

# Linking Boundaries:

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## Adaptable Notion of Home by Amber Bewza

A practicum submitted to the Faculty of Graduate Studies of The University of Manitoba  
in partial fulfillment of the requirements of the degree of

MASTER OF INTERIOR DESIGN

Department of Interior Design. University of Manitoba. Winnipeg, Manitoba

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... and my lap warmer Paisley.





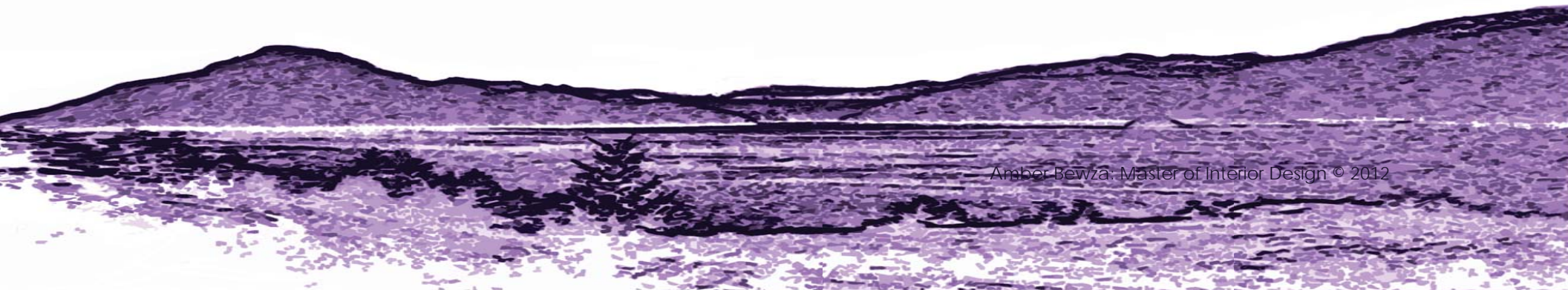


# Abstract

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This interior design practicum is the design of three floating houses located on Granville Island, Vancouver, British Columbia. They are spatially efficient and aid in human-nature connections through the manipulation of thresholds. The adaptation of small spaces is best accomplished through the use of multifunctional space, efficient storage, and manipulation of views. Linking of spaces and the blurring of thresholds is best accomplished through the use of implied axial linkage to the exterior and through the addition of ornament. The human-nature connection, or biophilic design, is best accomplished through the integration of direct, indirect, and symbolic experiences with the natural environment. This is accomplished through the variation of ceiling heights, linking internal and external views, integration of natural light, and use of natural materials that vary in texture and reflectance value.

Keywords: Interior Design, Floating House, Threshold, Small Space, Biophilia, Doorway, Nature, Adaptation, Boundary

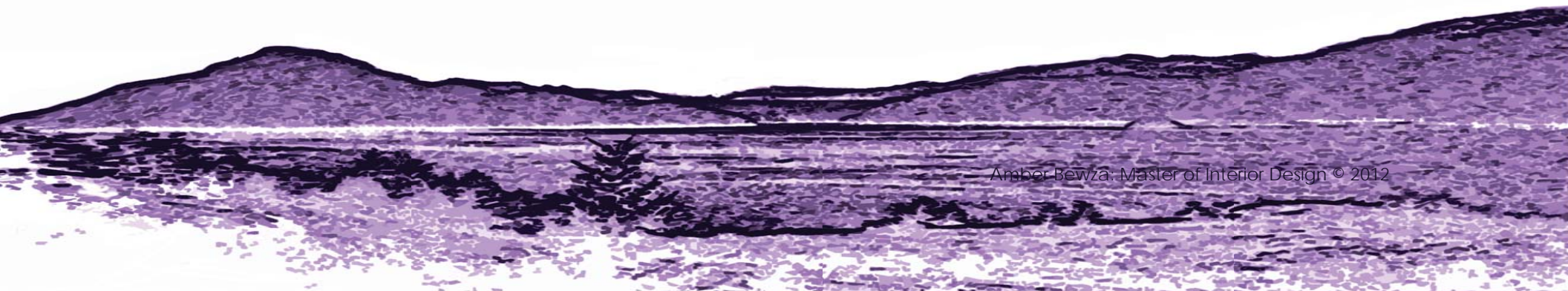


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# 1.0 Introduction

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There is a current shift in the housing market in North America. On the Canadian West Coast, property prices in Vancouver have risen eighty percent since 1990 and as a result, the city limits have spread drastically, creating many environmentally-unfriendly suburb communities.<sup>1</sup> Similar scenarios of high property costs and urban sprawl can be found throughout Canada and the United States.<sup>2</sup> People are looking for a different solution to high priced urban living that minimizes commute time, infrastructure, pollution, and the absorption of agricultural land.

The typology of the floating house will be investigated for this project as an alternative to the traditional suburban house. The floating home community is unique in its abundant sense of community, its independence and in its use of dissimilar types of house forms.<sup>3</sup> Current floating home residents tend to be somewhat radical in their choice of home and express the desire to “try something new.”<sup>4</sup> The typical resident of this type of community tends to be a member of a family or an individual looking for a different form of housing, an entrepreneur, mobile

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1 Derek Holt, “Outlook 2008 (Housing): Different Up Here,” *Canadian Business* 81, no. 1 (December 2007): 60.

2 Andrew Wahl, “Investor 500: A World of Opportunity,” *Canadian Business* 81, no. 9 (Summer 2008): 49-53.

John Caverley, “Uh-oh Domino,” *Canadian Business* 82, no. 2 (February 16 2009): 70-71.

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3 Barbara Flanagan, *The House Boat* (New York: Universe Publishing, 2003), 14.

4 Dolores R. Altin, “The Edge: A Floating Neighbourhood: an Exploration into the Phenomena of Float Home Living” (M.L.A. Thesis, University of Manitoba, 1998), 55.

workers<sup>5</sup>, snowbirds<sup>6</sup>, or designers. In this practicum, I will investigate the concepts of the adaptation of small scale space, the significance of the threshold, and the influence of biophilia, and will extract from these concepts design criteria that will be applied to the design of three floating homes as a possible response to the current social, economic and environmental demands of the twenty-first century.

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5 Mobile workers meaning people who are not bound to a geographical location for work.

6 Snowbirds meaning people who change location dependent on the seasons, typically summer and winter.

## 1.1 *Contextual Influences*

As mentioned in the introduction, the motivation for this practicum proposal is in part the current developing suburb that is designed in response to economic factors. Developers are building and buying the largest houses that consumers can afford. Houses have increased approximately one hundred percent in size between 1950 and 2000.<sup>7</sup> The same generic house is often built for all of its inhabitants without taking into consideration different family structures, sizes, needs, and wants.

This phenomena of purchasing a house with greater than necessary capacity is an example of the theory

of conspicuous consumption.<sup>8</sup> This theory can be summarized with the common phrase “Keeping up with the Jones,” wherein these larger homes tend to encourage the purchasing of objects to fill up the extra space.

The rising cost of property and discontent with current housing brings an opportunity to explore more psychologically and physiologically responsive alternatives that do not include long commutes, strain on current infrastructure, additional infrastructure such as new roads, electrical and water systems. Pollution and absorption of agricultural land - also current by-products of suburban development - could also be

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<sup>7</sup> Carol Lloyd, “Monster Homes R Us: American homes are monuments to conspicuous consumption,” *San Francisco Chronicle*, 14 October, 2005, <http://www.sfgate.com/cgi-bin/article.cgi?f=/g/a/2005/10/14/carollloyd.DTL&ao=all>. (accessed January 27, 2012).

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<sup>8</sup> Thorstein Veblen, *Theory of the leisure class: an economic study of institutions* (New York: Macmillan Co., 1899).

avoided.

The proposed floating houses will respond to current large-scale issues such as global warming and the rising ocean level that is lessening the total global land mass available for habitation. By being proactive and designing for water living now, frantic un-thought out responses to seasonal flooding and permanent land loss will be mitigated. Designing houses with the ability to float on water, especially houses close to sea level or located on a floodplain will reduce the need for emergency flood measures and for rebuilding damaged and destroyed homes following natural disasters.

The rising price of oil provokes more adaptable small

space design solutions as the world supply decreases.<sup>9</sup>

The design of floating houses will respond to this issue by providing occupants with highly functioning space conscious homes.

Extending beyond tangible design elements, biophilic design strategies will be employed to increase human connections to environmental processes and to awaken users to potential future environmental problems.

Cultural shifts are occurring in the ways people live and work. Technology has provided ways for people to live, work, learn, and interact in a more mobile setting and therefore are no longer tied down to one

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<sup>9</sup> Brian O'Keefe, "The Prophet of \$500 Oil," *Fortune* (September 29, 2008): 212-220.



geographic location.<sup>10</sup> The proposed floating houses can respond to this changing demographic and shift in daily routine.

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<sup>10</sup> Sally Shumaker and Gerald Conti, "Understanding Mobility in America," in *Home Environment*, ed. C. Werner & I. Altman, 237-253. (NY: Plenum Press, 1985), 238-242.



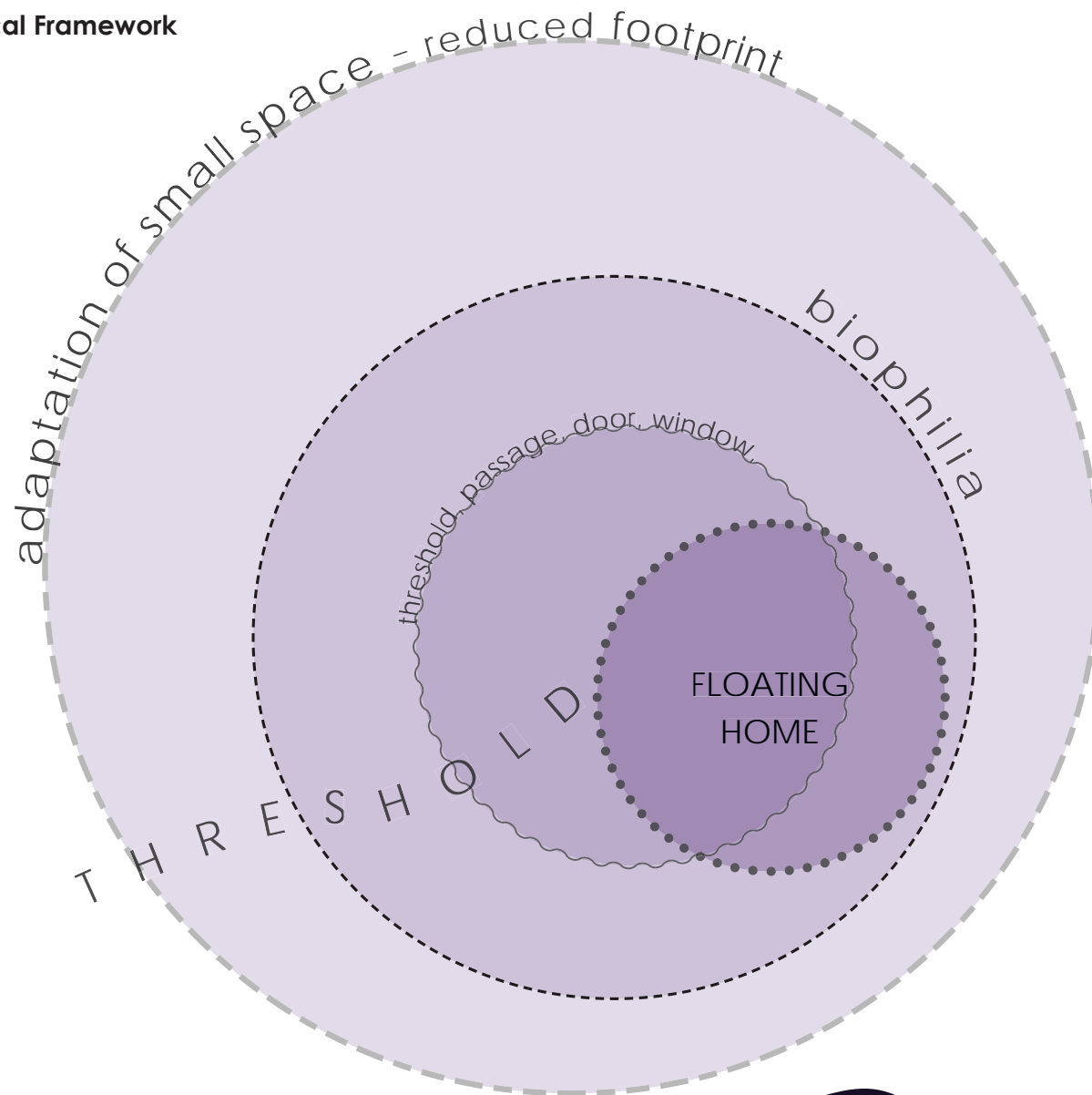
## 1.2 *Project Objective*

The purpose of this practicum project is to investigate the use of thresholds, biophilic design, and the adaptation of small-scale space and to apply resultant design implications to floating house designs.

Based on the resultant design guidelines, three floating houses will be designed for varied occupant groups. The objective of the resultant floating house designs is to satisfy occupants' needs and specific wants now and into the future, providing them with a home that is highly functional, adaptive, compact, and efficient; houses that promote a sustainable level of consumption, and connect occupants to their natural aquatic environment, their neighbors and surrounding community.

The application of design guidelines is not limited to the design of floating houses as they can also be adapted and applied to other residential typologies. The spatial restrictions that are placed on floating houses force spatial planning and storage solutions to support multi-functionality and efficiency with the ability to adapt to the users' needs, changing lifestyles and work arrangements. Other inherently small living spaces such as apartments, condos and prefabricated modular houses may also benefit from the small space solutions provided in the three floating house designs by adapting them to fit the required conditions.

1 Theoretical Framework



## 2.0 Literature Review & Theoretical Framework

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The theoretical framework diagram to the left (Image 1) depicts the topics and theories I will apply to the design of the floating house. The largest circle depicts the all encompassing need to create smaller residential designs. This reduced footprint is supported by an environmental awareness that humans have the potential to occupy less space by adapting smaller spaces. The notion of threshold can be utilized to link the built small-scale environment to the natural environment and spaces within the interior. The mobile aspect of a floating house is constantly present as its vertical movement is constantly present as it reacts to the movement of the water.

This chapter utilizes relevant literature and theories from various disciplines including psychology,

human geography, and ecology. The review will be presented in the following order. Each section will discuss a topic in more detail and will provide translation frameworks and resulting design criteria at its close.

### 2.1 Biophilia: *Nature*

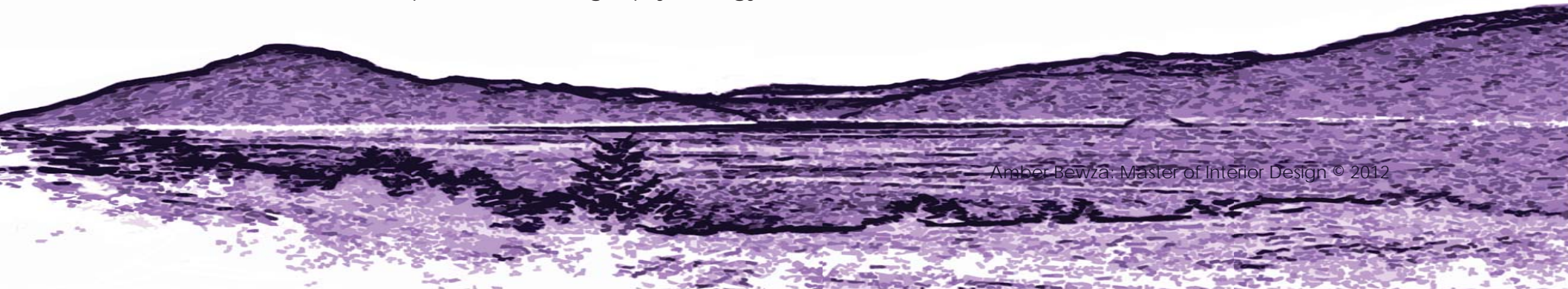
#### 2.1.1 Water: *Animalistic traits*

#### 2.1.2 Nature: *Points of entry*

### 2.2 Threshold

### 2.3 Adaptation of Small Space

Place: *Milieu*





## 2.1 *Biophilia* nature

Floating houses are unique in many aspects. One of the more obvious qualities that sets them apart from other dwellings is the ability to float on water; sitting on the flexible boundary between the built environment and the natural aquatic environment. This close connection to the natural aquatic environment is one that can be exploited through the use of biophilic design. In the introduction to the seminal book *Biophilic Design: The Theory, Science, and Practice of Bringing Building to Life*, Kellert stresses the widely accepted conviction that nature is important not only to human health but also to our ability to learn and stay motivated.<sup>1</sup> Harvard biologist Edward O. Wilson, Ph.D first defined the term biophilia as “the

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<sup>1</sup> Stephen R. Kellert, “Dimensions, Elements, and Attributes of Biophilic Design,” in *Biophilic Design: The Theory, Science, and Practice of Bringing Building to Life*, ed. Stephen Kellert and others (Hoboken, N.J.:Wiley, 2008), 4.

connections that human beings subconsciously seek with the rest of life.”<sup>2</sup> The fundamental human need to connect with nature is the principle on which biophilic design is based.<sup>3</sup> The practice of biophilic design, as summarized by Kellert, is “diminishing human separation from nature, enhancing positive contact with environmental processes, and building within a culturally and ecologically relevant context, all basic to human health, productivity, and well-being.”<sup>4</sup> This connection with nature is crucial in new design as the current modern built environment tends to separate itself from nature, creating a society with

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<sup>2</sup> Edward O. Wilson, *The Diversity of Life* (Cambridge, MA: Belknap Press of Harvard University Press, 1992), 350.

<sup>3</sup> Stephen R. Kellert and Judith H. Heerwagen, preface to *Biophilic Design: The Theory, Science, and Practice of Bringing Building to Life*, ed. Stephen Kellert and others (Hoboken, N.J.:Wiley, 2008), viii.

<sup>4</sup> Ibid.

an increased feeling of 'placelessness.'<sup>5</sup>

This separation from nature is detrimental to our health, as exposure to the natural environment has the opportunity to increase our overall health and ability to function effectively.<sup>6</sup> Homes need to become a place where people can truly rest and recover from the mental fatigue and irritability incurred from their daily lives.<sup>7</sup> Kaplan, Kaplan, and Ryan in *With People in Mind* outline what they term, patterns, or relationships between aspects of the environment and peoples experience or reaction to them. Some of the 45 patterns expressed will aid in

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5 Ibid., viii.

6 Rachel Kaplan, Stephen Kaplan, and Robert L. Ryan, *With People in Mind* (Washington, DC: Island Press, 1998), 1.

7 Ibid., 71.

the design of the proposed floating homes, including patterns for restorative environments, views and vistas, and places and their elements.

The relationship between humans and the positive influence of the natural environment is written about utilizing various labels however the study of Biophilic design is not a new design approach. The extent to which it has been applied to the built environment, and the interior in particular, has been somewhat limited. Instead of being integrated and purposefully designed, attempts at introducing nature into the interior tend to sometimes be superficial afterthoughts. Unsuccessful design attempts to create a biophilic designed interior include the use of synthetic decorative elements such as unrelated



scenic paintings, mini water features and lifeless floral patterned prints on floors walls or furniture. When used without a strong conceptual connection these synthetic decorative elements do not fully reach their potential to help connect occupants to the natural environment. It is important to adapt techniques that have been specified for other portions of the designed environment, inclusive of those prescribed exclusively for landscape and building design.

The chart on the following page, page 15, summarizes the various attributes, elements, and dimensions of biophilic design laid out by Kellert.<sup>8</sup> The main dimensions or concepts of biophilic design are [organic or naturalistic](#) and [vernacular](#) based design.

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<sup>8</sup> Kellert, 5-14.

The later, vernacular, being location based, draws on the local built and natural ecological environment to create a human connection to location. As floating homes, have the ability to be moored at various locations over their lifespan this local connection to place will be created through the use of *milieu*, which will be discussed in a later section, and through the integration of regional elements, such as materials readily found in old industrial sites, of which Granville Island is one. The first dimension, the organic or naturalistic dimension, will take focus for the design of the floating homes.

There are three ways in which humans can experience this naturalistic dimension in the built environment, they are [indirectly](#), [directly](#), and [symbolically](#).



## 2 Biophilic Dimensions, Elements and Attributes

dimensions

**Organic or Naturalistic** - "shapes and forms in the built environment that directly, indirectly, or symbolically reflect the inherent human affinity for nature." <sup>1</sup>

**Place-Based or Vernacular** - "building and landscapes that connect to the culture and ecology of a locality or geographic area." <sup>2</sup>

<sup>1,2</sup> Stephen R. Kellert and others, eds., *Biophilic Design: The Theory, Science, and Practice of Bringing Building to Life* (Hoboken, N.J.:Wiley, 2008), 5.

elements

Environmental Features	Natural Shapes and Forms	Natural Patterns and Processes	Light and Space	Place-based Relationships	Evolved Human-Nature Relationships
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attributes

<ul style="list-style-type: none"> <li>• Color</li> <li>• Water</li> <li>• Air</li> <li>• Sunlight</li> <li>• Plants</li> <li>• Animals</li> <li>• Natural materials</li> <li>• Views and vistas</li> <li>• Facade greening</li> <li>• Geology and landscape</li> <li>• Habitats and ecosystems</li> <li>• Fire</li> </ul>	<ul style="list-style-type: none"> <li>• Botanical motifs</li> <li>• Tree and columnar supports</li> <li>• Animal (mainly vertebrate) motifs</li> <li>• shells and spirals</li> <li>• Egg, oval and tubular forms</li> <li>• Arches, vaults, domes</li> <li>• Shapes resisting straight lines and right angles</li> <li>• Simulation of natural features</li> <li>• Biomorphy</li> <li>• Geomorphology</li> <li>• Biomimicry</li> </ul>	<ul style="list-style-type: none"> <li>• Sensory variability</li> <li>• Information richness</li> <li>• Age, change and the patina of time</li> <li>• Growth and efflorescence</li> <li>• Central focal point</li> <li>• Patterned wholes</li> <li>• Bounded spaces</li> <li>• Transitional spaces</li> <li>• Linked series and chains</li> <li>• Integration of parts to wholes</li> <li>• Complementary contrasts</li> <li>• Dynamic balance and tension</li> <li>• Fractals</li> <li>• Hierarchically organized ratios and scales</li> </ul>	<ul style="list-style-type: none"> <li>• Natural light</li> <li>• Filtered and diffused light</li> <li>• Light and shadow</li> <li>• Reflected light</li> <li>• Light pools</li> <li>• Warm light</li> <li>• Light as shape and form</li> <li>• Spaciousness</li> <li>• Spatial variability</li> <li>• Space and shape and form</li> <li>• Spatial harmony</li> <li>• Inside-Outside spaces</li> </ul>	<ul style="list-style-type: none"> <li>• Geographic connection to place</li> <li>• Historic connection to place</li> <li>• Ecological connection to place</li> <li>• Cultural connection to place</li> <li>• Indigenous materials</li> <li>• Landscape orientation</li> <li>• Landscape features that define building Form</li> <li>• Landscape ecology</li> <li>• Integration of culture and ecology</li> <li>• Spirit of place</li> <li>• Avoiding placelessness</li> </ul>	<ul style="list-style-type: none"> <li>• Prospect and refuge</li> <li>• Order and complexity</li> <li>• Curiosity and enticement</li> <li>• Change and metamorphosis</li> <li>• Security and protection</li> <li>• Mastery and control</li> <li>• Affection and attachment</li> <li>• Attraction and beauty</li> <li>• Exploration and discovery</li> <li>• Information and cognition</li> <li>• Fear and awe</li> <li>• Reverence and spirituality</li> </ul>
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Direct experiences occur through contact with the natural environment, including sunlight, views of natural settings, water, plants, animals. These direct experiences are normally unaltered with little human influence. Indirect experiences require human stimulus and care and occur in spaces that reflect the natural environment, its materiality, and its processes. Symbolic experiences are facilitated through biomimicry, forms that are representations of the natural environment, its patterns and curvilinear forms.

These dimensions along with the elements and attributes help provide a possible guide for the integration of biophilic design into the interior environment. This chart will be utilized when devising

design criterion for the three proposed floating home designs.

Sally Augustin in *Place Advantage: Applied Psychology for Interior Architecture*, remarks that symbolic representations of nature and ones that are more abstract are more sophisticated than direct representations of nature. This abstraction of natural forms is desired in the design of interior spaces as it creates a sense of protection from the natural environment.<sup>9</sup>

The natural environment provides humans with a rich sensory experience that is constantly in flux and

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<sup>9</sup> Sally Augustin, *Place Advantage: Applied Psychology for Interior Architecture* (Hoboken, N.J.: John Wiley & Sons, 2009), 85.

added to by natural cyclical rhythms and changes. Many modern buildings and their interiors are sensory deprived. Biophilic design indicates that a full sensory experience must be developed in the design of the floating houses utilizing a variance of textures, sounds, made through interaction with materials, smells etc. Floating houses are unique in this manor, due to their location on tidal waters the views are constantly changing due to the rising and lowering of the home constantly providing the occupant with new sensory information.

## 2.1.1 *Water* animalistic traits

Seventy percent of the earth's surface is covered by water. It is therefore not surprising when water is viewed as an element that links us to nature.<sup>10</sup> Floating houses possess a unique opportunity to take full advantage of this intimate connection with water as their entire existence relies on water to hold them up. Water is mobile and has the ability to circulate and interact with various environments. It is this constant movement and change that brings water to life and in turn brings life to the floating houses. The most notable movement that brings life to the floating houses is the motion of the connected ocean waters and their tidal cycles. These water level changes are a result of the changing gravitational field produced

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<sup>10</sup> Martin L. Mador, "Water, Biophilic Design, and the Built Environment," in *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life*, ed. Stephen Kellert and others (Hoboken, N.J.: Wiley, 2008), 43-44.

by the Sun and the Moon.

Water has the ability to possess animalistic traits such as movement, rhythm, playfulness, aggression, and growth that give it lifelike qualities. These lifelike qualities originate from water's motion, power, ever-changing nature, and sound helping to emphasize its humanistic attachment.<sup>11</sup>

Water's biophilic qualities have the potential to be harnessed through their interactions with other objects. Water's strong biophilic character can be expressed through its manipulation and its interaction with other natural elements. Water's surface, when still, has the ability to reflect the environment around it, like a mirror, and when movement does occur,

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<sup>11</sup> *Ibid.*, 45.

it creates an active dialogue that distorts and manipulates its view of the surrounding environment.

Natural and artificial light can also be reflected by the water's surface. This light more importantly acts to color water, changing its vibrancy through the differentiation of its rays and the absorption of surrounding environmental colors. Fog and mist particles created by weather conditions that only occur on the ocean's edge, react with natural light and/or artificial light and come to life, creating capricious light with flickering movement. Without light, water becomes uncommunicative and lifeless. On its own, water is motionless, odorless, colorless, and boring with no animalistic or biophilic qualities.

