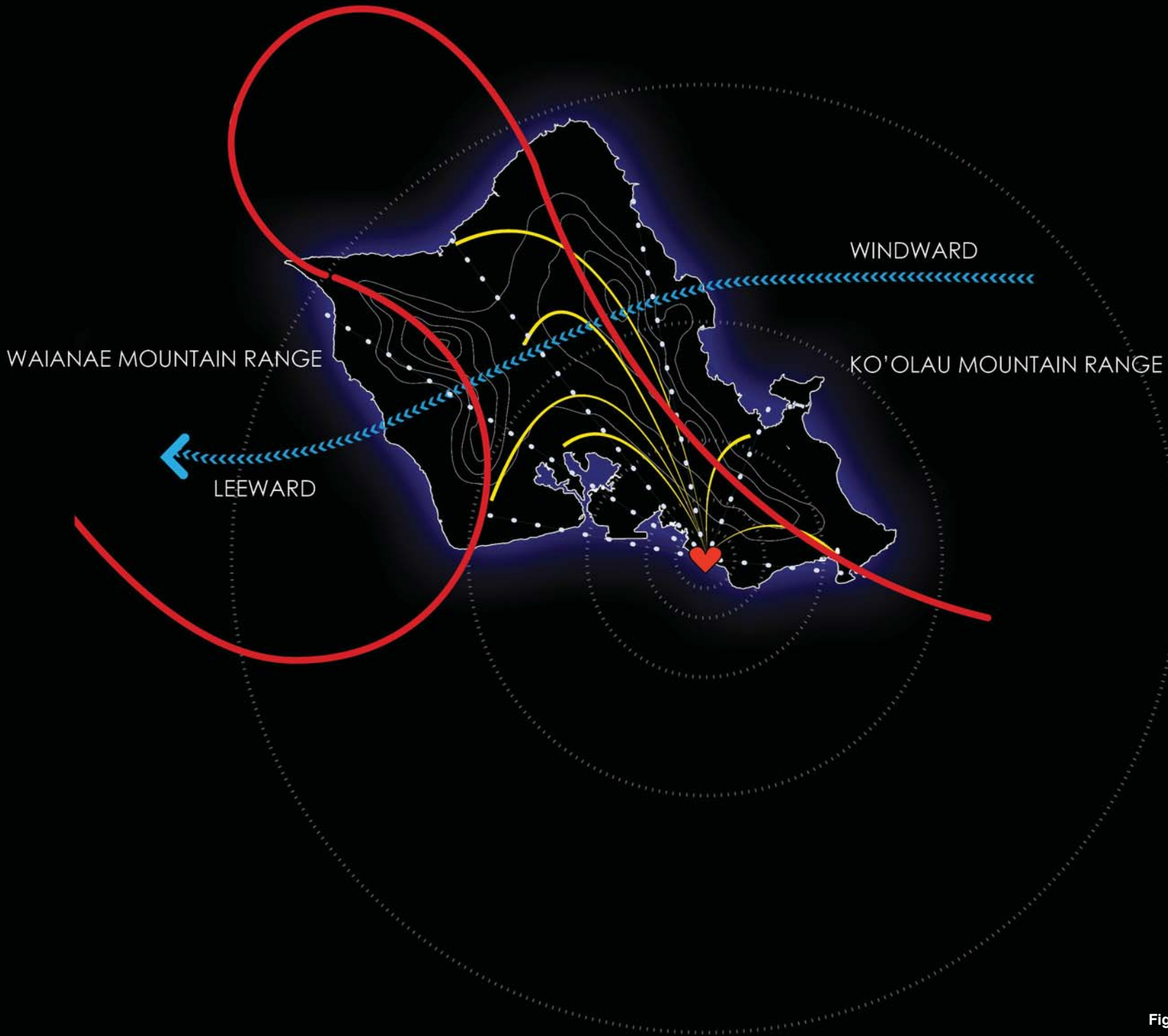


Figure 6 | Island of Oahu diagram

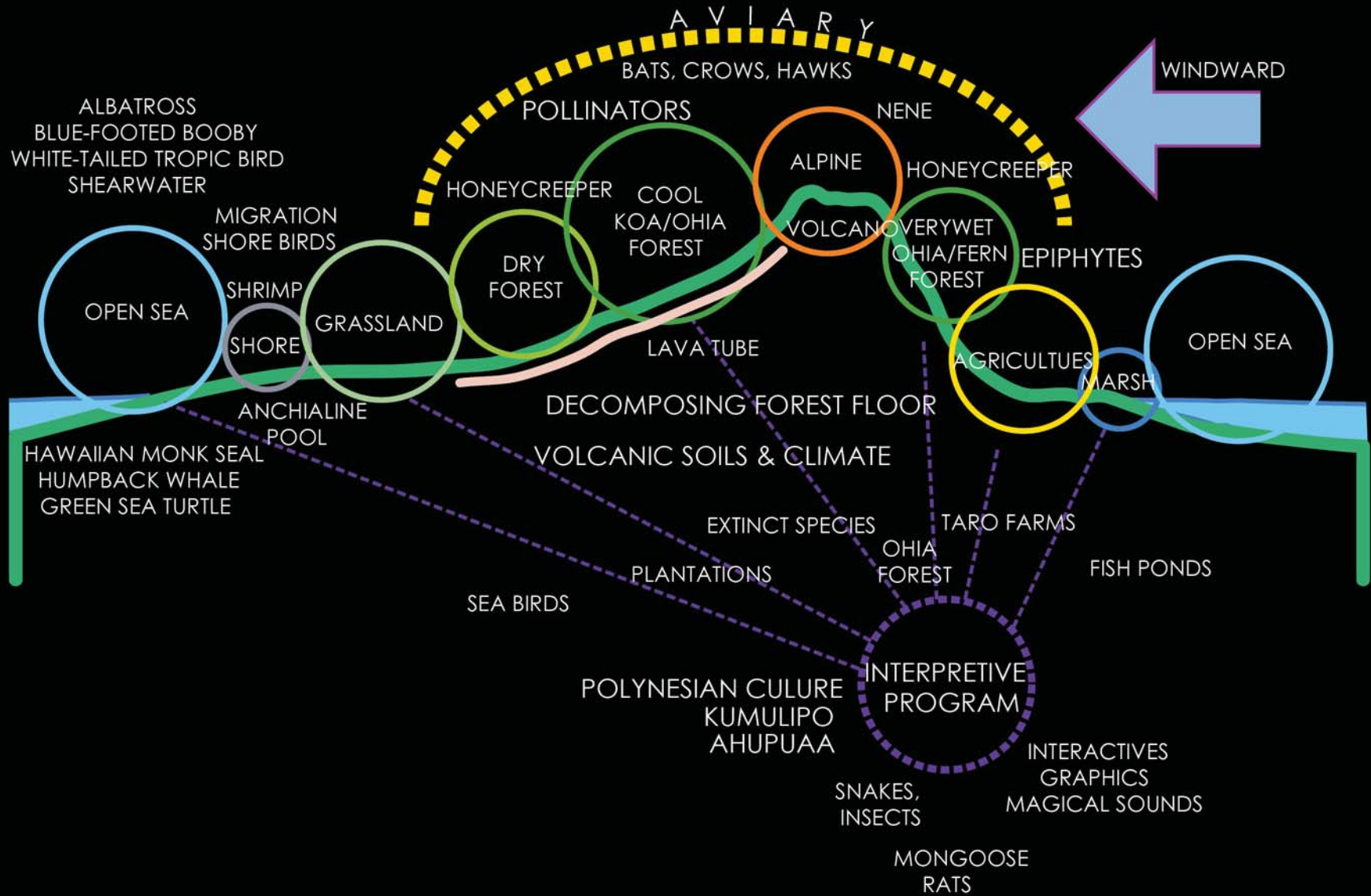


Figure 9 | Hawaiian Transect



Figure 7 | Hawaiian Monk Seal



Figure 8 | Hawaiian Green Sea Turtle

INTRODUCTION - continued

In 2002, a nonprofit led by Stuart Cowan developed a framework called the Conservation Economy, a “research initiative designed to capture the deep structure – the recurring economic, social, and ecological patterns” of sustainability.¹ This trinity, also known as the “three pillars of sustainability,” shed light on the elements needed to maintain the “quality of human life in harmony with nature (Figure 10).”² While ecological design is a popular topic in architectural discourse today, the concept of sustainability was practiced by the ancient Hawaiians in a series of highly organized land divisions called ahupua’a (Figure 11).

Historically, the ancient Hawaiians divided the land into ahupua’a, “a section of land most often running from the mountains to the sea”.³ This feature of Hawaiian land division was important because the Hawaiians “realized that within these sections there were three different areas important to life in early Hawai’i: upland, plain, and sea. They knew that together these three

areas contained the range of products and resources their people needed to survive.”⁴ This early model of sustainability underlines the importance of maintaining an economic, social, and ecological balance (Figure 12-14). Sadly, this model of sustainability has been lost to the modern era of globalized overconsumption.

Today, Hawai’i’s landscape has transformed from self-sustaining ahupua’a to an international tourist destination with over 7,000,000 visitors in 2010 (Figure 15).⁵ This transformation has dramatically affected the economic, social, and ecological balance of the islands, creating a place that has become unsustainable (Figure 16). Examples illustrating the gravity of the dire circumstances in Hawai’i include: the deterioration of public infrastructure, a continued reliance on a service-based economy, the vulnerability of Hawai’i in a global energy market, possible interruptions in travel and critical food supplies, threats to the fragile island ecosystem, and an



Figure 10 | Three pillars of sustainability

increasing number of residents and visitors.⁶ Many question the sustainability of life in Hawai’i and how future generations will be able to survive in a place so fragile. The thesis takes the position that instilling the values of conservation at a young age would help to disrupt the economic, social, and ecological imbalance that has been occurring in Hawai’i.

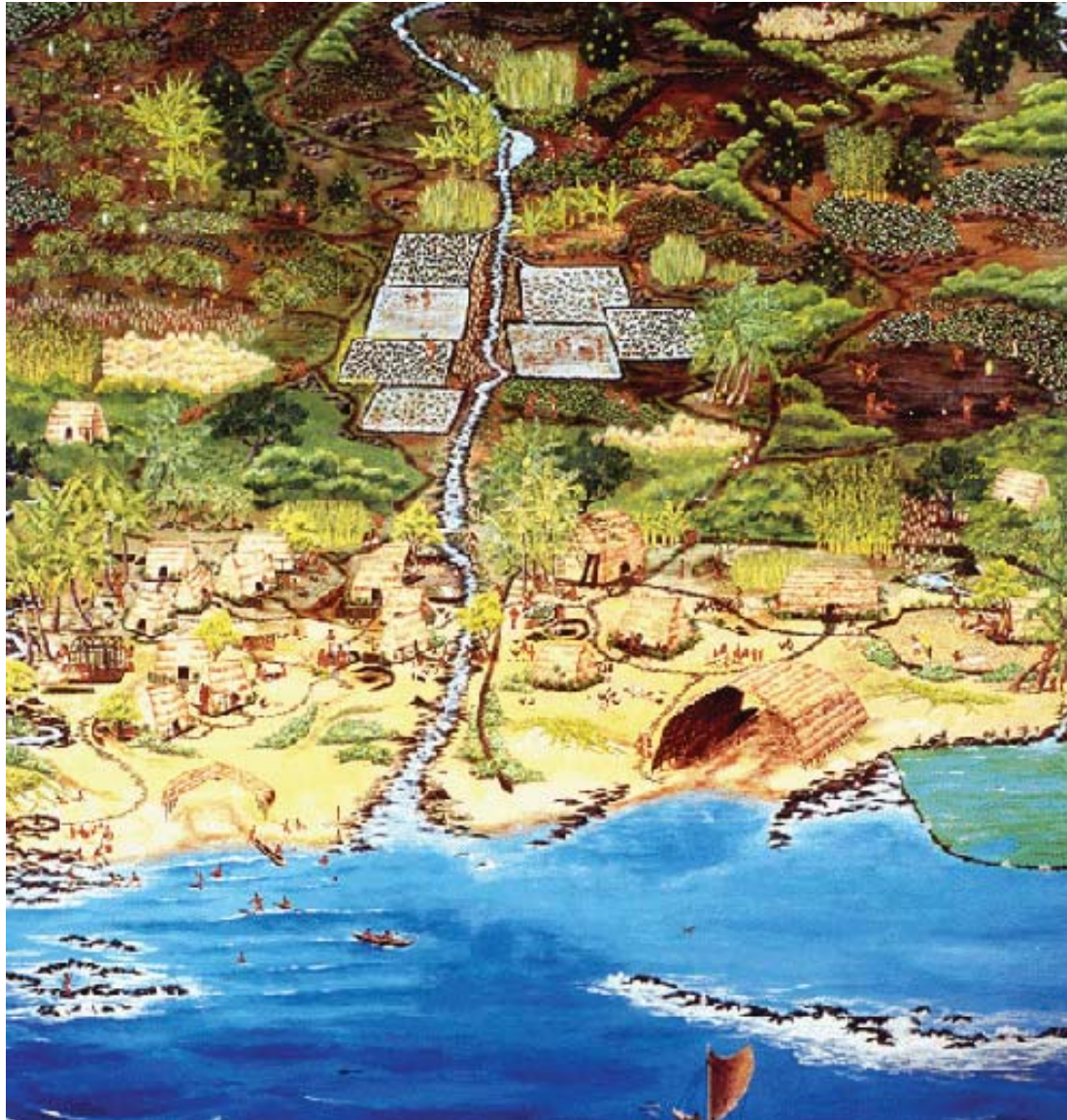


Figure 11 | Ahupua'a



Figure 12 | Ko'olau Mountain range



Figure 13 | Lo'i Pond



Figure 14 | Menehune Fish Pond



Figure 15 | Honolulu city grid



Figure 16 | Waikiki skyline

INTRODUCTION - continued

Helen Penn states that “[o]ne of the most significant changes in the urban landscape over the last century has been the disappearance of children.”⁷ Hawai’i’s most densely populated city,⁸ Honolulu, is an example of a city whose children have disappeared from public spaces. There has been a dearth in provision of places that integrate learning and play, leaving many children without educational play in an urban space. Children are not well integrated into the city because they “are literally perceived to be ‘in danger’ outside of their immediate domestic space; and to be dangerous to others if they roam unattended.”⁹ At the same time, as more and more of the natural world is built up, exposing children to the principles of living sustainably becomes increasingly important. Accordingly, this thesis asks: How can architecture serve as a tool to educate children of the importance of conservation and sustainability? How can

play serve as a means of learning about sustainability?

