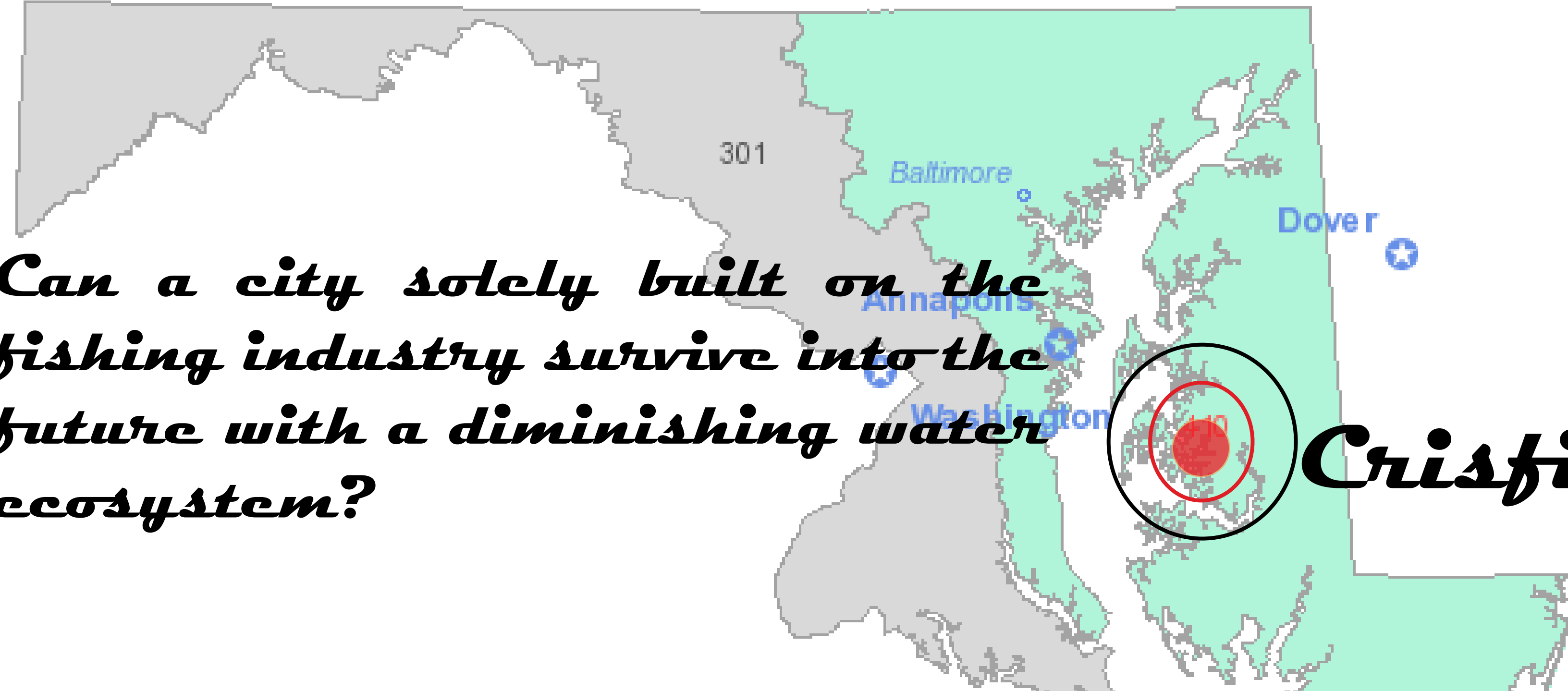


An Underwater Approach

Can a city solely built on the fishing industry survive into the future with a diminishing water ecosystem?



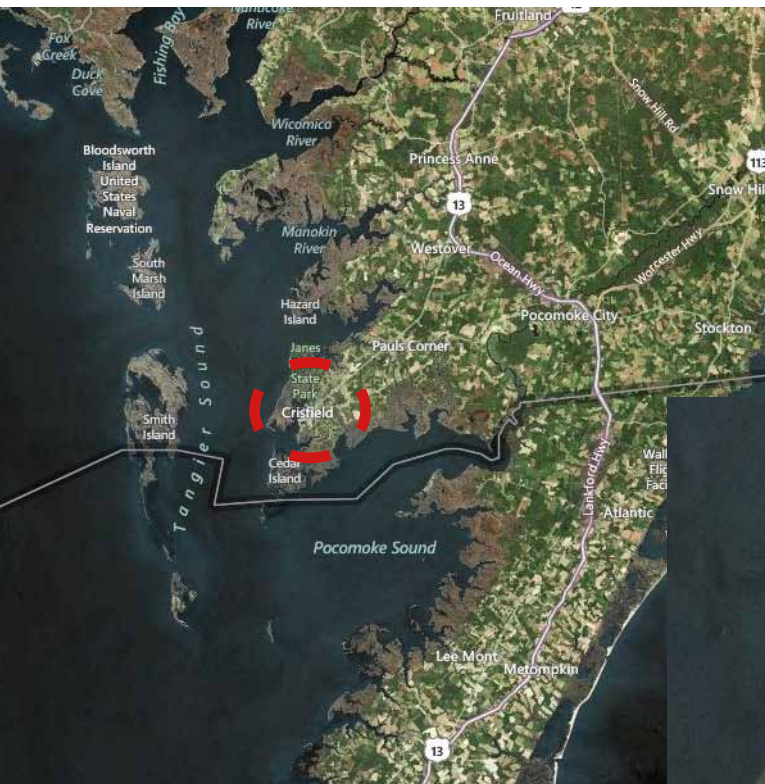
Crisfield



Site Context

The waterside community of Crisfield, MD is the southernmost town in Maryland. Located on the Eastern Shore of the Chesapeake Bay, Crisfield is famous for its seafood. Especially the Maryland blue crab, its Watermen, wildlife, natural beauty, simple lifestyle and strong sense of community built on faith and hard work.

Maryland



Somerset County



Crisfield, MD



Commercial Fishing

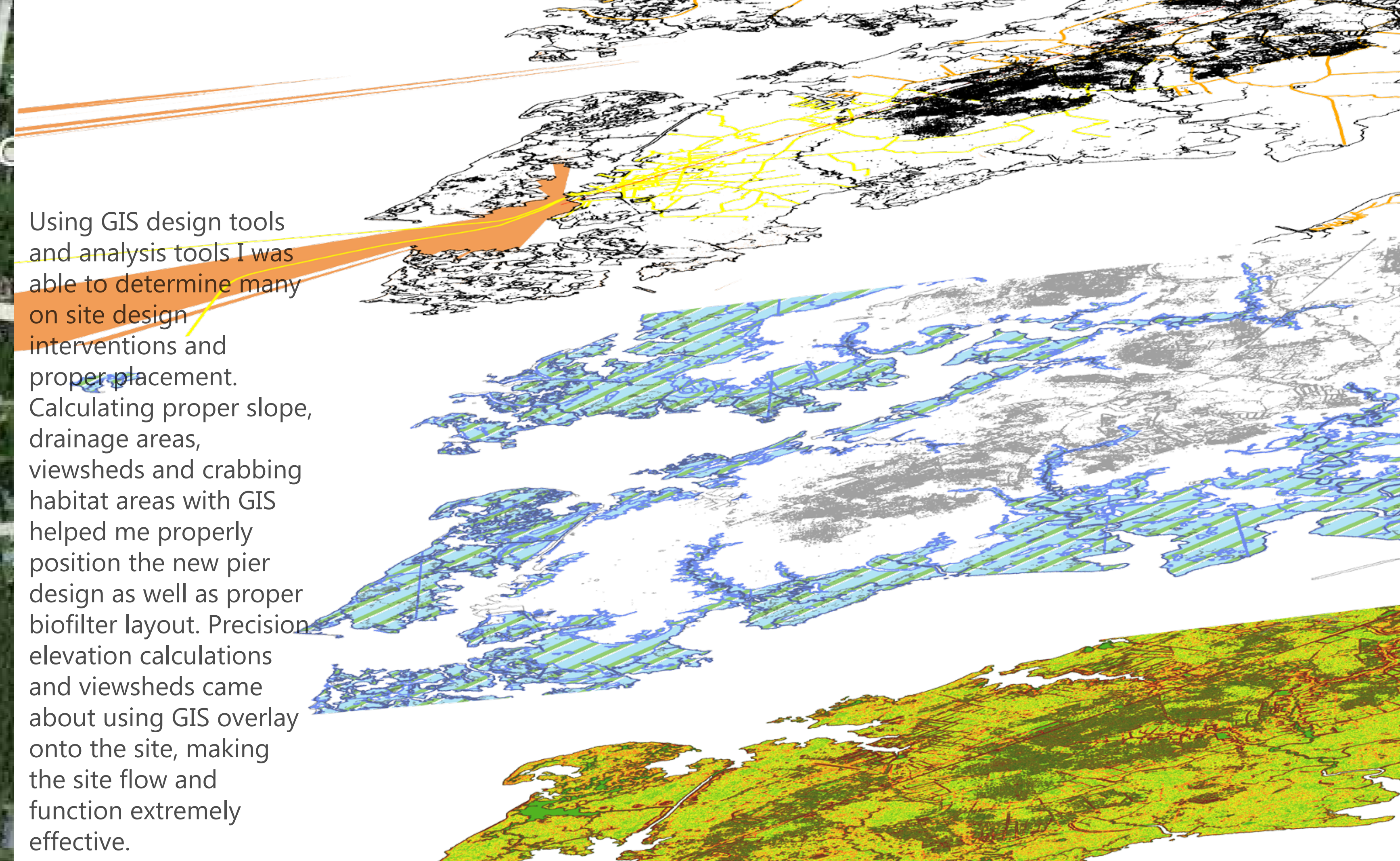
- Industrial
- Residential
- Downtown/ Shopping
- Marine Impliment

“The Crab Capital of the World”

Analysis



Using GIS design tools and analysis tools I was able to determine many on site design interventions and proper placement. Calculating proper slope, drainage areas, viewsheds and crabbing habitat areas with GIS helped me properly position the new pier design as well as proper biofilter layout. Precision elevation calculations and viewsheds came about using GIS overlay onto the site, making the site flow and function extremely effective.



Framing Sustainable Development Issues



Overfishing, agricultural runoff & poor water quality contribute to the overall economic downturn of Crisfield, MD. These issues will be addressed into the new design.



Crisfield waterman have struggled more and more in the recent years due to the poor harvest amounts of blue crabs. Local restaurants and crab shacks have suffered greatly due to the downturn in population. Reestablishing the blue crab population in the main harvesting areas is a main focus in the design.



Crisfield lacks a sense of connection and unity throughout. The "Crabbing Capital of the World" is in great need of a symbolic unifying element to attract visitors to the site and promote economic growth.



Key Issue:

Four large condo units are currently placed along the city's shoreline. One of the most important design elements will be to uniquely and purposely find the most effective use of the condos.



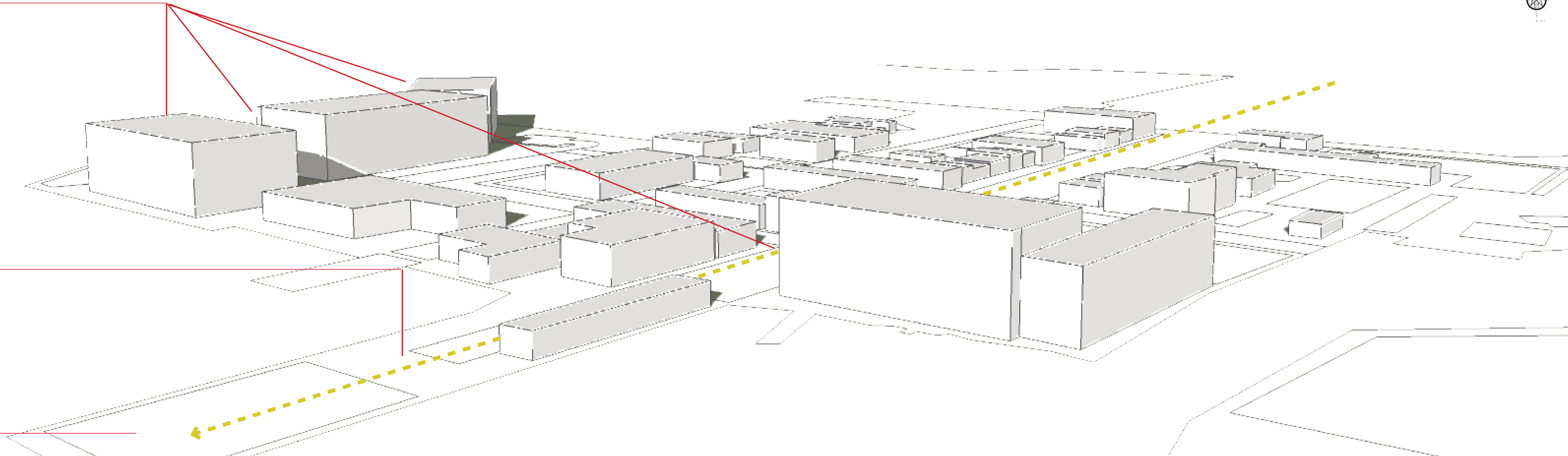
Key Issue:

Bringing visitors to the site by using unique connections and utilizing Route 413 into town will be one of the main focuses and keys to a successful design.