Another way to animate and bring life to water is through its interaction with natural materials such as stone or wood. This interaction is symbiotic as the addition of water to stone or wood acts to enhance and reveal the qualities of both such as the coloration of rock and the buoyancy of wood.

When in motion and through its interaction with flora and fauna, water develops a biophilic attraction.<sup>12</sup> It is only through water's interaction with external stimuli that it is able to take on these animalistic or lifelike qualities as water readily changes to absorb the character of its surrounding creating a strong humanistic attachment.

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<sup>12</sup> Ibid., 50.

## 2.1.2 *Nature* points of entry

Doors and windows are some of the main typical areas where nature can penetrate the boundaries of the interior environment. Likewise, these are areas where the interior environment can most easily project into nature. In the chapter “Where Doors Become Windows,” Kellert views both doors and windows as permeable places that allow a conversation between the interior and the exterior to occur. Viewing windows as doors allows for access to “views, daylight, sunlight, fresh air, breezes, natural comfort, passive survivability, outdoor spaces and activities, extended space, circadian regulation, seasons, climate, and nature’s sounds, smells, and life” from the interior.<sup>13</sup> It is with access to these

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<sup>13</sup> Vivian Loftness and Megan Snyder, “Where Windows Become Doors,” in *Biophilic Design: The Theory, Science, and Practice of Bringing Building to Life*, ed. Stephen Kellert and others (Hoboken, N.J.:Wiley, 2008),119.

elements that windows do become more like doors, allowing interior occupants to connect to the exterior environment.

Views of nature have been credited with many health benefits. Most of the research on this subject has been focused on health care facilities, work places and educational situations. These studies will be utilized as they relate to the residential setting. If a person is able to see the natural environment from a seated position in their workplace or from their hospital bed, they tend to have a “reduced length of stay after surgery, reduced sick building syndrome (SBS), increased performance at task, and overall improved emotional health.”<sup>14</sup> These are just some of

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<sup>14</sup> *Ibid.*, 120.

the benefits to allowing the natural environment into the interior of the building.

Viewing nature through a simple window, however, is scarcely adequate. Windows are impenetrable and for good reason. The glass is used to keep out harmful aspects found in nature like ultraviolet rays, insects, the elements, unwanted intruders and rodents, allowing occupants to enjoy nature from a safe and comfortable enclosed location. In order to make a window act as a door, we cannot just remove the glass. This protective barrier must therefore be softened to allow the preferred natural elements to enter interior spaces. Kellert suggests that the addition of ornament in a built boundary such as a window helps it perform this task by providing the viewer with

something to feel or imagine feeling when enjoying a view, increasing the “sensual association with the world outside.”<sup>15</sup> The design of ornament may be infinitely varied. An object that has similar qualities to the natural environment through colour, texture or material helps shorten the perceived distance to the natural environment when placed close to a window, either on the interior or exterior side. For example, when a wooded area is located at the edge of a stark lawn, placing a tree near an onlooking window allows the gap of the lawn to be shortened, encouraging the viewer to be more cognizant of the forest at the edge of the lawn. The common term “picture window” suggests this is a ‘good’ picture if

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<sup>15</sup> Kent Bloomer, “The Picture Window: The Problem of Viewing Nature Through Glass,” in *Biophilic Design: The Theory, Science, and Practice of Bringing Building to Life*, ed. Stephen Kellert and others (Hoboken, N.J.:Wiley, 2008), 254.



information in the foreground, background, and mid-ground (the window), gives the viewer something towards which to travel. The goal of the ornament, whether it be such additions as decorative elements or architectural details in the glass itself, is to create a more nebulous barrier that allows the flow of both interior and exterior elements.

The interaction between the interior and exterior is not limited to flow in one direction because windows also provide views to persons on the outside and may hint at what the activities in interior spaces are. This inward flow engages neighbours and passersby by helping connect the greater community to the occupants.

Biophilic design also suggests that the biodiversity of the site is important and that its unique features should be utilized whenever possible. As the floating houses will be mobile, the local biodiversity of a more vast area will be available as an influence. This will allow the opportunity to encompass a wider range of aspects from along the West Coast as opposed to an entirely static point along the coast in the proposed designs.



### 3 Translation Framework: *Biophilia*

<i>Theory/Concept</i>	<i>Design Filter</i>	<i>Design Criterion</i>
<b>Biophilia: Nature</b> <b>Water:</b> <b>Animalistic traits</b> <b>Nature:</b> <b>Points of entry</b>	<b>Design Elements</b> space line form texture light time colour shape pattern	line should mimic natural edges when possible lines and edges should be continuous  natural light should be captured for interior use materials should be natural or be a natural pastiche, mimicking qualities of natural materials.
	<b>Design Principles</b> proportion balance order rhythm harmony scale unity emphasis	ceiling heights should be varied
	<b>Programme &amp; Circulation</b> spatial adjacencies functions storage requirements spatial organization	all main spaces require exterior views
	<b>Spatial Character</b> the image projected spatial feeling concept views	views should be directed toward natural settings
	<b>Environmental &amp; Sensorial</b> light sound smell materiality	natural light should penetrate into all spaces

## 2.2 *Threshold*

Floating houses are located at a unique intersection between land and water. This land/water boundary is blurred by extending the floating homes onto the water. The threshold between land and water is therefore increased over a distance rather than being defined by a distinct beginning and ending point or edge. This expansion of threshold or blurring of boundaries between two dissimilar elements will be integrated into the floating house designs as they relate to both the macro and the micro. These dichotic relationships will include the play between land and water, between built and natural environments, and between interior and exterior spaces. In addition, less tangible dichotomies including place and placelessness, and private and public spaces will be incorporated.



The purpose of this inquiry into the use and meaning of thresholds is not to 'eliminate' boundaries through their tactful use because that is seemingly impossible. Rather, it is to question the appropriateness of bounded space in the design of a dwelling, adopting a more fluid approach when suitable. Francis Ching, in the fundamental design textbook, *Architecture: Form, Space and Order*, defines threshold as what "marks the passage from one place to another."<sup>16</sup> This flexible definition leaves room for interpretation. In most built environments, the threshold is merely an abrupt differentiation between two spaces, denoted by a tangible change. If you were to ask many people to show you what they believe to

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<sup>16</sup> Francis D.K. Ching, *Architecture, Form Space & Order* (New York: Van Nostrand Reinhold, 1996), 238.

be a threshold they would point to the change of flooring at the base of a door. Although this would be correct, it is a very limiting way of looking at the concept. When reviewing the definition again, it is the word "passage" that conjures an allusion to a physical journey that takes place over a period of time and through movement.

The actual physical characteristics and formation of thresholds can have very distinct psychological effects.<sup>17</sup> Openings, perforations and various forms of thresholds can be found in many different built forms. The most typical thresholds are the interior doorway, the interior-exterior doorway, and the window that is typically found between interior and exterior space.

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<sup>17</sup> Simon Unwin, *Doorway* (London: Routledge, 2007).

Closed windows, as mentioned on page 20, are great for allowing visual stimuli to contribute to a space. Closed windows do not, however, go much further, as they are static, bounding out all other sensual stimuli, and act the same as a wall if you were to close your eyes.

Why must our daily dwelling take place in a closed container? When climatic situations arise where outdoor living is possible we should take advantage of opportunities to introduce exterior elements back into our daily lives and dwellings. The proposed floating houses will use their windows as thresholds that allow for varied access, enhancing the adjustability of the threshold passage to accommodate such changes in weather, security, and personal preference.

Thresholds between the interior and exterior are not the only ones that will be blurred. Within the interior of the floating houses, the transition between areas of activity will be analyzed and designed to help integrate the interior spaces as a whole. Typical boundaries will be reviewed and their placement will be reorganized, directing focus to intentional links that create a fluid environment.

The concept of threshold and its use in design is discussed by Benzel in the book *The Room in Context*. She considers the role of thresholds in various scales from the room to the city, and demonstrates the influence they can have on connecting environments. Using the concept of thresholds provides the opportunity to create a connection with the exterior,



helping to increase the biophilic quality of the interior. The manipulation or dissolving of the threshold will be applied in the proposed floating house designs as a way to create greater connections between interior environments, the interior with the exterior, and the built environment with the natural environment.

This bridging or linking of spaces allows for the occasion to bring nature or elements that are derived from the natural environment into the proposed design. As the design is a partial reaction to global warming and rising ocean levels, human's connection to nature is valued more than ever and can be nourished and promoted by the design of sensitive interiors. Benzel states that "from inside a room, simply viewing the landscape - green pastures,

green mountains, graceful trees, flowing water - offers pleasure and may provide an effective and long-lasting lift by fostering a positive emotional state."<sup>18</sup> The floating houses I observed in my initial site visit to Vancouver did not take advantage of external sightlines toward shared dock areas or the surrounding site because many of their window openings were covered. The dock areas simply acted as a corridor to carry residents from point A to point B. This was casually observed again in the floating houses that are located on the north side of the Iron Workers Memorial Bridge at the Lynwood Marina in North Vancouver. This "context deprivation" does not allow the surroundings to influence interior spaces

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<sup>18</sup> Katherine F. Benzel, *The Room in Context: Design Beyond Boundaries* (New York: McGraw-Hill, 1998), 161.

and therefore, the interiors have a reduced influence on their surrounding environment. Floating houses, similar to many current conventional dwellings, seem to be designed by people who view natural elements as something to be contained and protected from. These designers do not strive to take advantage of the “physiological and emotional benefits from exposure to nature.”<sup>19</sup> This vortex-like thinking is quite limiting, and restrains nature into the backyard or planter, instead of allowing it to have a symbiotic and highly beneficial relationship with interior occupants.

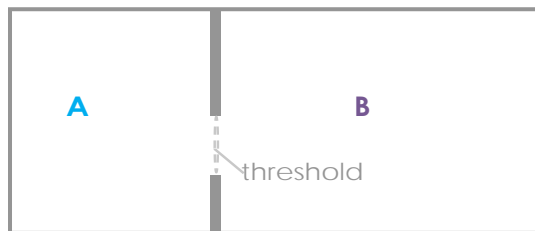
Viewing threshold as passage enables its expansion and malleability, and permits interactions between

spaces. These interactions allow elements from each space to flow into each other. This area of overlap created by the blurring of a defined threshold is neither space A nor B but an extension of them both, therefore increasing the perceived size of each space.

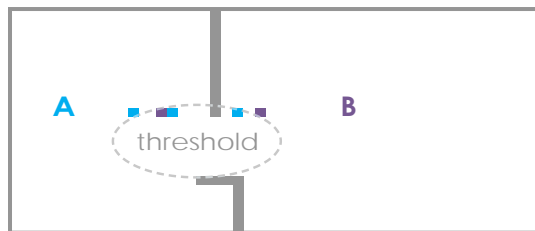
I have developed a diagram depicting, *threshold*, *extended threshold*, and *fluid or dissolved threshold* in order to illustrate threshold as passage, shown in Image 10. The first depicts an ordinary widely understood notion of threshold and is quite self explanatory. The second, extended threshold might be accomplished through the use of a wall, or architectural element placed perpendicular to the threshold and placed at its edge reaching into

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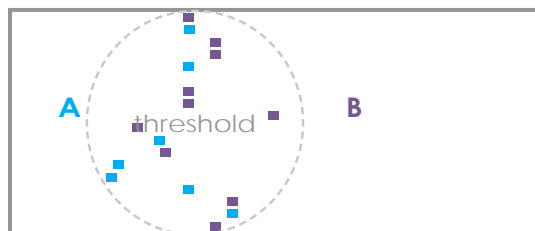
<sup>19</sup> Timothy Beatley, *Native to Nowhere: Sustaining Home and Community in a Global Age* (Washington, DC: Island Press, 2004), 9.



*Threshold*



*Extended Threshold*



*Fluid or Dissolved Threshold*

**10 Threshold as Passage**

the adjacent space(s). Extended threshold might also employ furniture placement. For example at the threshold between a kitchen and living space, a bench might be placed on the kitchen side of a living room, expanding the function into the adjacent space.

The third grouping of threshold as passage, fluid or dissolved threshold, effectively removes the notion of two separate spaces. This might be seen at a cafe where tables are placed onto the sidewalk and the roof over the cafe retracts to open the interior to the sky.

Simon Unwin, an architect and academic, focuses his attention on architectural analysis and design



in his seminal book *Analyzing Architecture*. An auxiliary book to this book, entitled *Doorway*, pays notable attention to the perforations that provide the ability to pass through walls in of the architectural world.<sup>20</sup> Here the terms “doorway” and “threshold” are synonymous with one another. The doorway is acknowledged as having more influence than a mere hole in a wall. Instead, Unwin proposes that even when a doorway is understood as an opening in an otherwise impenetrable surface, it does not have to be a distinct line and that this opportunity to pass between two spaces can take time over a period of space.

Unwin describes a threshold as “a seam in one’s

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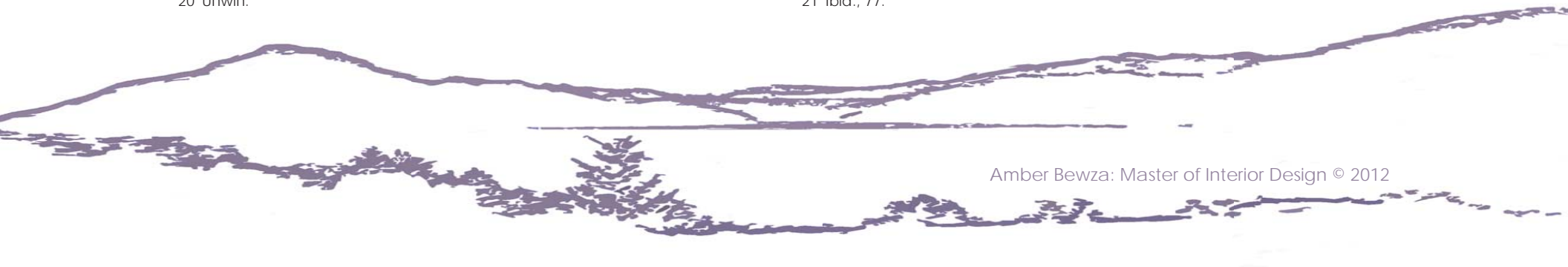
<sup>20</sup> Unwin.

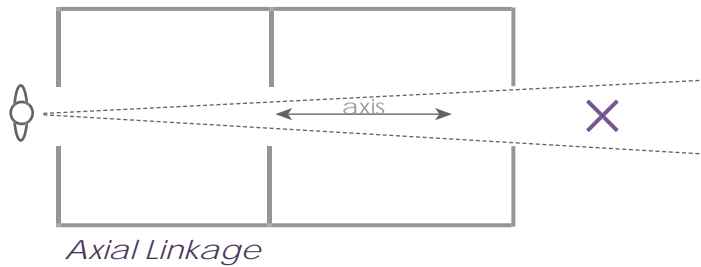
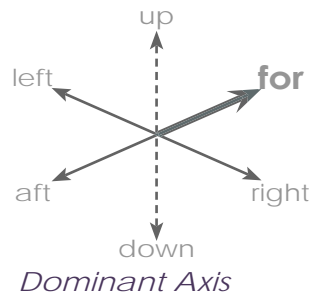
experience of the world.”<sup>21</sup> Extending the metaphor further, he notes that garments can have very obvious seams; such as those that switch from blue cotton to gold silk, or they can be very subtle and be barely noticeable. Thresholds possess this same variability. They can act as obvious punctuation or can be discreet; only seen if close attention is paid to one’s surroundings. In today’s world, many of our daily routine activities are done without thought as though we are on autopilot. No thought is given to passing through a mundane doorway of a home. When this occurs, designers have missed an opportunity to contribute to the meaningful experience of a space.

A doorway, whether intentional or not, creates an

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<sup>21</sup> Ibid., 77.





**11 Threshold Directs Focus**

axis that extends onto the spaces it connects, linking the spaces that are on either side of its threshold. This notion of axis is related to the body in space and the directionality of the body's movements.

There are six main directions that radiate from the body. The most prominent axial direction is for and aft, with prominence being in the direction of sight. When an object or space is positioned on this axis it draws attention and importance to the object or space. When a person travels through the doorway or hovers in the doorway they therefore place themselves on this axis, creating a unique relationship to the objects and spaces that align with it.<sup>22</sup> This added focus normally draws the user in the direction

<sup>22</sup> Ibid., 39.

of the axis, toward the 'special' object, marked in Image 11 with an X. Doorways create this focus by acting like blinders on a horse, directing the focus along the doorway's axis and removing distractions on the periphery.

Our minds create so little focus on actions like these that our thoughts are already directed toward our next tasks. This practicum project attempts to create an occupant's awareness when moving from one space to another, by incorporating threshold spaces that have enough sensory stimulation derived from surrounding spaces to keep occupants aware of their passage while at the same time blurring separations and creating gradual transitions that maintain the fluidity of space. By making the

threshold a passageway in the proposed floating houses, this unconscious movement will be diminished as occupants become more conscious of their movement. The enlargement of transitions and thresholds will help to raise the consciousness of one's mind so that it stays in the current moment and is able to appreciate its surroundings.



12 *Translation Framework: Threshold*

<i>Theory/Concept</i>	<i>Design Filter</i>	<i>Design Criterion</i>
<b>Threshold</b>	<b>Design Elements</b> space line form texture light time colour shape pattern	use line to create implied axis  expand spaces into each other - passage over time
	<b>Design Principles</b> proportion balance order rhythm harmony scale unity emphasis	embrace opportunities to connect with the outside and break external boundaries  make the most of opportunities to connect smaller spaces through internal thresholds ornament should be placed in thresholds to create the 'midground' of the picture
	<b>Programme &amp; Circulation</b> spatial adjacencies functions storage requirements spatial organization	spaces & objects of importance or focus should utilize axial linkages
	<b>Spatial Character</b> the image projected spatial feeling concept views	create views along axis to create emphasis
	<b>Environmental &amp; Sensorial</b> light sound smell materiality	

## 2.3 *Adaptation of Small Space*

Consumption levels in contemporary culture are at an indisputably high level, with most people often craving more things.<sup>23</sup> Small space design and multi-use function for spaces will be investigated and applied to each of the floating houses. In the book *Creating the Not so Big House*, Susanka provides a counter view of dwelling by suggesting that the “bigger-is-better” notion of home is failing and that more importantly, people should “want a home that really nurtures their spirit rather than simply impresses the neighbors with scale.”<sup>24</sup> This can begin to be accomplished by designing spaces with more than

one function when designing spaces that are smaller in scale. Susanka lays out six key design concepts for designing a small space. These key concepts will be utilized in the design of the floating houses and are summarized as follows:<sup>25</sup>

1. *Shelter Around Activity* - Space wraps around its occupant to create a feeling of protection
2. *Multifunctional Space* - Areas support more than one function, either concurrently or consecutively
3. *Variation in Ceiling Heights* - Ceiling heights are derived from the dimensions of the room; are based on proportion; the goal is to create comfort for occupants

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<sup>23</sup> Chris Clugston, “Excessive Consumption – America’s Real Addiction,” Culture Change, 20 October, 2007. [http://www.culturechange.org/cms/index.php?option=com\\_content&task=view&id=128&Itemid=65](http://www.culturechange.org/cms/index.php?option=com_content&task=view&id=128&Itemid=65). (accessed 3 March, 2009).

<sup>24</sup> Sarah Susanka, *Creating the Not so Big House*. (Newtown, CT: Taunton Press, 2000), 3.

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<sup>25</sup> *Ibid.*, 10.

4. *Interior Views* - views are provided within the house; a view can be seen from every space
5. *Diagonal Views* - Create the longest views possible, even if breaking out of orthogonal patterns
6. *A Place of One's Own* - Individual space are provided to encourage a sense of ownership and dwelling

The need and desire for more possessions will be reduced in the proposed floating houses through the deliberate manipulation or staging of the interior environment. Built-in storage solutions will be used as a tool to encourage the reduction of the acquisition of goods and to reduce the requirement for freestanding furnishings. They will encourage

occupants to “re-decide what is important to them.”<sup>26</sup> This proposed reduction of personal possessions will, in turn, allow for a smaller personal footprint and a more adaptable home.

Not all factors surrounding houses are the same as they were in the past. Human shelter has evolved over time to provide us with much more than the basic necessities for life. Houses, referring to the structures in which we live, become more than mere structures through the act of living in them that transforms them into our homes.

In the book entitled *Private Dwelling: Contemplating the use of Housing*, Peter King explores the meaning

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<sup>26</sup> Ibid.

of dwelling and what it means to dwell. Our homes, he says, do more than merely provide us with shelter by acting as a private haven for us. This haven allows us a place for intimacy that is both safe and private.<sup>27</sup>

Our homes are a reflection of our identity; they are the origin of our character. Each person on the planet is unique and as such no two homes are exactly alike. Their exterior structures may occasionally be the same but the objects on the interior express our individuality.<sup>28</sup>

This individuality becomes increasingly important as

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<sup>27</sup> Peter King, *Private Dwelling: Contemplating the use of Housing* (London: Routledge, 2004), Introduction.

<sup>28</sup> Ibid.

spaces become smaller. As noted previously, one of Susanka's key design concepts for small space design is the creation of a place of one's own. Theories of place and place-making can be used, with specific focus on the use of the concept of *milieu*, to create this individual place within the floating houses. First the floating house must be viewed in its entirety, looking at what makes a house a home.

### *Place: milieu*

Doreen Massey, a key thinker in place theory, acknowledges globalization in the formation of place through not prescribing set boundaries around place. As the ability to adapt is prominent in the design of the proposed floating houses, Massey's position on place fits well because it does not restrain place

with boundaries. Massey states in *Space, Place and Gender* that “a large component of the identity of that place called home derived precisely from the fact that it had always in one way or another been open; constructed out of movement, communication, social relations which always stretched beyond it.”<sup>29</sup> It seems, based on various readings including those by Massey, Shumaker, and Wise, that this notion of home as static is a relatively new thought. People have been nomadic historically, seeking the new country, and moving for personal betterment. The adaptability of the proposed floating houses lays the opportunity for the expansion of social networks and broader community links that strengthen the sense

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<sup>29</sup> Doreen Massey. *Space, Place and Gender*. (Minneapolis : University of Minnesota Press, 1994), 170-171.

of community that as a result, that as a result, will strengthen the sense of place in the houses.<sup>30</sup>

This discussion of place theory leads to the notion of home. A house - the physical structure - only becomes a home, a place, when it is experienced by an occupant over time.<sup>31</sup> J. Wise links various place theories in the article “Home, Territory, and Identity.” It is through this journey from place theory to place theory that he concludes that “home is the thread, a line and not a point.”<sup>32</sup> This unfixed notion of home implies that it is continually changing and adapting to

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<sup>30</sup> Sally Shumaker and Gerald Conti, “Understanding Mobility in America,” in *Home Environment*, ed. C. Werner & I. Altman, 237-253. (NY: Plenum Press, 1985), 238.

<sup>31</sup> Yi-Fu Tuan, *Space and Place: The Perspective of Experience* (Minneapolis: University of Minnesota Press, 1997).

<sup>32</sup> J Wise, “Home Territory and Identity,” *Cultural Studies* 14, no. 2 (2000): 305.



become an expression of its users, and quite possibly the users become an expression of it.

Similarly, sociologist, Mary Douglas discusses the ability for home to be adaptable, recognizing that the home and its contents do not have to be fixed but they have to have some regularity in their use in her article "The Idea of a Home: A Kind of Space." Douglas agrees with the concept of home being mobile, stating that "home is located in space, but it is not necessarily a fixed space. It does not need bricks and mortar, it can be a wagon, a caravan, a boat, or a tent."<sup>33</sup>

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<sup>33</sup> Mary Douglas, "The Idea of Home," in *Housing and Dwelling: Perspectives on Modern Domestic Architecture*, ed. Barbara Miller Lane. (Great Britain: Routledge, 2007): 62.

Geographer Yi-Fu Tuan's ideologies about space and place are expressed in his seminal book *Space and Place: The Perspective of Experience*. They will be utilized to analyze how people create attachments to their home.<sup>34</sup> This phenomenological approach from human geography will also be supplemented by Deleuze and Guattari's concept of *milieu*, as introduced in *A Thousand Plateaus*.<sup>35</sup> The concept of the *milieu* implies that one's home and identity are not rooted in their physical geographical location but rather in the objects and stories that surround them.<sup>36</sup> The creation of *milieu* through markers is not

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<sup>34</sup> Tuan.

<sup>35</sup> Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans Brian Massumi (Minneapolis: University of Minnesota Press, 1987).

<sup>36</sup> Wise, 295-296.

a static notion as each *milieu* overlaps and collides with others. It is “these connections with other *milieu* beyond the immediate place that give the markers their resonance.”<sup>37</sup> In other words, creating a sense of home is partially due to the linking of the *milieu* that surround it. This relationship to spaces beyond is what will aid in the connection of the interior of the proposed floating houses to the greater community.

A *milieu*, or combination of *milieu*, can also create a smaller and individual place within a larger one. Markers holding personal meaning to an individual when located in an area or space create a place that is unique to that individual, creating a place of one’s own.

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<sup>37</sup> Ibid., 298.

## Translation Framework: Adaptation of Small Space

<i>Theory/Concept</i>	<i>Design Filter</i>	<i>Design Criterion</i>
<b>Adaptation of Small Space</b>	<b>Design Elements</b> space line form texture light time colour shape pattern	shelter spaces of activity spatial character should be continuous throughout house spaces should build on one another creating spatial layering variation in spatial theme should occur in each space through slight differentiation in materials, colour, proportion to create an individuality of space(s)
	<b>Design Principles</b> proportion balance order rhythm harmony scale unity emphasis	ceiling height should be proportionate to space's dimensions and function, creating comfort
	<b>Programme &amp; Circulation</b> spatial adjacencies functions storage requirements spatial organization	built-in storage should be utilized to maximize storage potential spaces should have the ability to host more than one function, either simultaneously or concurrently
	<b>Spatial Character</b> the image projected spatial feeling concept views	interior views - a good view from every space, create awareness of other functions occurring in the adjacent space(s) long views - diagonal through space(s)
	<b>Environmental &amp; Sensorial</b> light sound smell materiality	occupant individualization should be encouraged by creating spaces for personal objects



## 2.4 *Summary*

During the investigation into the theories regarding the study of biophilia, threshold, and adaptation of small space that I started to notice a link. Many of the design criteria extracted from biophilic design centered around the manipulation of threshold. A direct experience with nature can only occur from within an interior environment through views, which relies on penetrating through the threshold that is the window or door.

Adaptation of small scale space is similar in its relation to threshold and the view. Two of the four key concepts, provided by Susanka, when designing a small scale space include views. These views can be within the interior of the house or created along the longest axis of the building. Susanka suggests

a diagonal view be emphasized, however in the application of the floating houses this is not possible as floating house views of interest are normally perpendicular to the dock and shoreline. Therefore the longest perpendicular axis of the proposed floating homes will be substituted.

