MAJOR LAND AND WATER ENVIRONMENTAL ASSESSMENT FOR THE LATITUDE 18 VESSUP BAY MARINA ST. THOMAS, U.S. VIRGIN ISLANDS

SUBMITTED

DEPARTMENT OF PLANNING AND NATURAL RESOURCES
DIVISION OF COASTAL ZONE MANAGEMENT
AND
U.S. ARMY CORPS OF ENGINEERS

PREPARED FOR

JACK ROCK B-A C LLC

PREPARED BY

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1.0 NAME AND ADDRESS OF APPLICANT

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2.0   LOCATION OF PROJECT

The Latitude 18 Marina is located on Vessup Bay in Red Hook, on the eastern end the island of St. Thomas.   Parcel 9B-A Estate Nazareth is located on the southern shore of Vessup Bay. The geographic coordinates of the proposed project are 18.324844°N and -64.847919°W.   The proposed mooring field is located at 18.325657°N 64.845457°W. The Location and Agency Review Map and Vicinity Map follow.

Figure 2.01 Agency Review Map, the entire project is within the first tier of CZM.

Figure 2.02 Vicinity Map showing the project in relationship to the surrounding area.

3.00 ABSTRACT

Jack Rock B-AC LLC purchased property within Estate Nazareth with the intention of developing a World Class Marina with an upland mixed use commercial development. Consolidated parcel 9B-A comprises a total of 5.556 acres. The entire area is zoned W-1-Waterfront Pleasure. The Proposed Development is permitted by the Virgin Islands Code as a matter of right. The project site contains a peninsula that forms the southern entrance to Red Hook Bay. That peninsula is a rocky abutment that extends to the National Park Service property on the East side and abuts the Vessup Beach area to the south.

The project area was the site of the Latitude 18 Marina. This Marina has been through significant damages because of the Hurricanes over the past 25 years, specifically Hurricane Marilyn in 1995 and Hurricanes Irma and Maria in 2017. The original Marina was never fully restored after Hurricane Marilyn in 1995. The viability of the property as a Marina has continually diminished over time, finally closing from damages as a result of the 2017 Hurricanes. The Development Plan intends to take advantage of this unique promontory at the entrance to Red Hook Bay. The Development Plan is supported by environmental studies that is basis for the location and development of upland, shoreline and overwater structures. The inclusion of a wave attenuator in the Marina Development Plan is intended to create calmer water under operational conditions. The Marina dock layout encompasses the area occupied by the previous Marina. The upland Development Plan includes areas reserved for natural drainage courses and preserved vegetation to address endangered species such the Tree Boa. A total of 10% of the lot areas are devoted to preservation, drainage areas, and landscaping.

The overall Development Plan includes a Managed Mooring Field that will have 14 buoys in Vessup Bay and 68 buoys in Muller Bay. Pump Out Facilities and showers will be available for the clients that lease moorings in the Mooring Field. Managed mooring fields throughout the United States are amongst the means to have proper anchorage for moored vessels and proper environment management within the Bay through the on-land Pump Out Facilities. This mooring Field will be an example of sound environmental practices in the Bay.

4.00 STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED PROJECT

The Marine Industry in the U.S. Virgin Islands has diminished over the past 30 years due to the emergence of other markets such as the British Virgin Islands and U.S. Coast Guard Requirements. The objective sought through this Application is to provide a World Class Marina with a complement of upland Food and Beverage Establishments, Retail and Support Facilities. This project will become a cornerstone in the Government of the U.S. Virgin Islands Marine Task Force Development. A further objective sought by this project is responsible Environmental Development through the preservation of Habitat for endangered species on the up-land development and the Managed Mooring Field that is proposed as a part of it. Managed mooring fields will include U.S. Coast Guard approved mooring balls, helix type anchors with floated lines, and requirements for sewage pump out stations that are a part of the Upland Development. These measures will have a significant improvement in the water quality in the Bay.

5.0 SUMMARY OF PROPOSED ACTIVITY

Upland

The upland structures will include design motifs that are particularly Tropical and Historical Danish Architecture in nature. The building structures will have concrete foundations, steel super structure, and roofing. Structures will be enclosed by masonry exterior walls. All fenestrations will be impact resistant assemblies. There are two primary upland structures. They are:

• Restaurant & Marina Services Building
• Warehouse Buildings-Drystack Structure

Restaurant & Marina Services Building

The Restaurant & Marina Services Building is the cornerstone of the upland development. it is located on the Northeast Promontory of the site. This location forms the southern entry point to Red Hook Bay. The overall structure will be one and a half stories in height with a total square footage of approximately 10,000 SF.

The vehicular entry will approach from the southeast with a turnaround covered by Porte-Cochere. Visitors will proceed through the courtyard eventually to an external passageway to the promenade. Marina users will be able to proceed by foot to the Marina Waiting Pavilion to the west and from there to the docks. The first floor will contain Support Spaces, Kitchen, Restaurant & Retail. The northern and eastern sides of the Multi-Use Structure are surrounded by a promenade, lounge area and other areas that transition from the first level of the building down to the dock-level. The second floor of the structure will contain a sunset viewing deck with support space. The envelope on the second floor shall step back from the lower-level envelope.

The west side of the building will provide access to support facilities to mooring field users, including restrooms and showers.

Warehouse Building

The Warehouse Building will be 10,000 SF in size. It will be a single-story structure that will contain storge of materials and supplies related to the operation of the Marina and a drystack for vessels.

Site Layout

The concept behind the layout of this site is to take into consideration the environmental resources that constrict the location of buildings within the area. Entry to the project site will be at the northwestern corner of the property where the existing Latitude 18 access was located. From this entry point the access road splits to allow for visitor circulation to bend toward the south then eastward towards the Marina Services Building. On the northern side of the property there will be a service road that will only be utilized by Marina Operations. It will be located at that boundary and then toward the drop well of the marina portion of the property near the northwestern part of the promontory. The area between these two access roads will contain the Warehouse, onsite utility infrastructure, construction staging area, hurricane storage and daily boating trailers. The proposed parking areas will include public parking for visitors to use the retail establishments and beach area.

The proposed Latitude 18 project will be comprised of a marina boat launch, marina building, drystack, and a restaurant. The supporting structures include a wastewater treatment plant, a fuel yard, potable water storage, and an electrical yard.

Boat Dry Storage and Service Yard Area

The marina boat dry storage and service yard will provide specialized facilities and equipment for boat storage and light technical services. The main facilities include:

- Drop well area – for launching and retrieval of boats using specialized equipment (e.g. marine forklifts)
- Maneuvering areas for equipment transferring boats
- Boat wash racks – stands for boat hull to be washed after retrieval from the water and before it is moved to the storage or service areas
- Boat drystack structure – for vertical storage of boats
- Boat workstations – yard area with utility connections, intended to secure boats for service work
- Workshop – shed for storage and equipment to support workstations

The facility will be designed so that yard spaces could potentially be interchangeable among the following 3 uses:

- boat drystack structures
- service workstations or
- surface dry storage (long term or for hurricane storage).

The handing equipment assumed for the basic design is marine forklifts, which are appropriate for motorboats up to about 45 feet. However, if sailboats, catamarans, or larger boats were to be served for surface dry storage, a travel lift will be required.

1.1 Drop well, wash racks, circulation, and maneuvering

The drop well area can operate up to 2 forklifts or a travel lift.

The basic design assumes the use of one main operational forklift for a design vessel of the following characteristics: motorboat, mono hull, up to 45 ft.
With the same footprint, equipment and installation modifications can allow the servicing of catamarans and surface dry storage of sailboats.
Adequate ground improvement or pavement will be provided in all circulation and yard areas, with appropriate stormwater and runoff management.

1.2 Workstations for light services
The proposed service yard area includes 9 workstations. These are open air yard spaces with adequate ground improvements or pavement, supported by utilities and workshop shed.

1.3 Boat Drystack structure
The proposed drystack storage is comprised of open or semi-covered racks of 4 levels. The proposed plan includes 8 bays for drystack racks.
The most common industry practice is that each bay is designed to accommodate 2 or 3 boats. Typically, 2 wider (longer and heavier) boats at the ground and second level, or 3 narrower, lighter and shorter boats at higher levels. Therefore, total capacity is inherently flexible. The proposed layout with 8 bays of 4 levels, has a capacity for 71 to 88 boats, depending on the arrangement of the racks in the bays.

Drystack Capacity (4 levels)	**total capacity**	**<30ft**	**>30ft**
Scenario 1	80	48	32
Scenario 2	88	72	16
Scenario 3	72	24	48

Marina

The proposed marine project is composed of docks and utilities, shoreline restoration and a managed mooring field.

The marina includes pile-supported fixed pier docks for the berthing of yachts. The marina will have 17 dedicated slips and 638 linear ft of alongside dockage, with a total capacity of 2,128 linear ft (approximately 26 vessels). The marina will provide permanent and transient berthing for a mix of vessels ranging from 60 to 200ft, with additional alongside berthing for smaller vessels.

The marina project lies in general location of a marina that was destroyed by previous storm events. The scope of work includes the removal of existing remaining structures, timber piles, sunken debris, and sunken vessels from the marina footprint.

The marina will have fuel service and fuel will provided by dispensers on the fuel dock, as well as in-slip fueling on the main docks slips.

The marina includes wave attenuation devices to provide comfort during operational conditions. A wave screen attached to the main fixed pier is proposed in areas that do not impede circulation flows. A floating wave attenuator is proposed to protect the marina slips facing Muller Bay and to reduce the need for wave screens.

Due to the elevation of the deck of the fixed piers, the docks which service smaller vessels, such as the fuel dock and smaller draft areas, will be provided with dock skirts to prevent small boats from going under the dock.

A new bulkhead will be built in front of the dilapidated existing bulkhead and rectifying the disturbed shoreline comprised of masonry irregular walls and a damaged pier structure, offering a stable water edge for access to the marina docks and marina operations. The seabed in the area adjacent to the new bulkhead will be excavated to achieve – 6.5ft MSL elevation, to provide safe draft for the intended operation.

The total overwater area of all fixed piers, mooring dolphins, floating docks, gangways, and wave attenuator is 29,199 square ft.

The project includes 311.5 linear ft of bulkhead. The bulkhead will replace 140 linear ft of damaged bulkhead and 232 linear ft of disturbed shoreline comprising masonry irregular walls and a damaged pier structure.

The dock structures will have a total of 274 piles and there will be 12 mooring piles. There will also be 16 pilings associated with the travel lit. The piling break down is in shown the following table and descriptions of the individual docks below.

	# Piles	Type
Dock C	**33**	Concrete
DD-W	**3**	Concrete
DD-E	**3**	Concrete
Platform Access	**4**	Concrete
Travel Lift Piers	*16*	Concrete
Mooring Dolphins (superyacht slips)	*8*	Concrete
Mooring Piles - Slips	*4*	Timber
Total	302	

Dock A-1

Dock A-1 will be 399 ft long and 10 ft wide, oriented east-west parallel to the shoreline bulkhead and upland facilities. Dock A-1 provides access from land to Docks A-2 and Dock B. The concrete fixed dock has a total overwater area of 3,990 square ft. The east portion of Dock A-1 will provide 135 linear ft of alongside docking for small vessels. A floating dinghy dock (DD-E) will be adjacent to this dock.

Indicative pile locations are shown on the project Drawings; 42 piles are anticipated for Dock A-1. The deck elevation of the pier will be +5.0 ft MSL.

Dock A-2

Dock A-2 provides berthing for approximately 17 vessels and has a total over-water surface area of 11,893 square ft. Eleven dedicated slips for vessels ranging in size from 70 ft to 130 ft and alongside berthing for large yachts on both sides of the T-head will be provided.

The shore perpendicular section of the concrete fixed dock will be 268 ft long by 15 ft wide. The shore parallel “T Head” of the dock will measure 335 ft long by 15 ft wide and will be able to accommodate large yachts. The 2 partial finger piers for the 130 ft slips will be 80 ft long and 10 ft wide with a 7 by 7 ft mooring dolphin. The 70-foot slips will have a full-length finger 7 ft wide. The deck elevation of the pier will be +5.0 ft MSL.

Indicative pile locations are shown on the project Drawings; 162 piles are anticipated for Dock A-2. Dock utilities such as water, electricity, fuel, pump-out, and Wi-Fi are proposed.
A wave screen attached to Dock A-2 is proposed in areas shown on the Drawings to attenuate locally generated waves and wakes and improve user comfort under normal operational conditions. The location and size of the wave screen was modeled to demonstrate that it will not adversely impact flushing of Vessup Bay.

Dock B

Dock B provides 4 dedicated slips and has a total over-water surface area of 1,468 square ft. Dock B features two double-loaded slips for 60 ft vessels, one 60 ft slip for catamarans, and an alongside slip dedicated for a 60 ft typical vessel.

The shore perpendicular section of the concrete fixed dock will be 108 ft long by 8 ft wide. The shore parallel “L head” of the dock will measure 61 ft long by 8 ft wide. The partial finger pier on Dock B will be 30 ft long by 6 ft wide, plus a mooring pile. The deck elevation of the pier will be +4.5 ft MSL. Indicative pile locations are shown on the project Drawings; 28 piles are anticipated for Dock B. Utilities such as water, electricity, and Wi-Fi are proposed for these slips.

Dock C

Dock C is designated for fuel and pump out service, as well as staging dock for the drop-well area. The concrete fixed dock has a total overwater surface area of 3,302 square ft.
The shore perpendicular section of the fixed dock will be 84 ft long by 12 ft wide, while the rest of the dock, angled 15° west from the shore perpendicular dock section, will be 190 ft long by 12 ft wide. The deck elevation of the pier will be +4.5 ft MSL.

Indicative pile locations are shown on the project Drawings; 32 piles are anticipated for Dock C. This dock will support fuel dispensers and a pump-out station. A floating dinghy dock (DD-W) will be adjacent to this dock.

Bulkhead

The proposed project includes the construction of a 311.5 linear ft of bulkhead, 281.5 linear ft along the waterfront and 30 linear ft as inland returns. The bulkhead will replace 140 linear ft of damaged bulkhead and 232 linear ft of disturbed shoreline comprising masonry irregular walls and a damaged pier structure. The bulkhead cap beam elevation will be +5.0 ft MSL on the western 90 linear ft of shoreline, to match the proposed fuel dock, drop well and access to Dock A-1. The bulkhead cap beam elevation will be +7.0 ft MSL on the eastern 191.5 linear ft. The bulkhead will be built immediately seaward of the structure that it is replacing, within 24 in from existing waterward face of the existing bulkhead and rectifying the alignment of the irregular masonry wall and other disturbed shoreline segments.

Adjacent to the bulkhead, seabed reprofiling is proposed to include the removal of approximately 886 cy of material in an area of approximately 6,500 square ft to a depth of -6.5 fee MSL. This proposed depth is the minimum required to allow navigation by catamarans and small vessels only near the bulkhead, thus reducing seabed impacts.

Floating Wave Attenuator

The proposed project includes a floating wave attenuator to improve tranquility for vessels on the outer main dock and Muller Bay dinghy dock. The goal of the floating wave attenuator is to reduce locally generated waves to improve comfort.

The proposed floating wave attenuator will be 380 ft long and 16 ft wide. The typical draft of the floating attenuator sections is 4.3 ft. The total overwater surface area of the floating attenuator will be 6,080 square ft at a water depth between 18 and 28 ft.

The floating attenuator is intended to be removable, so it is not in place during extreme events. The attenuator will be designed with a flexible (elastic) anchorage system and connections that allow for it to be disconnected from the deck, floating units to be separated and towed to the drop well area, and units lifted and stored in land with a forklift. The marina management will determine if the attenuator is removed for the entire hurricane season or upon issuance of a tropical storm watch. Indicative anchorage locations are shown on the project Drawings; 38 concrete block or helical anchors are anticipated for the removable floating attenuator. If possible helical anchors will be utilized to minimize impact.

Mooring Field

The mooring field includes 84 mooring buoys divided in two areas (14 in the Vessup Bay Mooring Field and 68 in the Muller Bay Mooring Field), over 96 LF of berthing on two floating docks for dinghies, and upland support facilities such as showers, restrooms, and solid waste collection bins. Vessels in the mooring field will have access to the pump out at the fuel dock and will be prohibited by their mooring lease contract to discharge sewage or other pollutants.

The mooring field area will be identified with new markers and additional navigation aids will be installed to better identify the navigation channels. The Port Authority was consulted to validate the navigation channel and location of navigation aids.

Proposed marina will maintain a high standard of operation, compatible with the vessel size and clientele expected. The marina operator will seek a Blue Flag, Clean Marina, or similar certification.

As part of its normal operation, the marina expects to:

- Establish and maintain a management plan that includes environmental management systems;
- Create and maintain an environmental policy that supports the implementation and updates of the environmental management plan;
- Display at the marina the code of conduct that reflects appropriate laws governing the use of the marina and surrounding areas;
- Display information relating to local eco-systems and the local environment;
- Provide marina and mooring lease agreements that include information about regulations, laws and permit conditions governing the use of the marina and its environmental management plan;
- Maintain the operation and promote the use of a sewage pump-out;
- Provide marina and mooring lease agreements that include the prohibition of discharge of sewage, bilge, oil or solid waste to the bay, as proper disposal procedures for fluid and solid waste will be available through the marina;
- Provide adequate and properly identified, segregated containers for the storage of waste oil and general solid waste;
- Provide adequate, clean, and well sign-posted sanitary facilities, including washing facilities are provided for the marina visitors and employees.
- Provide adequate and well signposted lifesaving, first-aid equipment, and fire-fighting equipment
- Prepare emergency plans in case of pollution, fire, or other accidents as part of an Approved Spill Prevention Control and Countermeasure Plan. Post safety precautions and information at the marina.
- Provide electricity and water in all marina slips and in-slip fueling in selected marina berths;
- Provide accommodations for disabled people are in place.
- A map indicating the location of the different facilities is posted at the marina

5.01a Purpose of Project

Jack Rock B-A C LLC intends to construct a World-Class Marina consisting of wet slips and a boat launch area, with a compliment of upland structures that will include Food and Beverage establishments, Retail, Marina Showers, and other support Structures. The Development Plan also includes the construction of a managed mooring field of approximately 14 buoys in Vessup Bay and 68 buoys in Muller Bay.

5.01b Presence and Location of any Critical Areas and Possible Trouble Spots

The subject parcels are within the Vessup Bay/ East End Red Hook Area of Particular Concern (APC) (Figure 5.01.1). The Vessup Bay/Red Hook APC is located on the eastern end of St. Thomas and includes Nazareth, Muller, Vessup, Red Hook, Great Bay, Cowpet Bay, Cabrita, Beck and Water Point, Great St. James, Little St, James, and Dog Island.

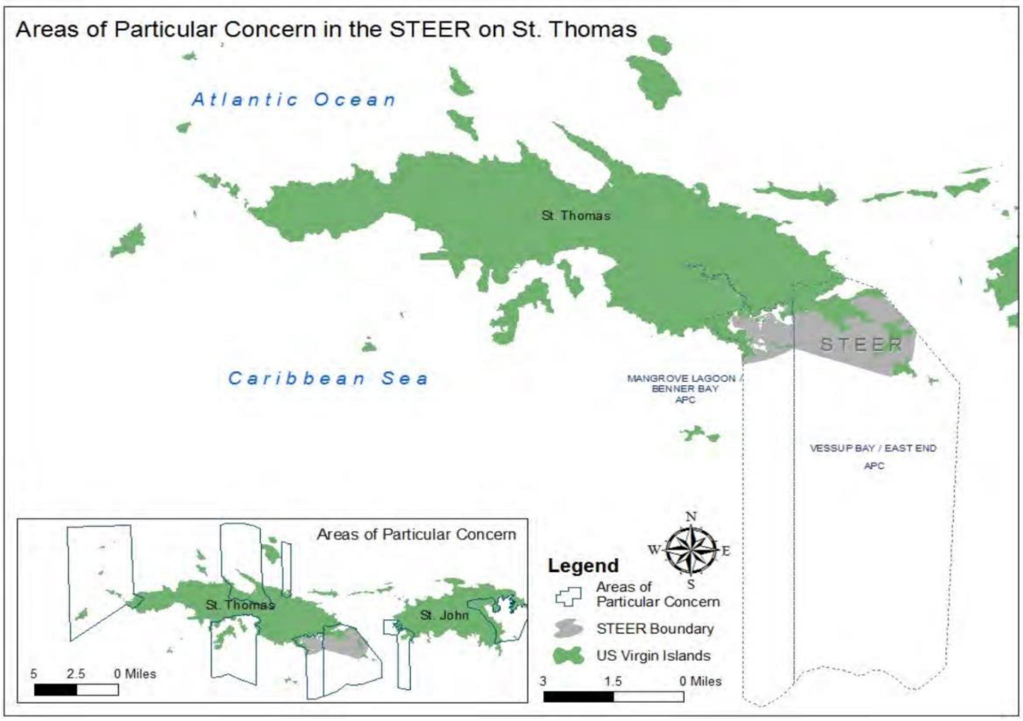

Figure 5.01.1 Areas of Particular Conern (STEER (2011) St. Thomas East End Reserve Management Plan. St. Thomas, USVI.

The Latitude 18 Marina has been developed since the 1980s. And prior to that the area was a sand operation. The marina docks were severely damaged by hurricane Hugo (1989), were repaired, and then were damaged again by hurricane Marilyn (1995), and only a portion would be rebuilt (CZT-7-95W). The marina was destroyed by hurricanes Irma and Maria 2017.

At one time dense seagrass, *Thalassia testudinum* was found in the eastern portion of the marina, however over time it has become less abundant, and the area is now fully mixed with the invasive seavine *Halophila stipulacea*. In early 2000 there was a *Dendrogyra cylindrus*, a coral which is now listed on the endangered species list, found on the riprap which rap around the point at the northeastern end of the property. Surveys in 2008 did not find this coral and no other ESA corals have been found on the shoreline revetment since that time. The piles and the shoreline revetment which faces north and is in Vessup Bay proper, is degraded habitat with significant algal colonization. These hard structures would not be considered critical habitat due to the amount of algal colonization. A few *Siderastrea spp*. and *Psuedodiploria spp.* are found in this area.

The riprap revetment which extends around the point into Muller Bay enjoys much better water quality and can be considered critical habitat. No construction is proposed for this area. There are scattered corals on the hardbottom although many of the corals were damaged due to a sailboat grounding on the riprap. The sailboat is still aground against the riprap.

There are emergent hard bottom areas to the east in Muller Bay, and there is sparse coral colonization on the emergent rock including *Orbicella faveolata* and *O. annularis* ESA listed coral species. The coral colonization increase to the east, and corals become abundant to the east of the proposed Managed Mooring Field. Each mooring location proposed has been surveyed and positioned to avoid hard bottom impact and impact to corals. Two mooring buoy locations originally planned were removed from the proposed plan due to potential impacts on corals, while three remain in an area generally classified as hardbottom habitat, but will not impact corals or hardbottom as they have been located in sand pockets. All lines and tackle will be floated so as not to damage the seafloor or the corals.

While the invasive seavine is found through Vessup, Muller and Red Hook Bay, there are still expanses of *Thalassia testudinum* and *Syringodium filiforme*. These sea grass beds are badly damaged by existing mooring practices, anchoring, dragging lines and debris.

The managed mooring field should help to alleviate these impacts and should facilitate recolonization by these species.

The area is known habitat to protected sea turtles and marine mammals and as such NOAA's Sea Turtle and Smalltooth Sawfish Construction Conditions will be followed as well as NOAA's Vessel Strike Avoidance Measures and Reporting for Mariners during the construction of the dock and installation of the moorings. To minimize esonification issues a sea turtle protection plan will be implemented.

The property is with the critical habitat for the Virgin Islands Tree Boa and tree boas are known to occur within the area. Much of the main marina site is cleared and offers little in the way of habitat for these species. Habitat with good interdigitation exists in the overgrown western portions of the property and in some of the areas of denser vegetation near the beach. All areas slated for development will follow Tree Boa protocols and will be hand cleared before any machine work ensues.

While most of the site has gentle gradients, the existing paved roadway onto the site has excessive slopes that should be taken into considered from a construction standpoint. Access to the site will be carefully planned to allow for construction activities to occur with minimal disruption to the local roadways and neighboring properties.

Vessup Bay and Muller Bay are directly downstream of the proposed construction site. Erosion control BMP's will be implemented to ensure the turbidity remains under the acceptable levels throughout construction. Also, constant attention will be required to ensure that erosion control measures are in place and maintained to protect the water quality of the bay below.

5.01c Method of Land Clearing

The project site is known endangered VI Tree Boa habitat therefore the Tree Boa clearing protocols will be followed. The site will first be hand cleared and rock and rubble piles will be taken apart by hand to allow any tree boas in the area to leave to more forested areas that will remain to the south southwest.

Immediately following the hand clearing, erosion and sediment control measures will be put into place as described in the following Sections 5.01d – e of this report.

After the hand clearing, most of the site will be machine cleared and excavated at the beginning stages of construction. Existing trees will be removed by and disposed of as necessary according to the Tree Removal Plan. Trees that are designated to remain will be protected during construction.

Furthermore, only the land within the limits of construction will be cleared. The clearing activities will be scheduled so that the existing soil is exposed to erosion for the shortest period that is reasonably possible.

Land for the project area will be cleared by bulldozers and backhoes, which will remove brush that lies within the building site. Brush cleared from the site will be used in the construction of rock/gravel and brush berms to prevent erosion. Additional brush that cannot be utilized for berms will be removed to the Bovoni landfill. No burning will be allowed on the property. Brush will be cleared to the extent necessary for contractor operations.

The structures on the site will be constructed of concrete foundations and cisterns, steel-super structure with metal decking, concrete floors, exterior masonry walls, framed interior partitions, impact door and window assemblies, metal railings, and metal-framed roof structures with metal roofing.

5.01d Provisions to Preserve Topsoil and Limit Site Disturbance

As previously stated, immediately following site clearing, erosion and sediment control measures will be installed. Furthermore, all topsoil located during site clearing will be immediately excavated, stockpiled, and protected from exposure to wind and water using a geotextile. The topsoil will be used as necessary in the landscape areas.

The dock and mooring locations have been located to minimize impact on the marine environment by avoiding all ESA listed corals, non-ESA corals, seagrass, hardbottom and minimizing seagrass impacts. Turbidity control and water quality monitoring will be implemented as well as sea turtle monitoring to minimize acoustic impacts. Areas will be cleared by hand to minimize impact to the VI Tree Boa. A Tree Boa protection plan is found in Appendix E.

5.00e Erosion and Sedimentation Control Methods to be Implemented

During construction, several methods of erosion and sediment control will be utilized. For areas to be exposed less than 14 days, a spray-on polymer specifically designed for the on-site soil conditions will be applied. For areas of exposure greater than 14 days, hydroseeding will be used to reduce the water velocity, encourage soil infiltration, and stabilize the soil.

To prevent water-borne sediment from leaving the site, silting basins will be used where possible. Additionally, as a secondary measure, double silt fences and hay bales will be installed on the downstream side of disturbed areas to protect the waterways in the event of the other measures not working as anticipated. Finally, turbidity barriers within the bay will be installed to prevent any sediment from entering the ocean uncontrolled.

Turbidity barriers will be installed around all areas of in-work, including pile driving, bulkhead construction, sediment removal and concrete pouring overwater. If pile socketing is required two rings of turbidity barriers will be installed and these barriers will be seafloor length. These barriers will be maintained until the interior water quality has fallen to acceptable levels.

5.01f Schedule for Construction Activities and Implementation of Sediment Control Measures

Schedule for Earth Changing Activities and Implementation of Erosion/Sedimentation Control Measures:

Terrestrial

• Obtain CZM Permit
• Secure Site
• Hand clear the site following DPNR Virgin Islands Tree Boa Guidelines
• Install Silt Fences/berms as necessary before any earth disturbance within an area
• Cleanup of Site
• Demolition of existing structures
• Construction
• Landscaping and stabilization of site

Marine

Turbidity barriers will be installed before any in-water work and maintained until interior water quality is within acceptable levels. Double turbidity barriers will be required if pile socketing is required and may be required during dredging.

5.00g Maintenance of Sediment and Siltation Control Measures

The sedimentation and erosion control measures as described in Section 5.01e above will require daily inspection and, if necessary, will be repaired immediately. Likewise, after large storm events, the erosion control measures will be checked and adjusted or repaired if they are not working as planned. The contractor will take measures such as reapplying the erosion control polymers, fixing, or replacing the erosion control blankets and fixing or replacing the silt fences and turbidity barriers if they fail. Devices for entrapment of silt will be cleaned as required to maintain functionality. If construction is delayed or completed in an area, the contractor will revegetate the bare soil with seed and mulch or hydroseed to stabilize the soil.

Turbidity barriers will be monitored throughout the day and will be repaired and adjusted as necessary as part of the water quality monitoring plan. Curtains will be maintained throughout the day and removed or secured as necessary when no in-water work is ongoing.

5.01h Method of Stormwater Management

The site does not currently have any ponds, swales, or other stormwater treatment measures. Given the site location on the edge of a small peninsula, there is little to no off-site flow coming through the site.

Using the proprietary stormwater modeling software AdICPR, Version 4, the pre-development flowrate was generated to be 6.72 cfs for the 2-year, 24-hour rainfall event. The model considers the existing soil conditions, drainage patterns, and rainfall distributions typically used for the area.

Proposed stormwater control facilities consist of a primary stormwater system and a secondary stormwater system. The primary stormwater system includes a dry detention pond with a drainage control structure. The pond provides water quality treatment and attenuation prior to discharging into the nearby bay.

The secondary system consists of a series of inlets and area/hardscape drains, connected by a network of drainage pipes that outfall into the detention pond.

Using the proprietary stormwater modeling software AdICPR, Version 4, the post-development flowrate was generated to be 2.22 cfs for the 2-year, 24-hour rainfall event. This is lower that the pre-development runoff rate of 6.72 cfs. Therefore, the runoff for the associated rainfall event has reduced the flowrate in the post-construction condition.

5.01i Maintenance Schedule for Stormwater Facilities

The sedimentation and erosion control measures as described in Section 5.01e of this report will require daily observation and, if necessary, will be repaired immediately. Likewise, after large storm events, the erosion control measures will be checked and adjusted or repaired if they are not working as planned. The contractor will take measures such as reapplying the erosion control polymers, fixing, or replacing the erosion control blankets and fixing or replacing the silt fences and turbidity barriers if they fail. Devices for entrapment of silt will be cleaned as required to maintain functionality. In the event that construction is delayed or completed in an area, the contractor will revegetate the bare soil with seed and mulch or hydroseed to stabilize the soil.

Once construction is complete the stormwater facilities will be inspected after all major rainfall events to removed debris. If excessive amount of sediment buildup that effects catchment volume, soils will be removed to restore original depth. The area will be hydroseeded after soil removal.

5.01j Method of Sewerage Disposal

The wastewater generated on-site will exit the buildings via 6” sanitary sewer gravity laterals and flow into a pumped lift station collection system. This building lift station will discharge to a master sanitary lift station located within a screened back of house area. The master lift station will pump sewage through a force main which will discharge into the headworks of the proposed Wastewater Treatment Plant (WWTP).

The WWTP will consist of the headworks (meter and mechanical bar screen), an equalization tank, an aeration basin, a clarifier or membrane chamber tank, a chlorinating basin, and a sludge bagger. The waste sludge will be stored in the clarifier or membrane chamber tanks until it is be pumped and hauled off-site to be disposed of according to environmental regulations.

The treated effluent from the WWTP will flow to the reuse water cistern. From there, the reuse water will be pumped into the site's irrigation mains, and it will be used as a primary source of water supply for the landscaping. During the rainy season, the effluent may be sprayed into the remaining undeveloped land to keep the cistern from overflowing. Additionally, there will be overflow drainage pipes to discharge excess irrigation water volume into the stormwater system.

5.01k Method of Construction

Marina fixed docks be built primarily from construction barges, including the installation of piles and construction of deck and other dock elements. Mooring buoy and floating dock attenuator installation will be done with light floating equipment and with the assistance of divers to install the helix anchors. Bulkhead construction will be completed with land-based equipment.

Dredging should be able to be done from a land mounded crane and spoils will be placed on the shoreline for de-watering and return water will drain back into the area contained by turbidity barriers. If any material is to far offshore for the equipment to reach it will be done from a barge mounted crane and placed on the shoreline for de-watering and drying.

5.01l Schedule for Construction Activities & Implementation of Sediment Control Measures

Turbidity control will be implemented before any in-water work begins. If a single ring of barriers is found to be ineffective in controlling turbidity a second set will be deployed.

5.01m Maintenance Schedule for Sediment and Siltation Control Devices

Turbidity barriers will be inspected on an ongoing basis as part of the Water Quality Monitoring Plan (Appendix D). If damage is noted repairs will be made immediately or the barriers will be replaced if they cannot be repaired. If a single ring of barriers is found not to be sufficient to control turbidity additional barriers will be deployed.

5.02 EXHIBITS AND DRAWINGS

	Drawing	Page
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	Survey Sheet (Southwest)	17
	Survey Sheet (Northeast)	18
	Erosion Control and Demolition Plan(1-5)	19-25
	Overall Site Plan	25
	Site Grading and Drainage Plan	26-28
	Detail	29
	Architectural Site Plan	30

C.Z.M. PERMIT DOCUMENTS

FOR

LATITUDE 18 @ MULLER BAY

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CIVIL SHEET INDEX

SHEET NUMBER	SHEET NAME	CZM 12/8/2021	REV 1 —	REV 2 —
C-000	CIVIL COVER SHEET	X		
C-001	NOTES SHEET	X		
C-010-011	SURVEY SHEET	X		
C-091 - 095	EROSION CONTROL DEMOLITION PLAN	X		
C-100	OVERALL SITE PLAN	X		
C-101 - 105	SITE PLAN	X		
C-201 - 204	GRADING & DRAINAGE PLAN	X		
C-301 - 304	UTILITY PLAN	X		
C-400 - 407	DETAILS	X		

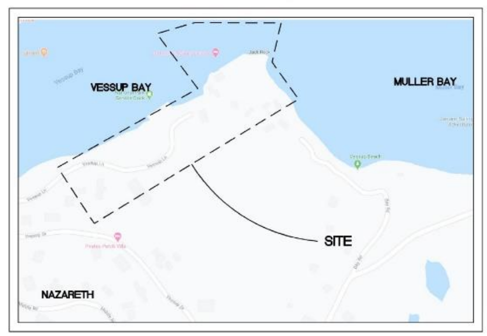
SITE LOCATION:
MULLER BAY,
ST. THOMAS, USVI

DATE: DECEMBER 8, 2021

VICINITY MAP

NOT TO SCALE

LOCATION MAP



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EB 9814

SCOPE DOCUMENTS

The Construction Documents have not been completed therefore this drawing may be incomplete or not coordinated. The documents issued indicate the general scope of the Project. The Contractor is responsible for complete and coordinated pricing and Work, and shall include all items necessary for the proper execution and completion of the Project, whether indicated or not. All components of the Project shall comply with any and all requirements of national, state, and local codes. The Contractor shall inform the Owner and Architect of any omissions, inconsistencies or errors in the information provided. If no notice is given and any omissions, inconsistencies or errors are discovered, the Architect's decisions on items of Work included in the scope shall be binding on the Contractor, when consistent with the general scope and quality of the Project.

ISSUANCES		
No.	Drawing Issue Description	Date
1		

LATITUDE 18 MARINA

9B-A ESTATE NAZARETH
ST. THOMAS, USVI
♦
Vessup Operations, LLC

COVER SHEET

D.W.T — Project Manager
07280000 — Project No.
12/03/2021 — Date

C-000
Drawing No.

NOT ISSUED FOR CONSTRUCTION


LATITUDE 18 MARINA
9B-A ESTATE NAZARETH
ST. THOMAS, USVI
Vessup Operations, LLC
SURVEY SHEET
C-010
NOT ISSUED FOR CONSTRUCTION
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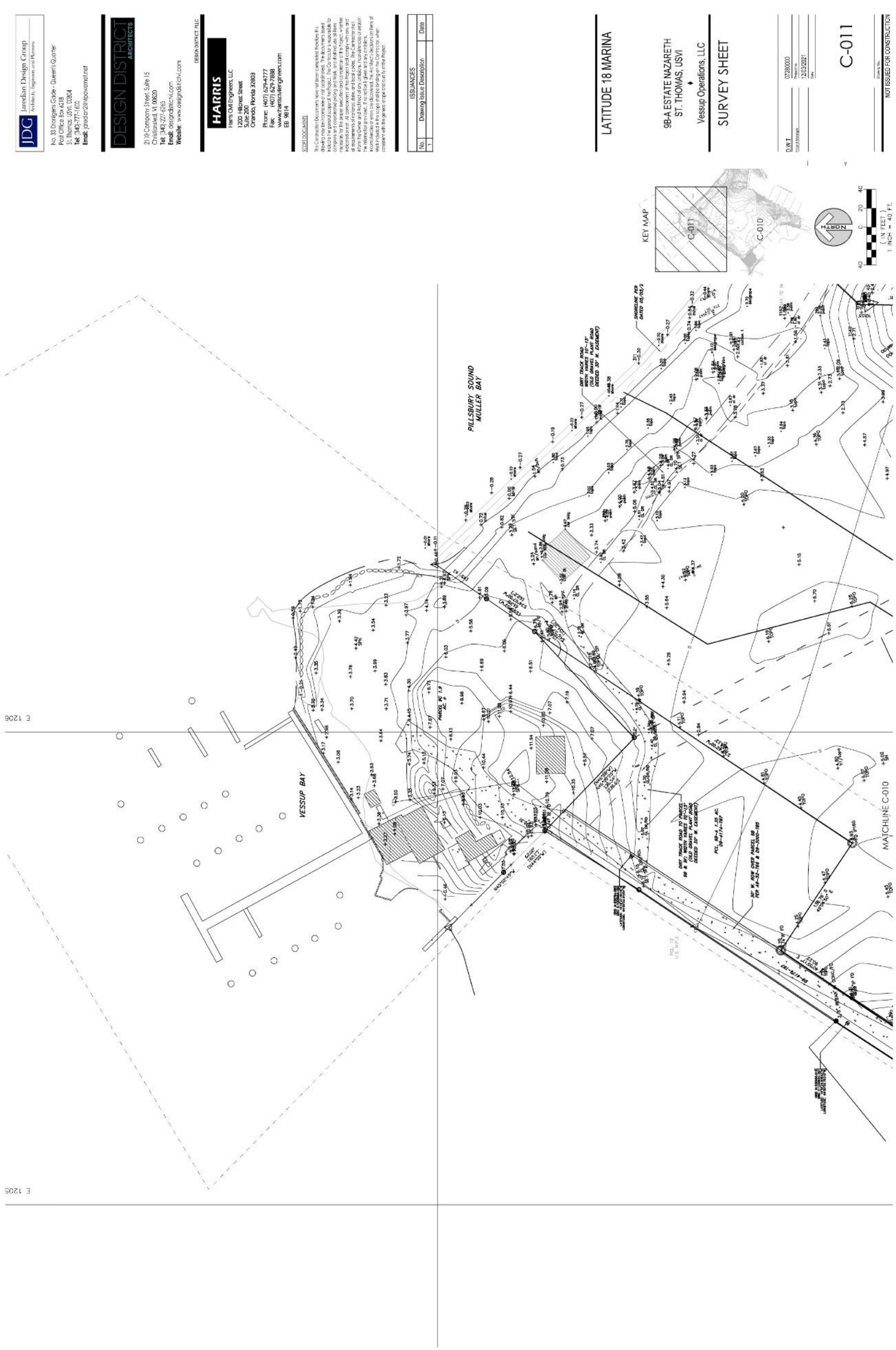
DESIGN DISTRICT
HARRIS
ISSUANCES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Vessup Operations, LLC
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C-011
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C-010
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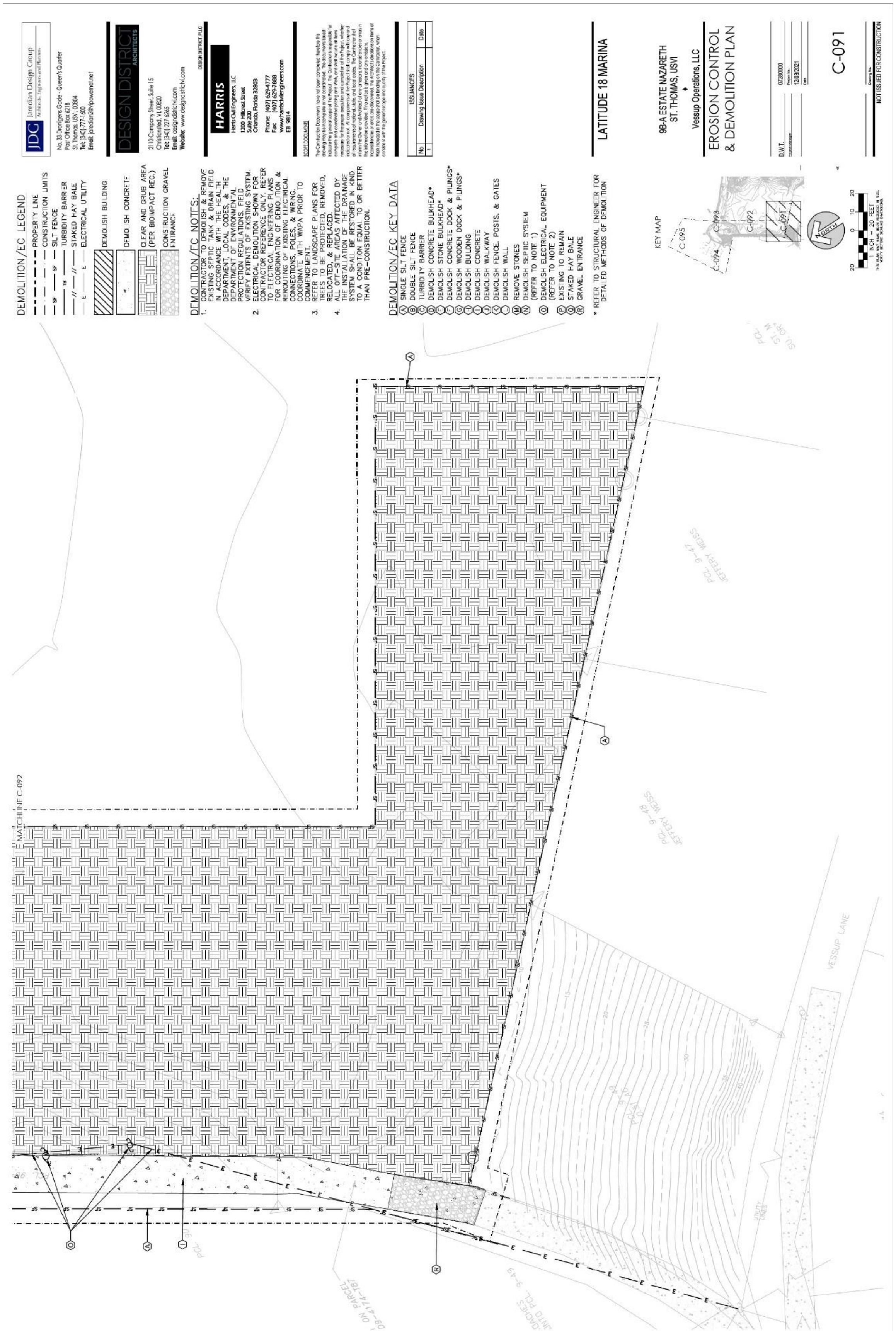
PILLSBURY SOUND
MULLER BAY
VESSUP BAY
MATCHLINE C-010



DEMOLITION/EC LEGEND
PROPERTY LINE
CONSTRUCTION LIMITS
SILT FENCE
TURBIDITY BARRIER
STAKED HAY BALE
ELECTRICAL UTILITY
DEMOLISH BUILDING
DEMOLISH CONCRETE
CLEAR AND GRUB AREA (PER BIOIMPACT REC.)
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DEMOLITION/EC KEY DATA
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DOUBLE SILT FENCE
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DEMOLISH FENCE, POSTS, & GATES
DEMOLISH WALL
REMOVE STONES
DEMOLISH SEPTIC SYSTEM (REFER TO NOTE 1)
DEMOLISH ELECTRICAL EQUIPMENT (REFER TO NOTE 2)
EXISTING TO REMAIN
STAKED HAY BALE
GRAVEL ENTRANCE
* REFER TO STRUCTURAL ENGINEER FOR DETAILED METHODS OF DEMOLITION
KEY MAP
C-091
C-092
C-093
C-094
C-095
NORTH
1 INCH = 20 FEET
JDG Jaredian Design Group
DESIGN DISTRICT ARCHITECTS
HARRIS
Harris Civil Engineers, LLC
ISSUANCES
LATITUDE 18 MARINA
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ST. THOMAS, USVI
Vessup Operations, LLC
EROSION CONTROL & DEMOLITION PLAN
C-091
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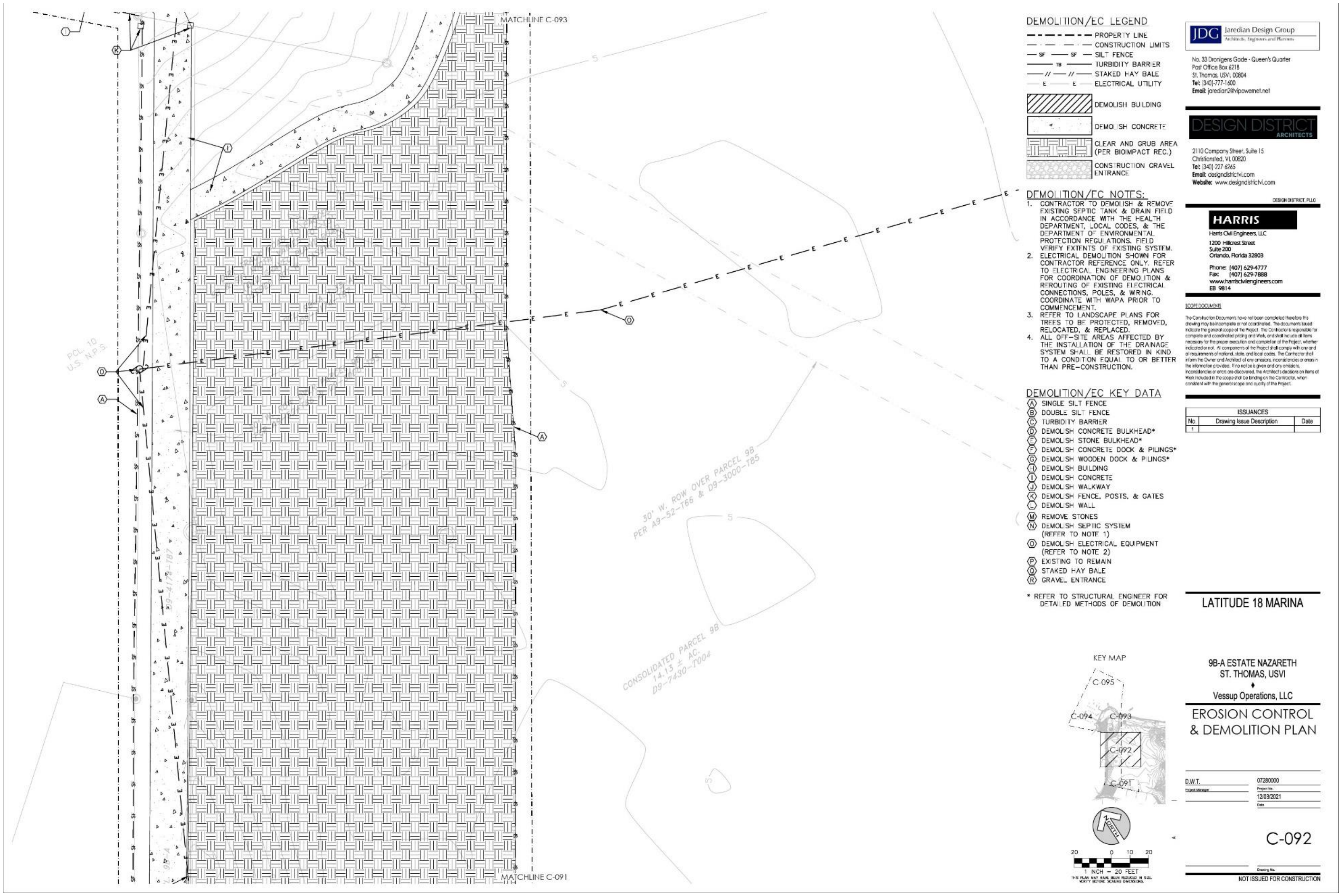