Key Issue:

The connection between the city, the water, and the surrounding ecosystem and how they all play an integral part in the city's future will be the most important key to success in this design.





Key Issue:

Runoff from both the city and agriculture need to be addressed and an education component will be strongly emphasized in the design.

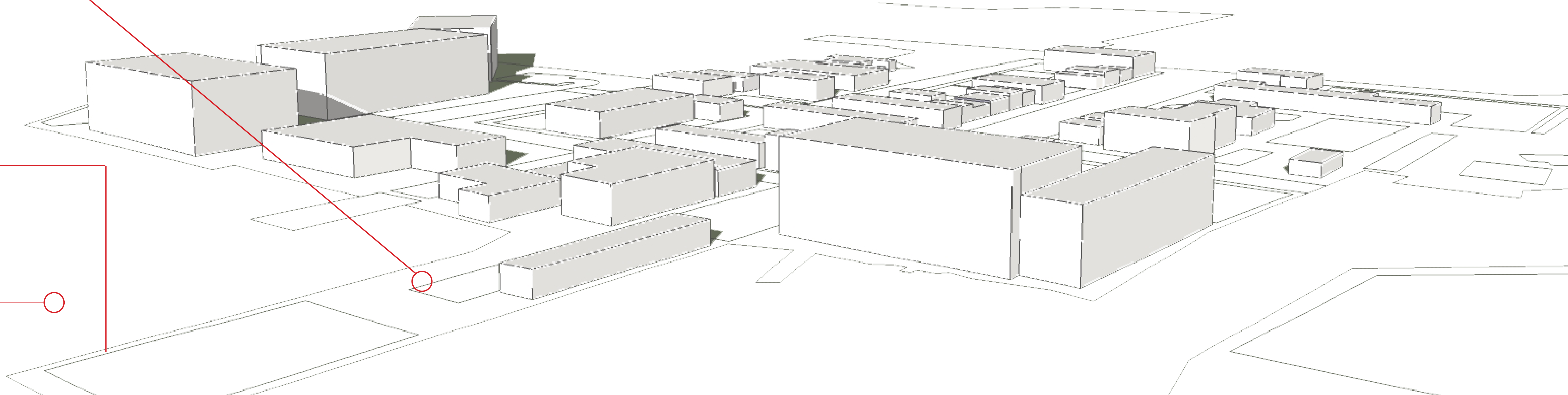
Key Issue:

Locating the focal point of the design will be to best serve both visitors to the site as well as local residents. The placement key design will be located near the current overlook dock area.

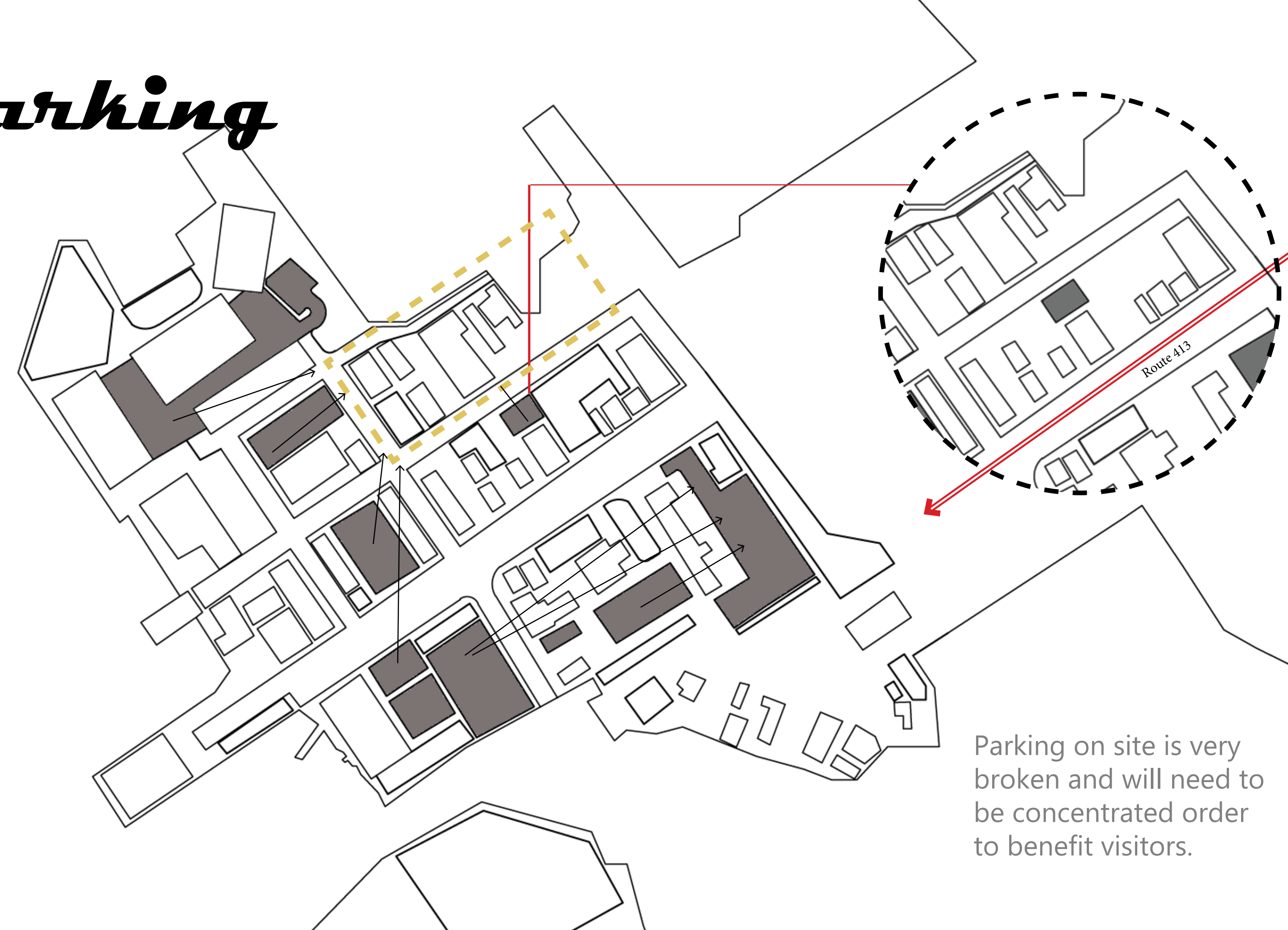


Key Issue:

Connecting the tourism with the local community will be a main design feature. Making a connection from land to water and the ties that go along with each will further solidify the design goals and create a sustainable element to the design.

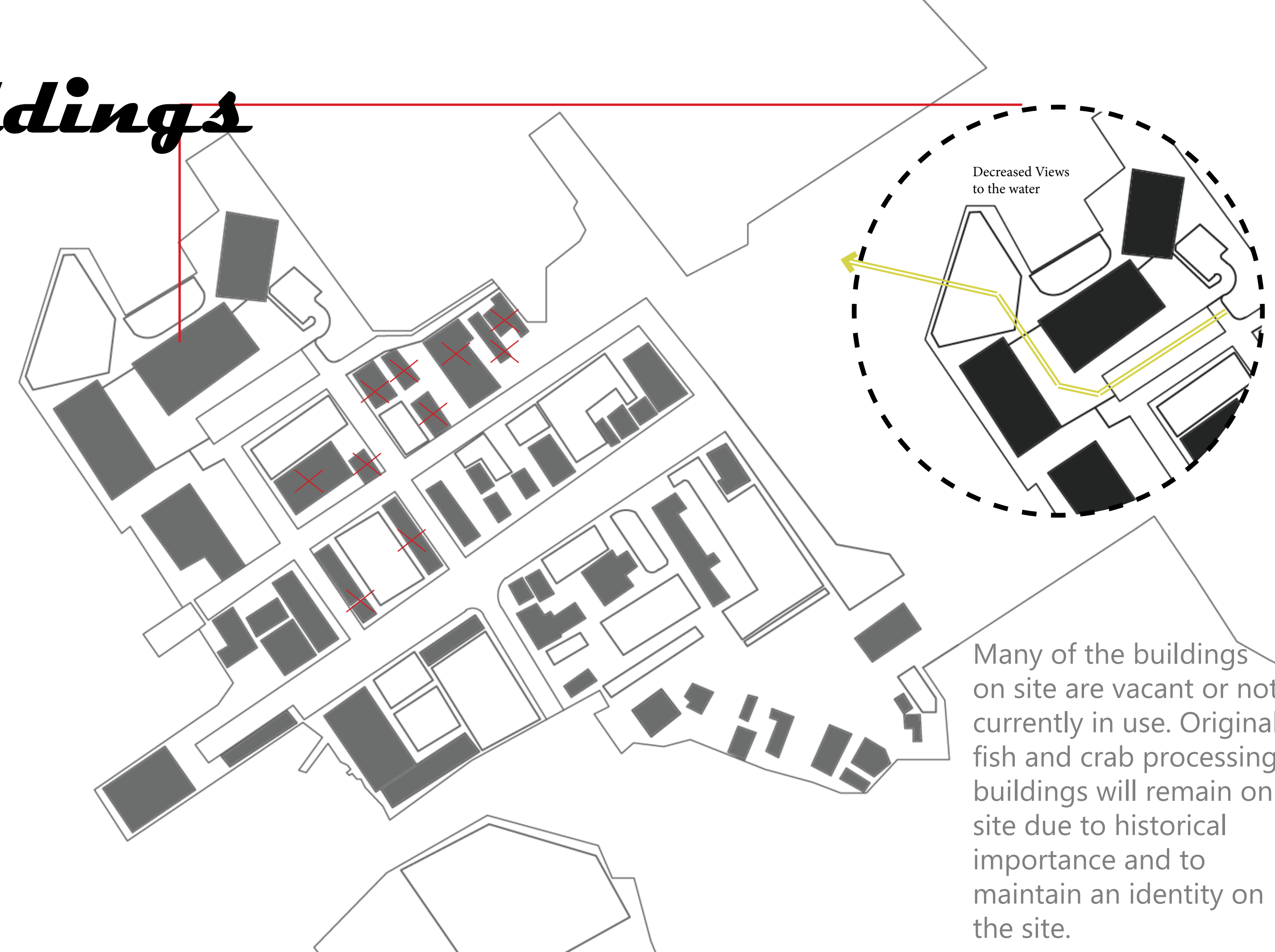


Parking



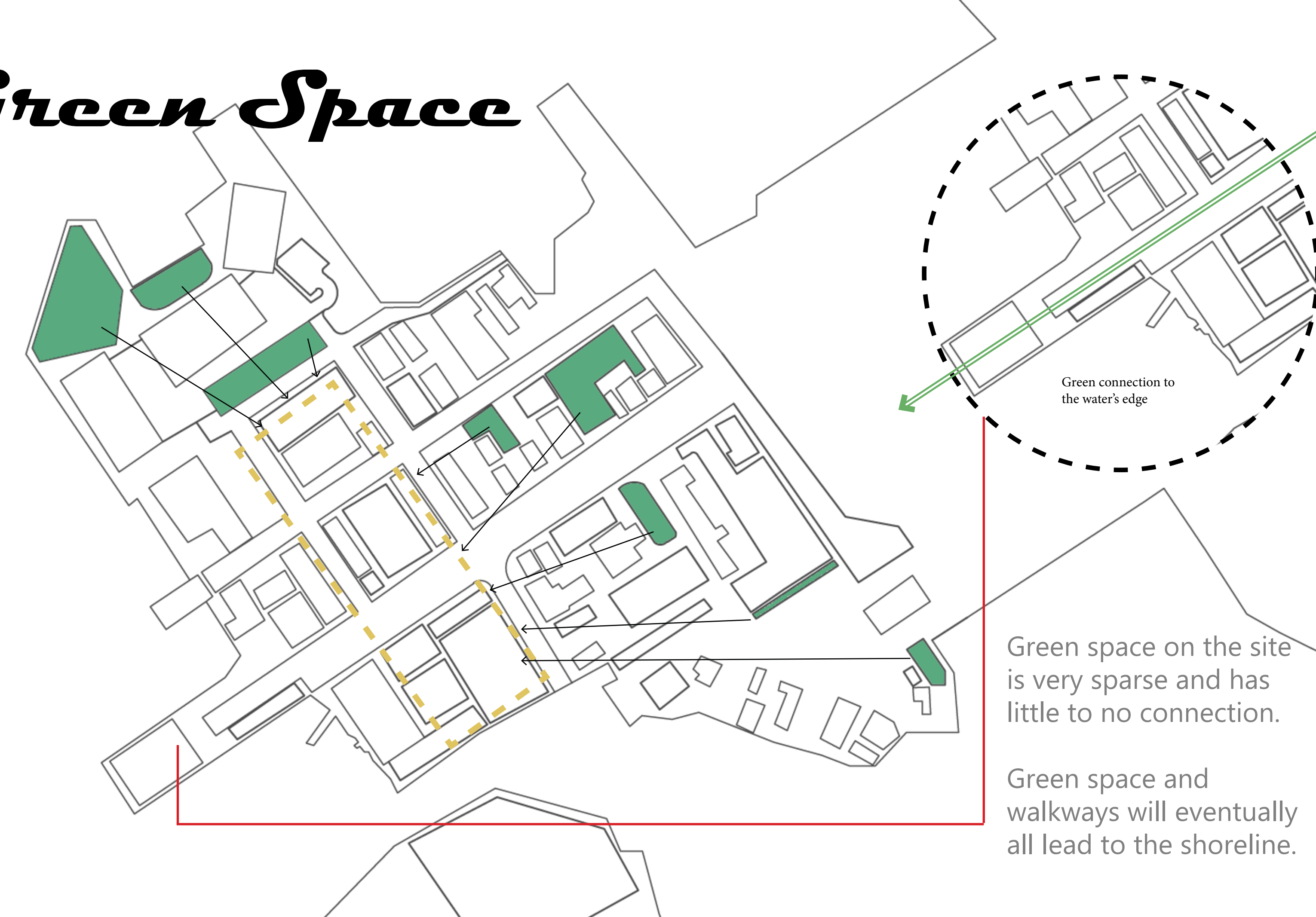
Parking on site is very broken and will need to be concentrated order to benefit visitors.