This thesis investigates the relationship between children, the environment, and sustainability (Figure 17). Specifically, it asks: how can the people of Hawai’i help children learn about sustainability so they can become environmentally aware citizens of the future? According to Robin C. Moore and Herb H. Wong, “a critical aspect of the present day crisis in education is that children are becoming separated from the daily experience of the natural world, especially in larger cities.”¹⁰ Research also suggests that this detachment from the natural world and the “move toward home entertainment as a focus of childhood amusement has meant that popular children’s media has been largely framed by the space of the home.”¹¹ With mediascapes taking over traditional physical play, “children and young people increasingly encounter the world with knowledge based on experience gained

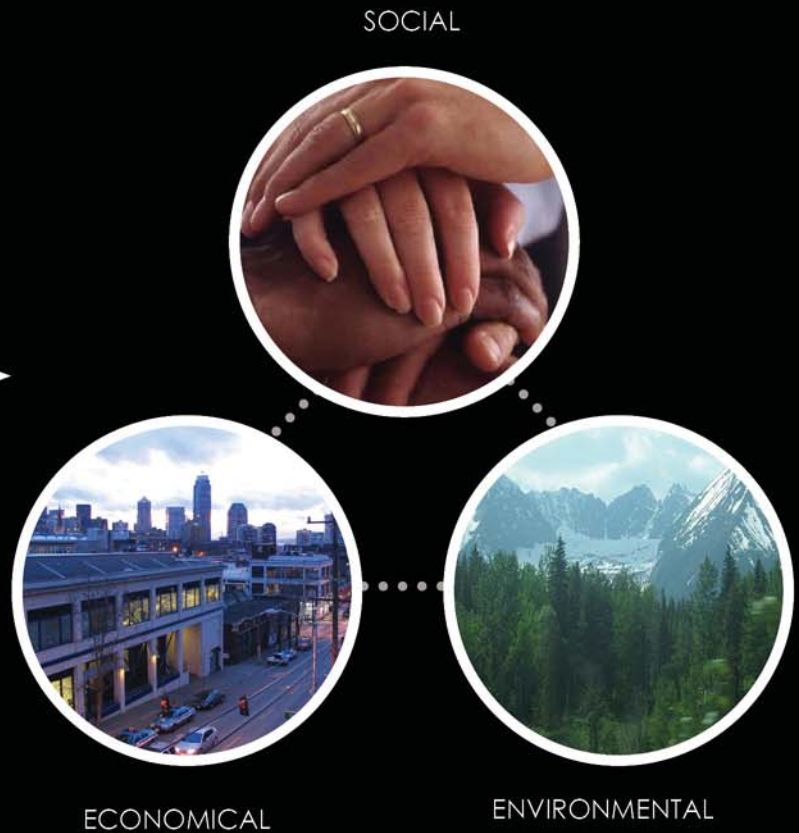
from media and not participatory practice.”¹²

This problem may lead a child to many potentially negative side effects, including obesity, social anxiety, and a lack of empathy for nature.¹³

The benefits of integrating play into early childhood development are well documented in child development research. Play is how children learn about themselves, each other, and the world they live in. The activity of play develops physical, social, cognitive, and many other skills that will be used later in a child’s life.¹⁴ Play can increase physical activity and exercise, promoting a healthy, active lifestyle. In addition, it can facilitate social interaction with other children, allowing them to build community. It can also develop cognitive skills that are essential to language learning, perceptual skill, and other brain development functions. The integration of play activities with the urban environment can promote good citizenry in children by allowing them to learn the values of a sustainable urban



CHILDREN



SUSTAINABILITY

Figure 17 | Children, Environment, Sustainability

lifestyle. In turn, the integration of play and nature can help promote environmental and ecological sensitivity. However, this thesis will go beyond traditional approaches to physical play by emphasizing the potential for developing environmental awareness through play. It posits that children can become socially, environmentally, and economically sustainable adults through hands-on, playful learning experiences.

In addition to developing environmental awareness through educational play, architecture will be used to promote learning about sustainability by providing spaces that are interactive, inspirational, and memorable. Drawing from research on architecture for children, this thesis proposes spaces that are dynamic and engaging, and that provide a plethora of space arrangements and options that constantly change. Also, it will seek to create an inspirational environment that promotes boundless creativity and stimulates the imagination. Above all, it will promise to an

architecture that engages all the senses so that it can create strong, positive, lifelong memories.

In sum, this thesis proposes an interpretive center that will integrate children into a highly urbanized environment. It will help them acquire the values of sustainability by engaging them in playful learning experiences and by using architecture that promotes learning about sustainability. The place of intervention will be focused within the heart of the Kaka'ako neighborhood in Honolulu, Hawai'i (Figure 18). To instill lifelong values in sustainability, this intervention will primarily serve a demographic ranging from one to twelve years old. As the site analysis will show, current amenities in this neighborhood for this age group lack the interpretive and educational component needed to create enriching and meaningful play. Therefore, this intervention will be designed to encourage early childhood development through play, while promoting awareness of the environment and

engagement with architecture. The facility would function as a community park and environmental education center for children.

The thesis is divided into four chapters. Chapter one was an introduction to the impetus behind the thesis. This included the problem statement, thesis proposition, and a project rationale. The second chapter will outline the theoretical framework of the thesis. The theoretical framework will explore how other theoreticians define environmental education and play as a means of early childhood development, and architecture as a tool to promote play and learning. The third chapter explores the site selection and analysis, a detailed list of the programmed spaces, and design principles. The fourth chapter outlines the final design of the architectural, landscape architectural, and urban design elements. In a concluding chapter, the findings will be reevaluated based on the final thesis presentation.



Figure 18 | Kaka'ako Skyline

ENVIRONMENTAL EDUCATION



AWARENESS



KNOWLEDGE



ATTITUDES



SKILLS



PARTICIPATION



PLAY



EMPATHY



NATURE



ENDANGERED AND ENDEMIC ANIMALS AND PLANTS



STEWARDS OF NATURE

Figure 19 | Environmenta; Education diagram

CHAPTER 2 : THEORETICAL FRAMEWORK

Environmental Education

The concept of environmental education is a central concept to this thesis. William B. Stapp defines environmental education as an approach “aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and has the attitudes, motivations, knowledge, commitment and skills to work individually and collectively towards solutions of current problems and the prevention of new ones.”¹⁵ Stapp’s definition outlines five major objectives: Awareness, Knowledge, Attitudes, Skills, and Participation (Figure 19).

Stapp’s objectives advocate that individuals and societies become aware of the environment and its issues regarding conservation and sustainability. As individuals and societies become aware of their environment, the knowledge of conservation and sustainability can develop attitudes towards active participation in

protecting the environment. With this newly acquired knowledge, skills can be learned and fostered toward participation in helping resolve environmental problems.

The implementation of these principles into early childhood education is valuable because it will instill in children from an early age the importance of economic, social, and ecological responsibility, ultimately bringing about urbanites who value sustainability.

Another perspective on environmental education comes from David A. Gruenewald, who argues that “the ultimate challenge for education, environmental or otherwise, is to prepare people with the skills and knowledge needed to identify and shape the quality of the world we share with others – human and nonhuman; in a multicultural and political world, this means education for cultural competence and political participation.”¹⁶ Furthermore, he argues that “environmental education will be ineffective in advancing

its own goal of creating an environmentally or ecologically literate citizenry as long as it continues to discipline itself within the norms of general education.”¹⁷ Gruenewald promotes the goals of the Earth Charter, a comprehensive sociological vision for the future. The Earth Charter is a declaration of fundamental ethical principles for building a just, sustainable, and peaceful global society in the 21st century.¹⁸ The relevant principles of environmental sustainability outlined in the Earth Charter are: 1. Respect and care for the community of life, and 2. Ecological integrity.

The first principle, respect and care for the community, outlines the importance of respecting the Earth and its diversity of life, as well as extending that attitude toward the communities and societies of life by promoting understanding, compassion, and love. This principle looks toward protecting the Earth for future generations. The second principle, ecological integrity, is an extension of the previous principle. It suggests that

the ecological systems of the world must be protected and restored to maintain biological diversity. In addition, extra care should be taken so that all patterns of production, consumption, and reproduction do no harm to the environment. The Earth Charter's global perspective on environmental education emphasizes the interconnectivity of the human race. This is particularly important because it addresses the reality of the globalization that exists in modern society.

Environmental Education in Hawai'i

Environmental education in Hawai'i is rapidly gaining steam with help from government officials, non-profit organizations, and existing cultural facilities. An example of the way government officials have been proactive in environmental education in Hawai'i is the publication of the Hawai'i 2050 Sustainability Plan (Figure 20). This plan outlines a vision for sustainable growth in Hawai'i. The major goal of the

document is to promote education and awareness within the Hawai'i education curriculum. An example of a non-profit agency that promotes environmental education for children is The Kokua Hawai'i Foundation. Its "mission is to provide students with experiences that will enhance their appreciation for and understanding of their environment so they will be lifelong stewards of the earth."¹⁹ Other institutions that provide environmental education include the Bishop Museum, the Honolulu Zoo, Sea Life Park, and the Waikiki Aquarium (Figure 21). These facilities provide formal learning environments for children rather than informal play experiences.

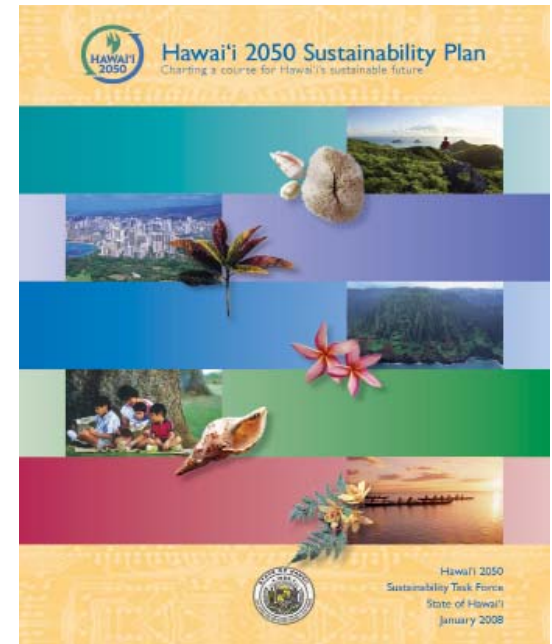


Figure 20 | 2050 Sustainability Plan



Figure 21 | Environmental sustainability Hawai'i

The Role of Play in Early Childhood Development

The first five years of life are the most important years of childhood development (Figure 22). During this stage, the human brain lays down the foundations of knowledge, value, and skill. According to M. Paul Friedberg, “it is a fact that a child’s personality and intellectual capacity are formed within the first five years of his life. His personality can later be adjusted through an extensive treatment, but the intellect, once arrested in its development, will never attain its full potential.”²⁰ Friedberg’s use of the word “arrested” suggests that the hindrance of growth to a child’s mind can leave the child a prisoner within him/herself. Thus, the importance of interactive play environments can be as a solution to the unwavering banality of current playground and schoolyard design, many of which resemble prisons for children. Play is a term employed in etiology and psychology to describe a range of voluntary, intrinsically

motivated activities normally associated with pleasure and enjoyment.²¹ Therefore, play environments make possible and reinforce education.

Traditionally, children were an integral part of the city. According to David Nasaw, “the children were everywhere: in the alleyways, on the stoops and sidewalks, hanging from fire escapes and out of windows” (Figure 23).²² In addition, “the children played on the streets because there was nowhere else for them.” However, since World War II, decreases in federal aid to cities and support for play, recreation, and youth services – combined with increases in crime (and parents’ fear of it), single-parent households, two-parent working families, and suburban sprawl – have diminished the social life that once existed in traditional urban neighborhoods (Hart et al. 1997). One of the issues that reinforces this childlike prison is the lack of integration of children within the scale of the contemporary city. While planners, urban designers, and

architects deal with issues of mobility, safety, and beauty for the adult population, they can marginalize children, who are forced to grow up in a world where they are less likely to engage with the city. Frederick J. McDonald, a Professor of Educational Psychology at Stanford University, stated that “one problem of urban education is to create a system in which the resources of the city are intimately integrated with the educational process, so that large numbers of children can utilize all the resources of the city for their education.”²³ This integration that McDonald addresses is largely lacking in Honolulu, where much of the built environment is non-educational, utilitarian, and adult-oriented.

Using Nature to Promote Environmental Awareness

The role of nature in children’s development is critical to a child’s awareness of environment. According to Moore and Wong, the environment can be used “as a vehicle for teaching all subjects and for

motivating children to learn through their play and instinctive curiosity.”²⁴ By using nature as a teaching tool, children are able “to understand the environment as a human artifact – an economic, social, scientific, and cultural resource, something we all depend on.”²⁵ Children have the right to spaces that promote play and education. According to Joseph Cornell, one way to develop a strategy that integrates play and education is through nature – by providing opportunities to see nature up close, encouraging play and discovery, and staging adventure – creating for children an enjoyable and memorable connection with nature.²⁶

The integration of nature can reinforce the enjoyable aspect of education. When children engage in the processes of life, they are able to see instantly the rewards and consequences of their actions. As stated by Moore and Wong, “Children need educational settings that immerse them in a feeling of ownership of their learning process. To be motivated to learn, children must feel

that they are discovering their own path.”²⁷ An example of a participatory opportunity for young children ages 1-12 is food production and cultivation, a process that can educate children about biological growth while also helping them understand where food comes from.²⁸

Architecture and Playful Learning

Children, like all living things, are inextricably connected to their environment (Figure 24). Climate, landscape, building, and cultural values are forces that shape children from an early age. Furthermore, a child who actively participates in the control of his/her environment develops a greater sense of empowerment and independence. The pre-schools of Reggio Emilia (a successor of the Montessori) established an approach that states, “children ask us to be their allies in resisting hostile pressures and defending spaces for creative freedom which, in the end, are also spaces for joy, trust and solidarity.”²⁹ The Reggio Emilia approach to



Figure 22 | Children playing



Figure 23 | Children in Streets



Figure 24 | Children in playing nature

a creative and educational environment is to “allow for flexible remodeling prompted by the activities and ideas of their children.”³⁰ This precedent informed other designers about the importance of flexibility and participation in the learning environment, which reinforces the importance of allowing children to become an integral part of their fluid space of learning.