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MATCHLINE C-091
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30' W. ROW OVER PARCEL 9B PER A9-52-T66 & D9-3000-T85
CONSOLIDATED PARCEL 9B 14.13 ± AC. D9-7430-T004
PCL. 10 U.S. N.P.S.
KEY MAP
C-095
C-094
C-093
C-092
C-091
NORTH
20 0 10 20
1 INCH = 20 FEET
JDG Jaredian Design Group
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EB 9814
SCOPE DOCUMENTS
ISSUANCES
No. | Drawing Issue Description | Date
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LATITUDE 18 MARINA
9B-A ESTATE NAZARETH
ST. THOMAS, USVI
Vessup Operations, LLC
EROSION CONTROL & DEMOLITION PLAN
D.W.T.
07280000
12/03/2021
C-092
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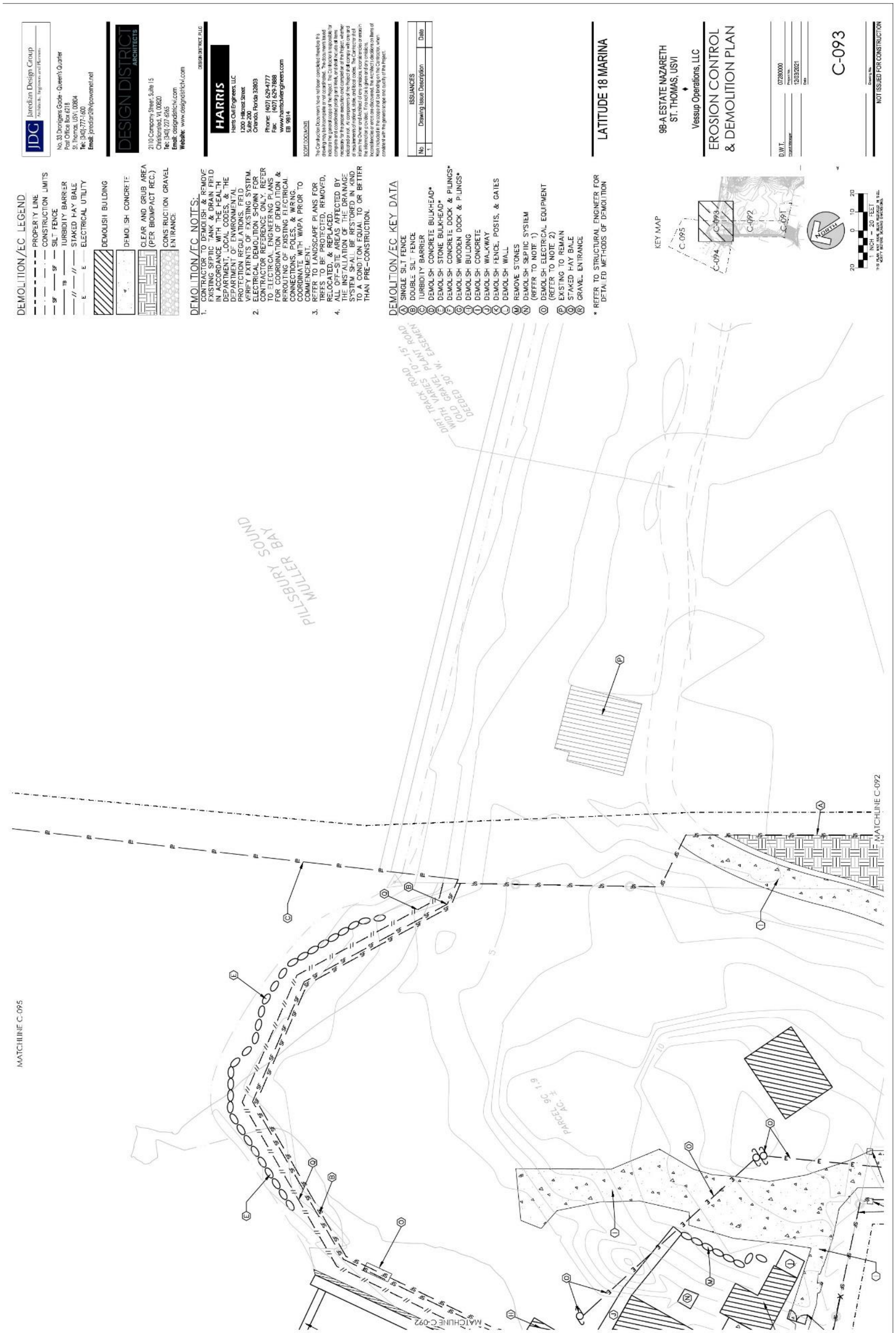
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LATITUDE 18 MARINA
KEY MAP
C-095
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C-093
C-092
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1 INCH = 20 FEET
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MATCHLINE C-095
MATCHLINE C-092
PILLSBURY SOUND
MULLER BAY
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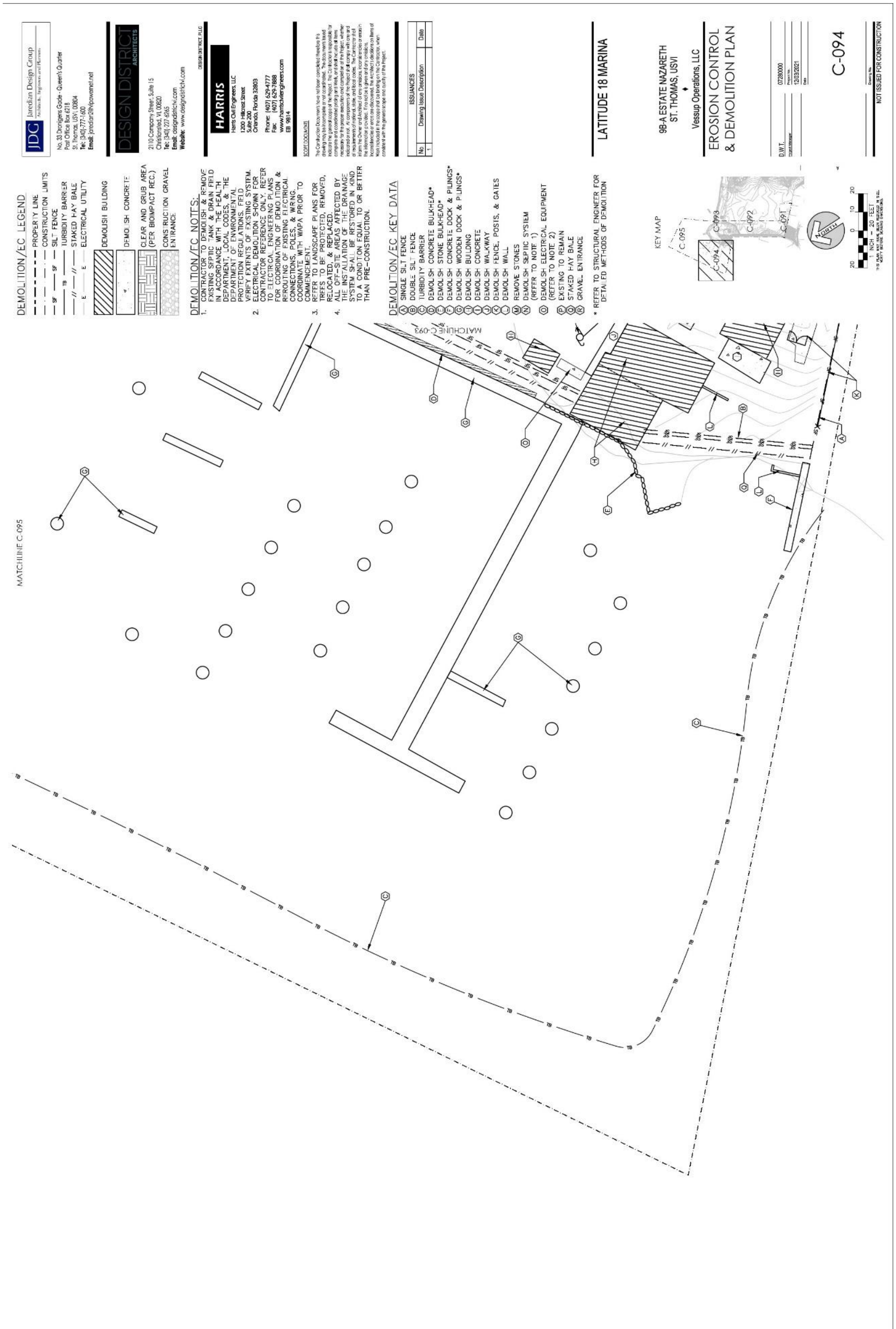
PARCEL 9C 1.9 AC. ±



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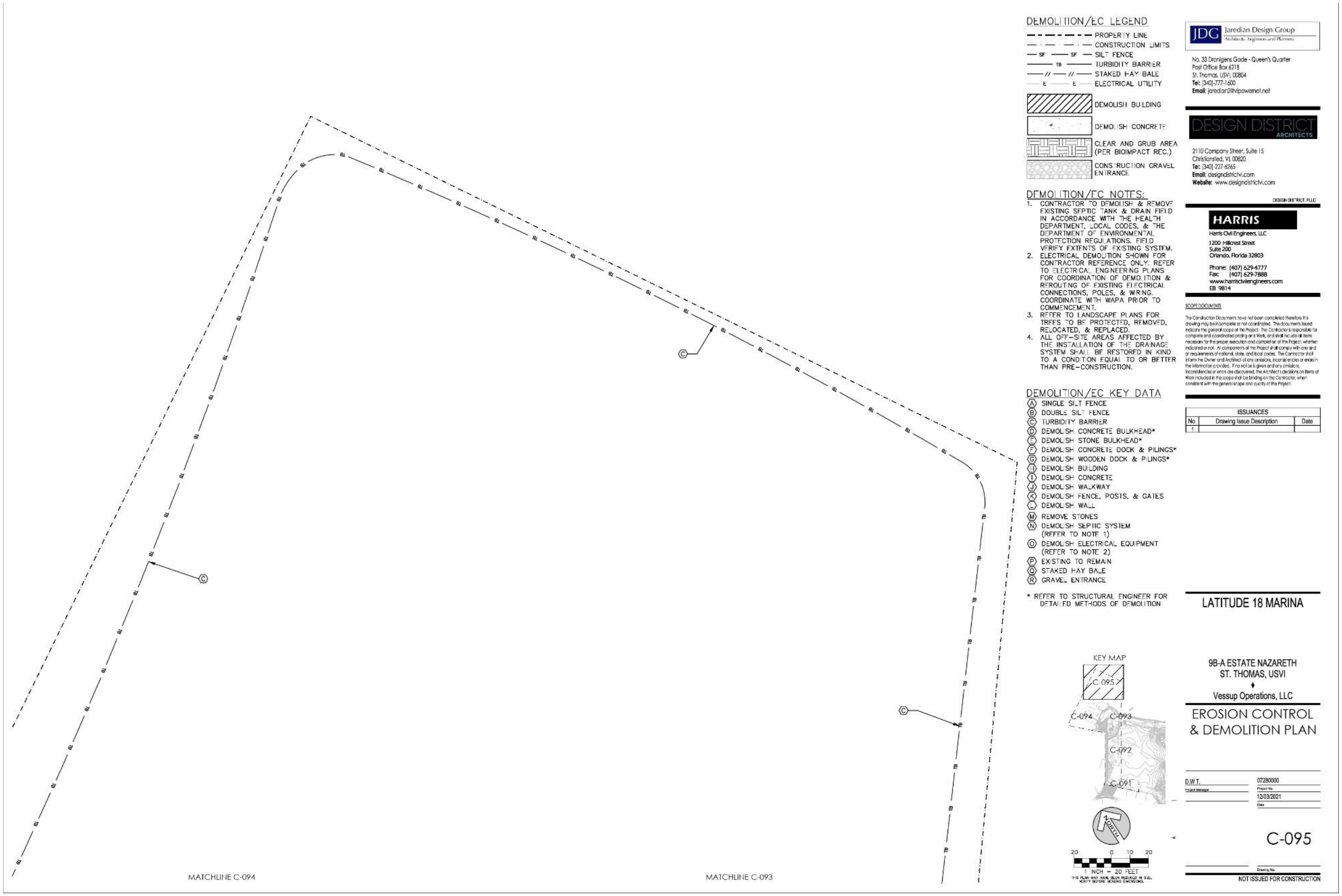
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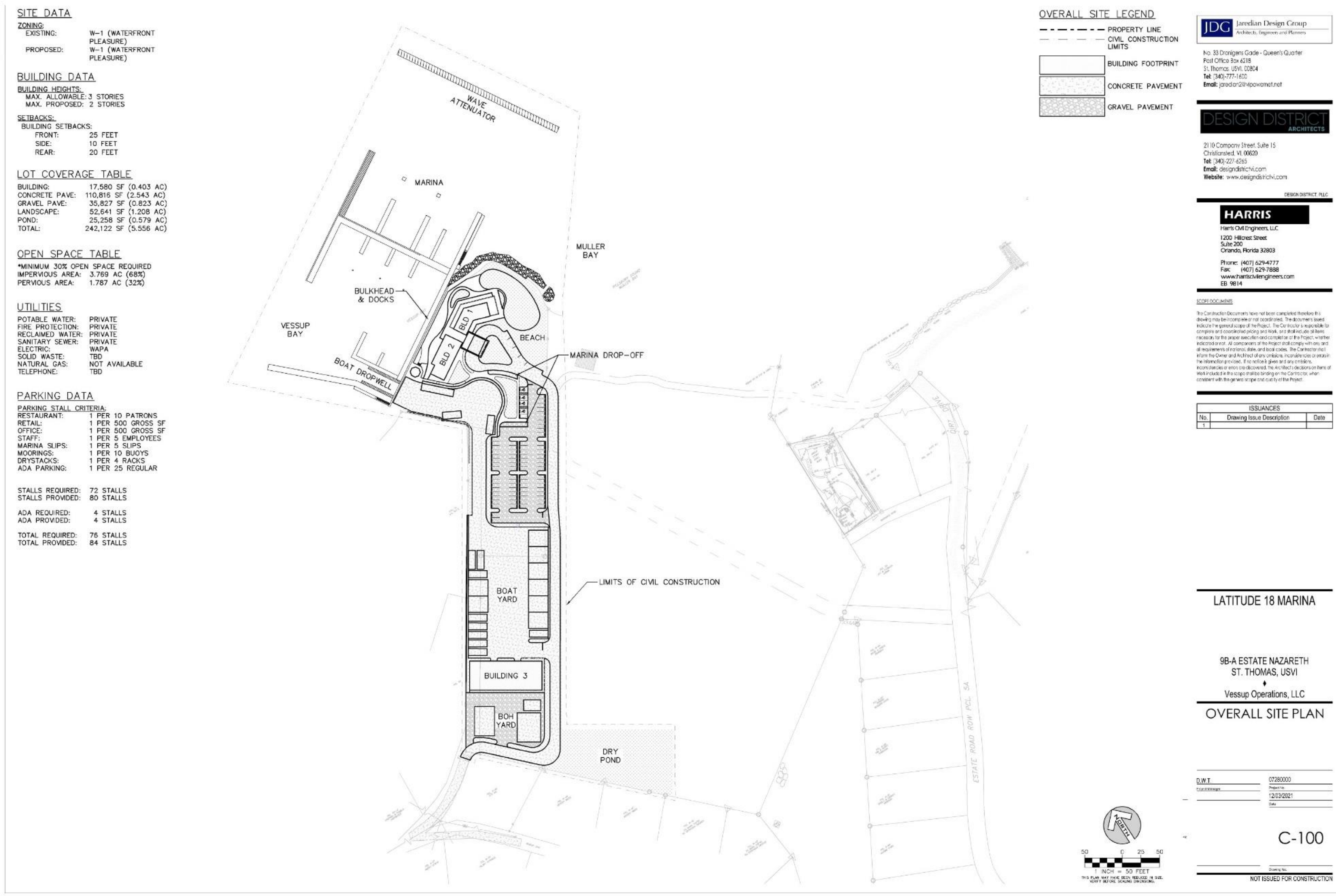
Date
1
LATITUDE 18 MARINA
KEY MAP
C-095
C-094
C-093
C-092
C-091
NORTH
20 0 10 20
1 INCH = 20 FEET
9B-A ESTATE NAZARETH
ST. THOMAS, USVI
Vessup Operations, LLC
EROSION CONTROL
& DEMOLITION PLAN
D.W.T.
07280000
12/03/2021
C-095
NOT ISSUED FOR CONSTRUCTION
MATCHLINE C-094
MATCHLINE C-093


SITE DATA
ZONING:
EXISTING: W-1 (WATERFRONT PLEASURE)
PROPOSED: W-1 (WATERFRONT PLEASURE)
BUILDING DATA
BUILDING HEIGHTS:
MAX. ALLOWABLE: 3 STORIES
MAX. PROPOSED: 2 STORIES
SETBACKS:
BUILDING SETBACKS:
FRONT: 25 FEET
SIDE: 10 FEET
REAR: 20 FEET
LOT COVERAGE TABLE
BUILDING: 17,580 SF (0.403 AC)
CONCRETE PAVE: 110,816 SF (2.543 AC)
GRAVEL PAVE: 35,827 SF (0.823 AC)
LANDSCAPE: 52,641 SF (1.208 AC)
POND: 25,258 SF (0.579 AC)
TOTAL: 242,122 SF (5.556 AC)
OPEN SPACE TABLE
*MINIMUM 30% OPEN SPACE REQUIRED
IMPERVIOUS AREA: 3.769 AC (68%)
PERVIOUS AREA: 1.787 AC (32%)
UTILITIES
POTABLE WATER: PRIVATE
FIRE PROTECTION: PRIVATE
RECLAIMED WATER: PRIVATE
SANITARY SEWER: PRIVATE
ELECTRIC: WAPA
SOLID WASTE: TBD
NATURAL GAS: NOT AVAILABLE
TELEPHONE: TBD
PARKING DATA
PARKING STALL CRITERIA:
RESTAURANT: 1 PER 10 PATRONS
RETAIL: 1 PER 500 GROSS SF
OFFICE: 1 PER 500 GROSS SF
STAFF: 1 PER 5 EMPLOYEES
MARINA SLIPS: 1 PER 5 SLIPS
MOORINGS: 1 PER 10 BUOYS
DRYSTACKS: 1 PER 4 RACKS
ADA PARKING: 1 PER 25 REGULAR
STALLS REQUIRED: 72 STALLS
STALLS PROVIDED: 80 STALLS
ADA REQUIRED: 4 STALLS
ADA PROVIDED: 4 STALLS
TOTAL REQUIRED: 76 STALLS
TOTAL PROVIDED: 84 STALLS
WAVE ATTENUATOR
MARINA
MULLER BAY
VESSUP BAY
BULKHEAD & DOCKS
BLD 1
BLD 2
BEACH
MARINA DROP-OFF
BOAT DROPWELL
BOAT YARD
LIMITS OF CIVIL CONSTRUCTION
BUILDING 3
BOH YARD
DRY POND
ESTATE ROAD ROW PCL 5A
OVERALL SITE LEGEND
PROPERTY LINE
CIVIL CONSTRUCTION LIMITS
BUILDING FOOTPRINT
CONCRETE PAVEMENT
GRAVEL PAVEMENT
NORTH
50 0 25 50
1 INCH = 50 FEET
JDG Jaredian Design Group
Architects, Engineers and Planners
No. 33 Dronigens Gade - Queen's Quarter
Post Office Box 6218
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Email: jaredian2@vipowernet.net
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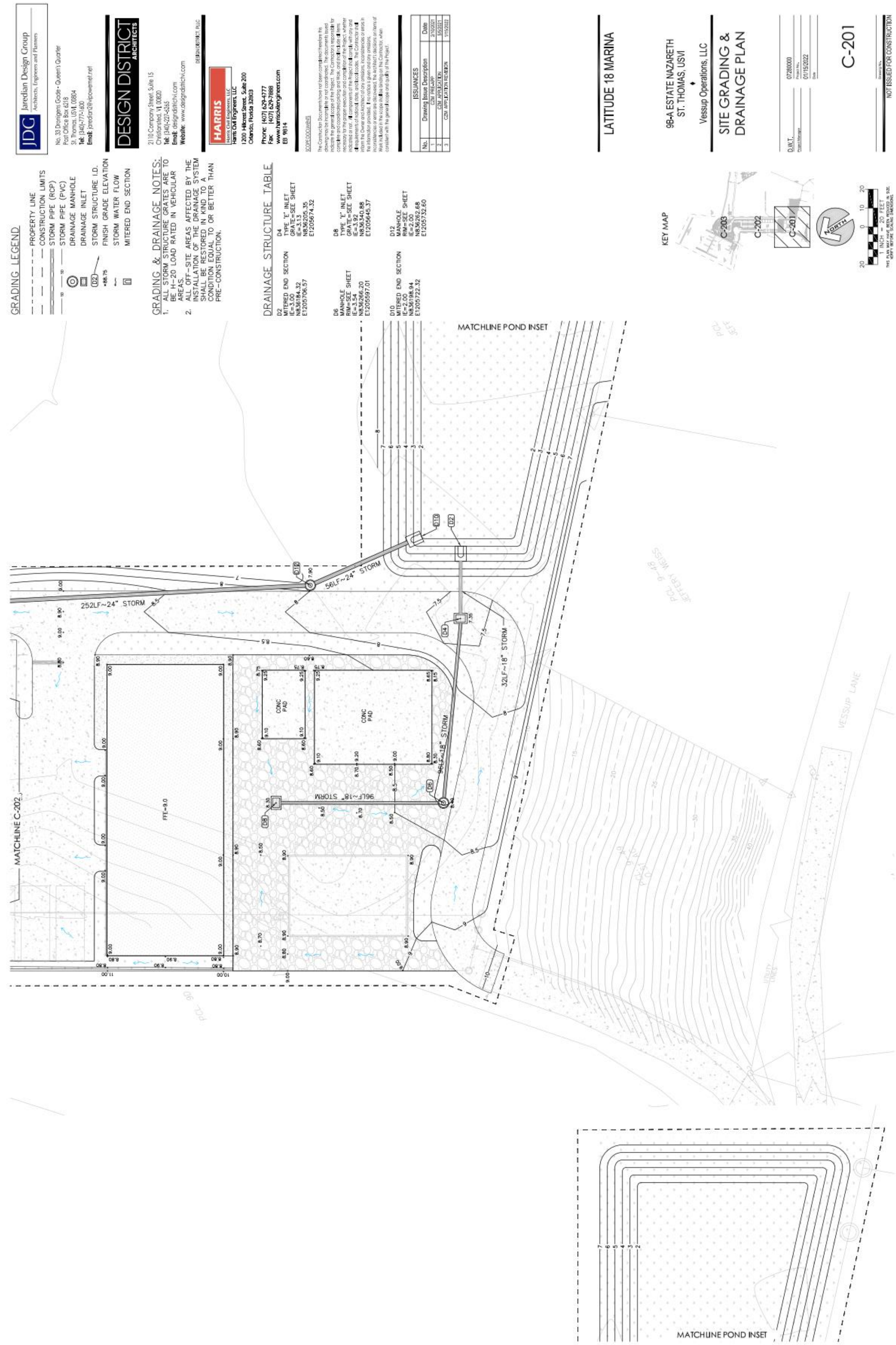
ARCHITECTS
2110 Company Street, Suite 15
Christiansted, VI 00820
Tel: (340)-227-6265
Email: designdistrictvi.com
Website: www.designdistrictvi.com
DESIGN DISTRICT, PLLC
HARRIS
Harris Civil Engineers, LLC
1200 Hillcrest Street
Suite 200
Orlando, Florida 32803
Phone: (407) 629-4777
Fax: (407) 629-7888
www.harriscivilengineers.com
EB 9814
ISSUANCES
No. Drawing Issue Description Date
1
LATITUDE 18 MARINA
9B-A ESTATE NAZARETH
ST. THOMAS, USVI
Vessup Operations, LLC
OVERALL SITE PLAN
DWT
07280000
12/03/2021
C-100
NOT ISSUED FOR CONSTRUCTION


GRADING LEGEND
PROPERTY LINE
CONSTRUCTION LIMITS
STORM PIPE (RCP)
STORM PIPE (PVC)
DRAINAGE MANHOLE
DRAINAGE INLET
STORM STRUCTURE I.D.
FINISH GRADE ELEVATION
STORM WATER FLOW
MITERED END SECTION
GRADING & DRAINAGE NOTES:
1. ALL STORM STRUCTURE GRATES ARE TO BE H-20 LOAD RATED IN VEHICULAR AREAS.
2. ALL OFF-SITE AREAS AFFECTED BY THE INSTALLATION OF THE DRAINAGE SYSTEM SHALL BE RESTORED IN KIND TO A CONDITION EQUAL TO OR BETTER THAN PRE-CONSTRUCTION.
DRAINAGE STRUCTURE TABLE
D2 MITERED END SECTION IE=3.00 N836184.32 E1205706.57
D4 TYPE 'E' INLET GRATE=SEE SHEET IE=3.13 N836205.35 E1205674.32
D6 MANHOLE RIM=SEE SHEET IE=3.54 N836266.20 E1205597.01
D8 TYPE 'E' INLET GRATE=SEE SHEET IE=3.92 N836340.88 E1205645.37
D10 MITERED END SECTION IE=2.00 N836198.94 E1205722.32
D12 MANHOLE RIM=SEE SHEET IE=2.00 N836262.68 E1205732.60
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DESIGN DISTRICT ARCHITECTS
2110 Company Street, Suite 15
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Website: www.designdistrictvi.com
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Phone: (407) 629-4777
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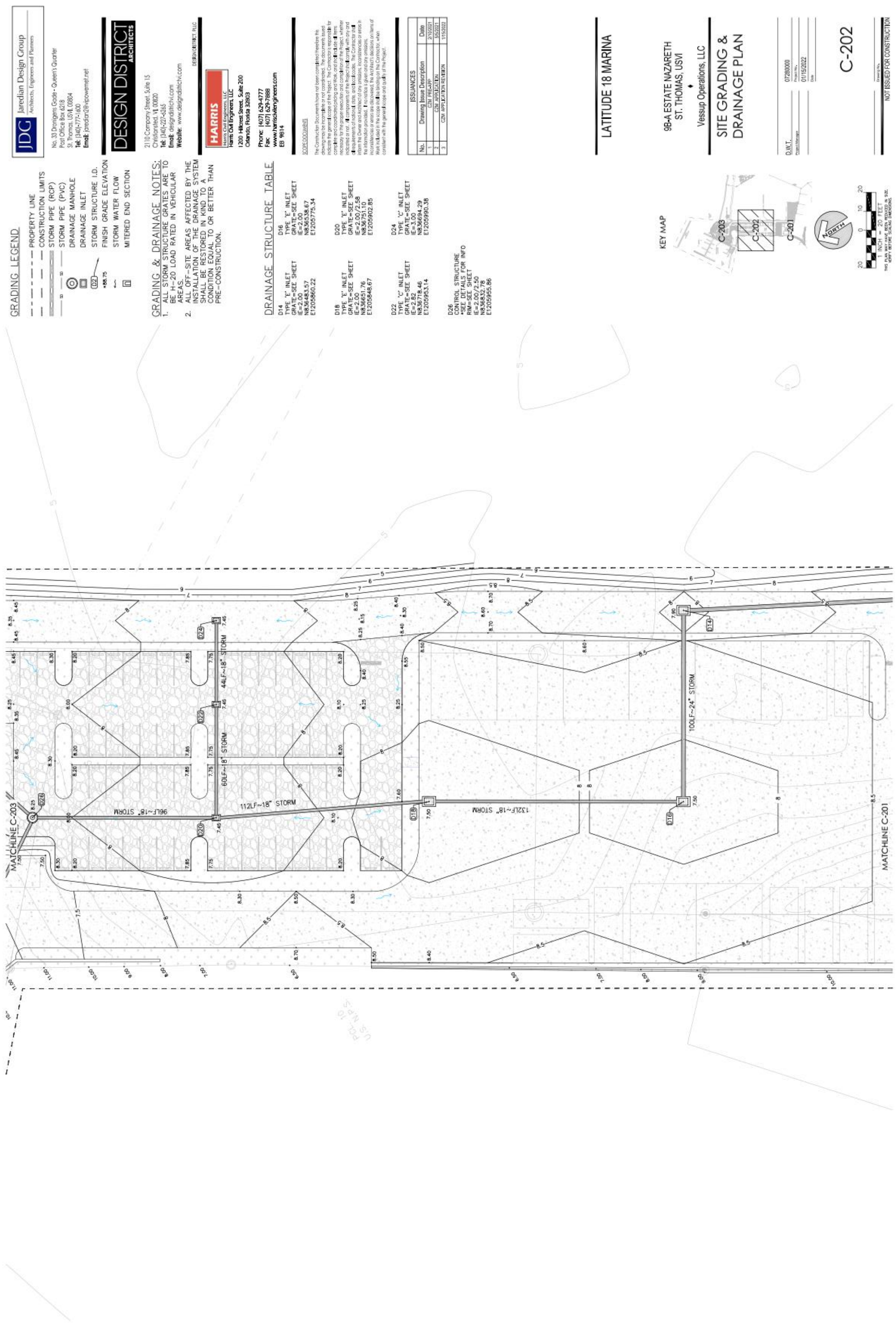
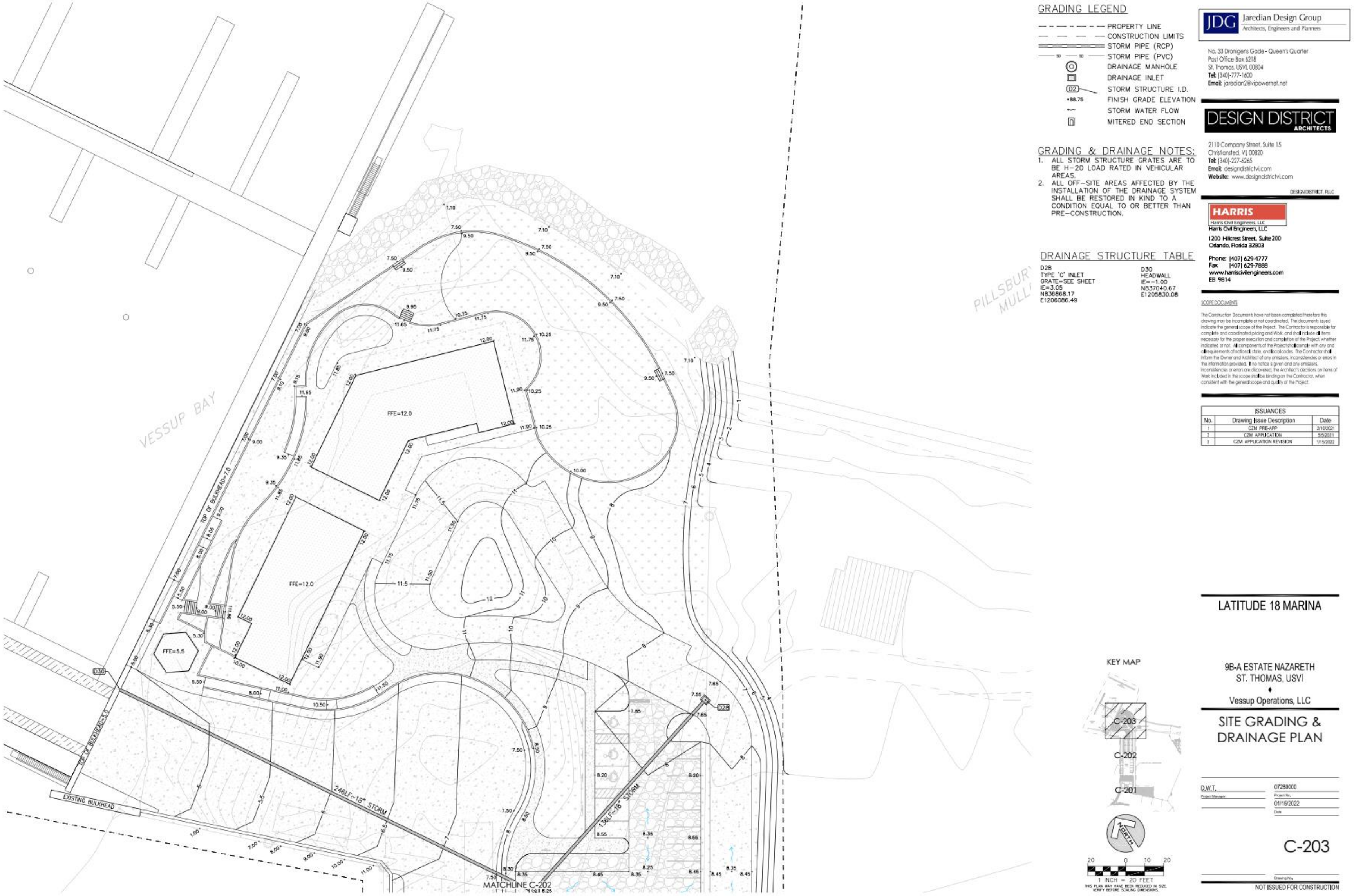
EB 9814
ISSUANCES
No. | Drawing Issue Description | Date
1 | CZM PRE-APP | 2/15/2021
2 | CZM APPLICATION | 5/5/2021
3 | CZM APPLICATION REVISION | 1/15/2022
LATITUDE 18 MARINA
9B-A ESTATE NAZARETH
ST. THOMAS, USVI
Vessup Operations, LLC
SITE GRADING & DRAINAGE PLAN
C-201
NOT ISSUED FOR CONSTRUCTION
KEY MAP
C-203
C-202
C-201
NORTH
MATCHLINE POND INSET
MATCHLINE C-202
252LF~24" STORM
56LF~24" STORM
32LF~18" STORM
96LF~18" STORM
CONC PAD
FFE=9.0
VESSUP LANE
MATCHLINE POND INSET


GRADING LEGEND
PROPERTY LINE
CONSTRUCTION LIMITS
STORM PIPE (RCP)
STORM PIPE (PVC)
DRAINAGE MANHOLE
DRAINAGE INLET
STORM STRUCTURE I.D.
FINISH GRADE ELEVATION
STORM WATER FLOW
MITERED END SECTION
GRADING & DRAINAGE NOTES:
1. ALL STORM STRUCTURE GRATES ARE TO BE H-20 LOAD RATED IN VEHICULAR AREAS.
2. ALL OFF-SITE AREAS AFFECTED BY THE INSTALLATION OF THE DRAINAGE SYSTEM SHALL BE RESTORED IN KIND TO A CONDITION EQUAL TO OR BETTER THAN PRE-CONSTRUCTION.
DRAINAGE STRUCTURE TABLE
D14 TYPE "E" INLET GRATE=SEE SHEET IE=2.00 N836483.57 E1205860.22
D16 TYPE "E" INLET GRATE=SEE SHEET IE=2.00 N836538.67 E1205775.34
D18 TYPE "E" INLET GRATE=SEE SHEET IE=2.00 N836651.76 E1205848.67
D20 TYPE "E" INLET GRATE=SEE SHEET IE=2.00/2.58 N836751.10 E1205902.85
D22 TYPE "C" INLET GRATE=SEE SHEET IE=2.92 N836718.46 E1205953.14
D24 TYPE "C" INLET GRATE=SEE SHEET IE=3.00 N836694.29 E1205990.38
D26 CONTROL STRUCTURE *SEE DETAILS FOR INFO RIM=SEE SHEET IE=2.00/2.50 N836832.78 E1205955.86
JDG Jaredian Design Group
DESIGN DISTRICT ARCHITECTS
HARRIS
KEY MAP
C-203
C-202
C-201
NORTH
LATITUDE 18 MARINA
98-A ESTATE NAZARETH ST. THOMAS, USVI
Vessup Operations, LLC
SITE GRADING & DRAINAGE PLAN
ISSUANCES
C-202
NOT ISSUED FOR CONSTRUCTION
MATCHLINE C-203
MATCHLINE C-201
96LF~18" STORM
112LF~18" STORM
132LF~18" STORM
60LF~18" STORM
44LF~18" STORM
100LF~24" STORM


GRADING LEGEND
PROPERTY LINE
CONSTRUCTION LIMITS
STORM PIPE (RCP)
STORM PIPE (PVC)
DRAINAGE MANHOLE
DRAINAGE INLET
STORM STRUCTURE I.D.
FINISH GRADE ELEVATION
STORM WATER FLOW
MITERED END SECTION
GRADING & DRAINAGE NOTES:
1. ALL STORM STRUCTURE GRATES ARE TO BE H-20 LOAD RATED IN VEHICULAR AREAS.
2. ALL OFF-SITE AREAS AFFECTED BY THE INSTALLATION OF THE DRAINAGE SYSTEM SHALL BE RESTORED IN KIND TO A CONDITION EQUAL TO OR BETTER THAN PRE-CONSTRUCTION.
DRAINAGE STRUCTURE TABLE
D28 TYPE 'C' INLET GRATE=SEE SHEET IE=3.05 N836868.17 E1206086.49
D30 HEADWALL IE=-1.00 N837040.67 E1205830.08
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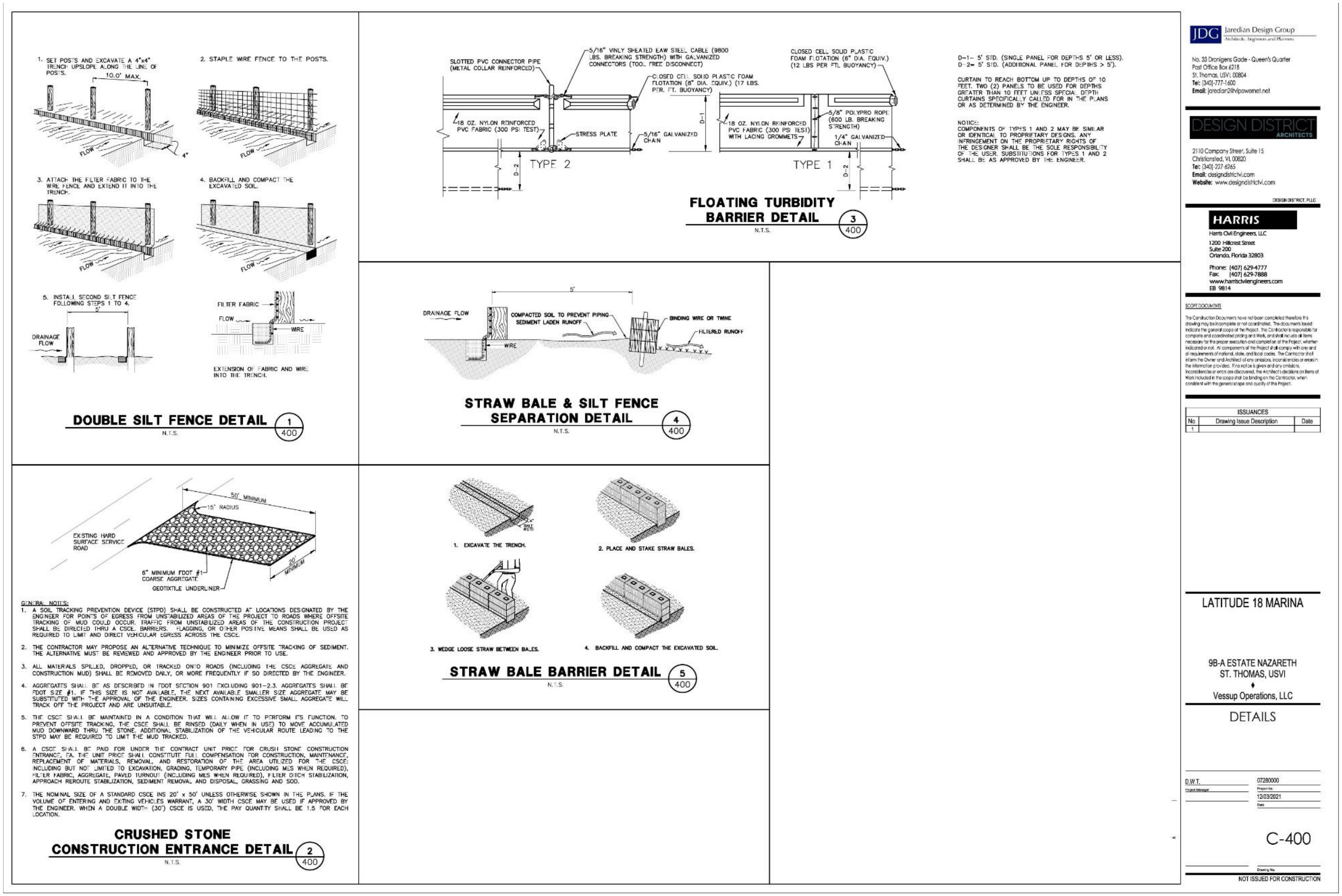
LATITUDE 18 MARINA
KEY MAP
C-203
C-202
C-201
NORTH
1 INCH = 20 FEET
9B-A ESTATE NAZARETH
ST. THOMAS, USVI
Vessup Operations, LLC
SITE GRADING & DRAINAGE PLAN
D.W.T.
07280000
01/15/2022
C-203
NOT ISSUED FOR CONSTRUCTION
VESSUP BAY
FFE=12.0
FFE=12.0
FFE=5.5
TOP OF BULKHEAD=7.0
TOP OF BULKHEAD=5.0
EXISTING BULKHEAD
246LF-18" STORM
MATCHLINE C-202


1. SET POSTS AND EXCAVATE A 4"x4" TRENCH UPSLOPE ALONG THE LINE OF POSTS.
10.0' MAX.
2. STAPLE WIRE FENCE TO THE POSTS.
3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.
4. BACKFILL AND COMPACT THE EXCAVATED SOIL.
5. INSTALL SECOND SILT FENCE FOLLOWING STEPS 1 TO 4.
DRAINAGE FLOW
FILTER FABRIC
FLOW
WIRE
EXTENSION OF FABRIC AND WIRE INTO THE TRENCH.
DOUBLE SILT FENCE DETAIL
N.T.S.
1
400
SLOTTED PVC CONNECTOR PIPE (METAL COLLAR REINFORCED)
5/16" VINLY SHEATED EAW STEEL CABLE (9800 LBS. BREAKING STRENGTH) WITH GALVANIZED CONNECTORS (TOOL FREE DISCONNECT)
CLOSED CELL SOLID PLASTIC FOAM FLOTATION (8" DIA. EQUIV.) (17 LBS. PER. FT. BUOYANCY)
CLOSED CELL SOLID PLASTIC FOAM FLOTATION (6" DIA. EQUIV.) (12 LBS PER FT. BUOYANCY)
18 OZ. NYLON REINFORCED PVC FABRIC (300 PSI TEST)
STRESS PLATE
5/16" GALVANIZED CHAIN
18 OZ. NYLON REINFORCED PVC FABRIC (300 PSI TEST) WITH LACING GROMMETS
5/8" POLYPRO ROPE (600 LB. BREAKING STRENGTH)
1/4" GALVANIZED CHAIN
TYPE 2
TYPE 1
D-1
D-2
D-1= 5' STD. (SINGLE PANEL FOR DEPTHS 5' OR LESS).
D-2= 5' STD. (ADDITIONAL PANEL FOR DEPTHS > 5').
CURTAIN TO REACH BOTTOM UP TO DEPTHS OF 10 FEET. TWO (2) PANELS TO BE USED FOR DEPTHS GREATER THAN 10 FEET UNLESS SPECIAL DEPTH CURTAINS SPECIFICALLY CALLED FOR IN THE PLANS OR AS DETERMINED BY THE ENGINEER.
NOTICE:
COMPONENTS OF TYPES 1 AND 2 MAY BE SIMILAR OR IDENTICAL TO PROPRIETARY DESIGNS. ANY INFRINGEMENT ON THE PROPRIETARY RIGHTS OF THE DESIGNER SHALL BE THE SOLE RESPONSIBILITY OF THE USER. SUBSTITUTIONS FOR TYPES 1 AND 2 SHALL BE AS APPROVED BY THE ENGINEER.
FLOATING TURBIDITY BARRIER DETAIL
N.T.S.
3
400
5'
DRAINAGE FLOW
COMPACTED SOIL TO PREVENT PIPING SEDIMENT LADEN RUNOFF
WIRE
BINDING WIRE OR TWINE
FILTERED RUNOFF
STRAW BALE & SILT FENCE SEPARATION DETAIL
N.T.S.
4
400
50' MINIMUM
15' RADIUS
EXISTING HARD SURFACE SERVICE ROAD
6" MINIMUM FDOT #1 COARSE AGGREGATE
GEOTIXTILE UNDERLINER
20' MINIMUM
GENERAL NOTES:
1. A SOIL TRACKING PREVENTION DEVICE (STPD) SHALL BE CONSTRUCTED AT LOCATIONS DESIGNATED BY THE ENGINEER FOR POINTS OF EGRESS FROM UNSTABILIZED AREAS OF THE PROJECT TO ROADS WHERE OFFSITE TRACKING OF MUD COULD OCCUR. TRAFFIC FROM UNSTABILIZED AREAS OF THE CONSTRUCTION PROJECT SHALL BE DIRECTED THRU A CSCE. BARRIERS. FLAGGING, OR OTHER POSITIVE MEANS SHALL BE USED AS REQUIRED TO LIMIT AND DIRECT VEHICULAR EGRESS ACROSS THE CSCE.
2. THE CONTRACTOR MAY PROPOSE AN ALTERNATIVE TECHNIQUE TO MINIMIZE OFFSITE TRACKING OF SEDIMENT. THE ALTERNATIVE MUST BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO USE.
3. ALL MATERIALS SPILLED, DROPPED, OR TRACKED ONTO ROADS (INCLUDING THE CSCE AGGREGATE AND CONSTRUCTION MUD) SHALL BE REMOVED DAILY, OR MORE FREQUENTLY IF SO DIRECTED BY THE ENGINEER.
4. AGGREGATES SHALL BE AS DESCRIBED IN FDOT SECTION 901 EXCLUDING 901-2.3. AGGREGATES SHALL BE FDOT SIZE #1. IF THIS SIZE IS NOT AVAILABLE, THE NEXT AVAILABLE SMALLER SIZE AGGREGATE MAY BE SUBSTITUTED WITH THE APPROVAL OF THE ENGINEER. SIZES CONTAINING EXCESSIVE SMALL AGGREGATE WILL TRACK OFF THE PROJECT AND ARE UNSUITABLE.
5. THE CSCE SHALL BE MAINTAINED IN A CONDITION THAT WILL ALLOW IT TO PERFORM ITS FUNCTION. TO PREVENT OFFSITE TRACKING, THE CSCE SHALL BE RINSED (DAILY WHEN IN USE) TO MOVE ACCUMULATED MUD DOWNWARD THRU THE STONE. ADDITIONAL STABILIZATION OF THE VEHICULAR ROUTE LEADING TO THE STPD MAY BE REQUIRED TO LIMIT THE MUD TRACKED.
6. A CSCE SHALL BE PAID FOR UNDER THE CONTRACT UNIT PRICE FOR CRUSH STONE CONSTRUCTION ENTRANCE, EA. THE UNIT PRICE SHALL CONSTITUTE FULL COMPENSATION FOR CONSTRUCTION, MAINTENANCE, REPLACEMENT OF MATERIALS, REMOVAL, AND RESTORATION OF THE AREA UTILIZED FOR THE CSCE: INCLUDING BUT NOT LIMITED TO EXCAVATION, GRADING, TEMPORARY PIPE (INCLUDING MES WHEN REQUIRED), FILTER FABRIC, AGGREGATE, PAVED TURNOUT (INCLUDING MES WHEN REQUIRED), FILTER DITCH STABILIZATION, APPROACH REROUTE STABILIZATION, SEDIMENT REMOVAL AND DISPOSAL, GRASSING AND SOD.
7. THE NOMINAL SIZE OF A STANDARD CSCE INS 20' x 50' UNLESS OTHERWISE SHOWN IN THE PLANS. IF THE VOLUME OF ENTERING AND EXITING VEHICLES WARRANT, A 30' WIDTH CSCE MAY BE USED IF APPROVED BY THE ENGINEER. WHEN A DOUBLE WIDTH (30') CSCE IS USED, THE PAY QUANTITY SHALL BE 1.5 FOR EACH LOCATION.
CRUSHED STONE CONSTRUCTION ENTRANCE DETAIL
N.T.S.
2
400
1. EXCAVATE THE TRENCH.
2. PLACE AND STAKE STRAW BALES.
3. WEDGE LOOSE STRAW BETWEEN BALES.
4. BACKFILL AND COMPACT THE EXCAVATED SOIL.
STRAW BALE BARRIER DETAIL
N.T.S.
5
400
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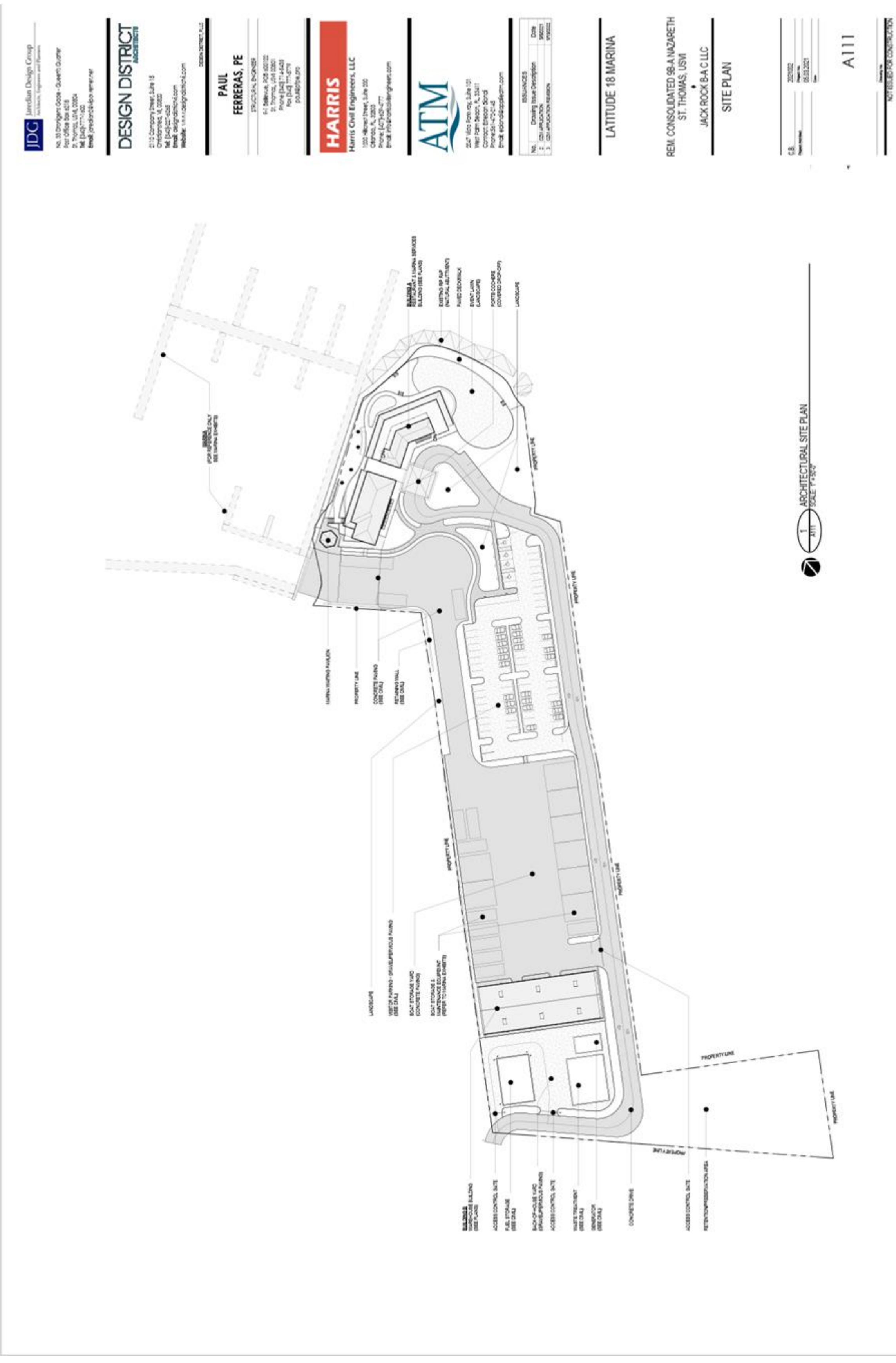
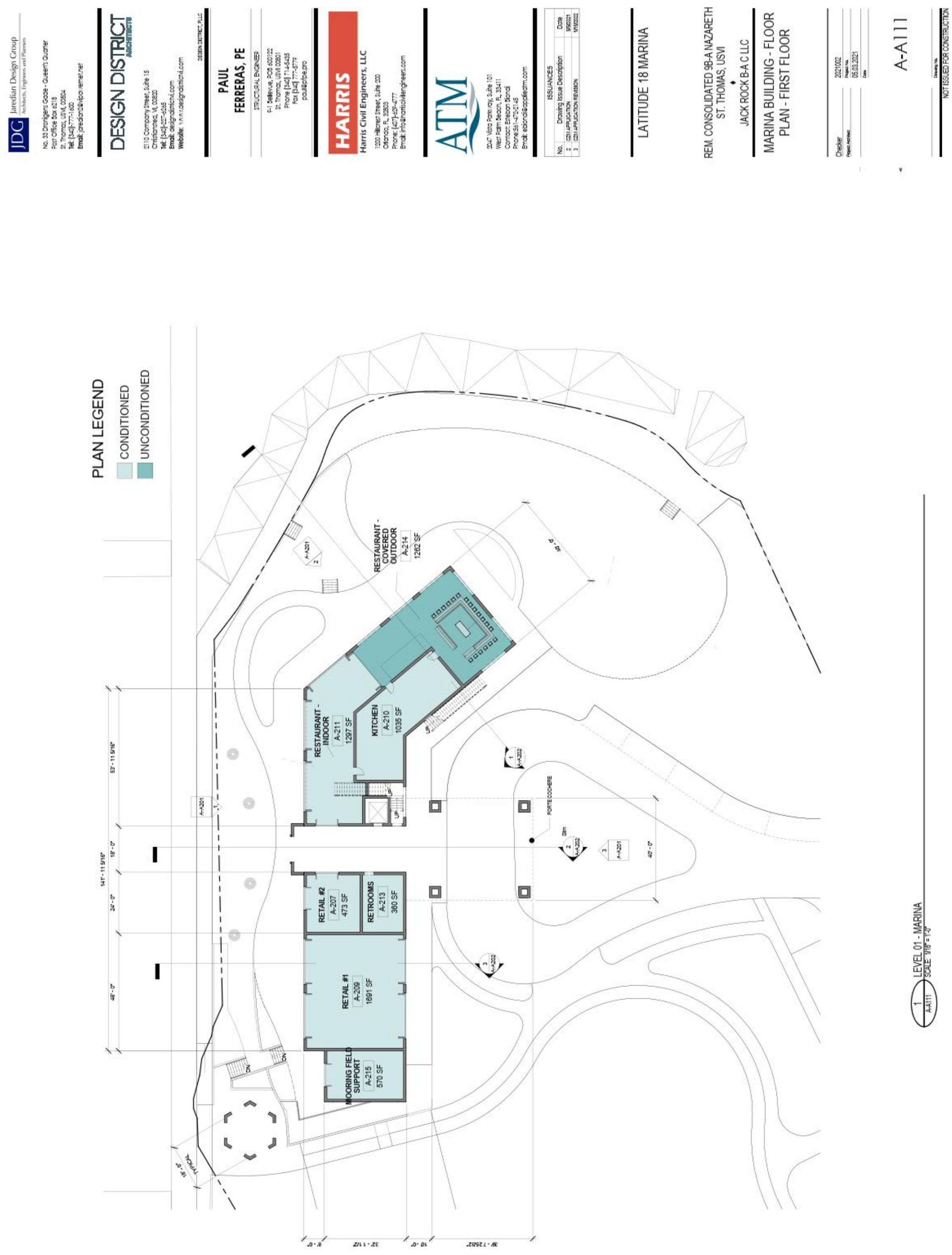
Fax: (407) 629-7888
www.harriscivilengineers.com
EB 9814
SCOPE DOCUMENTS
The Construction Documents have not been completed therefore this drawing may be incomplete or not coordinated. The documents issued indicate the general scope of the Project. The Contractor is responsible for complete and coordinated pricing and Work, and shall include all items necessary for the proper execution and completion of the Project, whether indicated or not. All components of the Project shall comply with any and all requirements of national, state, and local codes. The Contractor shall inform the Owner and Architect of any omissions, inconsistencies or errors in the information provided. If no notice is given and any omissions, inconsistencies or errors are discovered, the Architect's decisions on items of Work included in the scope shall be binding on the Contractor, when consistent with the general scope and quality of the Project.
ISSUANCES
No
Drawing Issue Description
Date
1
LATITUDE 18 MARINA
9B-A ESTATE NAZARETH
ST. THOMAS, USVI
Vessup Operations, LLC
DETAILS
D.W.T.
07280000
12/03/2021
C-400
NOT ISSUED FOR CONSTRUCTION