Buildings



Many of the buildings on site are vacant or not currently in use. Original fish and crab processing buildings will remain on site due to historical importance and to maintain an identity on the site.

Green Space



Green space on the site is very sparse and has little to no connection. Green space and walkways will eventually all lead to the shoreline.

"Only after the last tree has been cut down...
the last river has been poisoned...the last
fish caught, only then will you find that
money cannot be eaten."

- Cree Indian Prophecy

Design Process

Intrigue

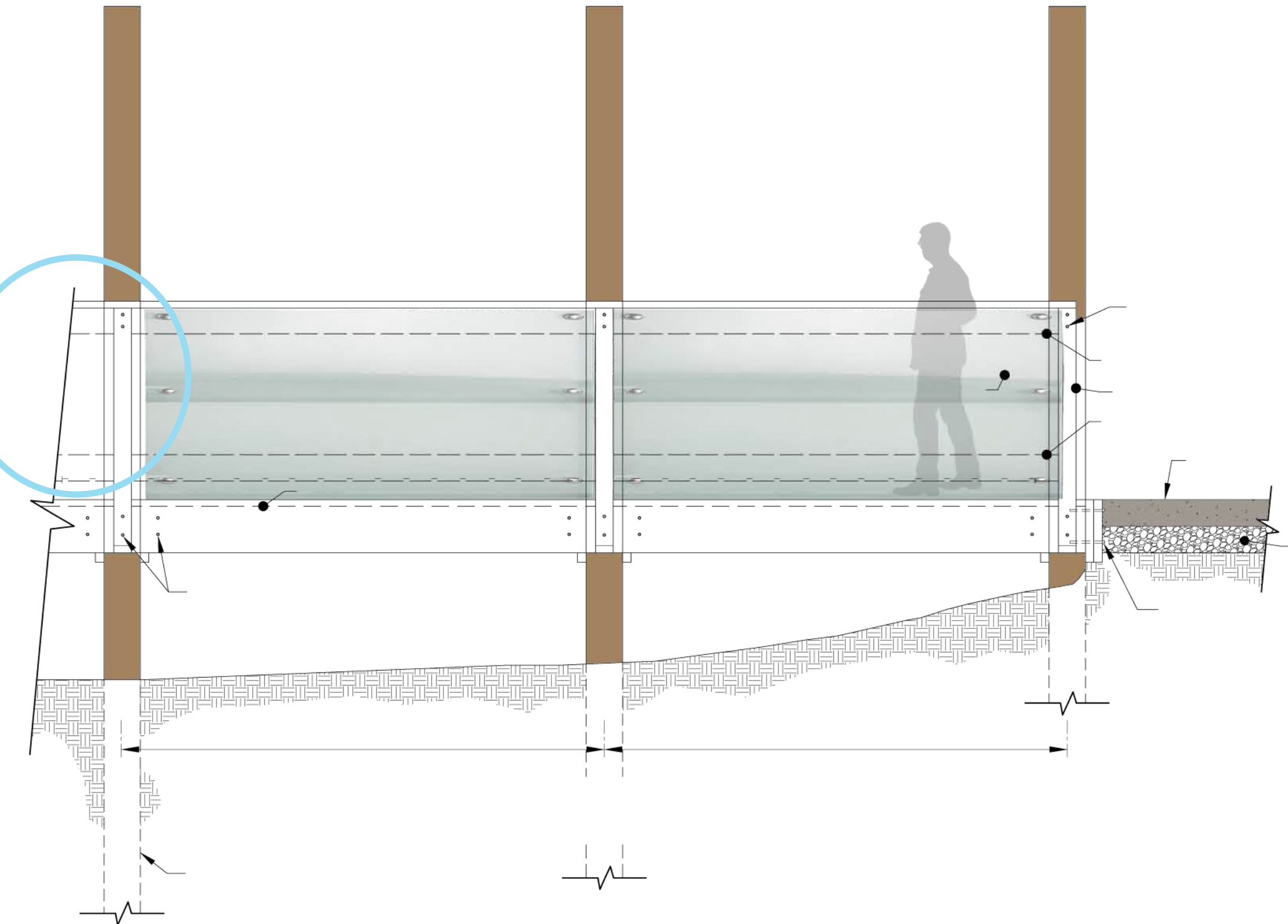
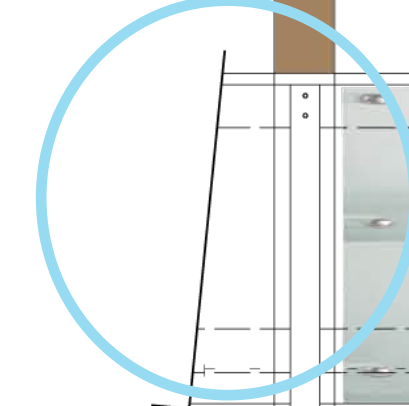
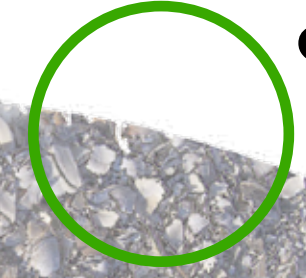
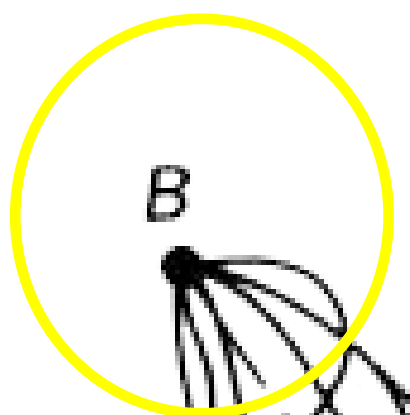
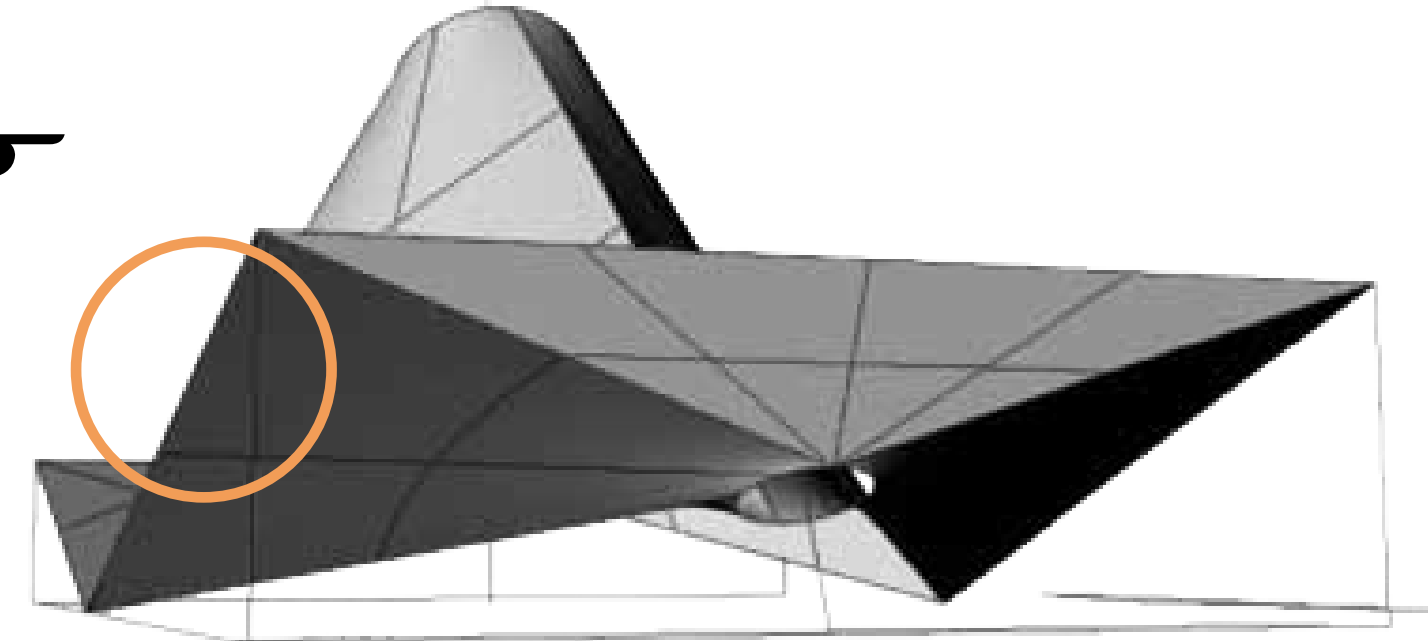
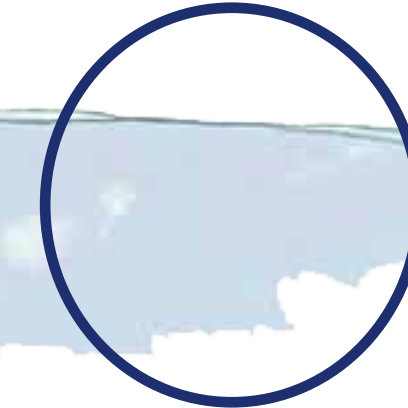
Habitat