Playing and participating are fundamental aspects that reinforce children’s environmental competence. For example, according to Koralek and Mitchell, “children love the immediacy of the workshop process, taking inspiration from, and great delight in, the success of the massive structures they have just made by hand.” Many children “play house or some variation of constructing a play space and creating something that allowed them to imagine an assumed role.”³²



Figure 25 | Children playing at the Hawai'i Children's Museum

Using Architecture to Promote Environmental Awareness

If the building acts a frame for creativity to take place, then is it possible to create spaces that children can manipulate and control (Figure 25).³³ By designing with moveable parts, a child may create and divide rooms and take part in the creation of their environment. This type of architecture can facilitate a sense of physiological and psychological exploration that is in contrast to the simple rectangular boxes children are so typically in.³⁴

Architecture and Meaning

Since architecture is an integral part of the larger urban context, the intervention proposed in this thesis must help children read the city and their place within it. Kevin Lynch theorized the image of the city as a series of elements including paths, edges, districts, nodes and landmarks.³⁵ The hands-on play school must have a clear presence within the context of the district so that the

“design form reinforces meaning.”³⁶ The project should function both as a node and a landmark structure that clearly identifies the neighborhood as child-friendly. Lynch defines nodes as “the strategic spots in the city into which an observer can enter, and which are the intensive foci to and from which he is traveling.”³⁷ Alain de Botton suggested a similar way in which architecture acquires meaning. He stated that “buildings speak to us, they also do so through quotation – that is, by referring to, and triggering memories of, the context in which we have previously seen them.”³⁸

Architecture and Experience

David Leatherbarrow described experience as “the light that illuminates the building’s performance.”³⁹ The structure in its entirety should perform highly in terms of sustainability and in experiential quality. Juhani Pallasmaa spoke of architecture as “an extension of nature into the man made realm, providing grounds for perception and the

horizon of experiencing and understanding the world.”⁴⁰ She further elaborated, “Every touching experience of architecture is multi-sensory; qualities of space, matter and scale are measured equally by the eye, ear, nose, shin, tongue, skeleton, and muscle.”⁴¹ A child’s spatial sensitivity is increased by engaging multiple senses in order to create memories and stimulate imagination, thus increasing his or her awareness of the environment. Pallasmaa also suggested that “perception, memory and imagination are in constant interaction;” thus, the ability to harness creative stimulation is paramount in using architecture to promote environmental awareness.⁴²

Architecture and Eco-Inspiration

Architecture inspired by nature is not a new idea in the history of architectural discourse. The interiors of English gothic cathedrals evoke images of trees in a forest; the zoomorphic lights of a Paris metro stop evoke the eyes of a praying mantis

(Figure 26). In the last hundred years, the proliferation of the Modernist movement gave way to buildings that lack inspiration from nature.

Architect Toyo Ito of Japan suggested “a new order” in architectural form-making and design. Ito questions the rigid grid “framework embodied in the images of Mies van der Rohe’s steel and glass skyscrapers or Le Corbusier’s concrete Unite d’habitation.”⁴³ Ito’s goal is to recover the relationship between nature and architecture by doing away with “the geometry of the grid [that] expresses the potentially infinite expansion of a centreless space.”⁴⁴ His answer to this “new order” is to mimic the lines of biological organisms (Figure 27). By eliminating the grid, and realigning form to mimic the natural processes of life, Ito found that architecture can “awaken the senses” by creating buildings that are dynamic, rather than static.

In thinking about a new typology that engages children in learning about both the

natural and built environments, the ideas of eco-inspirational architecture can be further explored in design. Another approach to achieving eco-inspirational spaces is to design with nature, which entails creating spaces that are in harmony with the natural world.⁴⁵ In contrast to the ideas of Ito, Ryn & Cowan looked beyond form, and theorized a framework for creating spaces that promote “the patterns of health.”⁴⁶ For example, designers should look for opportunities to integrate systems of the natural world into the built environment, such as the implementation of a constructed wetland versus a conventional wastewater treatment pond. Such design interventions could help children learn about and develop a respect for natural systems.

Case Studies

Olympic Sculpture Park, Seattle WA

The Olympic Sculpture Park is located in downtown Seattle, Washington (Figure 28).

This park was designed by Wiess Manfredi in



Figure 26 | York Cathedral



Figure 27 | Toyo Ito's Grin Grin project

2002, and completed in 2006. The design combines three disconnected parcels into a continuous Z-shaped park that connects the city to a newly created waterfront park. The significance of this park is the reclamation of a post-industrial landscape that features sculptures from artists and provides areas for recreation.⁴⁷ The park also remediates the soil and provides habitat diversity for both flora and fauna. This project is an example of the blending of architecture, landscape architecture, infrastructure, and art.

Hands-On Children's Museum, Olympia WA

The exhibitry at the Hands-On Children's Museum in Olympia is designed by The Portico Group (Figure 29). The museum structure is 27,000 ft², with 30,000 ft² of outdoor exhibitry.⁴⁸ Set to open in 2012, the new children's museum offers both indoor and outdoor exhibits. The significance of this museum is the way in which The Portico Group engages a plethora of educational opportunities, as well as the

sensitivity to a multitude of learning styles. The project underlines the importance of place, and educates children on the unique character of the Pacific Northwest.

Seattle Central Waterfront, Seattle WA

The Seattle Central Waterfront is the vision of the city of Seattle through the eyes of James Corner Field Operations (Figure 30). Currently in the design phase, the Seattle Central Waterfront aims to reconnect the city to the central waterfront, creating a waterfront for all.⁴⁹ The significance of this project is the value of public input. Over the course of a year, the design team has taken into consideration many of the desires and needs of the public, in addition to considering the needs of the stakeholders. This highly political project aims to redefine public space in Seattle in a dramatic way.



Figure 28 | Olympic Sculpture Park, Wiess/Manfredi



Figure 29 | Hands-On Children's Museum, Portico Group



Figure 30 | Seattle Central Waterfront, James Corner Field Operations

Conclusions

The design principles that are generated through the analysis of the literature review operate in multiple scales: global, regional, local, and building. The Earth Charter advocated by Gruenewald suggests a more holistic and global understanding of the issues of environmental education. These concepts connect people globally as sustainable principles of the human race. By allowing the intervention to function as a tourist destination, the center becomes a tool that reinforces cultural globalization focused on environmental education.

Stapp's approach to environmental education focuses on "solutions of current problems and the prevention of new ones."⁵⁰ His concepts develop a framework for an interpretive message strategy that can be integrated as play within Oahu and the neighboring islands. These messages are learned through play exhibits that promote the awareness of the built and natural world. In addition, the exhibits will aim to create

an empathy between children and nature. Creative and interactive play can educate children about solutions to environmental problems. The interpretive messages learned from these exhibits can urge the child to be a part of these solutions. The Hands-On Children's Museum is an example of a children's educational center focused on many different types of learning styles.

The landscape and architecture aim to be a place where people can come and go freely—a place that has a collective meaning for the purpose of promoting sustainable values within the community. From a distance, the project must function as a landmark so that people of the community recognize it as a "point-reference" that contributes to the child-friendly image of the neighborhood. The facility aims at creating a lasting impression on young children by providing memorable experiences. The concept of flexibility and space morphology can be explored in building scale when children are able to create their own spaces,

creating an environment of constant change. Programmatic elements such as food production and cultivation can educate children about biological growth. This integration of architecture and nature creates multi-sensory experiences that instill lifelong values in children.

CHAPTER 3 : METHODS

This thesis proposes to create a children's interpretive center of nature and environmental education. Through an architectural weave of Hawai'i's five ecological zones, interwoven with environmental education, play, place making, and experience, this project aims to make the boundary between land and water sacred (Figure 31). This park functions as an informal learning center that operates at multiple scales: global, regional, and local. This allows the facility to serve nearly 10,000 people a week to participate in various recreational, cultural, and playful programmatic activities. The site selection is an important factor in the design of this interpretive center.

Site analysis: Islands of Hawai'i

Hawai'i's isolation in the center of the North Pacific Ocean is like the isolation of Earth in space. By recognizing this similarity, Hawai'i is poised to become a case study in the teachings on environmental

sustainability and conservation. Being at the nexus of the eastern and western worlds, Hawai'i's location in the center of the North Pacific Ocean brings millions of visitors to the islands, allowing that critical mass to become aware of the unique island ecology.

Site analysis: City of Honolulu

The site is located in the dense, highly urbanized capital city of Honolulu (Figure 32). The city is bounded by the Pacific Ocean to the south and the Ko'olau Mountain range to the north. The prevailing trade winds flow over the mountain range from a northeasterly direction. There are two prominent geological volcanic formations in the city, Diamond Head Crater on the southeastern end and the Punch Bowl Crater to the north. Honolulu is home to three major harbors, the Honolulu Harbor, Kewalo Basin, and Ala Wai Harbor (Figure 32). By researching the most populous city in Hawai'i, Honolulu became the natural choice for my intervention. According to

the 2010 Census data of Honolulu, there are 19,428 children under the age of five, 17,176 children ages five to nine, and 17,459 children ages ten to fourteen, for a total of 54,063 children. Honolulu also has a robust network of existing day cares, elementary schools, and outdoor parks.

Site analysis: District of Kaka'ako

The site is located in the district of Kaka'ako (Figure 33). This district is industrial in character, with car dealerships and warehouses as the primary land use. The ocean side of the site is entirely artificial, created from coral reef deposits and refuse of the city. There are two major regional recreational parks located within the district, the Kaka'ako Waterfront Park and the Ala Moana Beach Park. Both parks are bisected by the Kewalo Basin (Figure 34). The site is located between the existing Hawai'i Children's Museum and the Kewalo Basin on nearly thirty-five acres of land. This site was chosen because of its potential to become an