DESIGN DISTRICT
PAUL FERRERAS, PE
HARRIS
Harris Civil Engineers, LLC
ATM
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
JACK ROCK B-A C LLC
SITE PLAN
A111
NOT ISSUED FOR CONSTRUCTION
ARCHITECTURAL SITE PLAN


DESIGN DISTRICT
PAUL FERRERAS, PE
HARRIS
Harris Civil Engineers, LLC
ATM
ISSUANCES
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
JACK ROCK B-A C LLC
LANSCAPE & IRRIGATION PLAN
A112
NOT ISSUED FOR CONSTRUCTION
TREE LEGEND
LANDSCAPE & IRRIGATION PLAN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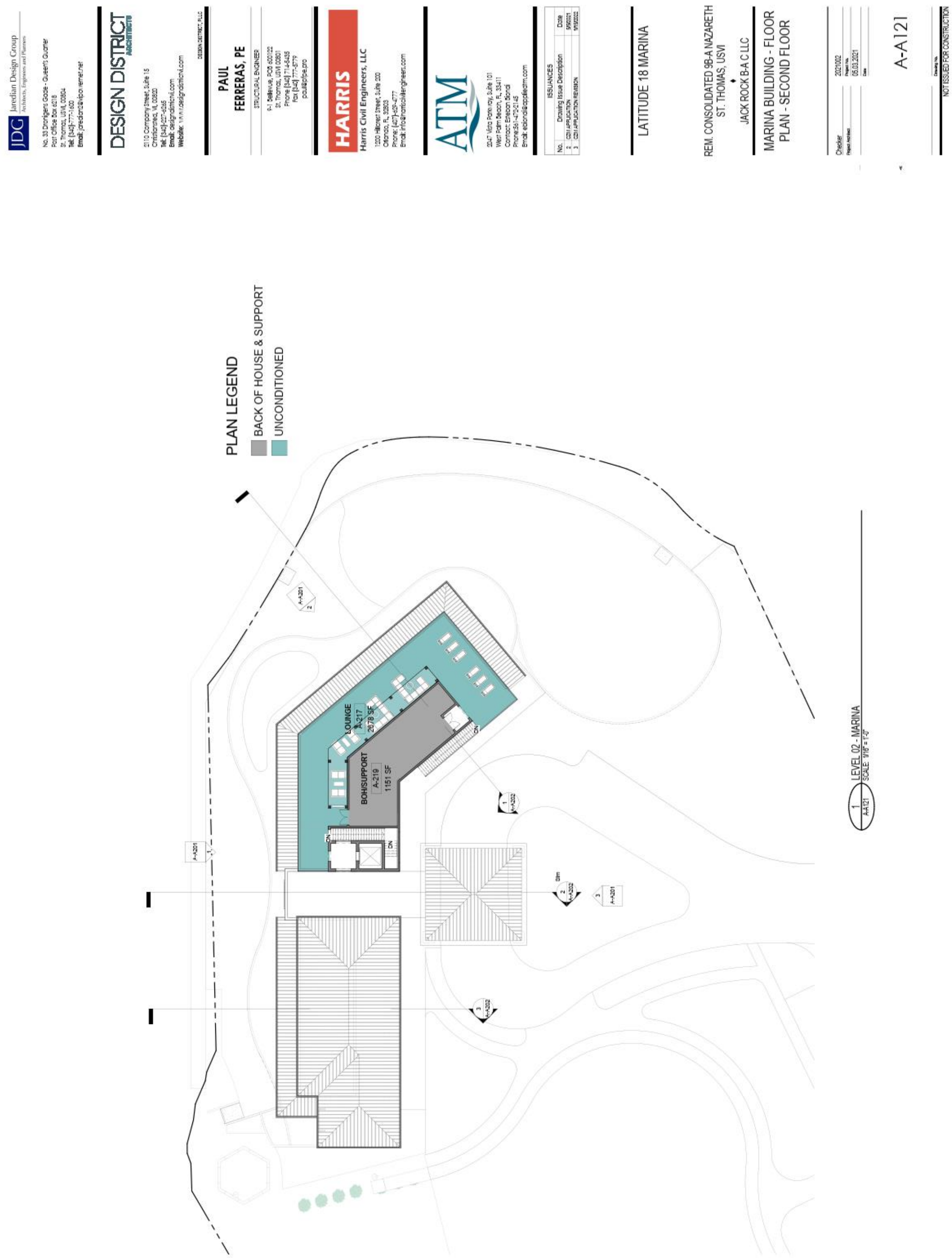
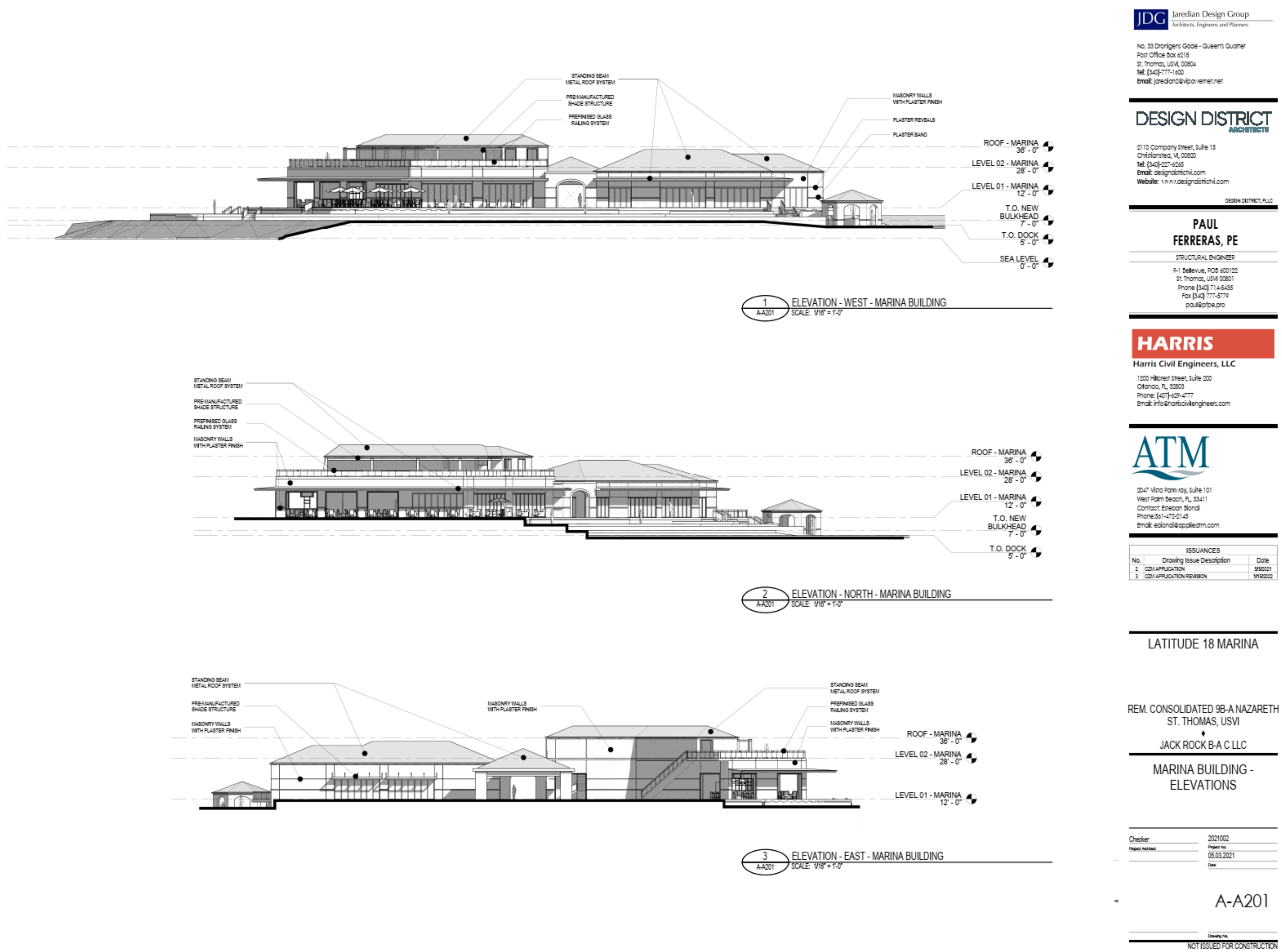
Harris Civil Engineers, LLC
ATM
ISSUANCES
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH ST. THOMAS, USVI
JACK ROCK B.A C LLC
MARINA BUILDING - FLOOR PLAN - FIRST FLOOR
A-A111
NOT ISSUED FOR CONSTRUCTION
PLAN LEGEND
CONDITIONED
UNCONDITIONED
RESTAURANT - COVERED OUTDOOR
A-214
1262 SF
RESTAURANT - INDOOR
A-211
1297 SF
KITCHEN
A-210
1035 SF
RETAIL #2
A-207
473 SF
RETROOMS
A-213
360 SF
RETAIL #1
A-209
1691 SF
MOORING FIELD SUPPORT
A-215
570 SF
PORTE COCHERE
LEVEL 01 - MARINA
SCALE: 1/16" = 1'-0"


PLAN LEGEND
BACK OF HOUSE & SUPPORT
UNCONDITIONED
LOUNGE
BOH/SUPPORT
A-219
1151 SF
LEVEL 02 - MARINA
DESIGN DISTRICT
PAUL FERRERAS, PE
HARRIS
Harris Civil Engineers, LLC
ATM
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH ST. THOMAS, USVI
JACK ROCK B-A C LLC
MARINA BUILDING - FLOOR PLAN - SECOND FLOOR
A-A121
NOT ISSUED FOR CONSTRUCTION


STANDING SEAM METAL ROOF SYSTEM
PRE-MANUFACTURED SHADE STRUCTURE
PREFINISED GLASS RAILING SYSTEM
MASONRY WALLS WITH PLASTER FINISH
PLASTER REVEALS
PLASTER BAND
ROOF - MARINA 36' - 0"
LEVEL 02 - MARINA 28' - 0"
LEVEL 01 - MARINA 12' - 0"
T.O. NEW BULKHEAD 7' - 0"
T.O. DOCK 5' - 0"
SEA LEVEL 0' - 0"
1 A-A201 ELEVATION - WEST - MARINA BUILDING
SCALE: 1/16" = 1'-0"
2 A-A201 ELEVATION - NORTH - MARINA BUILDING
SCALE: 1/16" = 1'-0"
3 A-A201 ELEVATION - EAST - MARINA BUILDING
SCALE: 1/16" = 1'-0"
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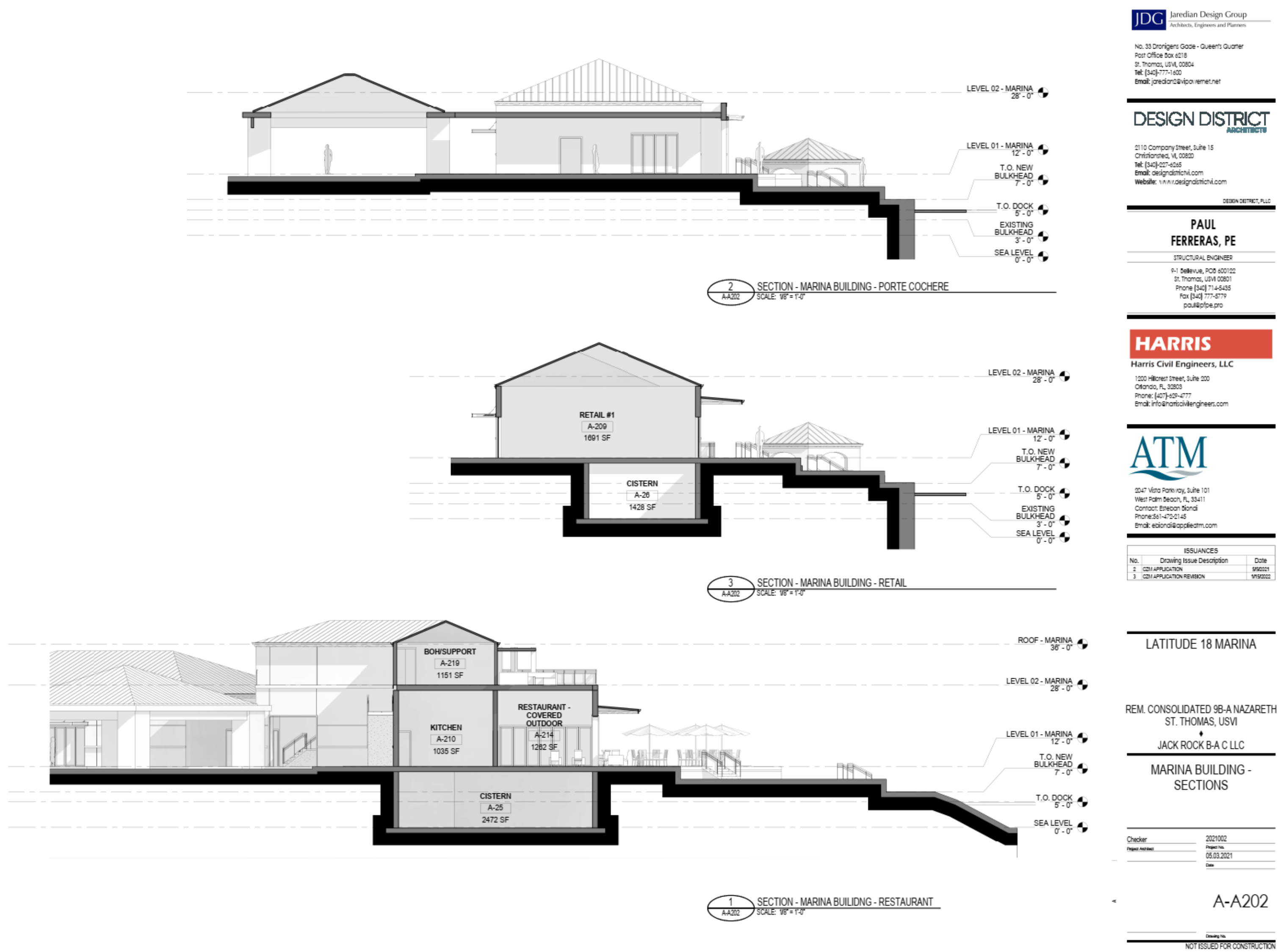
PAUL
FERRERAS, PE
STRUCTURAL ENGINEER
St. Thomas, USVI 00801
HARRIS
Harris Civil Engineers, LLC
1200 Hillcrest Street, Suite 200
Orlando, FL 32803
ATM
2047 Vista Parkway, Suite 101
West Palm Beach, FL 33411
Contact: Esteban Biondi
ISSUANCES
No. Drawing Issue Description Date
2 CZM APPLICATION
3 CZM APPLICATION REVISION
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
JACK ROCK B-A C LLC
MARINA BUILDING - ELEVATIONS
Checker
2021002
05.03.2021
A-A201
NOT ISSUED FOR CONSTRUCTION



LEVEL 02 - MARINA 28' - 0"
LEVEL 01 - MARINA 12' - 0"
T.O. NEW BULKHEAD 7' - 0"
T.O. DOCK 5' - 0"
EXISTING BULKHEAD 3' - 0"
SEA LEVEL 0' - 0"
2 A-A202 SECTION - MARINA BUILDING - PORTE COCHERE
SCALE: 1/8" = 1'-0"
RETAIL #1
A-209
1691 SF
CISTERN
A-26
1428 SF
3 A-A202 SECTION - MARINA BUILDING - RETAIL
SCALE: 1/8" = 1'-0"
ROOF - MARINA 36' - 0"
BOH/SUPPORT
A-219
1151 SF
KITCHEN
A-210
1035 SF
RESTAURANT - COVERED OUTDOOR
A-214
1262 SF
CISTERN
A-25
2472 SF
1 A-A202 SECTION - MARINA BUILDING - RESTAURANT
SCALE: 1/8" = 1'-0"
JDG Jaredian Design Group
Architects, Engineers and Planners
No. 33 Dronigens Gade - Queen's Quarter
Post Office Box 6218
St. Thomas, USVI, 00804
Tel: (340)-777-1600
DESIGN DISTRICT
ARCHITECTS
2110 Company Street, Suite 15
Christiansted, VI, 00820
Tel: (340)-227-6265
Website: www.designdistrictvi.com
DESIGN DISTRICT, PLLC
PAUL FERRERAS, PE
STRUCTURAL ENGINEER
9-1 Bellevue, POB 600102
St. Thomas, USVI 00801
Phone (340) 714-5435
Fax (340) 777-5779
paul@pfpe.pro
HARRIS
Harris Civil Engineers, LLC
1200 Hillcrest Street, Suite 200
Orlando, FL, 32803
Phone: (407)-629-4777
Email: info@harriscivilengineers.com
ATM
2047 Vista Parkway, Suite 101
West Palm Beach, FL, 33411
Contact: Esteban Biondi
Phone: 561-472-2145
Email: ebiondi@appliedtm.com
ISSUANCES
No. | Drawing Issue Description | Date
2 | CZM APPLICATION | 5/5/2021
3 | CZM APPLICATION REVISION | 11/15/2022
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
JACK ROCK B-A C LLC
MARINA BUILDING - SECTIONS
Checker
Project Architect
2021002
Project No.
05.03.2021
Date
A-A202
Drawing No.
NOT ISSUED FOR CONSTRUCTION

1 A-A231 MARINA BUILDING AXON NE
SCALE:

2 A-A231 MARINA BUILDING AXON NW
SCALE:

JDG Jaredian Design Group
Architects, Engineers and Planners

No. 33 Dronigens Gade - Queen's Quarter
Post Office Box 6218
St. Thomas, USVI, 00804
Tel: (340)-777-1600
Email: jaredian@vipowernet.net

DESIGN DISTRICT ARCHITECTS

2110 Company Street, Suite 15
Christiansted, VI, 00820
Tel: (340)-227-6265
Email: designdistrictvi.com
Website: www.designdistrictvi.com

DESIGN DISTRICT, PLLC

PAUL
FERRERAS, PE
STRUCTURAL ENGINEER
9-1 Bellevue, POB 600122
St. Thomas, USVI 00801
Phone (340) 714-5435
Fax (340) 777-5779
paul@pfpe.pro

HARRIS
Harris Civil Engineers, LLC
1200 Hillcrest Street, Suite 200
Orlando, FL, 32803
Phone: (407)-629-4777
Email: info@harriscivilengineers.com

ATM
2047 Vista Parkway, Suite 101
West Palm Beach, FL, 33411
Contact: Esteban Bionai
Phone:561-472-2145
Email: ebionai@appliedtm.com

ISSUANCES		
No.	Drawing Issue Description	Date
2	CZM APPLICATION	5/5/2021
3	CZM APPLICATION REVISION	1/15/2022

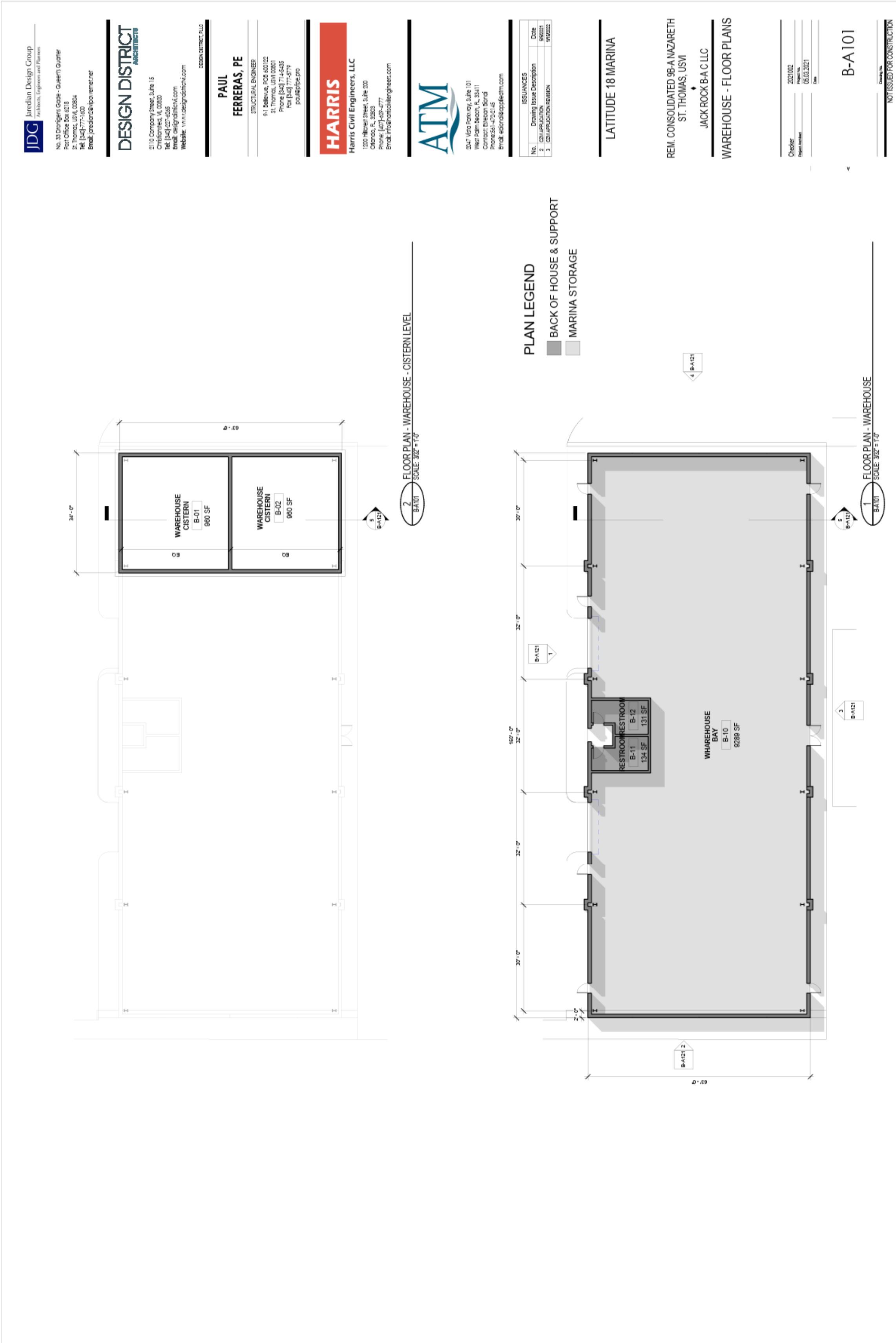
LATITUDE 18 MARINA

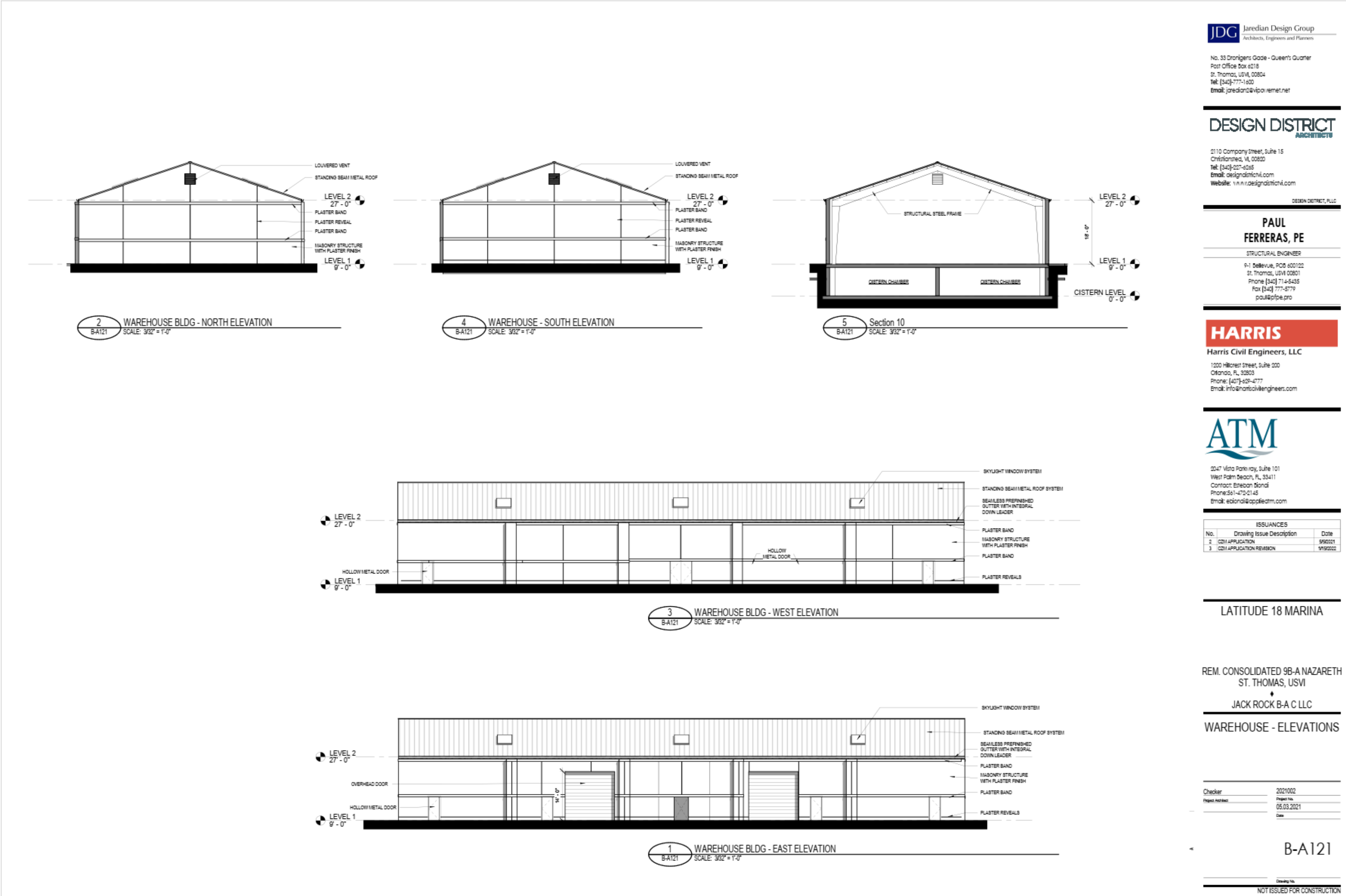
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
♦
JACK ROCK B-A C LLC

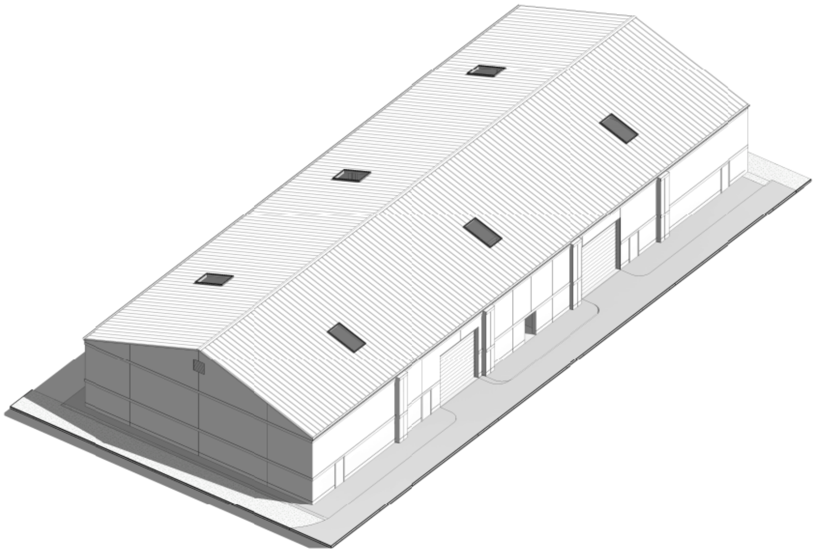
MARINA BUILDING -
AXONOMETRIC VIEWS

Checker | 2021002
Project Architect | Project No.
05.03.2021
Date

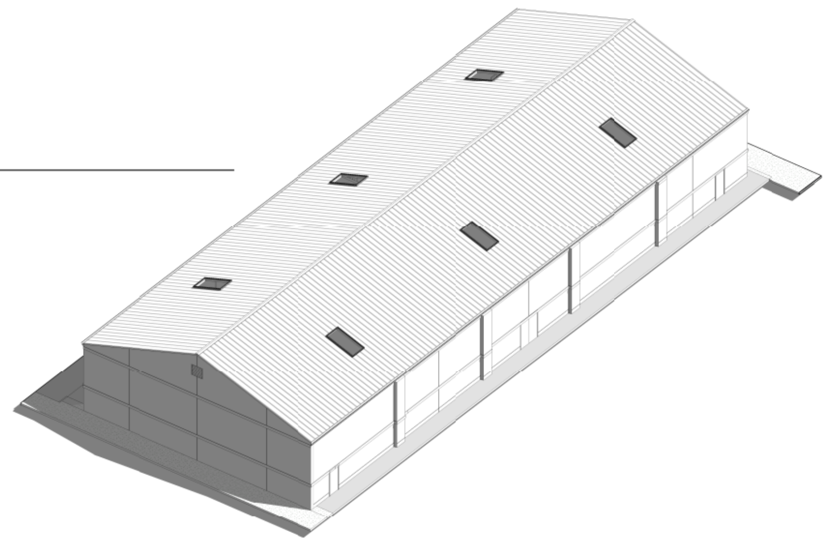
A-A231
Drawing No.
NOT ISSUED FOR CONSTRUCTION


Jaredian Design Group
DESIGN DISTRICT ARCHITECTS
PAUL FERRERAS, PE
STRUCTURAL ENGINEER
HARRIS
Harris Civil Engineers, LLC
ATM
ISSUANCES
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
JACK ROCK B-A C LLC
WAREHOUSE - FLOOR PLANS
B-A101
NOT ISSUED FOR CONSTRUCTION
PLAN LEGEND
BACK OF HOUSE & SUPPORT
MARINA STORAGE
WAREHOUSE CISTERN
B-01
960 SF
WAREHOUSE CISTERN
B-02
960 SF
FLOOR PLAN - WAREHOUSE - CISTERN LEVEL
SCALE: 3/32" = 1'-0"
RESTROOM
B-11
134 SF
RESTROOM
B-12
131 SF
WHAREHOUSE BAY
B-10
9289 SF
FLOOR PLAN - WAREHOUSE
SCALE: 3/32" = 1'-0"


WAREHOUSE BLDG - NORTH ELEVATION
SCALE: 3/32" = 1'-0"
WAREHOUSE - SOUTH ELEVATION
SCALE: 3/32" = 1'-0"
Section 10
SCALE: 3/32" = 1'-0"
WAREHOUSE BLDG - WEST ELEVATION
SCALE: 3/32" = 1'-0"
WAREHOUSE BLDG - EAST ELEVATION
SCALE: 3/32" = 1'-0"
LEVEL 2
27' - 0"
LEVEL 1
9' - 0"
CISTERN LEVEL
0' - 0"
LOUVERED VENT
STANDING SEAM METAL ROOF
PLASTER BAND
PLASTER REVEAL
MASONRY STRUCTURE WITH PLASTER FINISH
STRUCTURAL STEEL FRAME
CISTERN CHAMBER
SKYLIGHT WINDOW SYSTEM
STANDING SEAM METAL ROOF SYSTEM
SEAMLESS PREFINISHED GUTTER WITH INTEGRAL DOWN LEADER
PLASTER REVEALS
HOLLOW METAL DOOR
OVERHEAD DOOR
JDG Jaredian Design Group
Architects, Engineers and Planners
DESIGN DISTRICT
ARCHITECTS
PAUL
FERRERAS, PE
STRUCTURAL ENGINEER
HARRIS
Harris Civil Engineers, LLC
ATM
ISSUANCES
No.
Drawing Issue Description
Date
LATITUDE 18 MARINA
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
JACK ROCK B-A C LLC
WAREHOUSE - ELEVATIONS
Checker
2021002
05.03.2021
B-A121
NOT ISSUED FOR CONSTRUCTION



2 B-A231 WAREHOUSE BUILDING AXON SE
SCALE:



1 B-A231 WAREHOUSE BUILDING AXON NW
SCALE:

JDG Jaredian Design Group
Architects, Engineers and Planners

No. 33 Dronigens Gade - Queen's Quarter
Post Office Box 6218
St. Thomas, USVI, 00804
Tel: (340)-777-1600
Email: jaredian2@vipowernet.net

DESIGN DISTRICT ARCHITECTS

2110 Company Street, Suite 15
Christiansted, VI, 00820
Tel: (340)-227-6265
Email: designdistrictvi.com
Website: www.designdistrictvi.com

DESIGN DISTRICT, PLLC

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Fax (340) 777-5779
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HARRIS
Harris Civil Engineers, LLC
1200 Hillcrest Street, Suite 200
Orlando, FL, 32803
Phone: (407)-629-4777
Email: info@harriscivilengineers.com

ATM
2047 Vista Parkway, Suite 101
West Palm Beach, FL, 33411
Contact: Esteban Biondi
Phone:561-472-2145
Email: ebiondi@applieatm.com

ISSUANCES		
No.	Drawing Issue Description	Date
2	CZM APPLICATION	5/5/2021
3	CZM APPLICATION REVISION	1/15/2022

LATITUDE 18 MARINA

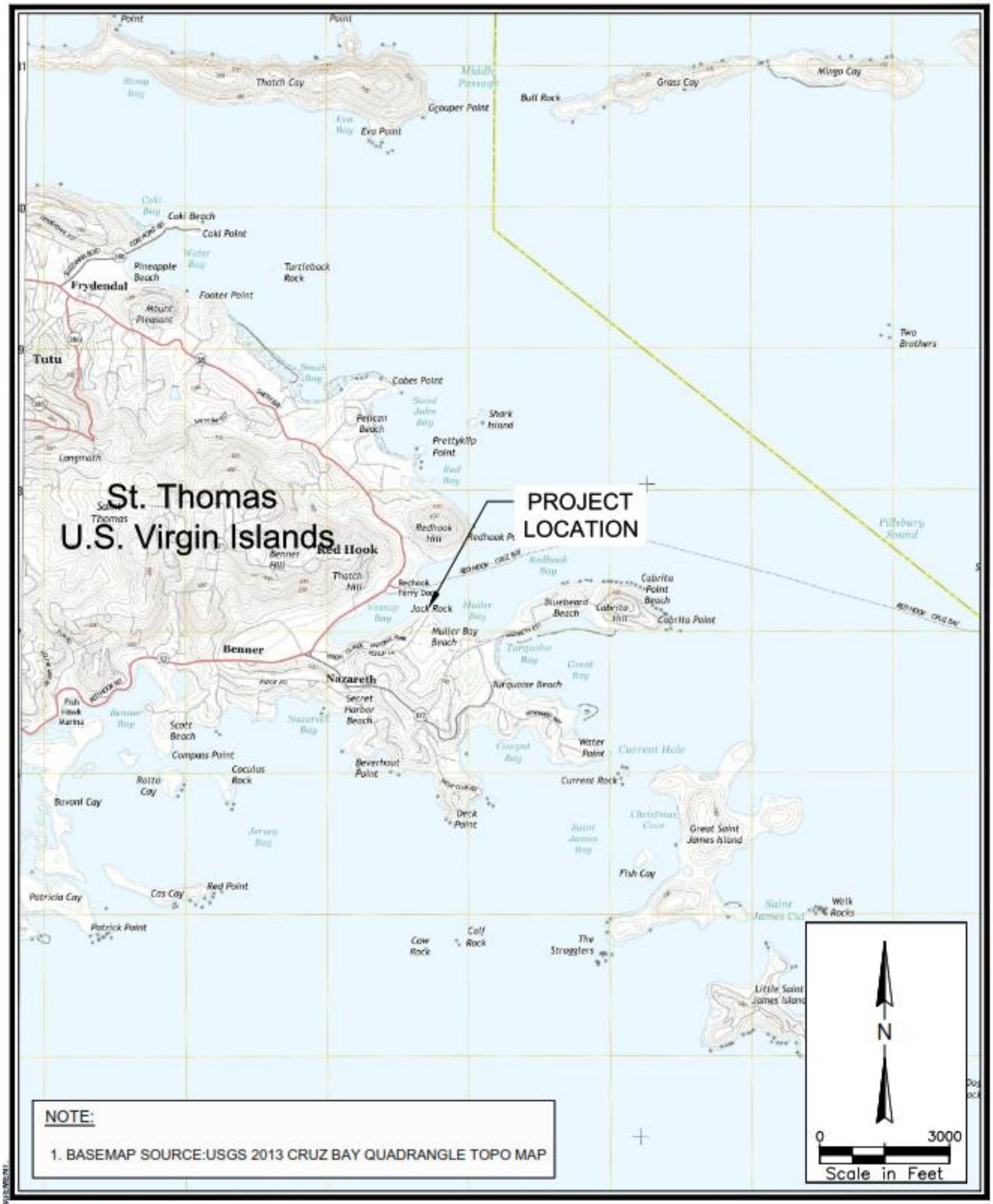
REM. CONSOLIDATED 9B-A NAZARETH
ST. THOMAS, USVI
♦
JACK ROCK B-A C LLC

WAREHOUSE BUILDING - AXONOMETRIC VIEWS

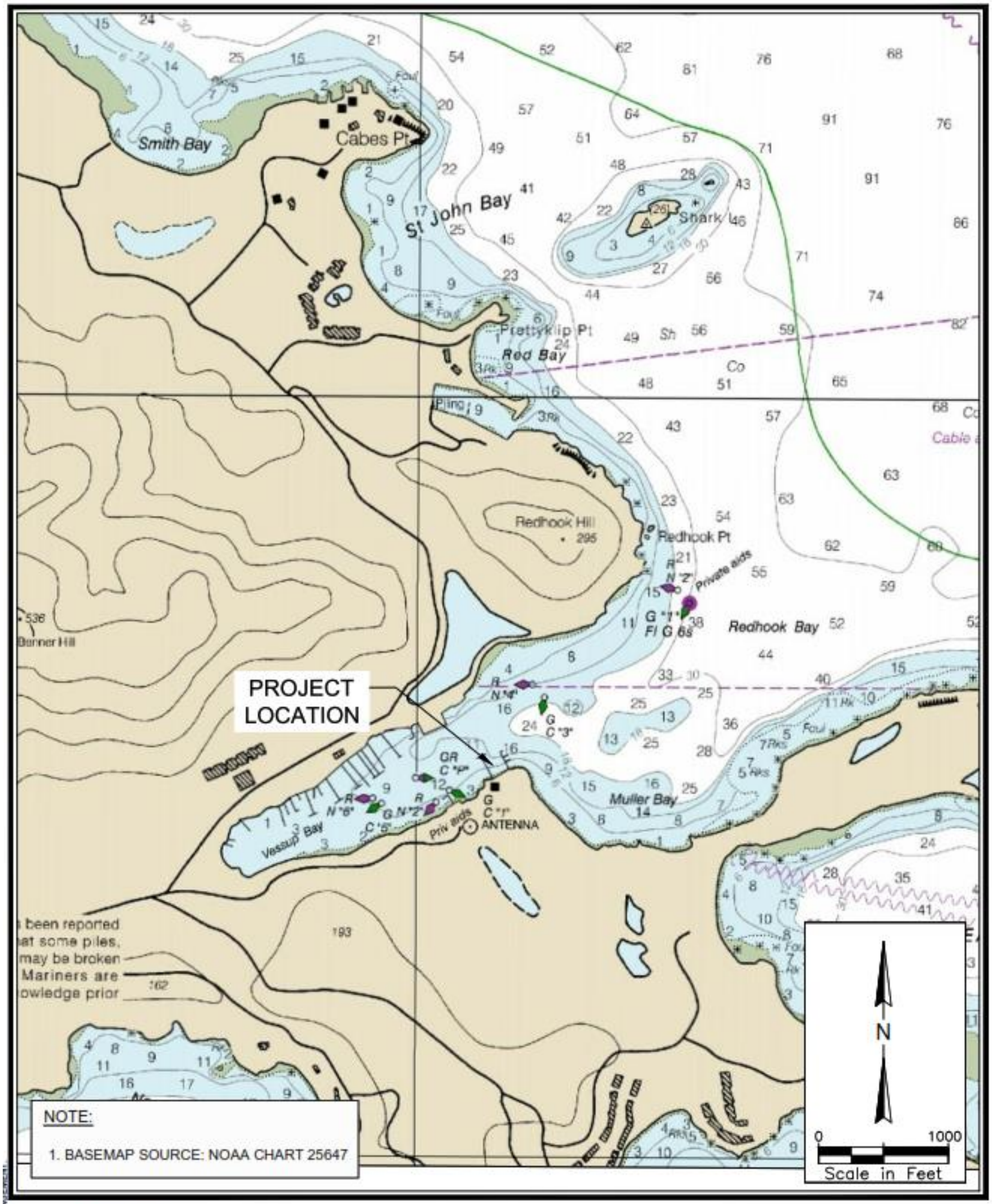
Checker	2021002
Project Architect	Project No.
	05.03.2021
	Date

B-A231
Drawing No.