Shapes & Design

Connections

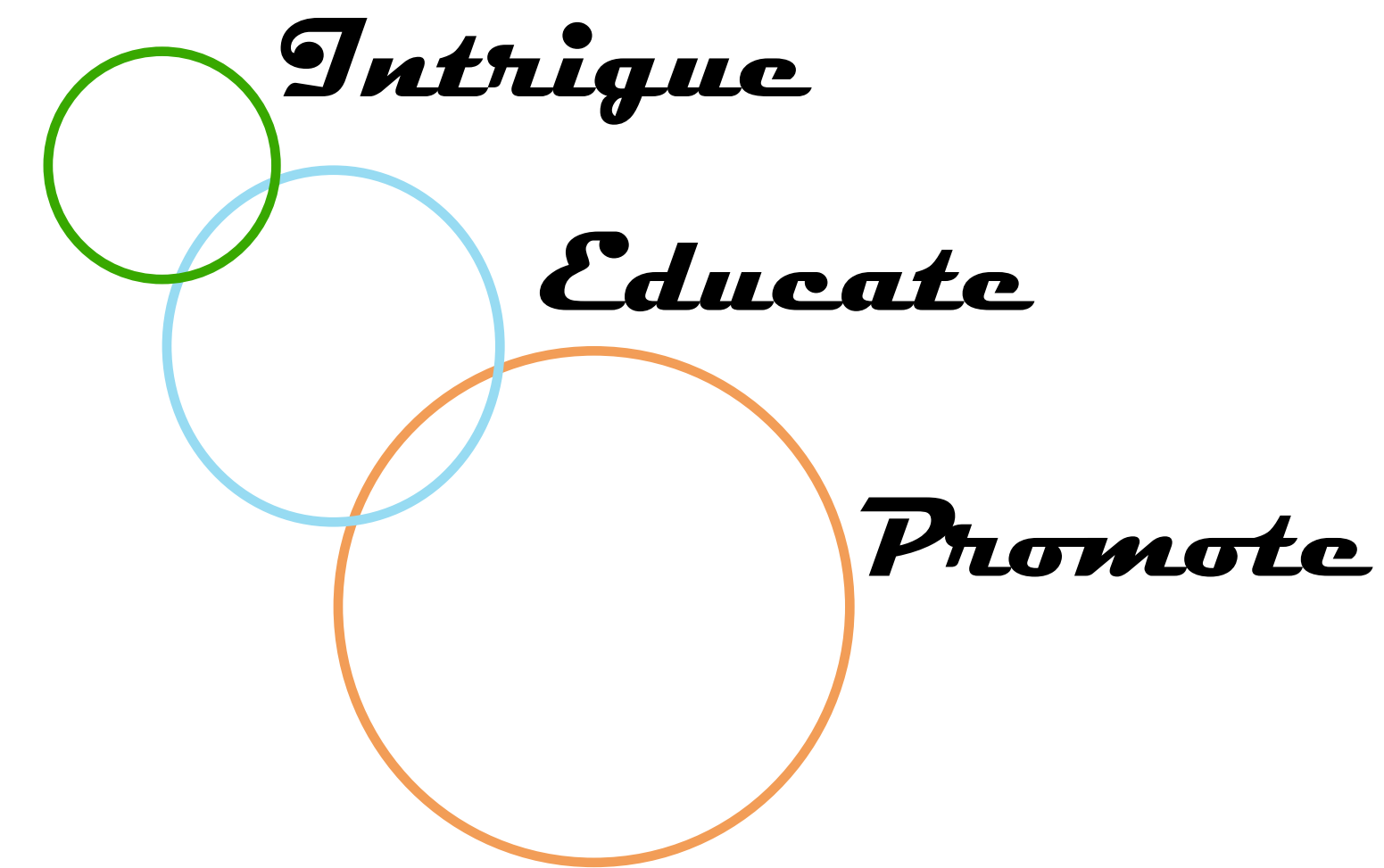
Sustainability

Detail



A

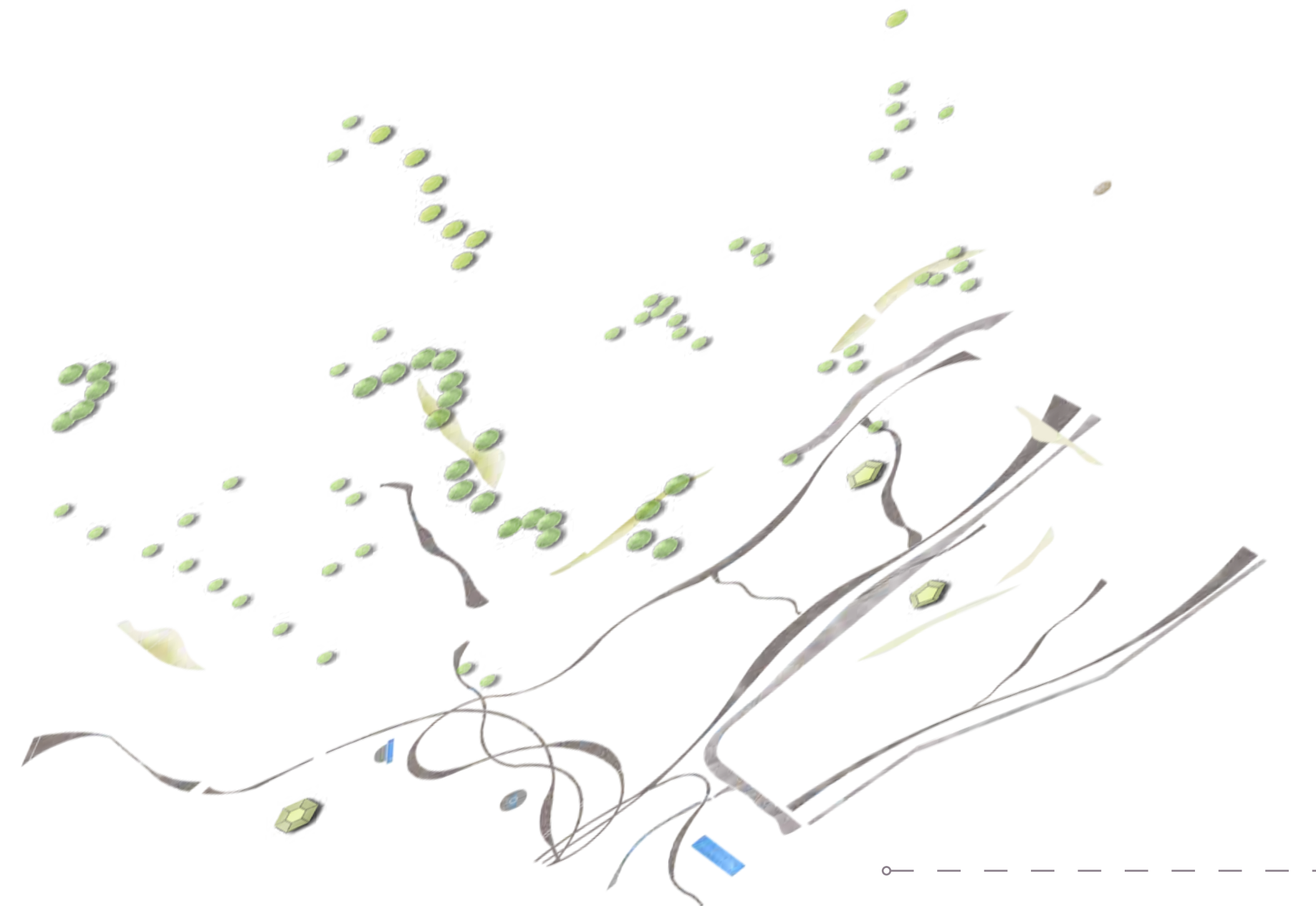
Master Plan



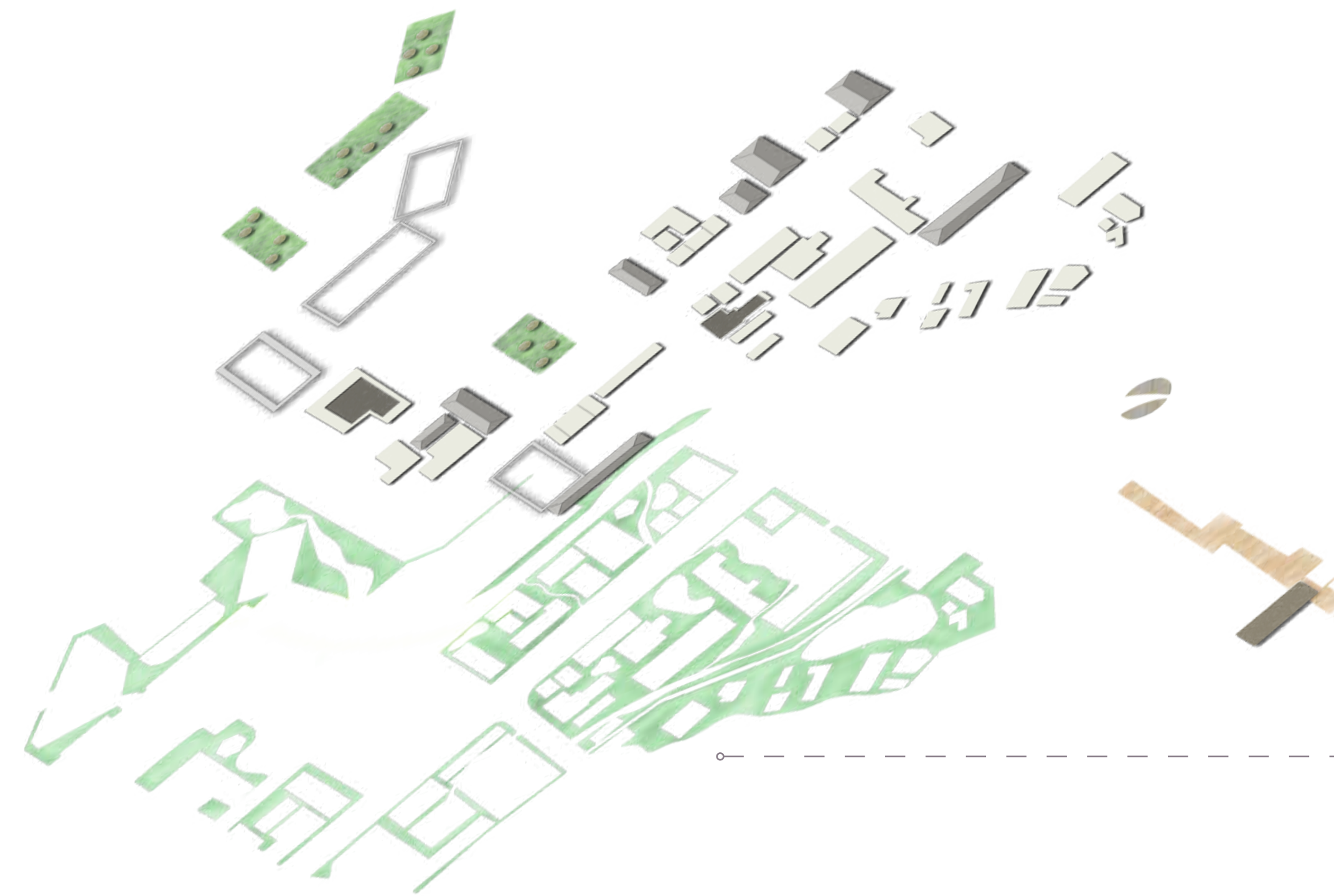
Design

The newly designed Crisfield site is not only functional to the fisherman who live here but also a wonderful all-around experience for visitors. With one of the largest man-made biofilters ever made, Crisfield, MD will see new growth in both tourist visitors as well as a much higher yielding production in blue crabbing efforts. This is truly a design founded on both form and function.

Phase 1



Phase 2



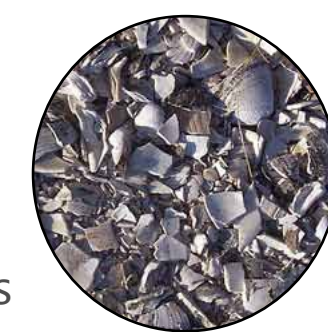
Phase 3



Phase 4



Large & Medium Trees



Oyster Shells



Tall Grasses



New Lumber



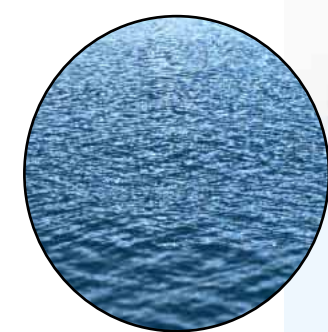
Recycled Lumber



Recycled Asphalt



Recycled Concrete



Water



Oyster Shell Reuse

Site Goals

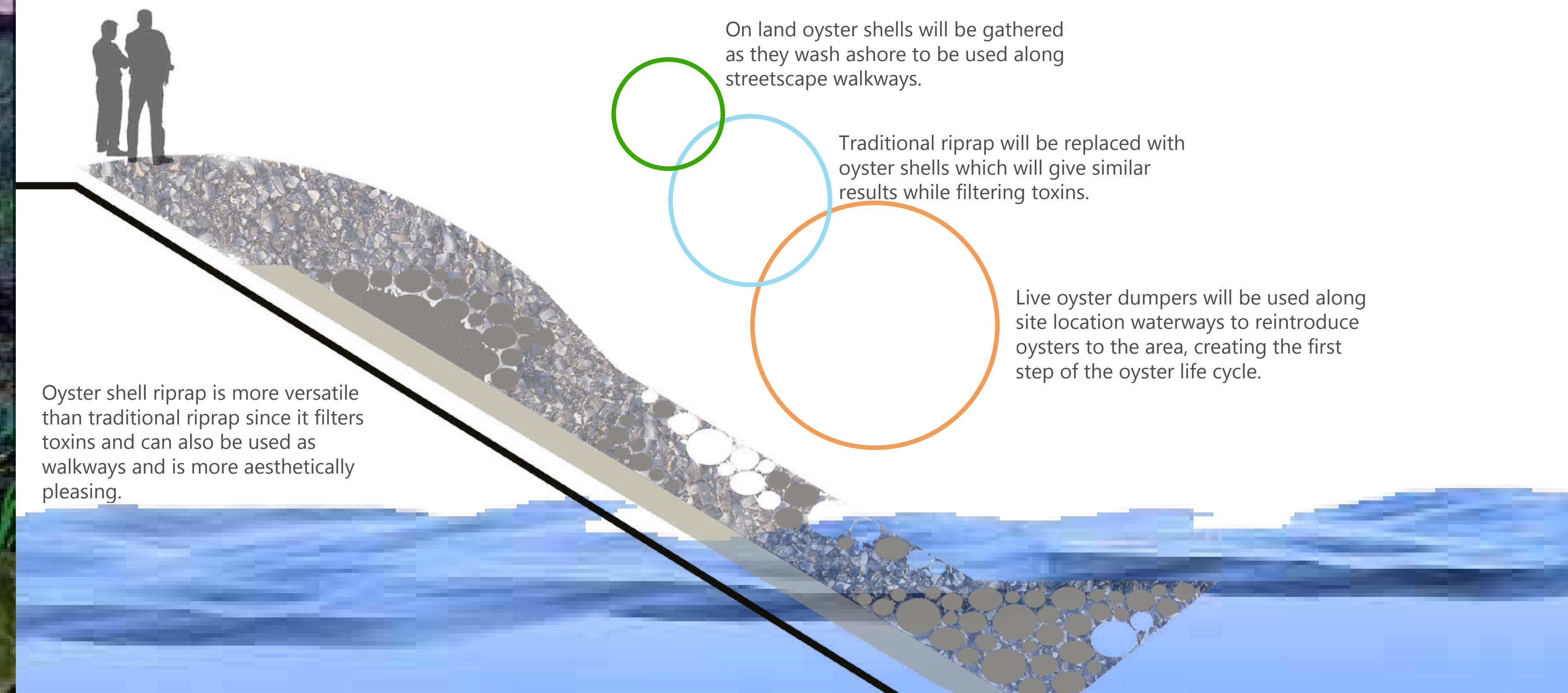
The use of oyster shells throughout the design is due to their unique ability to filter toxins and their abundance on location.