Figure 31 | Architectural weave diagram

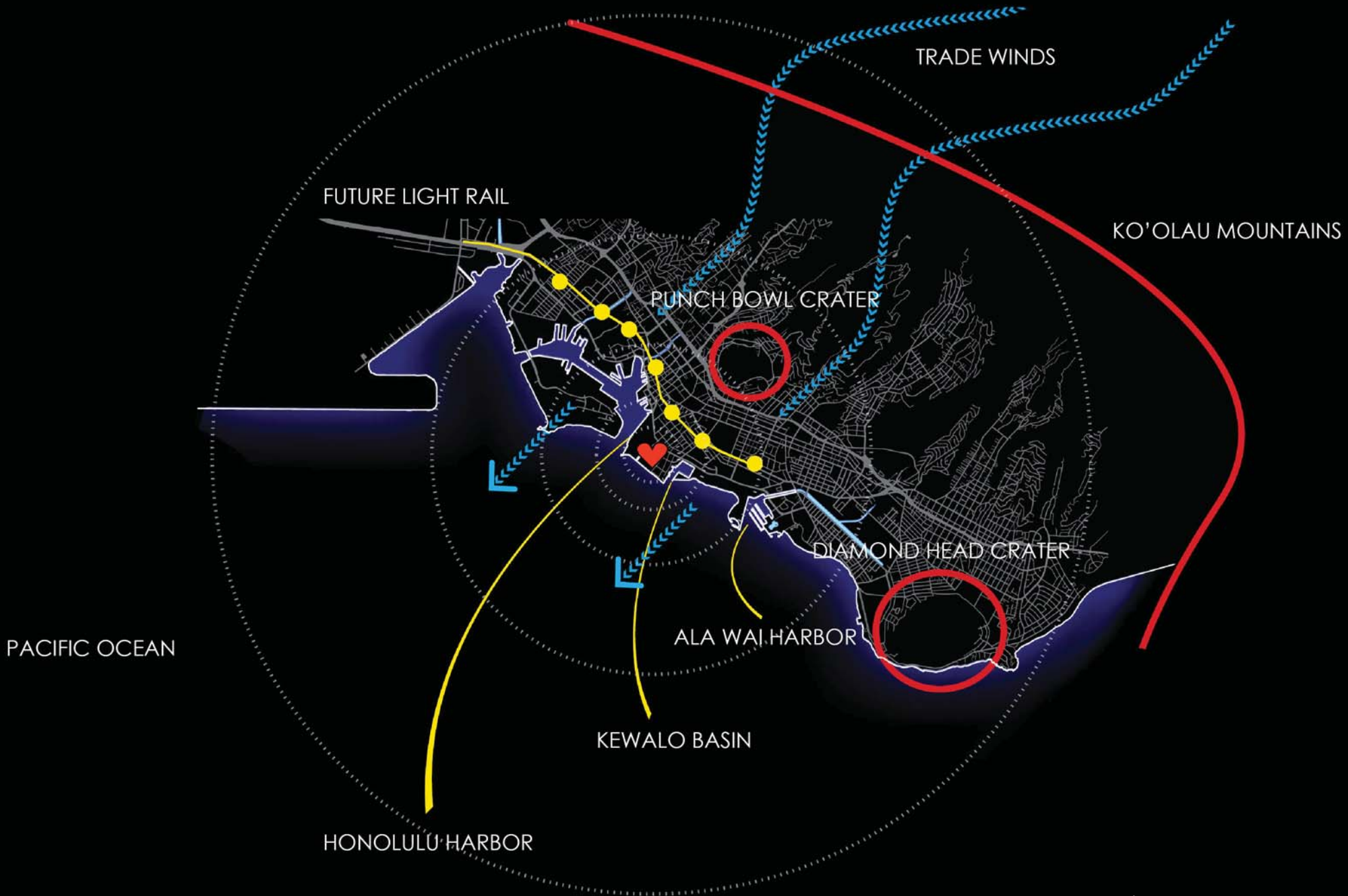


Figure 32 | City of Honolulu diagram



Figure 33 | District of Kaka'ako

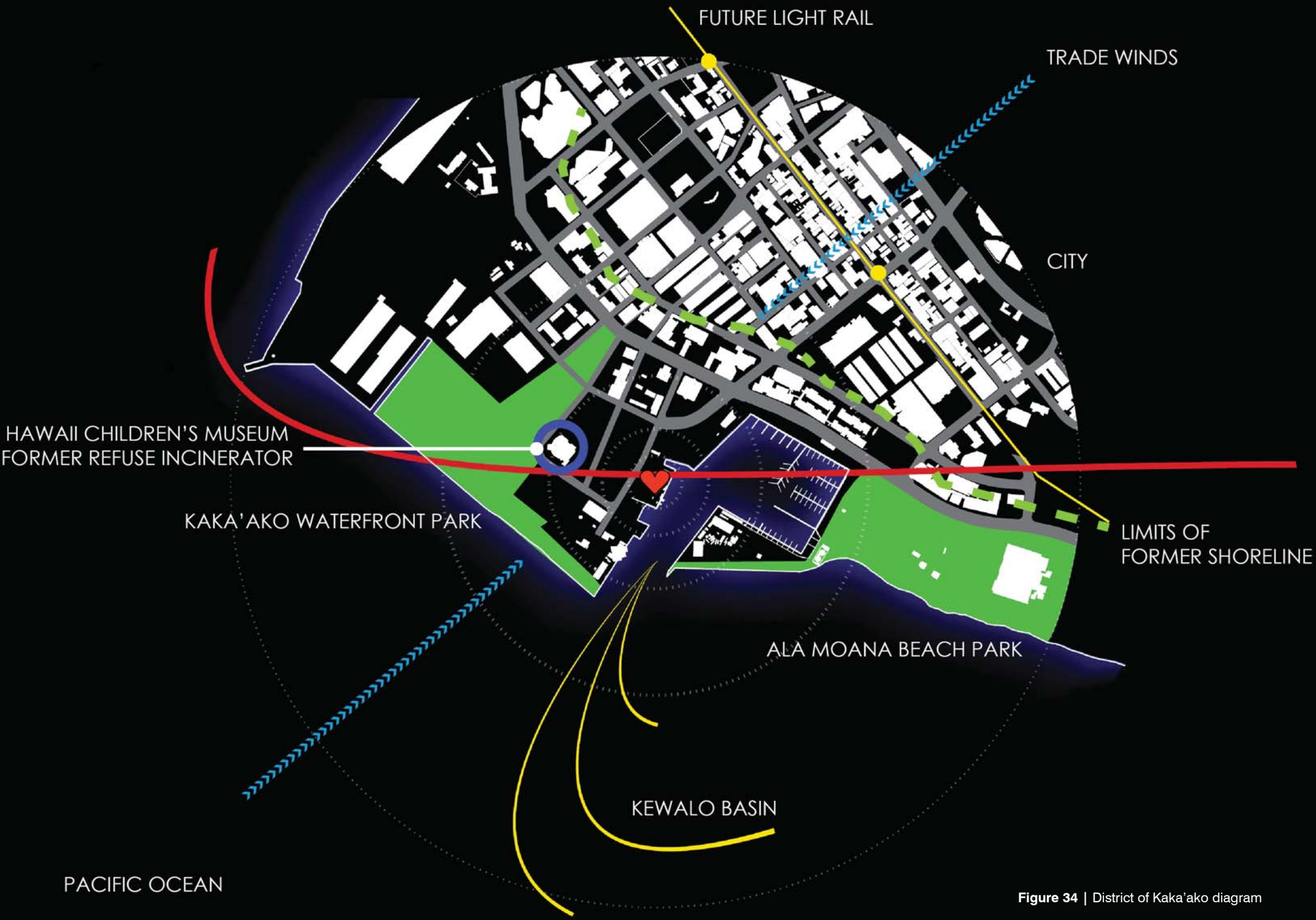


Figure 34 | District of Kaka'ako diagram

METHODS - continued

extension of the existing Children's Museum. Its prominent location, and adjacency to the Kaka'ako Waterfront Park and neighboring Ala Moana Beach Park, create an ideal linkage on the water's edge.

The Kaka'ako Waterfront is currently undergoing a rapid development boom, just the type of boom this thesis aims to help children learn to moderate. The Hawai'i Community Development Authority currently owns the site, and their master plan envisions the redevelopment of this former warehouse area into a mixed-use privatized urban community with residential, commercial, industrial, and other uses.⁵¹ Furthermore, development around Kaka'ako's light rail station promises to bring more families with children into the neighborhood.

The focus of this project is to challenge the current plans of the Hawai'i Community Development Authority. Rather than privatizing the waterfront, this intervention will introduce a new park that integrates with the existing Hawai'i Children's

Museum (Figure 35). The existing Children's Museum is a 45,000 ft² facility located within the shell of a former refuse incinerator. The interior of the building has been completely renovated and outfitted with various exhibits. The exhibits include Tot Spot, which focuses on early toddler sensory stimulation; Fantastic You, in which children learn about the human body; Your Town, which explains the functions of a town; Hawaiian Rainbows, in which children learn about living in Hawaii; and Your Rainbow World, which focuses on learning about different parts of the world.⁵² The museum features many different learning styles, from problem solving, to imaginative play, to full body, gross motor engagement (Figure 36). While many have questioned the repurposing of the existing structure, this intervention uses the building as part of a larger interpretive message. The incinerator's utilitarian form is a symbolic representation of the past degradation and destructive treatment of the land.

The park becomes a catalyst to

strengthen the community, providing the nexus that can bring adults together for special events and daily functions such as recycling and food composting. The local area boasts very significant educational and cultural facilities that can strengthen the network of this urban park, including the University of Hawaii John A. Burns School of Medicine, Cancer Research Center of Hawaii, and the headquarters of the Office of Hawaiian Affairs/Hawaiian Cultural Center Project (Figure 39).

The site is located within the Makai (water) side of Kaka'ako. The site directly adjacent to the west/southwest is the Kaka'ako Waterfront Park and parking lot (Figure 37). To the north is the Kaka'ako Makai Gateway Park, and to the east is a vacant lot owned by the Honolulu Transportation Department. Unfortunately, the vacant lot attracts the formation of informal dwelling units because of exorbitant rents due to the fact that most of Hawai'i has been sold off to foreign interests (Figure 38). The climatic conditions of the

site are very similar to those at other coastal locations in Honolulu, characterized by abundant sunshine, persistent trade winds, and consistent temperature.⁵³ The median temperature in Honolulu ranges from 73 degrees in the winter to 81 degrees in the summer. Rainfall in this area averages around 23 inches a year and typically happens during the months of November and April. Prevailing winds come from the northeast. Views to and from the site are limited because of the large warehouses and the Kaka'ako Waterfront Park. Current land use plans locate the site within a mixed use zone, with a floor area ratio of 3.5, and a height limit of 100 ft.

Existing Urban Conditions

There are four existing urban conditions that need to be addressed beyond the confines of the site proper: connectivity, programming, storm water fall-out, and blue and green habitat (Figure 40). Currently, the district has a pedestrian promenade on the



Figure 35 | The Hawai'i Children's Museum Exterior



Figure 36 | The Hawai'i Children's Museum Interior



Figure 37 | Aerial view of Kaka'ako

water's edge that ends abruptly because of the dredged Kewalo Basin. The site is largely under utilized and currently abandoned with no programming, allowing for the formation of informal dwellings. There are also three storm water fall-out locations at the edges of the site that contribute to pollution of the shoreline. Since the site is currently abandoned, there are no green and blue habitats that can support biological diversity. At its current state, the site requires a vision that creates a continuous flow from the Kaka'ako Waterfront Park to the Ala Moana Beach Park. The site needs programming that engages the community and reclaims the site for reuse by the people. And lastly, the site should be a place for bio-remediation, cleansing the water before it enters the open ocean and allowing for biological diversity to emerge from the fill.

Program

The following program was designed to take into consideration the



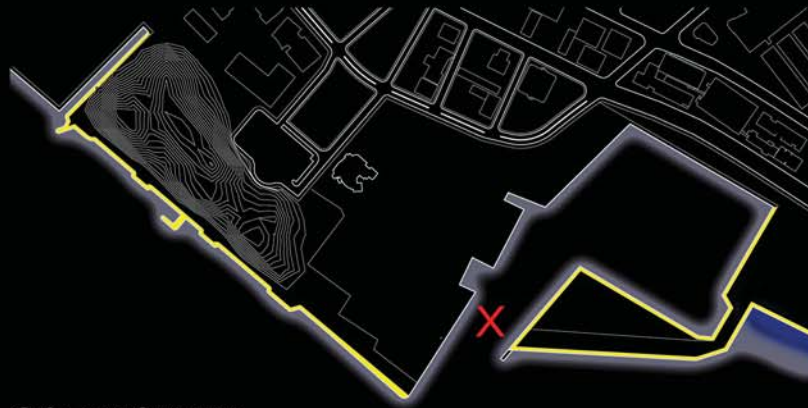
Figure 38 | Informal Dwelling Units in Kaka'ako



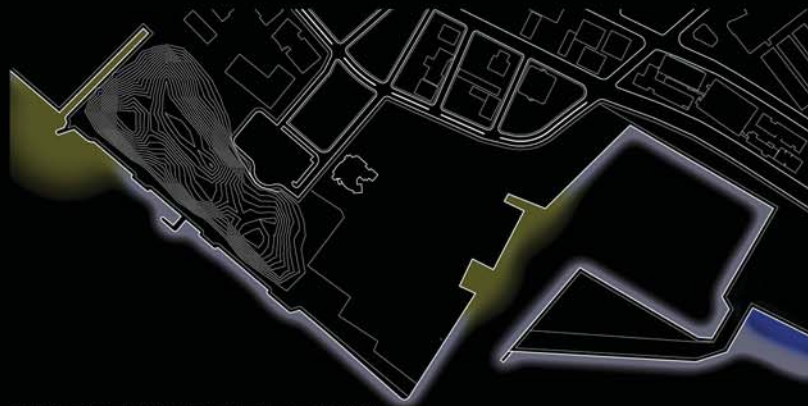
Figure 39 | John A. Burns School of Medicine



SEEKING CHALLENGES



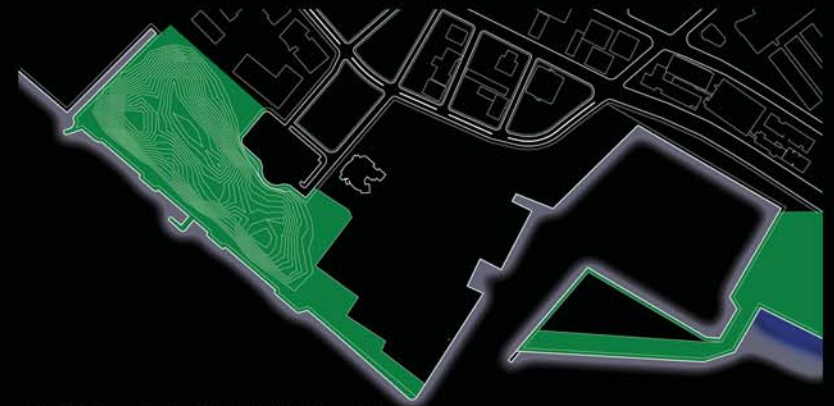
CONNECTIVITY



STORM WATERFALL-OUT



PROGRAMMING



GREEN & BLUE HABITAT

Figure 40 | Existing urban condition diagrams

grassroots effort lead by Friends of Kewalo, a non-profit organization composed of local recreational users of the Kewalo Basin Park area (Figure 41). The mission of Friends of Kewalo is: To Protect, Preserve, and Malama (care for) Kewalo Basin Park and the surrounding shoreline and ocean, to ensure that the recreational user will continue to have access and the ability to enjoy the area for future generations to come.⁵⁴ In their proposal, the Friends of Kewalo list several key programmatic features that protect and preserve the Kewalo basin from the privatization of public lands (Figure 42). The programmatic areas also respond to community and cultural needs of Hawai'i. These features include a surfing museum, hula theater, canoe launch, lo'i pond, cafe, coconut tree grove, native Hawaiian forest and a community festival area. The program is also designed to complement the existing exhibits of the Hawai'i Children's Museum..

Program Areas

- Hawai'i Children's Keiki Park
- Community Fruit Grove and Garden
- Outdoor Landscape
- Exhibit space
- Hula theater
- Entry pavilions
- Surf Museum
- Cafe
- Festival Pier
- Keiki Pool
- Intertidal Exhibitory
- Keiki Canoe Launch
- Pedestrian Bridge



Figure 41 | Friends of Kewalo



Figure 42 | Friends of Kewalo's Kaka'ako Masterplan

CHAPTER 4 : DESIGN

The design of the new Hawai'i Children's Discovery Center of Nature emerged from the exploration of the boundaries between land and water, loss and gain, artificial and natural, and architecture and landscape. It is these moments, in between these boundaries, that define this intervention (Figure 43).