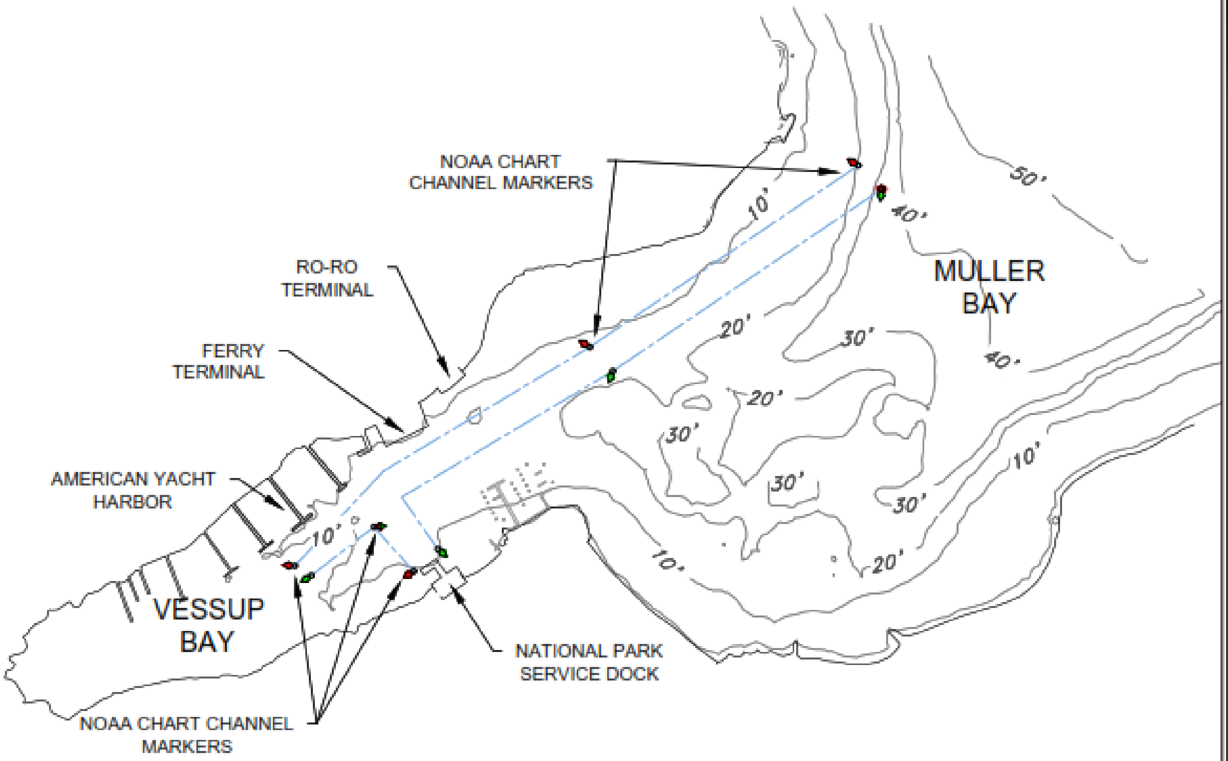
NOT ISSUED FOR CONSTRUCTION

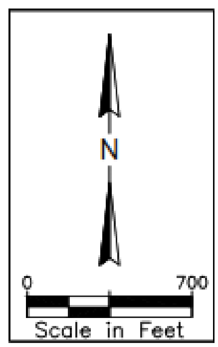


ATM 2047 Vista Parkway, Suite 201 West Palm Beach, FL 33411 (561) 659-0041 Certificate of Authorization #4669	LOCATION PLAN	Requested by: Jack Rock B-A, LLC Redhook Hayes B Rem, LLC	Location: Vessup Bay, St. Thomas , USVI Parcel ID: Waterbody: Muller Bay - Vessup Bay
	Vessup Point Marina	Sheet Number: 1 of FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION	Latitude: 18 19' 32" N Longitude: 64 50' 54" W Issue Date: xx-xx-xxxx



ATM 2047 Vista Parkway, Suite 201 West Palm Beach, FL 33411 (561) 659-0041 Certificate of Authorization #4669	NAVIGATION PLAN	Requested by: Jack Rock B-A, LLC Redhook Hayes B Rem, LLC	Location: Vessup Bay, St. Thomas , USVI Parcel ID: Waterbody: Muller Bay - Vessup Bay
	Vessup Point Marina	Sheet Number: 2 of FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION	Latitude: 18 19' 32" N Longitude: 64 50' 54" W Issue Date: xx-xx-xxxx



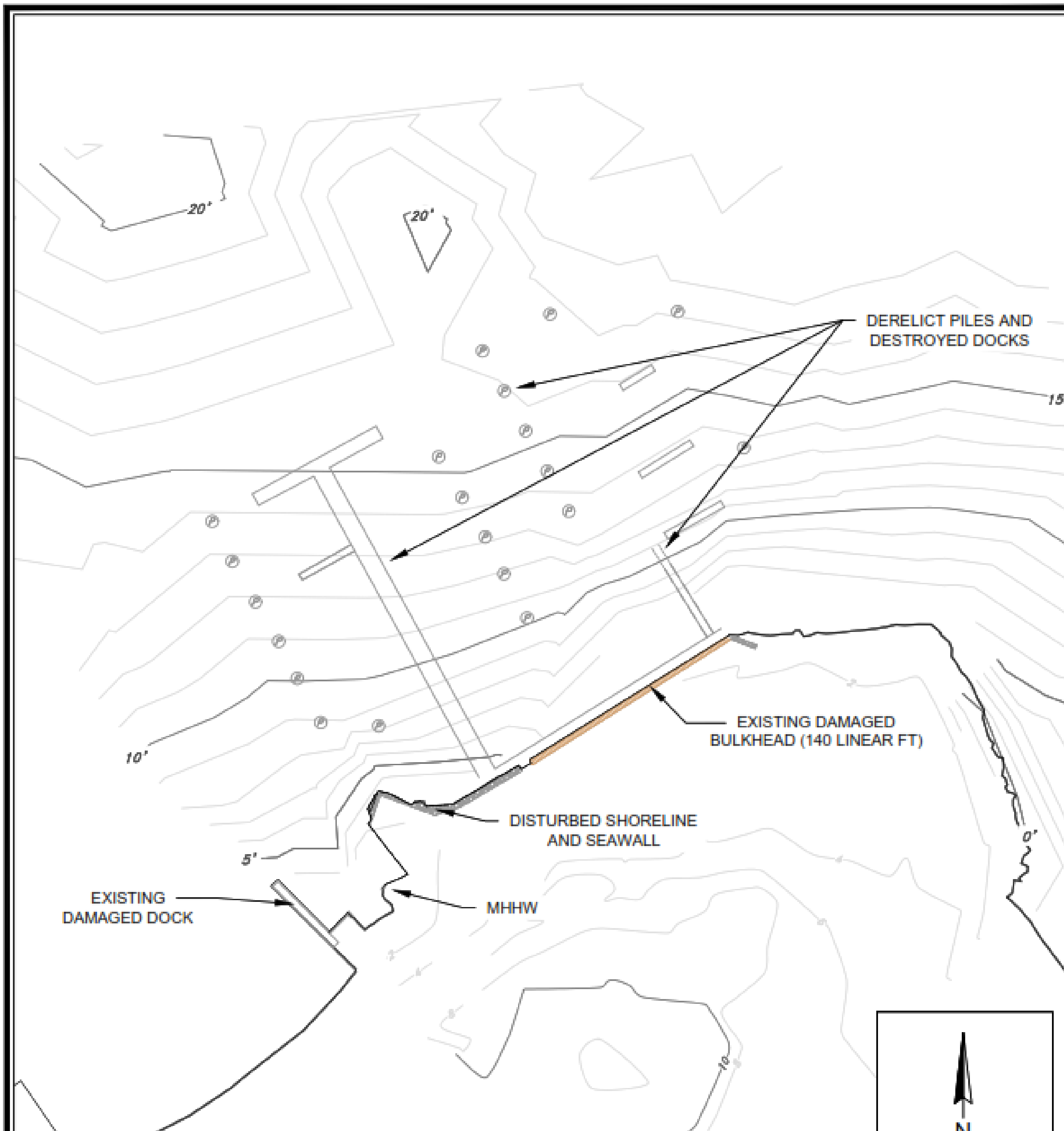


NOTES:

1. BARHYMETRY SOURCE: NOAA NATIONAL OCEAN SERVICE 2011 LiDAR
2. VERTICAL DATUM: LOCAL MEAN LOWER LOW WATER
3. HORIZONTAL DATUM: NAD83 PUERTO RICO AND VIRGIN ISLANDS, US FOOT
4. MHHW ELEVATION: +0.57 ft, MSL
5. MLLW ELEVATION: -0.52 ft, MSL

ATM 2047 Vista Parkway, Suite 201 West Palm Beach, FL 33411 (561) 659-0041 Certificate of Authorization #4669	EXISTING CONDITIONS VESSUP & MULLER BAY	Requested by: Jack Rock B-A, LLC Redhook Hayes B Rem, LLC	Location: Vessup Bay, St. Thomas , USVI Parcel ID: Waterbody: Muller Bay - Vessup Bay
	Vessup Point Marina	Sheet Number: 4 of FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION	Latitude: 18 19' 32" N Longitude: 64 50' 54" W Issue Date: xx-xx-xxxx

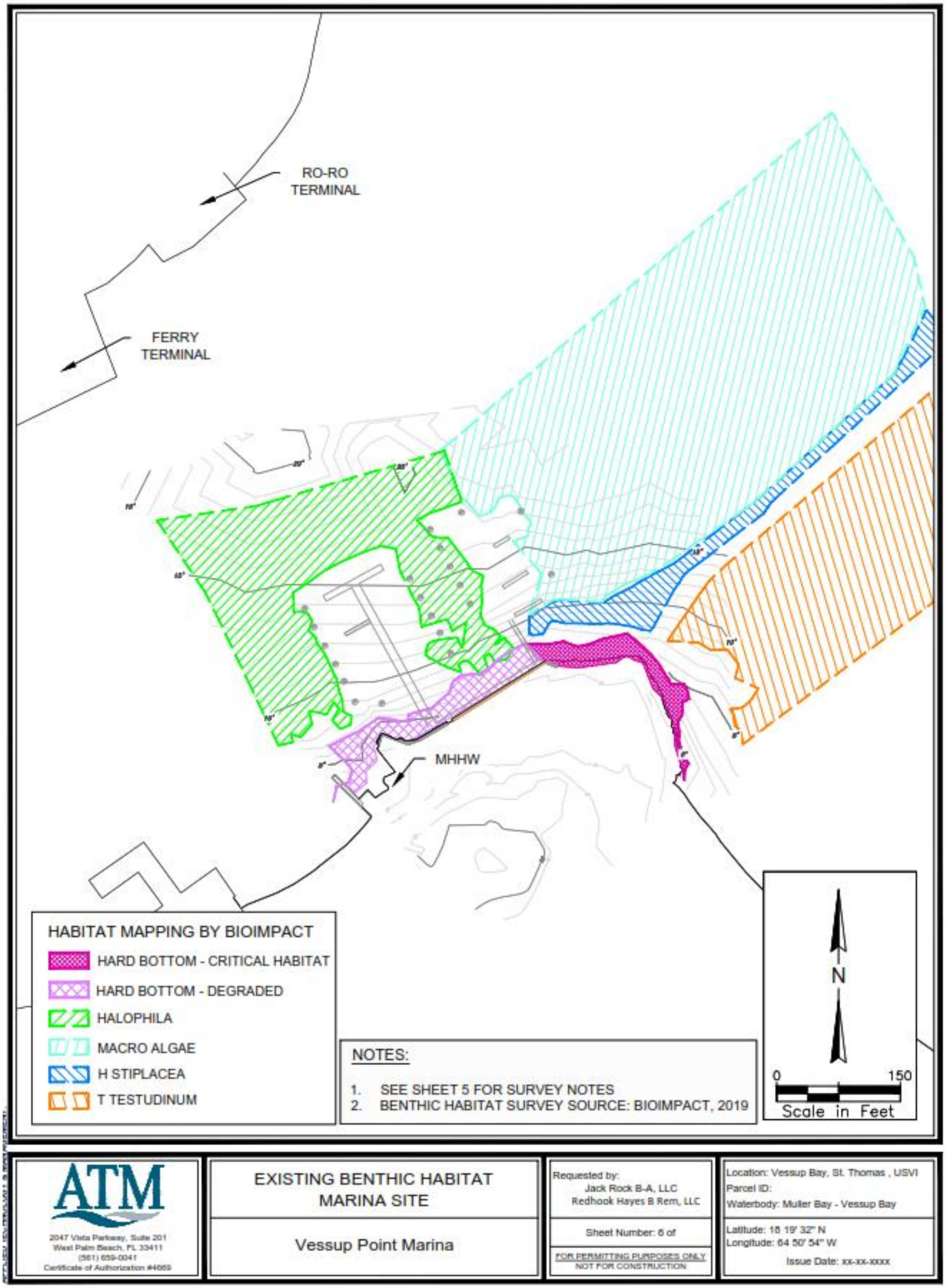
APPLIED TECHNOLOGY & MANAGEMENT



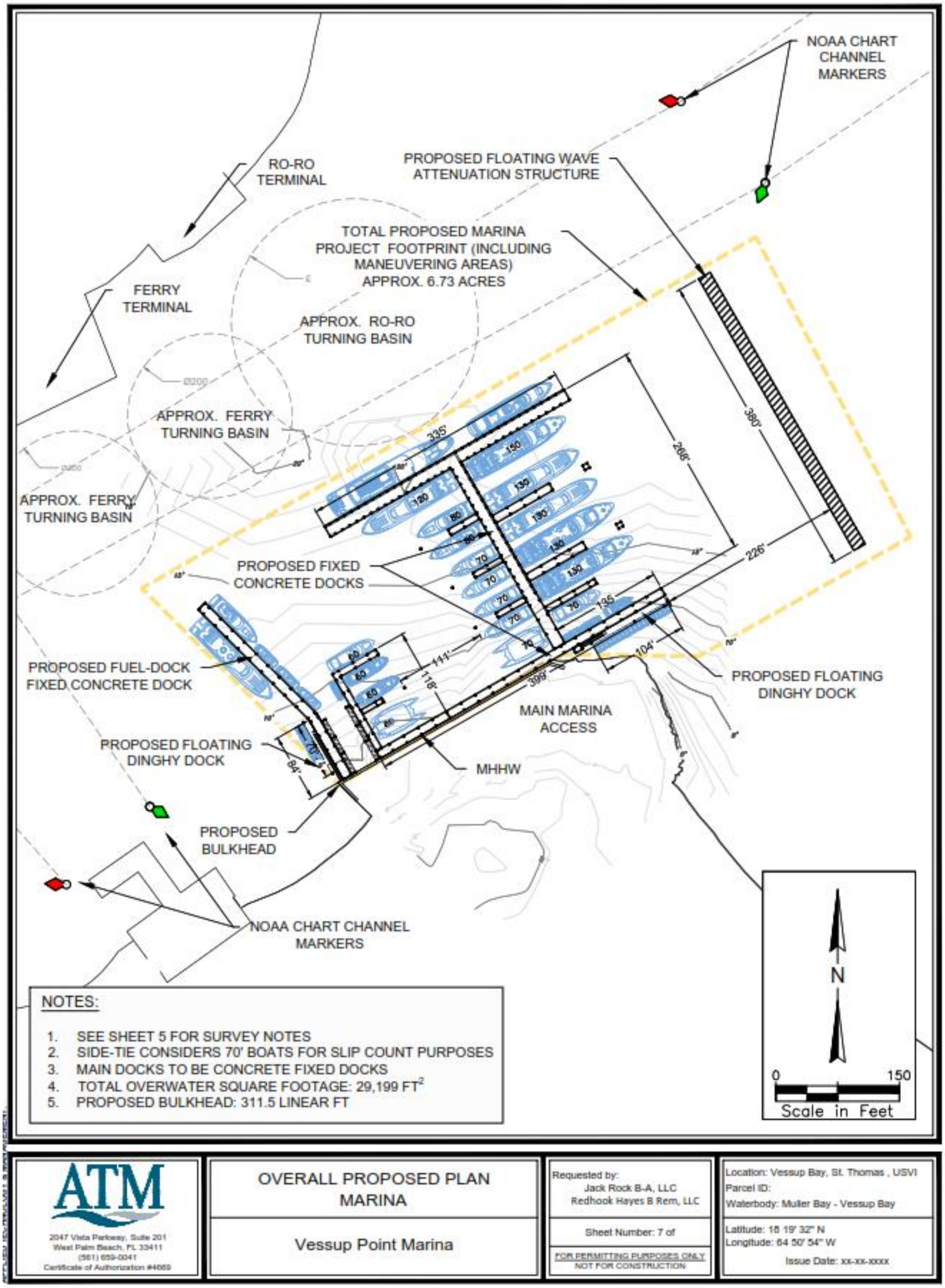
NOTES:

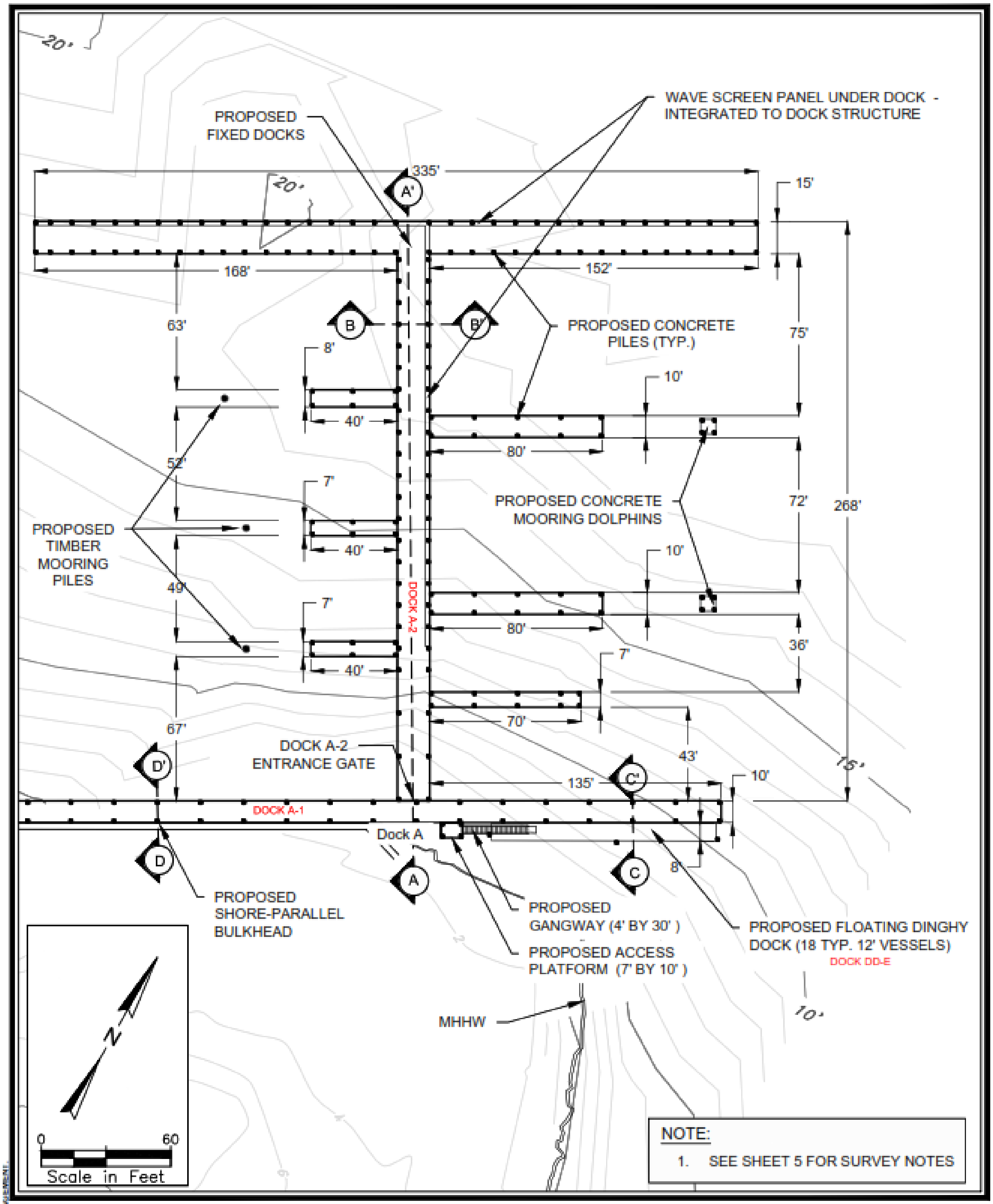
1. SURVEY PERFORMED BY: BCSC DOSPIVA, 2019
2. VERTICAL DATUM: LOCAL MEAN SEA LEVEL
3. HORIZONTAL DATUM: NAD83 PUERTO RICO AND VIRGIN ISLANDS, US FOOT
4. MHHW ELEVATION: +0.57 ft, MSL
5. MLLW ELEVATION: -0.52 ft, MSL

ATM 2047 Vista Parkway, Suite 201 West Palm Beach, FL 33411 (561) 659-0041 Certificate of Authorization #4669	SITE EXISTING CONDITIONS	Requested by: Jack Rock B-A, LLC Redhook Hayes B Rem, LLC	Location: Vessup Bay, St. Thomas , USVI Parcel ID: Waterbody: Muller Bay - Vessup Bay
	Vessup Point Marina	Sheet Number: 5 of FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION	Latitude: 18 19' 32" N Longitude: 64 50' 54" W Issue Date: xx-xx-xxxx



RO-RO
TERMINAL
FERRY
TERMINAL
MHHW
HABITAT MAPPING BY BIOIMPACT
HARD BOTTOM - CRITICAL HABITAT
HARD BOTTOM - DEGRADED
HALOPHILA
MACRO ALGAE
H STIPLACEA
T TESTUDINUM
NOTES:
1. SEE SHEET 5 FOR SURVEY NOTES
2. BENTHIC HABITAT SURVEY SOURCE: BIOIMPACT, 2019
N
0
150
Scale in Feet
ATM
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669
EXISTING BENTHIC HABITAT
MARINA SITE
Vessup Point Marina
Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC
Sheet Number: 6 of
FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION
Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay
Latitude: 18 19' 32" N
Longitude: 64 50' 54" W
Issue Date: xx-xx-xxxx


NOAA CHART CHANNEL MARKERS
RO-RO TERMINAL
PROPOSED FLOATING WAVE ATTENUATION STRUCTURE
TOTAL PROPOSED MARINA PROJECT FOOTPRINT (INCLUDING MANEUVERING AREAS) APPROX. 6.73 ACRES
FERRY TERMINAL
APPROX. RO-RO TURNING BASIN
APPROX. FERRY TURNING BASIN
APPROX. FERRY TURNING BASIN
335'
268'
380'
226'
PROPOSED FIXED CONCRETE DOCKS
PROPOSED FUEL-DOCK FIXED CONCRETE DOCK
111'
118'
399'
104'
135'
PROPOSED FLOATING DINGHY DOCK
MAIN MARINA ACCESS
PROPOSED FLOATING DINGHY DOCK
84'
MHHW
PROPOSED BULKHEAD
NOAA CHART CHANNEL MARKERS
NOTES:
1. SEE SHEET 5 FOR SURVEY NOTES
2. SIDE-TIE CONSIDERS 70' BOATS FOR SLIP COUNT PURPOSES
3. MAIN DOCKS TO BE CONCRETE FIXED DOCKS
4. TOTAL OVERWATER SQUARE FOOTAGE: 29,199 FT²
5. PROPOSED BULKHEAD: 311.5 LINEAR FT
N
0
150
Scale in Feet
ATM
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669
OVERALL PROPOSED PLAN
MARINA
Vessup Point Marina
Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC
Sheet Number: 7 of
FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION
Location: Vessup Bay, St. Thomas, USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay
Latitude: 18 19' 32" N
Longitude: 64 50' 54" W
Issue Date: xx-xx-xxxx



ATM
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

PROPOSED DOCKS A PLAN

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

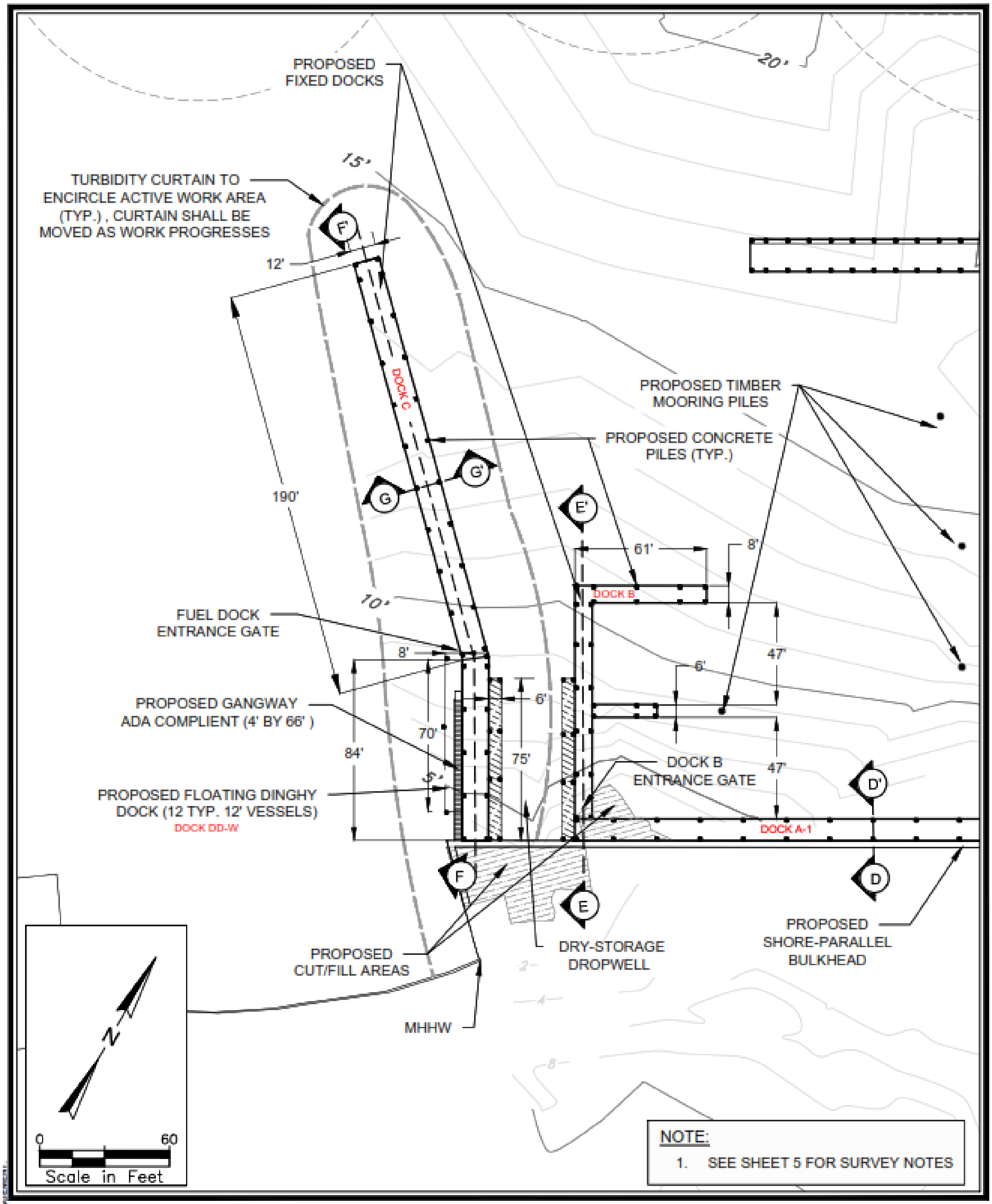
Sheet Number: 8 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx



ATM
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

PROPOSED DOCK B & C

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

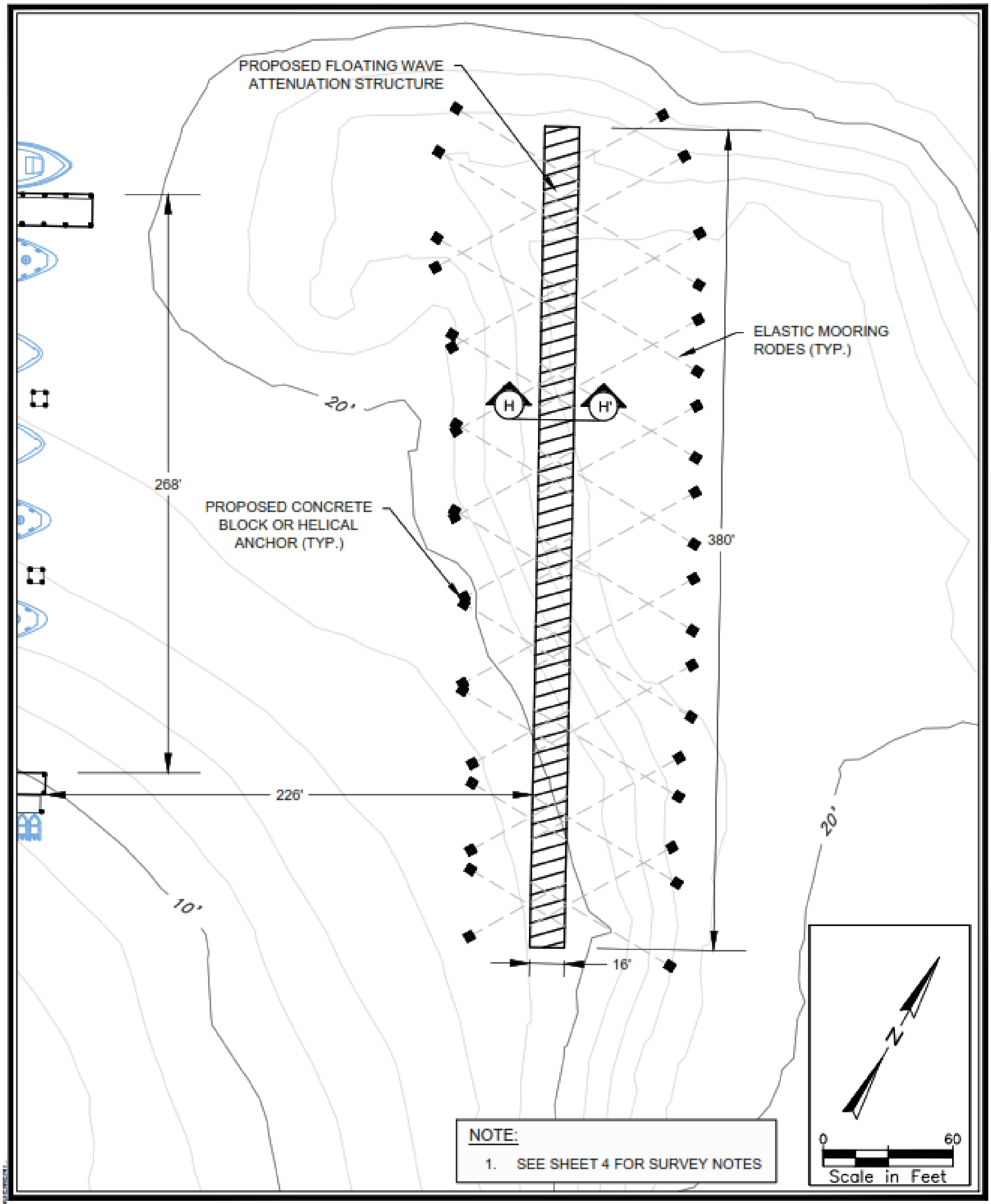
Sheet Number: 9 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx



ATM

2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

PROPOSED WAVE ATTENUATOR

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

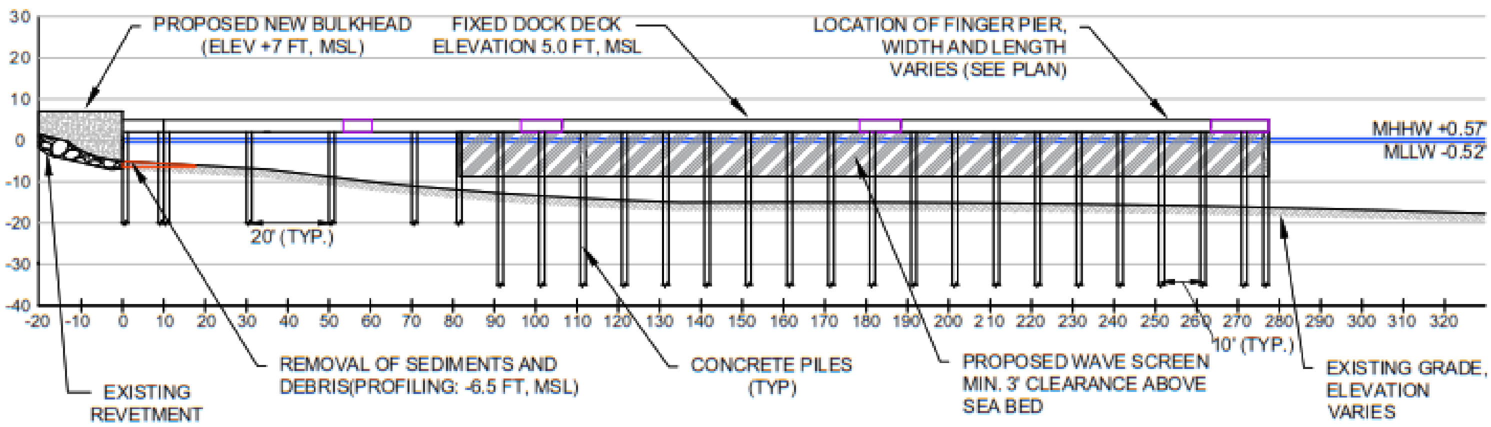
Sheet Number: 10 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

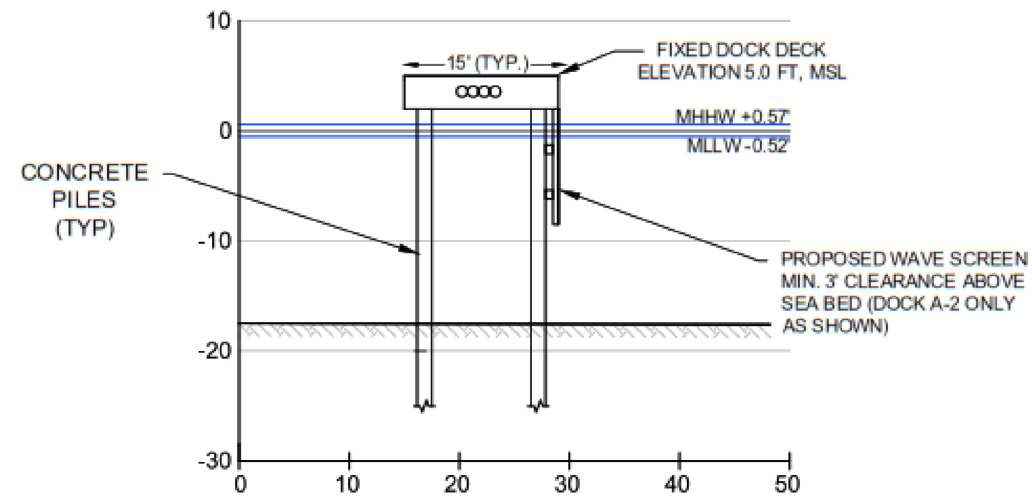
Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx



FIXED DOCK A-2
SECTION A-A' 1"=40'



DOCK SECTION (TYPICAL)
SECTION B-B' 1"=15'

APPLIED TECHNOLOGY & MANAGEMENT

2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

SECTION A & B

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

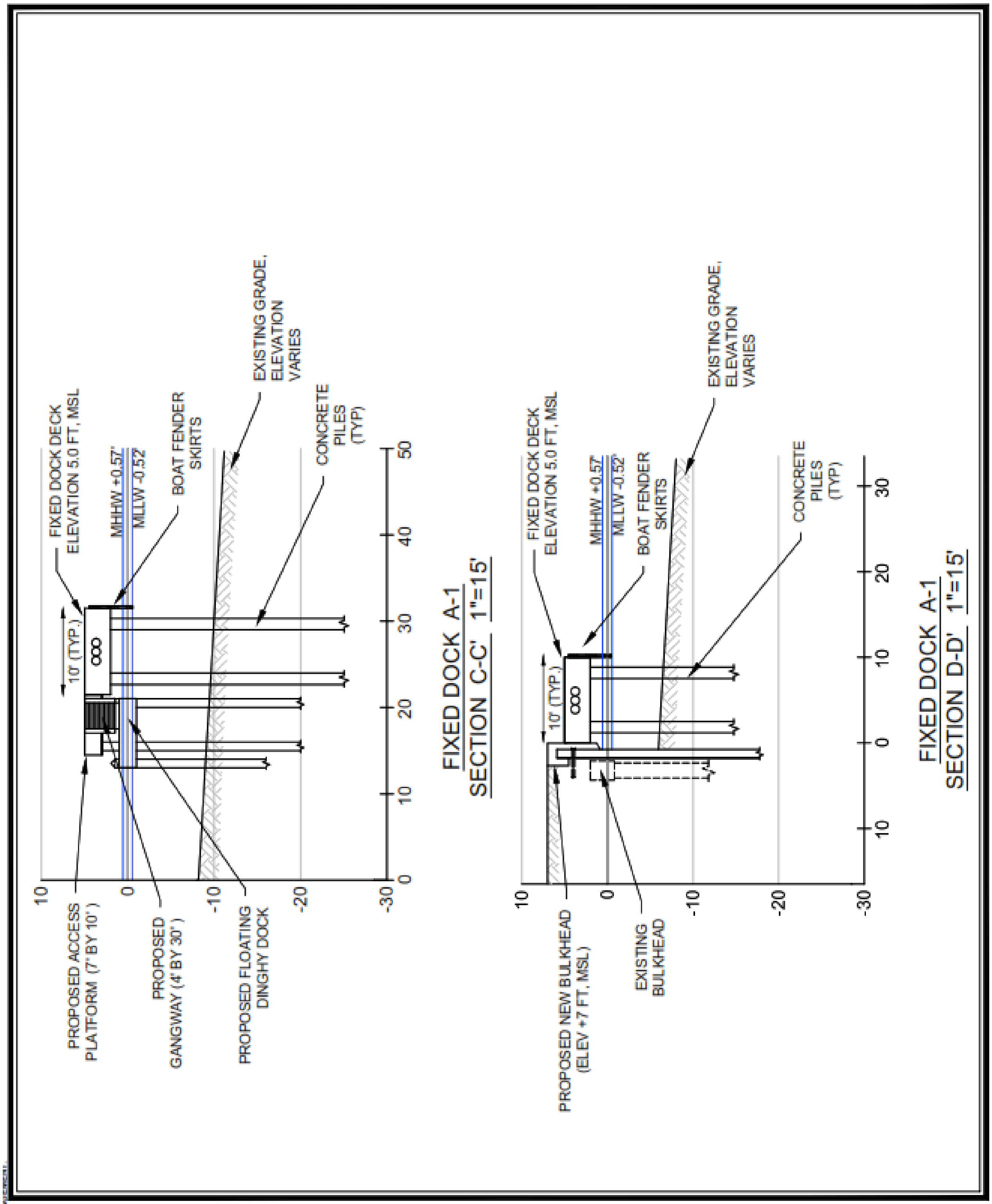
Sheet Number: 11 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx



ATM
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

SECTION C & D

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

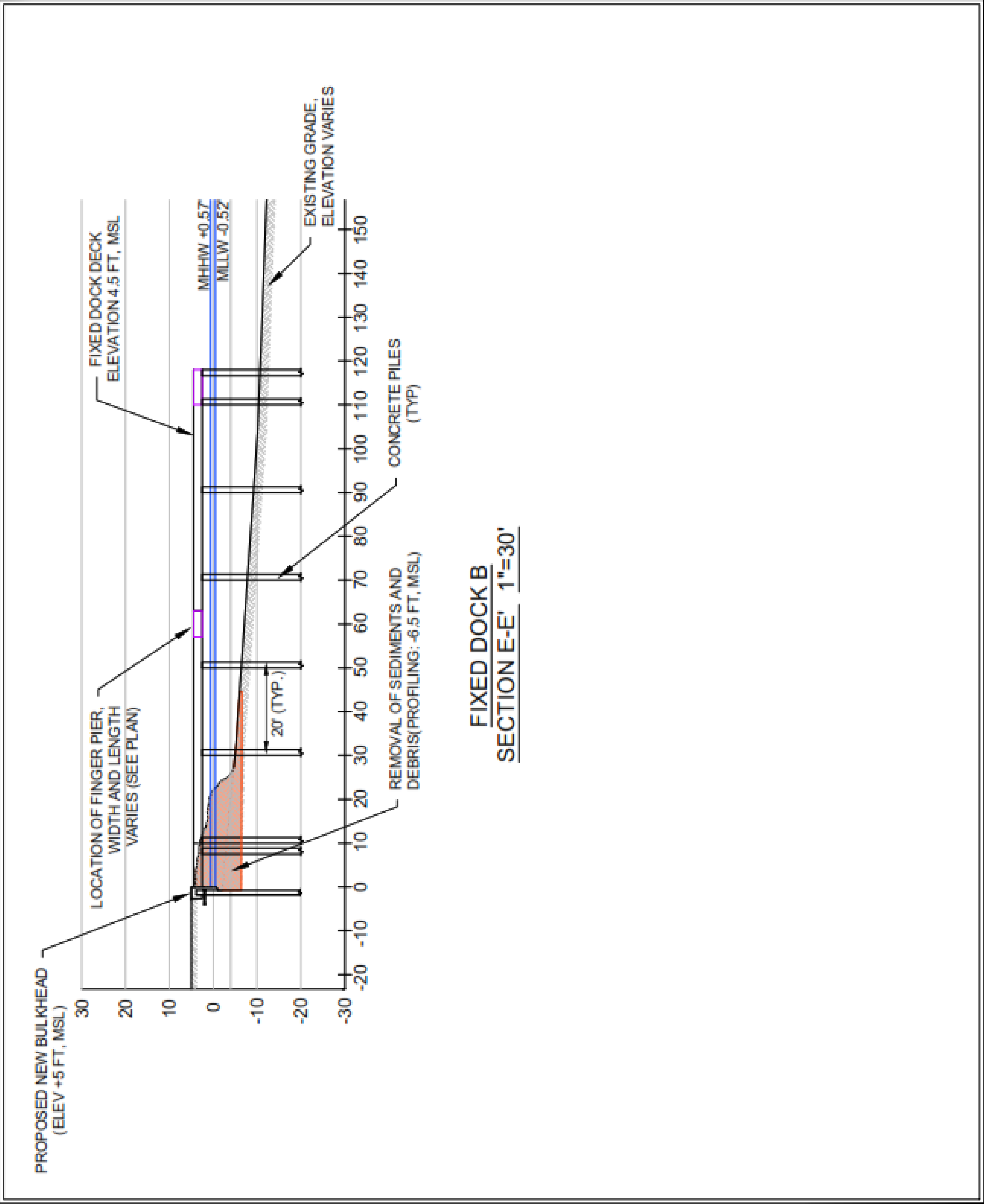
Sheet Number: 12 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

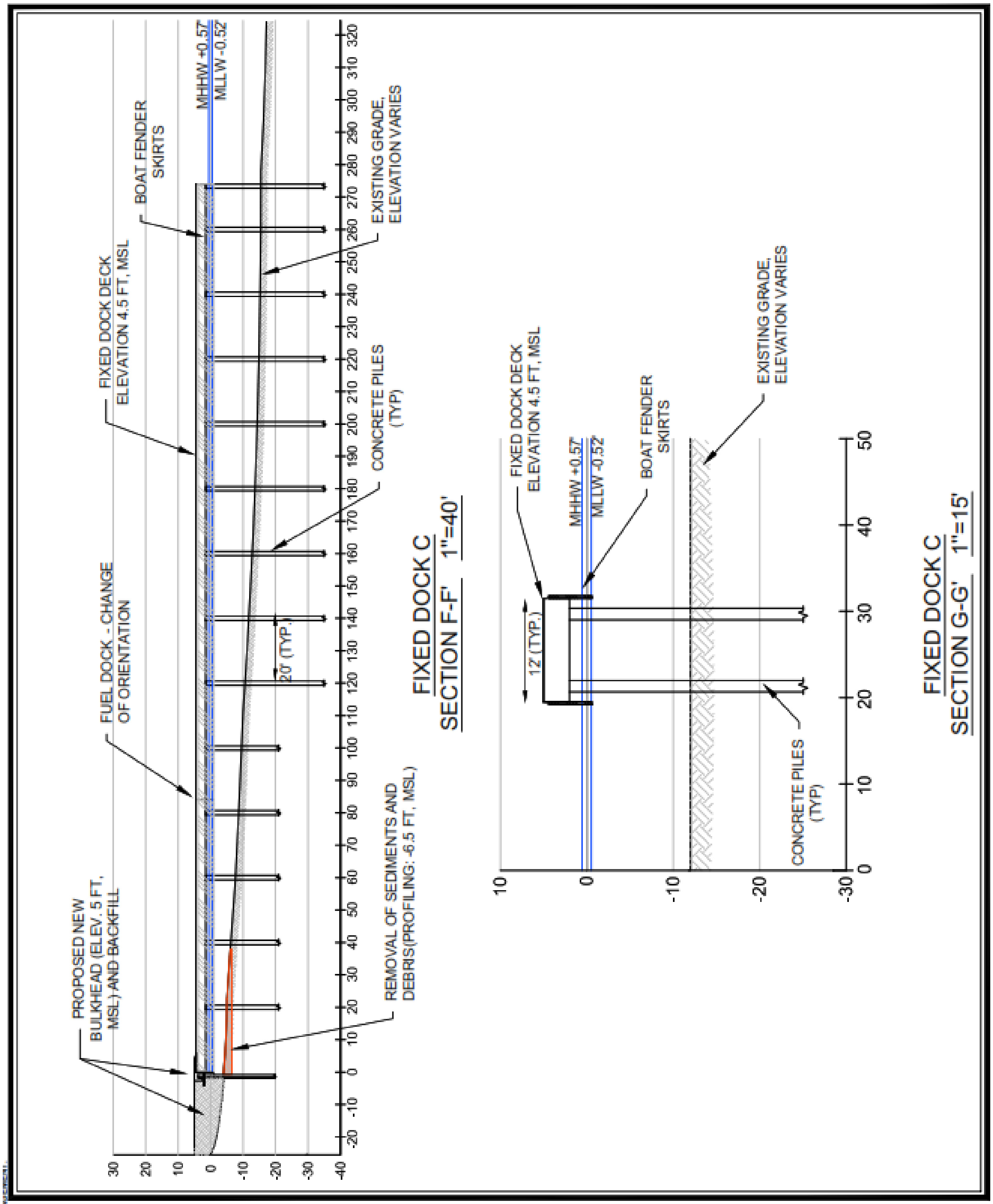
Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx



ATM 2047 Vista Parkway, Suite 201 West Palm Beach, FL 33411 (561) 659-0041 Certificate of Authorization #4669	SECTION E	Requested by: Jack Rock B-A, LLC Redhook Hayes B Rem, LLC	Location: Vessup Bay, St. Thomas , USVI Parcel ID: Waterbody: Muller Bay - Vessup Bay
	Vessup Point Marina	Sheet Number: 13 of FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION	Latitude: 18 19' 32" N Longitude: 64 50' 54" W Issue Date: xx-xx-xxxx



ATM
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

SECTION F & G

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

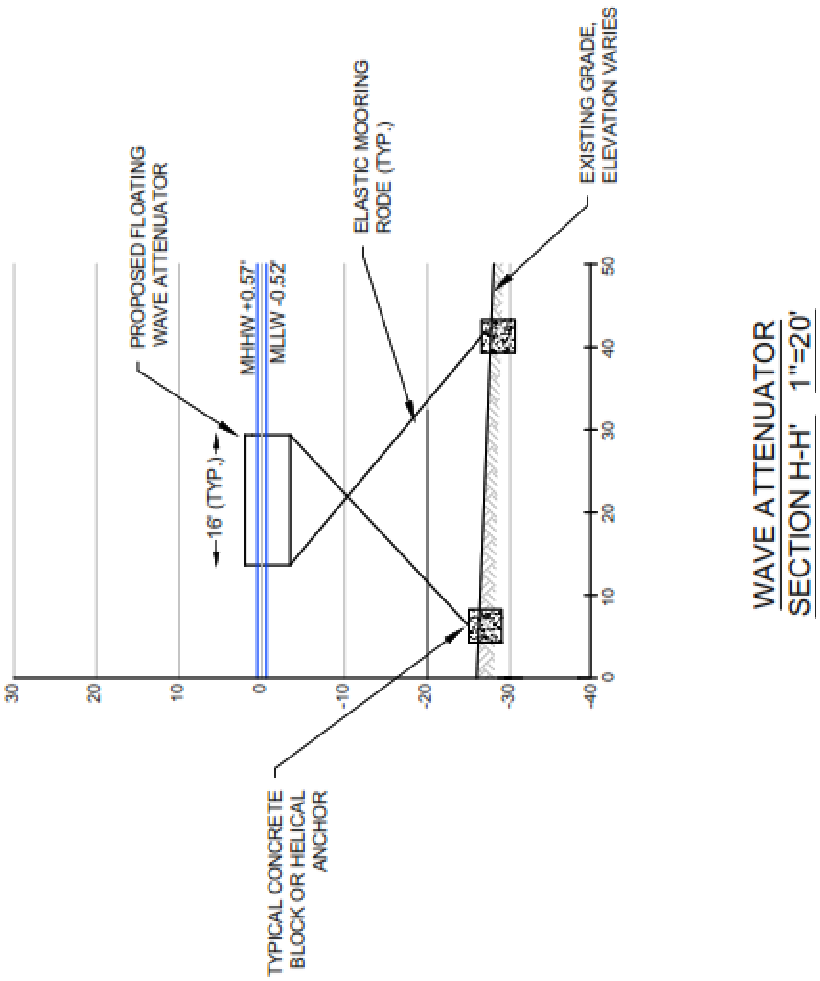
Sheet Number: 14 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx



ATM

2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

SECTION H
WAVE ATTENUATOR

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

Sheet Number: 15 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

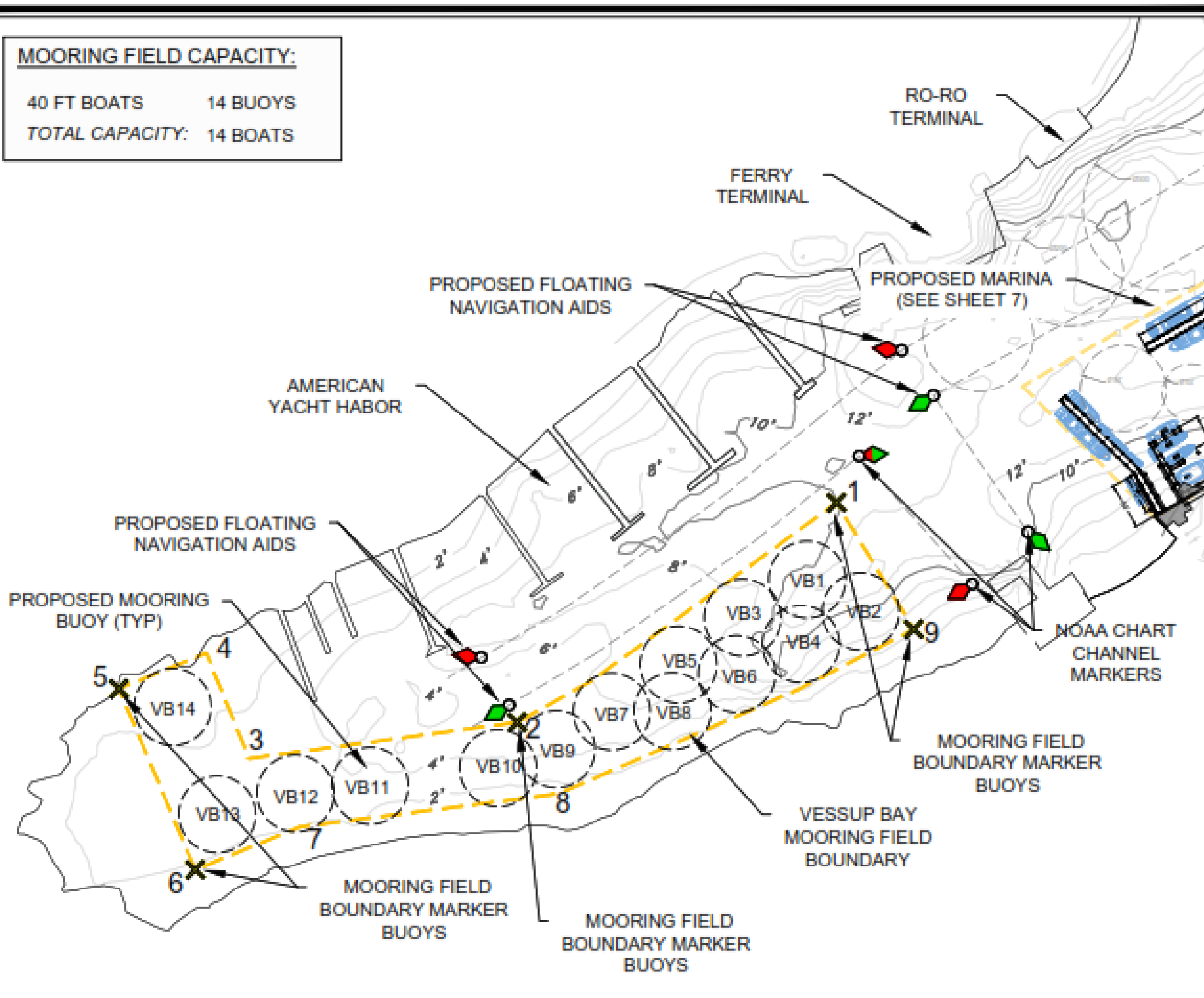
Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx

MOORING FIELD CAPACITY:

40 FT BOATS	14 BUOYS
TOTAL CAPACITY:	14 BOATS



MOORING FIELD LIMITS

	NORTHING (ft)	EASTING (ft)
POINT #1	837034.95	1205203.57
POINT #2	836635.49	1204623.02
POINT #3	836569.73	1204135.80
POINT #4	836761.30	1204057.97
POINT #5	836696.75	1203899.09
POINT #6	836367.41	1204037.73
POINT #7	836445.58	1204228.63
POINT #8	836505.52	1204697.92
POINT #9	836804.82	1205343.85

MOORING FIELD TOTAL AREA: 6.34 acres

NOTES:

1. SEE SHEET 4 FOR SURVEY NOTES
2. SHORELINE DELINEATION IS AN APPROXIMATION
3. SEE SHEETS 19-21 FOR INDIVIDUAL COORDINATES AND DETAILS

ATM
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411
(561) 659-0041
Certificate of Authorization #4669

OVERALL PROPOSED PLAN
VESSUP BAY MOORING FIELD

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

Sheet Number: 16 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

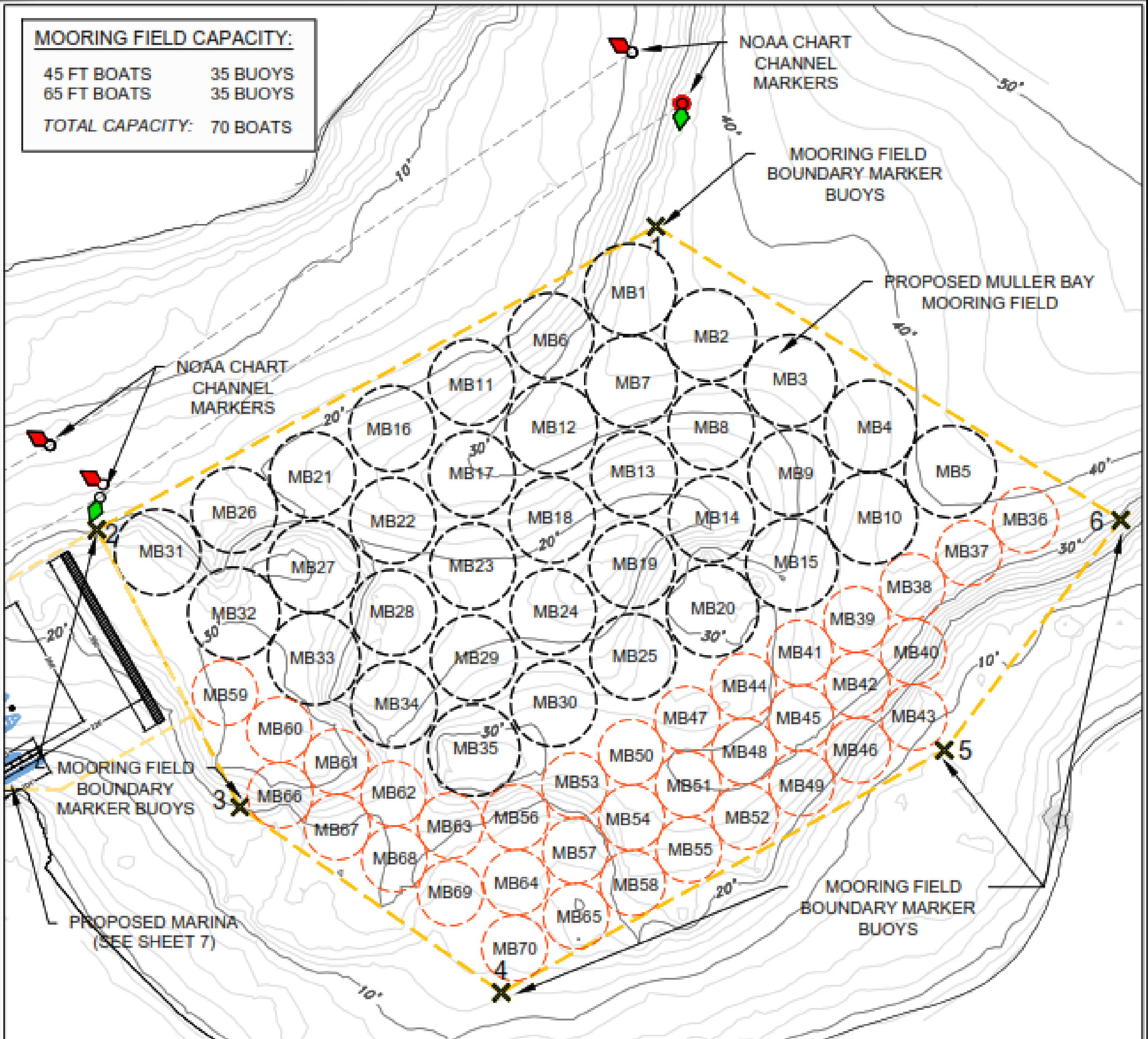
Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx

MOORING FIELD CAPACITY:

45 FT BOATS	35 BUOYS
65 FT BOATS	35 BUOYS
TOTAL CAPACITY:	70 BOATS



MOORING FIELD LIMITS

	NORTHING (FT)	EASTING (FT)
POINT #1	838266.69	1207382.87
POINT #2	837673.33	1206288.24
POINT #3	837129.70	1206568.54
POINT #4	836766.66	1207080.43
POINT #5	837241.01	1207947.76
POINT #6	837691.69	1208292.98

MOORING FIELD TOTAL AREA: 39.10 ACRES

NOTES:

1. SEE SHEET 4 FOR SURVEY NOTES
2. SHORELINE DELINEATION IS AN APPROXIMATION
3. SEE SHEETS 19-21 FOR INDIVIDUAL COORDINATES AND DETAILS

N

0 300
Scale in Feet

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OVERALL PROPOSED PLAN
MULLER BAY MOORING FIELD

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

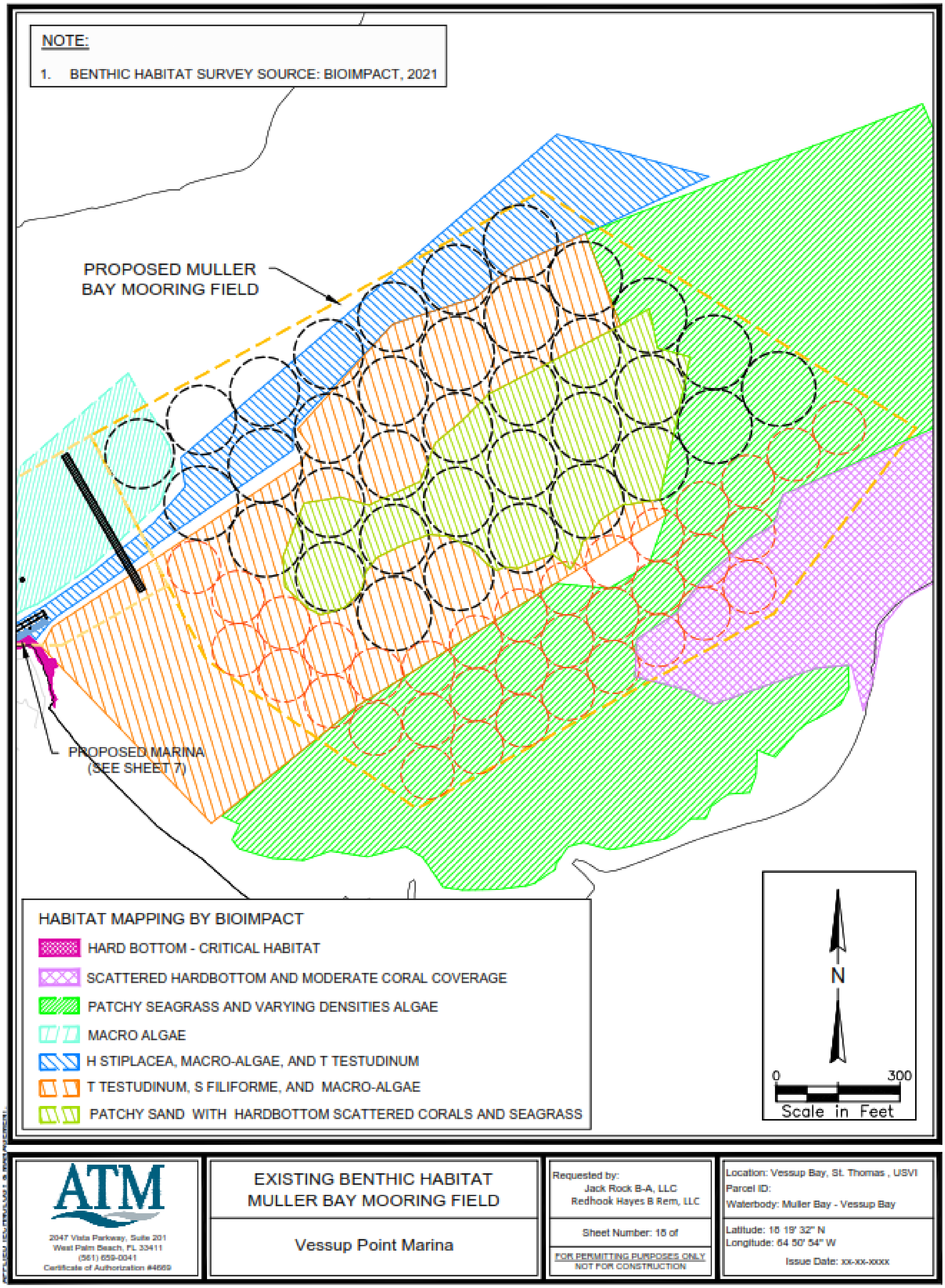
Sheet Number: 17 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx



NOTE:
1. BENTHIC HABITAT SURVEY SOURCE: BIOIMPACT, 2021
PROPOSED MULLER BAY MOORING FIELD
PROPOSED MARINA (SEE SHEET 7)
HABITAT MAPPING BY BIOIMPACT
HARD BOTTOM - CRITICAL HABITAT
SCATTERED HARDBOTTOM AND MODERATE CORAL COVERAGE
PATCHY SEAGRASS AND VARYING DENSITIES ALGAE
MACRO ALGAE
H STIPLACEA, MACRO-ALGAE, AND T TESTUDINUM
T TESTUDINUM, S FILIFORME, AND MACRO-ALGAE
PATCHY SAND WITH HARDBOTTOM SCATTERED CORALS AND SEAGRASS
N
0
300
Scale in Feet
ATM
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West Palm Beach, FL 33411
(561) 659-0041
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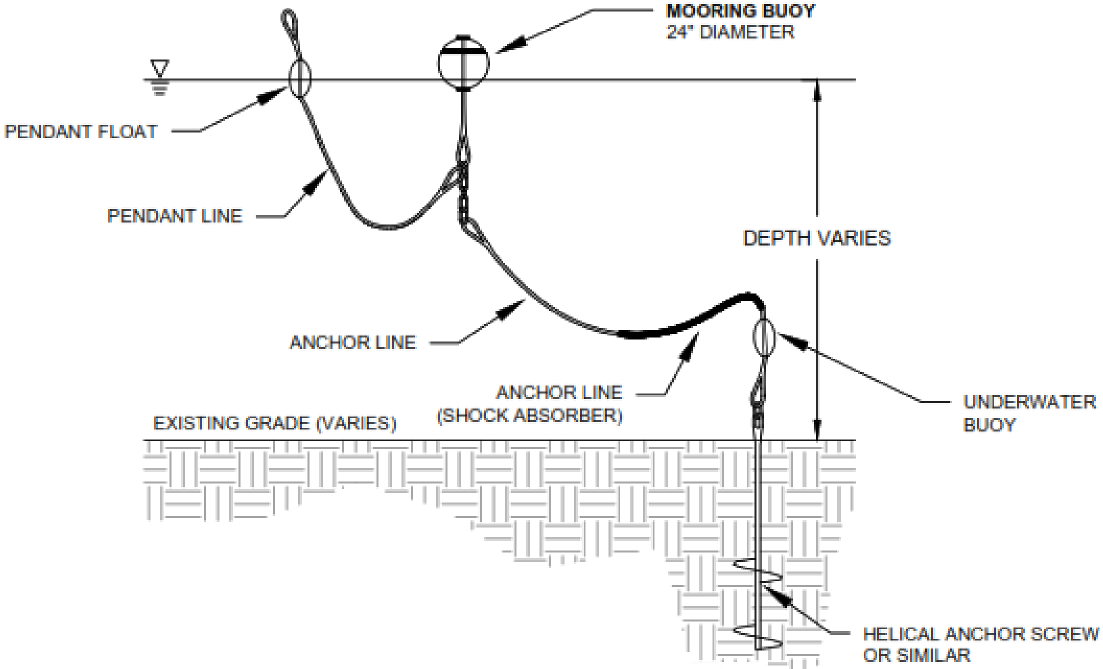
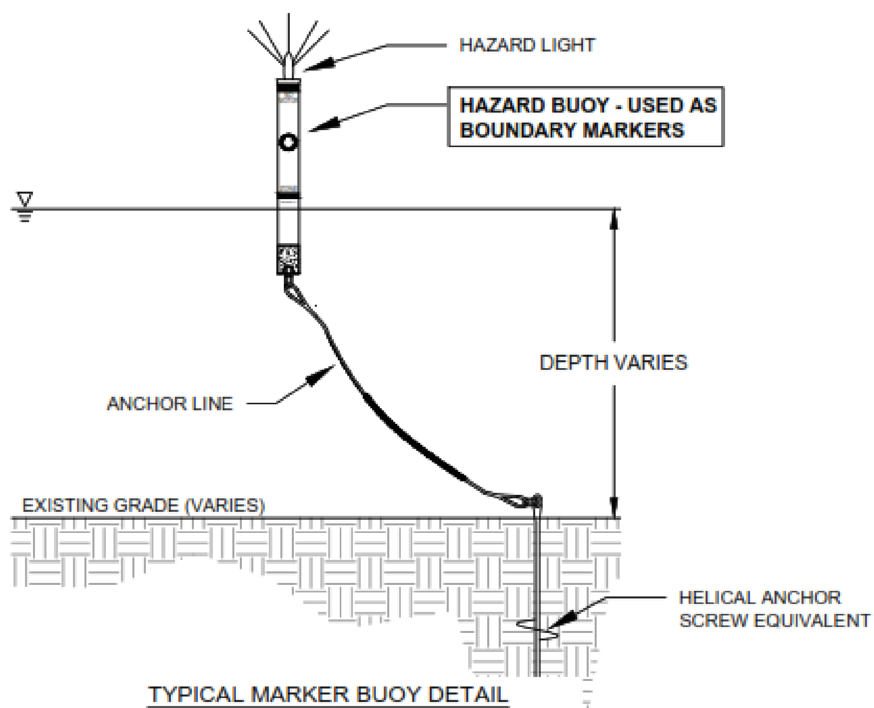
EXISTING BENTHIC HABITAT
MULLER BAY MOORING FIELD
Vessup Point Marina
Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC
Sheet Number: 18 of
FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION
Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay
Latitude: 18 19' 32" N
Longitude: 64 50' 54" W
Issue Date: xx-xx-xxxx



TYPICAL MOORING STATION DETAIL
NTS

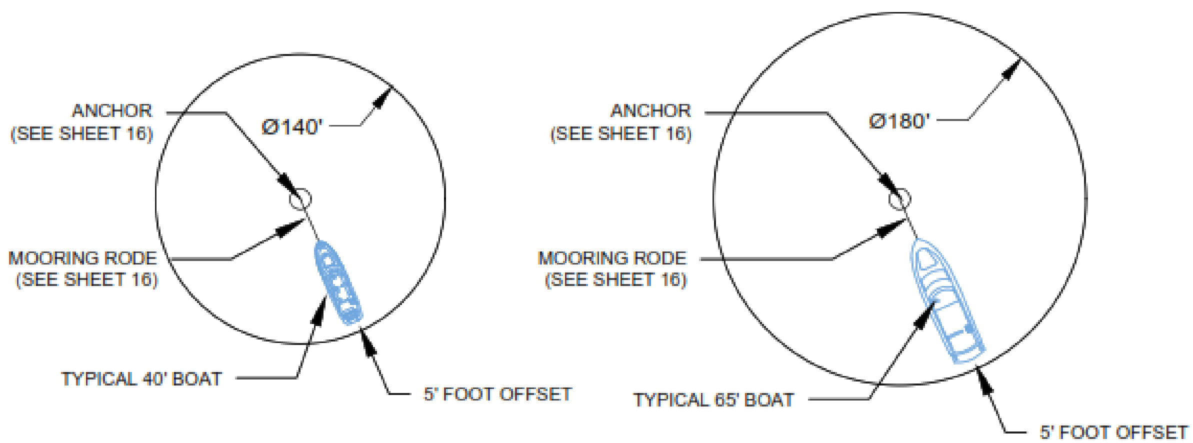


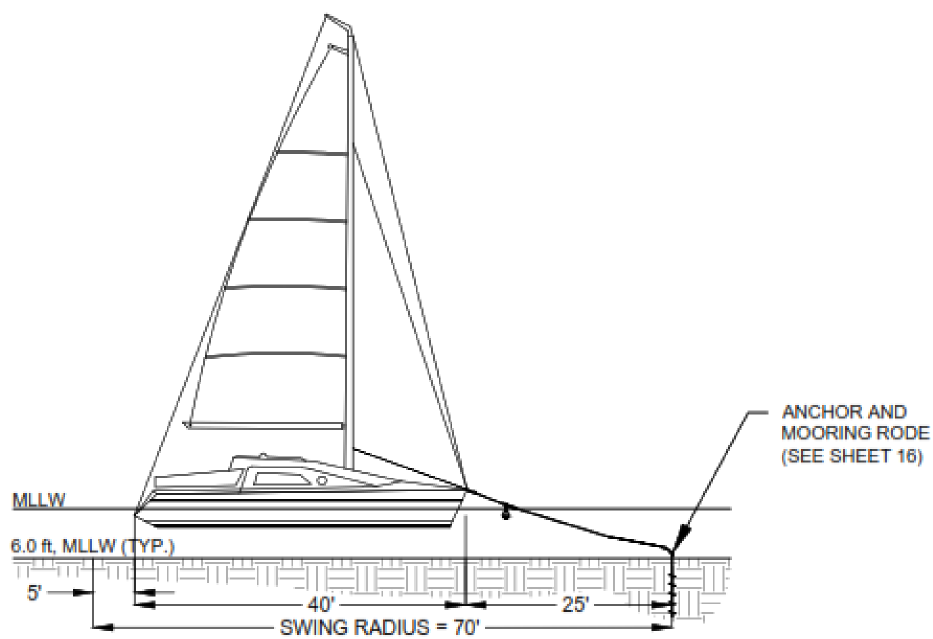
TYPICAL MARKER BUOY DETAIL
NTS

2047 Vista Parkway, Suite 201 West Palm Beach, FL 33411 (561) 659-0041 Certificate of Authorization #4669	MOORING FIELD TYPICAL ANCHOR DETAILS	Requested by: Jack Rock B-A, LLC Redhook Hayes B Rem, LLC	Location: Vessup Bay, St. Thomas , USVI Parcel ID: Waterbody: Muller Bay - Vessup Bay
	Vessup Point Marina	Sheet Number: 19 of FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION	Latitude: 18 19' 32" N Longitude: 64 50' 54" W Issue Date: xx-xx-xxxx

TYPICAL MOORING FIELD STATION VESSUP BAY (VB1 THRU VB14)

TYPICAL MOORING FIELD STATION MULLER BAY (MB1 THRU MB70)





TYPICAL VESSEL AT MOORING FIELD VESSUP BAY 1"=20'

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MOORING FIELD ADDITIONAL ANCHOR DETAILS	Requested by: Jack Rock B-A, LLC Redhook Hayes B Rem, LLC	Location: Vessup Bay, St. Thomas , USVI Parcel ID: Waterbody: Muller Bay - Vessup Bay
Vessup Point Marina	Sheet Number: 20 of FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION	Latitude: 18 19' 32" N Longitude: 64 50' 54" W Issue Date: xx-xx-xxxx

MULLER BAY MOORING FIELD (65 ft VESSELS)			
BUOY	NORTHING (FT)	EASTING (FT)	SWING RADIUS (FT)
MB1	838143.1487	1207332.639	90
MB2	838053.9131	1207489.47	90
MB3	837964.6779	1207646.30	90
MB4	837875.4425	1207803.131	90
MB5	837786.6332	1207959.711	90
MB6	838052.3894	1207177.196	84
MB7	837963.1538	1207334.026	90
MB8	837873.9186	1207490.856	84
MB9	837784.6832	1207647.687	84
MB10	837695.6166	1207804.418	90
MB11	837961.6302	1207021.752	84
MB12	837872.3948	1207178.582	90
MB13	837781.8624	1207338.249	84
MB14	837693.924	1207492.243	84
MB15	837604.600	1207649.125	90
MB16	837870.8709	1206866.308	84
MB17	837781.6355	1207023.139	84
MB18	837692.4001	1207179.969	84
MB19	837603.1647	1207336.799	84
MB20	837513.9293	1207493.63	84
MB21	837780.1117	1206710.864	84
MB22	837690.8763	1206867.695	84
MB23	837601.6409	1207024.525	84
MB24	837512.4055	1207181.356	84
MB25	837424.052	1207338.179	84
MB26	837711.110	1206557.410	84
MB27	837600.117	1206712.251	84
MB28	837510.8816	1206869.081	84
MB29	837421.6462	1207025.912	90
MB30	837332.4108	1207182.742	84
MB31	837629.080	1206407.400	84
MB32	837509.3578	1206556.807	84
MB33	837420.1224	1206713.638	84
MB34	837330.887	1206870.468	84
MB35	837241.2069	1207026.537	84

VESSUP BAY MOORING FIELD (40 ft VESSELS)			
BUOY	NORTHING (FT)	EASTING (FT)	SWING RADIUS (FT)
VB1	836895.2956	1205150.184	70
VB2	836837.0707	1205247.425	70
VB3	836826.0205	1205032.751	70
VB4	836778.159	1205138.895	70
VB5	836740.6424	1204916.328	70
VB6	836723.4665	1205022.227	70
VB7	836655.0201	1204794.883	70
VB8	836655.8552	1204905.197	70
VB9	836586.7679	1204694.466	70
VB10	836552.2812	1204588.361	70
VB11	836520.1517	1204355.569	70
VB12	836506.3017	1204220.208	70
VB13	836468.377	1204077.788	70
VB14	836663.6104	1203996.706	70

MULLER BAY MOORING FIELD (45 ft VESSELS)			
BUOY	NORTHING (FT)	EASTING (FT)	SWING RADIUS (FT)
MB36	837692.002	1208106.121	64
MB37	837627.0191	1207995.843	64
MB38	837562.0361	1207885.565	64
MB39	837497.0531	1207775.288	64
MB40	837434.0451	1207887.065	64
MB41	837432.0701	1207665.01	64
MB42	837369.0619	1207776.787	64
MB43	837306.0539	1207888.565	64
MB44	837367.0871	1207554.732	64
MB45	837304.0789	1207666.509	64
MB46	837241.0707	1207778.287	64
MB47	837302.1042	1207444.454	64
MB48	837239.0959	1207556.232	64
MB49	837176.0877	1207668.009	64
MB50	837237.1212	1207334.176	64
MB51	837174.1129	1207445.954	64
MB52	837111.1047	1207557.731	64
MB53	837172.1382	1207223.898	64
MB54	837109.13	1207335.676	64
MB55	837046.1217	1207447.453	64
MB56	837109.8621	1207109.323	64
MB57	837044.147	1207225.398	64
MB58	836981.1388	1207337.176	64
MB59	837353.6101	1206539.26	64
MB60	837281.0976	1206645.908	64
MB61	837218.5232	1206757.57	64
MB62	837155.9488	1206869.233	64
MB63	837093.3745	1206980.895	64
MB64	836981.9085	1207109.572	64
MB65	836916.1558	1207226.898	64
MB66	837153.0767	1206647.567	64
MB67	837090.5024	1206759.229	64
MB68	837027.928	1206870.891	64
MB69	836961.3783	1206981.043	64
MB70	836853.9483	1207106.381	64

NOTES:

1. SWING RADIUS VALUES TAKE WATER DEPTH INTO ACCOUNT

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MOORING FIELDS
BUOYS COORDINATES

Vessup Point Marina

Requested by:
Jack Rock B-A, LLC
Redhook Hayes B Rem, LLC

Sheet Number: 21 of

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

Location: Vessup Bay, St. Thomas , USVI
Parcel ID:
Waterbody: Muller Bay - Vessup Bay

Latitude: 18 19' 32" N
Longitude: 64 50' 54" W

Issue Date: xx-xx-xxxx

5.03 Project Work Plan/Schedule

The project will be constructed in a single phase. Erosion and sediment control measures will be installed and maintained throughout construction. The area cleared will include the pad area for the building(s) and/or amenities to be constructed along with the necessary staging area. Site access roadways will be maintained throughout construction. Main utility and drainage facilities will be started at the most efficient point during or after the excavation activities. With the building pad area complete, the building construction will then take place. As the building construction nears completion, drives and parking, hardscape and landscape will be constructed.

Marine:

- Turbidity Barriers will be placed around all area of in-water work prior to commencement of work.
- Demolition: removal of derelict timber piles and of construction material debris on the seabed in the marina area
- Dredging/Dewatering
- Silt fencing will be place around all areas of potential earth disturbance prior to commencement of work.
- Shoreline clearing, removal of derelict masonry wall, and preparation for bulkhead construction.
- Construction of new bulkhead, tie backs and backfill
- Pile installation for marina fixed pier docks
- Construction of pile caps, platform, dock decks and wave panels
- Installation of marina utilities (power and water)
- Installation of fuel system
- Installation of pump-out systems
- Installation of floating docks and gangways for dinghies
- Installation of floating wave attenuator seabed anchors, anchor system and attenuators
- Installation of mooring seabed anchors, anchor system and buoys

6.00 ENVIRONMENTAL SETTING AND PROBABLE PROJECT IMPACTS
6.01 Climate and Weather

Prevailing Winds

The Virgin Islands lie in the "Easterlies" or "Trade Winds" which traverse the southern part of the "Bermuda High" pressure area, thus the predominant winds are usually from the east-northeast and east (IRF, 1977). These trade winds vary seasonally (Figure 6.01.1) and are broadly divided into 4 seasonal modes: 1) December to February; 2) March to May; 3) June to August; and 4) September to November. Below are the characteristics of these modes as taken from Marine Environments of the Virgin Islands Technical Supplement No. 1 (IRF, 1977).

December - February

During the winter the trade winds reach a maximum and blow with great regularity from the east-northeast. Wind speeds range from eleven to twenty-one knots about sixty percent of the time in January. This is a period when the Bermuda High is intensified with only nominal compensation pressure changes in the Equatorial Trough. The trade winds during this period are interrupted by "Northerners" or "Christmas Winds" which blow more than twenty knots from a northerly direction in gusts from one to three days. Such outbreaks average about thirty each year. They are created by strengthening of high-pressure cells over the North American continent, which, in turn, allow weak cold fronts to move southeastward over the entire Caribbean region. Intermittent rains, clouds and low visibility accompany these storms.

March - May

During the spring, the trade winds are reduced in speed and blow mainly from the east. Winds exceed twenty knots only thirteen percent of the time in April. The change in speed and direction is the result of a decrease of the Equatorial Trough.

June - August

Trade winds reach a secondary maximum during this period and blow predominantly from the east to east-southeast. Speeds exceed twenty knots twenty-three percent of the time during July. The trend for increasing winds results from the strengthening of the Bermuda High and a concurrent lowering of the pressure in the Equatorial Trough. Trade winds during this period are interrupted by occasional hurricanes.

September - November

During the fall, winds blow mainly from the east or southeast and speeds reach an annual minimum. Only seven percent of the winds exceed twenty knots in October. The low wind speeds result from a decrease in the Equatorial Trough. During this period,
especially during late August through mid-October, the normal trade wind regime is often broken down by easterly waves, tropical storms, and hurricanes.

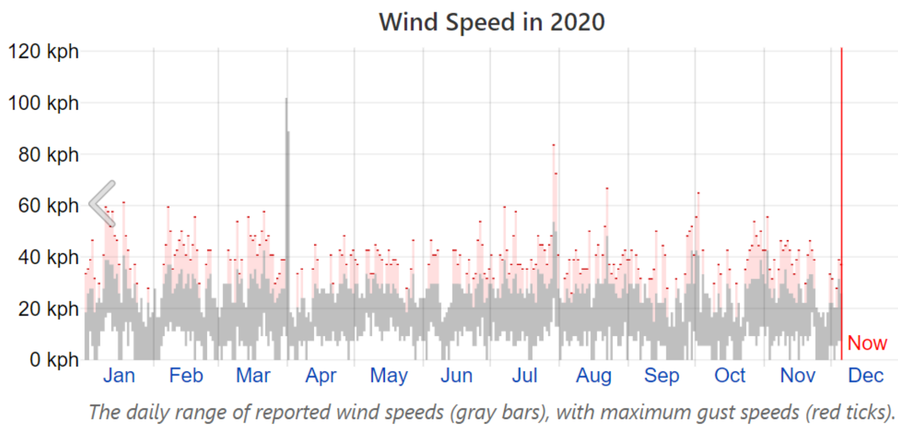

Figure 6.01.1 Wind speed and Gust reported at the Cyril E. King Airport, U.S. Virgin Islands in 2020 averages (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands).

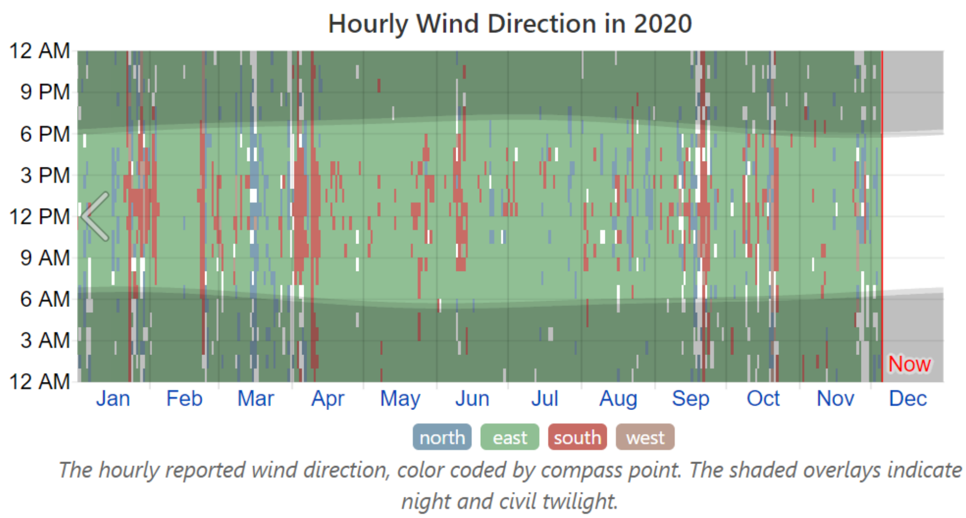

Figure 6.01.2 Hourly wind direction reported at the Cyril E. King Airport, U.S. Virgin Islands in 2020 (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands).

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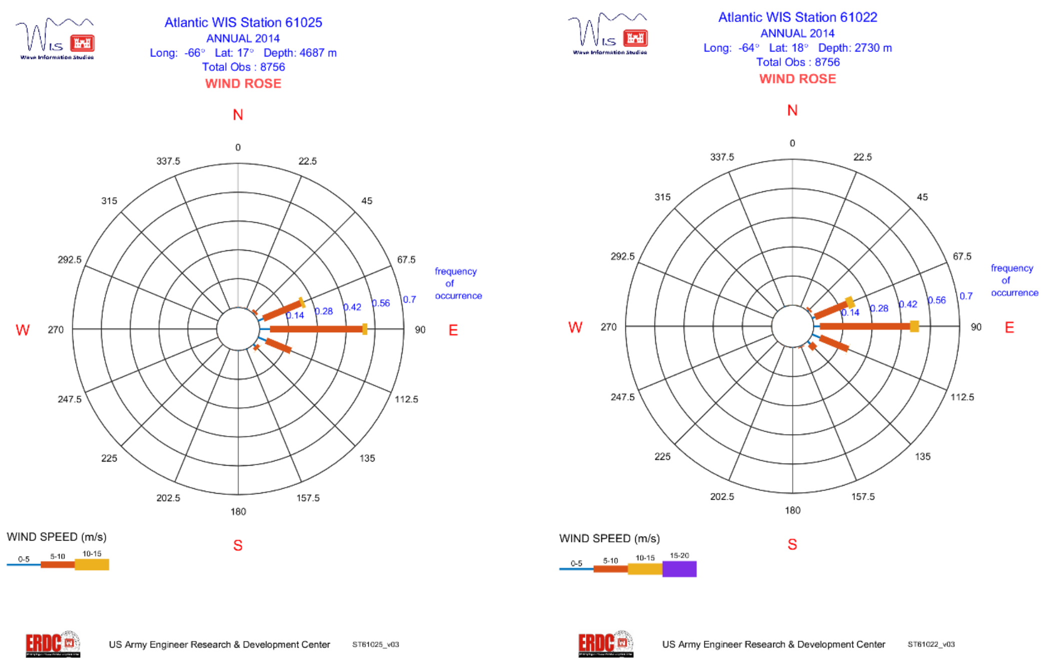


Figure 6.01.3 Wind Roses from the USACE showing the predominant easterly trade winds from the two closest buoys.

The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions (north, east, south, and west), excluding hours in which the mean wind speed is less than 1 mph. *The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).*

Figure 6.01.4 Wind averages (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands)

Storm and Hurricanes

There are numerous disturbances during the year, especially squalls and thunderstorms. These occur most frequently during the summer, lasting only a few hours, and causing no pronounced change in the trade winds.

A tropical cyclone whose winds exceed 74 miles per hour is termed a hurricane in the northern hemisphere, and significantly affects the area. These hurricanes occur most frequently between August and mid-October with their peak activity occurring in September. The annual probability of a cyclone is one in sixteen years (Bowden, 1974).

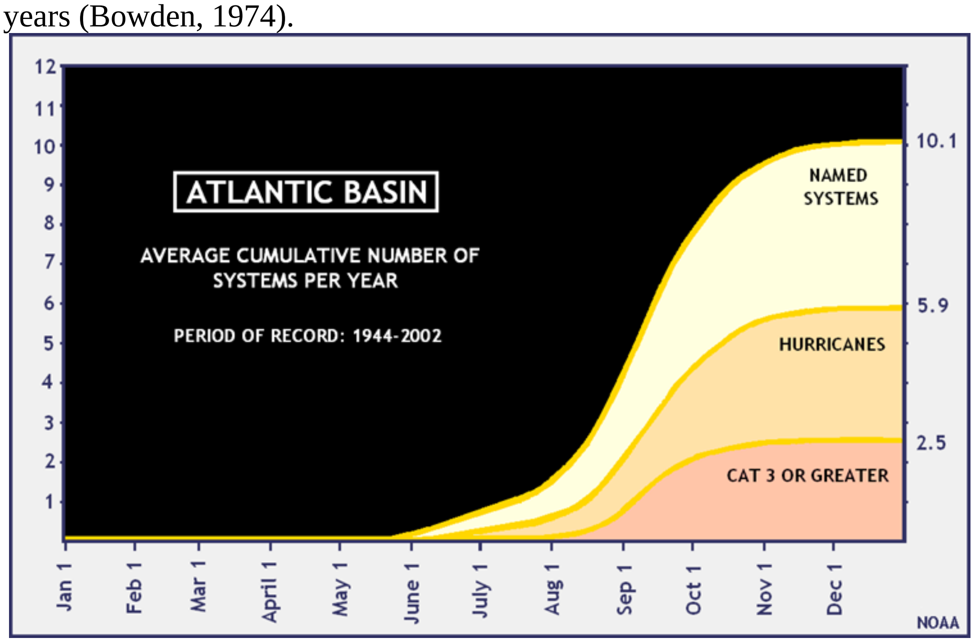


Figure 6.01.5. Tropical Hurricane Frequencies in the Virgin Islands (National Weather Service).

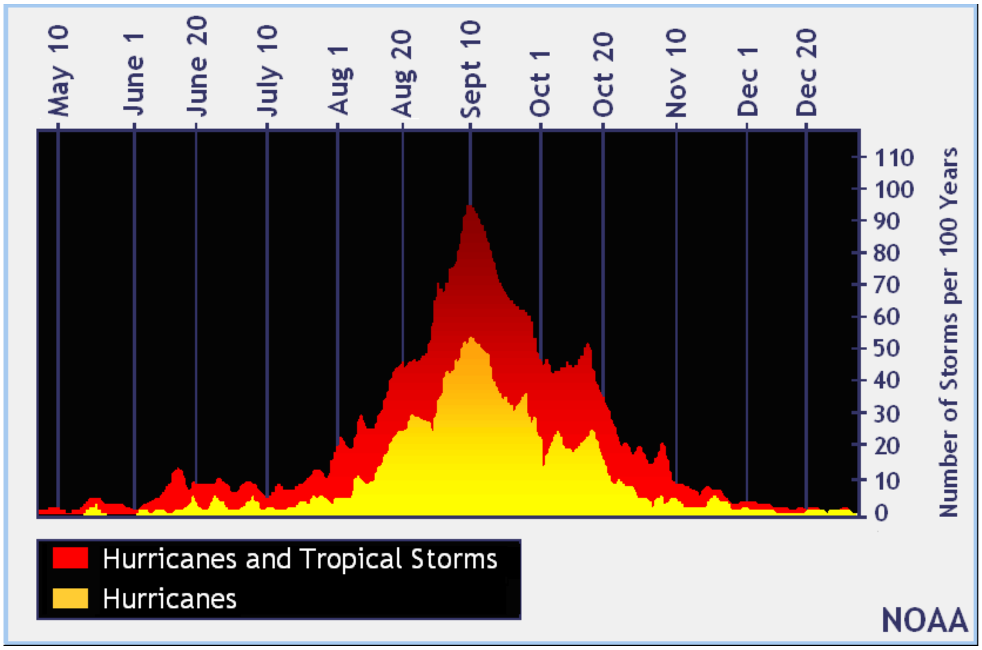


Figure 6.01.6. Tropical Storm and Hurricane Occurrences in the Atlantic (National Weather Service)

The marina has been significantly impacted by hurricanes in the past. The marina was significantly damaged by hurricanes, Hugo (1989), Marilyn (1995), and most recently by hurricanes Irma and Maria (2017).

The marina main structural components will be designed for 25- to 50-year return period design conditions (wind, waves, etc.), in accordance with standard industry practice for recreational marine structures. The floating wave attenuator will be designed to be removed prior to a tropical storm, following procedures to be established in a hurricane preparation plan.

Hurricane Preparation Guidelines can be found in Appendix B.

Climate

The Red Hook area gets between 36-45 inches of rainfall a year. Rainfall usually occurs in brief, intense showers of less than a few tenths of an inch and major rainfall events are associated with weather systems (USGS 1998). The Virgin Islands have no sharply defined wet season. The wettest period generally is from September to November, and the driest period is from January to June (USGS 1998). Rainfall data from 1981 to 2010 for the Red Hook Bay area is presented below.

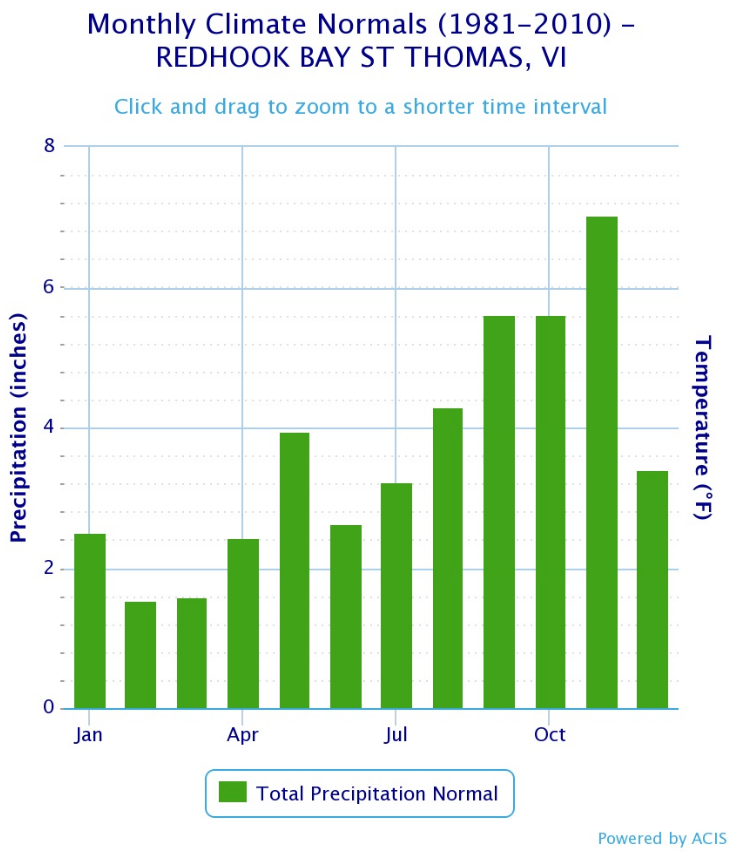


Figure 6.01.7 Rainfall Normals for Red Hook, St. Thomas.
https://www.weather.gov/images/sju/Interactive_Map/RedHookBay.jpg

The difference between the mean temperatures of the coolest and warmest month is only 5 to 7 degrees F. The highest temperatures August or September and the lowest are in January or February. The highest average daytime temperature in the warmest months is about 88 degrees F, and in the coolest months is in the low 80's. Nighttime lows are usually in the mid 70's during the warmer months and in the high 60's during the cooler months (USGS 1998). In general, air temperature in the Virgin Islands ranges between 77 degrees and 85 degrees.

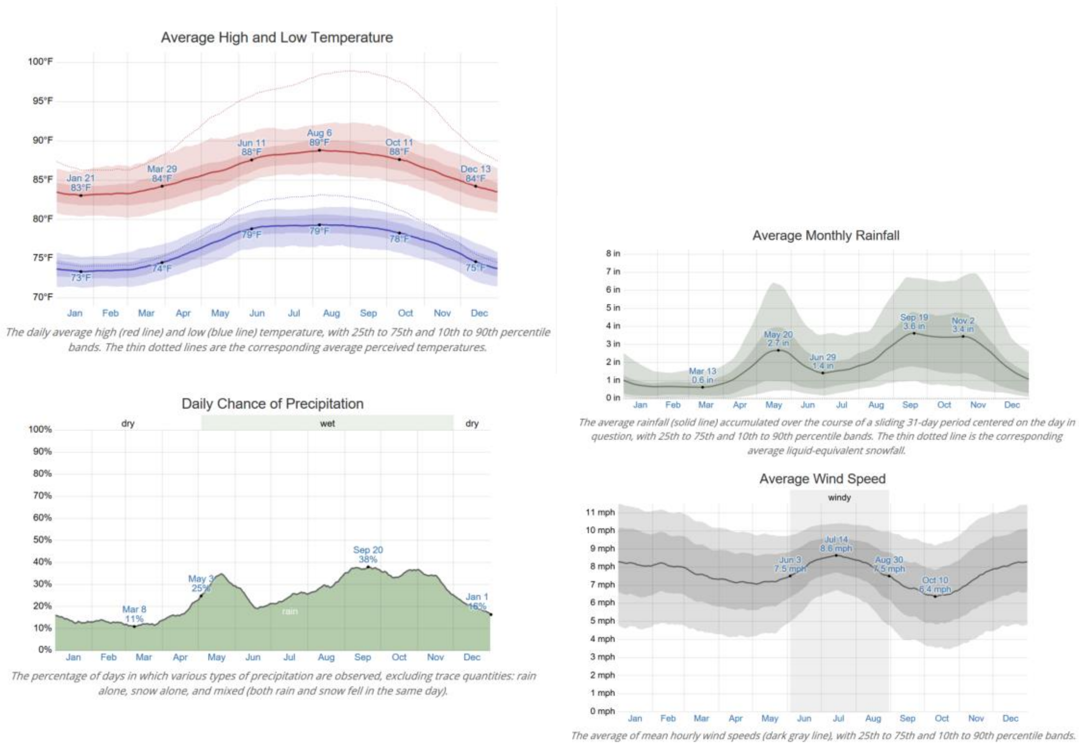


Figure 6.01.8 Climate averages (https://weatherspark.com/y/28234/Average-Weather-inCharlotte-Amalie-U.S.-Virgin-Islands)

6.02 **Landforms, Geology, Soils, and Historic Use**

GEOLOGY OF ST. THOMAS, ST JOHN AND SURROUNDING CAYS

The Virgin Islands are near the northeastern corner of the present Caribbean Plate, a relatively small trapezoidal-shaped plate that is moving eastward relative to the North and South American continents carried on the American plate. The arc of the Lesser Antilles is an active volcanic arc above a subduction zone in which the Atlantic oceanic crust of the American Plate is carried downward under the Caribbean Plate. The closest volcano to the Virgin Islands that is still active is Saba, about 160 km. to the east. St. John is 7 miles long and 3 miles wide for a total of 12,000 acres or 19 square miles. The oldest rocks of St. John are submarine lavas (keratophyre and spilite), beds of volcanic debris and chert. Associated intrusive rocks of the Water Island Formation is overlain by andesitic volcanic and volcanoclastic rocks of the Louisenhoj Formation which underlies the island of St. Thomas to the east and much of the northwestern portion of St. John. Donnelly (1966) suggested that the Louisenhoj Formation was deposited unconformably on the Water Island Formation after a period of emergence, tilting and erosion, on the slopes and environs of a subaerial volcanic island located roughly between St. Thomas and St. John, an area now occupied by Pillsbury Sound. The youngest layered deposits on St. Thomas are volcaniclastic rocks of the Tutu Formation. Fossils contained in the Tutu Formation suggest that those deposits are of the Early Cretaceous (Albain) Age (Donnelly et. al. 1971). It appears that all the volcaniclastic rocks of St. Thomas and St. John were deposited in a relatively short period of time spanning 10 to 15 million years approximately 100 million years ago (D. Rankin 1988).

GEOLOGY OF THE LATITUDE 18 SITE

The project site sits between Vessup Bay, Mueller Bay and Red Hook Bay. The northwestern shore of the property faces Vessup Bay a narrow embayment which has poor water quality. The bay then widens, and the subject property has an eastern shoreline which faces Mueller Bay. Red Hook Bay is used to refer to the areas further seaward and often to refer to the enter bay which includes Vessup and Mueller Bay embayments.

The northern face of the property within Vessup Bay has been revetted with a rubble masonry wall and then stone riprap at “Jack Point” or “Jack Rock” wrapping around to the south into Mueller Bay. Mueller Bay has a sandy beach. Offshore in Vessup Bay the sediments area silty sand and in Mueller Bay there are coarser sands. Farther out within the area of the mooring field there are areas of emergent rock pavement.

Prior to 1960 there was a large salt pond to the southwest of the marina site which was filled with dredge material, the area still has piles of sand and there is still some piping associated with the dredging within the area. The soils throughout the filled area are sandy. The property reaches a maximum elevation of 10ft.

White dredged sand is present throughout the filled area, some pushed up into large berms.

Figure 6.02.1 Orientation of the Latitude 18 property.

SOILS OF THE PROJECT SITE

The Custom Soil Survey of the Unites State Virgin Islands has classified 3 soil types on the Cabrita Property. **Salt flats ponded (SaA)** consist of area of unvegetated saline flats, saline marshes and salt ponds. The soils are very deep and poorly drained, strongly saline and frequently ponded for very long periods. This soil type encompasses where the old salt pond used to be in the center of the property. **Solitude gravelly fine sandy loan (SoA)**, is found in areas that are adjacent to saline marshes, flats and salt ponds and are a mixture of terrestrial and marine sediments. This soil type is found surrounding the area of the old salt pond and extends to the shoreline to the east. The final soil type is **Ustorthents (Us),** these soils are typically highly altered and have little vegetation and are excessively drained. These soils are found along the shoreline of the marina area and encompass a large portion of the property.

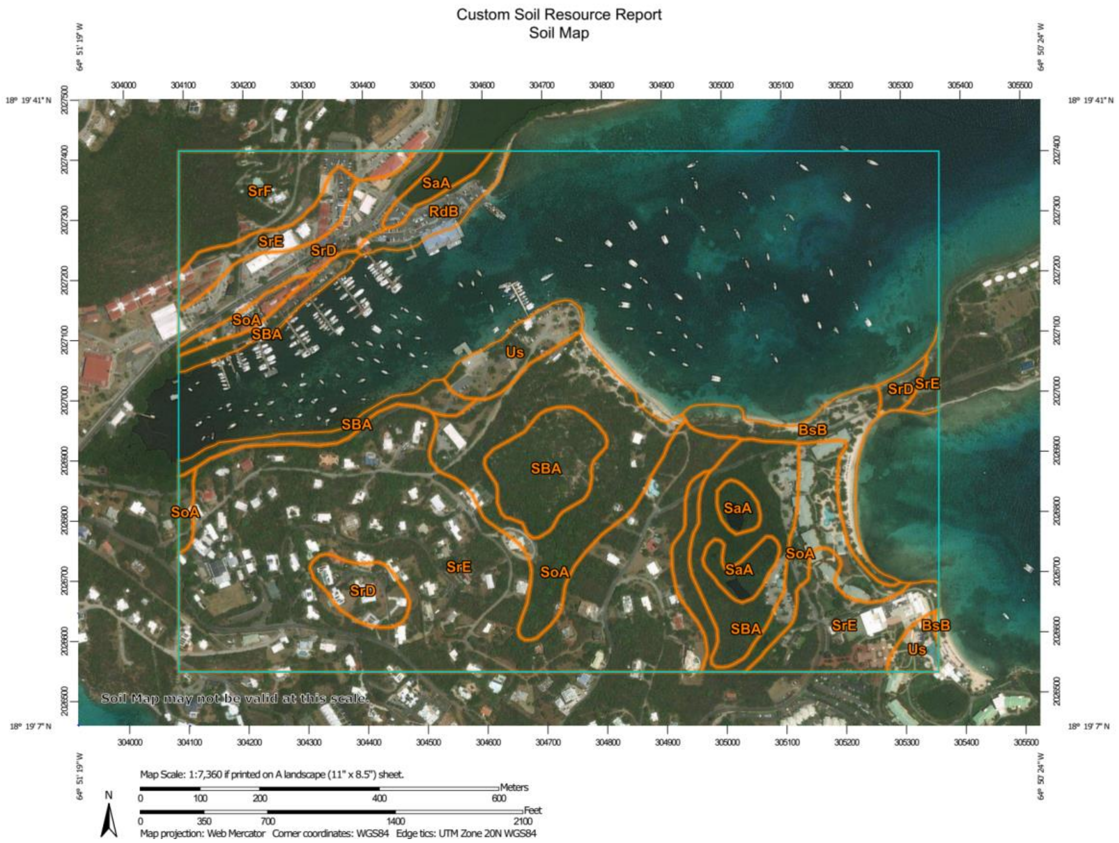


Figure 6.02.1 Custom Soils map of the project area (USGS Custom Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx)

The bottom sediments of the bay consist of sand and gravel over hard rock. Coarse sand and shell fragments area commonly found in Muller Bay, while the inner reaches of Vessup Bay are silt and mud as a result of upland runoff.

Sediments were tested in 2006 during surveys for a previously proposed project. Cores were taken west of the existing dock and to the east of the existing docks. The samples were found to contain no fecal coliform bacteria or enterococci bacteria. The samples contained no mercury, silver, arsenic, beryllium, cadmium, lead, antimony, selenium, or thallium. The soils samples did not contain Diesel Range or Gasoline Range organics.

The samples contained chromium, nickel, and zinc. Sample 1 had 3.43 mg/kg chromium, 9.60 mg/kg nickel and 9.69 mg/kg zinc. Sample 2 contained 3.27 mg/kg chromium, 6.56 mg/kg nickel, and 3.93 mg/kg zinc. These concentrations are below regulatory target cleanup levels.

Compound	South Marina Sample 1 ppm=mg/kg	North Marina Sample 2 ppm=mg/kg	Florida CTLs Residential mg/kg	Florida CTLs Industrial/Commercial mg/kg	TCLP "Safe" Values Hazardous Waste ppm=mg/kg
Percent Solids	30.3506	30.5477			
Percent Moisture	26.2	27.7			
Fecal Coliform	0	0			
Enterococci	0	0			
Antimony	ND	ND	27	370	
Arsenic	ND	ND	2.1	12	
Beryllium	ND	ND	120	1400	
Cadmium	ND	ND	82	1700	
Chromium	3.27	3.43	210	470	100ppm
Copper	6.56	9.6	150	89000	
Lead	ND	ND	400	1400	
Nickel	ND	ND	340	35000	100ppm
Selenium	ND	ND	440	11000	
Silver	ND	ND	410	8200	100ppm
Thallium	ND	ND	6.1	150	
Zinc	3.93	5.69	26000	630000	
Mercury	ND	ND	3	17	
Diesel Range Organics	ND	ND			
Gasoline Range Organics	ND	ND			

Table 6.02.1 Results of 2006 sediment sampling

HISTORIC USE

Prior to any development the area had an expansive wetland and salt pond and there was a rocky promontory on the point which was once referred to as Jack Rock. The 1954 USGS aerial below shows the site prior to the filling of the wetland.

The 1954 aerial shows expansive wetlands at the site, at the Ritz Carlton site and a pond which covers the width of Cabrita Point.

By 1972 the wetland had been filled and there is a structure on the site. The area from which the sand was dredged is visible in the Bay.

By 1974 there was more development in the subject parcel.

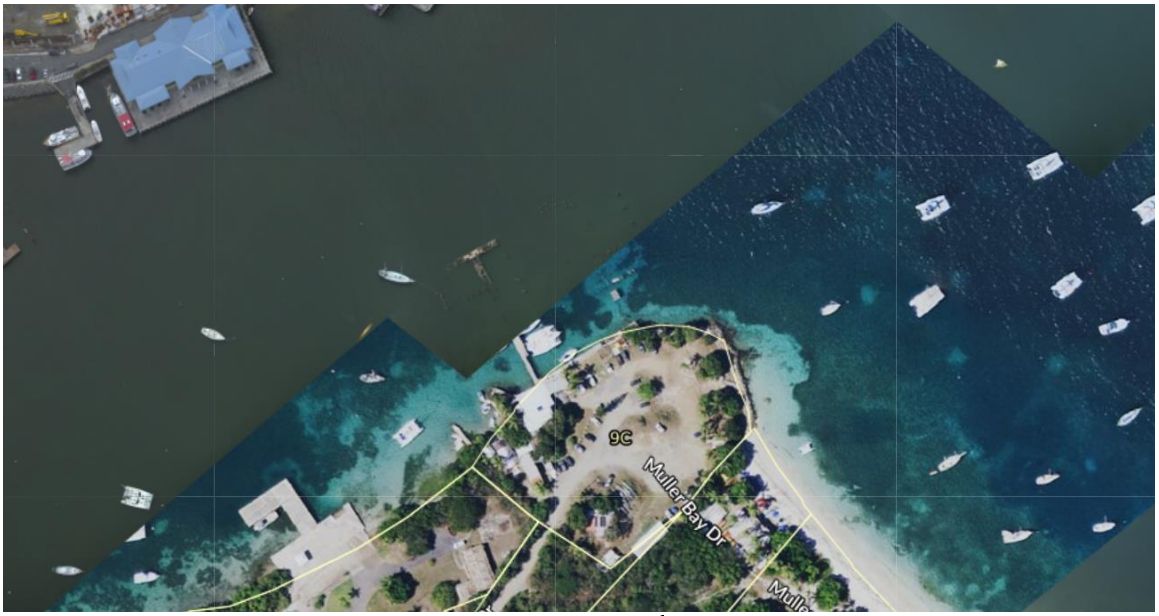

This infrared photograph firm 1984 shows there has still been limited activity on the property and the old wetland area is revegetating.