On land oyster shells will be gathered as they wash ashore to be used along streetscape walkways.

Traditional riprap will be replaced with oyster shells which will give similar results while filtering toxins.

Live oyster dumpers will be used along site location waterways to reintroduce oysters to the area, creating the first step of the oyster life cycle.

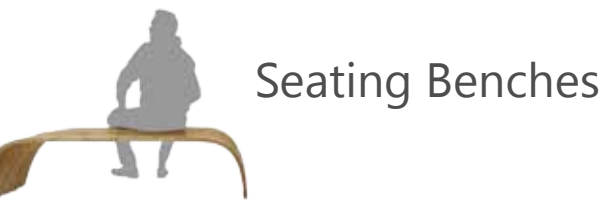
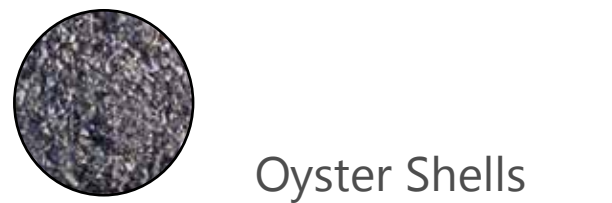
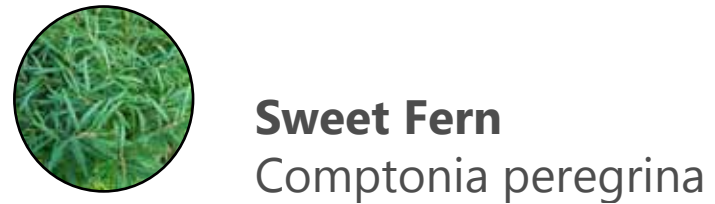
Oyster shell riprap is more versatile than traditional riprap since it filters toxins and can also be used as walkways and is more aesthetically pleasing.



Streetscape *Sight Goals*

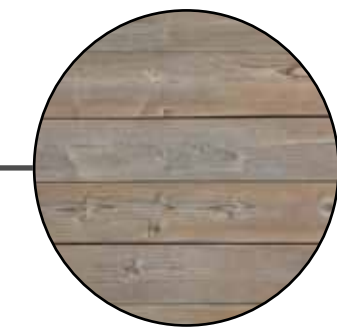


The overall streetscape design is primarily to attract and educate visitors to the site and lead them to the pier. With the path design mimicking waves in order to create an open-close effect it will create a sense of wonder and shifting throughout the site.





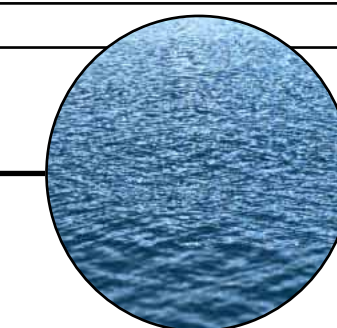
Educational Water



Recycled Lumber



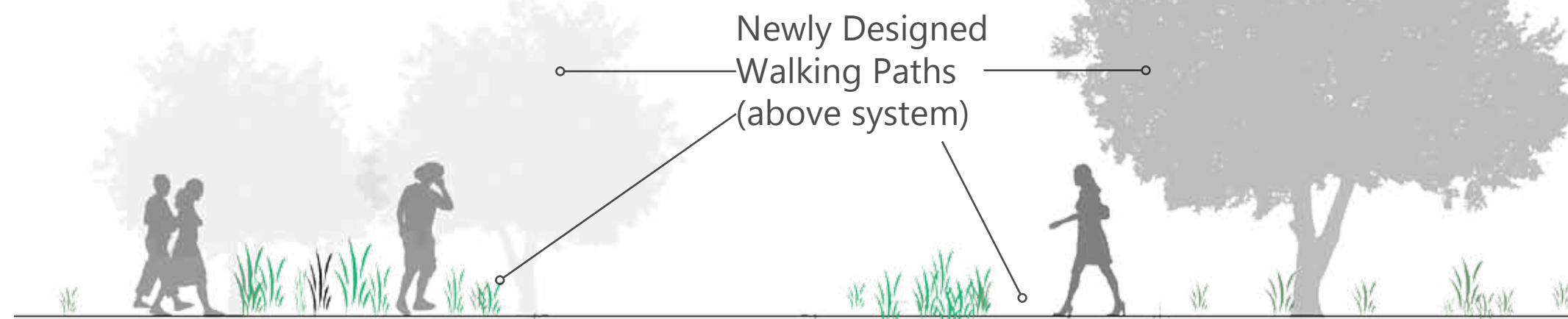
Permeable Pavers



Water

Site Goals

Educational water features will primarily be designed to inform site visitors about how important the water is socially, economically, and environmentally.



Newly Designed Walking Paths (above system)