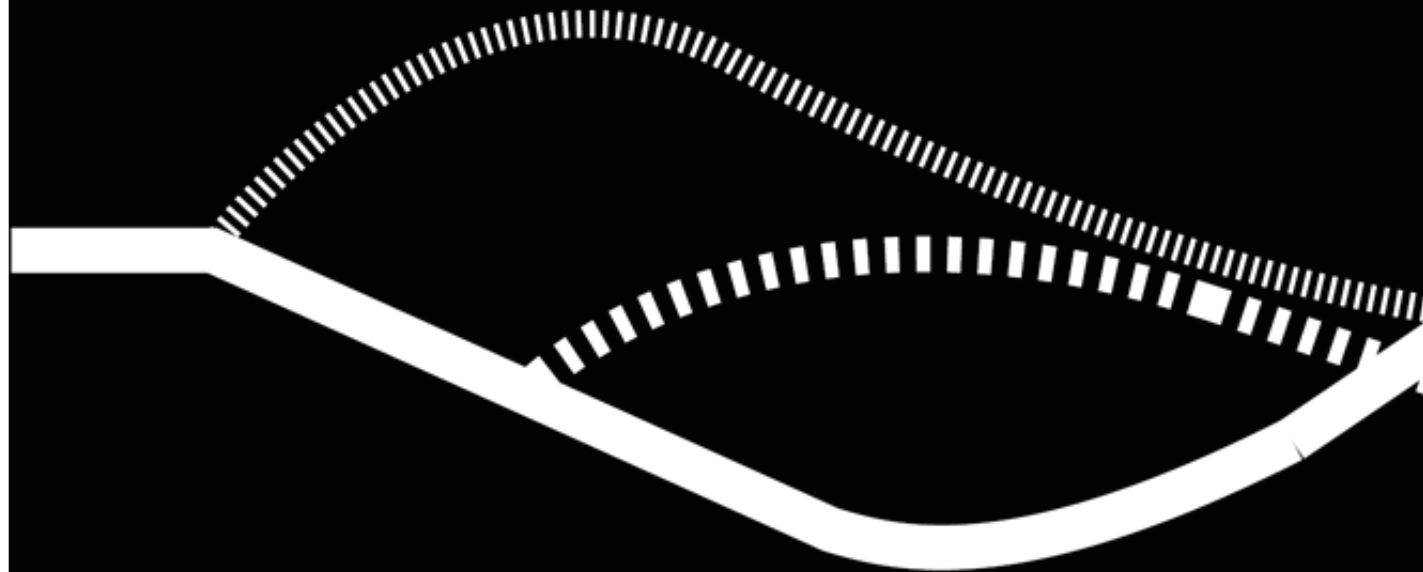
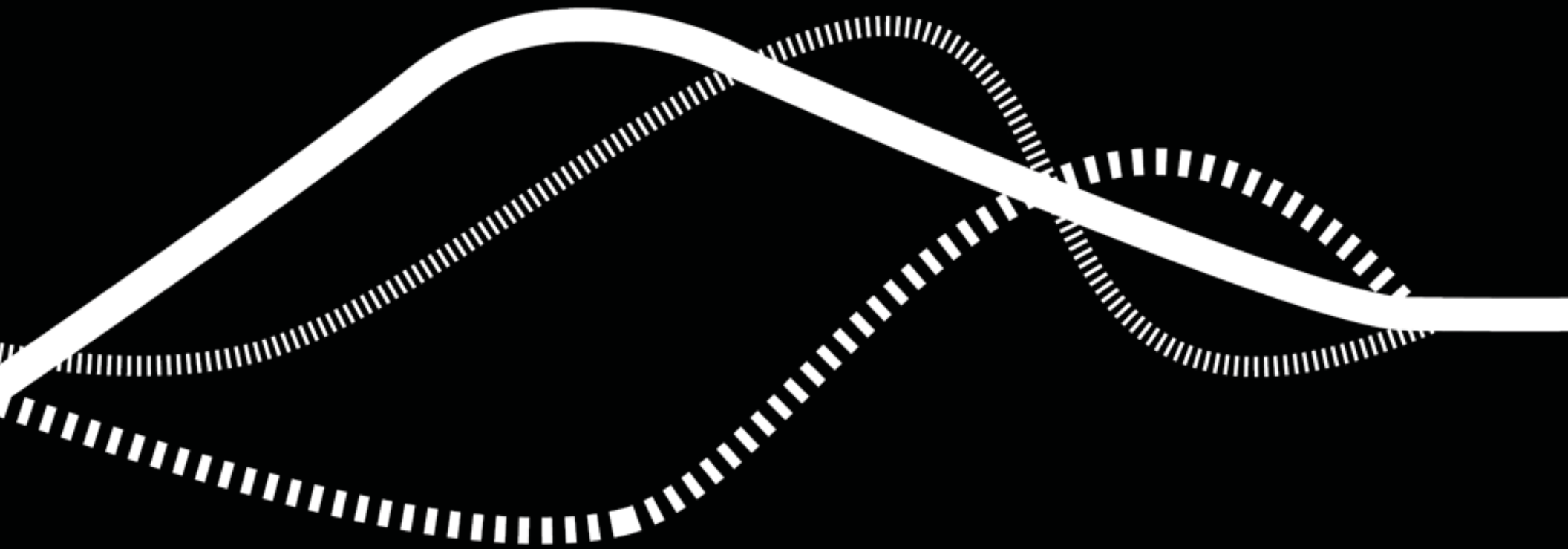


Figure 43 | Inspiration diagram



Urban Design Strategy

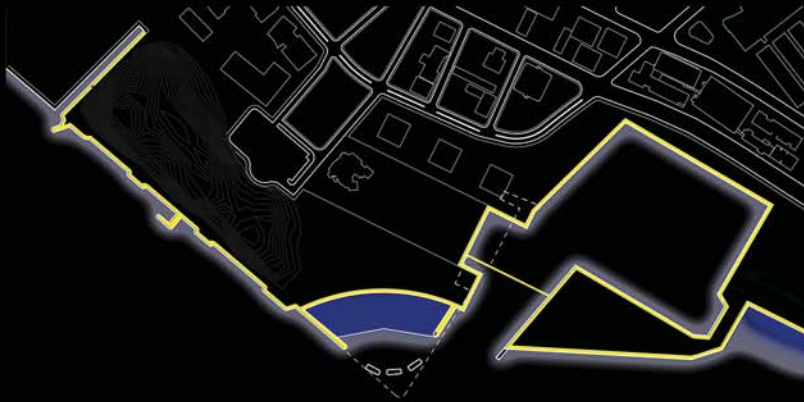
Urban design is integral to place making for the Kaka'ako Waterfront. Major infrastructural linkages, such as the access to light rail, bike lane, and sidewalks, have priority over vehicular circulation. The integration of public art, uniform paving, and way finding along these linkages reinforce

the neighborhood's connectivity and provide opportunities for interpretive learning. In addition to public art, these linkages integrate a variety of play follies that are designed into the landscape infrastructure, such as bus stops, drinking fountains, trash cans, etc. Areas for composting and recycling are also an important part of the site design,

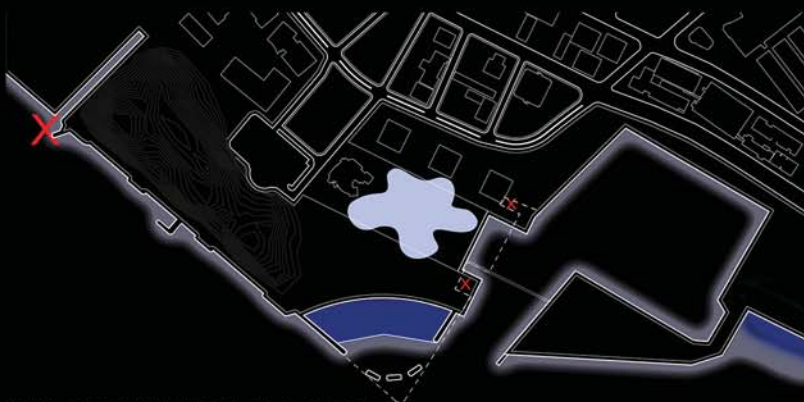
providing an attractive and safe place for the community's sustainability practices. The urban design component of this intervention addresses the four existing conditions of connectivity, programming, storm water fallout, and blue and green habitat.



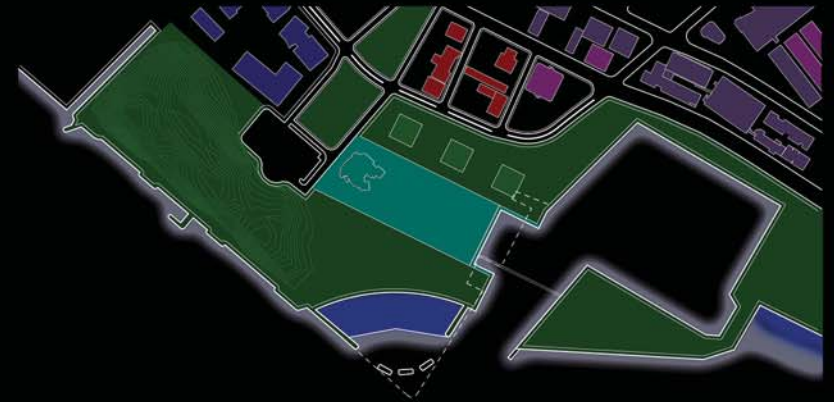
CREATING OPPORTUNITIES



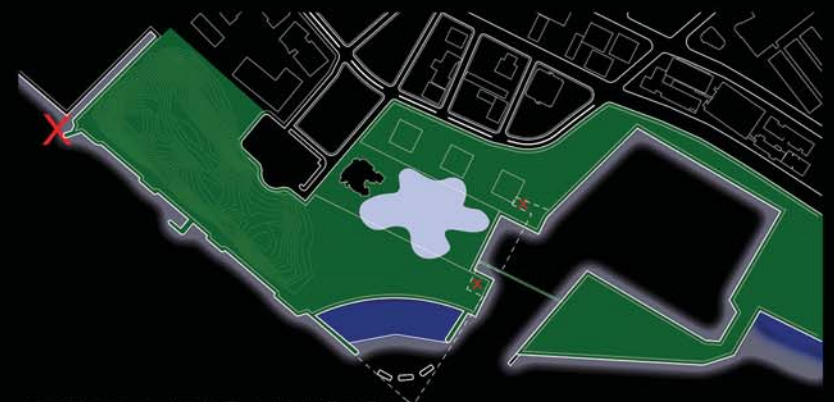
CONNECTIVITY



STORM WATERFALL-OUT



PROGRAMMING



GREEN & BLUE HABITAT

Figure 44 | Urban design considerations diagrams

Urban Design

In order to continue the existing pedestrian promenade from the Kaka'ako Waterfront Park to Ala Moana Beach Park (Figure 44), the waterfront promenade wraps around the Kewalo Basin, enhancing the connection to the water, and activating marina activities on and off shore. The design proposes a pedestrian bridge that spans the Kewalo Basin Channel. Connecting the two parks enhances the pedestrian experience at the water's edge, allowing the user to experience being above the water.

Since much of the existing site is under utilized and abandoned, the design aims to create a sense of place by programming the site with a multitude of public activities. The creation of a new beach park through excavation enhances the beauty of the Kaka'ako area by providing a

multiplicity of water recreation opportunities including swimming, snorkeling, sunbathing, and beach combing. In addition to water recreational activities, users can explore a new park area that is covered in a coconut grove, providing areas for play and relaxation. In addition, the design suggests a new community fruit grove and garden at the city's edge. This amenity allows the community to gather and celebrate the bounty of the land. The groves will feature native Hawaiian fruit trees, and the community garden and pea patches located within the fruit groves provide a protected area for growing vegetables.

As an effort to reduce the impact of storm water pollution into the ocean, the existing storm water fall-out locations will be diverted onto the relatively flat site. By allowing the water to slowly flow through

the site, the polluted water can be cleansed through a process of bio-remediation. This essentially creates a wetland where green and blue habitats emerge, creating a home for biological diversity.

This series of interventions is integrated into the existing parks and district, and builds community by acting as a civic landmark that identifies the neighborhood as child-friendly (Figure 45). The site's urban design connects contextually to its surroundings with the use of consistent paving, native vegetation, and signage. In addition, the facility provides community spaces and facilitates community events, including the provision of recycling and composting facilities for use by members of the community.



BEFORE



AFTER

Figure 45 | Before & After

Hawai'i Children's Discovery Center of Nature: Strategy

The design of the new Hawai'i Children's Discovery Center of Nature is an extension of the existing Hawai'i Children's Museum. The strategies employed on the site proper were a response to the urban design of the surrounding area. These strategies include: slice, divide, overlay, program, hydrate, and weave (Figure 46).

Slice

The first strategy employed is to slice the land, preparing it for intervention (Figure 46.1). The slice is oriented toward the Kewalo Basin, connecting the existing Children's Museum to the water.

Divide

In the tradition of the ahupua'a, the second strategy employed is to divide the site into seven precise strips analogous to the five major ecological zones of a typical Hawaiian transect (Figure 46.2). In addition to the five major ecological zones, the design

added two more strips: one strip addressed the recognized need for a storm water detention basin; the other was added after additional study concluded that the forest should be divided into two zones, a wet and dry zone.

Overlay

The third strategy is to overlay primary pedestrian paths that wrap around the water's edge, and secondary pedestrian paths corresponding to the city grid (Figure 46.3). In addition, the site was oriented toward desired views of Diamond Head.

Program

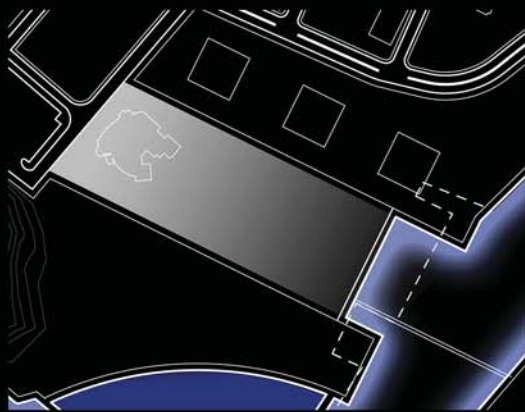
The fourth strategy is to place the programmatic elements with respect to view corridors and circulation elements (Figure 46.4). The program was strategically placed to find opportunities to create landmarks and nodes.

Hydrate

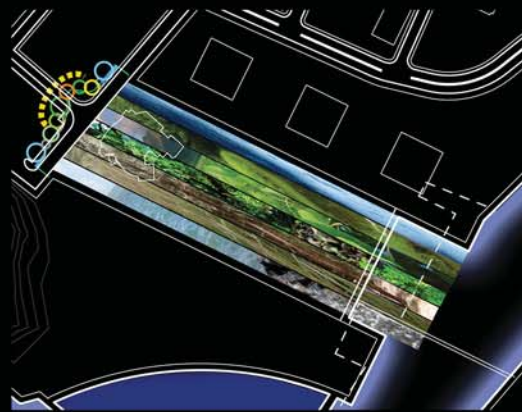
Storm water is stored within the first strip and then flows through a series of controlled flooding filters through the marsh strip, irrigates the lo'i ponds, saturates the soil of the wet forest and makes its way toward the intertidal strip (Figure 46.5).

Weave

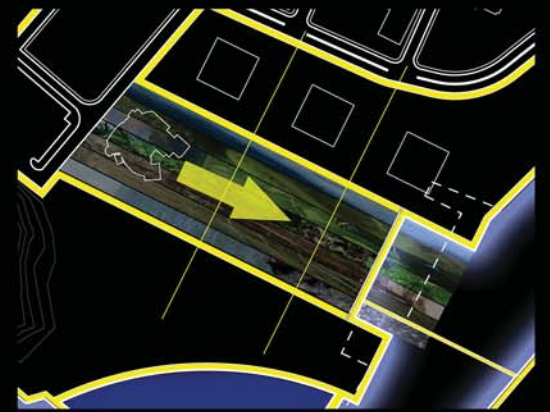
The last strategy employed is the weaving of a path of discovery (Figure 46.6). This provides an informal, playful, adventurous path that promotes exploration. The path weaves in and out of the seven strips, through different ecological zones and program elements.