The docks would begin development in the mid 1980’s and they were damaged by first hurricane Hugo in 1989 and then hurricane Marilyn in 1995.


This1999 shows that one dock was rebuilt, and the remnants of the more easterly dock are present. The easterly dock was destroyed by hurricane Marilyn.

The dock prior to the 2017 hurricanes,


Post Hurricane Irma on September 15th or 16th.



While this post Irma photograph on September 22nd did not cover the entire site it shows that the end of the dock was taken out by the second storm.

ADVERSE SITE CONDITIONS

There is always some risk of damage in a coastal facility. The 100-year storm condition is an arbitrary standard adopted in the US for coastal insurance purposes. It means that the event has a 1% chance of exceedance in any year and is based on historical records. Statistically, there is a 26% chance of a 100-year design condition occurring or being exceeded over a consecutive 30-year period. Similarly, there is a 9.6% chance over a consecutive 10-year period.

The predicted water level elevations (for a 100-year storm) are not bound. Extreme storms may cause conditions which exceed the calculated design parameters at any time during the lifespan of the facility. Such an occurrence can cause severe damage. A detail coastal resiliency report has been prepared for the project and can be found in Appendix C.

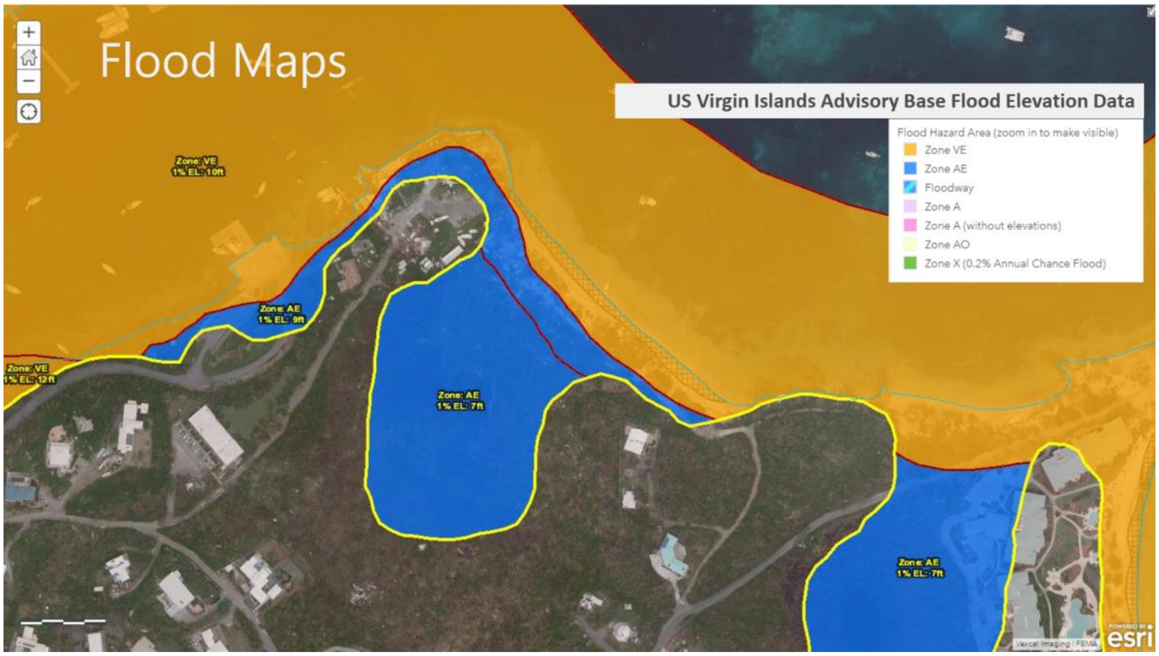


Figure 6.02.2 Base flood elevation data for the project site (US Virgin Islands Advisory).

Figure 6.02.3 National Flood Hazard flood elevations.

The coastal resilience study performed for this project considered the effect of sea level rise in the hurricane impacts. For quantitative analytical purposes, the same “100-year” storm conditions (storm surge and waves) were modelled with the same tools used to generate FEMA flood maps, but for future sea level rise scenarios. This method exposes the increased base flood elevation in high hazard areas. These scenarios were used to evaluate potential future impacts and test possible adaptation measures, specifically to reduce wave impacts. Overall flooding risk was addressed by increasing the fill elevation and construction finished flood elevations to 12ft above mean sea level.

The site resides in multiple zones regarding the FEMA Flood Map. The beachfront area and land adjacent to the proposed marina bulkhead are Zoned VE with a corresponding flood elevation of +10 feet. Based upon this criterion, the minimum finished floor elevation is required to be at +11 feet. To ensure that the Marina Building remains dry and out of the known flood elevation, the finished floor was set an additional +1 foot above the minimum requirement. The Marina Building finished floor has been set at +12 feet.

The other buildings located on-site are within Zone AE according to the FEMA Flood Map. The corresponding flood elevation was generated to be +7 feet. Based upon this criterion, the minimum finished floor elevation for these buildings is required to be at +8 feet. To ensure that the buildings remain dry and out of the known flood elevation, the finished floor was set an additional +1 foot above the minimum requirement. The additional site buildings have a finished floor set at +9 feet.

The U.S. Virgin Islands lie in one of the most earthquake prone areas of the world, and are susceptible to ground shaking, earthquake-induced ground failures, surface fault ruptures and tsunamis (tidal waves) (Hays, 1984). The activity is mostly associated with large-scale tectonic activity or faulting, originating in the Anegada Trough to the northeast of the islands. The trough and its related scarp apparently were thrown up by block faulting during the late Pliocene or early Pleistocene. It is oriented generally northeast to southwest, separating St. Croix from Puerto Rico and the other Virgin Islands. Based on shallow focus earthquakes, the Anegada Fault Trough is estimated to be more than 400 miles in length. There are indications that strike slip movement is occurring, with St. Croix shifting northeast relative to Puerto Rico (Puerto Rico Water Authority 1970). The year 2021 marks the 154th anniversary of the last major earthquake in the islands. This quake, which occurred on November 18, 1867 had an identified intensity of VIII on the Modified Mercalli Scale. Earthquakes of this magnitude have generally been associated with epicentral ground accelerations of between 0.05 and 0.35 gravities. Since the 1868 quake, there has been continuous low intensity activity, all below 6.0 Richter. Thousands of tiny earthquakes are encountered every year on the island.

IMPACT OF SITE GEOLOGY ON THE DOCK

The site geology will be impact how pilings can be installed, based previous projects in the area it is probable that the piles and sheet piles can be driven with a vibratory hammer. If seafloor composition allows the floating wave barrier will be installed with helix anchors, if helix anchors cannot be place anchor blocks will have to be used.

IMPACT OF THE PROJECT ON GEOLOGICAL RESOURCES

A small amount of dredging will be required to remove sediments along the bulkhead to provide adequate operations for the proposed facility, approximately 886cy of material will be dredged. The material will be used as fill material on the site.

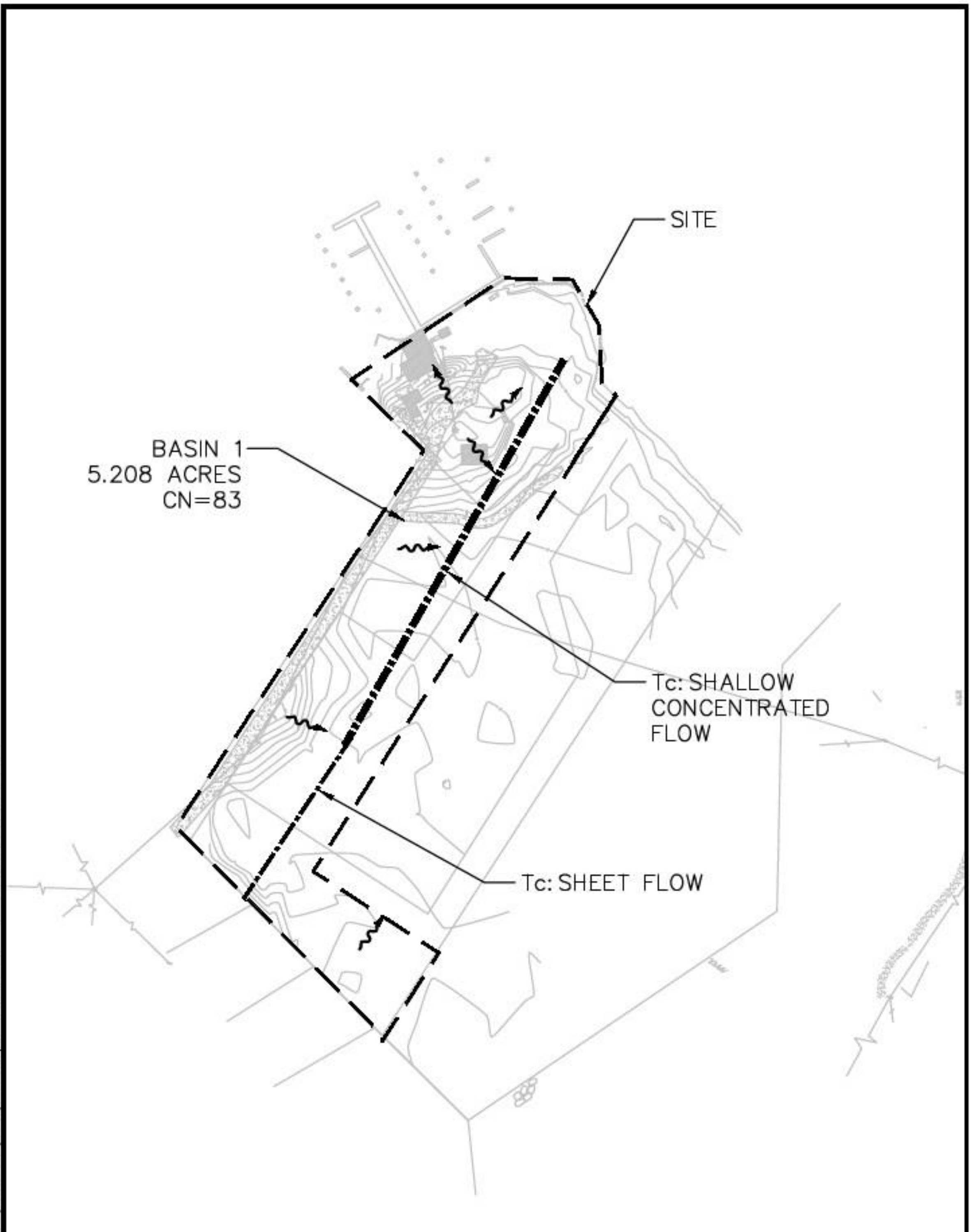
The site will be graded to address coastal flooding and drainage issues.

6.03 Drainage, Flooding, and Erosion Control

6.03 a Existing Drainage Patterns

The site does not currently have any ponds, swales, or other stormwater treatment measures. Given the site location on the edge of a small peninsula, there is little to no off-site flow coming through the site.

Using the proprietary stormwater modeling software AdICPR, Version 4, the pre-development flowrate was generated to be 6.72 cfs for the 2-year, 24-hour rainfall event. The model considers the existing soil conditions, drainage patterns, and rainfall distributions typically used for the area.



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HARRIS
Harris Civil Engineers, LLC
1200 Hillcrest Street
Suite 200
Orlando, Florida 32803

LATITUDE 18
WATER RESOURCES MAP - EXISTING BASINS
REFERENCE: SECTION 5.01.h

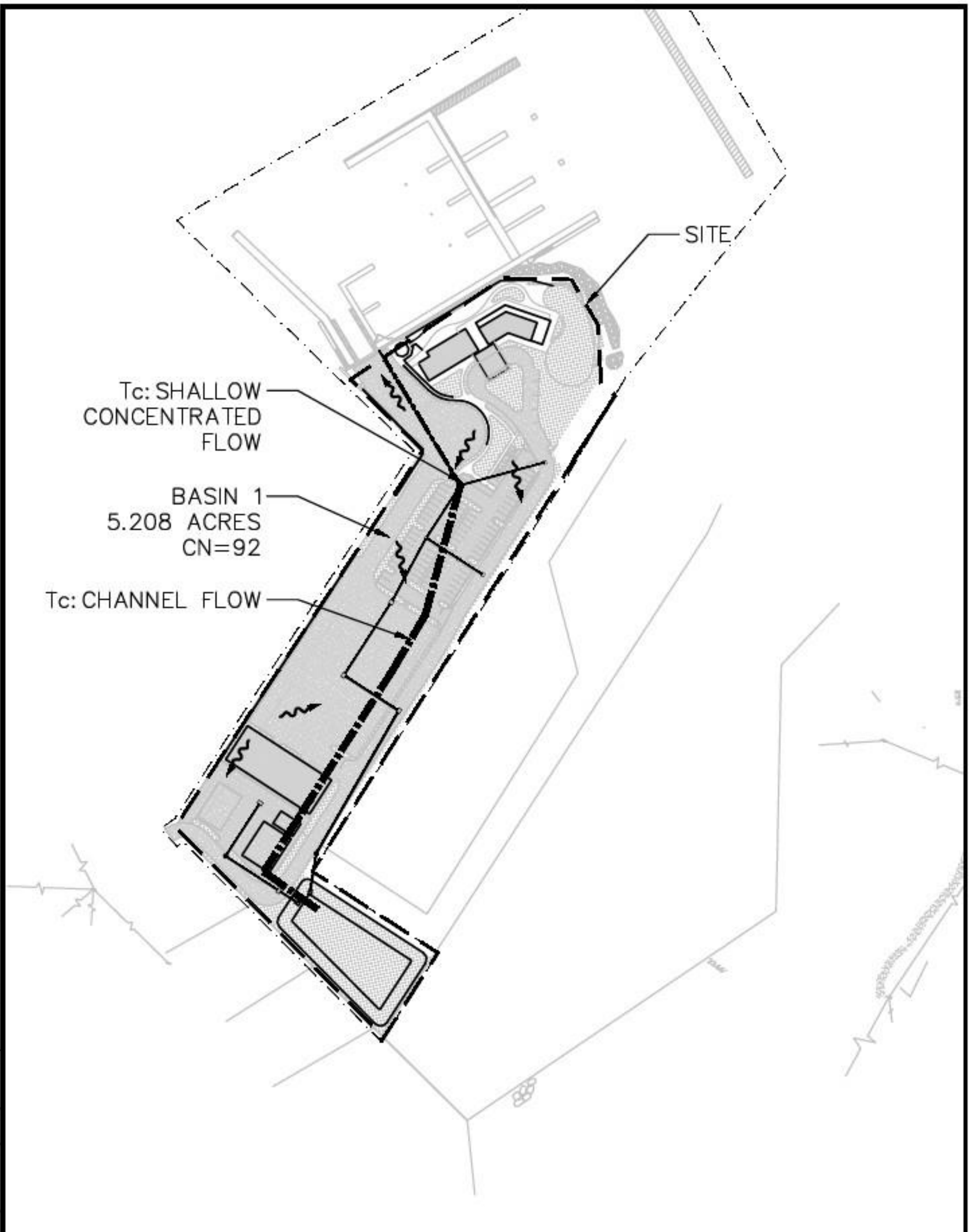
SECTION 5
FIGURE 1

6.03b Proposed Alterations to Drainage Patterns

Proposed stormwater control facilities consist of a primary stormwater system and a secondary stormwater system. The primary stormwater system includes a dry detention pond with a drainage control structure. The pond provides water quality treatment and attenuation prior to discharging into the nearby bay.

The secondary system consists of a series of inlets and area/hardscape drains, connected by a network of drainage pipes that outfall into the detention pond.

Using the proprietary stormwater modeling software AdICPR, Version 4, the post-development flowrate was generated to be 2.22 cfs for the 2-year, 24-hour rainfall event. This is lower that the pre-development runoff rate of 6.72 cfs. Therefore, the runoff for the associated rainfall event has reduced the flowrate in the post-construction condition.



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Suite 200
Orlando, Florida 32803

LATITUDE 18
WATER RESOURCES MAP - PROPOSED BASINS
REFERENCE: SECTION 5.01.h

SECTION 5
FIGURE 2

6.03c Relationship of the Project to the Coastal Flood Plain

The offshore area where the dock is proposed, and the adjoining shoreline lie within area VE elevation 9ft where FEMA has determined that the 100-year flood elevation with velocity (wave action) will be 9ft as shown on FIRM map 30 of 94 and the immediate coastal area is in AE elevation 9ft where the 100-year coastal flood elevation has been determined to be 9ft. The old salt pond area is in AE elevation 7ft where the 100-year coastal flood has been determined to be 7ft. The rest of the property is in Zone X where coastal flooding is not expected.

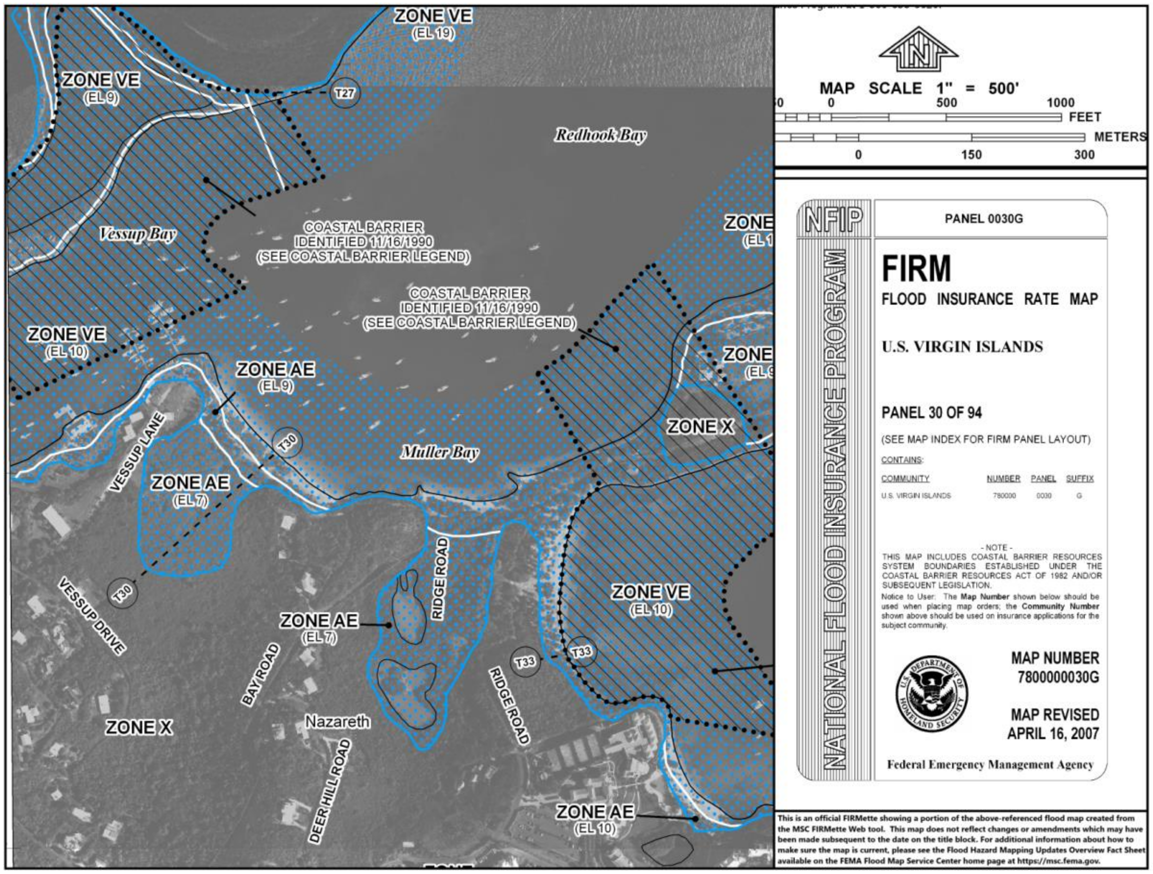


Figure 6.03.3 FEMA FIRM Map 30 of 94.

6.03d Peak Stormwater Flow Calculations

Using the proprietary stormwater modeling software AdICPR, Version 4, the post-development flowrate was generated to be 6.72 cfs for the 2-year, 24-hour rainfall event. This is lower that the pre-development runoff rate of 2.22 cfs. Therefore, the runoff for the associated rainfall event has reduced the flowrate in the post-construction condition.

6.03e Existing Stormwater Disposal Structures

There are no existing stormwater disposal structures on the site.

6.03f Proposed Stormwater Control Facilities

Proposed stormwater control facilities consist of a primary stormwater system and a secondary stormwater system. The primary stormwater system includes a dry retention pond with a drainage control structure. The pond provides water quality treatment and attenuation prior to discharging into the nearby bay.

The secondary system consists of a series of inlets and area/hardscape drains, connected by a network of drainage pipes (ranging in size and material from 4” PVC to 24” RCP) that outfall into the retention pond.

6.03g Maintenance Schedule for Stormwater Facilities

Periodic mowing and cleaning or repair shall be done as needed. Nuisance-species plant-life shall be removed should it exceed 10% of the vegetative covering.

6.03h Method of Land Clearing

Most of the site has been developed and as such only limited clearing will occur. Because the property is within the critical habitat for the Virgin Islands Tree Boa, clearing will follow the Tree Boa Protocol developed by the Division of Fish and Wildlife with the initial clearing being done by hand and in the direction of other forested areas. Immediately following the clearing, erosion and sediment control measures will be put into place as described in sections 5.01d – e of this report.

After hand clearing areas to be developed, most of the site will be machine cleared and excavated at the beginning stages of construction. Existing trees will be removed by and disposed of as necessary according to the Tree Removal Plan. Trees that are designated to remain will be protected during construction.

Furthermore, only the land within the limits of construction will be cleared. The clearing activities will be scheduled so that the existing soil is exposed to erosion for the shortest period that is reasonably possible.

6.03i Provisions to Preserve Topsoil and Limit Site Disturbance

Immediately following site clearing, erosion and sediment control measures will be installed. Furthermore, all topsoil located during site clearing will be immediately excavated, stockpiled, and protected from exposure to wind and water through the use of a geotextile. The topsoil will be used as necessary in the landscape areas.

The dock and mooring locations have been located to minimize impact on the marine environment by avoiding all ESA listed corals, non-ESA corals, seagrass beds and minimizing hard bottom impacts. Turbidity control and water quality monitoring will be implemented as well as sea turtle monitoring to minimize acoustic impacts. Areas will be cleared by hand to minimize impact to the VI Tree Boa. A Tree Boa protection plan is found in Appendix E.

6.03j Presence and Location of Any Critical Area(s) and Possible Trouble Spot(s)

The subject parcels are within the Vessup Bay/ East End Red Hook Area of Particular Concern (APC) (Figure 5.3). The Vessup Bay/Red Hook APC is located on the eastern end of St. Thomas and includes Nazareth, Muller, Vessup, Red Hook, Great Bay, Cowpet Bay, Cabrita, Beck and Water Point, Great St. James, Little St, James, and Dog Island.

The Latitude 18 marina has been developed since the 1980s. The docks were badly damaged by hurricane Hugo (1979), were repaired, were damaged by hurricane Marilyn (1995), and only a portion would be rebuilt. The marina was then significantly damaged by hurricanes Irma and Maria 2017.

At one time dense seagrass was found in the eastern portion of the marina, however over time while there is still Thalassia testudinum present it has become less abundant and is now fully mixed with the invasive seavine Halophila stipulacea. In early 2000 there was a Dendrogyra cylindrus, a coral which is now listed on the endangered species list, found on the riprap which rap around the point at the northeastern end of the property. Surveys in 2008 did not find this coral and no other ESA corals have been found on the shoreline revetment. The piles and the shoreline revetment which faces north and is in Vessup Bay proper is degraded habitat with significant algal colonization. These hard structures would not be considered critical habitat due to the dense algal cover. A few *Siderastrea spp*. and *Psuedodiploria spp*. are found in this area.

The riprap revetment which extends around the point into Mueller Bay enjoys much better water quality and can be considered critical habitat. No construction is proposed for this area. There are scattered corals on the hardbottom although many of the corals were damaged due to a sailboat grounding on the riprap and remaining for a considerable amount of time.

There are also emergent hard bottom areas to the east in Mueller Bay, and there is sparse coral colonization on the emergent hard bottom including *Orbicella faveolata and O. annularis* ESA listed coral species. Each mooring was surveyed and positioned to avoid hard bottom impact and impact to corals. All lines and tackle will be floated so as not to damage the seafloor or the corals.

While the invasive seavine is found through Vessup, Mueller and Red Hook Bay, there are still expanses of *Thalassia testudinum* and *Syringodium filiforme* beds. These beds have been badly damaged by existing mooring and anchoring, lines dragging and debris.

The managed mooring field should help to alleviate many of these impacts and should facilitate recolonization by these species.

The area is known habitat to protected sea turtles and marine mammals and as such NOAA’s Sea Turtle and Smalltooth Sawfish Construction Conditions will be followed as well as NOAA’s Vessel Strike Avoidance Measures and Reporting for Mariners during the construction of the dock and installation of the moorings.

The property is with the critical habitat for the Virgin Islands Tree Boa and tree boas are known to occur within the area. The much of marina the site is cleared and offers little in the way of habitat for these species. The western portion of the site which is overgrown does have interdigitation as does the more heavily wooded area near the beach.

While most of the site has gentle gradients, the existing paved roadway onto the site has excessive slopes that should be taken into considered from a construction standpoint. Access to the site will be carefully planned to allow for construction activities to occur with minimal disruption to the local roadways and neighboring properties.

Vessup Bay and Muller Bay are directly downstream of our construction site. Erosion control BMP's will be implemented to ensure the turbidity remains under the acceptable levels throughout construction. Also, constant attention will be required to ensure that erosion control measures are in place and maintained to protect the water quality of the bay below.

6.03k Erosion and Sediment Control Devices to be Implemented

During construction, several methods of erosion and sediment control will be utilized. For areas to be exposed less than 14 days, a spray-on polymer specifically designed for the on-site soil conditions will be applied. For areas of exposure greater than 14 days, hydroseeding will be used to reduce the water velocity, encourage soil infiltration and stabilize the soil.

In order to prevent water-borne sediment from leaving the site, silting basins will be used where possible. Additionally, as a secondary measure, double silt fences and hay bales will be installed on the downstream side of disturbed areas to protect the waterways in the event of the other measures not working as anticipated. Finally, turbidity barriers within the bay will be installed to prevent any sediment from entering the ocean uncontrolled.

6.03l Maintenance of Erosion and Sediment Control Devices

The sedimentation and erosion control measures as described in Section 5.01e of this report will require daily observation and, if necessary, will be repaired immediately. Likewise, after large storm events, the erosion control measures will be checked and adjusted or repaired if they are not working as planned. The contractor will take measures such as reapplying the erosion control polymers, fixing, or replacing the erosion control blankets and fixing or replacing the silt fences and turbidity barriers if they fail. Devices for entrapment of silt will be cleaned as required to maintain functionality. If construction is delayed or completed in an area, the contractor will revegetate the bare soil with seed and mulch or hydroseed to stabilize the soil.

6.03m Impacts of Terrestrial and Shoreline Erosion

Terrestrial

The site has limited slopes and site drainage will be put in throughout the site to control runoff. Terrestrial erosion is not expected.

Shoreline erosion

The marina will not cause any change to the adjacent rubble shoreline, nor to the sandy beach facing Muller Bay.

Wave studies were preformed and no alteration to wave patterns along the shoreline or surf zone in the vicinity of the marina are expected.

The risk of erosion along the shoreline facing the marina will be significantly reduced by the proposed bulkhead. The new bulkhead structure, built to withstand surge and wave action and with a higher elevation than the existing dilapidated structure, will offer better performance stabilizing the shoreline and protecting the upland development compared to the present condition.

6.04 Fresh Water Resources

There are no freshwater surface resources within the property. The historic presence of the salt pond/wetland system would indicate that groundwater resources if present would be brackish. The project does not propose the installation of a well.

6.05 Oceanography
6.05a Seabed Alteration

Localized seabed impacts are expected due to pile installation for fixed piers and the installation of anchor systems for floating wave attenuator and for the mooring buoys. Localized impacts will also be caused due to dredging of seabed material as part of the reprofiling of the seabed adjacent to the rebuilt bulkhead and the rectification of a portion of the disturbed irregular shoreline, required for the bulkhead construction. The total area of seabed impact is 6,490 sq ft. The total volume of material to be removed and disposed on the upland as fill is approximately 886 cy.

The marina docks and floating wave attenuator have a continuous deck that will cause localized shading impacts. The approximate total surface of decking of the marina docks and access structures is 21,550 sq ft, of the dinghy dock and access facilities surface area is 1,570 sq ft and of the decking of the floating wave attenuator is 6080 sq ft. The docks will require 274 piles, there will be 12 mooring piles and there will be 16 piles associate with the travel lift.

These impacts are unavoidable for the development of a marina and were minimized my design or mitigated, as follows:

- The proposed design seeks to reduce the number of piles by avoiding the use of mooring piles between slips and by using partial length fingers. The previous marina had dock pier structural piles and also mooring piles between each slip.

- The proposed water depths near the bulkhead were reduced to only accommodate smaller draft vessels, as opposed to the ideal design depth to maximize the marina efficiency, to reduce the seabed impact. The required water depth for mono-hull yachts of the size envisioned requires -8 ft msl water depth, which resulted in a 18,325 sq ft area impact and 2,260 cy of material to be removed from the seabed. An alternative was proposed to locate catamarans in those slips and providing a design depth of -6.5 ft MSL. The final area impact is 6,490 sq ft and the volume to be removed is approximately 886 cy at the expense of losing one slip.

- The floating wave attenuator performance to reduce agitation is driven by the structure width. Wider floating elements provide more wave attenuation than narrower ones. The structure is intrinsically massive and opaque. The only impact reduction strategy available is to design the attenuator with the minimum width that serves the required function. Grated decking for light floating element structural solutions were explored and considered unfeasible. The actual seabed impact is ultimately minor because the water depth is on the order of between 18 and 28 ft.

- All mooring buoys will be anchored to the seabed by drilled anchors and connected to the buoy bollard with elastic rods. This mooring buoy design solution avoids seabed impacts during operation. Alternative anchorage systems, such as anchor and chain which is common in this area at present, and boat anchors typically cause significant seabed damage, as documented in this section.

6.05B TIDES AND CURRENTS

The Virgin Islands coastal areas are not subject to significant tidal ranges or tidal currents. Due to the small size of the island, the sea flows around the island causing an average tidal height of only a few inches and maximum change of only a little over a foot. Only very narrow intertidal zones are found because of this lack of tidal amplitude and the steepness of the island rising out of the sea. The tides within Red Hook Bay are primarily semi-diurnal in nature, with two cycles of high and two of low water every 24 hours. The second cycle is often indistinguishable. The mean tides range from 0.8f. to 1.0 ft and the spring tidal ranges reach up to 1.3ft (IRF 1977). There are no notable locally driven tidal currents due to the lack of confinement within the area. NOAA has a tide gauge in Charlotte Amalie which is a southern exposure which has been recording water levels since 1975. The high tide recorded on September 18, 1989 (Hurricane Hugo) was +3.35ft, and in 1995 during Hurricane Marilyn the Charlotte Amalie tide station recorded the highest tide height 3.98ft above Mean Lower Low Water (MLLW). The lowest tide recorded was on February 6, 1985 and was -1.44ft. The tidal ranges of the Charlotte Amalie station are as follows:

Mean Higher High Water	1.09ft
Mean High Water	0.94ft
Mean Tide Level	0.54ft
Mean Sea Level	0.52ft
Mean Low Water	0.13ft
Mean Lower Low Water	0.0ft

There is also a Tide Station in Redhook (Station ID: 9751540), the station is located at latitude 18° 19.6 N and longitude 64° 51.1 W and has a mean tidal range of 0.82ft and a diurnal range of 1.09ft.

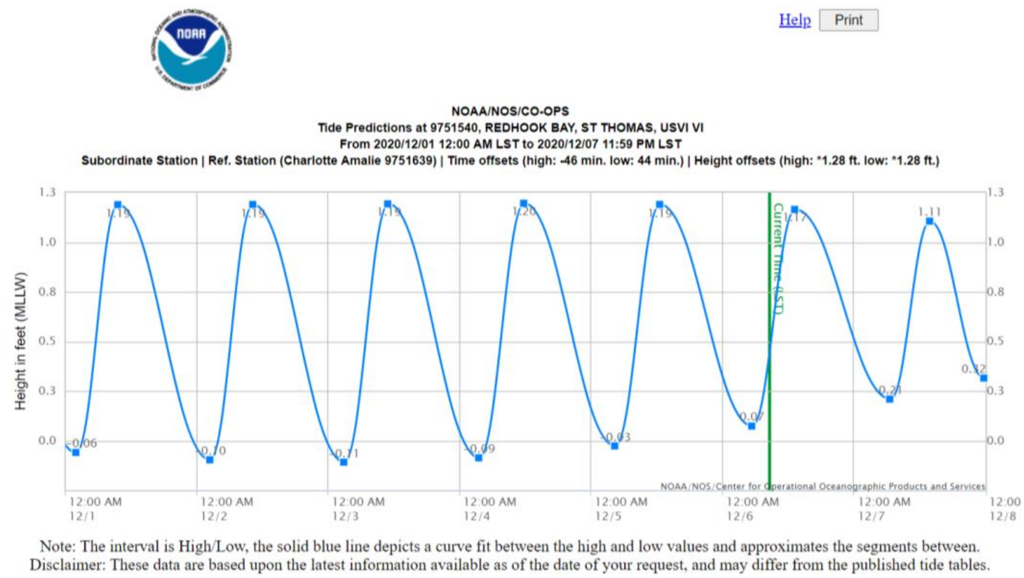


Figure 6.05.1. Tidal data from the Redhook Tidal Station (NOAA Buoys)

The surface currents throughout the Caribbean are driven by the North Equatorial Current that runs through the islands west-northwest and then joins the Gulf. These currents change very little from season to season with the currents coming more from the south during the summer months. Because of the shallowness of the Caribbean basin of less than 1000m, mainly surface water from the Atlantic flows through the islands. The westerly drift of the Caribbean Current sweeps into Pillsbury Sound from the Southeast, seeking a way North through the barrier set up by the Cays to discharge along the North Shore of St. Thomas and out into the Atlantic. Tidal currents in the vicinity of marina and mooring field project are very small and highly influenced by wind. Measured currents are generally about 3 centimeters per second (cm/s). ATM conducted tidal and current measurements for the calibration of the water circulation model (ATM 2020)

The measured data shows that there is no significant variation in the tidal signal between Muller Bay and the upper end of Vessup Bay, i.e. no damping or amplification.

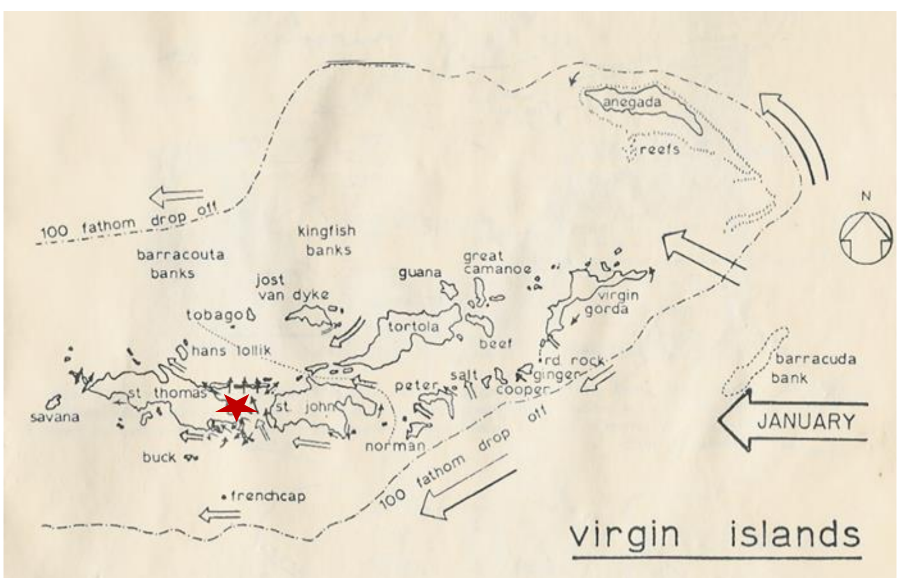


Figure 6.05.2 Currents surround the northern islands and Cays (IRF 1977).

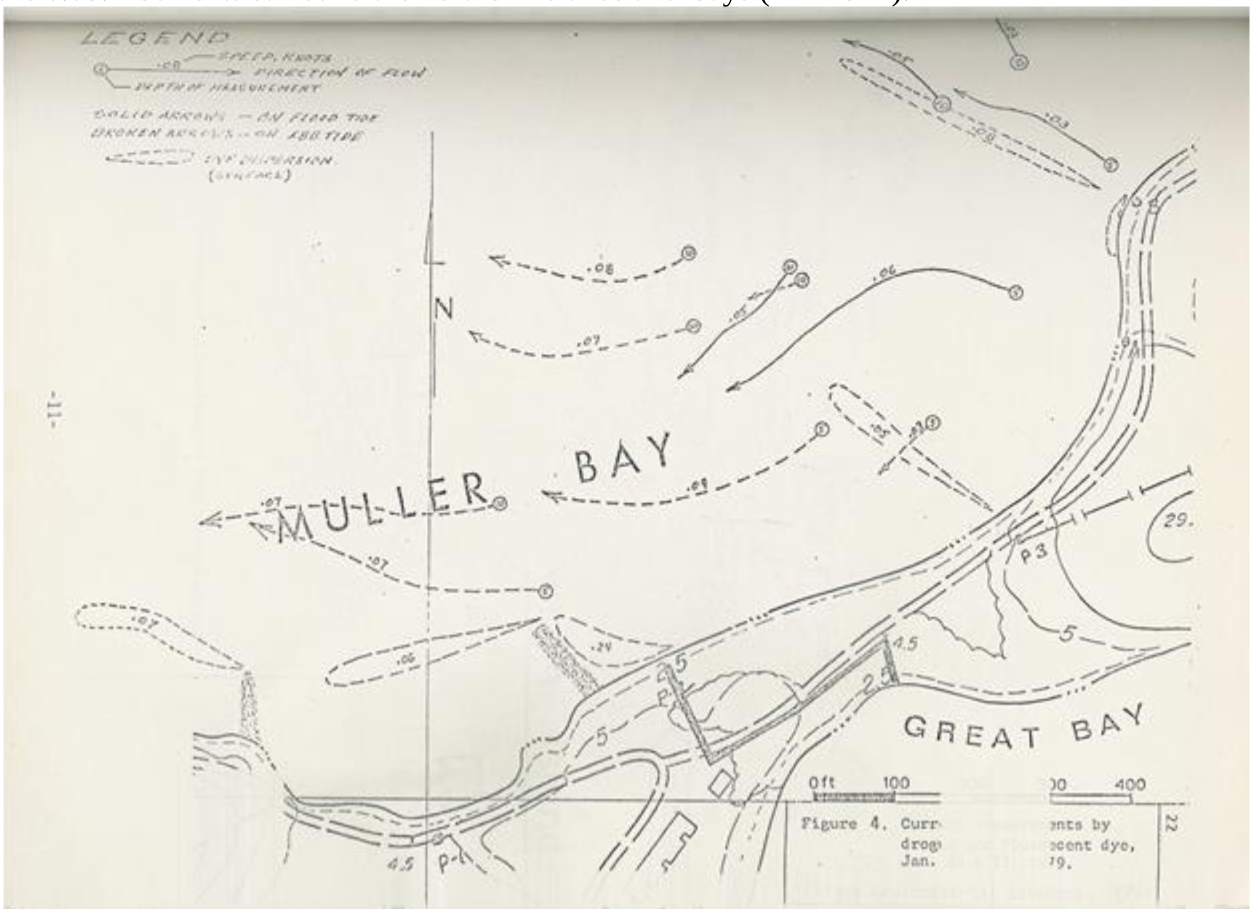


Figure 6.05.3 Currents in Muller Bay.

6.05C WAVES

The deep-water waves off Red Hook Bay are primarily driven by the northeast trade winds that blow most of the year. Waves average from 1 to 3ft from the east, 42% of the time throughout the year (IRF, 1977). For 0.6% of the time easterly waves reach 12ft in height. The southeasterly swell with waves one to twelve feet high become significant in late summer and fall when the trade winds blow from the east or when tropical storms and hurricanes pass the islands at a distance to the south. During the winter months, long length, long period northern swells develop to a height of 1 to 5 feet. The USACE Hindcast Studies for buoy 61022 the two buoy whose waves patterns directly affect the project area, shows that a majority of the waves which occurred approach from easterly directions.

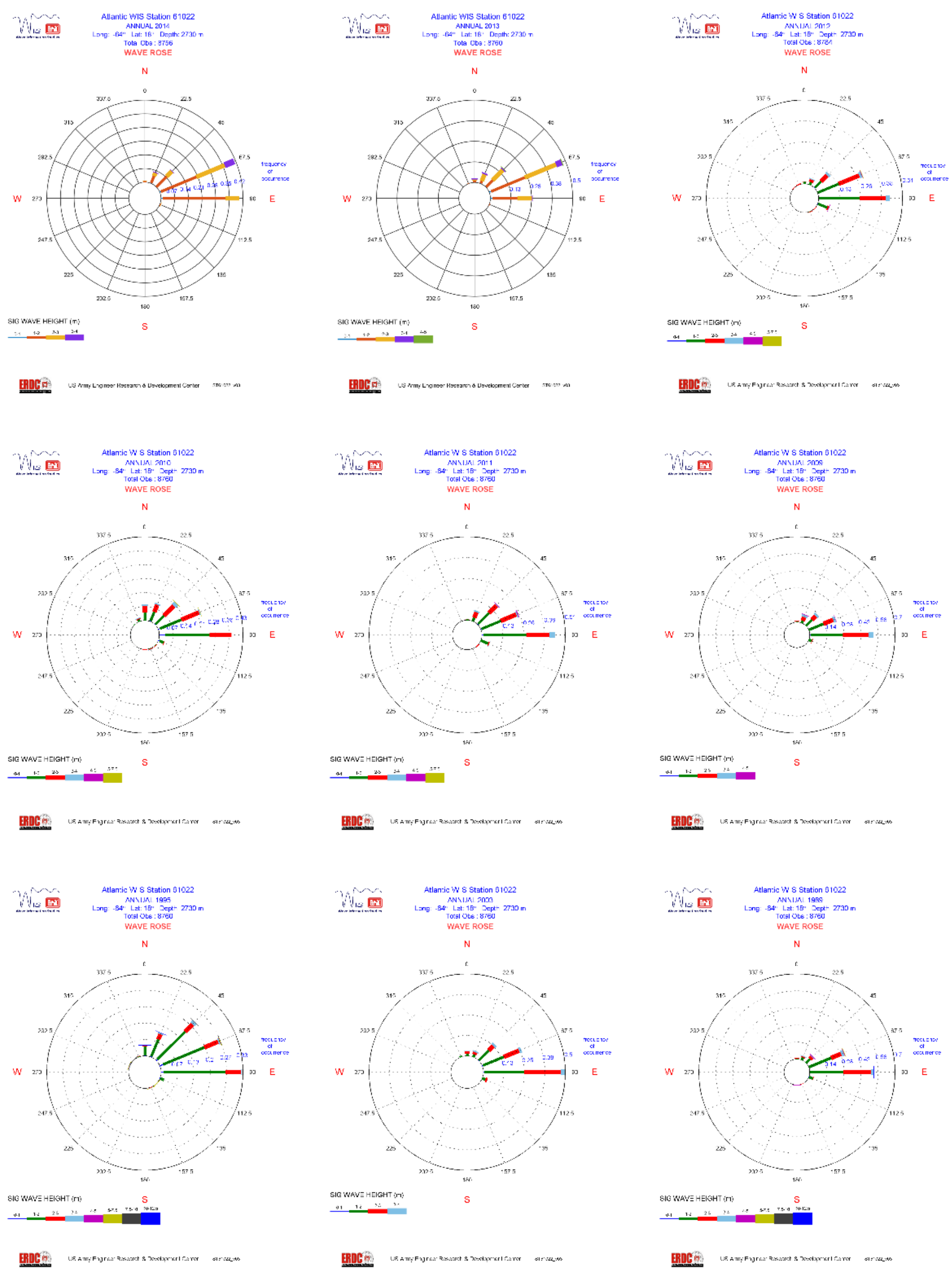


Figure 6.05.4. Wave Roses from the USACE Wave Information Studies for buoy 61022.

The property and the area proposed for the marina are exposed to hurricane waves and winter storms. An older timber dock marina facility in this same location was destroyed by cumulative impacts of various hurricanes over the years.

Detailed studies were performed to determine design conditions for extreme events and operational conditions of the marina.

Locally generated waves

Local waves at the Vessup Point Marina site were studied to assess agitation under normal conditions. The analysis was carried out with the aim of quantifying the short-period waves “typical wind chop” characteristics in the proposed marina berthing zone in order to identify control measures, such as wave attenuation devices.

The USACE wave forecasting model, ACES (USACE, 1992), was used to evaluate the potential locally generated short-period wind-wave conditions at the site. The critical fetches were used to calculate predicted wave characteristics for different wind speed intervals. Summary tables of wave calculations are given below.

Table 6.05.1 Significant Wave Height Occurrence

Wave Height Range (ft)		**Occurrence* (%)**
<0.50		**10.7**
0.50	**0.70**	**46.5**
0.70	**1.00**	**10.2**
1.00	**1.30**	**3.5**
>1.30		**0.4**

Table 6.05.2: Wave Peak Period Occurrence

Wave Period Range (s)	**Occurrence* (%)**
<2	57.3
2 to 3	14.0

*** Note**: Wind waves from the 3 directions analyzed account for 71.3% of all waves. Winds over 7.5 mph occur 60.6% of the time on an average December month from these directions.

Extreme Events

Extreme event wave modeling was conducted to assess the marina development site, in addition to the analysis of FEMA Flood maps.

Based on the desktop review of tidal data, the wave studies and using the local mean sea level (MSL) as the vertical reference, the following still water levels and wave crest elevations are considered representative of conditions in the marina site:

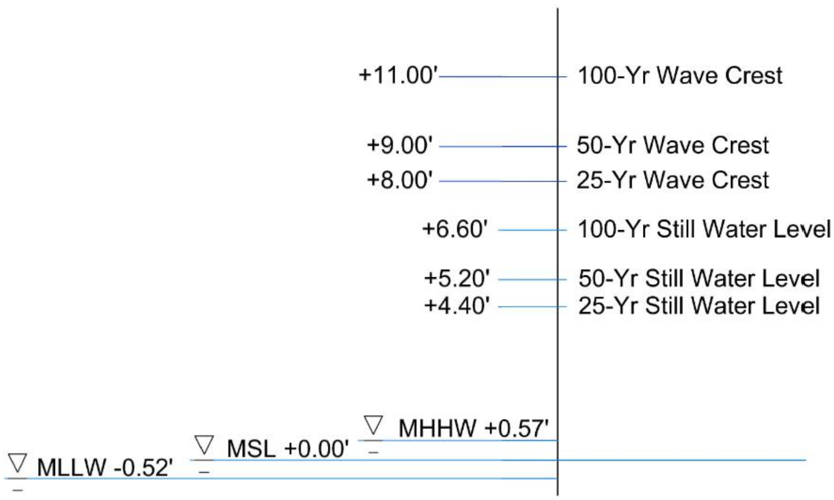


Figure 6.05.5: Summary Water Elevations. (*Wave crest values vary depending on project site's location.)

Storm Surge

Table 6.06.6 presents a summary of storm surge levels for the 10-, 25-, 50-, and 100-year recurrence intervals at the project coastline of the project site.

Return Period (Year)	FEMA* (Feet, MSL)
10	3.4
25	4.4
50	5.2
100	6.6

* FEMA Flood Insurance (FIS) Report for US Virgin Islands (25-yr value based on interpolation)

The Federal Emergency Management Agency (FEMA) Flood Insurance Study for the U.S. Virgin Islands is shown in Figure 6.03.1.

For 25-year return period storm conditions, open ocean swell is able to diffract around the surrounding islands and land masses and impact the site. The associated wave heights with these swells, however, are relatively minor (typically less than 0.3 m) as the offshore swell heights are reduced significantly before reaching the site. The controlling 25-year wave conditions are primarily due to shorter period locally generated wind waves which can reach up to 1.5 m at the site with periods of approximately 5 seconds.

Extreme Wave impacts with sea level rise and climate adaptation

Further analysis of Sea Level Rise impacts on Coastal Development was studied for the design storm condition (1% annual exceedance) for upland impacts and climate adaptation.

6.05D MARINE WATER QUALITY

The offshore waters are classified as Class B and the best usage of the water is listed as the propagation of desirable species of marine life and for primary contact recreation (swimming, water skiing, etc.). The quality criteria include dissolved oxygen not less than 5.5mg/l from other than natural conditions. The pH must not vary by more than 0.1 pH unit from ambient; at no time, shall the pH be less than 7.0 or greater than 8.3. Bacteria (fecal coliform) cannot exceed 70 per ml, and turbidity should not exceed a maximum nephelometric turbidity unit of three (3) NTU.

Water sampling has occurred on the site over the last several of years in order to establish a baseline of water quality conditions. Samples were taken with a calibrated YSI EXO multi-meter and were taken at a depth of 1 meter. The samples from 2019 and the beginning of 2020 were focused within the marina. As the idea of a managed mooring field was considered additional sampling locations were added (Table 6.05.3). Samples were also taken during the current study which are provided in Table 6.05.4.F The map below shows the location of the samples.