Existing Soil

Valve Container Entrance

Valves

Permeable Drainage

Overflow Outlet

Transfer Pipe

Pump

Main

Water flow to Fountain & Waterfall

Water Flow from Chesapeake Bay



American beech
Fagus grandifolia



Tulip poplar
Liriodendron tulipifera



Dense St. John's wort
Hypericum densiflorum

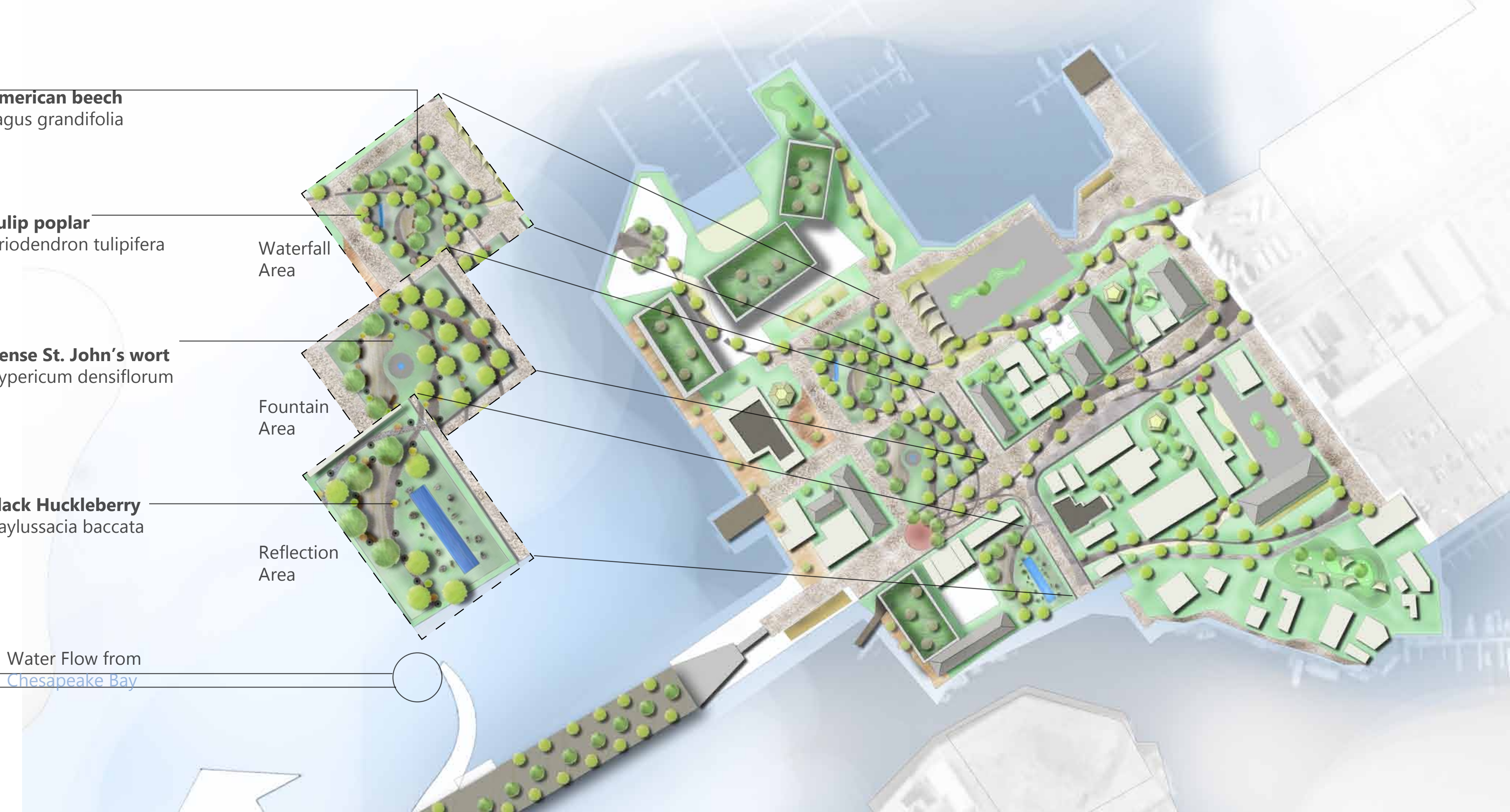


Black Huckleberry
Gaylussacia baccata

Waterfall Area

Fountain Area

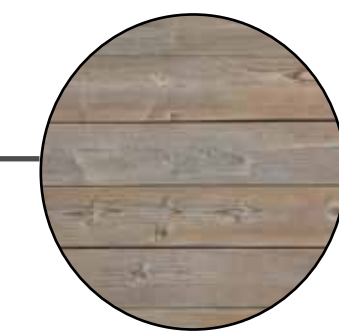
Reflection Area



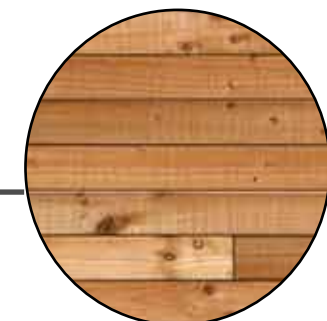
Boardwalk Details



Educational Kiosk



Recycled Lumber



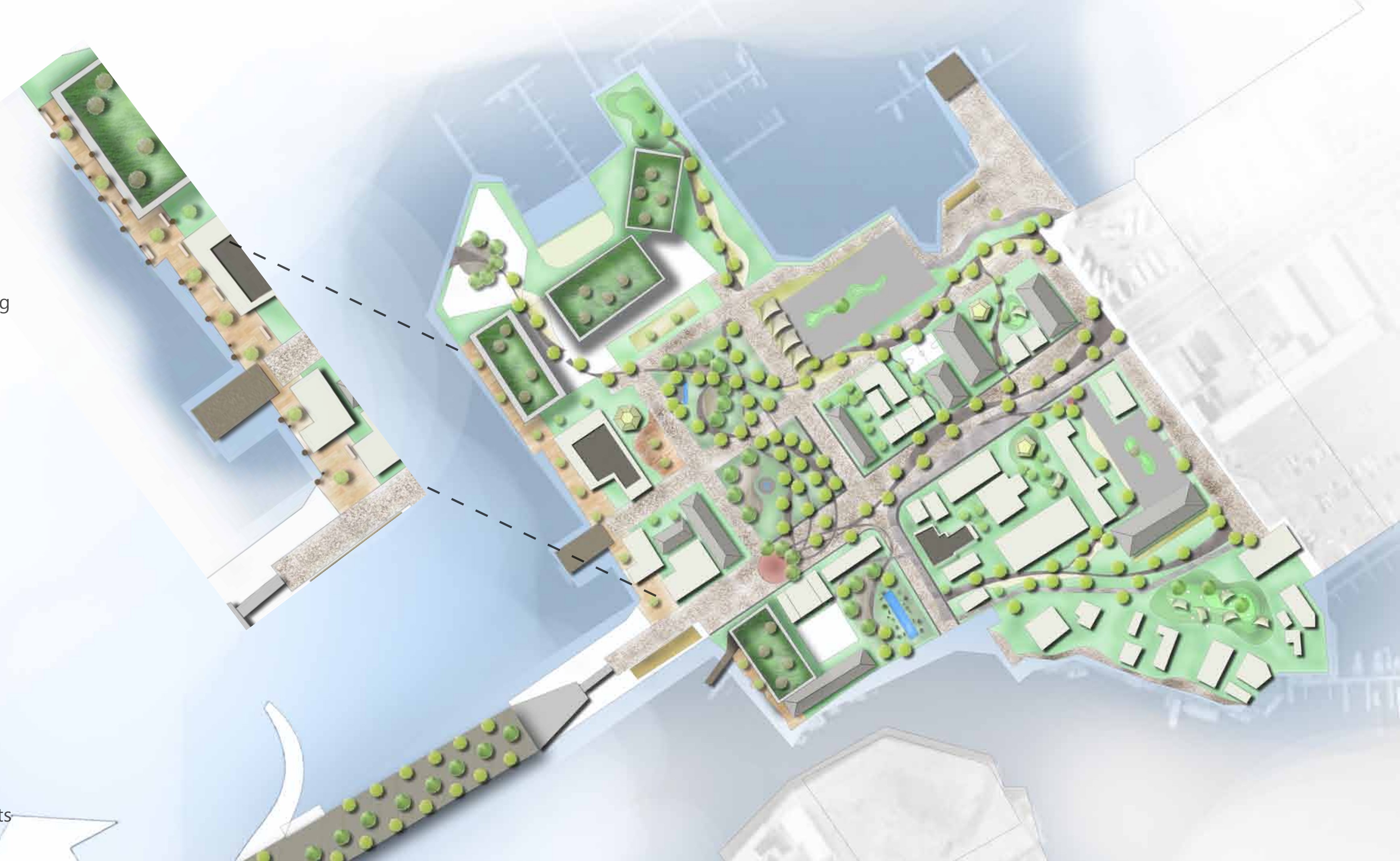
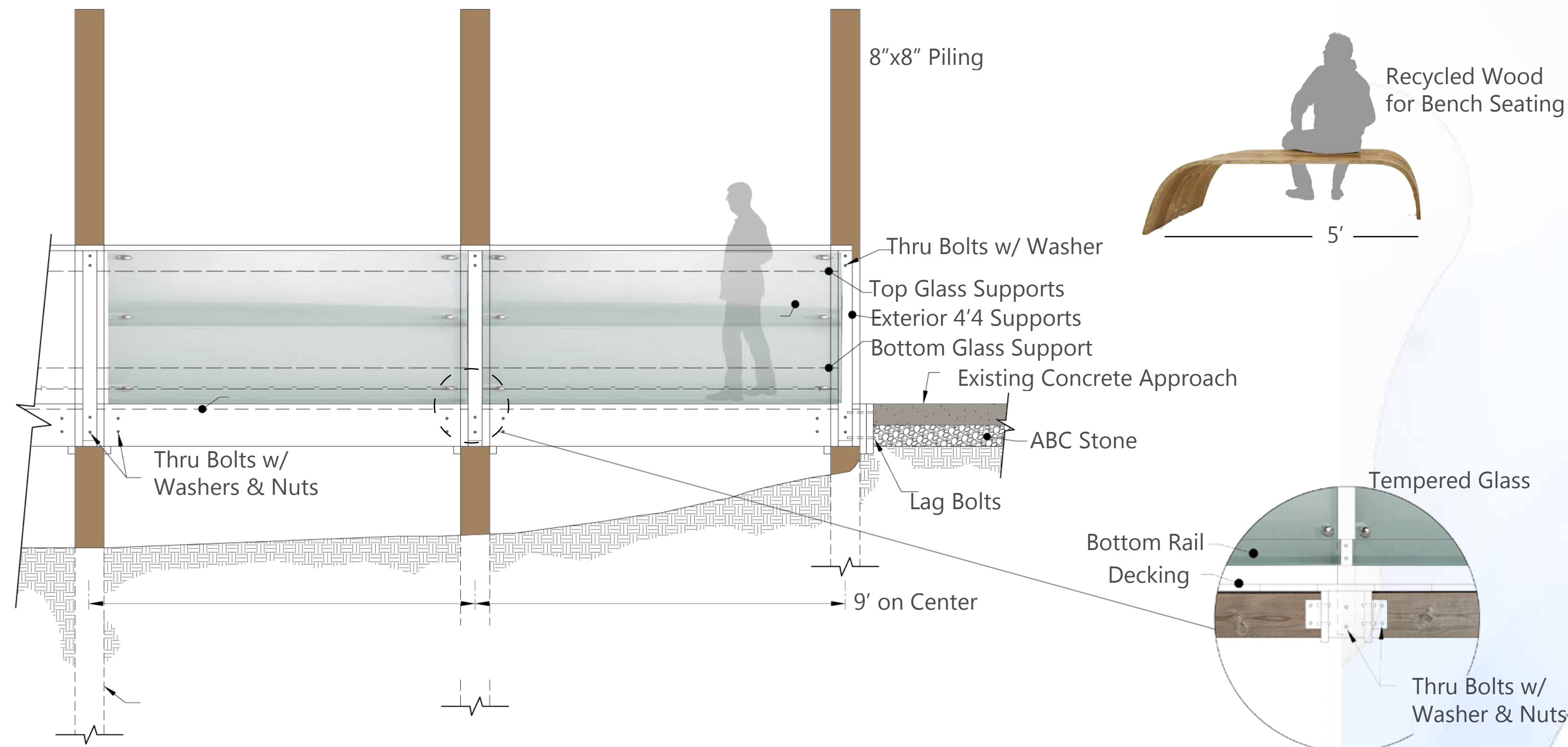
New Lumber



White Fringetree
Chionanthus virginicus

Site Goals

The goals for the boardwalk area are to promote growth of business and traffic toward the waters edge as well as to educate visitors about working systems around them.

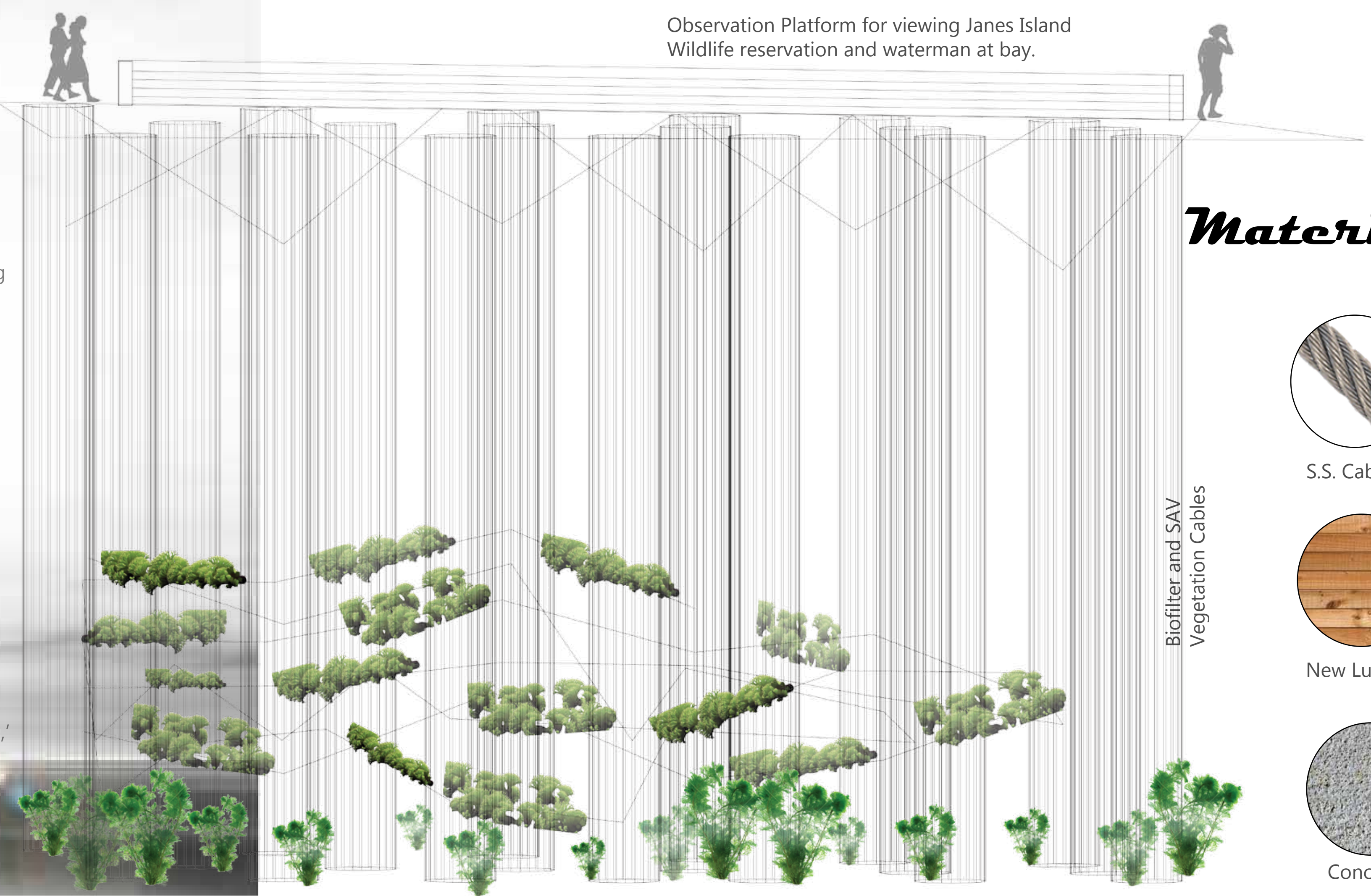


Pier Elements

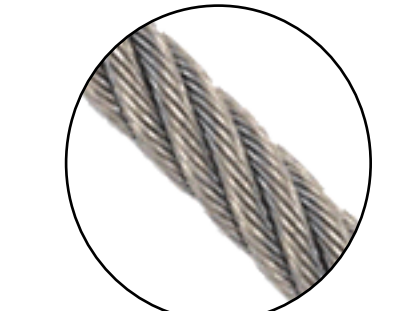


Submerged aquatic plants lined along the biofilter can affect the water quality of Chesapeake Bay by using dissolved nitrogen and phosphorus for their growth. By withdrawing the nutrients from the water, they make them unavailable for use by algae, which often reach pea-soup concentrations in summer in rivers that flow into the Bay. The grasses then convert these nutrients into plant tissue, which eventually is incorporated into Chesapeake Bay food webs by animals that consume live plants or detritus such as blue crabs. The grasses thus act as a 'nutrient pump,' recycling nitrogen and phosphorus from the sediments to the Bay and the animals in it.

Observation Platform for viewing Janes Island Wildlife reservation and waterman at bay.