A contradiction in theories is found between adaptation of small scale space and the addition of ornament or visual interest. Many biophilic design features can be viewed as extra or not required. This requires a bit of give and take, providing some ornament, such as baseboards or mouldings around furnishings, as these take up minimal space but influence the symbolic biophilic experience of environment.



## 3.0 Precedent Review

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An investigation into unique homes provided various potential resultant precedents. It was only when layered with the additional concepts of biophilia, threshold, and adaptation of small scale space more relevant precedents for informing the design of this project were identified. The first three of the following precedents were additionally chosen for their ability to float on water and their relation to the typology of the floating house.

- 3.1 Floating Home: *Lake Union Seattle, WA*
- 3.2 Lake Bridge House: *Ontario, Canada*
- 3.3 Amphibious Housing: *Maasbommel, Netherlands*
- 3.4 Mobile Home: *Airstream trailer*
- 3.5 Adaptable Home: *Suffolk, England*



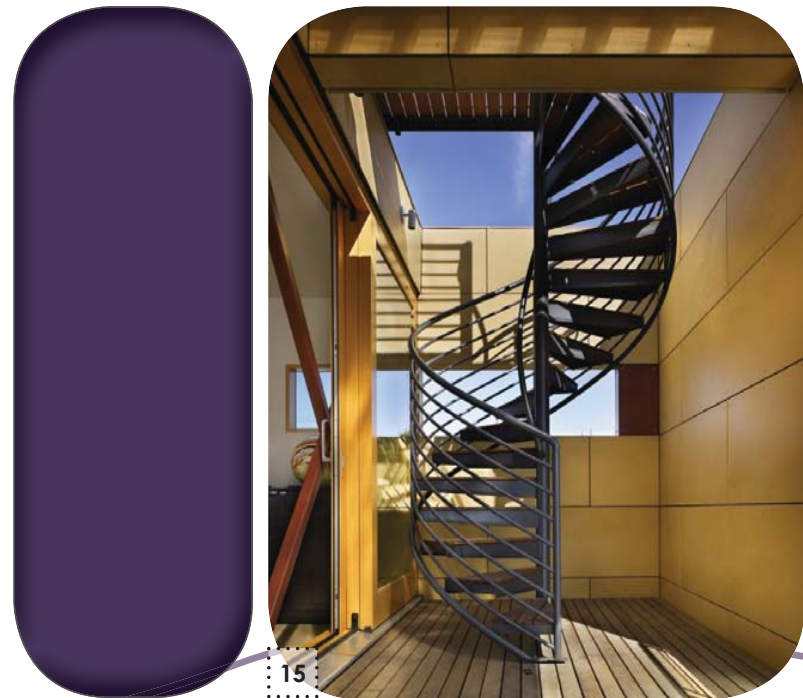
### 3.1 *Lake Union* Seattle, WA

Designer: Vandeventer + Carlander Architects

Square Footage: 2,200 sq. ft.<sup>1</sup>

This floating house is situated on Lake Union, in the heart of urban Seattle, in an area that is similar to the proposed site of Granville Island. This precedent was chosen for its ability to link exterior space with interior space through the use of circulation, sight lines, materials and reflectivity. Although larger in scale than the proposed floating house designs this precedent utilizes many of the key concepts for designing a small space as presented by Susanka. The house has the ability to connect to exterior living spaces through an open air spiral staircase, connecting all levels and allowing natural light to penetrate into the interior, essential to biophilic design.

<sup>1</sup> Rebecca Teagarden. "The Beauty of Basic / Fresh Afloat," *The Seattle Times*, 18 May 2008.

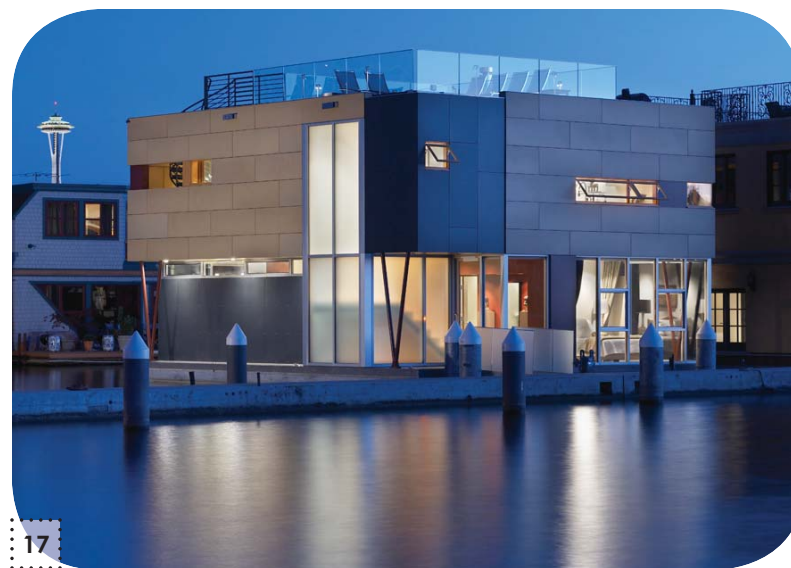




On the interior of the house, some living spaces have the possibility of opening up to the exterior through the use of moveable partitions and windows, allowing for various sheltered activities to occur in the same space. When full height windows are not utilized, horizontal windows placed at seated eye level allow for a constant visual connection to the exterior. Materials applied with horizontal emphasis, create a symbolic biophilic quality as they mimic the focus on the horizon. This use of materials also helps to draw a visual connection to the houses natural exterior



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surroundings, directing the occupants attention through the interior spaces to the exterior, utilizing two of Susankas key concepts, *interior views*, and *diagonal views*. The use of reflectivity in this space makes a further connection between the interior and exterior environment. The image of the house is mirrored in the water transferring and/or expanding its qualities of light and colour across the threshold between the built and natural environment.

## 3.2 *Lake Bridge House* Lake Huron, Ontario

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Designer: MOS Architects

Square Footage: 2002 sq. ft.<sup>2</sup>

The main focus for the design of this floating house is its ability to adapt to weather and changing water levels through the use of a steel platform with built-in pontoons. The interior is contemporary and focuses on its exquisite natural setting. The built structure is

<sup>2</sup> Nico Saieh, "Floating House / MOS Architects" *ArchDaily*, 29 Dec 2008 <http://www.archdaily.com/10842/floating-house-mos/>, (accessed January 30, 2009).

used as a connection between the mainland and a rock island that can be viewed as an extension of the home's outdoor living area. Site has played a great role in this home's design. However, there are many design elements that are independent of the site that can be translated to other projects, such as its dual connective quality. This home's interior is mainly located on the second level leaving the main floor water level open to the elements sheltered only from

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the necessary elements. This elevated interior living space acts as a roof for the outdoor space, and due to its elevation, is protected from the wave action below.<sup>3</sup> The use of biophilic design can be observed in this precedent in a naturalistic dimension through direct and symbolic experiences. The exterior views provide the occupant with direct experience while the window casings natural wood material and hue represent natural elements found within the framed view.

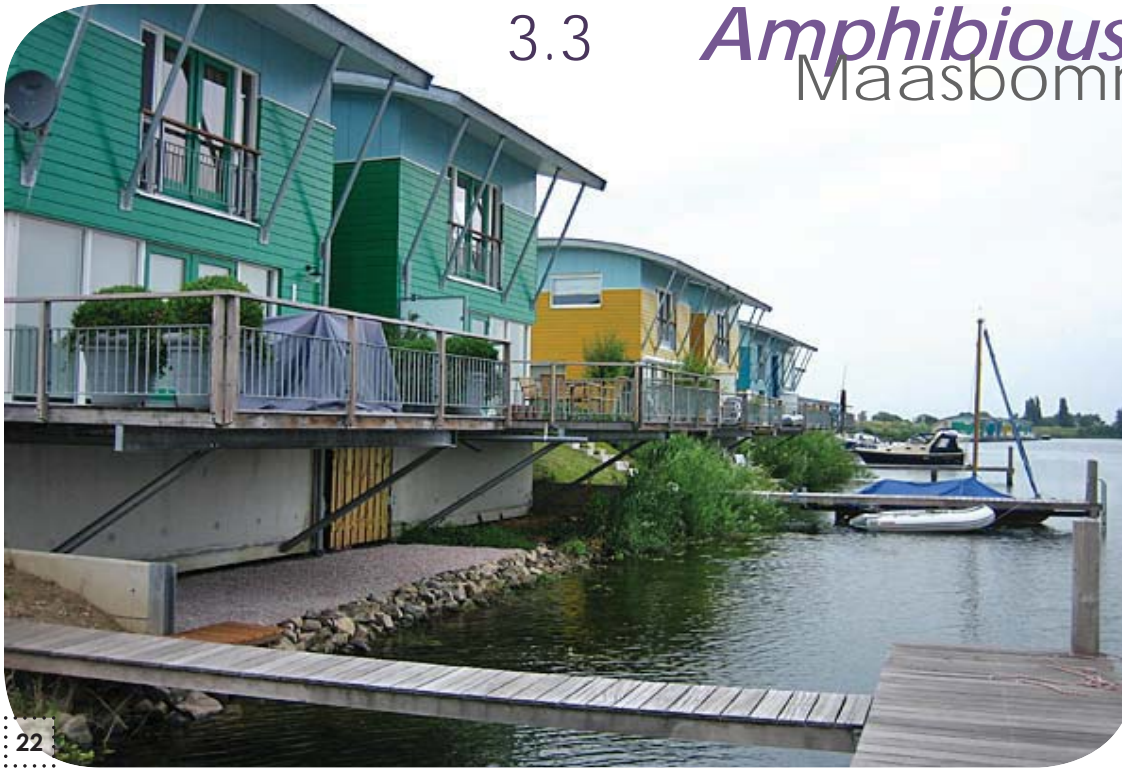
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<sup>3</sup> "Floating House," MOS Architects, [http://www.mos-office.net/project/2004-7\\_Floating%20House](http://www.mos-office.net/project/2004-7_Floating%20House), (accessed January 30, 2009).

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3.3

## *Amphibious Housing* Maasbommel, Netherlands

Designer: Dura Vermeer

Square Footage: 1,300 sq. ft.

These “amphibious” homes of the Netherlands were designed as a reaction to global warming and rising ocean levels. The dams, dikes, and pumps that are used to keep water out of the Netherlands are beginning to fail. Embracing the now inevitable flooding, this

“amphibious” group of homes adapts to changing water levels.<sup>4</sup> Built on flexible foundations each

<sup>4</sup> Dutch Prepare for Global Warming: Factor Architecten Designs Amphibious Homes.” *World Architecture News*, 12 April 2007. [http://www.worldarchitecturenews.com/index.php?fuseaction=wanappln.projectview&upload\\_id=995](http://www.worldarchitecturenews.com/index.php?fuseaction=wanappln.projectview&upload_id=995). (accessed 9 February, 2009).



home has the ability to adapt to changing water levels by sliding up and down anchored poles. Electrical and sewer lines are flexible and move with the changes in elevation, allowing the homes to function on both land and water.<sup>5</sup> This precedent introduces the notion of adaptability which will be

utilized in the design of the proposed floating houses allowing for them to adapt to the changing tidal levels. If relocation of the proposed floating houses is necessary they will have the ability to be transferred or rest on land as their flotation structure will be designed for either scenario.

<sup>5</sup> Rico Gagliano. "Plan B: Adapting to a Warmer World, Dutch Homes will Float with the Climate." *Marketplace*, 29 January 2008. [http://marketplace.publicradio.org/display/web/2008/01/29/planb\\_am2\\_floatinghouses/](http://marketplace.publicradio.org/display/web/2008/01/29/planb_am2_floatinghouses/). (accessed 8 February, 2009).



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### 3.4 *Airstream Trailer* Mobile Location

Designer: Airstream

Square Footage: 20 meters, mean size

The airstream trailer will be looked at primarily for its ability to relocate easily with a secondary focus on its multifunctional compact design. This particular airstream trailer contains all the pertinent tanks and storage devices that make it possible to be used for several days without plugging into services such as electrical, water, and sewage hookups. This gives the

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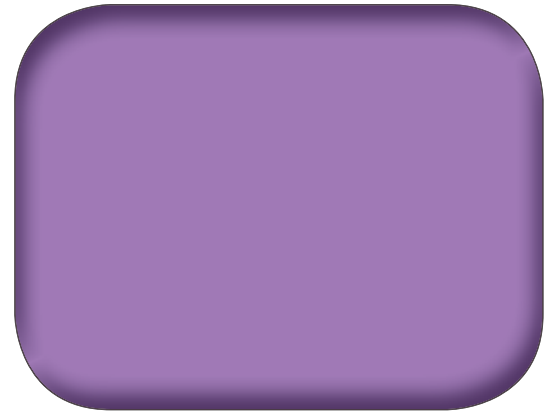
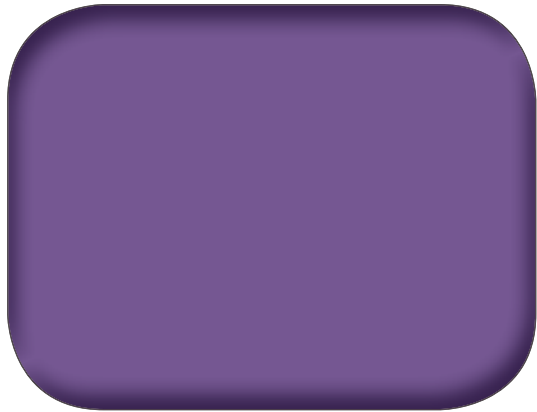
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structure the freedom to be moved almost anywhere its towing vehicle can go, allowing it to be self-sufficient for a period of time. The docking procedure is simple and efficient, making the availability of appropriate hookups the only major concern when relocating.

The proposed design will utilize a similar ease of docking mechanism that increases its potential for mobility. Efficiency in this example goes beyond hookups and can be seen in the design of the interior, where many items have more than one purpose or function. In addition, each item required by the occupant in the airstream has a place to be kept when not in use. This storage space is devised to maximizing the amount that can be stored in the prescribed storage area. By utilizing similar storage techniques and multifunctional components the proposed project has the potential to have a smaller footprint and therefore be more mobile.<sup>6</sup>

<sup>6</sup> "Ocean Breeze." *Airstream*. <http://www.airstream.com/products/2008-fleet/travel-trailers/international-line/ocean-breeze/>. (accessed January 15, 2009).

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## 3.5 *Adaptable House* Suffolk, England

Designer: London Architects dRMM, Alex de Rijke,  
Joana Pestana, Lages Goncalves

Square Footage: varies L28m, W5.8m, H7.2m

This home in Suffolk was chosen for its unconventional movable roof and walls that alter conventional boundaries of interior and exterior space. The roof slides over three stationary structures, creating open air living rooms when the weather is nice and covered spaces when it is not. In addition the roof slides out of the front of the house past the glass portion and allows for interior threshold to be extended past the front, creating an "interior" outside. The manipulation

of this one element, whose complete transformation from one end to the other only takes 6 minutes, allows for a dramatic integration of interior with exterior.<sup>7</sup> This large-scale manipulation will be considered as an inspiration for breaching the boundary between the interior and exterior as well as for having the ability to transform the views and light integration in the floating houses when, or if they move to a different location.

<sup>7</sup> Rose Etherington, "Sliding House by dRMM," *dezeen Design Magazine*, 19 January, 2009. <http://www.dezeen.com/2009/01/19/sliding-house-by-drmm-2/>. (accessed April 5, 2009).

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## 3.6 *Summary*

The above precedents have introduced several ideas and design concepts that will be utilized in the design investigation of the proposed floating houses. Boundaries, especially between nature and city, interior and exterior, will be dissolved through the application and manipulation of sight-lines, multi-functionality of space, reflectivity, vertical circulation, and movable gestures. Ease of mobility will be enhanced through the use of universal hookups, efficient storage solutions, capability for water and land use, and elements that can adapt to changing environmental conditions through repositioning. As environmental consciousness will be at the forefront of the design discussion, it will incorporate easily available design elements to create a home with limited negative impact on the Earth.

## Translation Framework: Precedents

<i>Precedent</i>	<i>Design Criterion</i>
<b>Lake Union</b> Seattle Washington	vertical circulation should allow natural light to enter interior moveable partitions horizontal emphasis - sightlines from seated position reflectivity of materials
<b>Lake Bridge House</b> Lake Huron, Ontario	adapts to weather and water levels bridging - dual connective spaces; interior-interior, interior-exterior shelter from select natural elements, allowing some in spatial organization - living area on second floor, elevated from onlooking viewers window casings should be symbolic representation of natural elements, ex. material & hue
<b>Amphibious House</b> Maasbommel, Netherlands	adaptability - flexible foundation and anchored poles. flexible electrical and sewer lines
<b>Airstream</b>	ease of relocation multifunctional compact short-term self-sustaining storage - everything has a location
<b>Adaptable House</b> Suffolk, England	moveable architectural elements - changes space when interior opens to exterior open air living areas transform views and light







## 4.0 Site Analysis

---

Many interior environments are designed devoid of any influence from their exterior environment. The exterior environment is such an integral part of the design concept and theoretical integration of the proposed floating houses that it must be both understood and analyzed. The following section will examine the social, cultural, historic, and natural characteristics of the Sea Village, Granville Island and Vancouver. The information gathered in this section will inform the design of the proposed floating homes.

## 4.1 *Site Selection*

Granville Island, located in Vancouver, British Columbia, is the site for which the proposed floating houses are designed. Mobility is a large characteristic of floating houses. They therefore must have the ability to shift site when needed. Granville Island acts as one possible location where this phenomena of the floating house is found. The community of floating houses located on Granville Island is called the "Sea Village."

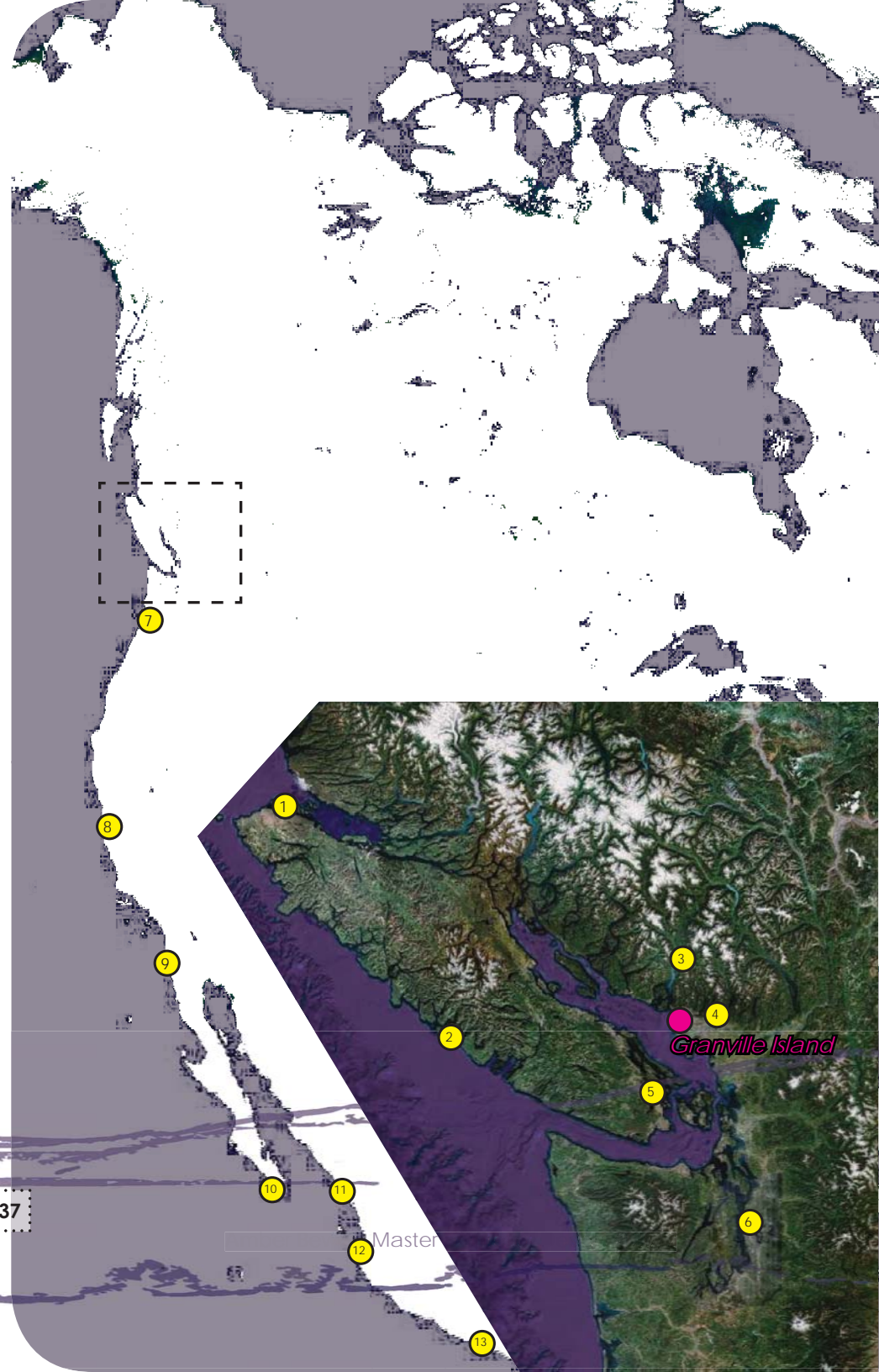
The larger site of Granville Island was chosen based on a grouping of selection criteria:

Firstly, the West Coast of North America was chosen as the larger context as it allows for *ample movement along the coast* with the possibility of extending

southward to South America. Secondly, the location needed to be on the coast or *connected through waterways* to the larger site, the Pacific Ocean. Thirdly the sample anchoring location needed to currently be or have the potential to be a shipping center, with infrastructure at the water's edge. Finally, although no minimum size or population requirement of the site was defined, anchoring sites must have *an emerging or evolved marina culture*, that does not necessarily include floating residences. I considered other sites as potential locations, but the final decision was weighted by the fact that Vancouver is a Canadian location that I understand. After many days and weeks of participating in the grandeur that Granville Island has to offer, it became the logical site choice for my design interpretation of the theoretical

concepts discussed in this practicum project.

Other potential future anchoring sites include, but are not limited to, (1)Port Hardy, BC, (2)Tofino BC, (3) Squamish BC, , Gibbons Way BC, (4)Maple Ridge BC, (5)Sidney BC, (6)Seattle, WA, (7)Portland OR, (8) San Francisco CA, (9)San Diego CA, (10)Cabo San Lucas MX, (11)Mazatlan MX, (12)Puerto Vallarta MX, (13)Acapulco MX, and Panama.







*Sea Village*





## 4.2 *Granville Island* development timeline

### *Past*

Granville Island did not become the third most visited location in Canada by chance or overnight.<sup>8</sup> It was through many ebbs and flows of growth and success that Granville Island became a popular tourist destination. In order to understand the current success of Granville Island its past must be explored.

***Beginnings of Granville Island*** - Like many other Canadian cities, the arrival of the Canadian Pacific Railway (CPR) sparked the beginning of change for the small mill town of Granville, whose name changed to Vancouver in 1886. During this time the site that is now Granville Island was utilized by local First Nations' members for fishing. This sandbar location brought

about much debate when the new settlers arrived. They wanted to transform it into dry land that could be developed or water that they could utilize. It was due to economical restrictions that this impasse began to break and in 1909 a second steel Granville Street Bridge was built to gradually replace the original wooden one.<sup>9</sup>

The less costly decision made by the Vancouver Harbour Commission in 1915 brought about the birth of what is now called Granville Island. By dredging a portion of Falls Creek, a \$342,000 reclamation project was able to provide enough fill to create a 35-acre piece of land under the Granville Street Bridge.

<sup>8</sup> Kerry Banks, "Canada's Top Tourist Draws," *My Westworld*, 25 Feb, 2009, <http://www.mywestworld.com/places/canada/canadas-top-tourist-draws/> (accessed, May 5, 2011).

<sup>9</sup> "Island Heritage," *Granville Island*, <http://www.granvilleisland.com/discover-island/island-heritage>. (accessed May 5, 2011).

Tenants of this **reclaimed land** were based around the forestry, mining, construction and shipping industries.<sup>10</sup>

Building structures reflected the industrial trend of the island. **Wood-framed, corrugated tin clad structures** could be seen everywhere. Several of these original building structures and building materials are still present on the island today.

Transportation to Granville island was unique for its 1200 workers. Each arrived by streetcar to a stop in the middle of the Granville Street Bridge. Many flights of stairs were built from the bridge to the island below

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<sup>10</sup> "Island Heritage," *Granville Island*, <http://www.granvilleisland.com/discover-island/island-heritage>. (accessed May 5, 2011).

to transport the workers to work.

The Great Depression brought about drastic change for the people and the industries that relied on the success of Granville Island. It was during this time that the first make-shift form of **house boat** appeared on the island on top of floats and piles. The City of Vancouver finally had to evict the squatters due to rampant disease and crime.

WWII created an influx of industrial development, providing opportunities for factory development on Granville Island once again. The island was at the top of its game, producing products from its sawmills and factories. However it also produced an unwanted product in the form of pollution.

With the close of the war, Granville Island took a brief turn for the worst before it began transforming along the track that made it what it is today. Dirty and oily factories covered the island, producing an unappealing atmosphere until many of them burnt down. This scuzzy island needed a face-lift. Many groups had very different ideas of what should become of Granville Island and the adjacent Falls Creek area. If it were not for the \$50-million price tag, Falls Creek would have been completely filled, making Granville Island land locked and full of industry. Instead only six acres were reclaimed and the officials changed the direction of the island. Their new goal was to create a people-friendly destination place that included parkland, housing, and public exhibition space.



## Present

Today, Granville Islands mission is:

*"To provide a self-sustaining environment that fosters diverse cultural, educational and commercial enterprises while maintaining the Island's historic industrial character."*<sup>11</sup>

<sup>11</sup> "Granville Island Leasing Guidelines," Granville Island, 2007, [http://www.granvilleisland.com/sites/all/files/07\\_leasing\\_guidelines\\_web.pdf](http://www.granvilleisland.com/sites/all/files/07_leasing_guidelines_web.pdf), (accessed November 22, 2011).





Original railway track, cobblestone streets, building structures, materials, and some old industrial factories including the concrete factory (over 90 years old), Ocean Construction Ltd. and a drill bit manufacturer, Micon Industries, all still reside on Granville island today.



During both day and night, Granville Island is a hub of activity. Its minimal 37 acres are destination to 12 million visitors a year, making it the third most popular tourist destination in Canada.<sup>12</sup> Its origin of industry and the need for large trucks to be able to maneuver around and through the island left it ideal for pedestrian traffic once the factories were replaced with new businesses. There are no boulevards or

<sup>12</sup> <http://www.mywestworld.com/places/canada/canadas-top-tourist-draws/>



sidewalks dividing the vehicular and pedestrian traffic. Distinct markings on the cobblestones mark where vehicles are allowed and their parking restrictions and directions. Pedestrian traffic trickles and flows over the entire island as it pleases, however, designated pedestrian cross-walks are present along some streets, mainly at the entrance to the island. Once on the island, however, pedestrians command the right of way.