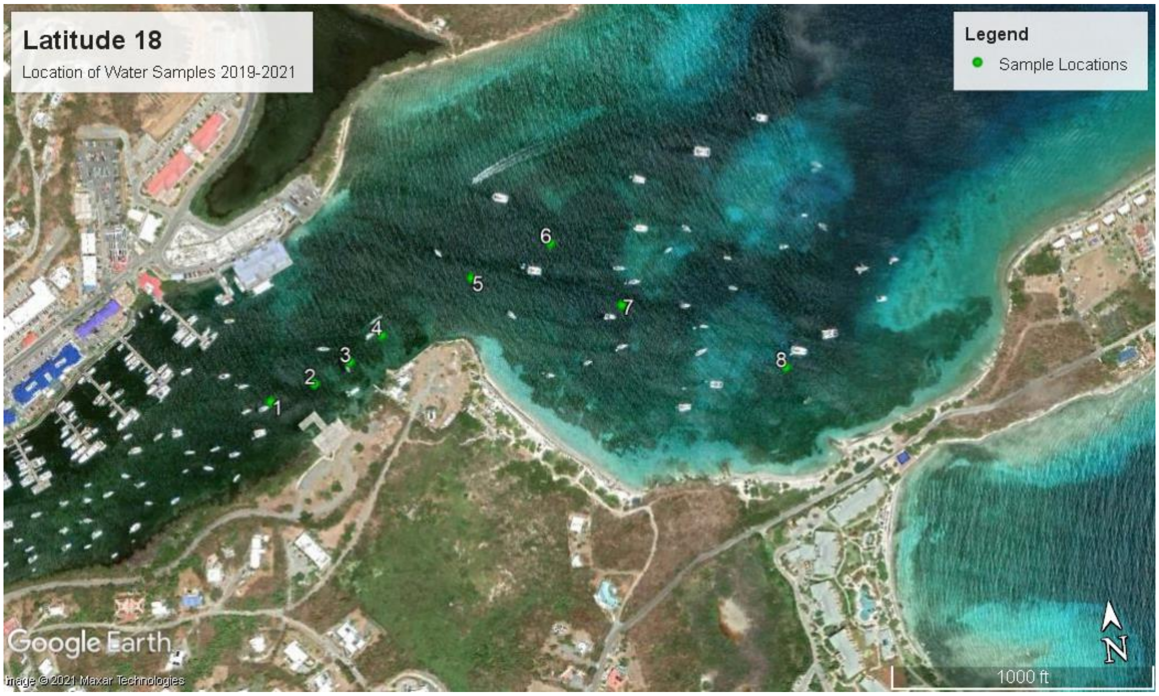


Figure 6.05.3 Location of samples taken between 2019 and 2021

		Turbidity NTU														
Station	Location	5/13/2019	6/15/2019	8/22/2019	9/19/2019	10/22/2019	12/5/2019	3/17/2020	5/15/2020	8/20/2020	11/1/2020	12/3/2020	1/14/2021	2/20/2021	3/17/2021	4/19/2021
1	18.324763°-64.849718°	2.11	3.26	5.6	2.99	1.77	2.16	2.76	6.78	3.32	0.98	1.23	2.09	1.12	2.14	0.78
2	18.324904°-64.849217°	1.12	0.87	2.13	1.23	1.18	1.43	1.09	2.76	2.14	0.47	0.98	1.34	0.87	1.16	0.87
3	18.325089°-64.848813°	1.08	0.67	1.78	1.01	0.97	0.88	1.25	2.34	2.03	0.46	0.99	0.86	0.78	1.43	0.67
4	18.325330°-64.848435°	0.86	0.56	2.08	0.94	0.89	1.1	0.98	0.88	2.09	0.68	1.02	0.67	0.78	1.34	0.87
5	18.325815°-64.847384°	0.82	0.65	1.59	0.96	1.11	0.92	0.65	0.67	1.34	0.73	0.78	0.56	0.67	85	0.81
6	18.326089°-64.846486°												0.77	0.62	0.54	0.76
7	18.325368°-64.845776°												0.81	0.31	0.56	0.81
8	18.324541°-64.844065°												0.65	0.78	0.45	0.51

		Dissolve Oxygen mg/l														
Station	Location	5/13/2019	6/15/2019	8/22/2019	9/19/2019	10/22/2019	12/5/2019	3/17/2020	5/15/2020	8/20/2020	11/1/2020	12/3/2020	1/14/2021	2/20/2021	3/17/2021	4/19/2021
1	18.324763°-64.849718°	4.66	3.31	4.13	5.12	3.54	4.41	5.11	4.98	4.63	5.56	5.37	4.61	3.21	4.11	4.89
2	18.324904°-64.849217°	6.49	5.26	5.26	4.63	6.43	6.66	6.38	6.18	5.99	6.09	6.06	6.06	4.79	3.60	5.18
3	18.325089°-64.848813°	6.46	6.06	6.06	4.56	6.45	6.70	6.29	6.05	6.11	6.21	6.32	6.32	2.32	5.46	5.97
4	18.325330°-64.848435°	4.31	6.32	6.32	5.33	5.67	5.20	6.55	6.00	6.12	6.19	6.85	6.85	6.59	4.84	5.74
5	18.325815°-64.847384°	4.10	6.85	6.85	5.26	5.78	5.29	6.51	5.86	6.14	6.06	6.45	7.11	6.72	4.58	5.68
6	18.326089°-64.846486°												6.11	6.21	6.12	5.78
7	18.325368°-64.845776°												6.04	6.09	6.23	6.01
8	18.324541°-64.844065°												5.99	6.07	6.00	6.03

		pH														
Station	Location	5/13/2019	6/15/2019	8/22/2019	9/19/2019	10/22/2019	12/5/2019	3/17/2020	5/15/2020	8/20/2020	11/1/2020	12/3/2020	1/14/2021	2/20/2021	3/17/2021	4/19/2021
1	18.324763°-64.849718°	8.34	8.20	8.39	8.31	8.38	8.37	8.11	8.37	8.33	8.40	8.38	8.36	8.33	8.29	8.37
2	18.324904°-64.849217°	8.20	8.33	8.39	8.31	8.35	8.40	8.29	8.34	8.31	8.36	8.38	8.31	8.31	8.26	8.37
3	18.325089°-64.848813°	8.39	8.34	8.30	8.35	8.35	8.37	8.26	8.33	8.34	8.31	8.38	8.33	8.34	8.23	8.40
4	18.325330°-64.848435°	8.38	8.33	8.30	8.35	8.28	8.40	8.23	8.25	8.38	8.33	8.40	8.33	8.38	8.33	8.37
5	18.325815°-64.847384°	8.25	8.33	8.40	8.38	8.26	8.40	8.33	8.25	8.40	8.33	8.37	8.38	8.40	8.37	8.40
6	18.326089°-64.846486°												8.38	8.40	8.34	8.40
7	18.325368°-64.845776°												8.38	8.36	8.33	8.11
8	18.324541°-64.844065°												8.40	8.31	8.25	8.29

Table 6.05.1 Water samples taken in the vicinity of the dock and mooring field between 2019 and 2021.

Location	Date	Turbidity	Dissolve Oxygen
18.324225°-64.837556°	8/15/2020	0.91 NTU	6.21mg/l
18.324225°-64.837556°	9/5/2020	0.76 NTU	5.99mg/l
18.324225°-64.837556°	9/12/2020	0.49 NTU	6.18mg/l
18.324225°-64.837556°	10/1/2020	0.68 NTU	6.32mg/l
18.324225°-64.837556°	11/3/2020	0.71 NTU	6.43mg/l
18.324225°-64.837556°	11/22/2020	0.47 NTU	6.17mg/l

Table 6.05.2 Water samples taken in dock footprint in 2020.

Existing conditions

Existing water quality in Vessup Bay is poor and it is listed as Impaired Waters under CWA Section 303(d).

Water exchange is very weak and highly dependent on wind conditions to force circulation and improve mixing, as tidal flows are extremely low.

Based on the calibrated circulation model implemented by ATM for Vessup Bay, water exchange under average wind conditions is less than 75% in 10 days. Exchange improves to 90% in 9 days for the high wind conditions but decreases to 40% in 10 days for low wind conditions.

In addition to poor circulation, Vessup Bay receives pollutant discharges, including a public WWTP and has no enforceable management of discharges by many of the boats anchored in the bay.

Water circulation improves in Mueller Bay due to increased mixing and better circulation given the larger water body and positive influence of wind-driven mixing.

The marina location in Vessup point is in the transition between the poorly flushed Vessup Bay and the better-mixed waters of Muller Bay.

The change in water quality is visible in the data collected overtime across the site. Turbidities are higher farther into Vessup Bay and dissolved oxygen is lower. Water quality shifts across the site with the changing tides.

IMPACT OF PROPOSED PROJECT

During construction, the seafloor will be disturbed through the cleanup of debris, removal of existing pilings, and then by the dredging, de-watering and pile driving. A water quality plan will be implemented monitor control devices, and water quality and to ensure control features remain in good repair and that additional measures are added or implemented as necessary to maintain ambient water quality.

If properly executed there should be minimal impact to marine water quality.

A specific flushing study was conducted to determine the project design that will cause no negative impact to circulation in Vessup Bay. In addition to showing no negative impact, the proposed mooring field management includes the installation of a sewage pump out station and the enforcement of no-discharge requirements within the mooring field, which should improve water quality in Vessup Bay.

6.06 MARINE RESOURCES

Benthic Habitat Description
General

The project site lies within Red Hook Bay at the intersection of Vessup and Mueller Bay, due to the differences of exposure, circulation and use the water quality to the north of the project site is extremely different that the water quality to the east. Vessup Bay is a very narrow bay which extends just under 0.5miles inland and is only 0.1mile at its widest. The discharge from the Vessup Bay WWTP is located at the very head of Vessup Bay. Vessup Bay is a heavily used for marine uses, with marinas and docks and the Red Hook Marine Terminal is located immediately across the bay from the project site. The Terminal includes the landing and facility for ferries transiting to St. John and the British Virgin Islands and the landing for car ferries from the island of St. John. Over the last few years Vessup Bay has been significantly impacted by *Sargassum* further impacting the water quality.

At the project site Red Hook Bay opens to 0.34 mile in with and Mueller Bay is located to the east and has significantly more flushing than Vessup Bay and has significantly improved water quality. During surveys, the turbid plume from Vessup Bay was observed moving into or out of the marina area.

Vessup Bay is mangrove lined on the southern shoreline and while the bay used to have relatively large *Thalassia testudinum* and *Syringodium filiforme* beds the bay bottom is now dominated by the Halophila *stipulacea* and macro algae. Only small, scattered seagrass beds remain. Very few corals are found on hard substrates within Vessup Bay, on the VIPA terminal across the bay there are a very few small *Diploria strigosa, S. siderea, S. radians* and *D. labyrinthiformis* on the pilings.

Offshore bay supports seagrass beds composed of *Thalassia testudinum, Syringodium filiforme, Halodule beaudettei*, *Halophila decipiens* and more recently *Halophila stipulacea*. There are ESA listed coral species which occur on the reefs that fringe each side of the bay and the rocky promontories at Redhook Bay's entrance.

Methods

The area was surveyed on both SCUBA. Mooring locations and corals were located by GPS and were mapped to assist in locating the proposed dock. Species were identified to species within the project area.

The NOAA NOS Benthic habitat map, depicts. This is an accurate description of the benthic habitats within the area. The NOAA NOS map is provided below followed by a benthic habitat map. Inner Vessup Bay is shown as mud with small areas of seagrass along the sides of the bay. The inner harbor is heavily algal colonized, and there is sparse seagrass along the edges. The area immediately off the marina site is shown as sand. This area is colonized by scattered algae and *H. stipulacea.* The NOS map shows seagrass 70-90% offshore, this area is more in the order of 30-40% and this area is highly impacted by *H. stipulacea*, anchors, ropes, and debris. The NOS map shows seagrass continuous along the eastern shoreline, again the seagrass is closer to 50%. The map shows an area of dredging in the bay which shows in the historic aerials shown in Section 6.02.

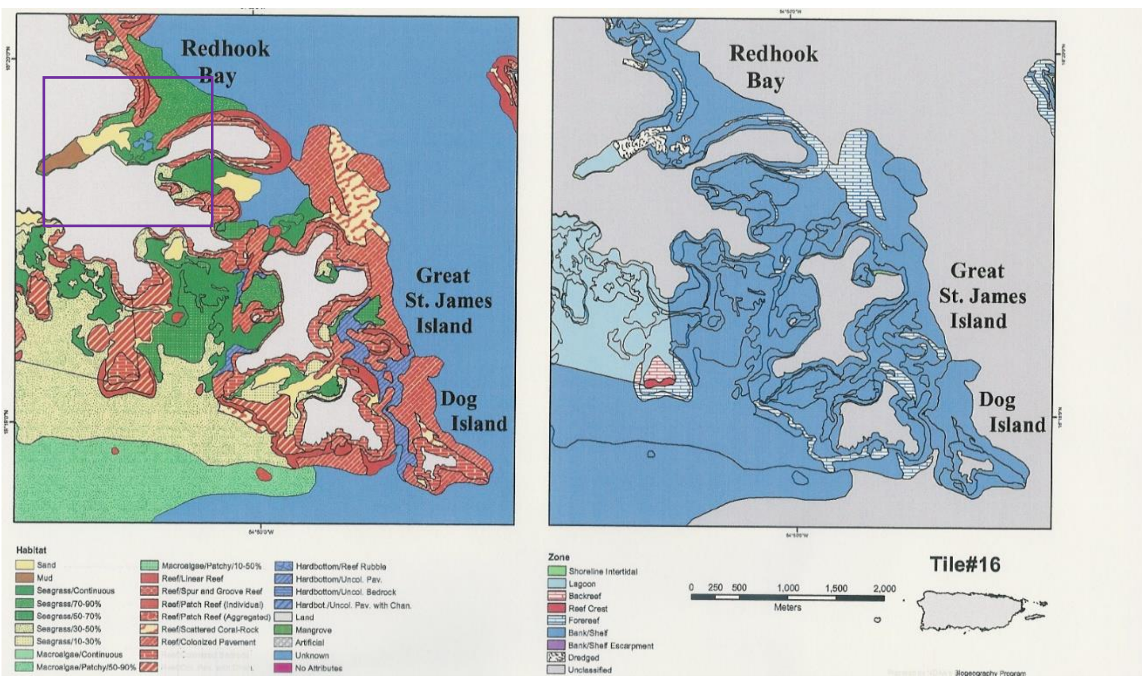


Figure 6.06.1. NOS Benthic Habitat Map Tile 16. Great Bay is shown within the blue box, and the project site is indicated by the red star.

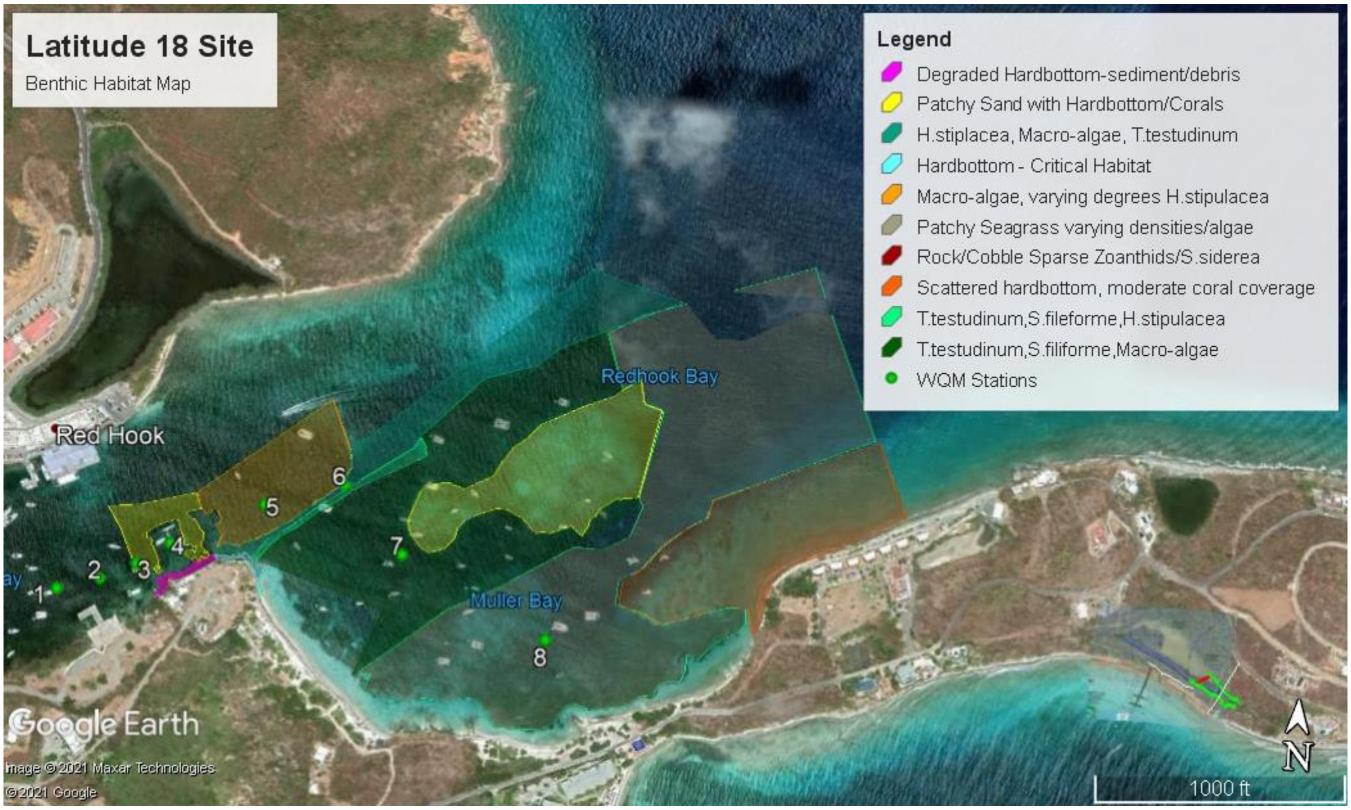


Figure 6.06.2 Benthic Habitat in the marina area

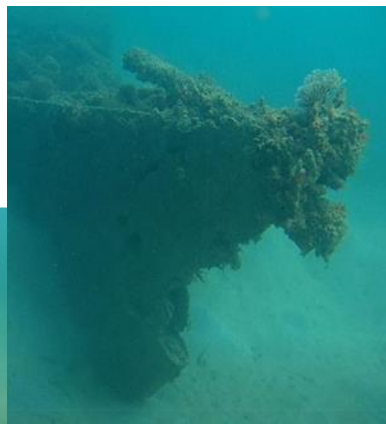
Vessup Bay

The project area is significantly impacted by the activities which occur within the bay, the boating, the marine vessel discharges, the debris from vessels, the suspension of vessels from propwash and vessels grounding and resuspending sediments and impacting bottom sediments and colonization. The area is also subject to high nutrients from the WWTP effluent discharge. There are however impacts that are the result of natural phenomena, not just the hurricanes, but the accumulation of Sargassum weed in the head of the bay. The weed accumulates blocking light to benthic organism and then later settles on them as the algae losses its floats and slowly sinks. All the shallows of the very inner bay have been impacted by the Sargassum.

In the areas shallower than 1' algae is the most abundant colonizer and *Enteromorpha flexuosa*, *Chaetomorpha sp.*, *Neomeris annulata, Laurencia, Avrainvillea nigricans, Penicillus capitatus, Caulerpa*, *Acetabularia*, *Hypnea*, *Dictoya, Wrangelia,* and *Halimeda* are all present. *Caulerpa spp.* are probably the most abundant. These are scattered amid exposed patches of mud and areas of disturbance. *Halophila stipulacea* has become the most abundant deeper than 1' and covers larger areas than the algae did in shallower water. There are large uncolonized areas, many of which look as though they were the result of vessel activities. There are scattered pieces of debris and broken limbs throughout the Vessup bay. Near the fringing mangrove there are patches of *Thalassia testudinum*.

Marina Footprint and Wave Attenuator

The marina area is impacted by water quality and by the heavy marine activity which has occurred in the area overtime. Offshore around the eastern portion of the old marina the area is a mix of sand and *H. stipulacea*. The pilings and debris which remain in the area are heavily algal colonized with sparse sponge colonization. The stone bulkhead is heavily algal colonized with very sparse corals, palythoas and sponges which are found on bulkhead and stones which have been broken loose from the wall. *Siderastrea siderea*, *Pseudodiploria strigosa*, *Zoanthus puchellus* and *Palythoa caribbaeorum* are found on the bulkhead and loose rocks. Millepora alcicornis is found on some of the larger debris and on some of the cables. *Monanchora unguifera*, *Desmapsamma anchorata*, and *Spirastrella spp*. are found on debris and pilings. *Caulerpa, Cladophora, Cladosiphon occidentalis Acanthophora, Penicillus, Halimeda, Dictyota, Laurencia, Hypnea* and *Cheatomorpha* are all present within the marina footprint.


The seafloor is a mix of uncolonized sand, *Halophila stipulacea*, and scattered *Halimeda opuntia*, *Udotea flabellum* and *Penicillus capitatus*.



The sponges and corals represent less than 1% of the total bottom cover within the marina area.



Moving to the east there are scattered patches of *algae* amid denser *H. stipulacea*. Moving to the south around the point there is a mix *of Thalassia testudinum* and *H. stipulacea*.

Mooring field and Surrounding Area

There are vast seagrass beds within Muller Bay. The composition and densities of these beds vary with depth and disturbance. The seagrasses *Thalassia testudinum* is intermixed with *Syringodium filiforme* and a minimal amount *Halodule wrightii* can be found. There are some isolate areas where Syringodium is the dominant grass and others where *Thalassia* is the dominant grass. The invasive seagrass is most abundant to the north nearest the channel, but small areas of *H. stipulaceae* were found in the seagrass beds to the south.   Found within these beds and within blowout areas are the algae *Caulerpa, Cladophora, Cladosiphon occidentalis Acanthophora, Penicillus, Halimeda, Dictyota, Laurencia, Hypnea* and *Cheatomorpha*.   In the outer bay, the seagrass cover ranges between 20 to 100% per meter squared and have blade densities of 17 to 444 blades per m*2*. In the inner bay the coverage is lower due to impact by mooring and anchoring vessels and the maximum coverage is between 30-40%. *Thalassia* is more prevalent in the shallower areas and *Syringodium* dominates at depth.

Towards the east there becomes a mixture of coral colonized cobbles and exposed broken pavement in the grass beds and *Orbicella spp*. and *Porites astreoides* are common.

Within Muller Bay there are areas of dense *Thalassia testudinum* colonization often mixed with *Syringodium filiforme* and areas of dense colonization by invasive *Halophila stipulacea*. Green algae (*Halimeda spp., Udotea spp., Penicillus capitatus*) abundant in seagrass. *Dictyota pulchella* abundant in bushy tangled clumps among seagrass and green algae species.

The algae makes up as much as 50% of the bottom cover in some areas. Seagrass abundance varies from *T. testudinum* to *S. filiforme* as the most abundant.

Debris is found throughout the seagrass and algal beds. There are sunked boats, and pieces of upland debris.

There are several sunken vessels, dinghies and even a historic anchor which someone was using as a mooring.

There are large scars that are the result of moorings. These are the result of mooring ropes dragging on the bottom. Some of the areas are recolonizing with algae and *H. stipulacea*.

Some moorings use large rocks, other have three-point moorings which are resulting in large scour areas.

Moving to the east the area becomes intermixed with rocks and cobbles, slowly becoming a mix of emergent pavement with sand channels.   At the edge of the pavement there are loose rocks which have scattered corals. As shown in the photograph there are scattered helix anchors which are scattered where they have pulled out of the shallow sand.

The more emergent rocks have been colonized by *Porites porites* and *Agarica agaricites. Orbicella faveolata* is present on scattered rocks and on the pavement to the east.

The largest corals are found on the pieces of rock which have the most vertical relief.

Corals and hard bottom become more abundant to the east. The moorings have been positioned to avoid all corals and all hardbottom areas.



Table 6.06 Species in the project area

Algae	Marina	Wave Attenuator	Mooring Site	Greater Area
Halimeda opuntia	X	X	X	X
Halimeda moline	X	X	X	X
Dictyota pulchella	X	X	X	X
Penicillus captitatus	X	X	X	X
Caulerpa mexicana	X	X	X	X
Laurencia papulosa	X	X	X	X
Galaxaura oblongata			X	X
Jania spp			X	X
Sargassum fluitans	XX		X	X
Halimeda copiosa			X	X
Ventricaria ventricosa			X	X
Wrangelia penicillata	X		X	X
Seagrass				
Thalassia testudinum		X	X	X
Syringodium filiforme		X	X	X
Halodule wrightii		X	X	X
Halophila stipulacea	X	X	X	X
Sponges				
Ircinia compana			X	X
Agelas confera			X	X
Aplysina cauliformis			X	X
Aplysina fulva			X	X
Aplysina insularis			X	X
Desmapsamma anchorata	X	X	X	X
Holopsamma helwigi	X	X	X	X

Neofibularia nolitangere			X	X
Xestospongia muta			X	X
Callispongia vaginalis			X	X
Cinachyrella kuekenthali	X		X	X
Ircinia strobilina	X		X	X
Niphates erecta			X	X
Verongula gigantea			X	X
Callyspongia plicifera			X	X
Monanchora unguifera	X		X	X
Spirastrella spp.	X		X	X
Corals				
Favia fragum			X	X
Siderastrea siderea	X		X	X
Siderastrea radians	X		X	X
Porites astreoides			X	X
Orbicella faveolata			X	X
Gorgonia ventalina			X	X
Meandrina meandrites			X	X
Montastrea cavernosa			X	X
Pseudeodiploria strigosa			X	X
Dichocoenia stokesi	X		X	X
Eusmilia fastiginia			X	X
Agaricia agaricites			X	X
Soft Corals				
Palythoa caribbaeorum	X			
Gorgonia flabellum			X	X
G. marina			X	X
Pseudoplexuara			X	X
Plexuara			X	X
Muricea			X	X
Invertebrates				
Echinometra ***lucunter***	X		X	X
Diadema antillerum	X		X	X

Impact of Construction and Mooring Installation

The construction of the marina expansion will impact the marine environment physically through the placement of piles and sheet piles and could impact water quality through siltation and turbidity during construction, dredging and de-watering of spoils. A water quality monitoring plan will be implemented to monitor control devices and to ensure repairs are made when necessary and additional measures are taken with installed devices are not effective.

The marina and wave attenuator will impact areas that are colonized by algae and *Halophila stipulacea*. The removal of the piling will result in the loss of encrusting sponges and the placement of the new sheetpile wall will impact 12 corals (*Psuedodiploria strigosa* and *Sidereastrea siderea*). The corals will be relocated as part of the mitigation for the project. The mitigation plan is found in Appendix D.

The marina will have a total of 302 pilings, 274 associated the dock structures, 12 mooring piles and 16 pilings associated with the travel lift. These will all disturb areas of algae and *H. stipulacea*. It is probable that each pile will disturb 1.5ft of seafloor due to wave turbulence.

As shown on Proposed Wave Attenuator drawing and the Section H Wave Attenuator drawings the floating breakwater would be installed with either helix anchors or concrete blocks (if helix anchors cannot be installed due to substrate, this should not be an issue, there are numerous helix anchors in the mooring field to the south of the channel). As shown in the benthic habitat map Figure 6.06.8 Benthic Habitat in the Marina Area, the wave attenuator is in an area of Macro-algae and varying degrees *H. stipulacea*. The attenuator is anchored with helix anchors will have a negligible impact during installation, if blocks are placed it will have at most 700ft (0.016 acre) of algal/*H. stipulacea* impact (footprint and turbulence impact). The lines used with be elastic mooring rodes and will have no impact on the seafloor.

The attenuator is 16’ in width and is in approximately 30’ of water and is oriented in a north south orientation which means that during the course of the day the shading of the attenuator will shift, and the area of shading would shift throughout the day and should have no impact on the algae and *H. stipulacea* which is scattered within the area. No seagrass or corals will be impacted by this structure.

The dock will be providing slips for 28 vessels many larger than vessels currently within the area. The marina is designed so that vessels should have adequate depth for maneuvering and there should be minimal suspended sediment. The marina will have fuel service and the system designed has secondary containment, double wall fuel lines and leak detection systems. The marina will have a Terminal Facility License and a Spill Prevention Containment Countermeasure Plan. Fuel supplies will be situated at the main docks as well as on the dinghy dock in the event of inadvertent spills. Fueling of dinghies on the dinghy dock or in the mooring field will be prohibited.

No discharge from vessels at the marina will be allowed and the marina will have a pump out facility.

The moorings have been sited to avoid all hardbottom and corals. Some of the mornings will be in areas of mixed seagrass, and in areas with *H. stipulacea* and algae. The moorings will utilize helix type anchors and floating lines so there will be minimal impact on seagrasses after the moorings are installed.

There may be some blade and rhizome lost during installation. Seagrass currently is thriving in the outer bay under vessels in the bay where ropes and anchors are not impacting the seafloor.

The implementation of the managed mooring field with proper moorings and the cleanup of the debris from the seafloor will allow for the recolonization of the damaged areas by sea grasses. Unfortunately, due to the presence of *H. stipulaceae* it may colonize many of the areas which are cleared or no longer swept by lines before *T. testudinum, S. filiforme* or *H. wrightii* can spread into the area.

Vessels are currently moored haphazardly through Vessup and Mueller Bay. Most have anchoring systems which are damaging the seafloor. Many of the vessels are live-a-boards who simply dump their waste straight into the sea. Some vessels have been allowed to sink on their moorings.

The introduction of a managed mooring field will not only stop many of the ongoing physically damaging things which are occurring, but it should help reduce the nutrient loading by providing pump out service and enforcing it in the managed mooring field.

	Disadvantages	**Advantages**
Comparison Existing Mooring/Anchoring Conditions vs Managed Mooring Field Mooring Buoys	• mooring buoys installed by individuals • different technical solutions / equipment – weights, engine blocks, rocks, anchors • boat anchors and anchorage chains and ropes dragging seabed • short term anchoring • vessels deploying multiple anchors • no moorings available for short-term rental	• Engineered mooring buoys professionally installed • elastic mooring lines that do not impact seabed • Mooring buoys installed and maintained by Management • Short and long-term users have the mooring buoy system available for rent
Water Space Use	• Mooring locations only approximately located • No control on anchoring locations • Limited and unreliable markers • Encroachment into navigation channel • Boats close to the public beach	• Mooring field area with offset to beaches (approximately 300ft) • Mooring field area with offset to navigation channels • Mooring field area markers and mooring buoys precisely located • Additional navigation channel markers • Prohibition to drop anchor • Enforcement by Management
Sewage and Waste Management	• No control of boat discharges • No control over repair activities • Detriment to water quality	• prohibition of discharge of sewage, bilge, oil or solid waste to the bay • sewage pump out • solid waste bins • proper disposal procedures for fluid and solid waste will be available through the marina • Management provides control and enforcement
Upland services	• Some services provided at American Yacht Harbor	• Dinghy docks professionally installed

		• Dinghy docks maintained and repaired by Management • Restrooms, showers, and laundry • Authorized access to land • Car and bike parking • WIFI

6.07 Terrestrial Resources

The site is highly disturbed, it encompasses the Latitude Marina which has been developed since the 1970's, the old wetland, which was filled in the 1960s, a boat rental area and a highly used beach. The site was almost complete disturbed in 1972. The only undisturbed area is immediately to the north of the access road.

By 1974 there was more development in the subject parcel, the approximate disturbance lines for the Latitude 18 development are shown in red.

The marina was landscaped at one time, but the landscape has been significantly impacted by storm events and is no longer maintained. There are seagrapes (*Cocoloba uvifera*) found along the shoreline and scattered throughout the property. A large Norfolk pine (*Araucaria heterophylla*) in the center of the open yard has died due to the hurricanes of 2017 and a West Indian Almond (*Terminalia catappa*) which is doing poorly. Coconut palms (*Cocos nucifera*) are found along the northern shoreline of the marina are. There are seaside maho (*Thespesia populnea*) intermixed with the seagrapes along the shoreline. Much of the marina site is either mown grass of compacted dirt or gravel. The area immediately around and around the buildings on the southeastern side of the property are overgrown with tan-tan (*Leucaena leucocephala*).

Beach Area/Littoral Woodland

There is a fence separating the marina from the beach area to the southeast. The fence line is overgrown with seaside maho, seagrapes and capers (*Capparis indica*). The boat rental place which is only open on the weekend, has Hobi cats, kayaks, and small sail boats. Amid the trailers are extremely large seaside maho. There are also scattered seagrapes and coconut palms amid the trailers. The area becomes more forested to the west between the trailers and a beach access road and there are several marble trees, (*Cassine xylocarpa*) and a *Jacquinia arborea*, and very dense seaside maho.   The beach extends to the southeast and there is a dirt roadway and then parking areas scattered between large seaside maho, seagrapes and scattered coconut trees.   Scattered amid the parking areas and the trees were small patches of seaside lavender (*Argusia gnaphalodes*), beach peavine, and *Cakile lanceolata.*

Inland behind the littoral woodland is the old filled wetland. Buttonwood mangroves (*Conocarpus erectus*) are found scattered within the area, some are quite large and extend above the surrounding canopy which is primarily tantan (*Leucaena leucocephala*)*, Solanum sp,* crotons (*Croton* spp), sages (*Lantana* spp), smaller buttonwoods, widely scattered small casha (*Acacia tortuosa*), large *Acacia maracantha*, small *Cocoloba microstachya.* Vines are common in the old wetland including lizard food (Momordica charantia) and beach peavine (*Canavalia rosea*).

Along the roadway into the existing marina and scattered throughout the wooded area in from the road and the dirt track to the beach are caper capers (Capparis cynophallophora, Capparis flexuosa, Capparis indica).   Spanish bayonet (*Yucca aloifolia*) is common along the roadway and into the edge of the old wetland presumably having been dumped as landscaping debris as well as cactus (*Opuntia dillenii*). Turpinetine trees (*Bursera simaruba*) are found on the fence line of the existing marina and along the roadway. Wild cotton (*Gossypium hirsutum*) is found both along the roadside and in the old wetland area.

The following table lists plant species noted during the terrestrial surveys.
Table 6.07.1

SPECIES	Marina	Beach	Filled Wetland	Roadside
Acacia maracantha			x	
Acacia tortuosa			x	x
Adenanthera pavonina	x			
Araucaria heterophylla				
Argusia gnaphalodes			x	
Bursera simaruba	x		x	x
Cakile lanceolata	x	x	x	x
Canavalia rosea		x	x	
Capparis cynophallophora	x		x	x
Capparis flexuosa			x	
Capparis indica	x		x	x
Cassine xylocarpa		x	x	
Cenchrus incertus	x	x		
Chrysobalanus icaco		x	x	
Citharexylum fruticosum			x	

Coccoloba uvifera	x	x	x	x
Cocoloba microstachya	x	x	x	
Conocarpus erectus	x	x	x	x
Croton betulinus			x	x
Croton discolor			x	
Distichlis spicata	x	x	x	
Erithalis fruticosa			x	x
Eugenia cordata			x	x
Eugenia sessiliflora			x	x
Euphorbia mesembrianthemifolia			x	
Gossypium hirsutum			x	x
Heliotropium curassaruium		x	x	
Ipomoea pes caprae		x		
Jacquinia arborea		x	x	
Jatropha gossypifolia		x	x	
Krugiodendron ferreum		x	x	
Lantana camara			x	x
Lantana invoucrata			x	
Leucaena leucocephala	x	x	x	x
Malpighia linearis			x	x
Momordica charantia			x	
Morinda citrifoli		x		
Opuntia dillenii				x
Pictetia aculeata			x	x
Pyschotria nervosa			x	
Sesuvium portulacastrum		x		
Solanum sp.			x	x
Sporobols virginicus	x	x	x	x
Stigmaphyllon emarginatum			x	
Terminalia catappa	x	x		
Thespesia populnea	x	x	x	
Yucca aloifolia	x			x

Fauna

Deer tracks were noted in the old wetland area. Birds seen on the property outside the cleared marina area include Zenaida dove (*Zenaida aurita*), common ground dove *(Columbina passerina)* and a gray kingbird (*Tyrannus dominicensis*).

Reptiles were abundant and tree anoles (*Anolis cristatellus*), grass anoles (*Anolis pulchellus*), barred anoles (*Anolis stratulus*), dwarf geckos (*Thecadactylus* sp), and common ground lizards (*Sphaerodactylus macrolepis*) were seen within the property boundaries. The St. Thomas tree boa (*Epicrates monensis granti*) is probably present but was not seen during the survey. The site is in its critical habitat.

Impact of Project

Most of the site has been previously disturbed in the past, approximately 95% of the site has been cleared as part of the previous marina development , the sand operation on the site or by the wetland filling more than 50 years ago. Approximately 1.38 Acres of that has been recolonized by opportunistic species and species which could tolerate the saline soils and the remainder has been recolonized by non-salt tolerant species.

The project will clear most of the site. This will be removing primarily tan-tan, buttonwoods, casha, seagrapes, and other species that recolonized the old salt pond area when it was filled. Nearer the shoreline and along the roadway to the existing marina ruin, seaside maho, turpentines, seagrapes, capers, wild cotton, and Spanish bayonets. Large trees will be preserved as part of the landscaping plan and tree boa corridor.

Once the project is complete approximately 1.223 acres of the site will be vegetated. A total of 0.579 acres of the site will become part of the drainage swells and will be set aside for preservation. Trees will be planted along the upper banks of the swells and within the pond where possible. Upon completion of the property 1.208 acres will be landscaped with native trees replanted to provide habitat to tree boas and other species. Approximately 0.7 acres or just over 10% of the site will be suitable tree boa habitat.

To maintain a consistent level of landscape quality year-round, there will be a need to utilize measured amount of fertilizer. Two major components of the plan are an Integrated Pest Management (IPM) program and a Nutrient Management Plan (NMP).

The total irrigation demand for the site will be approximately 7,000 gpd. The reuse water will be pumped through irrigation mains that will be used to supply the irrigation zones on site. The cistern can be supplemented by the potable water system through a valved connection to the site water main (as discussed in the above cistern section). To utilize all the effluent generated during periods of high usage, the irrigation system will be designed to water as much of the undeveloped site as necessary to dispose of the effluent.

The irrigation water will be pumped from the reuse cistern into a looped irrigation distribution system. The irrigation distribution will be controlled through a series of zones that will be set up to ensure that each area of the development does not receive too much or too little water. During times of rain and other times when the cistern becomes too full, the pumping system will pump the excess reuse water into undeveloped areas, or the cistern will overflow into the stormwater collection.

6.08 Wetlands

The U.S. Army Corps of Engineers defines wetlands as "those areas that are periodically inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, bogs, marshes and similar areas." (U.S. Army Corps of Engineers, 1986).

The area does contain an old filled saltpond/wetland system as shown in the 1954 aerial. These were filled like several wetlands systems in the late 1950s and through the 1960s. The area was filled with spoils pumped in from dredging the adjacent bay. To assess whether there were any remaining wetlands a delineation was conducted, and test augers were done throughout the site. No hydric soils were found within 36” of the surface and all subsoil material was sandy in nature. To confirm this assessment Jose Cedeno of the U.S. Army Corps of Engineers conducted a site visit and concurred with the findings.

Figure 6.08.1 There were wetlands throughout the site in 1954.

Figure 6.08.2 Comparing this 1972 aerial to the 1954 aerial you can clearly see the areas which were dredged.

During the archeological survey a backhoe was utilized to excavate to try to find the depth of the fill on the site and that study found approximate 5ft of sand fill over what were hydric soils, the tape in the picture below is extended 2 meters.

From the archeological report, “The dredged spoil was found to extend from the surface to depths varying between approximately 2 to over 3 meters below the surface. The dredged materials consisted entirely of sand with surprisingly little coral or shell. We observed only a few juvenile conch shells and fewer mature specimens in the dredged spoil. Some seabed rock was also contained in the dredge deposits.”

6.09 RARE AND ENDANGERED SPECIES

All three endangered sea turtle species are known to frequent the waters offshore of St. Thomas: Leatherback Sea turtles (*Dermochelys coriacea*), green sea turtles (*Chelonia mydas*) and hawksbill sea turtles (*Eretmochelys imbricata*). Both green and hawksbill turtles have been seen during the numerous surveys in Red Hook Bay over the last 30 years. The offshore seagrass beds and coral reefs are foraging habitats for these species. The site does have a suitable turtle nesting beach which faces Mueller Bay.

The hardbottom in the mooring field is critical habitat to listed coral species. O*rbicella faveolata* is found within the mooring.

The Nassau Grouper (*Epinephelus striatus*) was seen during surveys of the area. The grouper should not be adversely affected by the dock construction or mooring field installation.

A large Giant Manta Ray (*Manta birostris*) was seen offshore of the southside of Cabrita Point in 2000.

Scalloped Hammerhead (*Sphyma lewini*) and Oceanic Whitetip Shark (*Carcharhinus longimanus*) do not occur within the project area due to its location in Vessup Bay.

The endangered Antillean manatee (*Trichechus manatus manatus*) has recently been seen in the U.S. Virgin Islands after not being seen for many years. No manatees have been reported from this area.

Coastal waters and waters within the Virgin Islands are frequented by whales *(Megaptera novaeangliae, Balaenoptera physalus*) during winter for mating and birthing and dolphins (*Tursiops truncates*) are year-round residents. Dolphins have been frequently seen with Great Bay and whales are occasionally seen in Pillsbury Sound adjacent to Great Bay.

The property is within the designated critical habitat for the St. Thomas Tree Boa (*Epicrates monensis granti* recently reclassified as *Chilabothrus granti*), a federally listed rare and endangered species. Vegetation within the project footprint will be cleared by hand to limit impacts to the tree boas. A tree boa mitigation plan is found in Appendix E.

Table 6.09.1. ESA Threatened and Endangered Species Potentially Occurring in the Greater Project Area

Scientific Name	**Common Name**	**Status**
Acropora palmata	Elkhorn coral	T
Acropora cervicornis	Staghorn coral	T
Orbicella annularis	Lobbed Star coral	T
Orbicella faveolata	Mountainous star coral	T
Orbicella franksi	Boulder star coral,	
Dendrogyra cylindrus	Pillar coral	T
Mycetophyllia ferox	Rough Cactus Corals	T
Eretmochelys imbricata	Hawksbill sea turtle	E
Dermochelys coriacea	Leatherback sea turtle	E
Chelonia mydas	Green sea turtle	T
Caretta caretta	Loggerhead sea turtle	T
Trichechus manatus manatus	West Indian manatee	E
Megaptera novaeangliae	Humpback whale	E/D[2]
Balaenoptera physalus	Finback whale	E
Epinephelus striatus	Nassua grouper	T
Manta birostris	Giant Manta Ray	T
Sphyma lewini	Scalloped Hammerhead	T
Carcharhinus longimanus	Oceanic Whitetip Shark	T

Table 6.09.2 ESA Species Observed in the Action Area

	Morningstar Bay
Species	
ESA Listed	
Acropora palmata	
Acropora cervicornis	
Orbicella franski	
Orbicella annularis	
Orbicella faveolata	X
Mycetophyllia ferox	
Dendrogyra cylindrus	
Eretmochelys imbricata	X
Dermochelys coriacea	
Chelonia mydas	X
Caretta caretta	
Trichechus manatus manatus	
Megaptera novaeangliae	
Balaenoptera physalus	
Epinephelus striatus	X
Manta birostris	
Sphyma lewini	
Carcharhinus longimanus	

Table 6.09.3. Species managed by CFMC occurring in the nearshore area in the Virgin Islands.

Scientific Name	Common Name
Cnidarians	All corals
Strombus gigas	Queen conch
Panulirus argus	Spiny lobster
Epinephelus struiatus	Nassau grouper
E. guttatus	Red hind
E. fulvus	Coney
Ocyurus chrysurus	Yellowtail snapper
Lutjanus analis	Mutton snapper
L. apodus	Schoolmaster
L. gruiseus	Grey snapper
L. vivanus	Silk snapper
Chaetodon striatus	Butterflyfish
Holocentrus ascensionis	Squirrel fish
Haemulon plumieri	White grunt
Balistes vetula	Queen triggerfish
Malacanthus plumieri	Sandtilefish
Sparisoma chrysopterum	Redtail parrotfish
Lactophrys quadricornis	Trunkfish
-	Sharks and Tunas
-	Swordfish and Billfishes

Figure 6.09.1 Critical habitat near the marina.

Impact of Project

The project will have the potential to impact sea turtles, marine mammals, and fish during the driving of piles for the dock due to acoustic impacts and during vessel movements. Most of the piles should be able to be driven by a vibratory hammer. The use of an impact hammer will be minimized as such will create a minimal esonification of the area. As a part of the water quality monitoring plan monitors will monitoring for sea turtles prior to all pile driving to ensure that no sea turtles are within a 500m safety zone. If a sea turtle or marine mammal ventures into the safety zone work will stop until such time the sea turtle leaves the area of its own volition. Sea turtle monitoring is discussed in the Water Quality Monitoring Plan Appendix D.

In addition, the Standard Construction Conditions established for the sea turtles by the National Marine Fisheries Service and Vessel Strike Avoidance Measures and Reporting for Mariners will be implemented during the project construction and are attached for reference in Appendix E. This will also protect the West Indian Manatee (*Trichechus manatus*), while not usually present in the USVI, two have been seen in St. Croix in 2018.

The marine habitats around the proposed mooring field have coral and seagrass resources. There is an ESA listed corals species near the proposed mooring field. *Orbicella faveolata* are located within the proposed moorings. The closest ESA species is located 25ft from the closest mooring. The contractor will be made aware of the coral locations so that they can be avoided. The corals should not be impacted by dock construction or use.

Double turbidity barriers will be deployed, and water quality monitored will be conducted during all in water work. Turbidity barriers will not be opened or removed until interior water quality has settled to acceptable levels. Turbidity barriers will be removed or secured when not in use to limit impact to the surrounding benthos. If turbidity control is properly maintained and monitored the impacts should be minimal.

Vegetation within the project footprint will be cleared by hand to limit impacts to the tree boas. The tree boa mitigation plan is found in Appendix E. The berms and portions of the basin for the stormwater basin will be planted with trees to provide additional habitat for tree boas. A corridor with interdigitation will be planted along the southern border of the property, upon completion of the project approximately 0.7acres or approximately 10% of the project area will be suitable tree boa habitat and the sediment pond and surrounding area will be preserved as boa habitat.

6.10 Air Quality

All of St. John and St. Thomas is designated Class II by the Environmental Protection Agency in compliance with National Ambient Air Quality Standards. In Class II air quality regions, the following air pollutants are regulated: open burning, visible air
contaminants, particulate matter emissions, volatile petroleum products, sulfur compounds, and internal combustion engine exhaust (Virgin Islands Code Rules and Regulations).

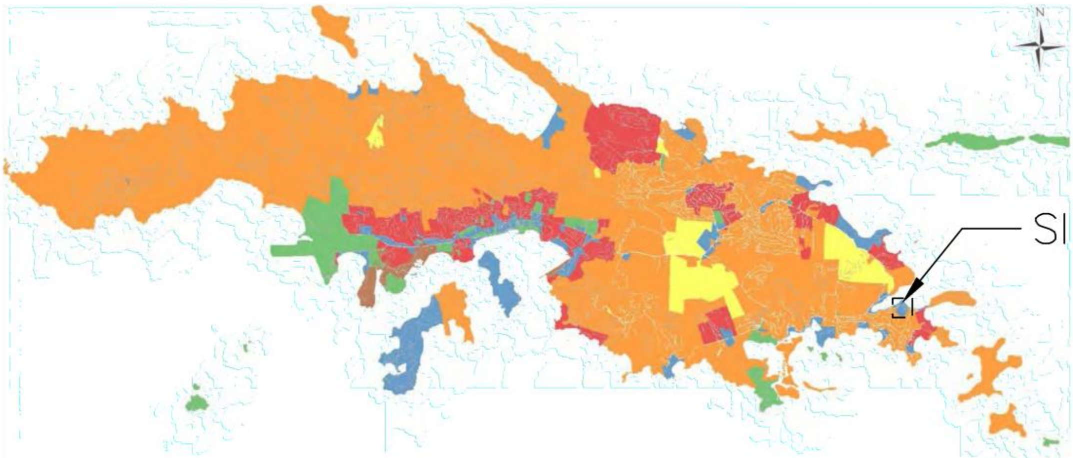
There will be a slight increase in air emissions during the use of heavy equipment for pile socketing/vibra-hammering. Once the dock is completed, air quality will be impacted by the periodic vessel visitations. The dock will have a negligible impact on air quality.

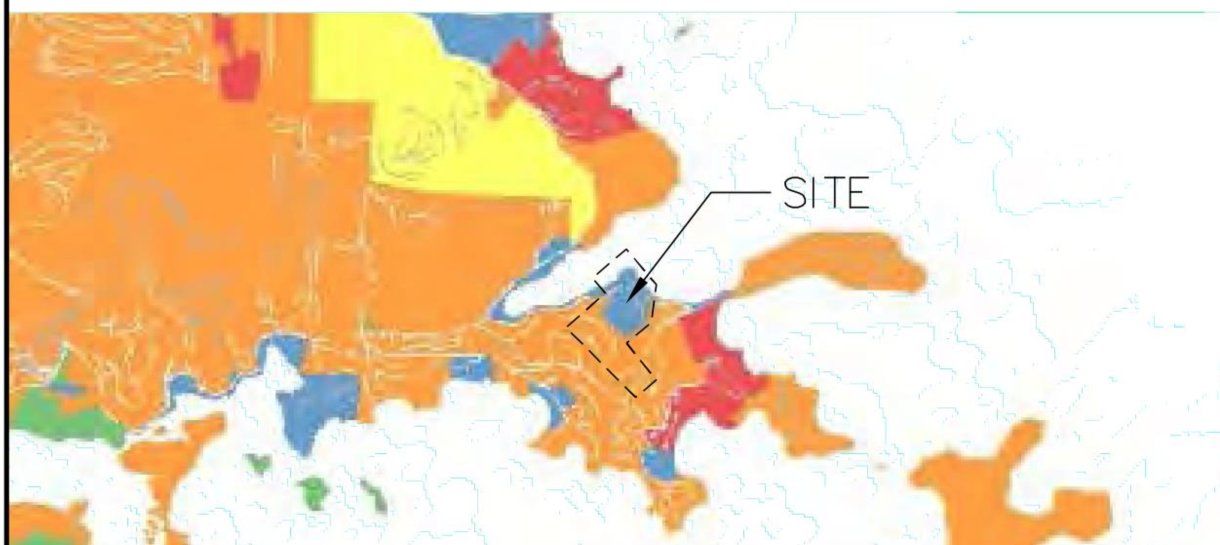
7.00 IMPACTS ON THE HUMAN ENVIRONMENT
7.01 Land and Water Use Plans

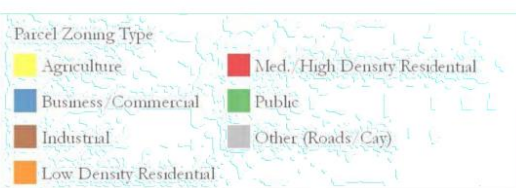
The property is zoned W-1, Waterfront – Pleasure Zone. The project components are allowed as a Right-of-Use;

“20. Dwellings, 27. Marinas (Recreational Marine Crafts), Charter & Rentals, Boat Access Sites, Boathouses (Storage), 40. Restaurants, 42. Sewage Lift & Pressure Control Station, and 43. Sewage Treatment Plants. Uses permitted subject to the conditions set forth in sections 231 and 232 of Chapter 3. Virgin Islands Zoning and Subdivision Law: 1. Apartment Houses, Hotels and Guesthouses (Dwelling, Multi-Family). Accessory uses permitted subject to the conditions set forth in section 233 of Chapter 3. Virgin Islands Zoning and Subdivision Law: 1. Accessory Buildings (Structures).”

A specific flushing study was conducted to determine the project design that will cause no negative impact to circulation in Vessup Bay. In addition to showing no negative impact, the proposed mooring field management includes the installation of a sewage pump out station and the enforcement of no-discharge requirements within the mooring field, which should improve water quality in Vessup Bay.







HARRIS
Harris Civil Engineers, LLC
1200 Hillcrest Street
Suite 200
Orlando, Florida 32803

LATITUDE 18
OFFICIAL ZONING MAP
REFERENCE: SECTION 5.02

SECTION
7.01.1

7.02 Visual Impact

The proposed project will be a substantial improvement visually on the existing property. Presently, the Latitude 18 development consists of a wood framed ruin damaged from Hurricanes Irma and Maria in 2017. The existing marina layout has also been severely damaged over the past 25 years by the major hurricanes starting with Hurricane Marilyn in 1995 and culminating with Hurricanes Irma and Maria. The proposed wet slip Marina will for the most part be aligned with the layout of the original Latitude 18 Marina. The Restaurant & Marina Services Building is the cornerstone of the upland development. it is located on the Northeast Promontory of the site. This location forms the southern entry point to Red Hook Bay. The overall structure will be one and a half stories in height with a total square footage of approximately 10,000 SF. The Warehouse Building will be 10,000 SF in size. It will be a single-story structure that will contain storge of materials and supplies related to the operation of the Marina. The axonometric views shown below provide a visual representation of the project once complete.