Materials



S.S. Cables



New Lumber

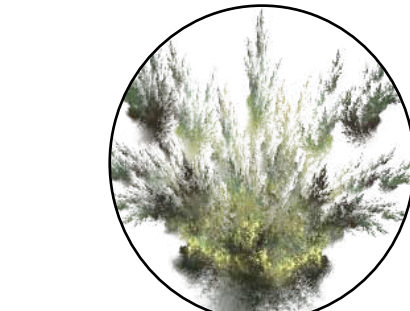


Concrete

Plants



Eurasian watermilfoil



Hydrilla



Waterstar



Curly pondweed

Biofilter and SAV
Vegetation Cables

Sailboat Knoll

Site Goals

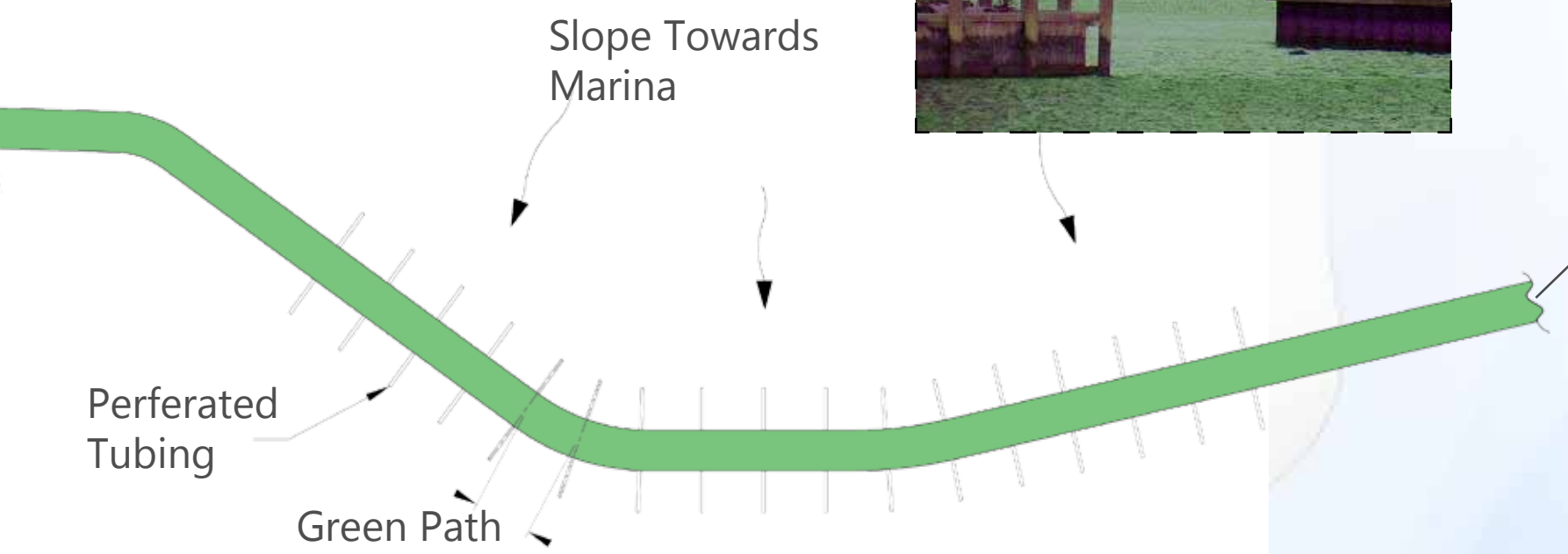
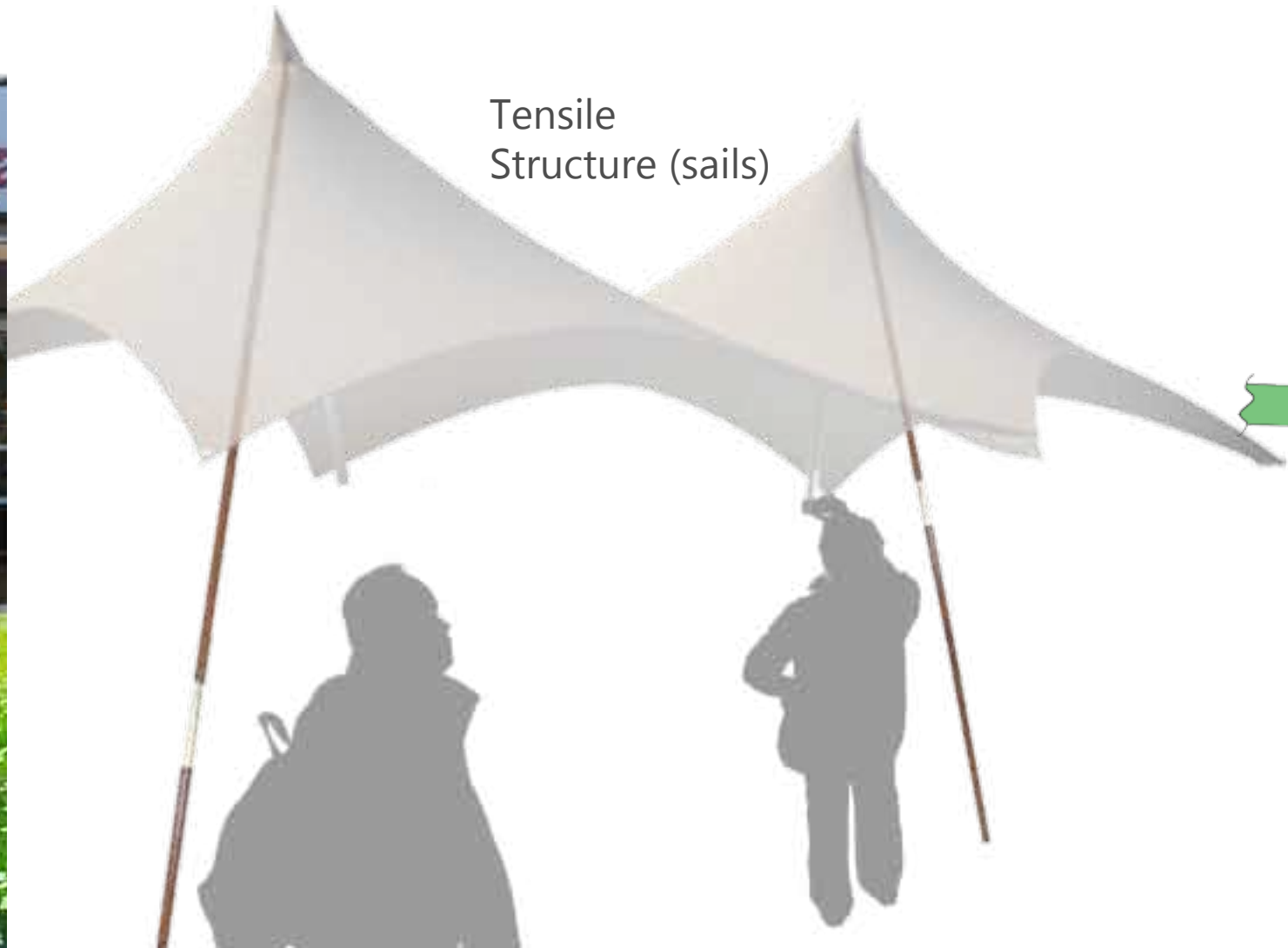
Sailboat Knoll is designed to connect those on land to those on the water, tying the sails on the boats to the tensile structures, helping visitors relate.



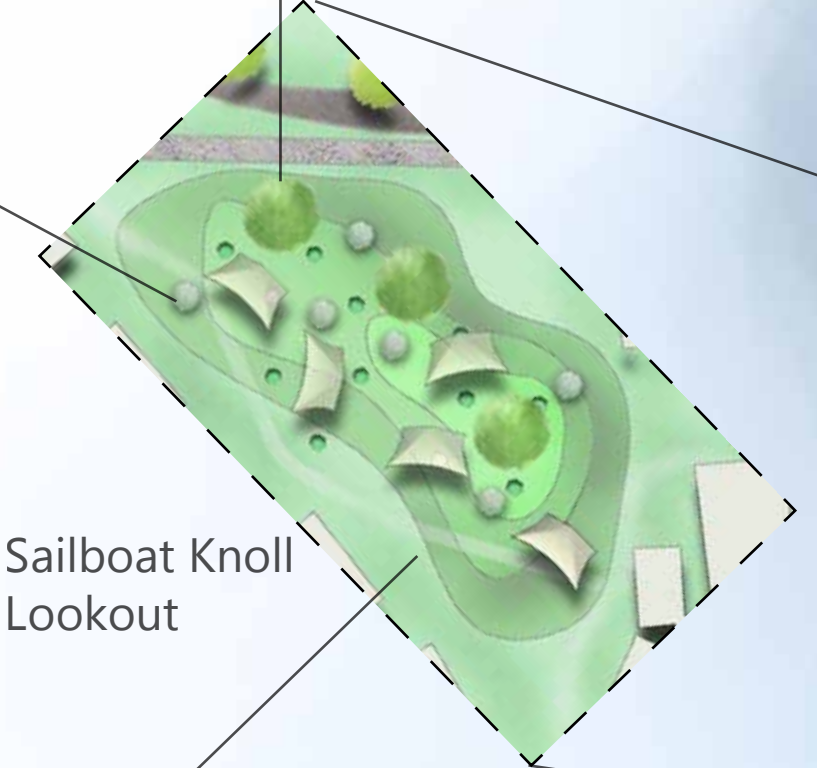
American basswood
Tilia americana



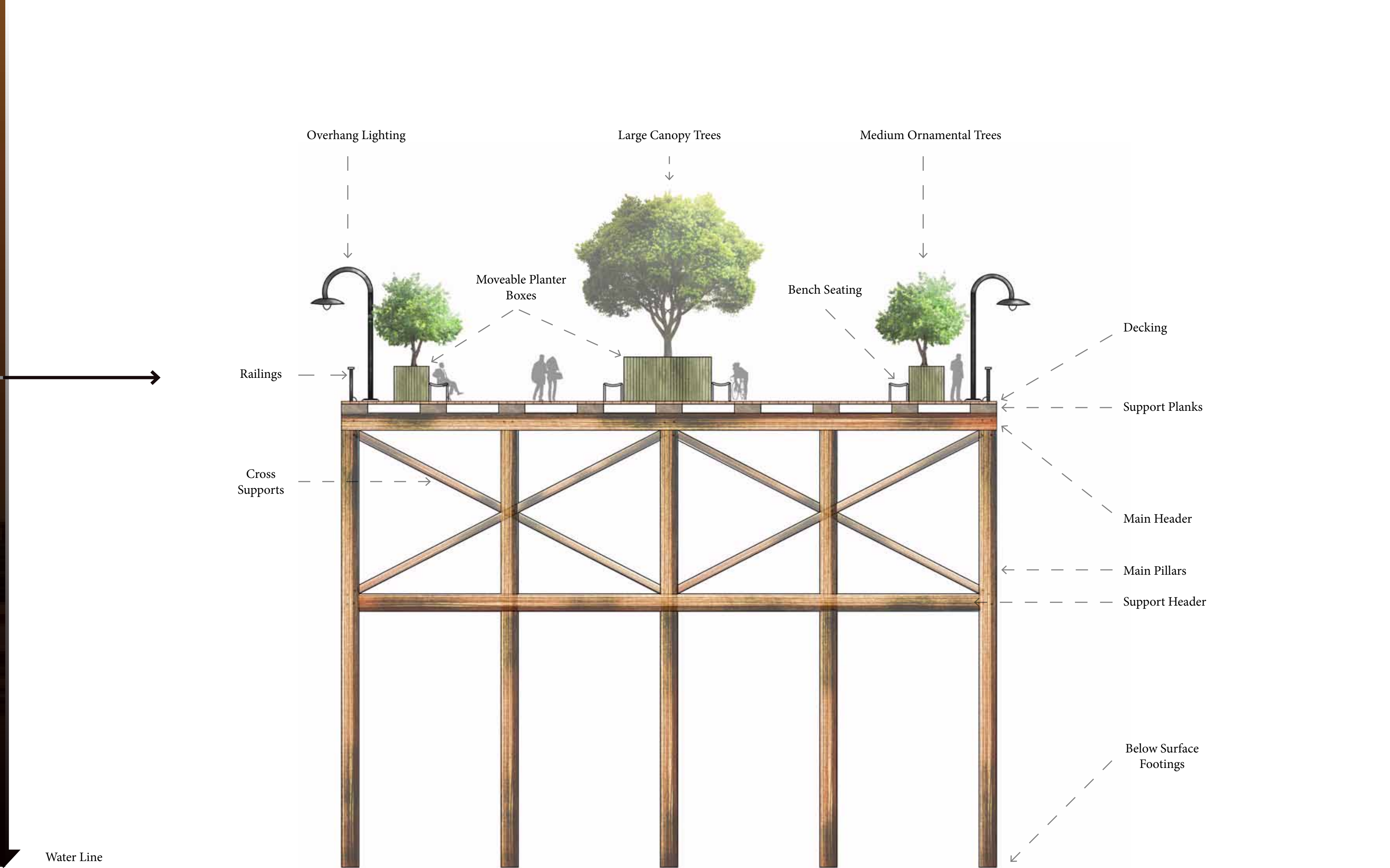
Mountain laurel
Kalmia latifolia



Sailboat Knoll Lookout



Day Perspective



Night Perspective



From Beginning to End

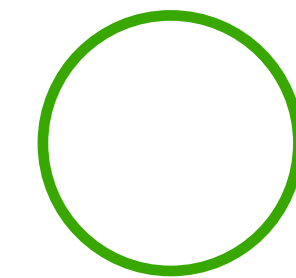
From the entrance onto the site all the way to the end of the new city, pier visitors will experience many things along the way. They will not only experience education about their surrounding ecology but will be witnessing working systems that will aid in a sustainable Crisfield, MD.



Overall Results

The overall design will have a profound effect on the city of Crisfield, its residents, to visitors and the overall economy. With a new opportunity for blue crab production and an improved ecosystem, Crisfield will now be capable of succeeding well into the future as the "Crab Capital of the World."





Programs Used:

Autodesk 2012

Sketchup 8

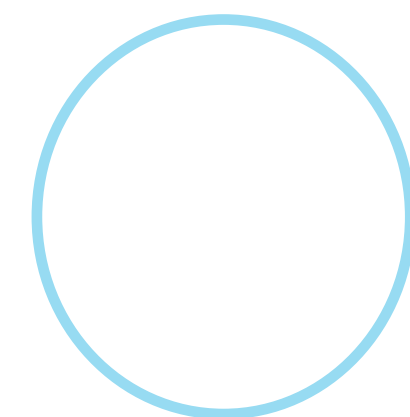
Adobe InDesign

Adobe Photoshop

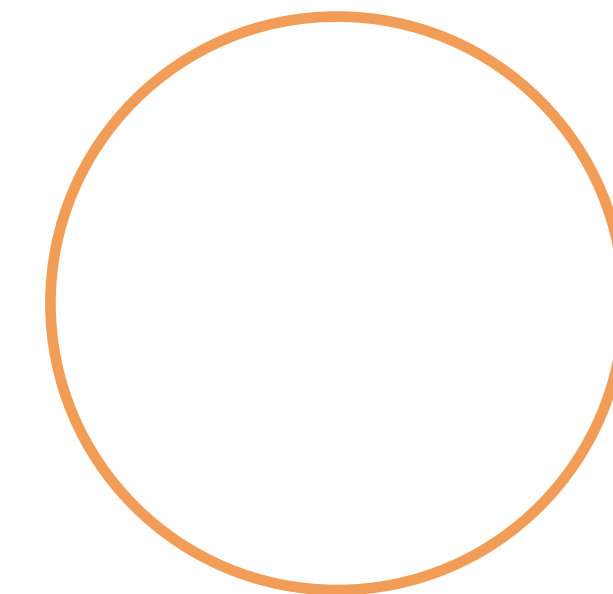
ArcGIS

ArcMap

Maxwell Render



I want to give a special thanks to my thesis advisor David Crutchfield and all the faculty that helped me with the design process.



An Underwater Approach

by Travis Steffen

LA 572 Thesis Design

2012

Detail Examination

Oysters can filter as much as 2.5 g.p.h.

Oyster shells acts as a natural trap and keep large and medium sized particles from reaching the bay.

Oyster shells are a sustainable paving material in the area and will naturally become cyclical.

Decreasing populations not only affects oyster consumption, it creates a large problem for the underwater ecosystem. Oysters are “filter feeders”. They’re not just hanging out below and relaxing, they feed on algae and keep the water system clean. Smaller oyster populations and excess algae are causing some communities to build intricate sewage systems. The easy, natural, inexpensive answer is: [build up the oyster population.](#)

[Back](#)

Crisfield, MD

Detail Examination

The blue crab population is vulnerable to increased harvest pressure, as well as the effects of habitat loss due to poor water quality. Proper management of the crab harvest, as well as water quality improvements and bay grass restoration efforts will help restore the Bay's blue crab population and maintain this valuable resource into the future.