### *Sea Village*

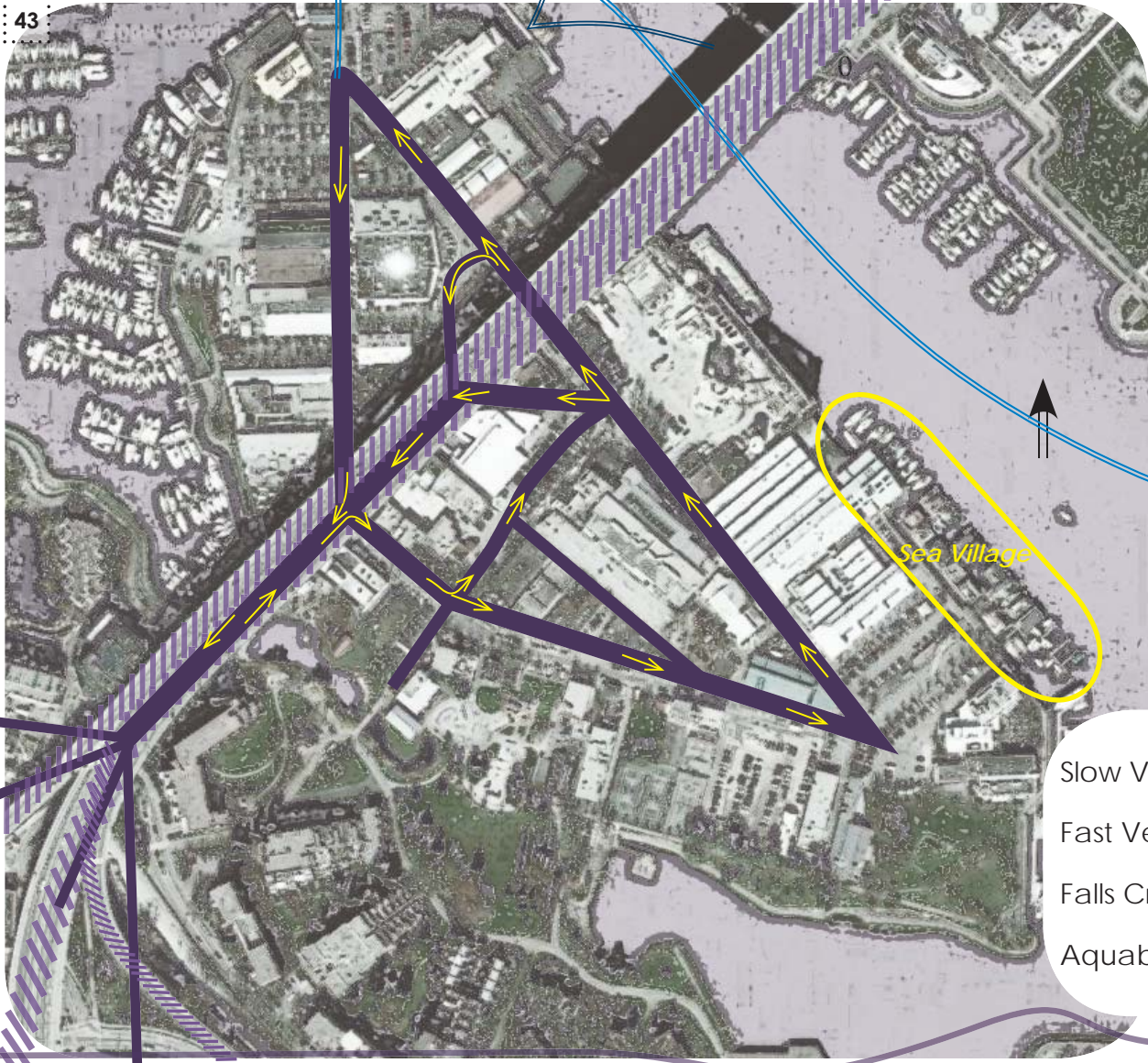
Today Sea Village consists of a compilation of thirteen floating homes that are connected by floating wooden walkways and the use of a communal laundry facility. It is secured by a gate at its entrance to deter people from entering the 'yard' space.







4.3

# Circulation & Paths

43



- Slow Vehicle Paths 
- Fast Vehicle Paths 
- Falls Creek Ferry 
- Aquabus 





44



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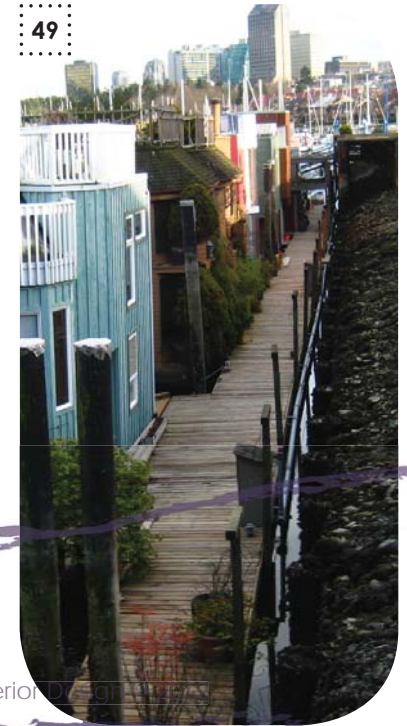
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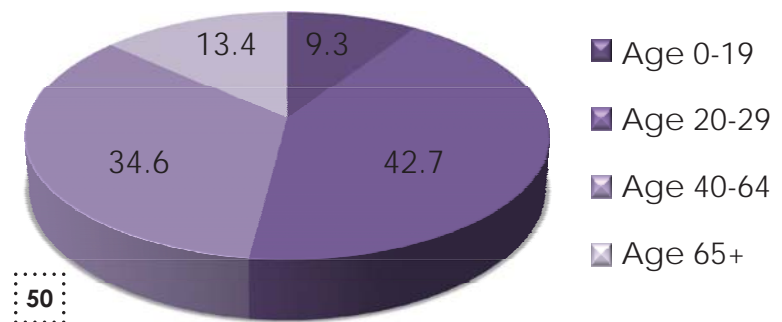
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## 4.4 *Land Use & Density Statistics* fairview neighbourhood

Granville Island is located in the Fairview Neighbourhood of the City of Vancouver. After becoming familiar with Granville Island and its numerous amenities and functions, it is my belief that for statistical purposes, Granville Island should be treated as a subcategory within Fairview. However, for the purposes of this practicum project, the statistical information used will be from the entire Fairview community and therefore will be utilized more for its ability to illustrate general area trends than for its specific numerical values.

Population density is greater in the neighbourhood of Fairview than it is on average in the remainder of Vancouver. Each resident of Fairview occupies 1223 sqft of space per person. Real estate has become



premium with the average gross rent rate 10% higher than the remainder of Vancouver.<sup>13</sup>

The statistical information shown on page 69 will be utilized in devising descriptions of possible client and occupant descriptions.

<sup>13</sup> "Community web pages: Fairview," <http://vancouver.ca/commsvcs/planning/census/2006/localareas/fairview.pdf> (accessed September 22, 2011). Original copyright material provided by Statistics Canada, Census.



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*1223 sqft/person*

*29,295 Total Population*

52 Fairview Neighbourhood Statistical Data

*Workforce 19,295*

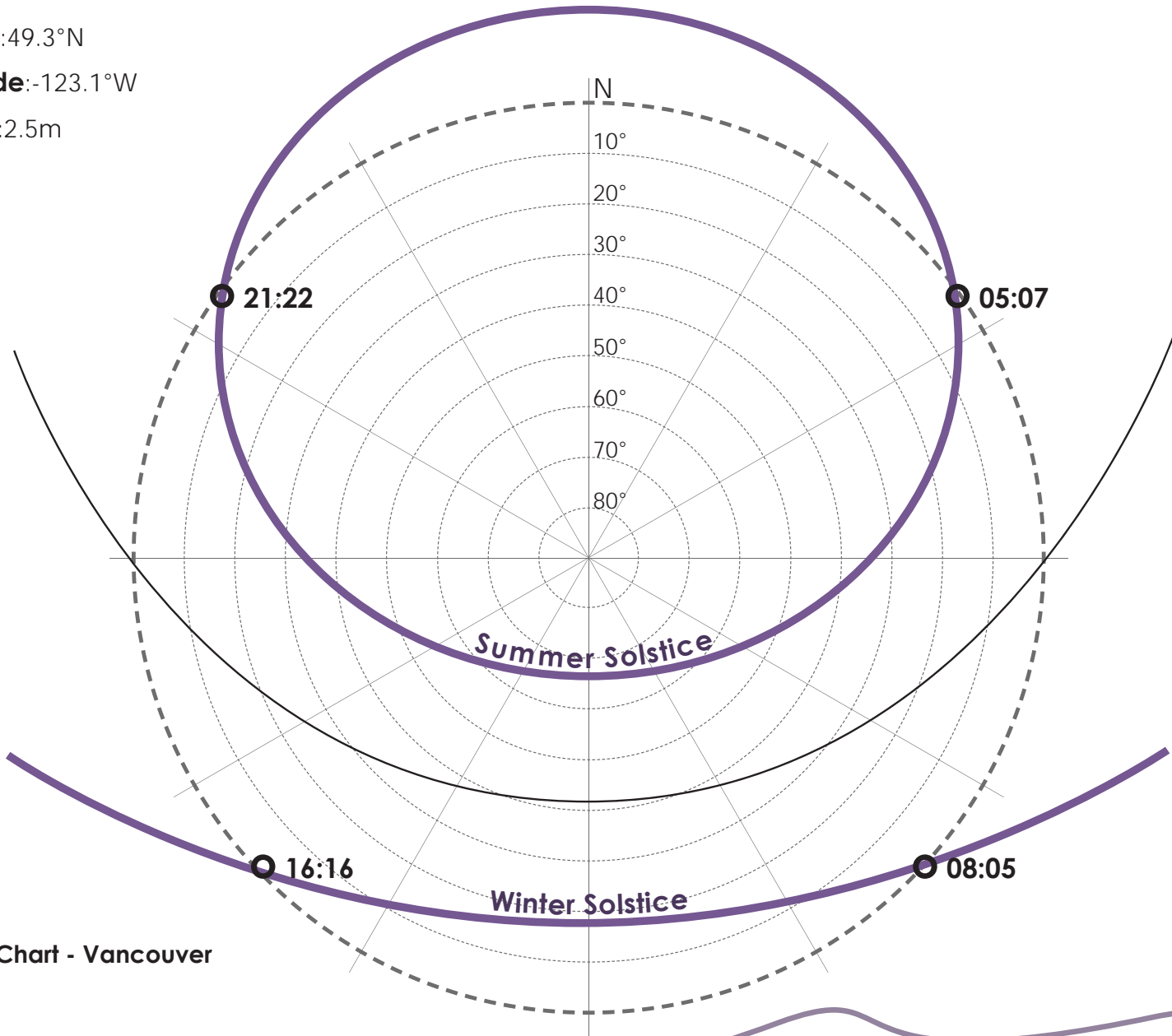
*\$52,458 Median Household Income*

*Private Dwellings 17,395*

*Increased Trend in Working from Home*

7.6%	8.5%	10.1%	<b>12.9%</b>
1996	2001	2006	<b>2011</b> (projected)

**Latitude:** 49.3°N  
**Longitude:** -123.1°W  
**Altitude:** 2.5m

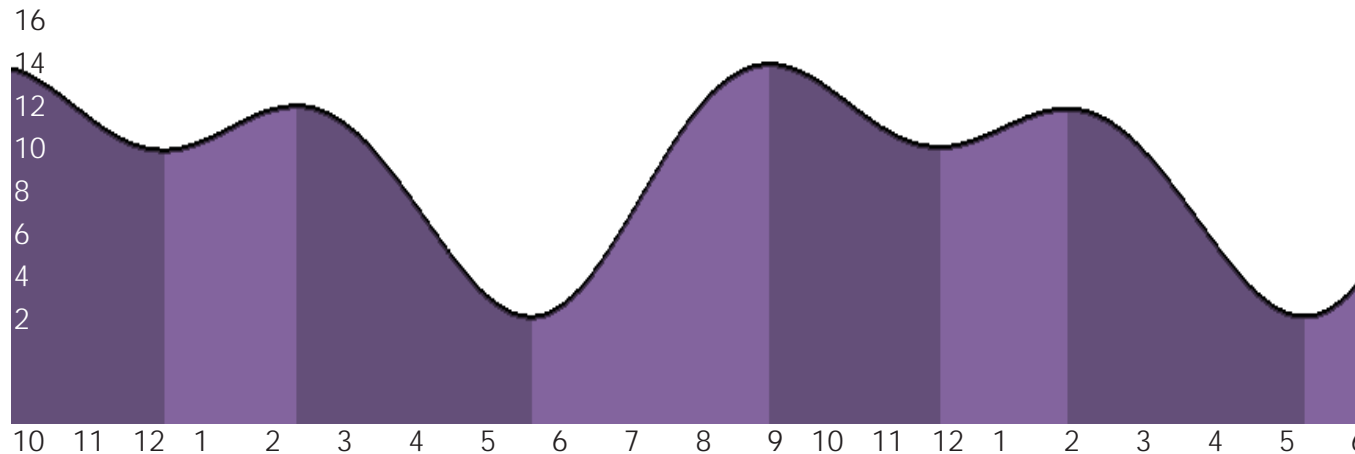


53 Sun Chart - Vancouver

# 4.5 *Climate, Wind, Sun, Water* granville island & vancouver

Variable	J	F	M	A	M	J	J	A	S	O	N	D
Temperature, °C	4.8	5.9	7.6	10	13.2	15.9	18.1	18.3	15.4	11.1	7.1	4.8
Wind speed, m/s	7	9	8	9	8	8	8	7	7	7	8	8
Humidity at 6am (%)	83	79	75	79	83	83	84	86	90	87	80	83
3pm (%)	80	75	68	65	63	63	63	63	69	75	76	78
Precipitation, mm	179	184	156	118	87	70	53	51	73	148	239	231
Sun, h/day	2	3	4.3	6.1	7.4	7.6	9.5	8.6	6.6	4.0	2.1	1.8
Days with Precipitation	17	15	17	14	13	11	7	7	9	14	20	18

54: Granville Island Climate Data



55: Tidal Variance (ft/hour)



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57 View toward Sea Village from Granville Islands adjacent path



58 View toward Sea Village from Downtown Vancouver across False Creek



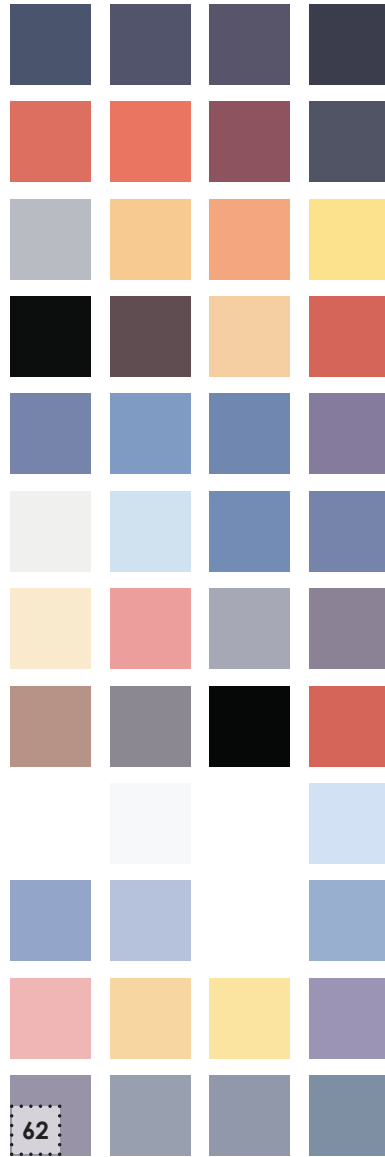


## 4.6 *Views & Access*

Views and access ramps to the Sea Village are constantly changing dependent upon the changing water levels. Ramps and access docks vary from providing a gradual descent toward the houses or one that is a fairly steep. The docks in between the

floating houses remain fairly level during these tidal cycles. At low tide, the height of a passerby on the adjacent walkway of Granville Island is approximately in line with the top of the float homes and at high tide a passerby would be level with a second floor occupant.





## 4.7

# Colour Study materials

The sun rises in the east and sets in the west; a fact that is universally true from every point on earth. On the West Coast, during the hours of sunset, the sun can be observed interacting with the moisture particles in the air and amongst the clouds, creating an array of a multitude of colors.

In contrast, when the sun's rays are barricaded out by the collection of moisture particles in the form of clouds, it provides an environment that is perfect for growing a layer of moss, as seen in the photos to the right. This green substance is found in abundance over the lower portions of the vegetation throughout Granville Island and



the extending costal region. Algae, a green slimy substance, is found at the meeting of land and water around Granville Island, and it is especially exposed when the water retreats during low tide.



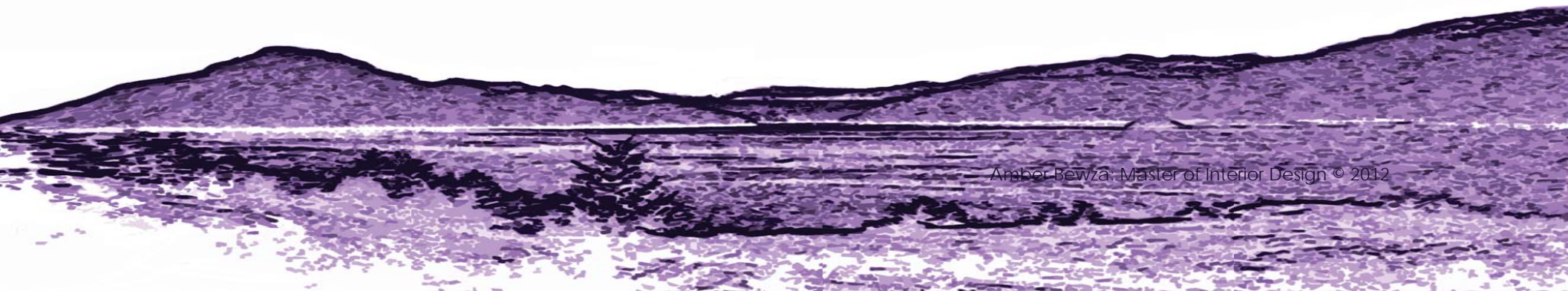


# 5.0 Programme

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The program requirements for this project have been formulated based on the specific needs of the hypothetical client and users and will be discussed as follows:

- 5.1 Client & User Group: Occupancy Structures
- 5.2 Spatial Requirements & Characteristics: Area, Adjacency, & Zoning
- 5.3 Building Code Analysis: Floating Houses



## 5.1 *Client & User Group* occupancy structures

### *Client*

The proposed client will be a residential developer based in the Vancouver, British Columbia area, and or an individual home owner / residential landlord.

### *User*

The user group will vary slightly, depending on the occupants relationship structures. For the purpose of this practicum statistical information concerning Granville Island and the subsequent Sea Village has been used to help inform the description of the three different hypothetical occupancy structures. Specific statistical information about the Fairview neighbourhood can be found in section 4.4 "Land Use & Density." Care has been taken to select user traits that are varied by ages, family structures, physical limitations of occupants, values, habits, and daily

routines, to name a few. Design liberties have been taken when creating these hypothetical occupancy structures. The limitations provided by these varied occupancy structures allow for a variety of solutions to be demonstrated. This allows for the integration of the proposed theories to be tested and expressed in three different floating house designs.

Similarities between the occupancy structures include an average household income greater than \$200K per annum. Occupants are looking for an alternative to their current living condition and are attracted to mobility, connection to nature, sense of place and community offered by Sea Village. Some are highly mobile in job or lifestyle and all want to have a home that has the ability to be moved and adapted with

their lifestyle and growing needs. All users will have the need for communication and therefore the latest communication technologies will be viewed as imperative.

## Occupancy Structures



### *Family (2 adults, 2 children, cat)*

*Marina - female, 42.* Marina is a marine biologist by day and an active mother and volunteer environmental activist by night. She enjoys aquatic life and always has an aquarium at home. She requires a work space where she can do her volunteer work, and from which she can oversee the

children while they are doing their homework.

*George - male, 39.* George is married to Marina. It is very rare to find George without a book, or an electronic version of one, in his hands. This can be attributed to his being a professor of Art History at the Emily Carr University of Art and Design.

*Alfie - male, 12.* Alfie takes care of the family cat, Jake. Alfie is tall for his age, and enjoys running along the seawall, a pathway along the ocean, with his father.

*Susan - female, 10.* Susan wants to be a ballerina. She likes to put on fashion shows for her family and create art.



All four family members are on the go. Both parents work and the children attend the local school. Marina and George share the household duties including the cooking, cleaning, and the upbringing of their children. They like to entertain and can be found hosting various gatherings and dinner parties in their unique home.



### ***Shared Living (2 detached adults)***

*Dameon - male, 28.* Dameon owns the house and supplements his mortgage payment by collecting rent from a house mate. Having a tenant gives Dameon peace of mind while he is away on business, promoting a local umbrella brand, knowing that the

house is looked after. When home Dameon, enjoys spending time with friends at the restaurants on Granville Island.

*Sydney - female, 29.* Sydney moved to Vancouver a few months ago for a job in fashion design. She needs to remain in touch with trends and living in the Sea Village provides her with that opportunity. Sydney works from home, sketching and sewing several days a week. Her nephew, age 5, comes to stay with her one weekend a month.

Both enjoy kayaking on Falls Creek and sailboat racing. Although they get along well, both Dameon and Sydney have their own groups of friends and need to be able to have a semiprivate living area of

their own.

By living in a shared house, these adults are able to afford a style of living that they could not afford separately. An extra room is a necessity to provide an area for at home work. This room also has the possibility of being used as a third bedroom, if more rent is required or occupant structure changes in the future.



### *Golden Couple (2 adults)*

*Marge - female, 73.* Marge retired from her career at a large bank and is currently working on writing a cookbook. She perfects the recipes in her chef-

grade kitchen. She is also an avid yogi and practices daily.

*Rob - male, 67.* The latest in gadgets and electronics are always purchased by Rob as he indulges as he sees fit. Due to working at a steel factory in his youth, Rob has a hearing impediment and can rarely hear someone who is in another room.

Having grown up in Manitoba, this Golden Couple has decided to move to Vancouver and to travel to California during the winter months, becoming typical snowbirds. This routine will continue until health dictates otherwise and they are forced to remain permanently in Vancouver.



Realizing that material things are not the secret to happiness, they have donated the possessions they no longer need. This streamlined way of living affords them the ability to have two small homes in their preferred locations. As they are growing older and this will later become the couple's only home, it must provide them with a safe environment as they age. Their three grandchildren also come to visit them for a month every summer.

## 5.2 *Spatial Requirements* area, adjacency, & zoning

### *Area*

In residential design it is customary to add 30 percent of the required spatial area total to the total required allowing for circulation throughout. Part of the design challenge of this practicum is to reduce the footprint required by users. Therefore the addition of circulatory space has been omitted, leaving out the 30 percent increase from the proposed totals. A further reduction is expected to occur throughout the design process as adaptability of spaces will allow for multiple functions to occur in one space. These functions may occur sequentially or simultaneously.

#### *Family*



*Aim less than: 1530 sq.ft.*

*Actual: 1433 sq.ft. (781+652)*

#### *Shared Living*



*Aim less than: 1125 sq.ft.*


*Actual: 1121 sq.ft. (608+513)*


#### *Golden Couple*



*Aim less than: 985 sq.ft.*

*Actual: 541 sq.ft.*

<b>Family</b>	 <b>Space/Function</b>	<b>Approx. Sq.Ft. *</b>
	<b>Entry</b>	<i>35 sq.ft.</i>
	<b>Sleeping</b> (mom & dad)	<i>160 sq.ft.</i>
	<b>Sleeping</b> (child 1)	<i>120 sq.ft.</i>
	<b>Sleeping</b> (child 2)	<i>120 sq.ft.</i>
	<b>Eating</b> (seating for 10)	<i>200 sq.ft.</i>
	<b>Cooking</b>	<i>125 sq.ft.</i>
	<b>Working</b> (3 people)	<i>120 sq.ft.</i>
	<b>Living</b>	<i>450 sq.ft.</i>
	<b>Laundry</b>	<i>50 sq.ft.</i>
	<b>Hygiene</b> (mom & dad)	<i>70 sq.ft.</i>
	<b>Hygiene</b> (children)	<i>50 sq.ft.</i>
	<b>Hygiene</b> (public)	<i>30 sq.ft.</i>
<b>TOTAL</b>	<b><i>1530 sq.ft.</i></b>	

<b>Shared Living</b>	 <b>Space/Function</b>	<b>Approx. Sq.Ft. *</b>
	<b>Entry</b>	<i>35 sq.ft.</i>
	<b>Sleeping</b> (person A)	<i>120 sq.ft.</i>
	<b>Sleeping</b> (person B)	<i>120 sq.ft.</i>
	<b>Sleeping</b> (Impromptu)	<i>0 sq.ft.</i>
	<b>Eating</b> (seating for 6)	<i>150 sq.ft.</i>
	<b>Cooking</b>	<i>100 sq.ft.</i>
	<b>Work/Sleeping</b> (person C)	<i>150 sq.ft.</i>
	<b>Living</b> (person A)	<i>150 sq.ft.</i>
	<b>Living</b> (person B)	<i>150 sq.ft.</i>
	<b>Laundry</b>	<i>50 sq.ft.</i>
	<b>Hygiene</b> (person A)	<i>50 sq.ft.</i>
	<b>Hygiene</b> (person B)	<i>50 sq.ft.</i>
<b>TOTAL</b>	<b><i>1125 sq.ft.</i></b>	

\*Approximate Square Footage derived from area charts in Interior Design handbooks, taking the small to moderate area.<sup>1 2</sup>

<sup>1</sup> Karla J. Nielson and David A. Taylor, *Interiors: An Introduction* (Madison, WI: Brown & Benchmark Publishers, 1994), 119.

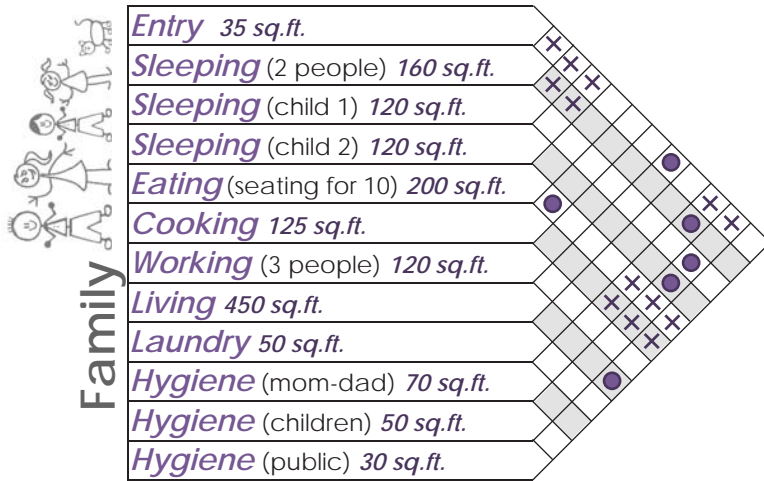
<sup>2</sup> John F. Pile, *Interior Design* (Upper Saddle River, NJ: Pearson Prentice Hall, 2007), 168.