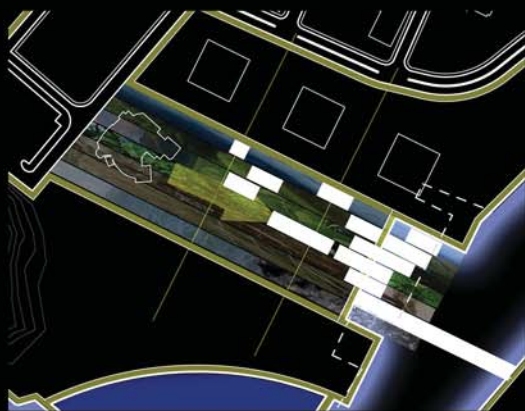
1 | SLICE



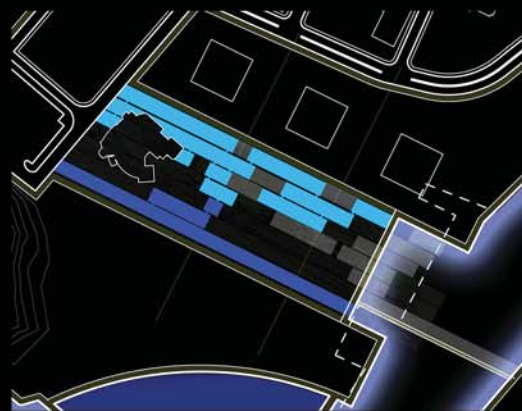
2 | DIVIDE



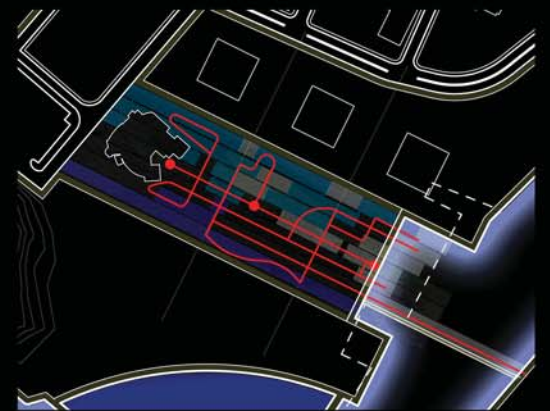
3 | OVERLAY



4 | PROGRAM



5 | HYDRATE



6 | WEAVE

Figure 46 | Site strategy diagrams

Hawai'i Children's Discovery Center of Nature: Site Planning

The park operates as an open facility, allowing the public to enter through primary and secondary access points (Figure 47). The entry pavilions are located at the public interface and provide protected space for gathering and informational signage. These spaces can also be used for concession during events. The access points provide a welcoming and exciting procession that terminates at the water's edge.

The exhibit is an open air play space that will contain play objects for the enjoyment of children. These objects relate to the site and provide educational opportunities for children to learn about the environment. This space can also hold events such as parties and meetings for school groups (Figure 48).

The hula theater is an open air structure with theater seating and a stage. This programmatic feature provides space for formal and informal performances of hula. The purpose of the surf museum is to

educate people about the history of surfing. The exhibits within contain relics of famous surfers as well as play objects for children.

The cafe is a place where visitors can relax and grab a bite to eat or drink (Figure 49). This covered open air space will have seating and a food and beverage stand. The festival pier is a place for public art and gathering. This pier provides a place to walk and relax under the Hawaiian sun.

The Keiki pool is a salt water wading pool for children. This area provides a safe area for young children to be near the ocean, but in a controlled environment. The intertidal exhibit area is an area where children can learn about various plant and animal species that reside in the tidal zone. The Keiki Canoe launch is a safe launching point for water related activities such as kayaking, canoeing, and paddle boarding.



Figure 47 | Site Plan



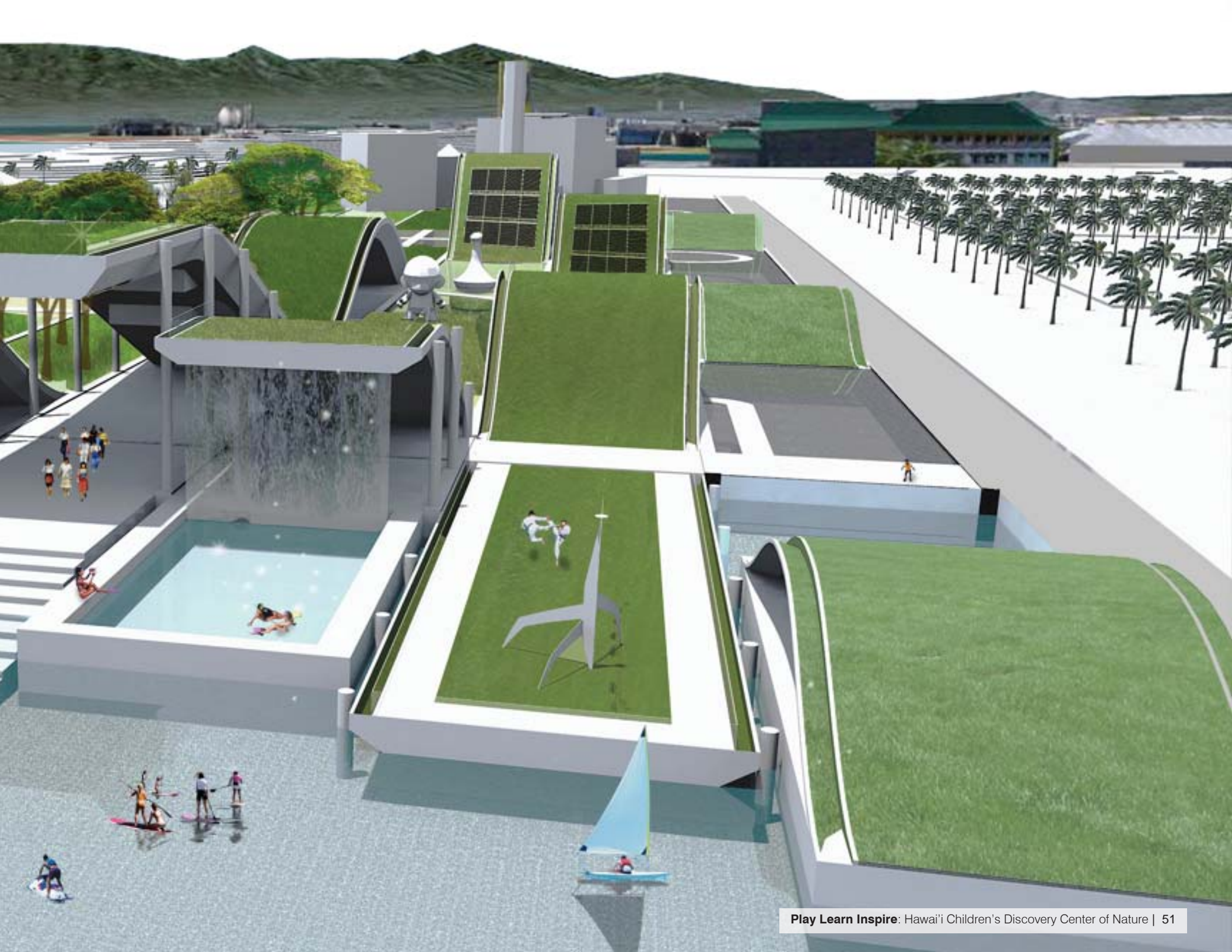
Figure 48 | Perspective of exhibit space





Figure 49 | Perspective of water's edge

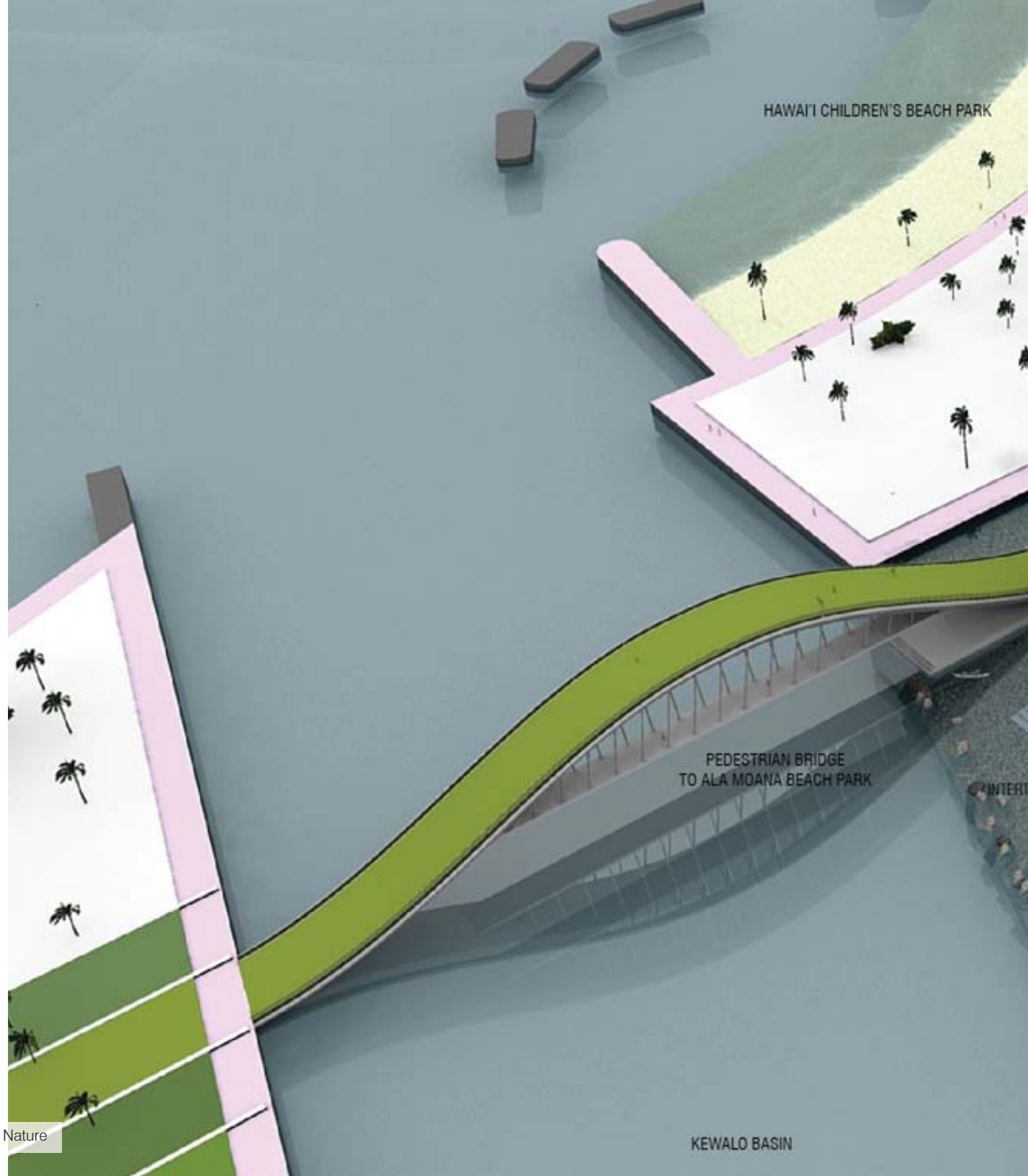


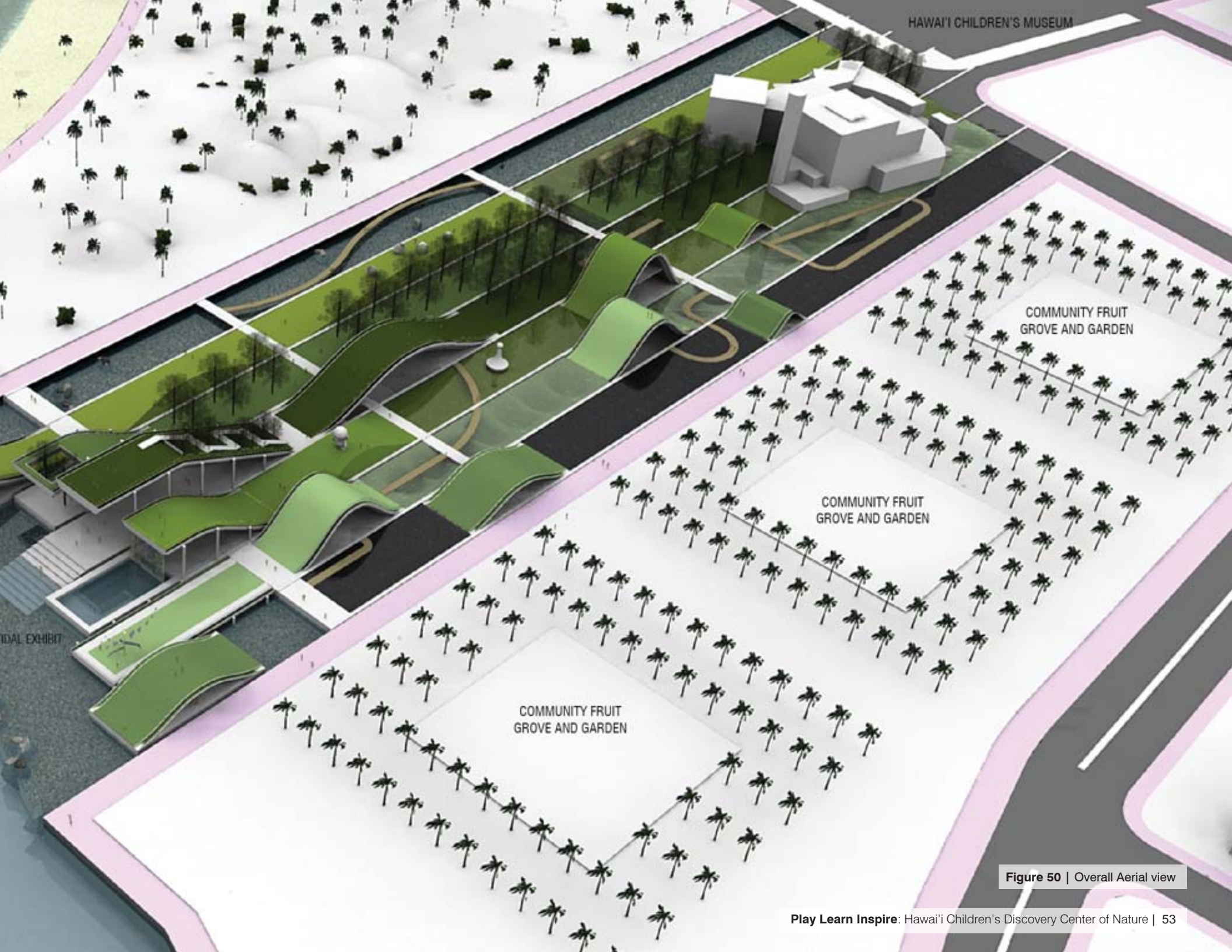


Hawai'i Children's Discovery Center of Nature: Architectural Expression

The site is a topographic condition (Figure 50). The procession moves from the city's edge, through the community fruit grove and gardens, filters through the site proper, and terminates at the newly created Keiki Beach Park. The site connects the Kaka'ako Waterfront Park to Ala Moana Beach Park through a pedestrian bridge. The pedestrian bridge serves as a landmark that can be seen for miles around. The Hawai'i Children's Museum is connected to the water through an exhibit corridor composed of the seven ecological zone strips.