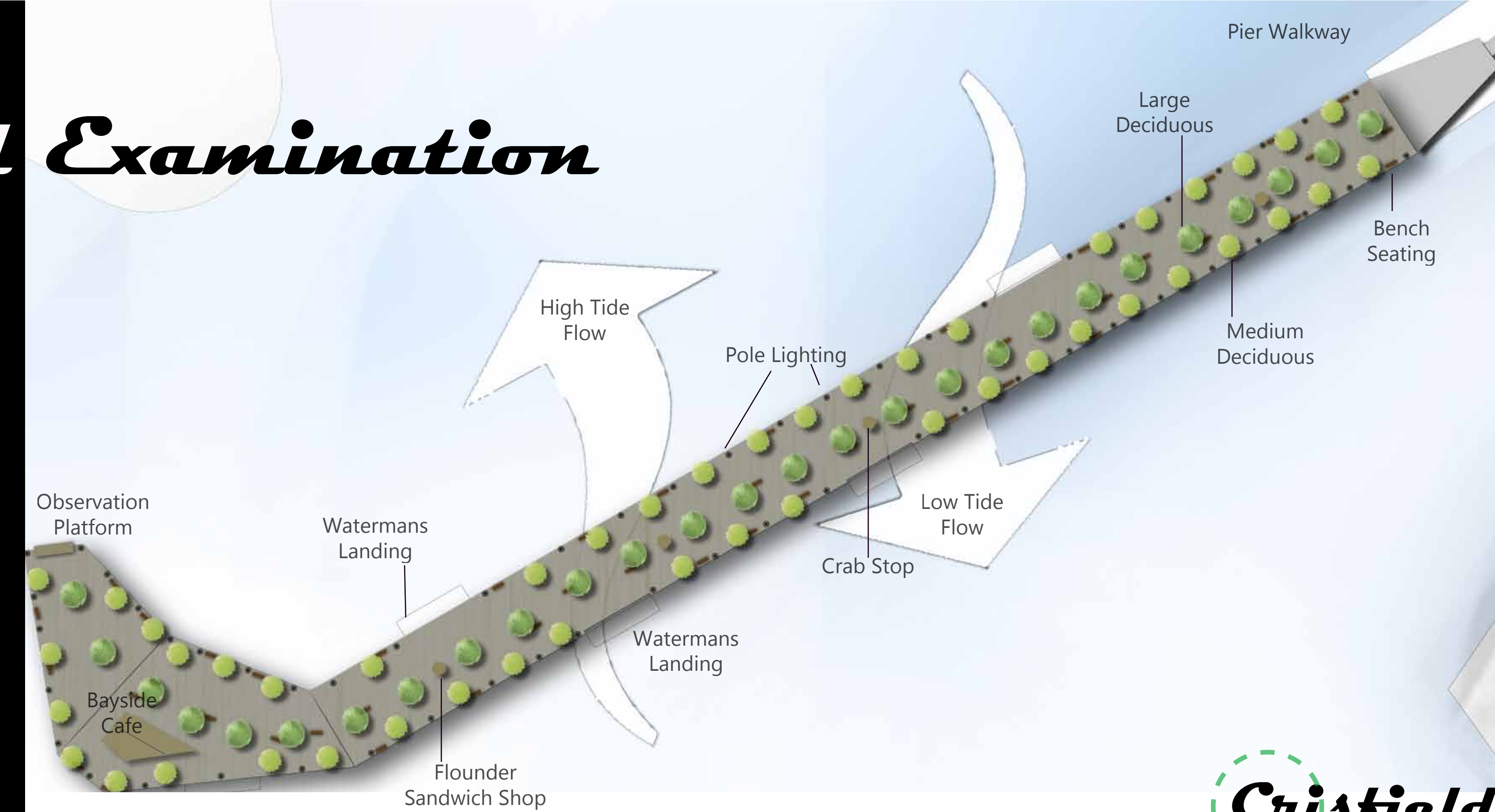
There's nothing more "Chesapeake" than the Bay's signature crustacean.



Back

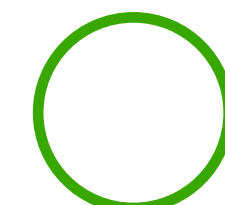
Crisfield, MD

Detail Examination

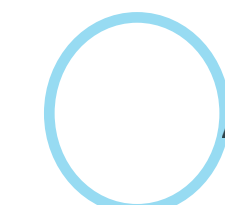


Crisfield, MD

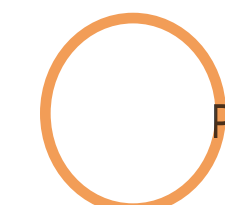
Back



Functional 1500' filter to promote SAV growth



Attract visitors to the site while educating



Promote economic growth by aiding waterman

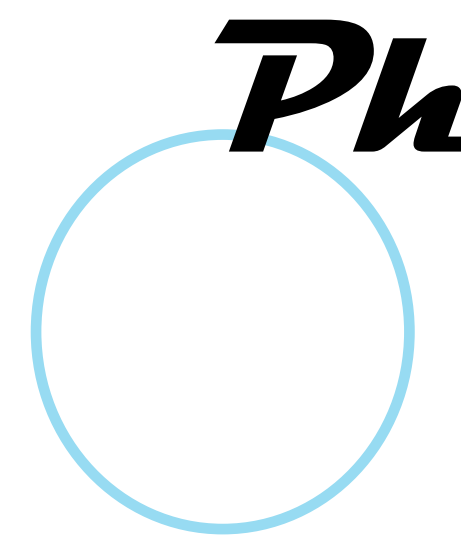
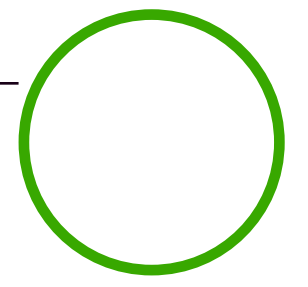
Detail Examination

Phase 1

Phase 1 of the design will consist of the removal of many of the existing parking lots and broken sidewalks, and in turn reuse the material to help build the new pathways. Both concrete and asphalt will be used. Along the paths, new trees will be installed along with smaller shrub plantings. Also, the three educational water features will be placed.

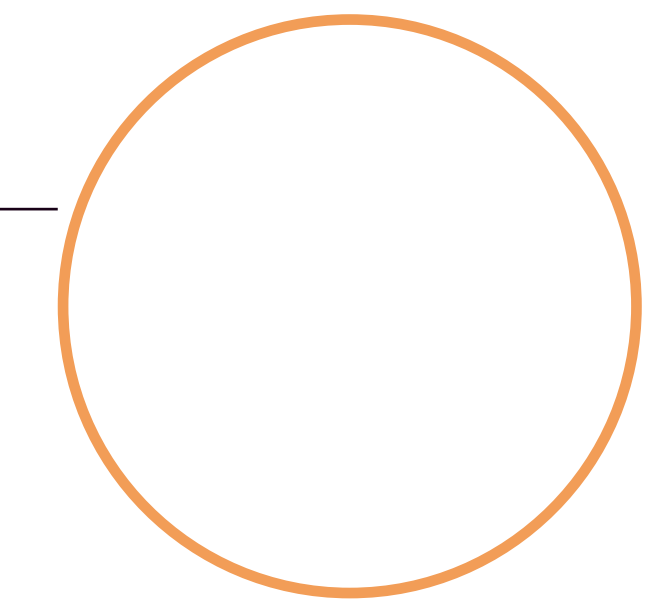
Phase 3

Phase 3 of the design will consist of installation of the greenroof areas on top of the four water edged hotels, as well as replanting of all grass and open greenspace areas. During this phase, building facades will be updated and abandoned buildings will be discarded or relocated.



Phase 2

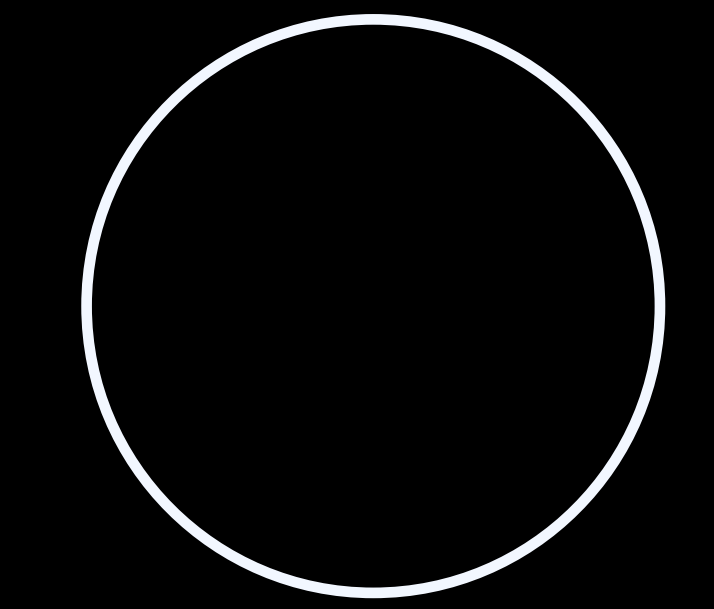
Phase 2 of the design will consist of laying and installing of the oyster bay paths as well as adding new fishing docks and boardwalk along the water's edge and tying them into the rest of the city. Greenspace boardwalks will be installed and educational signage will be placed at this time.



Back

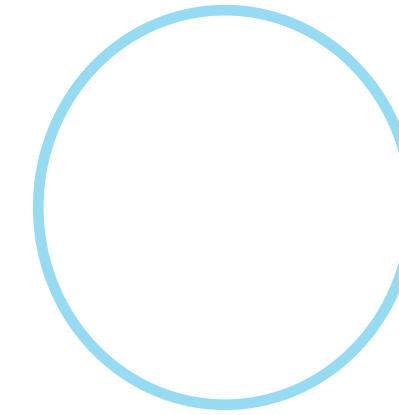
Phase 4

Phase 4 of the design will consist of the construction of a multipurpose pier. The pier will consist of a 1500' bio filter that will clean and promote growth of SAV vegetation, draw visitors to the site, and educate and promote blue crab growth. The biofilter will consist of anchored stainless steel cables intertwined with underwater vegetation that acts as membranous filter and will second as a blue crab habitat.



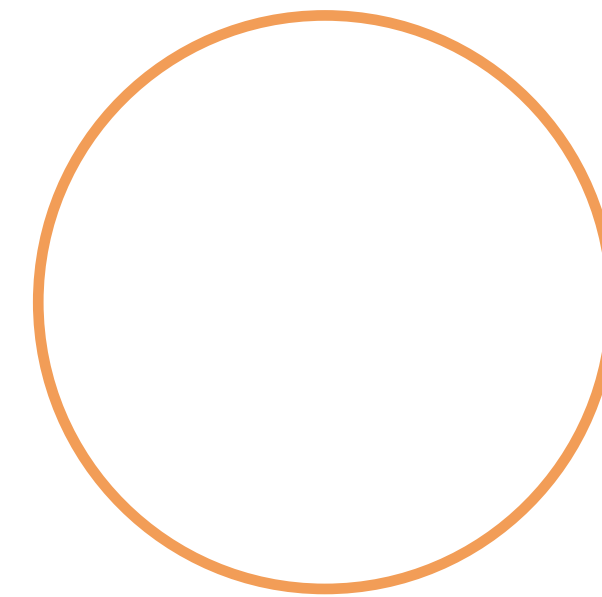
Detail Examination

Who Pays?



The city of Crisfield will fund most, if not all, of the initial capital needed, and provide infrastructure cost updates as needed. As blue crab production yields increase, more revenue is generated, providing an opportunity to increase sales tax on related sales.

Who Benefits?



The city of Crisfield will greatly benefit from the new design, including local retail shops, tourist related businesses and watermen, as well as surrounding agricultural practices.

Back



Detail Examination

Both the museum and the dive center will have a profound impact on the history of the site as well as the resources to protect the site into the future.



The dive center will be responsible for further developing SAV growth strategies as well as educating visitors underwater.



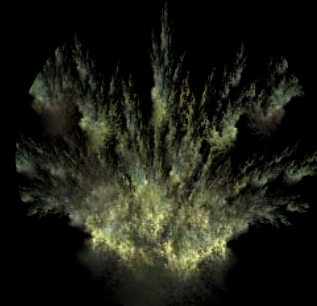
Back

Crisfield, MD

Detail Examination



Eurasian watermilfoil



Hydrilla



Waterstar



Curly pondweed

[*Back*](#)

Specific Plant Benefits

Nutrient Buffering

Submerged aquatic plants can affect the water quality of the Chesapeake Bay by using dissolved nitrogen and phosphorus for their growth. By withdrawing the nutrients from the water, they make them unavailable for use by algae, which often reach pea-soup concentrations in summer in rivers that flow into the Bay. The grasses then convert these nutrients into plant tissue, which eventually is incorporated into Chesapeake Bay food webs by animals that consume live plants or detritus. The grasses thus act as a 'nutrient pump,' recycling nitrogen and phosphorus from the sediments to the Bay and the animals in it.



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