Golden Couple

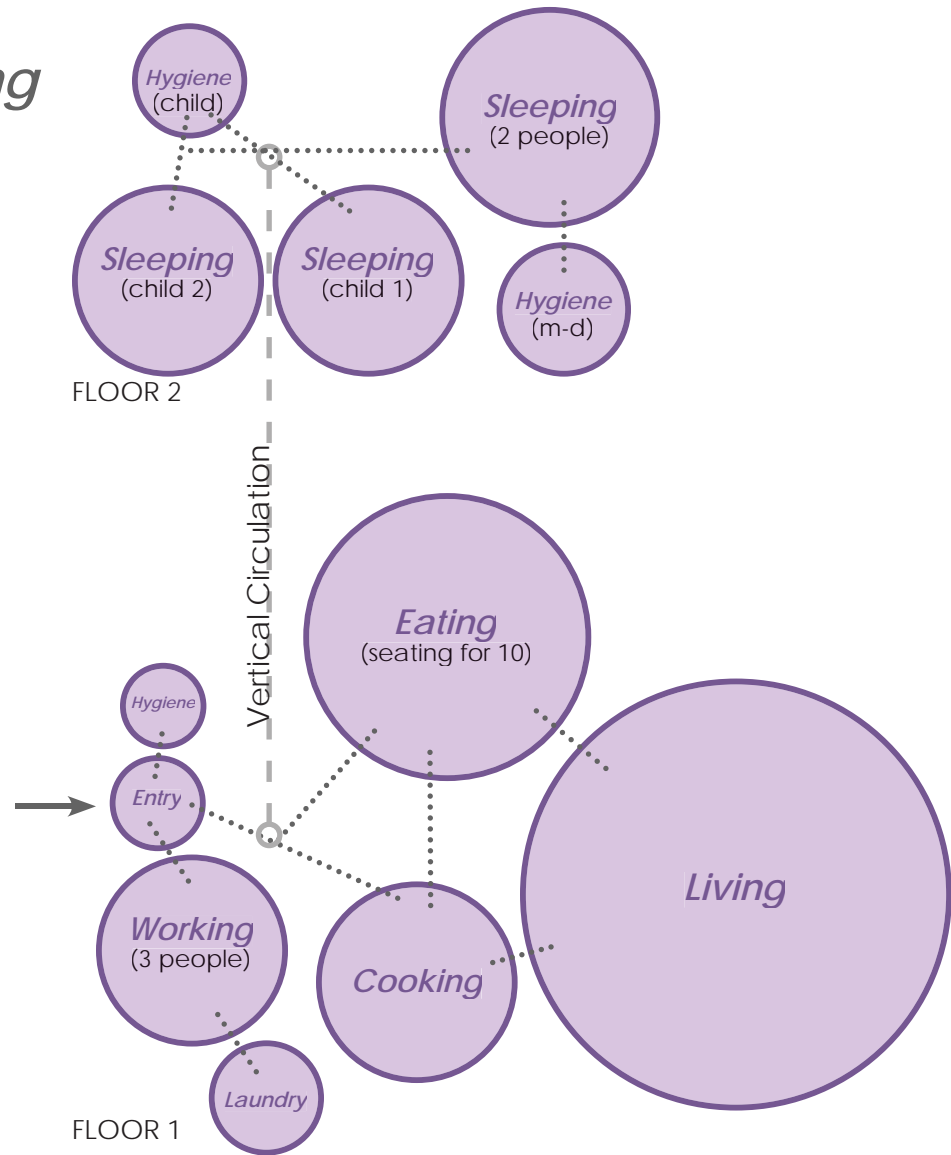
<i>Space/Function</i>	<i>Approx. Sq.Ft. *</i>
<i>Entry</i>	<i>35 sq.ft.</i>
<i>Sleeping</i> (male & female)	<i>160 sq.ft.</i>
<i>Sleeping</i> (3 children)	<i>120 sq.ft.</i>
<i>Eating</i> (seating for 6)	<i>150 sq.ft.</i>
<i>Cooking</i>	<i>100 sq.ft.</i>
<i>Living</i>	<i>250 sq.ft.</i>
<i>Laundry</i>	<i>50 sq.ft.</i>
<i>Hygiene</i> (male & female)	<i>70 sq.ft.</i>
<i>Hygiene</i> (public)	<i>50 sq.ft.</i>
<b>TOTAL</b>	<b>985 sq.ft.</b>

# Spatial Adjacencies & Zoning

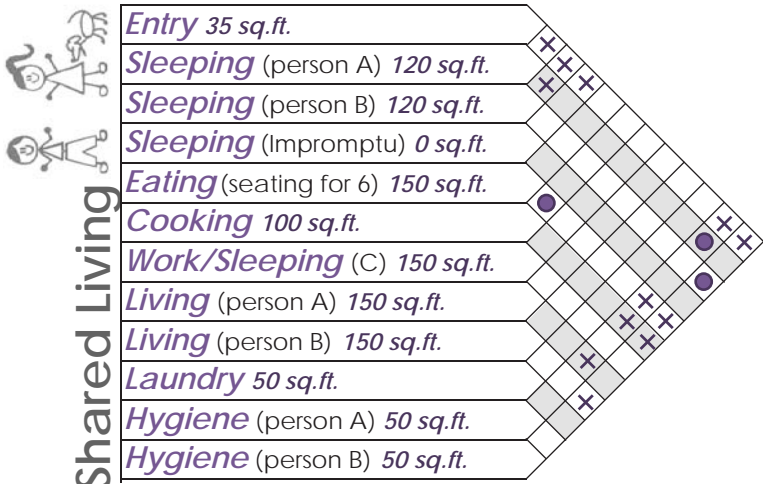


69 Adjacencies Matrix

- close proximity
- x area between required (open area)

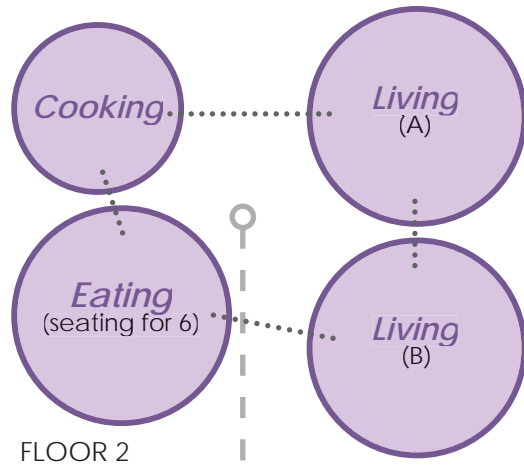


70 Zoning Diagram

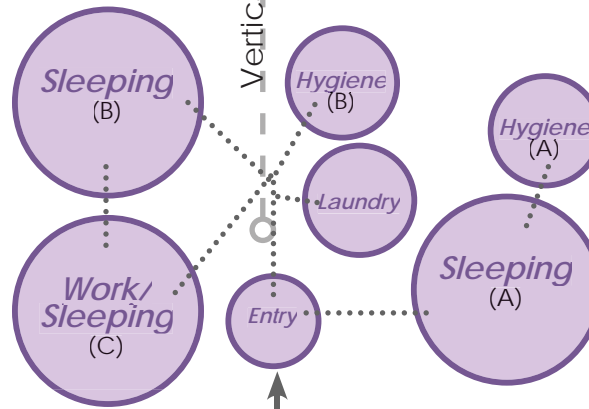


71 Adjacencies Matrix

- close proximity
- x area between required (open area)



FLOOR 2



FLOOR 1

72 Zoning Diagram

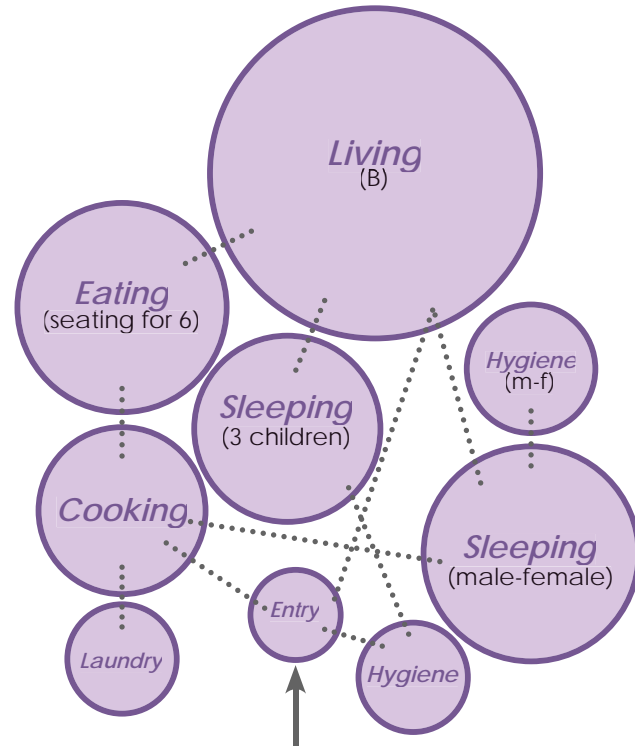


Golden Couple

Entry 35 sq.ft.								
Sleeping (Male-Female) 160 sq.ft.	x	x						
Sleeping (3 children) 120 sq.ft.	x							
Eating (seating for 6) 150 sq.ft.								
Cooking 100 sq.ft.								
Living 250 sq.ft.								
Laundry 50 sq.ft.								
Hygiene (Male-Female) 70 sq.ft.								
Hygiene (public) 50 sq.ft.								

73 Adjacencies Matrix

- close proximity
- x area between required (open area)



FLOOR 1

74 Zoning Diagram



Amber Bewza: Master of Interior Design © 2012

## 5.3 *Building Code Analysis* floating house

Notably what sets floating houses apart from other homes is their ability to float on water. This is mainly due to the flotation foundations or slabs on which they are built. There are various forms of flotation compositions that can be used. For the purpose of this practicum several construction standard guides have been consulted including:

- **Hitchhikers Guide to the Float Home Standards**
- **British Columbia Float Home Standards**
- **Vancouver Building By-law: Part 11 of Division B: Float Homes and Marinas**
- **False Creek Official Area Development Plan**
- **Canadian National Building Code**

### *Hitchhiker's Guide to the Float Home Standards*<sup>1</sup>

Standards for floating houses vary dependent on municipal laws and sometimes are not existent in others. "The Hitchhiker's Guide to the Float Home Standards" is produced as a joint effort between the Floating Home Association Pacific Canada and the Association of Marine Surveyors of B.C. as a guide to be utilized and considered by the B.C. Provincial Ministry of Municipal Affairs. Many municipalities and harbours in B.C. have adopted standards that are based on these recommendations. Pertinent portions of this standard, as they relate to the design of the proposed floating houses, can be found in the Appendix on page 151.

<sup>1</sup> "Hitchhiker's Guide to the Float Home Standards," Floating Home Association Pacific Canada, <http://www.floathomepacific.com> (accessed June 2, 2011).

### ***British Columbia Float Home Standards<sup>2</sup>***

In the past, most municipalities did not have jurisdiction over floating home sites, even though they were expected to provide them with emergency services, and there were no standards to follow for the design and construction of floating homes. Necessitated by municipal concern over liability issues and floating home safety requirements, the former Building Standards Branch of the Ministry of Municipal Affairs developed a standard or code that includes floating home design and construction, and fire protection for the floating home and its mooring marina.

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<sup>2</sup> Ministry of Energy and Mines, Office of Housing and Construction Standards, "British Columbia Float Home Standards," British Columbia: The Best Place on Earth, <http://www.housing.gov.bc.ca/pub/htmldocs/floathome.htm> (accessed June 10, 2011).

Currently, as a result of these standards it is much easier for municipalities to gain regulatory power over floating homes and their mooring sites. Most sites considered as aquatic lands, or land that is located below the low water mark, are under the jurisdiction of the Ministry of Environment, Lands and Parks. Authority can be transferred to the Federal or Provincial Government and further to municipal governments in order to regulate floating homes. These agreements are made easier through the use of the "British Columbia Float Home Standards" as all parties are then cognisant of the regulations to be enforced. Pertinent portions of this standard, as they relate to the proposed floating houses, can be found in the Appendix on page 156.

### ***Vancouver Building By-law: Part 11 of Division B: Float Homes and Marinas***<sup>3</sup>

Pertinent portions of this standard, as they relate to the proposed floating houses, can be found in the Appendix on page 159.

### ***False Creek Official Area Development Plan***<sup>4</sup> (Adopted by By-law No. 4812, November 5, 1974)

Pertinent portions of this standard, as they relate to the proposed floating houses, can be found in the Appendix on page 161.

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<sup>3</sup> Office of the Chief Building Official, "Vancouver Building By-law: Part 11 of Division B: Float Homes and Marinas," City of Vancouver, <http://vancouver.ca/commsvcs/cbofficial/vbbl/part11.htm> (accessed May 25, 2011).

<sup>4</sup> City of Vancouver, "False Creek Official and Area Development Plan," City of Vancouver, <http://vancouver.ca/commsvcs/Bylaws/odp/fccdd.pdf> (accessed January 16, 2012).

### ***National Building Code of Canada***

The following is an analysis of the *National Building Code of Canada 2010 Volume 1 and 2* as it relates to the typology of a Single Family Dwelling. This analysis is sectioned to correspond to the headings provided by the NBCC. When necessary, the NBCC is overwritten by Standards developed specifically for the typology of the Floating Home, these special building requirements have been mentioned in the previous section.

#### **Major Occupancy Classification:**

Group C - Residential Occupancies

#### **Building Area:**

Family: 1433 sq.ft.

Shared Living: 1121 sq.ft.

Golden Couple: 541 sq.ft.

## Integral Standards, Guidelines, and Codes for the Design of Proposed Floating House Designs

In addition to the National Building Code of Canada

Chart provides a summary of the afore mentioned standards, guidelines and codes. Listed are the integral areas for the design of the proposed floating houses.

\*Indicates where standards differ. The standard provided has been deemed more appropriate for floating house designs.

<p><i>Hitchhikers Guide to the Float Home Standards</i></p>	<p>1.b. Floating house can not contain more one dwelling unit and must remain under three stories in height.</p> <p>1.p. Safety equipment shall include one fire extinguisher (appropriate type and location established by local fire authority) and one life ring 30 inches diameter.</p> <p>5.a,b. Minimum distance between adjacent float house is 9.843 feet (3 meters)</p> <p>5.c. Each float house shall abut open water of at least 19.685 feet (6 meters)</p> <p>5.d. Access to float houses shall be provided on two adjoining sides, either on the base of the structure (minimum 3.937 feet or 1metre) or attached to the marina floats.</p> <p>5.e. At least one habitable room within a floating house should overlook an unobstructed area of at least 16.404 feet (5 meters) measured horizontally perpendicular to the exterior wall, and its width not less than the length of the exterior wall of the room.</p>
<p><i>British Columbia Float Home Standards</i></p>	<p>3.3.1.b. Guards are not required on walkways, decks, balconies, less than 1m in height above the water line. *NBCC - requires guards 42".</p>
<p><i>False Creek Official Area Development Plan</i></p>	<p>2.3.g. Flat roofs should be accessible and "roof-scaped"</p> <p>2.3.h. Views from the interior should be intimate (containing nature), views of the community, and views of distant natural elements.</p> <p>2.3.i. Rooms of frequent use should be located in the sunny portion of the building.</p> <p>2.3.j,k. Livable outdoor spaces should be provided (minimum six foot square), and when possible should incorporate vegetation.</p> <p>7.2 Live-aboard vessels are permitted in False Creek, if they comply with all City, Provincial and Federal regulations and/or standards.</p>





## 6.0 Design

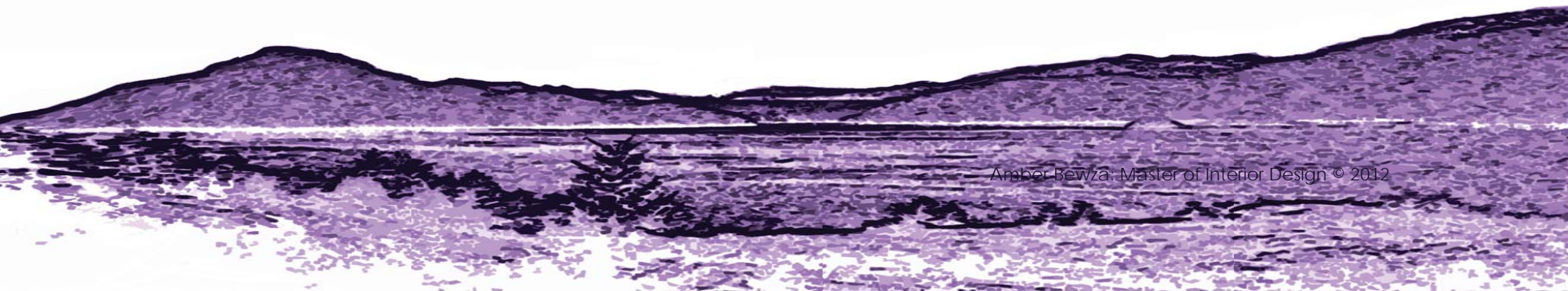
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The focus of this chapter is on the design of the three proposed floating homes. A synthesis of the information gathered in the previous chapters will be expressed in the designs to follow.

Each of the three floating house designs are unique as they are designed specifically for their occupants. All utilize the design criteria extracted from the literature and precedent review through the use of the four translation frameworks as shown on page 14, 22, 32, and 39. These design criteria will be used as a guide to integrate biophilia, threshold, adaptation of small scale space as well as information extracted from the precedent examples into the design of all three of the proposed floating houses.

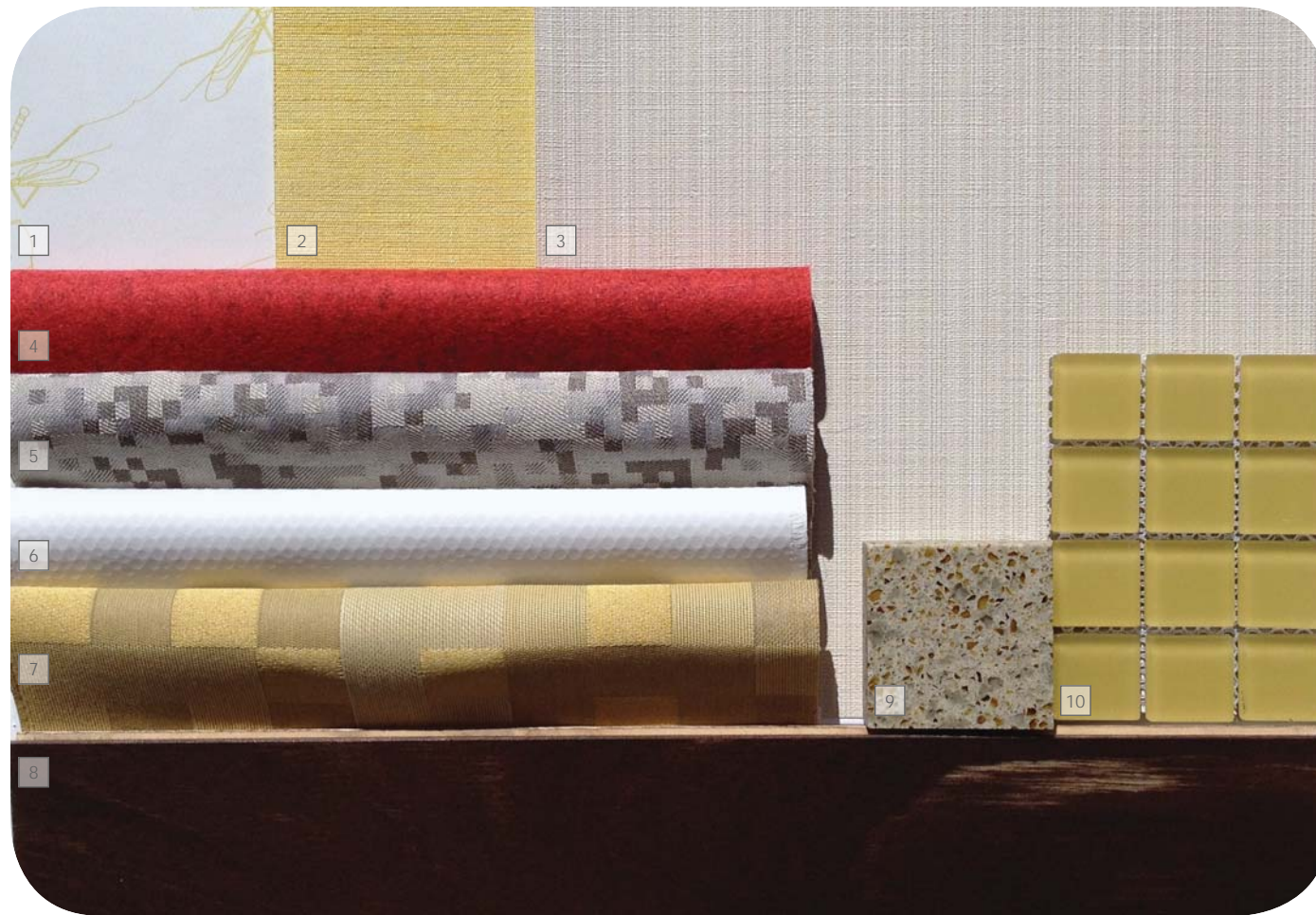
The design proposal for each floating house will include:

- Spatial Character, Material & Colour
- Exterior Development & Elevations
- Plans
- Design Features: use of Biophilia, Threshold, and Adaptation of Small Scale Space
- Interior Perspectives



# 6.1 *Family*

## *Spatial Character, Material & Colour*



Bright sunny yellow accents found around Granville Island inspired this lively colour scheme. Natural fabrics and textures with a variety of light reflectance values create a dynamic feel when layered throughout the spaces.

**1 Wallcovering - Master Bedroom**

Maharam  
Pattern: Longlegs 399516  
Colour: 002 Fennel

**2 Wallcovering - Accent Washrooms**

Maharam  
Pattern: Grain 399418  
Colour: 008 Canary

**3 Wallcovering - First Floor**

Maharam  
Pattern: Strait 399442  
Colour: 005 Buff

**4 Upholstery - Dining Chairs**

Maharam  
Pattern: Diviana Melange by  
Kvadrat 460830  
Colour: 531

**5 Upholstery - Sofa**

Maharam  
Pattern: Disperse 466017  
Colour: 003 Chalk

**6 Upholstery - Accent Seating**

Maharam  
Pattern: Imprint 466030  
Colour: 001 Snow

**7 Upholstery - Accent Seating**

Maharam  
Pattern: Couple 466010  
Colour: 004 Dijon

**8 Flooring**

Armstrong  
Premier Performance - Engineered  
Hardwood  
Species: Birch  
Colour: Vanilla Bean  
Dimensions: 3/8" x 3" x varying  
lengths up to 48"

**9 Kitchen Counters**

DuPont Zodiaq  
Colour: Mossy Green

**10 Backslash**

Olympia Tile  
Crystalith Matte 1" x 1"  
Gold MKG1132M  
Code # MI.CM.GLD.0101.NM



# Exterior Elevations



View from Water (West Side)



View from Water





(South Side)

Dock / Land (East Side)

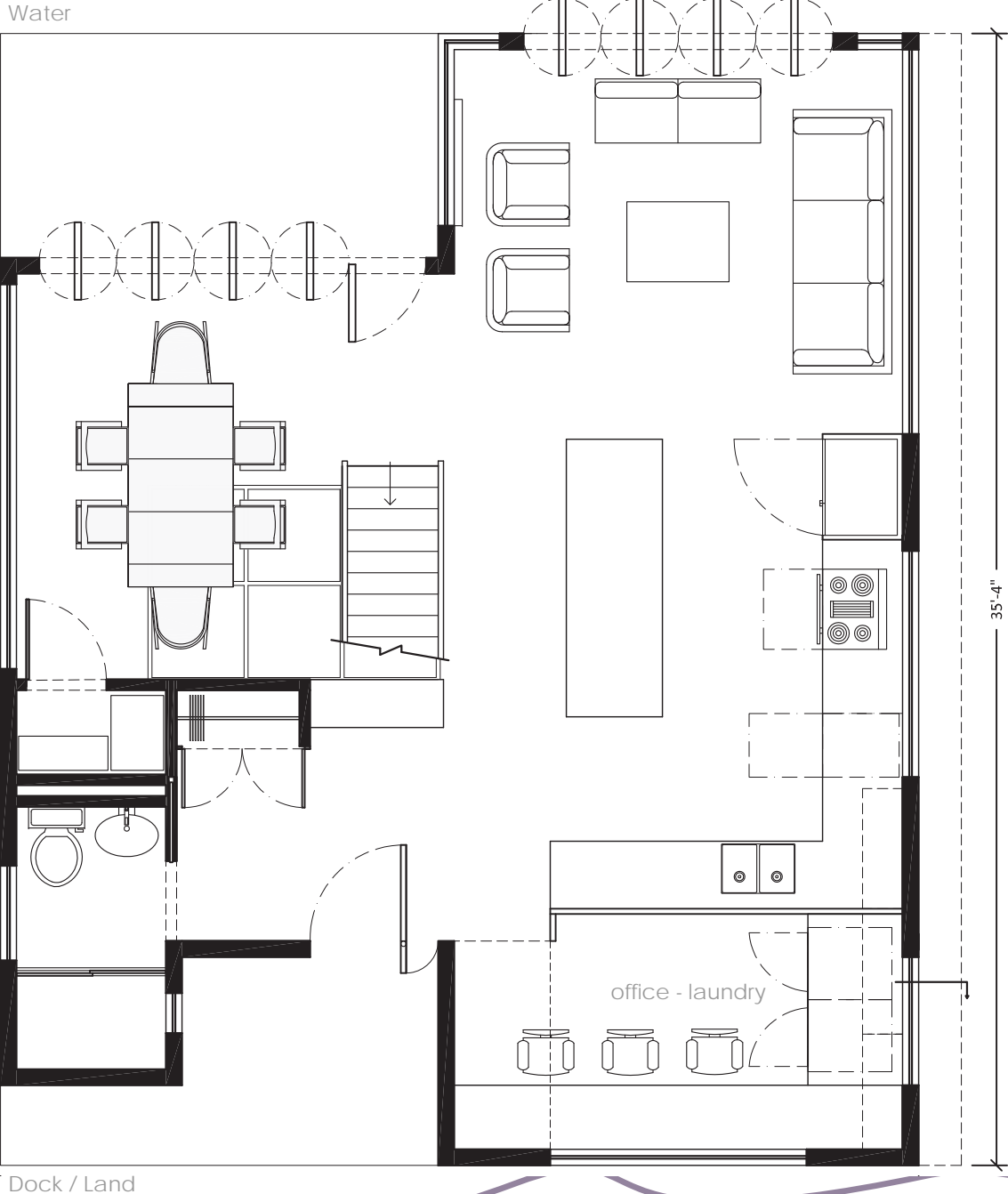
(North Side)