Formally, the strips are anchored at the existing Children's Museum, and delaminate toward the water's edge. From a distance, the design of the structure easily communicates to children as a playful architectural expression (Figure 57). The placement of the major public programs at the water's edge creates a civic landmark that offers spectacular views to the City Skyline, Diamond Head Crater, Ala Moana Beach Park, and adjacent Marina.





HAWAII CHILDREN'S MUSEUM

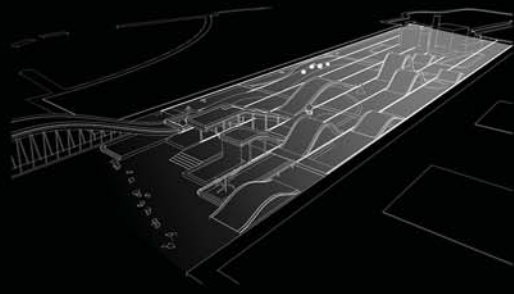
COMMUNITY FRUIT GROVE AND GARDEN

COMMUNITY FRUIT GROVE AND GARDEN

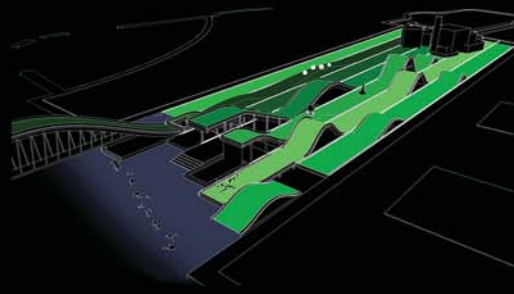
COMMUNITY FRUIT GROVE AND GARDEN

TIDAL EXHIBIT

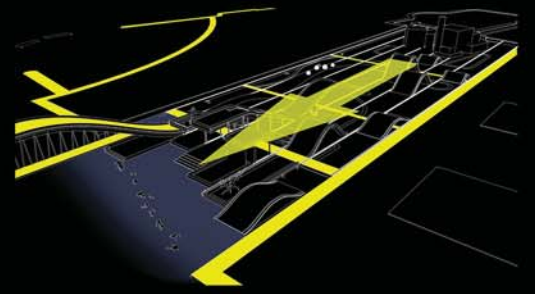
Figure 50 | Overall Aerial view



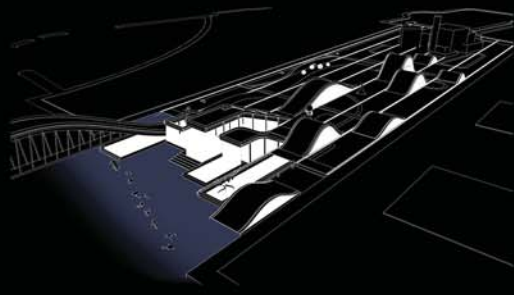
1 | SLICE



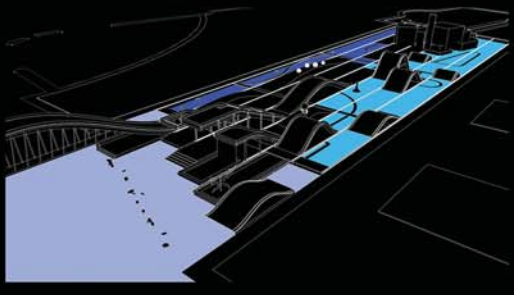
2 | DIVIDE



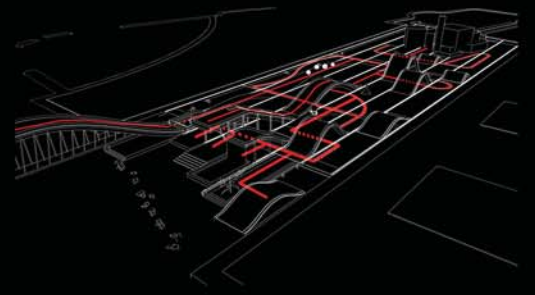
3 | OVERLAY



4 | PROGRAM



5 | HYDRATE



6 | WEAVE

Figure 51 | Strategy diagrams in 3d

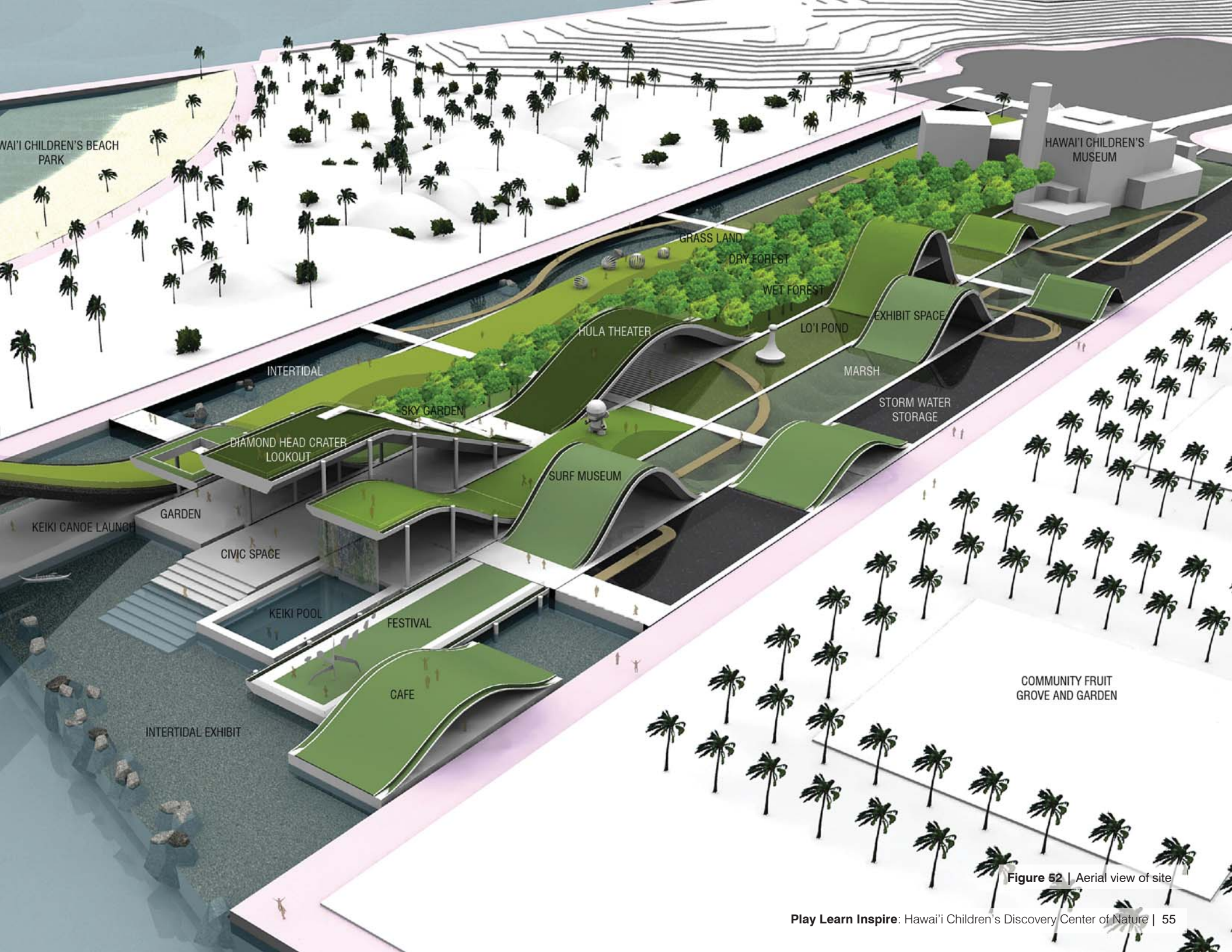


Figure 52 | Aerial view of site

Biotopes

There are seven major areas on the site that are analogous to the major ecological zones of a typical transect of Hawai'i (Figure 53). These zones are an artificial representation of the natural environment. The constructed zones are not meant to create an illusion of the real environment, but to serve as a teaching tool of nature.

Environmental Education and Play

A major goal of this project is promotion of sustainability through education and example (Figure 54). Toward this goal, good building practices will exhibit sustainable practices at work on the site; the site and building configuration will respond to climatic variables and use high performance sustainable systems, such as storm water

retention, bio-remediation, passive cooling, and solar energy collection. Ecological design is paramount in considering integrated passive/active systems. These systems will be integrated within the architecture so that they can be used as educational tools.

The framework for developing the exhibit's interpretive messages stems from the five principles outlined by Stapp: awareness, knowledge, attitudes, skills, and participation. These concepts help inform the formation of the program themes and various spatial experiences. The five major ecological zones that inform the interpretive message are the open ocean, grasslands, forest, wetlands and intertidal habitat. These strands are essential to understanding the diverse ecologic landscape of Hawai'i (Figure 55).

Experience

Above all, the goal of the built environment is to create memories and stimulate imagination, to "awaken the senses" by designing spaces that are dynamic and inspirational. To this end, several objectives can be met. The site functions as a hands-on educational exhibit of the natural world, engaging multiple senses to increase a child's spatial sensitivity. The design creates a sense of physiological and psychological exploration; the park's landscape and architecture weave through the five major ecological zones, punctuated by moments of cultural/recreational programming and play (Figure 56).

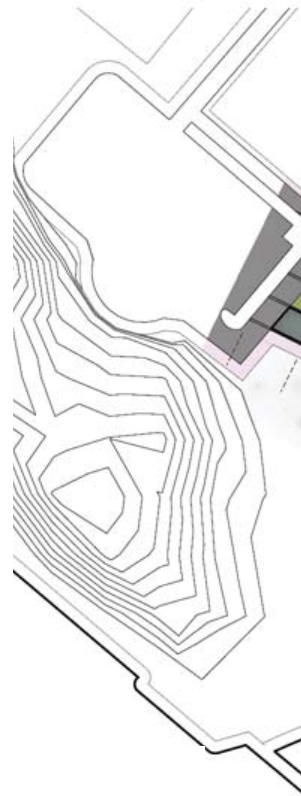


Figure 57 | Elevation

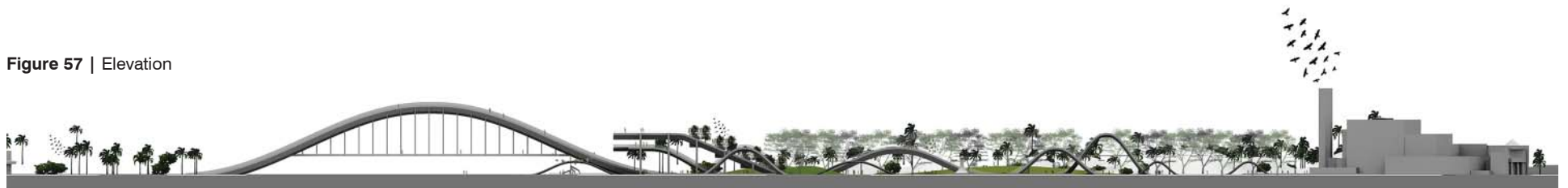
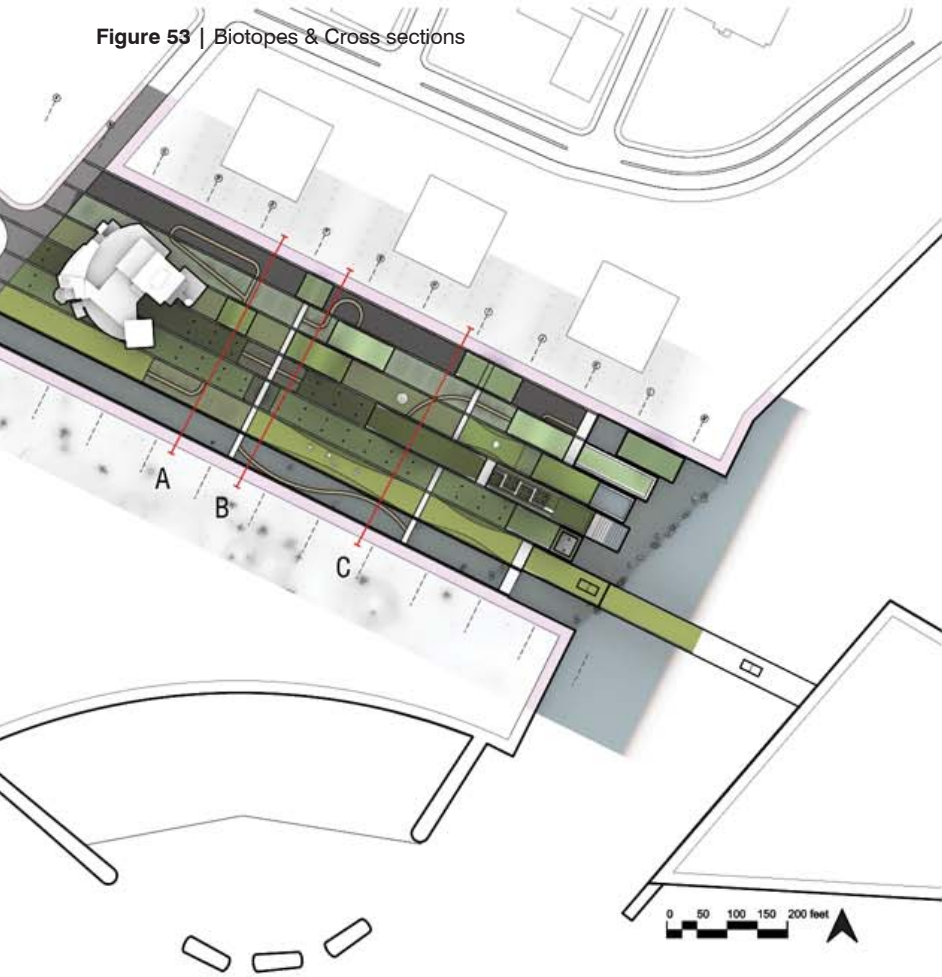