View from Dock

# Plans

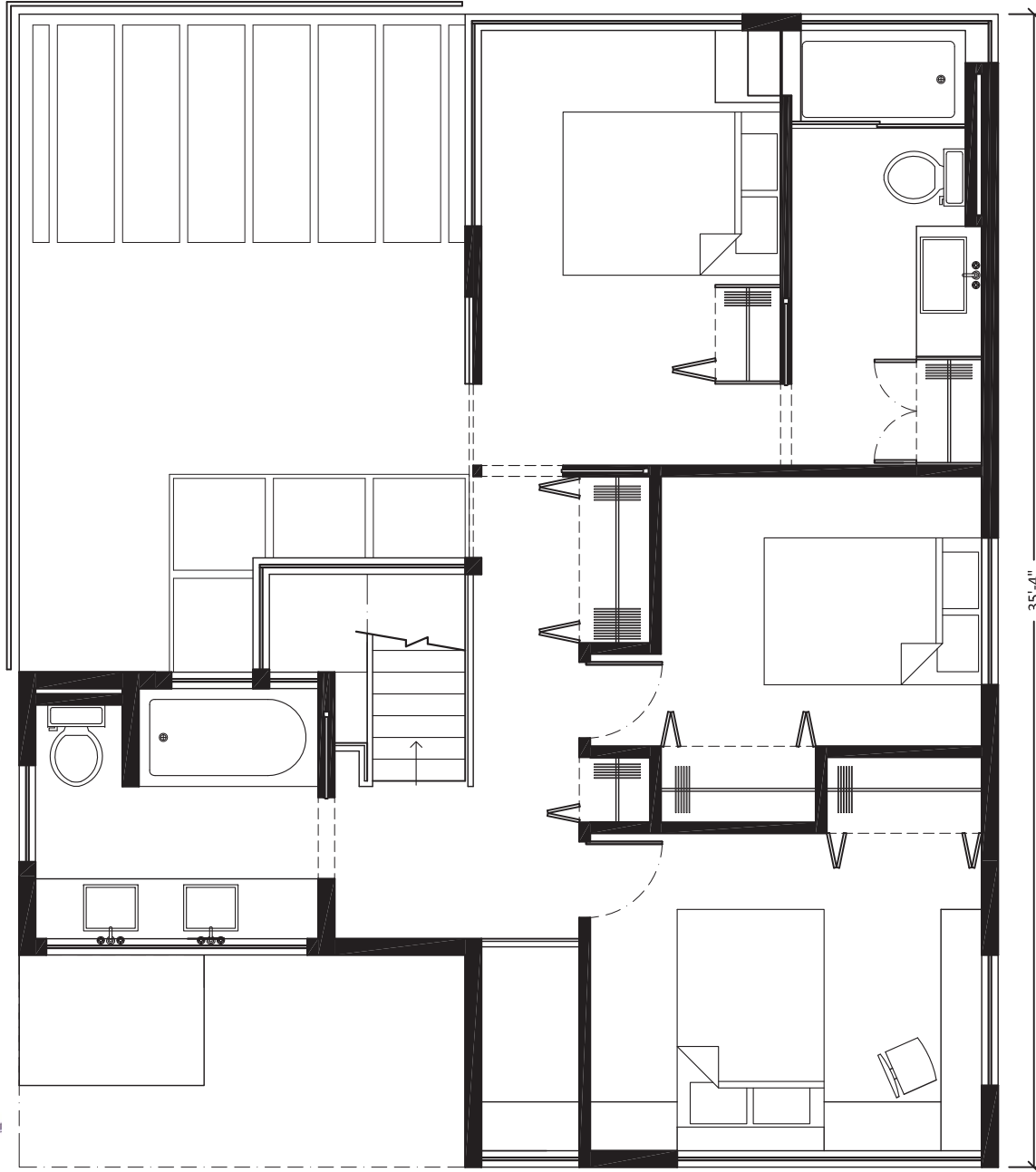
Total Area: 1433 sq.ft. (781+652,



First Floor Plan



Water



Second Floor Plan



Dock / Land

# Design Features

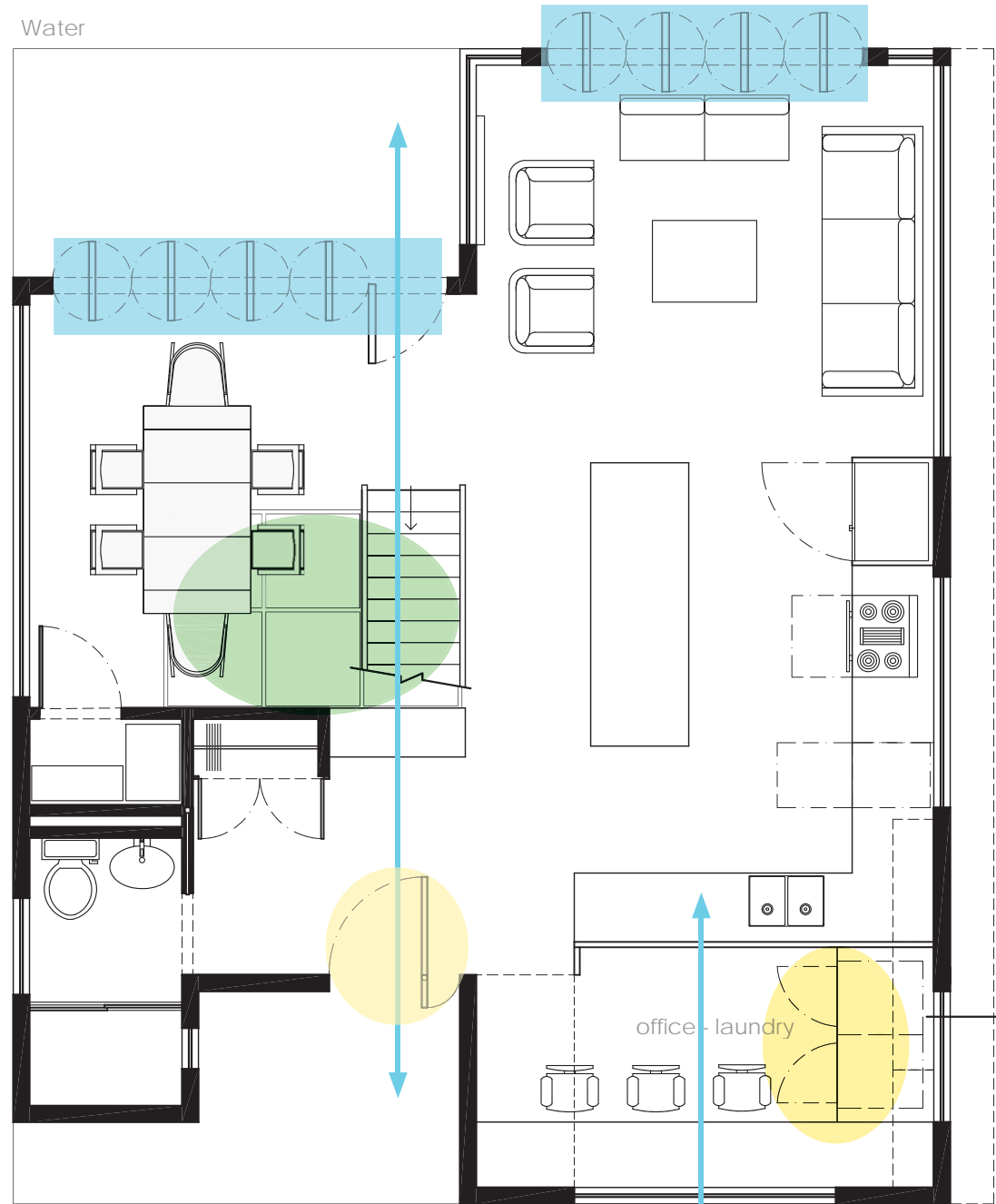
## Biophilic Design

- 1. Natural materials and textures are utilized throughout the space
- 2. Natural light enters both levels through a skylight above the stairs.
- 3. Skyward (celestial) views are also located above the 'master' bed and bathtub to connect occupant to exterior views when in a reclined position
- 4. A fish tank located beneath six removable plexiglass partitions is found under the staircase and dining room table, providing an indirect biophilic experience.

First Floor Plan

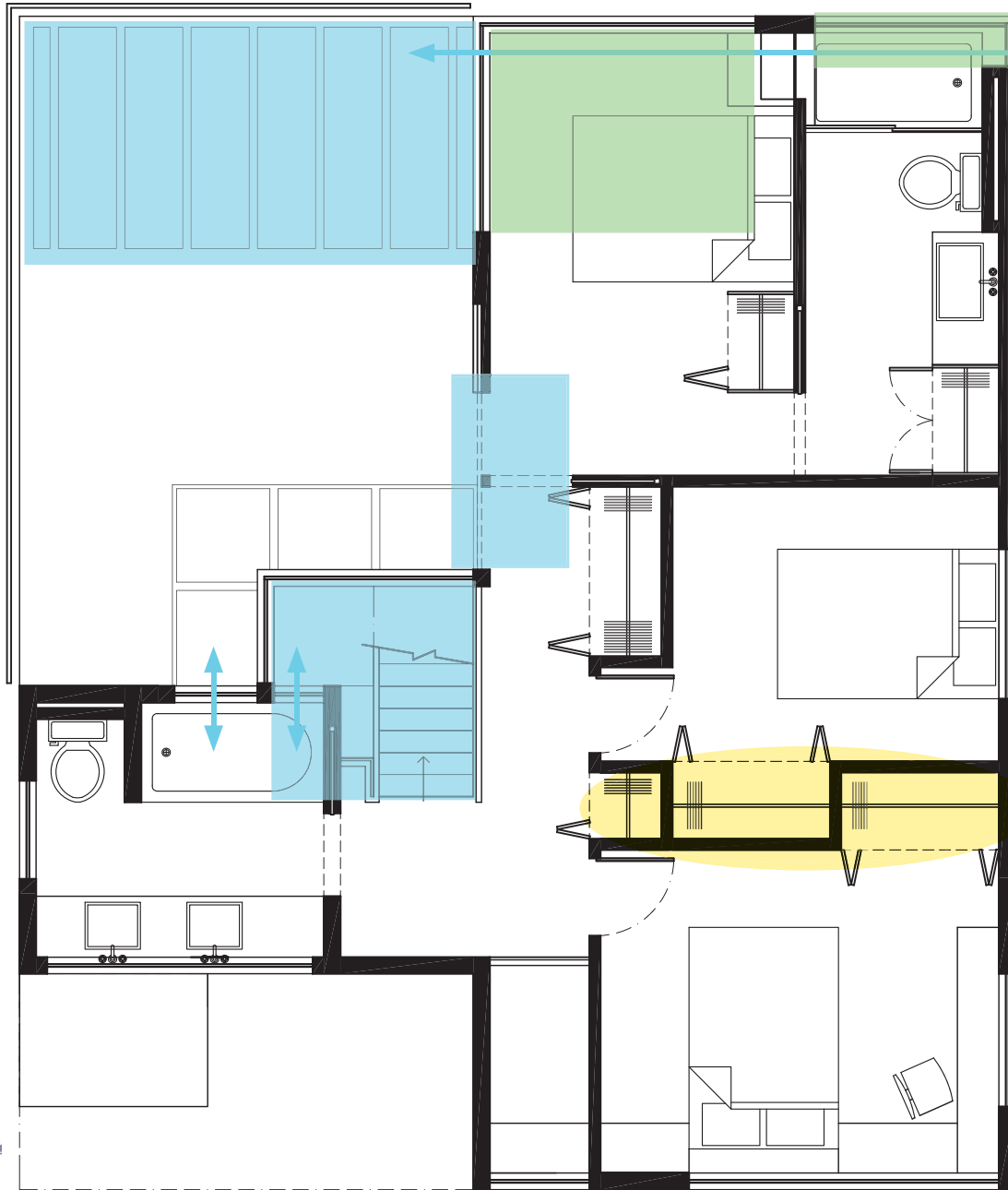


Water



Dock / Land

Water



Dock / Land

### Threshold Manipulation

1. Entry door has a wide proportion providing an invitation for entry
2. The stairway provides a visual mid-ground that directs occupants through the space with focus toward the exterior.
3. On the second floor, three sliding doors exiting onto the exterior deck space open up the deck, bedroom and hall space and allow ease of movement
4. Kitchen window is located at counter height to provide those on the outside with a glimpse of the interior activity.

### Adaptation of Small Scale Space

1. Entry door pivots on a middle point utilizing less floor space.
2. Closets are grouped together and act as a division of space.

Second Floor Plan





## *Design Features*



Stairs - Ornament (the stair treads & translucent bench) creates visual interest and draws occupants view through the living area and towards the exterior environment.



Deck opens up to interior with three sliding doors creating an extended threshold.



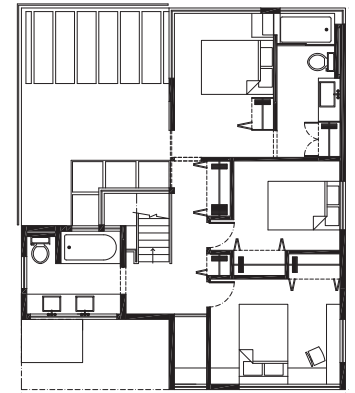
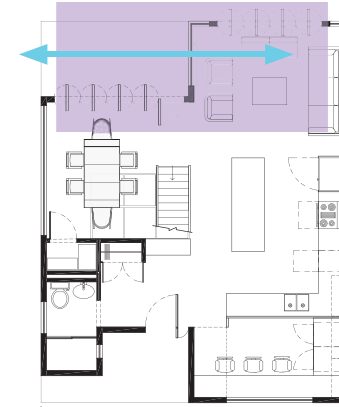
## *Interior Perspectives*



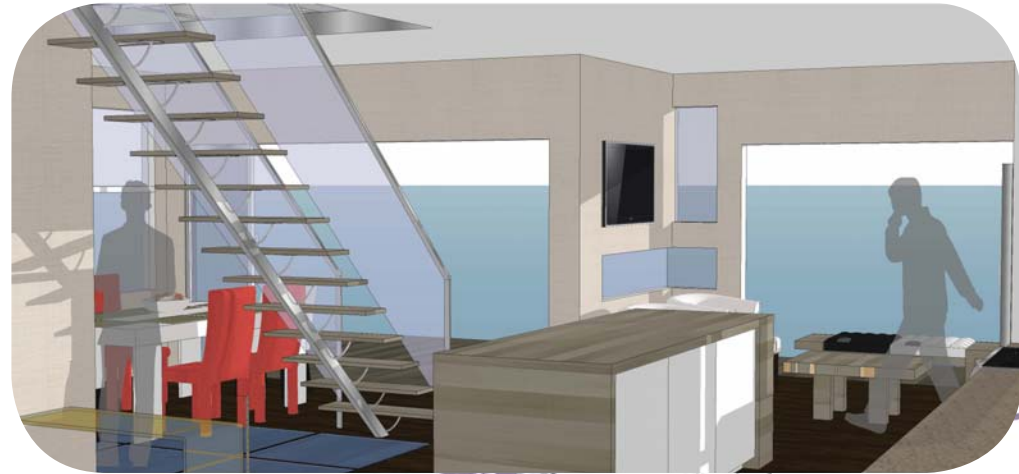
View from seated level



Main Space Doors Closed



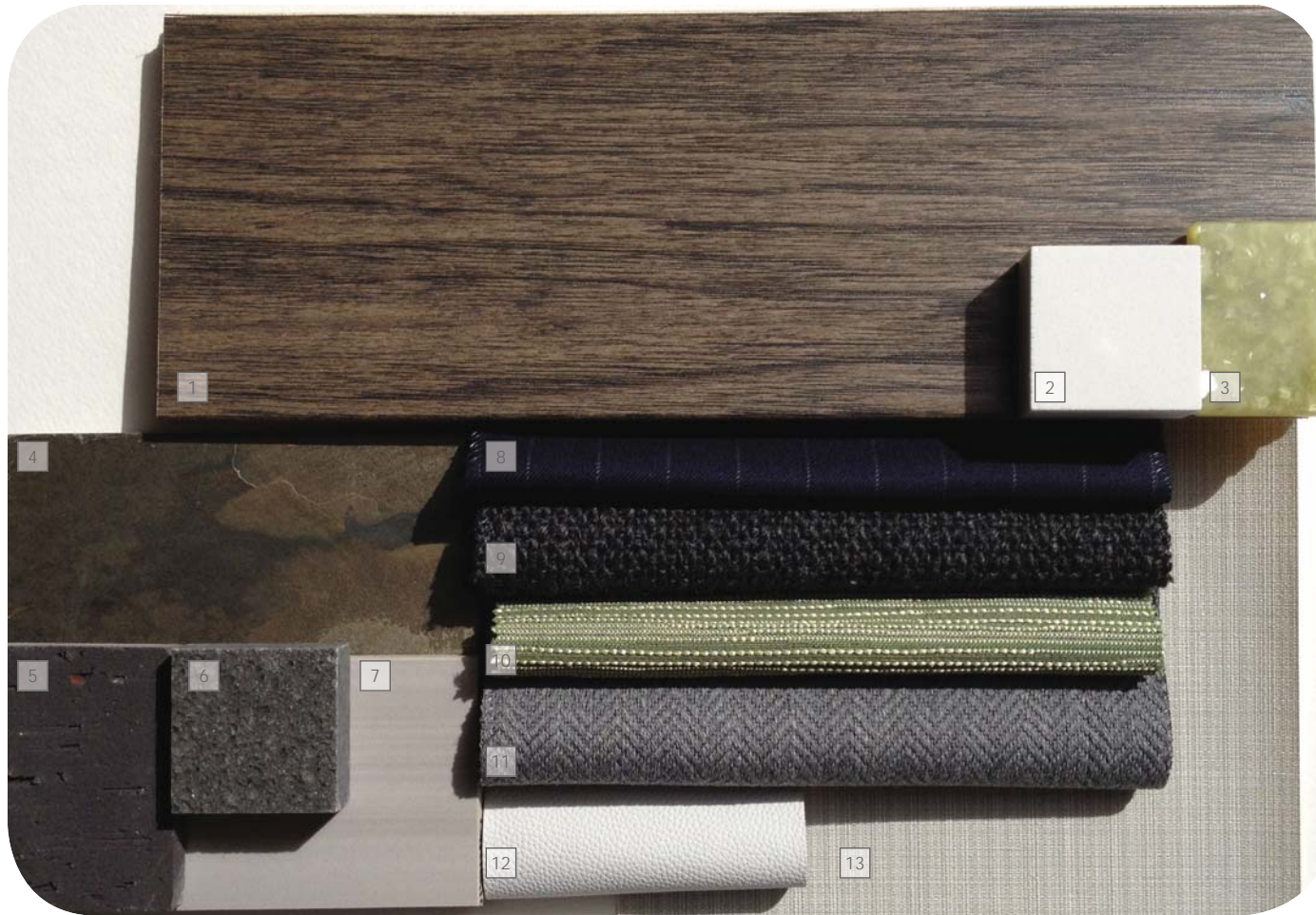
Main Space Doors Open





## 6.2 *Shared Living*

*Spatial Character, Material & Colour*





As hearty as the moss & algae on Granville Island these materials will stand the test of time. Wool, cotton, linen and brick all have subtle coordinating lines and textures allowing for flow between spaces.

- 1 **Flooring**  
Armstrong  
Engineered Hardwood GCH484MTLG  
Species: Hickory  
Colour: Mountain Smoke  
Dimensions: 1/2" x 5" x lengths up to 46"
- 2 **Bathroom Counters**  
DuPont Zodiaq  
Colour: Snow White
- 3 **Bathroom Translucent Wall**  
Avonite Surfaces  
Studio Collection  
Colour: Cat Eye K3-8330 Gloss

- 4 **Flooring - First Floor Hall**  
Olympia Tile  
Colour: California Gold 12" x 24"  
GM.SL.CGD1224
- 5 **Kitchen Backsplash**  
The Brick People  
Black Graitex Custom 209
- 6 **Kitchen Counters**  
DuPont Zodiaq  
Colour: Storm Grey
- 7 **Kitchen Backsplash (Secondary)**  
Ceratec  
Maestro Ceramic tiles Collection  
Sorengeti Series by FAP  
Colour: Grigno 6" x 35"
- 8 **Upholstery - Floor/Accent Cushions**  
Maharam  
Pattern: Dandy 463550  
Colour: 001 Navy
- 9 **Upholstery - Floor/Accent Cushions**  
Maharam  
Pattern: Cobblestone 465250  
Colour: 006 Charcoal

- 10 **Upholstery - Floor/Accent Cushions**  
Guilford of Maine  
Pattern: Cosmopolitan 3097  
Colour: Spring 011
- 11 **Upholstery - Dining/Kitchen Chairs**  
Maharam  
Pattern: Alpaca Herringbone  
465898  
Colour: 002 Cinder
- 12 **Upholstery - Side Chairs**  
Spinneybeck  
Pattern: AU610
- 13 **Wallcovering - All**  
Maharam  
Pattern: Strait 399442  
Colour: 002 Pebble

*Adaptable Furnishings*  
**Adaptable Bed/Desk**  
Dealer: Resource Furniture  
Product Name: LGM Tavolo  
[www.resourcefurniture.com](http://www.resourcefurniture.com)

# Exterior Elevations



View from Water (West Side)

View from Water



Entrance (South Side)

Dock / Land (East Side)

(North Side)

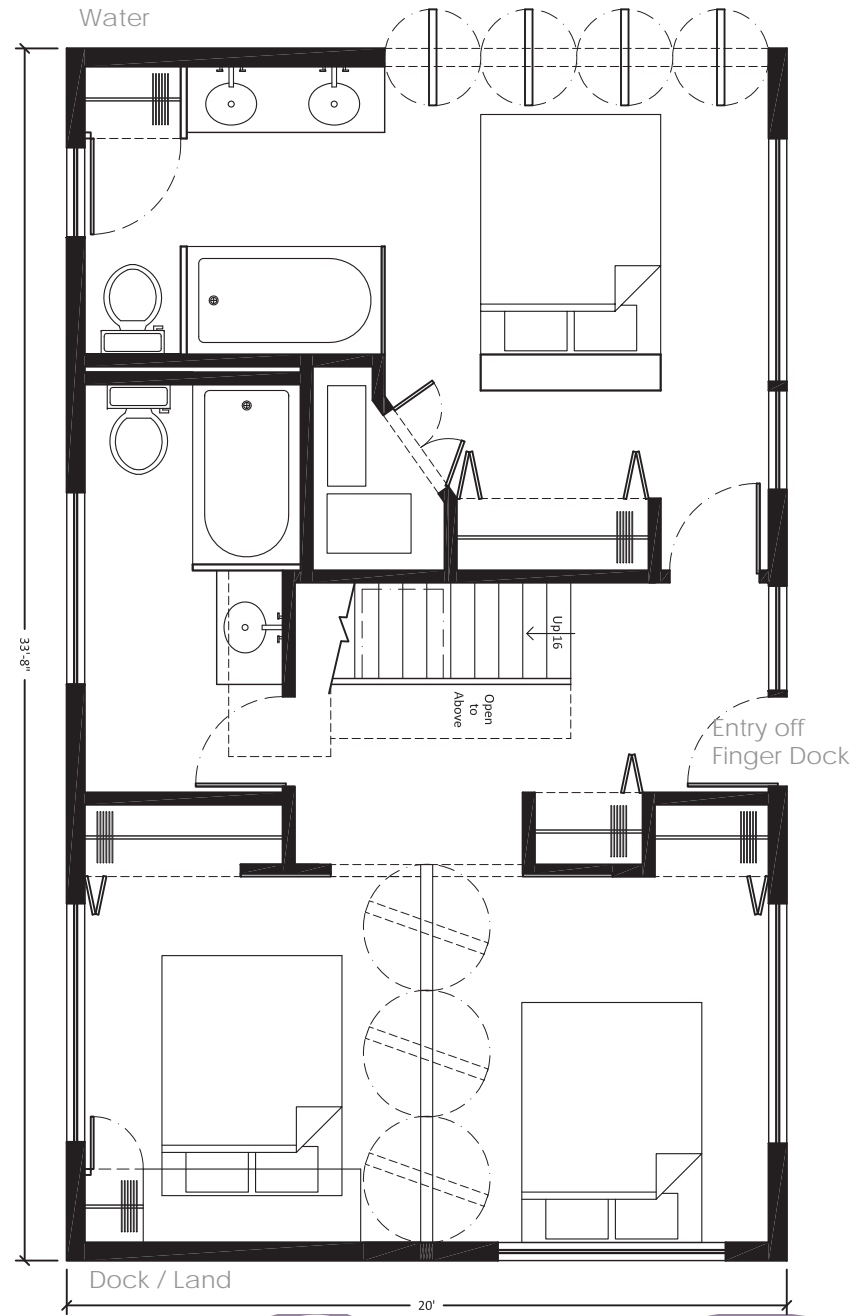


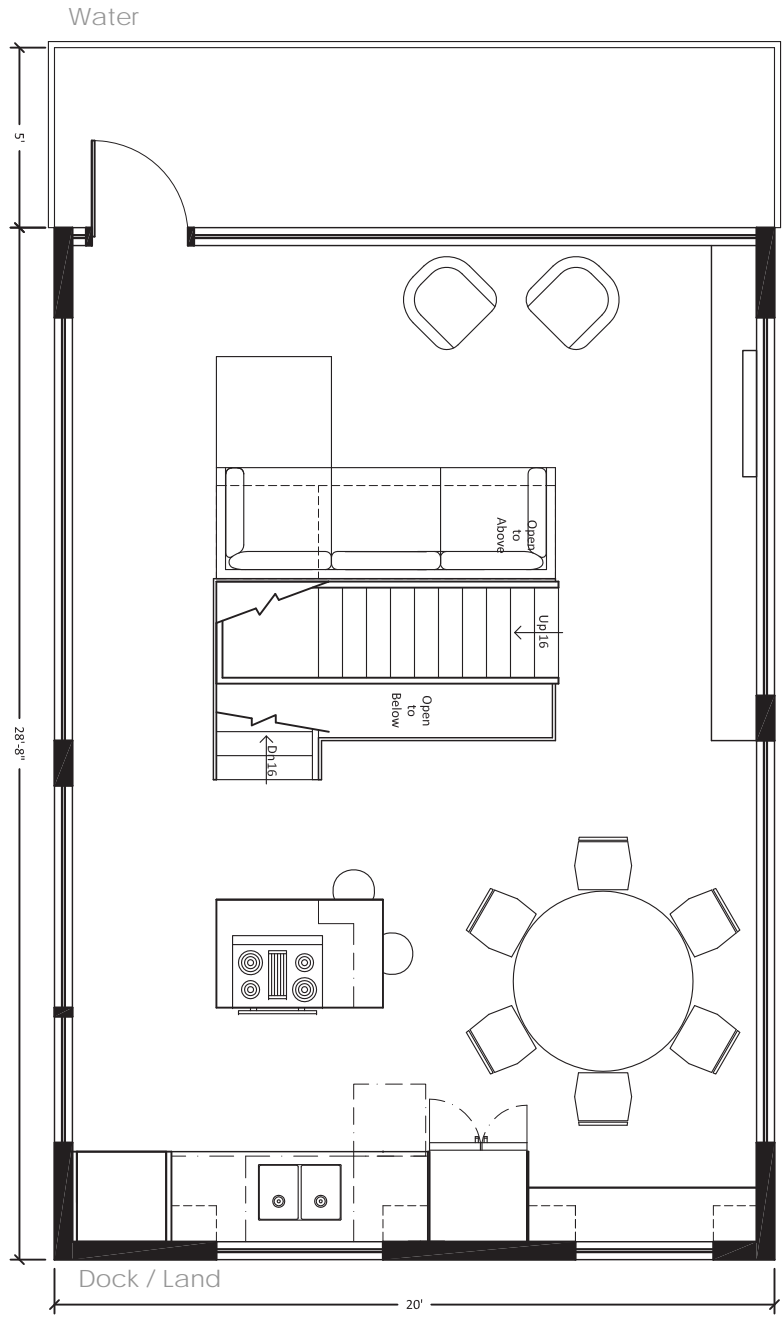
View from Dock

# Plans

Total Area: 1121 sq.ft. (608+513)

First Floor Plan





Second Floor Plan



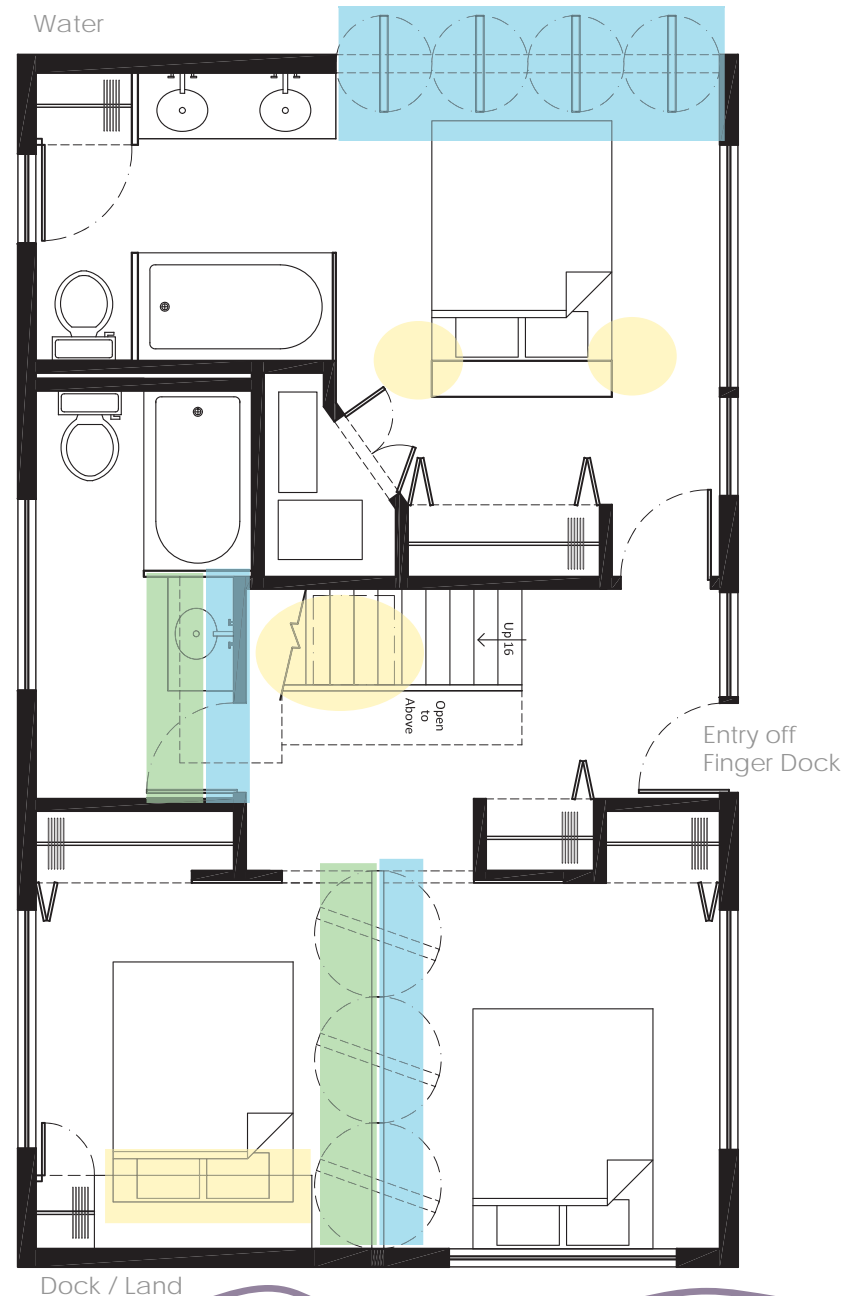


# Design Features

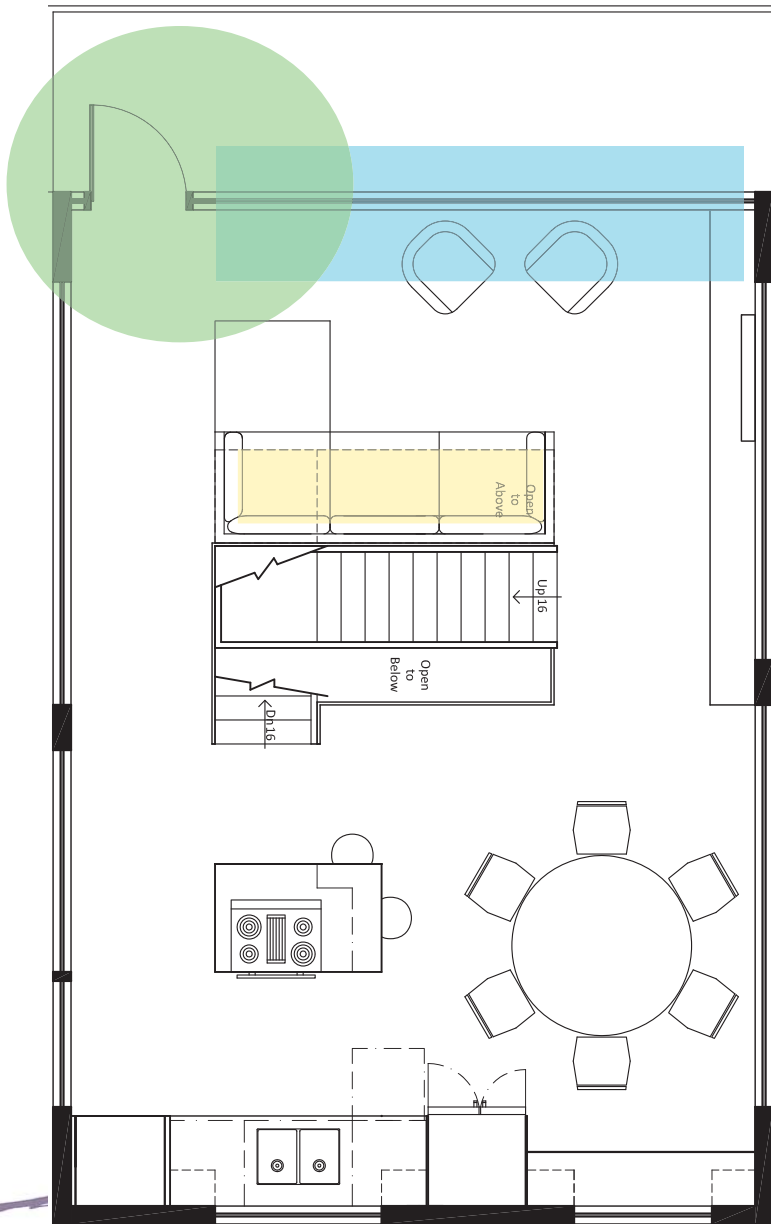
## Biophilic Design

1. The fenestration and roof line on the water side of the house gesture towards the natural environment. The fenestration is also placed at varied angles symbolic of the variance found in nature. It also acts to interact with light in an animalistic way, making the light appear life-like.
2. Real vegetation found in the local environment is placed on the interior of the doors between the two bedrooms.
3. The placement of the stair's second run creates a variety of ceiling heights above the vanity in the washroom and at its entrance. This is symbolic of the varied canopy heights you would find in nature.
4. Natural wood casings can be found on most of the building openings, mimicking the natural wood hues found in the local environment. On the water side galvanized stainless steel mullions can be found as an exception to this. The high reflectivity of the steel creates glare when hit with light similar to the glare off the water.

First Floor Plan



Water



Dock / Land

### Threshold Manipulation

1. The stairway provides an opportunity to pierce the roof and utilize the exterior space.
2. The skylight structure can be opened allowing for external stimuli to enter the space.
3. Between the bedrooms, doors, create a flexible wall that can slide to the side when the spaces are required to be joined. The doors provide the opportunity for the occupant to personalize the space as a multitude of objects can be placed in the cavity provided between the glass doors. The transparency of these doors can also be manipulated to suit privacy requirements of the occupants
4. On the second floor, two large sliding doors open the living space to the exterior deck

### Adaptation of Small Scale Space

1. In adjoining bedroom spaces, one bed folds up and becomes an office desk space, allowing for multifunctional space.
2. Laundry area is located underneath stairs.
3. End tables swing out from customized storage headboard in 'master' bedroom.
4. Sectional on second floor provides for impromptu sleeping

### Second Floor Plan



# Sections



View Towards Entrance Side (North)



View (South)



View Towards Dock (East)



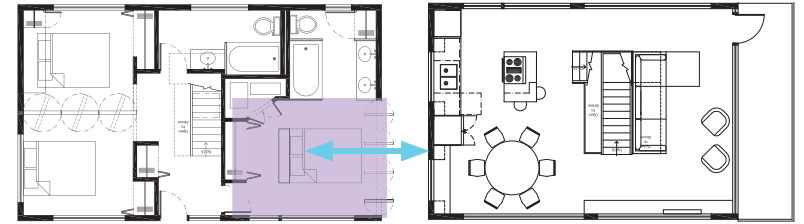


View Towards Water (West)

## *Interior Perspectives*



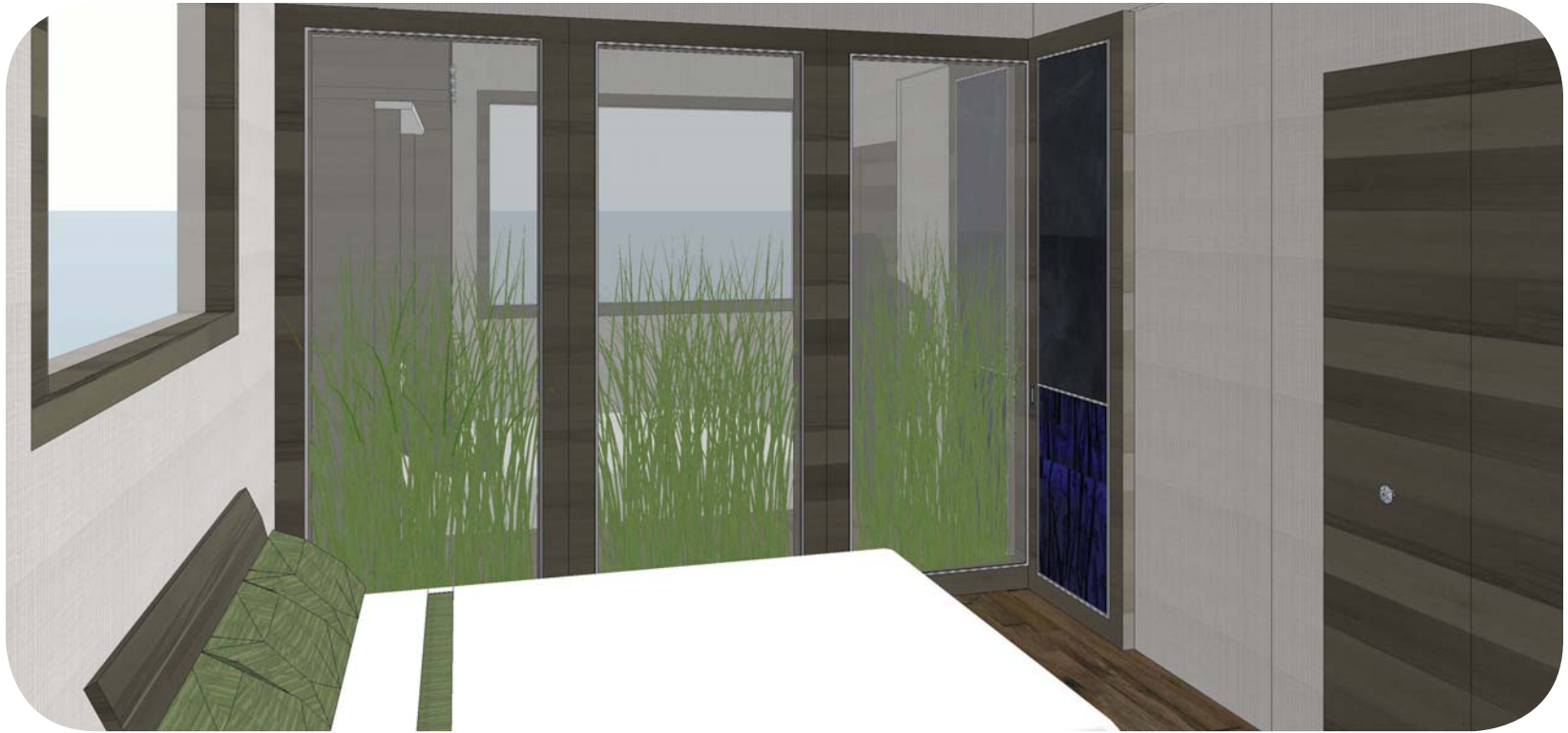
Closed Space



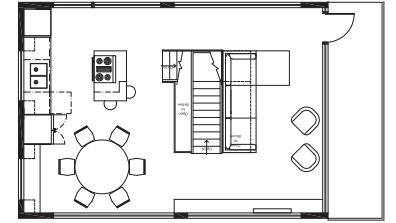
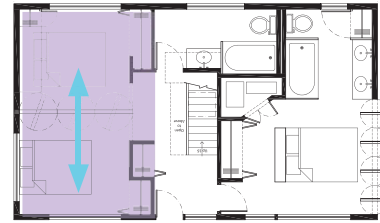
Open to Outside



Flip out End Table Trays



Bedroom Spaces Closed

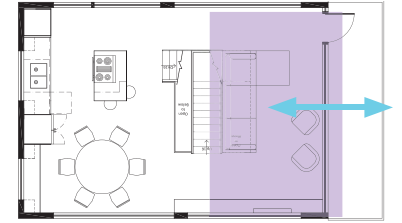
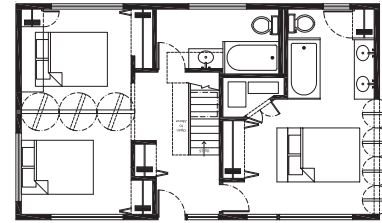


Bedroom Spaces Closed





Sliding Doors Closed: view towards water



Sliding Doors Open: view towards water

## 6.3 *Golden Couple*

*Spatial Character, Material & Colour*



The red and violet hues from the setting sun extend onto the interior materials, creating a quiet relaxation punctuated by high gloss tile and soft and fuzzy cushions.

**1 Wallcovering - All**  
Maharam  
Pattern: Noble 399394  
Colour: 002 Mist

**2 Kitchen Backsplash**  
Goldray  
Colour: Purple Basil  
Clear glass - opaque

**3 Counters**  
DuPont Zodiaq  
Colour: Cloud White

**4 Upholstery - Sofa Cushions**  
Maharam  
Pattern: Coach Cloth 458950  
Colour: 008 Dusk

**5 Upholstery - Sofa**  
Guilford of Maine  
Pattern: Rattan 3087  
Colour: Mercury 020

**6 Upholstered Bed Frame**  
Spinneybeck  
Pattern: VO785

**7 Wallcovering - All**  
Maharam  
Pattern: Overlay 399439  
Colour: 017 Seagrass

**8 Flooring**  
Armstrong  
Premier Performance - Engineered  
Hardwood EHP3012  
Species: Walnut  
Colour: Smoke Gray  
Dimensions: 3/8" x 3" x varying  
lengths up to 48"

### *Adaptable Furnishings*

#### **Adaptable Sofa Wall Bed**

Dealer: Resource Furniture  
Product Name: Atoll 202  
[www.resourcefurniture.com](http://www.resourcefurniture.com)

#### **Adaptable Coffee/Dinner Table**

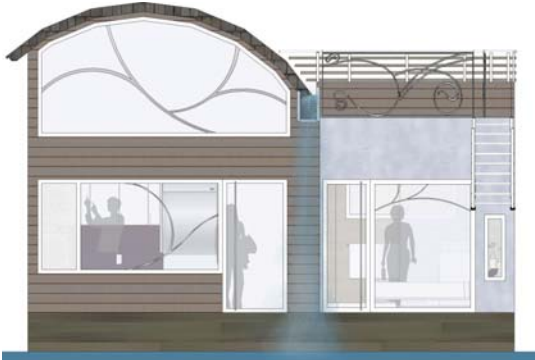
Dealer: Ozzio Design  
Product Name: T105 E-Motion  
[www.ozzio.com](http://www.ozzio.com)

#### **Slim Folding Chair**

Dealer: Resource Furniture  
Product Name: S209 Pocket  
[www.resourcefurniture.com](http://www.resourcefurniture.com)



*Exterior Elevations*



View from Water (West Side)



View from Water





(South Side)

Dock / Land (East Side)

(North Side)

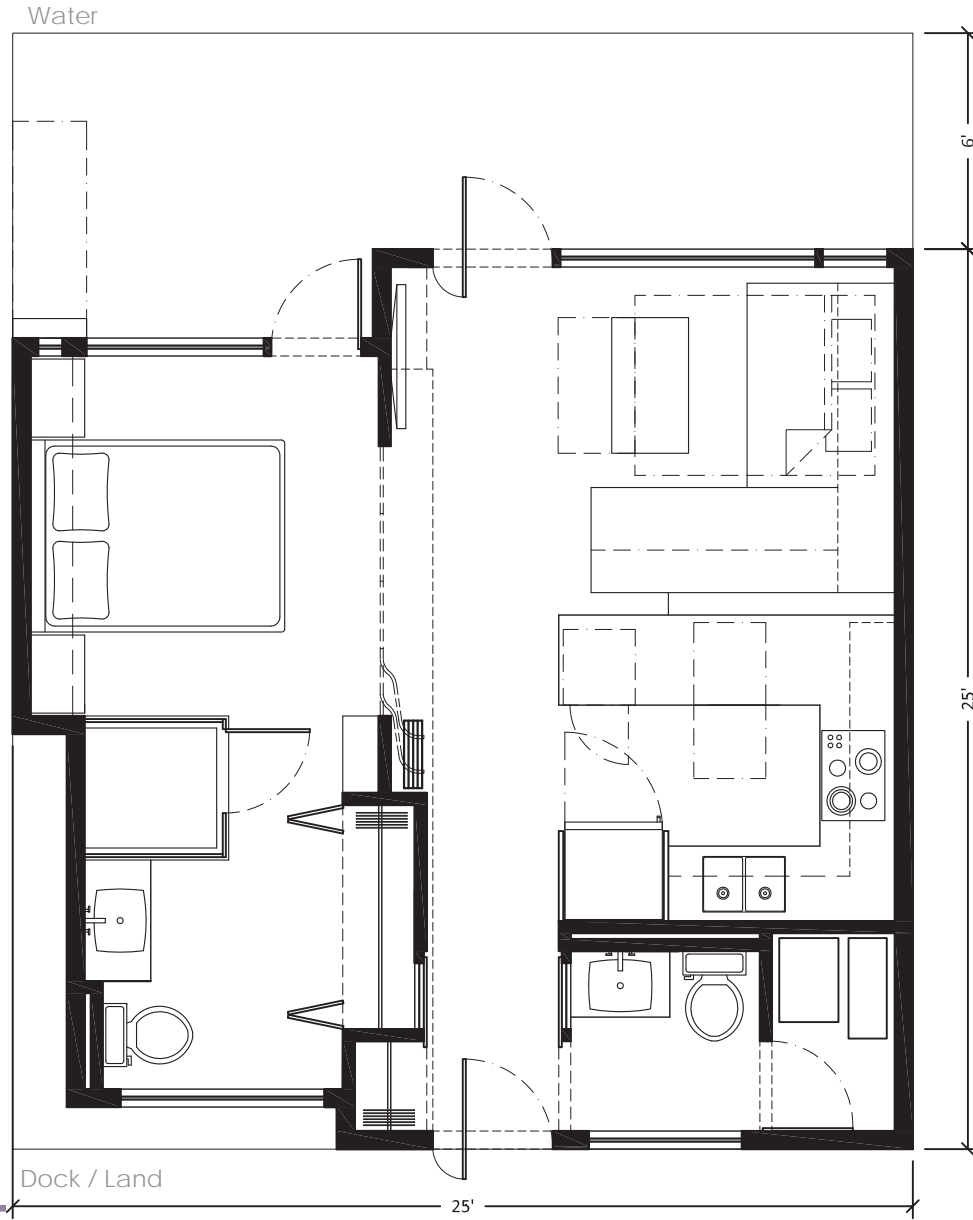


View from Dock

# Plans

Total Area: 541 sq.ft.

Floor Plan



# Design Features

## Biophilic Design

1. Roof line provides a device to capture rainwater, funneling it towards the deck space, engaging users with environmental processes.
2. Raised vegetation allows direct experience with nature allowing the occupant to grow local or edible vegetation.

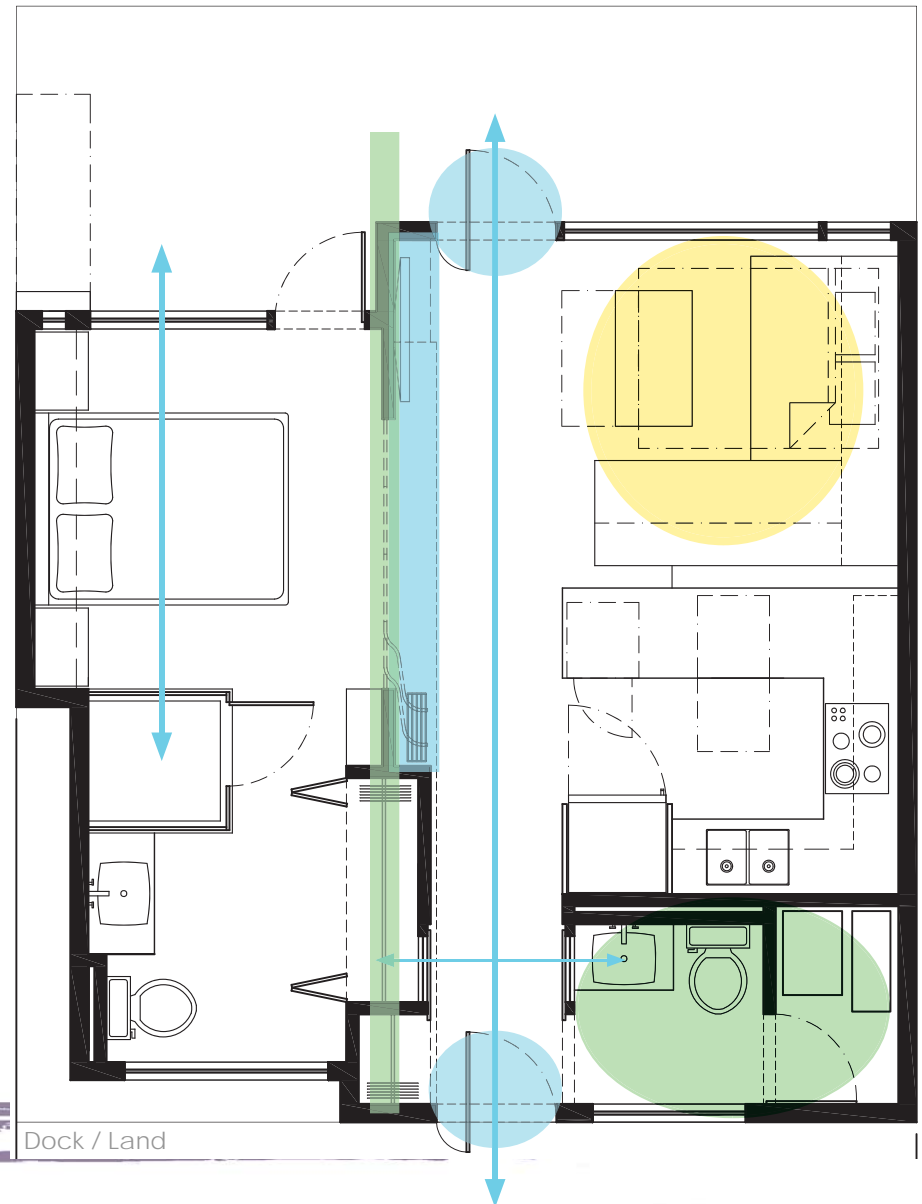
## Threshold Manipulation

1. Views are provided from all interior spaces into an adjoining space. Note the translucent panels in the 'master' closet and secondary washroom that allow the occupant to see if the other space is in use.
2. Axis is created through space from front entrance directly through space. This is emphasized by various changes in ceiling height along the side of the axis.
3. Sliding doors between multifunctional space and 'master' area allow for occupant to customize space.
4. Entry door has a wide proportion, providing an invitation for entry.