Figure 53 | Biotopes & Cross sections



FRESH STORM WATER
 MARSH
 LO'I PONDS
 DRY FOREST
 WET FOREST
 GRASSLAND
 INTERTIDAL

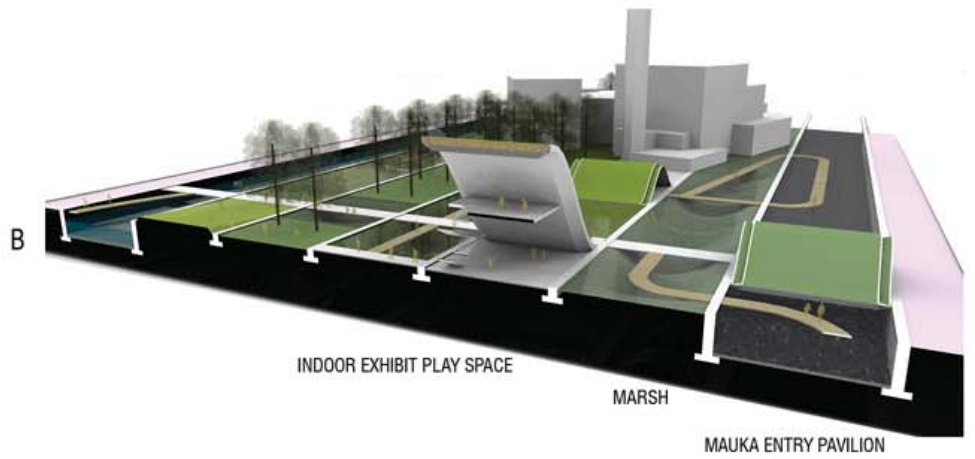


Figure 54 | Perspective of wetlands and Hula Theater beyond



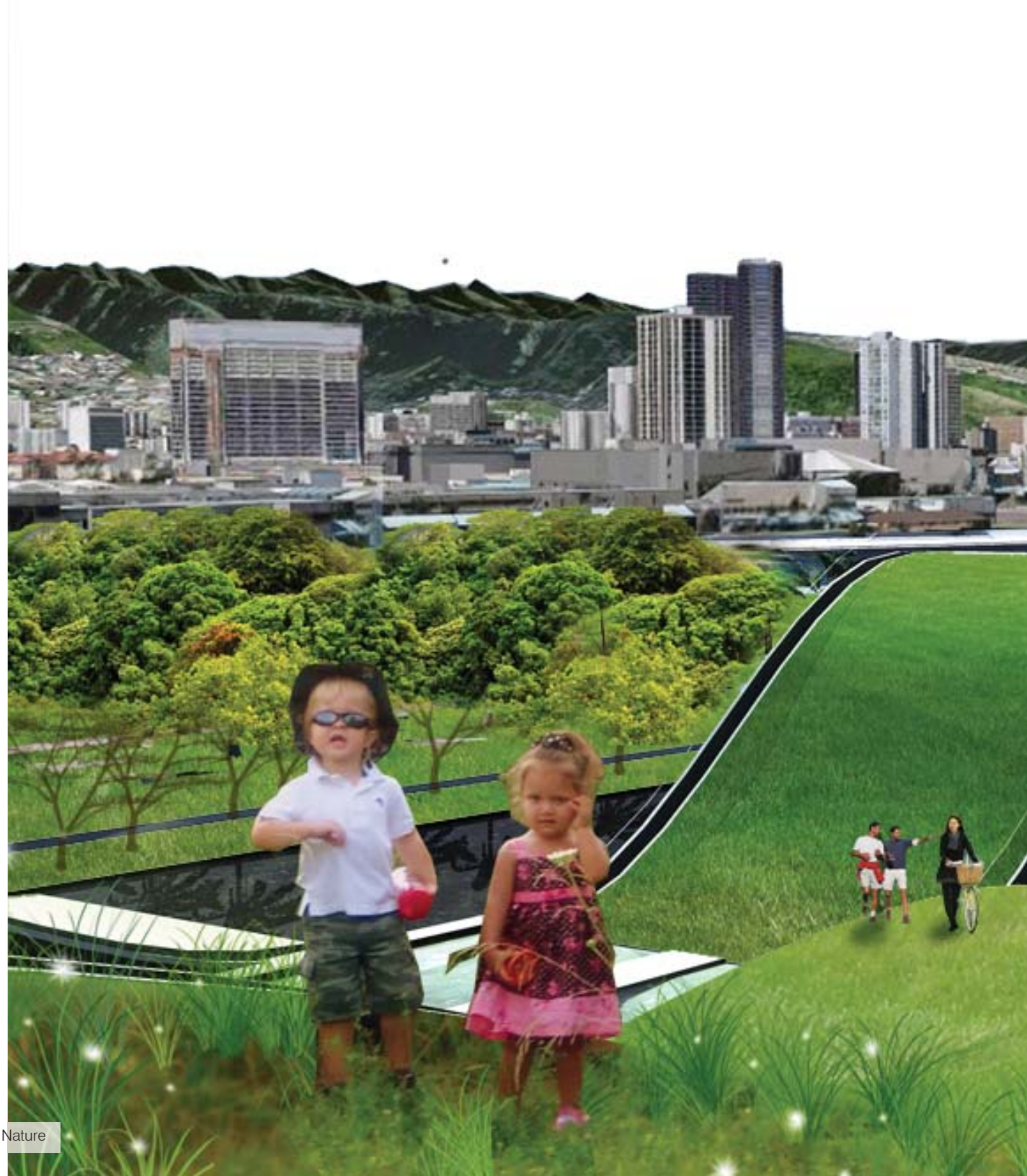


Figure 55 | Perspective of forest





Figure 56 | Perspective towards city





Conclusions

There were two goals for this thesis. One was to explore how architecture can be an environmental education tool for children. The other was to explore the uniqueness of Hawai'i and to create a sense of place that honors the past in a referential way rather than in nostalgia.

The radical design of the Hawai'i Children's Discovery Center of Nature was to be an architectural commentary on the degradation of the islands of Hawai'i, its fragile ecosystems, and its biodiversity. The theoretical investigation between the core principles of environmental education and play is essential in developing places for children. This thesis champions places for children by responding to the fact that much of the built environment ignores their existence and denies them rich, playful learning opportunities. By integrating an interpretive design approach in the built environment, designers are able to create more meaningful places and spaces. The

most important element in creating place is through a comprehensive site analysis.

Powerful and meaningful places and spaces are developed by a deep understanding of the history of the site. The exploration of the uniqueness of Hawai'i led the design to its current state. The architectural expression is an abstraction of the dramatic forces that created the islands. The act of dividing the site into seven biotopes is a manipulation of the boundaries between the natural and artificial. Using the site for bioremediation negotiates the boundaries between land and water, and the excavation of the Hawai'i Children's Beach Park explores the boundary between loss and gain. Above all, the experience of the park is paramount in the design. The undulating waves that delaminate toward the water – the boundary between architecture and landscape – aim to awaken the senses, and to make children aware of their environment.

These boundaries are what excite me as a designer. I find these moments

interesting, challenging, and exciting. I feel blessed to be given this gift from God. I will continue to seek these boundaries in my practice. I will use design as a way to make a positive contribution to humanity. I will create buildings that channel positive energy, affecting one person to the next, and allowing that energy to grow exponentially. I hope to design and build elegant, expressive, and cheerful architecture for the masses.

END NOTES

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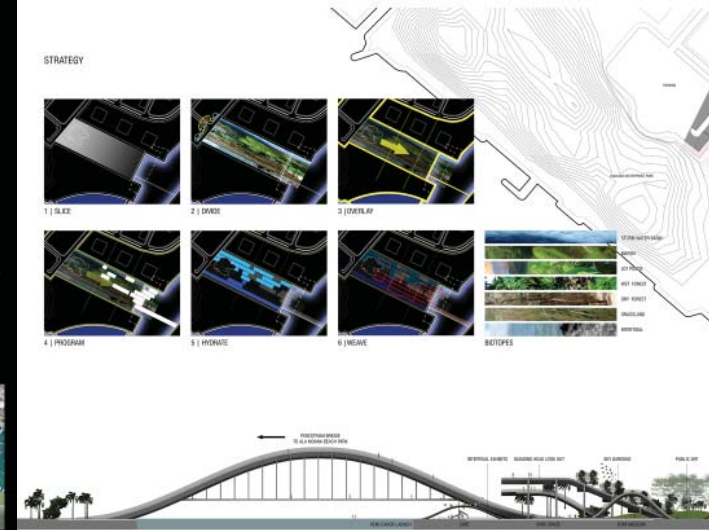
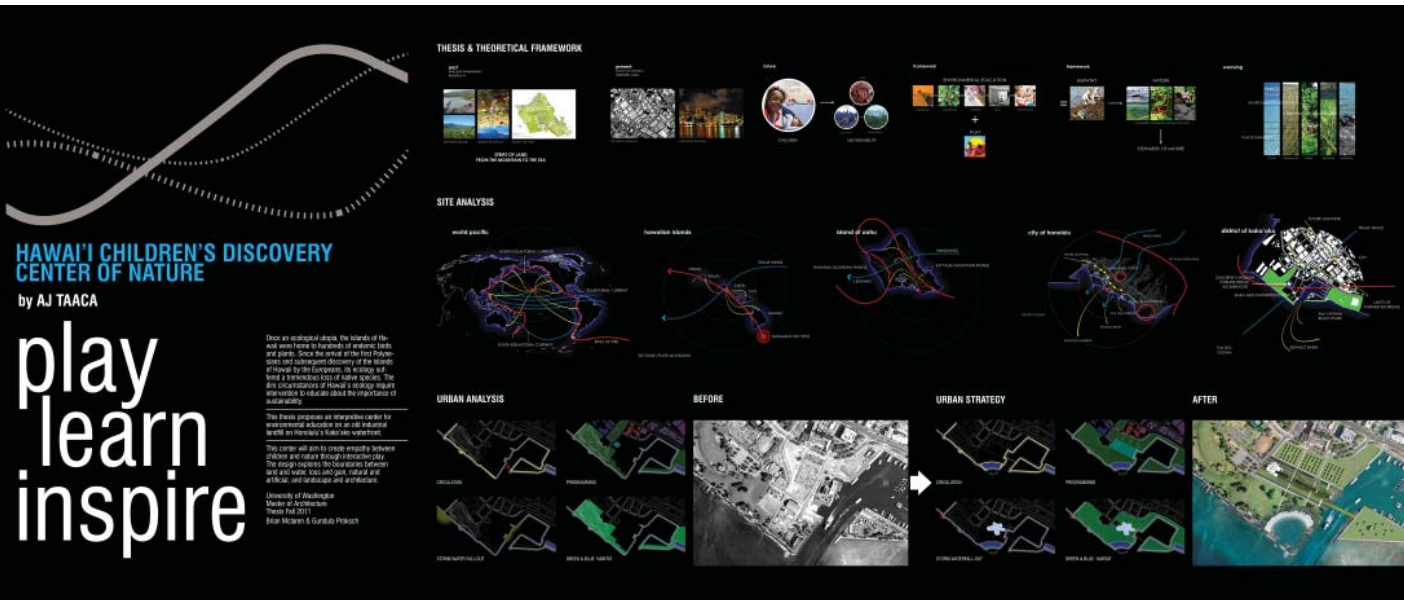
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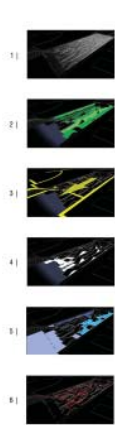
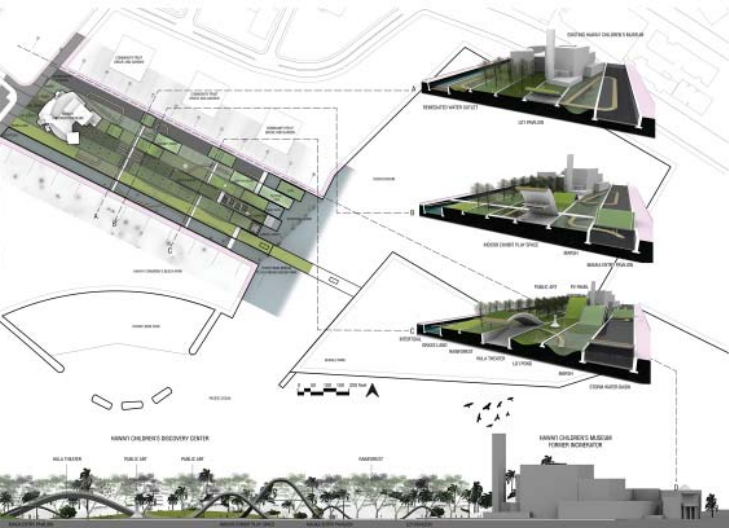
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APPENDIX A: FINAL PRESENTATION DRAWINGS

Figure A1 | Presentation drawings





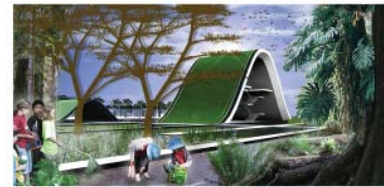
EXPERIENTIAL



WATERFRONT



NORTHEAST AERIAL



FOREST



CITY VIEW



FRESHWATER



WETLAND

KAKA'AKO WATERFRONT PARK

APPENDIX B: PROGRAM AREAS

Hawai'i Children's Keiki Park

-Park Area - 357,000 sf

-Beach area - 110,000 sf

Community Fruit Grove and Garden

-Grove area - 271,200 sf

-Garden area - 58,800 sf

Outdoor Landscape

- Storm water storage - 40,670 sf

-Marsh - 27,600 sf

-Lo'i Pond - 17,141 sf

-Wet Forest - 37,400 sf

-Dry Forest - 35,000 sf

-Grasslands - 24,500 sf

-Intertidal - 44,800 sf

Exhibit space

-9,700 sf

Hula theater

-9,200 sf

Entry pavilions

-Mauka - 2,250 sf

-Makai - 4,700 sf

Surf Museum

-4,700 sf

Cafe

-4,700 sf

Festival Pier

-6,100 sf

Keiki Pool

-3,000 sf

Intertidal Exhibitory

-25,100 sf

Keiki Canoe Launch

-3,000 sf

Pedestrian Bridge

-23,500 sf