## Adaptation of Small Scale Space

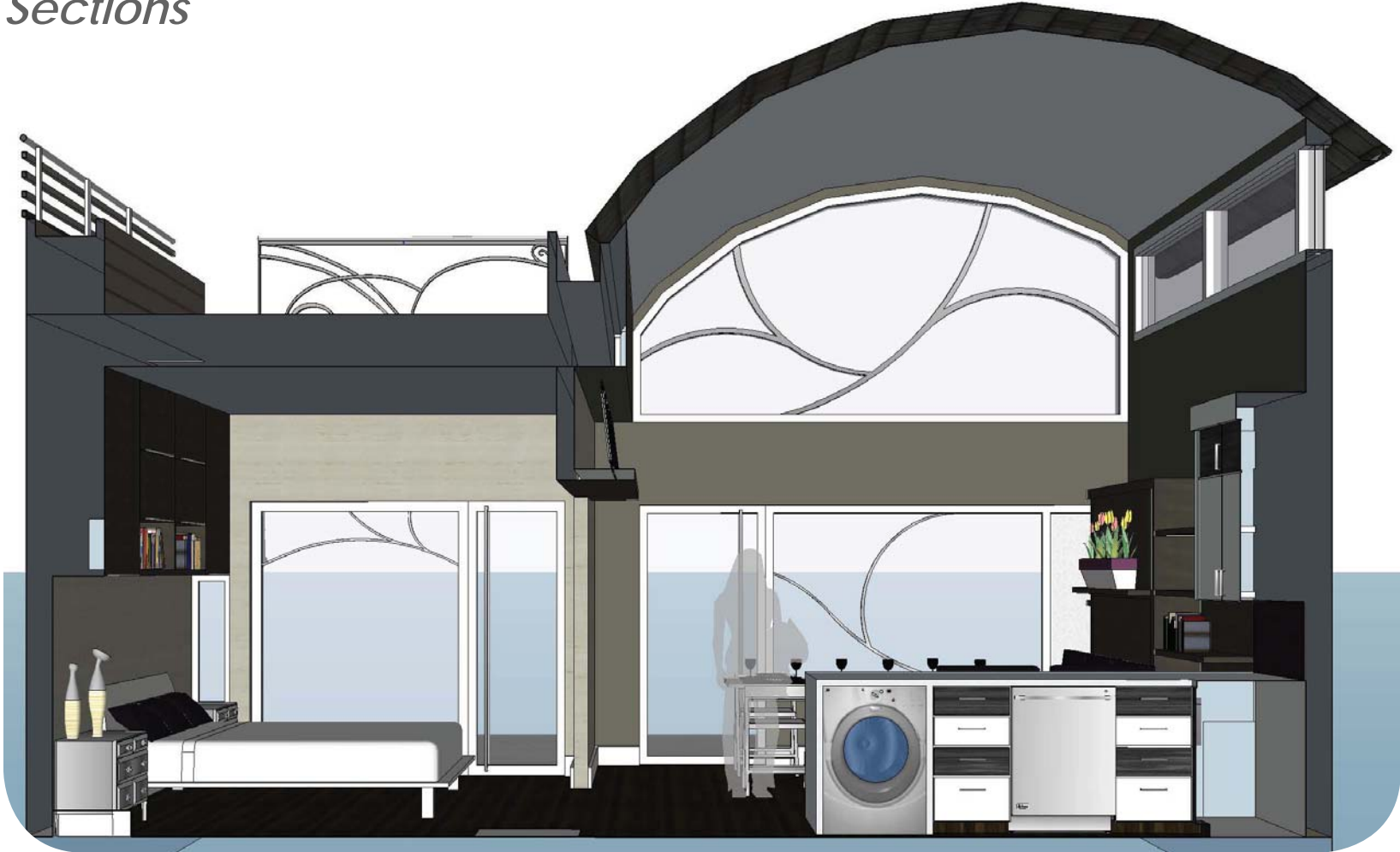
1. Through use of multifunctional and adaptable furnishings this space provides, at varied times, a seating area, dining area for 6, and sleeping area for up to 3 persons.

Water



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*Sections*



Facing Water



Facing Dock





Facing Right

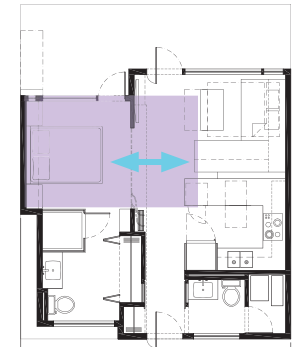


Facing Left

## *Interior Perspectives*



Closed - Divided Space



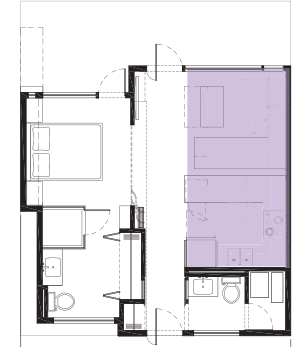
Open - Free Flowing Space





Dining for 6





Sleeping for 2-3



Casual Seating

## 7.0 Conclusion

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This practicum investigates how interior design can be used to create an alternative to the current residential suburban houses, their lack of connection to the natural environment and their immense size. This project approaches the investigation of concepts of the adaptation of small scale space, the significance of threshold, and the influence of biophilia to help establish design criteria that respond to the spatial needs of the occupants as well as facilitate a positive relationship between humans and their natural environment and its processes. The resultant design criteria were applied to the typology of the floating house, chosen for its unconventional site and its inherent spatial restrictions. The product is the design of three floating houses located on Granville Island, Vancouver, British Columbia that

are spatially efficient to encourage the reduction of personal possessions, and to aid in human-nature connections through the manipulation of threshold.

### *Lessons Learned*

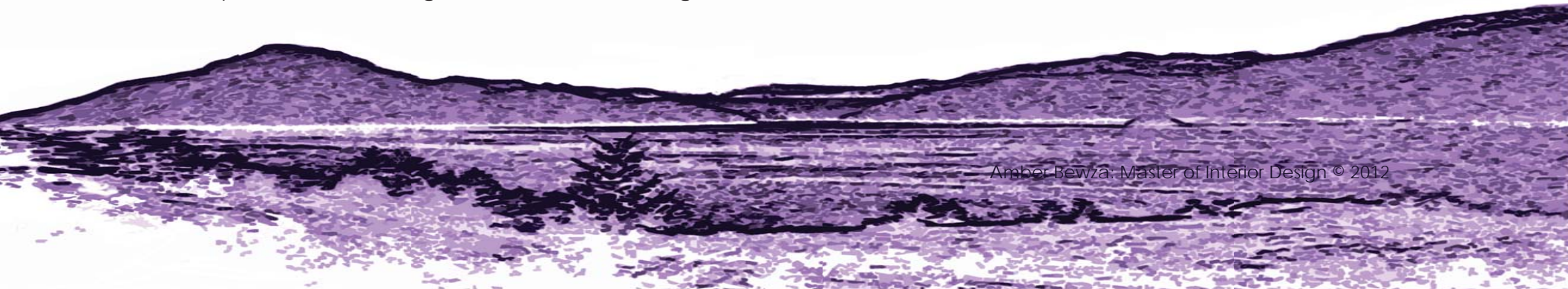
The notion of threshold and creating views started to take form as the most influential linking element in the design project. It was through the manipulation of threshold that the other design criteria of biophilic design and adaptation of small scale space were layered. For example, of Susanka's six key concepts for designing a small space, three, center around threshold and views, within the interior, diagonally through to the exterior and through the manipulation of the ceiling plane.

Due to the restrictive site of the floating home, creating a view that extends from one corner of the house to the opposing corner, creating a view diagonally through the house, does not make sense. Rather the emphasized view was directed towards the water, the longest orthogonal direction found on the floating houses.

At times this practicum felt as though it was two separate projects in conflict with one another. One being the design of an economically sustainable small scale home and the other being the design of a house that possesses biophilic qualities. I believe it was the selection of the floating house as the chosen typology that created conflict. Its choice was based on provided a setting for small scale design and

the application of biophilic design. Each topic if discussed separately would perhaps benefit from alternate building typologies. As a result of using the typology of the floating home, sacrifices towards one or the other were made. When sacrifices were made neither ended up being accomplished as successfully as it could have been.

This conflict is best seen in the design of the floating house for the Family occupants. This home acts as an 'okay' example of the application of biophilic design, thresholds, and the adaptation of small scale space. Its fixed use of spaces takes away from its full success, in specific the living area and dining area, perhaps could have been accomplished in the same space.



Out of the three floating house designs the most successful resultant design ended up being the smallest one, designed for the Golden Couple occupants, occupying total interior area of 541 sq.ft. For the design of this house I placed creating a small space as the most important of the design criteria.. I believe the success of this design, its ability to produce an environment that encourages and enhances humans link, to nature through biophilic design strategies, as well as its ability to blur the boundaries between adjoining spaces through the manipulation of threshold, was a result of the spatial limitations. Each of the design gestures applied became more refined and integrated as it was a larger percentage of the total design.

The design of the Golden Couple house was not without flaw, however. Its full success was limited by preconceived notions about what is necessary and or considered standard in a home. For example, some argued that the second bathroom was not necessary. I included the additional 'guest' bathroom in the design, rationalizing its inclusion based on the comfort level of guests and occupants and not for its functional requirement. This way of thinking is difficult to change, and is in part the very standardization present in the suburban home, to which this practicum project was reacting against.

Some obstacles were encountered when arguing that the designs were specific to the typology of the floating home and if placed on land would

not be as successful. Perhaps this was due to how the initial question was posed. Yes, floating homes have unique qualities, they float and react to water levels. The problem arose when asked would these proposed floating home designs be as successful on land? At the onset of the practicum the typology of the floating home was chosen for its unique location between land and water and built and natural environment and for its inherent spatial restrictions. The typology choice was more to do with the ability for floating houses to be relocated, float, and rest on land having the ability to adapt to the changing climatic conditions.

### ***Future Investigations***

Inquiry into the implications of placemaking when a building is mobile was lacking and limited in the design of the proposed floating house designs, and is a possible source of future development and exploration.

I would have liked to push the spatial limits even further. A possible future research direction might be into the design of microspaces.





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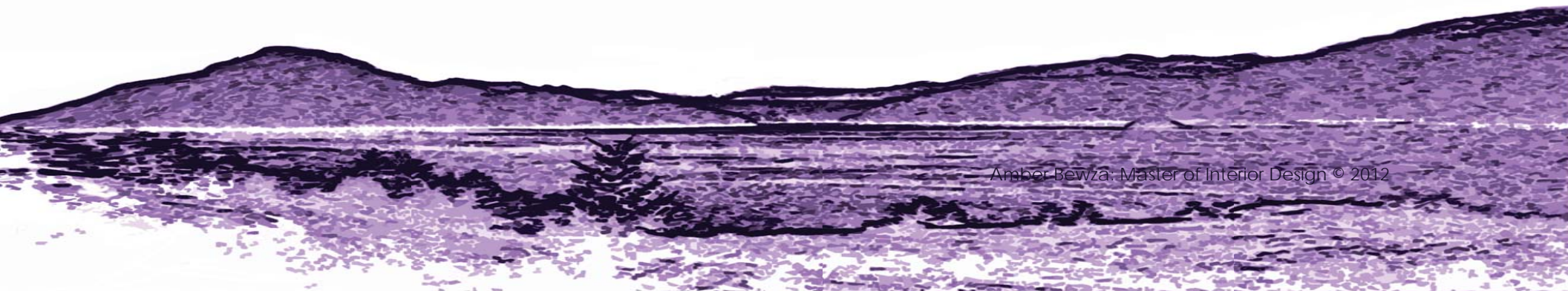
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# Appendix

Each of the following standards, guidelines, and codes have been analyzed in section 5.3 Building Standard, Guideline, & Code Analysis. The following is a compilation of the pertinent sections taken directly from each standard, guideline, or code as they relate to the unique requirements of the design of the proposed floating homes:

- **Hitchhikers Guide to the Float Home Standards**
- **British Columbia Float Home Standards**
- **Vancouver Building By-law: Part 11 of Division B: Float Homes and Marinas**
- **False Creek Official Area Development Plan**

# *Hitchhiker's Guide to the Float Home Standards<sup>1</sup>*

<sup>1</sup> "Hitchhiker's Guide to the Float Home Standards," Floating Home Association Pacific Canada, <http://www.floathomepacific.com> (accessed June 2, 2011).

## **1. Requirements / Standards for Float Homes:**

- a. A float home shall not be located other than within land designated in the [municipality name] zoning and developed bylaw as permitting Waterborne residential use.
- b. A float home shall contain not more than one dwelling unit, nor shall it exceed in height three stories.
- c. The floatation system shall be designed according to accepted marine engineering and architectural principles, and shall be approved by a qualified member of the Association of Marine Surveyors or the Professional Engineers Association of British Columbia.
- d. The floatation device shall be durable and not subject to deterioration by water, mechanical damage due to floating debris, electrolytic action, water-borne solvents, organic infestation or physical abuse, to the satisfaction of a marine surveyor or professional engineer.
- e. Where solid floatation devices are not used, an adequate portable bilge pump shall be maintained in proper working order and sounding pipes provided for each compartment. Material and construction to maintain a minimum of 12" of freeboard, and less than two inches of trim and list. Logs, untreated wood and exposed foam is not considered suitable.
- f. The overall buoyancy and stability of the floats and superstructure shall be sufficient (in the opinion of a marine surveyor) to accommodate local wind and water turbulence, moving and launching, wave action, tides, loads imposed by vessels and walkways moored to the structure, and snow loads, or the possibility of water flooding associated with fire fighting.
- g. The floatation system of a floating home shall be designed as an independent unit to work in conjunction with the superstructure and to provide overall stability of the float home.

Special Note: Positive floatation is required to qualify for a CMHC mortgage.

- h. The framing of the float home shall conform to either of the following standards:
  - CSA structural standards for mobile homes provided that construction is carried out under controlled conditions with proper inspections and is CSA certified. Structural components shall be designed and utilized only as component parts of a unified system; or
  - the relevant sections of the British Columbia Building Code, together with Provincial Government Standards developed from time to time and specifically related to float home design and construction.
- i. All fastenings shall be hot dip galvanized marine grade bronze, copper, stainless steel or other material suitable for marine use.
- j. All electrical systems on float homes shall comply with CSA residential standards intended for

connection to a 120/240 volt, 3 wire, single phase AC supply. Electrical equipment on board shall be restricted to those appliances which conform to the standards of the Canadian Electrical Code.

- k. All float homes shall be connected to an approved source of potable water, and shall have plumbing systems which conform to either of the following standards:
  - CSA plumbing standard for mobile homes provided that these are assembled, inspected and approved by CSA; or
  - plumbing as per the British Columbia Plumbing Code.
- l. Liquid petroleum gas, including propane naphtha, butane, natural gas and gasoline systems shall not be permitted on float homes unless the design and installation of the entire lighting, heating and cooking systems have been inspected and approved by the local fire authorities.
- m. Fireplace and flue construction shall comply

with the relevant section of the British Columbia Building Code.

- n. All float homes shall be equipped with smoke alarms to the satisfaction of the local fire authorities.
- o. Guard rails at least 1.1 metres (3.609 feet) high shall be provided at the edges of all decks not encompassed by the exterior walls of the float home superstructure and otherwise shall be provided as required by the British Columbia Building Code.
- p. Safety equipment within a float home shall include one fire extinguisher of a type and in a location to be established by the local fire authority, one axe for cutting mooring lines, and one life ring 76 centimetres (30 inches) in diameter.
- q. A float home shall have prominently affixed to it a numbered and dated decal issued by the Building Inspector to indicate that he is of the opinion that the float home has met the standards required in

the Agreement.

### **5. Spacing:**

- a. The minimum distance between the floats or walls of adjacent float homes shall be 3 metres (9.843 feet).
- b. The minimum distance between the walls of float homes on opposite sides of a moorage walkway shall be 3 metres (9.843 feet).
- c. Float homes shall have sufficient direct access to open water, as determined by the local fire authorities, to allow for access in and out of moorage berths in a case of emergency. Each float home shall abut open water of a least 6 metres (19.685 feet) in width.
- d. Access shall be provided to at least two adjoining sides of the float home by walkways either on the base of the structure itself or on the floats of the marina. Access on the structure shall be a



minimum of 1 metre (3.937 feet) in width.

- e. At least one habitable room within a float home shall overlook an unobstructed area having a width of 5 metres (16.404 feet) measured horizontally at right angles to the exterior wall of the room, and having a breadth equal to the full length of the exterior wall of the room.

#### **6. Resident Access:**

- a. A float home shall have access to the upland area by a float or wharf of at least 1.5 metres (4.921 feet) in width, except where entry is gained directly to the float home by a gangway in which case the gangway shall be not less than 1 metre (3.937 feet) in width.
- b. Float walkways shall be a minimum of 1.5 metres (4.921 feet) in width. Slip walkways or finger piers shall be a minimum of 1 metre (3.937 feet) in width.

- c. All walkway surfaces shall be covered with a nonslip surface and shall be stable.

#### **7. Water Supply:**

- a. An adequate supply of pressurized potable water shall be available at all marinas at a walking distance of not greater than 150 metres (492.126 feet) from any watercraft moored at the marina.
- b. Potable water shall be available 24 hours a day and should be conveyed in such a manner as to maintain the quality of water from its source.
- c. All moorage spaces for float homes shall be provided with potable water connections.
- d. The potable water supplied to dockside watering points and watercraft connections shall be protected with backflow prevention devices and to the standards provided by the British Columbia Plumbing Code.
- e. Fire standpipes, hydrants or other fire fighting

apparatus shall be provided to the approval of the municipals fire department. Pressure and flow shall at all times be adequate to meet fire fighting requirements.

- f. All water supply mains shall be located beneath the walkway surface of the dock walkway or, alternatively, if above the level of the walking surface, shall not diminish the effective width of the dock walkway below the width required in Section 6 "Resident Access".

#### **8. Sewage Disposal:**

- a. All float homes shall have provision for connection to an approved municipal sewage system; or into an alternative sewage system approved by; either the Medical Health Office or the Waste Management Branch, B.C. Ministry of the Environment.

## *British Columbia Float Home Standards<sup>1</sup>*

<sup>1</sup> Ministry of Energy and Mines, Office of Housing and Construction Standards, "British Columbia Float Home Standards," British Columbia: The Best Place on Earth, <http://www.housing.gov.bc.ca/pub/htmldocs/floathome.htm> (accessed June 10, 2011).

### **Part 3 - Technical Requirements**

#### **Section 3.1 General Requirements**

##### **3.1.2. Safety Equipment**

Safety equipment within a float home shall include at least one buoyant throwing aid with at least 7.5 meters of line attached (e.g. a life ring conforming to Coast Guard small craft requirements).

#### **Section 3.2 Design Standards for Flotation Devices for Floating Homes**

##### **3.2.1 Reserve Buoyancy Criteria**

The floatation device shall have sufficient buoyancy to support the lightship weight of the float home plus the maximum combined weight of deadweight items and design snow load and maintain a minimum freeboard of 200 mm. The floatation device shall maintain a minimum freeboard of 400 mm under normal load conditions (the above noted loads minus design snow load).

### **Section 3.3 Superstructure**

#### **3.3.1 Design and Construction**

Float home superstructures and interior living areas shall be designed and built in accordance with Part 9, "Housing and Small Buildings," of the B.C. Building Code with the following exemptions:

- a. Stairs providing a required means of egress from an area of not more than 40 sq m shall have a minimum clear width of 760 mm and the angle of inclination above the horizontal shall not exceed 50 degrees.
- b. Guards are not required where open decks, balconies, and walkways do not exceed 1 m in height above the water line.
- c. Fastenings in areas exposed to the elements shall be hot dipped galvanized steel, marine grade bronze, copper, stainless steel, or other corrosion resistant material suitable for marine use.
- d. Additional structural specifications may be required for the design of the floatation system

due to local wind and water conditions.

### **Section 3.4 Utilities**

#### **3.4.3 Plumbing**

- a. Float homes shall be supplied with an approved source of potable water.
- b. Float homes shall have a plumbing system which conforms to good engineering practices and is accepted by the authority having jurisdiction. Plumbing systems conforming to the B.C. Building Code are acceptable.
- c. Where a piped water supply is available, each moorage space for float homes shall be provided with a potable water connection.

#### **3.4.4 Sewage Disposal**

Float homes shall have, or be connected to, an approved sewage disposal system. Sewage disposal

systems shall comply with the Sewerage System Regulation or the Municipal Sewage Regulation.

### **Section 3.5 Float Home Fire Prevention Measures**

#### **3.5.1 Portable Fire Extinguishers**

Placement of portable fire extinguishers shall be in accordance with Chapter 3 of NFPA 10, "Standard for Portable Fire Extinguishers." A minimum of one 2A5BC rated portable fire extinguisher shall be placed at the entrance/exit of each float home.

#### **3.5.2 Fixed Fire Extinguishing System**

Float homes, located in a marina, shall be protected in accordance with either Option 1 or Option 2 as detailed below, unless deemed to be unnecessary by the authority having jurisdiction.

##### **Option 1**

Float homes shall be protected by a fixed automatic

sprinkler system installed in accordance with NFPA 13D, "Standard for the Installation of Sprinkler Systems in One-and-Two Family Dwellings and Mobile Homes."

#### Option 2

- a. Wharves, piers and walkways serving the float home shall be constructed of totally non-combustible materials,
- b. Wharves and piers shall incorporate a standpipe system installed in accordance with NFPA 14, "Standard for the Installation of Standpipe & Hose Systems" and
- c. Fire fighting access to float homes must be acceptable to the authority having jurisdiction.

### **Section 3.6 Moorage and Attachments**

#### **3.6.1.**

- a. Float homes shall be moored in conformance with the Navigable Waters Protection Act.

- b. Sufficient fastenings shall be available to prevent the float home from separating from the wharf, pier or walkway due to list, wind, or grounding.

### **Section 3.7 Access**

#### **3.7.1.**

- a. Each float home shall have direct access to an unobstructed walkway or pier leading to shore.
- b. Piers and walkways shall be a minimum of 1.5 m in width.
- c. Walkways shall have a non-slip surface.
- d. Inclined walkways or ramps with a gradient exceeding 1:10 shall have handrails.
- e. Accessible areas shall be illuminated to an average illumination level of 20 lux at walkway level with critical areas such as gates, ramps and safety stations being provided with 50 lux of illumination.

Disclaimer



# Vancouver Building By-law: Part 11 of Division B: Float Homes and Marinas<sup>1</sup>

<sup>1</sup> Office of the Chief Building Official, "Vancouver Building By-law: Part 11 of Division B: Float Homes and Marinas," City of Vancouver, <http://vancouver.ca/commsvcs/cbofficial/vbbl/part11.htm> (accessed May 25, 2011).

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## Section 11.2. Design and Construction and Other Requirements

### 11.2.2. New Float Homes and Marinas

#### 11.2.2.1. Construction Requirements

1. A marina walkway shall be protected against fire spread and collapse in accordance with NFPA 303, "Fire Protection Standard for Marinas and Boatyards."
2. A float home shall be designed and constructed in accordance with the British Columbia Float Home Standard.
3. In addition to this Part 11, the requirements of Parts 7, 9, and 10 shall apply to the design, construction, and alteration of a float home.

4. In addition to this Part 11, the requirements of Parts 3 to 9 shall apply to the design and construction of any structure or installation forming part of a marina.

#### 11.2.2.2. Potable Water Supply for Marinas

2. Each moorage space for a liveaboard vessel or float home shall be provided with a potable water connection.
3. Where potable water is supplied to a dockside, watering point, or watercraft connection, the potable water supply and each berth connection shall be protected with a backflow preventer.
4. A marina shall meet the requirements of Part 7 regarding potable water supply.

#### 11.2.2.3. Sewer Discharge for Float Homes and Marinas



1. Each moorage space for a liveaboard vessel or float home shall be provided with a sanitary sewer connection.
2. Sewage shall be discharged into an acceptable sanitary sewer.
4. Pump-out facilities shall be discharged into the sanitary sewer, and shall be designed, operated, and maintained to prevent any discharge of sewage onto docks or into the adjacent water.
5. A sewer pipe shall be located beside or underneath the surface of any marina walkway and in a manner that it is at no time submerged below water.
6. A marina shall meet the requirements of Part 7 regarding sewage discharge.

#### **11.2.2.4. Lighting for Marinas**

1. All areas throughout a marina shall be illuminated to a minimum average level of 50 lux at the level

of all marina walkways.

#### **11.2.2.5. Marina Walkways and Ramps Serving Float Homes and Marinas**

1. A floating marina walkway which provides access to the upland area shall be at least 2 m wide.
2. A floating marina walkway which provides direct access to water craft shall be at least 750 mm wide.
3. An inclined marina walkway shall have a non skid surface and handrails on both sides conforming to Article 9.8.7.4.
4. Life rings, assist poles, and ladders from docks into the water shall be provided at intervals not exceeding 30 m along the length of all marina walkways.

## *False Creek Official Area Development Plan (Adopted by By-law No. 4812, November 5, 1974)*<sup>1</sup>

<sup>1</sup> City of Vancouver, "False Creek Official and Area Development Plan," City of Vancouver, <http://vancouver.ca/commsvcs/Bylaws/odp/fccdd.pdf> (accessed January 16, 2012).

### **2.0 Residential Use**

### **2.3 Design Guidelines**

- b. Dwelling Types – Dwelling units may include studio, one, two, three and more bedroom units, and may also include experimental type housing.
- d. Residential Clusters – Residential development should be grouped to afford a minimum area occupied by streets and provide ample open space between building complexes.
- g. Roof Tops Are for Living – Flat roofs should be accessible to people and “roof-scaped”
- h. Three Kinds of View – Every dwelling unit should have access to three kinds of view; an intimate view containing nature just outside the unit--neighbourhood glimpse into the life of the surrounding community--and a vista that encompasses distant natural elements that remain “constant” such as the sea or mountains.
- i. Sunny Main Rooms – Ensure that the most frequently used habitable rooms in every dwelling

unit are capable of receiving sunlight.

- j. Six Foot Balcony – Make habitable indoor/outdoor space such as a balcony, gallery, porch, deck or arcade, at least six foot square.
- l. Earth Balcony – Consider providing dwelling units above grade level with their own “earth balcony”, and design them so that bushes, small trees, shrubs, flowers and grass can be grown.
- m. Identifiable Front Entrances – Ensure that the front entrance of every unit is, or is capable of becoming, distinctly different from its neighbours.
- n. Entrance Transition – Give each doorway and entrance an appropriate entrance transition by introducing alcoves, seats, level change, direction change, materials change, etc.
- o. Short Corridors – Break down longer corridors into smaller, less than 50 foot stretches by jogging them, opening them to courts, widening them into lobbies.

## **7.0 Water's Edge, Area and Uses**

### **7.1 Mandatory Requirements**

- a. Public Access – The waterfront edge shall be continuously accessible to the public around False Creek, except as approved by City Council for specific area development plans.
- b. Stabilized – An attractive shoreline treatment which is structurally stable shall be developed along the entire False Creek waterfront in association with the adjacent redevelopment.
- d. Small Marinas – Marina activities should be limited in number, size and capacity in order to not overcrowd the Creek.

### **7.2 Interpretive Requirement**

- a. Moorage – Facilities related to boat moorage should be permitted between Connaught and Granville Bridges.
- c. Live-aboard Permitted – Persons wishing to live

aboard their motor or sailing vessels in False Creek may be permitted to do so provided that such vessels comply with all City, Provincial and Federal regulations and/or standards.

### **7.3 Design Guidelines**

- a. Irregular Alignment – The water's edge should be given an irregular alignment to permit widenings of the water basin for creation of bays, views and usable water frontage.
- b. Variety on Waterfront Walk – Create a variety of experiences along the waterfront walk by varying the treatment of the water's edge, by changing the walk's direction, width and elevation, by pulling the walk back from the water occasionally and by changing vistas along it. Encourage a variety of facilities and activities to develop along the walk that are sympathetic to the water's edge.
- c. 1,700 Boats – The number of boats in the False

Creek Basin be limited to a maximum of 1,700 until the Kitsilano Trestle is removed.