Figure 7.02.1 The Restaurant and Marina Services Building

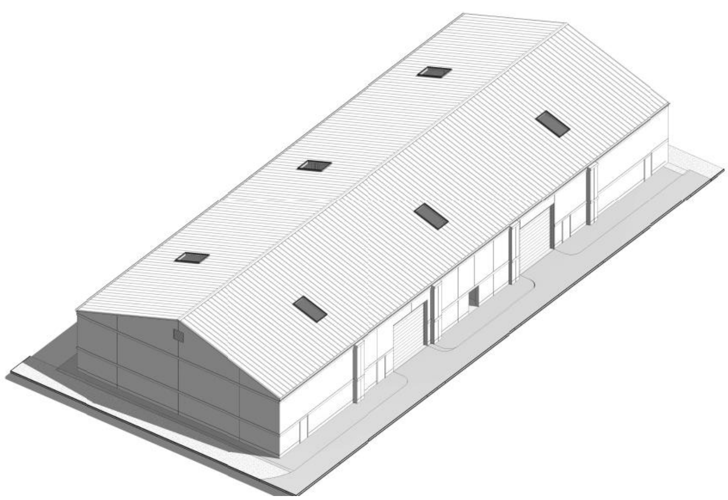


Figure 7.02.2 Axonometric Warehouse Building View

As such, the visual impact of the new Marina will be like that of the historic layout. The managed morning field will not substantially increase the number of vessels within the bay but will have a very positive impact visually on water quality.

7.03 Impact on Public Services

7.03a Water

The potable water for the site will be supplied via water trucks. The water will be stored in a potable &fire water cistern located within the back of house area underneath the warehouse building. It will be pumped into the on-site distribution system which has been sized to adequately handle the fire demand and the maximum daily demand for the site.

A potable water connection will also be provided to the reuse cistern. This connection is meant to provide supplemental irrigation volume in the scenario that the reuse cistern runs empty.

In severe cases where the potable water volume of the cistern would be low, water would be trucked in from a local distributor.

Demands

The potable water system has been designed to meet the demands for all of the site usages. These elements include a marina facility with retail shops, restaurants & bars, recreational areas, a BOH support building, and miscellaneous usages. Table 7.03-1 is a breakdown of the total demands.

Label	Usage	Units	Unit Flow Rates	Total Flow Rates	Notes
A	Marina Facilities & Retail	2,734 Ft^2 Bld.	0.25 gal/day/Ft^2	684 gal/day	
B	Restautant & Bar	140 Seats	25 gal/day/Seat	3,500 gal/day	Seats
C	Back of House & Support	9,650 Ft^2 Bld.	0.25 gal/day/Ft^2	2,413 gal/day	
D	External Areas & Parking	4,500 Ft^2	0.15 gal/day/Ft^2	675 gal/day	
E	Marina Slips(1)	28 Slips	500 gal/day/Slip	14,000 gal/day	Slips
	TOTAL AVERAGE DAILY FLOW			21,271 **gal/day**	
	MAX DAY FLOW (ADF x 2)			**42,542 gal/day**	
	PEAKING FACTOR			2.5	
	PEAK FLOW RATE			**36.9 gpm**	

Notes:
(1) Actual count varies depending on operational decisions

Table 7.03-1: Summary of Potable Water Demands

The fire demand for the site is the sum of the fire hydrant and sprinkler demands and is based on the site plan in conjunction with the ISO method for required fire flow. The fire hydrant demand will be approximately 1,000 gpm for two (2) hours

Potable & Fire Water Cistern

The total minimum volume of the final potable water cistern will be equal to three days of full project (after build-out) average daily flow plus a volume equal to the amount of fire sprinkler and hydrant demand required to fight a single building fire. The total anticipated potable cistern volume required is approximately 186,000 gallons (21,271 GPD system average daily demand times three, days plus 120,000 gal for fire flow requirements [rounded up]).

A 186,000-gallon potable water cistern will be constructed in the BOH area. This cistern will be the reservoir for the potable water demands for plus fire demands. A water supply main with a backflow preventer assembly will be constructed from the cistern to the site distribution system.

Table 7.03-2: Potable & Fire Water Cistern Sizing

Potable & Fire Water Cistern Size		
Three (3) Day Potable Water Storage Volume	63,813	gal
Fire Flow Volume (1000 gpm @ 2hr)	120,000	gal
Total Potable/Fire Cistern Storage Volume	**183,813**	**gal**

Potable & Fire Water Cistern Dimensions		
Required Volume	183,813	gal
Required Volume	24,574	cubic feet
Height	8	feet
Length	60	feet
Width	52	feet
Provided Volume	**186,701**	**gal**
Provided Volume	**24,960**	**cubic feet**

The total roof area for the project at build-out will be approximately 15,780 SF. The following table is a breakdown of preliminary roof areas.

Table 7.03-3: Summary of Building Roof Areas

Label	Usage	Gross Area (SF)	Gross Area (Acres)
A	Marina Facilities & Retail	6,180	0.14
B	Back of House & Support (1)	9,600	0.22
	TOTAL	**15,780**	**0.36**

Notes:
(1) Roof area discharged directly into irrigation cistern below the building.

The supply water from the BOH building roof runoff will enter the reuse water cistern and will be pumped throughout the site reuse water distribution system.

Potable Water Distribution System

The potable water will be pumped from the cistern into a common potable water and fire suppression distribution system.

The pumping system will include four pumps. A small (jockey pump) will maintain the system pressure during the low flow periods during the day. When the demand increases beyond the capabilities of the jockey pump, a larger potable water pump will become operable. The fire pumping system will have separate pumps from the potable supply pumps. This system will include two pumps (one for redundancy) as well as separate and backup power supplies.

As an alternative to the two-pump potable system, a variable frequency drive control could be used with a single potable pump. The pumps will be manifolded into common suction and discharge headers. The pump manifolding system will be designed so that future pumps may be added to the system if future site development demands it. Cistern level controls will be set to ensure that there is always adequate fire volume in the potable water cistern.

The water main distribution system will be looped around the development. It has been sized to provide adequate pressure during a period of maximum day flow (two times the average daily flow) plus the fire demand (1,000gpm). At each point of connection with the buildings, the potable water will pass through a reduced pressure backflow prevention device. The backflow prevention devices are necessary to prevent possible contamination of the site's potable water distribution system from chemicals and/or stale water present in the fire system.

The water main system will be complete with properly located fire hydrants.

7.03b Sewage Treatment and Disposal

The wastewater generated on-site will exit the buildings via 6" sanitary laterals and flow into a gravity sewer/manhole collection system. This gravity system will discharge to a sanitary lift station located within a screened back of house area. The lift station will pump into a force main which will discharge into the headworks of the proposed Wastewater Treatment Plant (WWTP).

The WWTP will consist of the headworks (meter and mechanical bar screen), an equalization tank, an aeration basin, a clarifier or membrane chamber tank, a chlorinating basin, and a sludge bagger. The waste sludge will be stored in the clarifier or membrane chamber tanks until it is be pumped and hauled off-site to be disposed of according to environmental regulations.

The treated effluent from the WWTP will flow to the reuse water cistern. From there, the reuse water will be pumped into the site's irrigation mains, and it will be used as a primary source of water supply for the landscaping. During the rainy season, the effluent may be sprayed into the remaining undeveloped land to keep the cistern from overflowing. Additionally, there will be overflow drainage pipes to discharge excess irrigation water volume into the stormwater system.

Demands

The wastewater system has been designed to meet the overall flows for all of the site usages. These elements include a marina facility with retail shops, restaurants & bars, recreational areas, a back of house support building, and miscellaneous usages. Table 7.03-3 is a breakdown of the total flows.

Table 7.03-4: Summary of Wastewater Flows

Label	Usage	Units	Unit Flow Rates	Total Flow Rates	Notes
A	Marina Facilities & Retail	2,734 Ft^2 Bld.	0.21 gal/day/Ft^2	574 gal/day	
B	Restautant & Bar	140 Seats	21 gal/day/Seat	2,940 gal/day	Seats
C	Back of House & Support	9,650 Ft^2 Bld.	0.21 gal/day/Ft^2	2,027 gal/day	
D	External Areas & Parking	4,500 Ft^2	0.12 gal/day/Ft^2	540 gal/day	
E	Marina Slips(1)	28 Slips	250 gal/day/Slip	7,000 gal/day	Slips
	TOTAL AVERAGE DAILY FLOW			**13,081 gal/day**	
	PEAKING FACTOR			2.5	
	PEAK FLOW RATE			**22.7 gpm**	

Notes:
(1) Actual count varies depending on operational decisions

Collection System

The wastewater generated on-site will exit the buildings via 6" sanitary sewer gravity laterals and flow into a pumped lift station collection system. This building lift station will discharge to a master sanitary lift station located within a screened back of house area. The master lift station will pump sewage through a force main which will discharge into the headworks of the proposed Wastewater Treatment Plant (WWTP).

Each of the restaurant facilities will be equipped with a grease trap (if applicable). The grease traps will be designed to guard against grease and other oils, which may be harmful to the collection system and the WWTP.

Wastewater Treatment Plant

Prior to the start of operations for any portion of the site, a WWTP will be constructed and functional. The proposed WWTP will be a conventional extended air activated sludge process or a membrane technology plant. It will consist of a flow meter, mechanical bar screen, an equalization tank, an aeration basin and a clarifier or membrane tank, and a chlorinating basin. The plant will be built to accommodate flows from the project and will have the capability to be easily upgraded if needed in the future. The plant will be located in the designated back of house area.

The WWTP will produce approximately 6 lbs. of sludge production per day. Prior to sludge thickening the daily wasting rate will be approximately 142 GPD (assuming 1% solids) and 29 GPD after sludge thickening (assuming 5% solids) (if available).

Sludge Disposal

Based on recent experience working on similar projects in the USVI, the sludge can be disposed at the local WWTP, landfill or other environmentally approved methods.. The waste sludge produced will be stored for 30 days, tested for compliance with 40 CFR 503.32 (1000 Most Probable Number (MPN) per gram of total dry solids for coliform density and 3 MPN for salmonella). Each month a random sample from the waste sludge that is to be hauled will be tested and, after the sample meets the above stated requirements, the material will be collected by a private agency and hauled to the local landfill or WWTP.

Reuse Water Demand and Cistern

The irrigation demands for the site were calculated by assuming a weekly irrigation rate of 1.25" over the landscape area. The site is proposed to have approximately 1.8 acres of landscaped or undisturbed land area. Of the 1.8 acres, it is conservatively assumed that the total landscape irrigation coverage is 80% of the total green area.

Table 7.03-5: Irrigation Demands

Usage	Gross Acres (Acres)	Irrigation Area (%)	Irrigation Area (Acres)	Irrigation Unit Volume (Ft/d)	Total Irrigation (gpd)
Pervious Area	1.80	80%	1.44	0.015	7,000
TOTAL			**1.44**		**7,000**

Notes:
1. Based on 1.25 in/week irrigation.

The total minimum volume of the irrigation water cistern will be equal to three days of full project (after build-out) demand. The total anticipated irrigation cistern volume required is approximately 21,000 gallons.

A 21,500-gallon irrigation cistern will be constructed underneath the BOH Building. An irrigation supply main with a backflow preventer assembly will be constructed from the cistern to the site distribution system.

Irrigation Water Cistern Size		
Three (3) Day Irrigation Storage Volume	21,000	gal
Total Irrigation Cistern Storage Volume	**21,000**	**gal**

Irrigation Water Cistern Dimensions		
Required Volume	21,000	gal
Required Volume	2,808	cubic feet
Height	8	feet
Length	30	feet
Width	12	feet
Provided Volume	**21,542**	**gal**
Provided Volume	**2,880**	**cubic feet**

Table 7.03-6: Irrigation Cistern Sizing

Reuse Design

According to the calculations, the total irrigation demand for the site will be approximately 7,000 gpd. The reuse water will be pumped through irrigation mains that will be used to supply the irrigation zones on site. The cistern will be installed so that it can be supplemented by the potable water system through a valved connection to the potable water supply main with a backflow prevention device. In order to utilize all of the effluent generated during periods of high usage, the irrigation system will be designed to water as much of the undeveloped site as necessary to dispose of the effluent.

The reuse cistern will be designed in a similar fashion, and to the same regulations, as the potable water cistern as described above. It will be sized to hold three (3) days of WWTP effluent during times of peak usage, have an overflow with a cross sectional area equal to or greater than the combined area of all the inlet pipes, and will be located in a non-flooding area.

This cistern will receive roof run-off from some of the on-site structures. In addition to the cistern receiving the WWTP effluent and roof run-off, the potable water distribution system will be able to fill the cistern (through a reduced pressure backflow preventer to prevent contamination) during periods of drought. Float switches (set at predetermined elevations in the cistern) connected to an automatically actuated gate valve on the backflow prevention assembly will control the potable water feed to the reuse cistern.

The irrigation water will be pumped from the reuse cistern into a looped irrigation distribution system. The irrigation distribution will be controlled through a series of zones that will be set up to ensure that each area of the development does not receive too much or too little water. During times of rain and other times when the cistern becomes too full, the pumping system will pump the excess reuse water into undeveloped areas, or the cistern will overflow into the stormwater collection system.

7.03c Solid Waste Disposal

It is anticipated that the site will produce approximately 0.25 tons of solid waste per day during peak usage periods. Table 7.03.7 is a breakdown of the contributing elements to the solid waste stream.

USAGE	UNITS	POUNDS PER UNIT PER DAY	TOTAL POUNDS PER WEEK
Marina Facilities & Retail	2,734 ft^2	0.006 /ft^2	16
Restautants & Bars	140 seats	1 /seat/day	140
Back of House & Support	9,650 ft^2	0.006 /ft^2	58
External Areas & Parking	4,500 ft^2	0.006 /ft^2	27
Employees	30 employees	1.24 /empl./day	260
		TOTAL (pounds/day)	502
		TOTAL (tons/day)	0.251

Table 7.03.7: Summary of Solid Waste Production

The solid waste generated by the site will be stored on-site in large roll off style dumpsters which will be picked up on a regular basis by a private waste management service that is EPA and DPNR approved. The waste will be hauled off-site to be disposed of according to environmental regulations.

7.03d Roads, Traffic and Parking

Roads

A single driveway will provide the site with vehicular access. The two-lane driveway will begin at Vessup Lane and continue into the site, providing beach access and site circulation. The two-lane driveway access will split upon entry to the property. The northern drive lane shall provide site access to the back-of- house area. The other roadway will provide access to the marina and retail building porte-cochere, the boat yard, and the site parking.

Parking will be provided on-site. Any loading and unloading that is required will take place at the reserved parking stalls near the marina and retail building. It is not anticipated that large truck access will be necessary, and thus, no truck docks are included for this project. There will be an electronic gate arm installed on the boat launch and back of house entry to prevent unauthorized access.

Within the private roadway system and the walking paths will be constructed of concrete. The parking stalls and associated drive isles will be constructed of a pervious gravel pavement. The roadway system will provide access to the buildings and structures throughout the site as well as to the boat launch marina area.

The boat launch area will be graded such that minimal slopes are experienced at the water's edge.

Parking

The number of parking spaces required for the site was calculated per the VI Code. Table 7.03.8 is a breakdown of the parking requirements for the site.

USAGE	UNITS		REQUIRED SPACES PER UNIT	TOTAL REQUIRED
Marina Facilities & Retail(1)	2,734	ft^2	1 per 500 ft^2	5
Restautants & Bars(1)	140	Seats	0.1 per seat	14
Back of House & Support(1)	9,650	ft^2	1 per 500 ft^2	19
Marina Slips (3)	28	slips	1 per 5 slips	6
Mooring Field(3)	74	buoys	1 per 10 buoys	7
Drystack(3)(4)	72	racks	1 per 4 racks	18
Employees/Staff(2)	30	empl.	1 per 5 employees	6
TOTAL REQUIRED				**76**
TOTAL REGULAR PROVIDED				**80**
TOTAL ADA REQUIRED				**4**
TOTAL ADA PROVIDED				**4**
EXTRA PROVIDED				**8**

(1) Per the VI Code Title 29 Section 230-r.
(2) Per the VI Code Title 29 Section 230-p.
(3) Actual count varies depending on operational decisions.
(4) Actual count varies depending on final design.

Table 7.03.8: Summary of Parking Spaces

The number of spaces required for all usages, with exception to number of employees, is per the VI Code Title 29 Section 230-r which states "…one (1) parking space for each five hundred (500) square feet of floor area.".

The number of spaces per employee was calculated per VI Code Title 29 Section 230-o which states "The number of employees on any premises shall be calculated upon … the maximum employment in any work shift in a twenty-four (24) hour period" and VI Code Title 29 Section 230-p which states "One(1) off-street parking shall be provided for every five (5) employees."

The number of employees was estimated to be 30 with 50% (15 employees) comprising the largest shift. The total number of spaces in the parking lot provided (84) is greater than the total number of spaces required (76).

7.03e Electricity

The developer proposes to purchase all the electrical power needs for the operation of the proposed development from the V.I. Water and Power Authority (WAPA). The feeder, which is in the vicinity of the project, currently supplies power to the adjacent Ritz Carlton Hotel. At final build-out, it is anticipated that 13,200 VAC power/18 MW of connected load will be added to the WAPA feeder. The existing lines were reviewed by WAPA's engineering department and determined to have sufficient capacity to support this project without upgrades.

Power will be brought to the site via new overhead utility poles and lines, then dropped underground to serve three new transformers. The changes to the existing skyline are minimal and will include adding the aforementioned new overhead wooden utility poles at each end of the property along the road in order to drop high voltage lines to the new pad mount utility transformers.

Emergency power will be provided by self-contained generator sets for the life safety loads, water pumps and sanitary systems only. Emergency power is not anticipated to be provided in order to maintain the site for normal use in the event of a WAPA power outage.

Conduits for telephone, cable and security system lines will be run during the project construction. These services will be contracted to a local provider.

7.03f Schools

The patrons of the new facilities will primarily be temporary visitors or locals whose children are already being service by either public or private schools. Therefore, there will be no impact to the local school system from them.

It is probable that the employees will all be local residents whose children already attend the V.I. public or private schools. Therefore, there will be no impact to the local school system.

7.03g Fire and Police Protection

The project will include a fire protection system (as discussed in the potable water section above). The system will meet NFPA Life Safety Code Standards. The structures will maximize the use of fire-retardant materials and the facilities will have fire sprinkler systems, extinguishers, smoke detectors, and Siamese connectors for the sprinkler systems.

The water main distribution system will be looped around the development to ensure adequate pressure for daily consumption as well as fire suppression scenarios. Each of the buildings will have a connection for the fire suppression system. A double check valve backflow prevention assembly and a post indicator valve will be installed. The water main system will be complete with properly located fire hydrants and Fire Department Connections for each fire sprinkler suppression system.

The internal road system will provide easy access for public safety vehicles (fire, police, EMT units, etc.). There will be sufficient lighting in all the public areas (parking lots, walkways, buildings, etc.) to lessen security issues.

7.03h Health

The only health issues anticipated during construction and during operation will be the occasional emergency's that arise on a normal basis and these emergencies will be treated by the public hospital or one of the private health clinics within the Red Hook area. Long term or significant affects to the Public Health System will be negligible since transient visitors will travel home for health care and residents are already served by the existing health care system.

7.04 Social Impacts

The proposed Marina Development will provide economic opportunities for residences in the marine industry with the employment of approximately 45 persons. Access onto the property and the nearby Vessup Beach will be greatly improved with the construction of the project.
Vessup was once a popular destination for locals. The access over the past two decades has been limited by the erosion of the existing rocky dirt driveways. The destruction of the Latitude 18 Marina and upland building has further limited access to the beach by residents. The proposed development will reverse that providing open access to all Virgin Islands Residents.

7.05 Economic Impact

Recreational boating is one of the most popular leisure activities in the United States. The boating industry experienced a surge in demand as outdoor recreation and became one of the only leisure alternatives and work environments have become more flexible. According to the National Marine Manufacturer's Association, in 2020, boat sales, marine products, and services in the U.S. hit $47 billion an increase of nine percent over the prior year. More than 310,000 power boats were sold in 2020, exceeding levels not seen since the Great Recession. Additionally, sales are expected to remain high in 2021 and 2022.

Meanwhile, there are roughly 10,500 marinas in the United States with 1.1 million slips. Despite increases in demand for slips, the number of marinas in the United States has been declining by 1.3 percent annually over the last five years. Marina development in the U.S. is very limited because of high barriers to entry such as zoning laws, tide restrictions, high cost of waterfront land, and environmental opposition limiting the number of new facilities that can be developed. Overall, these trends will positively impact the yachting industry in the USVI and the proposed subject marina.
Specific to the Virgin Islands, for decades, the region has had a reputation as one of the premier winter cruising grounds in the world for small sailing charters. Over the last 20 years, the popularity of the mega yacht has expanded the islands' market base. Since 2000, the industry has grown rapidly both in terms of number of vessels, as well as overall length. International trends are expected to positively impact the USVI market into the long term.

Methodology

Economic impact is defined as the measurement of changes in the economy of a defined trade area (i.e., city, county, territory, region, etc.) because of new projects and/or political policies. For purposes of this analysis, our economic impact estimates focus on the direct and indirect monetary benefits that will accrue to St. Thomas and the United States Virgin Islands (USVI) from the development of the *Latitude 18 Marina*. In this case, there will be two distinct periods for analysis:

- a one-time development phase including pre-development, development, and construction costs; and,
- annual operational impact.

The methodology used to estimate the contribution of the proposed marina and upland facilities to the defined trade area is based on two forms of economic impact – direct and indirect/induced - as they relate to revenues, taxes, and employment generated by the operation of the new facilities.

Direct Impact is defined as the direct economic effects that are generated as a new business sells a product or service (in this case marina services, food and beverage, event space, retail, etc.), pays territory taxes on the sale of the product/service, as well as the monies paid on the tangible real and personal property used in the operation of the business, and wages paid to workers (construction and day-to-day operations) at the facility.

Indirect and Induced Impact is defined as the economic effects that result from the subject business purchasing goods and services from other businesses in support of the operation, including patrons of the marina and upland facilities purchasing goods and services from surrounding businesses.

Please note, these estimates assume the project is registered and approved as an EDC beneficiary and the related USVI tax benefits have been applied to these projections of impact. This assumption reduces the direct economic impact of the subject through the elimination or reduction of the taxes outlined in the following table.

USVI EDC Tax Incentives to EDC Beneficiary Corporations			
	Base Rate	**Exemption**	**Adjusted Rate**
Corporate Income Tax	Varies	90%	Varies
Personal Income Tax	Varies	90%	Varies
Gross Receipts Tax	4.0%	100%	0.0%
Business Property Tax	7.11%	100%	0.0%
Excise Tax	Varies	100%	0.0%
Customs Duty	6.0%	83%	1.0%
Source: United States Virgin Island Economic Development Authority			

One-Time- Development Phase

The development phase will generate one-time fiscal and economic impacts as spending on the marina and upland facilities ripples through the economy. A facility program is detailed in the following table.

Proposed Marina and Upland Facilities				
Facility	**Square feet/Linear Feet**		**Number of Seats/Slips**	
	Indoor	**Outdoor**	**Indoor**	**Outdoor**
Marina				
Slips	--	2,055	--	26
Mooring Balls	--	--	--	84
Food and Beverage				
Marina Restaurant	2,000	2,000	80	80
Marina Bar	1,750	--	75	--
Retail Space				
Market/Coffee Shop	4,000	--	--	--
Ships Store	1,500	--	--	--
Other				
Administration	750			
Back of the House & Support	4,860	--	--	--
Source: Vessup Operations, LLC				

Based on information provided by *Vessup Operations, LLC*, the construction cost for the proposed marina and upland facilities is estimated at $13.47 million as outlined in the following table:

Construction Cost Estimate Latitude 18 Marina and Upland Facilities	
Facility	**Amount**
Marina	$9,000,000
Upland Facilities	$1,318,275
Site Work	$2,100,000
Retail and Restaurant	$1,050,000
Total	**$13,468,275**
Source: Vessup Operations LLC	

Of the total budget, 50 percent is projected by *Vessup Operations, LLC* to be labor cost and 50 percent is projected to be materials cost. We have also assumed that 50 percent of the development cost (labor and materials) will originate outside the USVI, primarily from the United States and Puerto Rico. Therefore, we assume that 50 percent, or $6.73 million, will be spent locally and used as a basis for our analysis. Based on these assumptions, we have estimated the amount of fiscal (tax) impact to the USVI Government and economic impact to the USVI economy by the development of the proposed marina as outlined in the following table.

Estimated Fiscal and Economic Impact Latitude 18 Marina and Upland Facilities One-Time Development Phase	
Fiscal (Tax) Impact	
USVI Unemployment Tax	$67,816
Gross Receipts	$453,400
Personal Income Tax	$1,247,172
Custom Duties	$8396
Total Fiscal Impact	**$1,776,784**
Economic (Direct, Indirect and Induced) Impact	
Direct Economic Impact from Construction Costs (50 Percent of Construction Costs)	$6,734,138
Indirect and Induced Economic Impact (Total Economic Impact – Direct Economic Impact)	$13,602,958
Total Economic Impact (Direct Impact X 3.02)	**$20,337,095**
Total Development Phase Economic Impact	**$20,337,095**
Source: Vessup Operations LLC	

The estimated fiscal impact assumes the contractors pay USVI unemployment tax on wages and gross receipts tax on the value of the construction contract by the construction contractor; and personal income tax is paid by the employees. The analysis also assumes that, as an EDC beneficiary, the lower rate on custom duties will be paid for materials and no excise tax will be due. Please note, we have assumed that only 15 percent of the building materials will be sourced from outside of the United States and subject customs duty has been applied to that amount.

Direct impact will result from the $6.73 million of the construction budget that will be spent locally as the developers hire local contractors and purchase good from local suppliers. Furthermore, these businesses and employees will spend their earnings on local goods and services, creating indirect and incremental impact. Based on the *2020 Economic Impacts of Commercial Real Estate Report* by the *NAIOP Research Foundation*, every $1 in commercial construction spending generates $3.02 in direct/indirect/induced spending. Therefore, in order to calculate the induced and indirect impact we first must calculate the total impact, which is done by multiplying the direct impact by the 3.02 multiplier. Then the direct impact is deducted from the total impact and the remaining amount is the induced or indirect impact. Overall, we project the construction of the *Latitude 18 Marina* and upland facilities will generate $20.3 million in fiscal and economic impact.

Annual Operational Phase

The annual operations of the marina and upland facilities will also generate ongoing fiscal and economic impacts. These impacts will include the employees hired to work at the various facilities, as well as goods and services purchased by the marina and upland facilities for operational purposes and capital expenditures. The operating expenses for the proposed marina and upland facilities are presented in the following table.

Operating Expenses Latitude 18 Marina and Upland Facilities		
Expense Line Items	**Year 1**	**Year 2**
Cost of Goods Sold	$1,306,219	$1,700,987
Payroll & Related	$1,496,777	$1,783,093
Other Operating Expenses	$881,481	$1,222,015
Total	**$3,684,477**	**$4,706,095**
Source: Vessup Operations LLC		

Based on REV*PAR* International, Inc.'s feasibility study dated April 2021, total expenditures (cost of goods sold, payroll and related expense, and other operating expenses) in Year 1 are estimated to total $3.68 million. This figure is projected to increase to $4.7 million in Year 2 as the facility ramps up its operations to a stabilized level. After Year 2, expenses are projected to increase at the rate of inflation, assumed to be 3.0 percent.

The marina's largest operational expense will be payroll and related and, in a typical year, this expense is projected to represent 27 percent of total operating expenses. By Year 2, the marina and upland facilities are projected to employ roughly 30 full time equivalent (FTE) employees. The following table presents the estimated FTE jobs in a typical year for the marina and upland facilities.

Estimated FTE Jobs Latitude 18 Marina and Upland Facilities Operational Phase	
Marina and Administrative	
Director, Marina	1.0
Dockmaster	1.0
Deckhands	3.0
Security	1.5
Maintenance	1.0
Accounting	1.0
Marina Subtotal	**8.5**
Food and Beverage	
Director, Food and Beverage	1.0
Catering Manager	1.0
Assistant Manager	1.0
Chef	1.0
Cooks	3.0
Servers/Bartenders	4.0
Dishwashers	1.5

Food Runners/Bussers/Dishwashers	3.0
Hosts	1.5
Food and Beverage Subtotal	**17.0**
Retail	
Market Manager	1.0
Ship's Store Manager	1.0
Stockers	1.0
Retail Subtotal	**3.0**
Total Jobs	**20.0**
Source: REV*PAR* International, Inc.	

Similar to the development phase, we have estimated operations at the proposed facility will generate the following fiscal taxes to the USVI government and economic impacts to the economy as outlined in the following table.

Year 1 Estimated Fiscal and Economic Impact Latitude 18 Marina and Upland Facilities Operational Phase	
Fiscal (Tax) Impact	
Custom Duties	$4,000
Unemployment Tax	$7,272
Personal Income Tax	$69,333
Corporate Tax	$0 (1)
Fiscal Impact	**$80,605**
Economic (Direct, Indirect and Induced) Impact	
Direct Economic Impact (100% of Operating Expenditures)	$3,684,477
Indirect Economic Impact (Total Economic Impact – Direct economic Impact)	$5,563.560
Total Economic Impact (Direct Economic Impact X 2.51)	**$9,248,037**
Total Operational Phase Economic Impact	**$9,328,642**
Note: (1) Assumes depreciation in year one exceeds EBITDA before reserve so no corporate tax is owed. Source: REV*PAR* International, Inc.	

The estimated fiscal impact assumes custom duties are paid on the purchase of goods from outside the United States for operational purposes, as well as periodic capital expenditures. The analysis also assumes the marina will pay USVI unemployment tax on the salaries of the employees and personal income tax is paid by the employees. The operation will pay the lower EDC beneficiary rates on custom duties and corporate income tax. As a reminder, we assume the marina will be an EDC beneficiary and the operation will not pay business property tax, gross receipts tax, and excise tax.

Direct impact will result from the annual operational expenditures of the marina and upland facilities including cost of goods sold, payroll, and other operated costs. Simply put, we have assumed that all operational expenditures represent direct economic impact and will serve as the basis for the calculation of indirect and induced economic impact.

Indirect and induced impact will also flow through the community as the marina spends money at local businesses and they spend in return, and the marina employees spend money in the community. Furthermore, the marina and upland facilities will induce visitors to St. Thomas that might not come without the new marina, and they will spend money in the greater USVI community. In reviewing the *2016 World Travel & Tourism Council Economic Impact* report for the USVI, the travel and tourism industry in the USVI generated a direct impact of $551.0 million resulting in a total impact of $1.38 billion. Dividing the total impact by the direct impact results in a multiplier of 2.51. Therefore, in order to calculate the induced and indirect impact, we first must calculate the total impact, which is done by multiplying the direct impact by the 2.51 multiplier. Then the direct demand is deducted from the total and the remaining amount is the induced or indirect demand. Please note, we have used data prior to the hurricanes in 2017 since it is more representative of the USVI tourism industry's potential going forward. Applying the multiplier of 2.51 to the annual operating expenditures, the operations will generate a direct and indirect economic impact of $9.3 million in Year 1. Alternatively, we reviewed the *U.S. Marina Industry Economic Impact Study* from May 2018, which indicated U.S. marinas generate a multiplier of 3.77, well above the multiplier of 2.51 in the *World Travel & Tourism Council Economic Impact.* Given the subject's location in the USVI and the transient and seasonal nature of the subject marina, we felt it was more reasonable to select the lower multiplier for our analysis.

Total Economic Impact

As illustrated in the following table, the economic impact of the development of the *Latitude 18 Marina* including the one-time development phase and the ongoing operational phase is significant.

Estimated Fiscal and Economic Impact
Latitude 18 Marina and Upland Facilities, St. Thomas, USVI
Development and Operational Phase

Impact	Construction Impact	Operational Impact		
		Year 1	Years 2 to 12	Total
Fiscal (Tax)	$1,776,784	$80,605	$1,719,405	$1,800,010
Economic (Direct/Indirect/Induced)	$20,337,095	$9,248,037	$184,839,285	$194,087,322
Total	**$22,113,879**	**$9,328,642**	**$186,558,690**	**$195,887,332**
Grand Total	**$218,001,211**			
Source: REV*PAR* International, Inc.				

7.06 Impacts on Historical and Archeological Resources

A Phase I A & B Archeological Study was done for the site by Cocosol International, Inc. No potentially significant cultural resources were identified during the course of the Phase I Cultural Resources Survey performed for the subject property. No archaeological contexts were identified during the course of this survey. The study concluded "Based on the findings of the Phase I (A&B) Cultural Resources Survey performed for Consolidated Parcels 9B-A and Rem. CDM 9B, Estate Nazareth, #1 Red Hook Quarter, St Thomas, U.S. Virgin Islands, CocoSol recommends that the Virgin Islands State Historic Preservation Office issue a finding of no objection to the earth change activities that may be necessary for the rehabilitation of the existing marina facilities and/or future development within the subject property.

7.07 Recreational Use

Vessel mooring and anchorage in Muller Bay have limited control and enforcement. Some of the observed outcomes of demand pressures with limited controls include the presence of boats in relative proximity to the beach and the navigation channels.

The proposed mooring field demarcation and management provides increased setbacks from the beach (approximately 300 ft), including the beach on Mueller Bay. The location of the mooring buoys, the markers delineating the mooring field and the active management of the mooring field are all conducive to improving swimming safety.

The proposed marina and mooring field footprint will not impede maritime traffic in the area (VIPA, 2021). The proposed managed mooring field markers and management plan will help resolve an ongoing issue of vessels mooring or anchoring too close to the navigation channel used by ferry passengers (VIPA 2021). The proposed project, including the location of the mooring buoys, the markers delineating the mooring field and the active management of the mooring field are all conducive to improving swimming safety, will have a positive impact on navigation safety and vessel maneuverability.

The marina will provide a significant benefit by increasing the berthing capacity of the island for yachts between 60 ft and 130 ft in length.

The managed mooring field will provide secure moorings with equipment maintenance, safety and environmental management of the mooring buoys controlled by a professional operator. Upland amenities and services will be available to boaters anchored in the mooring field, enhancing the recreational and commercial use of the vessels in the area.

7.08 Waste Disposal

The general contractor will provide construction dumpsters on site and remove all construction waste to the Bovoni landfill. No known hazardous wastes will be used or produced on the site during or after construction. All construction debris will be hauled by an EPA and DPNR approved waste disposal company.

Also, as discussed in section 7.03c, an approved company will collect all municipal wastes on a regular basis. All wastes generated on site will hauled off-site to be disposed of according to environmental regulations. The sludge produced by the WWTP will be processed as discussed above in section 7.03b and will be stored in a containment area until it is deemed safe to hauled off-site to be disposed of according to environmental regulations.

The marina and mooring field vessel users will be provided solid and fluid waste disposal collection facilities and removal services.

Oil and hazardous waste will be collected in separate containers and handled according to the regulatory requirements and best practices of marina environmental management (Blue Marina, Clean Marina or similar certification system).

The marina operation staff will collect floating debris in the marina area and handle the collection and disposal procedures.

It is expected that sargassum will accumulate on the dock wave screens and dock skirts, which will be removed along with other floating debris.

7.09 Accidental Spills

Hazardous materials that may be present on this project include diesel fuel supplies for the marina and emergency generators, chlorine for the WWTP, and fuel areas for the equipment during construction. None of the hazardous materials will produce hazardous wastes. All the materials will be stored in separate containment areas. In the event of a spill of any of these materials, the spilled materials will be stored in approved containers and hauled by an approved company to the local landfill. Due to petroleum materials being stored on-site, a spill contingency plan will be developed in accordance with local and federal rules and regulations.

The marina will have fuel service and therefore will have fuel storage tanks. The tanks will be double wall aboveground storage tanks designed to meet or exceed Federal and local regulations. There will be three (3) 20,000-gallon Diesel Modern Welding Double wall UL-2085 Aboveground Storage Tanks and one (1) 20,000-gallon Gasoline Modern Welding Double wall UL-2085 Aboveground Storage Tank. The tanks will be anchored on a site-specific designed concrete foundation and will have include overfill and overspill protection. All fuel piping with the double walled to minimize potential releases.

The marina will have fuels spill kits on all docks including the dinghy dock and at the tank area.

7.10 Potential Adverse Effects Which Cannot Be Avoided

The project area will be altered during its use by the addition of a temporary construction office. The site will also be altered during the clearing and access preparation for the geotechnical drilling. There will be some unavoidable adverse effects due to the development of the site. They include:

- Site preparation and land shaping activities;
- Erosion during construction;
- Increased stormwater run-off;
- Increase in noise (especially during construction);
- Increase in traffic on this part of the island;
- Increase is boat activity within the marina; and
- Increased visitors on the beach.

The major adverse effects will involve site preparation and excavation for the roadways, buildings marina, and back-of-house area. These activities will involve removal of vegetation and grading of the site. During construction, the possibility of increased erosion exists. To minimize this erosion, measures will be taken as described in the above sections 5.01c-g and 6.03. After construction, all areas which remain exposed will be landscaped for permanent stabilization of the soils.

Another adverse effect will include the increase in stormwater runoff from the site. Measures will be taken to ensure that this adverse effect will be kept to a minimum. The pre-construction overland flow patterns will be changed as little as possible, and measures will be taken to capture and clean stormwater run-off from the new impervious surfaces. A stormwater retention pond will be constructed to provide water quality treatment and attenuation prior to discharging into the nearby bay.

This project will cause an increase in the noise level of the area. Construction noise levels will be high (as is the nature of this type of construction). Car noise and ambient noises (i.e. music, workers, gatherings of people, etc.) will also contribute to the raised noise level. The topography of the site will direct sound primarily toward the bay. Thus, the increase noise from the site should have a minimal on local residents.

The construction of the marina expansion will impact the marine environment physically through the placement of piles and sheet piles and could impact water quality through siltation and turbidity during construction, dredging and de-watering of spoils. A water quality monitoring plan will be implemented to monitor control devices and to ensure repairs are made when necessary and additional measures are taken with installed devices are not effective.

The marina and wave attenuator will impact areas that are colonized by algae and *Halophila stipulacea*. The removal of the piling will result in the loss of encrusting sponges and the placement of the new sheetpile wall will impact 12 corals (*Psuedodiploria strigosa* and *Sidereastrea siderea*). The corals will be relocated as part of the mitigation for the project. The mitigation plan is found in Appendix D.

The marina will have a total of 302 pilings, 274 associated the dock structures, 12 mooring piles and 16 pilings associated with the travel lift. These will all disturb areas of algae and *H. stipulacea.* It is probable that each pile will disturb 1.5ft of seafloor due to wave turbulence.

As shown on Proposed Wave Attenuator drawing and the Section H Wave Attenuator drawings the floating breakwater would be installed with either helix anchors or concrete blocks (if helix anchors cannot be installed due to substrate, this should not be an issue, there are numerous helix anchors in the mooring field to the south of the channel). As shown in the benthic habitat map Figure 6.06.8 Benthic Habitat in the Marina Area, the wave attenuator is in an area of Macro-algae and varying degrees *H. stipulacea*. The attenuator is anchored with helix anchors will have a negligible impact during installation, if blocks are placed it will have at most 700ft (0.016 acre) of algal/*H. stipulacea* impact (footprint and turbulence impact). The lines used with be elastic mooring rodes and will have no impact on the seafloor.

8.00 Mitigation Plans

To abate and minimize environmental impacts the following mitigation and monitoring plans are proposed.

Mitigation Plan - Appendix D
Water Quality Monitoring Plan and Sea Turtle Protection Plan - Appendix D
Tree Boa Protection Plan - Appendix E

9.00 Alternatives to Proposed Action

These impacts are unavoidable for the development of a marina and were minimized by design or mitigated, as follows:

- The proposed design seeks to reduce the number of piles by avoiding the use of mooring piles between slips and by using partial length finger piers. The previous marina had dock pier structural piles and mooring piles between each slip.

- The proposed water depths near the bulkhead were reduced to only accommodate smaller draft vessels, as opposed to the ideal design depth to maximize the marina efficiency, to reduce the seabed impact. The required water depth for mono-hull yachts of the size envisioned requires -8 ft msl water depth, which resulted in a 18,325 sq ft area impact and 2,260 cy of material to be removed from the seabed. An alternative was proposed to locate catamarans in those slips and providing a design depth of

-6.5 ft msl. The final area impact is 6,490 sq ft and the volume to be removed is approximately 886 cy at the expense of losing one slip.

• The floating wave attenuator performance to reduce agitation is driven by the structure width. Wider floating elements provide more wave attenuation than narrower ones. The structure is intrinsically massive and opaque. The only impact reduction strategy available is to design the attenuator with the minimum width that serves the required function. Grated decking for light floating element structural solutions were explored. The actual seabed impact is ultimately minor because the water depth is on the order of 20ft.

• All mooring buoys will be anchored to the seabed by drilled anchors and connected to the buoy bollard with elastic rods. This mooring buoy design solution avoids seabed impacts during operation. Alternative anchorage systems, such as anchor and chain which is common in this area at present, and boat anchors typically cause significant seabed damage, as documented in this section

Wave panel analysis of alternatives – significant reduction of circulation if wave panels used all along the dock

Dock layout alternatives – excavate more if using mono-hull design criteria near the bulkhead. The required water depth for mono-hull yachts of the size envisioned requires -8 ft msl water depth, which resulted in a 18,325 sq ft area impact and 2,100 cy of material to be removed from the seabed. An alternative was proposed to locate catamarans in those slips and providing a design depth of -6.5 ft msl. The final area impact is 6,490 sq ft and the volume to be removed is 780 cy at the expense of losing one slip.

No managed mooring field - larger seabed impact, no control on boat discharges, less navigation safety due to uncontrolled anchorage in navigation channel.

A detailed survey was done throughout the project area and ESA corals were located and moorings are proposed with avoid corals and hardbottom.

Project Study and Analysis of Alternative wave Screen Layouts

Due to the sensitive nature of the water quality in Vessup Bay, a detailed study was undertaken to evaluate potential project impacts. While the pile supported fixed pier dock causes negligible impact circulation, the proposed wave screen panels can block circulation.

A calibrated circulation model was set up and calibrated with field measurements and tested for a variety of alternative layouts of the wave panels:
Base Condition – no structures

Design condition - gap of 70 feet between the shoreline and the wave protection structure
Alternative 1 – wave panels connecting to the shoreline
Alternative 2 – gap of 23 feet between the shoreline and the wave protection structure
Alternative 3 - gap of 46 feet between the shoreline and the wave protection structure

Figure 9.00.1: Proposed Marina Location and Wave Protection Structure (Design Condition)

Initially, the design looked to extend the wave barrier perpendicular to the shoreline up to the shoreline in order to provide the maximum protection (Alternative 1). Initial flushing simulation results showed that this would significantly increase the overall flushing times within Vessup Bay. Two other alternatives were run. The first had a gap of 23 feet between the shoreline and the wave protection structure (Alternative 2). The second had a gap of 46 feet (Alternative 3). The runs with a gap of 70 feet was shown to have no negative impact on circulation.

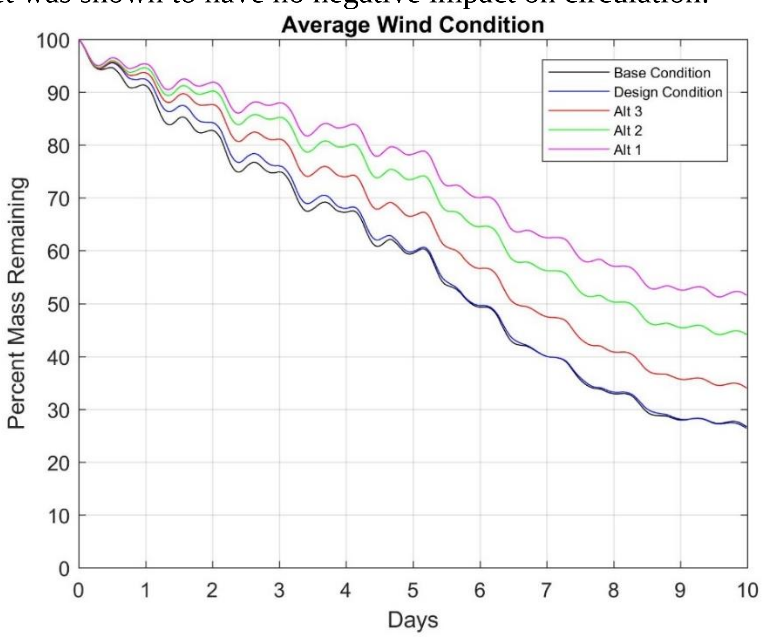


Figure 9.002: Comparison of the Percent Mass Remaining for the Alternatives, the Design Condition and the Baseline Condition under Average Wind Conditions

From the point of view of flushing Vessup Bay, the project achieved no negative impact by locating wave panels in a way that do not obstruct circulation, as demonstrated by the results of a calibrated flushing model.

Moreover, by providing management of boat discharges as part of the Managed Mooring Field management plan (Appendix B) the project is seeking a net positive impact on the water quality of Vessup Bay.

A detailed survey was done throughout the project area and ESA corals were mapped and moorings were located to avoid corals and hardbottoms.

10.00 Relationship Between Short -Term and Long-Term Uses of Man's Environment

The redevelopment of brown field areas is by far the best use of the environment, it alleviates impact to natural areas. The project involves the renovation of a marina which was previously hurricane damaged, which will stimulate the local economy and provide much needed jobs. The development of the managed mooring fields is the best long-term use of the bay. It will stop on going impacts created by poor mooring and anchoring practices and will stop the continuing degradation of water quality from vessel discharges.

11.00 REFERENCES

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http://www.ndbc.noaa.gov/

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https://www.weather.gov/images/sju/Interactive_Map/RedHookBay.jpg

APPENDIX A

Team

Vessup Operations, LLC (VO)

AMS Hospitality (AMSH)

Applied Technology & Management (ATM)

Jaredian Design Group (JDG)

Edge of Architecture (EOA)

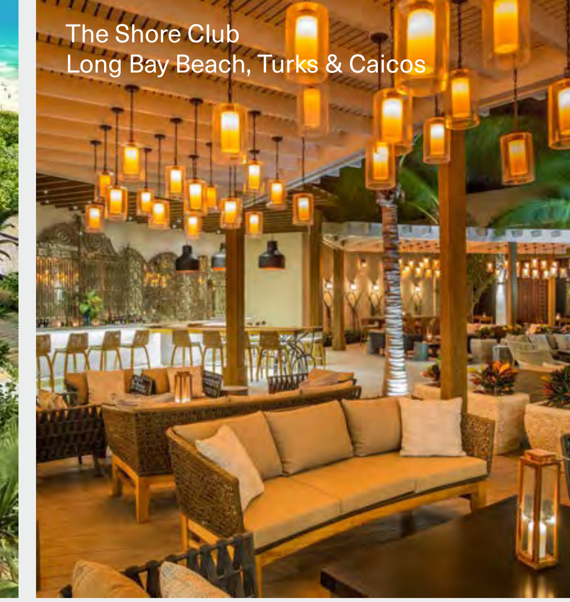
Design District Architects (DDA)

Harris Civil Engineers (HCE)

Paul Ferreras, P.E. (PFPE)

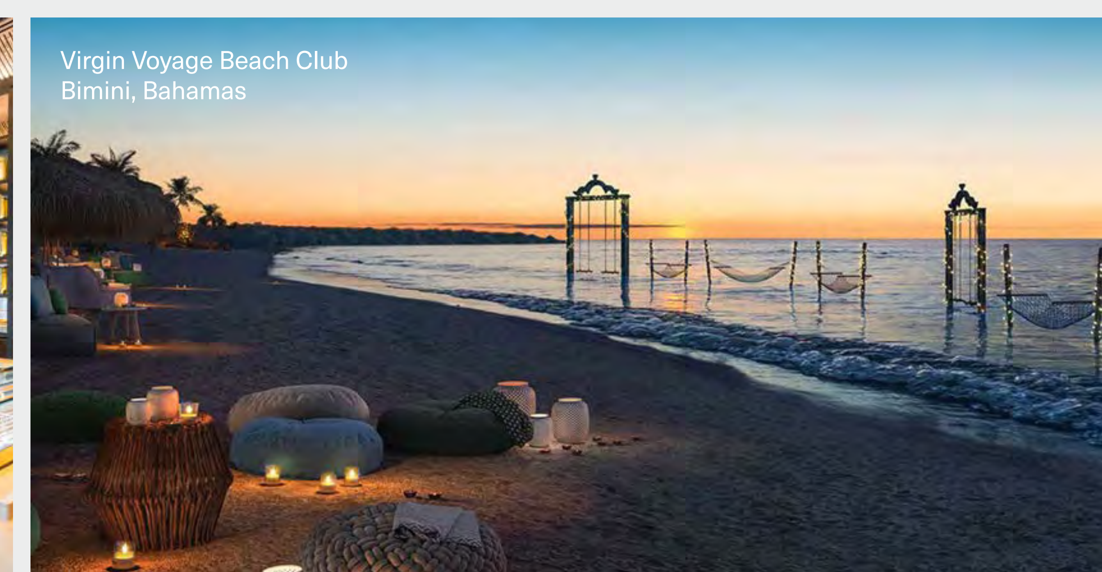
Bioimpact, Inc. (BI)


1 Hotel Beach Club
Miami Bech, FL


The Shore Club
Long Bay Beach, Turks & Caicos


Yacht Haven Grande
St. Thomas, U.S. Virgin Islands


SLS Lux Brickell
Miami, FL


Virgin Voyage Beach Club
Bimini, Bahamas

Vessup Operations, LLC (VO)
Company Overview

Vessup Operations, LLC (VO) Company Overview

Lee Steiner
Manager
Vessup Operations, LLC

Vessup Operations LLC (VO) is a single purpose entity created to manage the redevelopment of the Latitude 18 Marina. The result of this redevelopment will be a landmark facility that will help the US Virgin Islands recapture revenues from the marine industry that have previously been generated outside of the territory in neighboring islands while providing much needed opportunities for Virgin Islanders in the marine industry.

Vessup Operations LLC is managed by Virgin Islands businessman Lee Steiner who is a lifetime resident of the Virgin Islands and represents one of four generations of his family who have resided in the territory since the 1950's. Mr. Steiner is the founder and owner of USVI Sotheby's International Realty which has done business in the territory for over a decade. He is also the principal of multiple businesses engaged in real estate development and management in St. Thomas. Mr. Steiner is active in the community that he cares about deeply and has served on several boards including the Downtown Revitalization Initiative and the Virgin Islands Port Authority.

AMS Hospitality (AMSH)
Company Overview & Case Studies

AMS Hospitality Company Overview

AMS Hospitality (AMSH) is a hotel development firm that represents a strategic joint venture of two premier real estate owners and developers, Stormont Hospitality Group (SHG) and The Allen Morris Company (AMCO), who have partnered to develop and acquire strategically-located hospitality properties throughout the U.S.

The partnership of AMS Hospitality leverages the key strengths and expertise of both firms across development, construction, capital markets, and asset management.

Over
140
Years Combined Experience

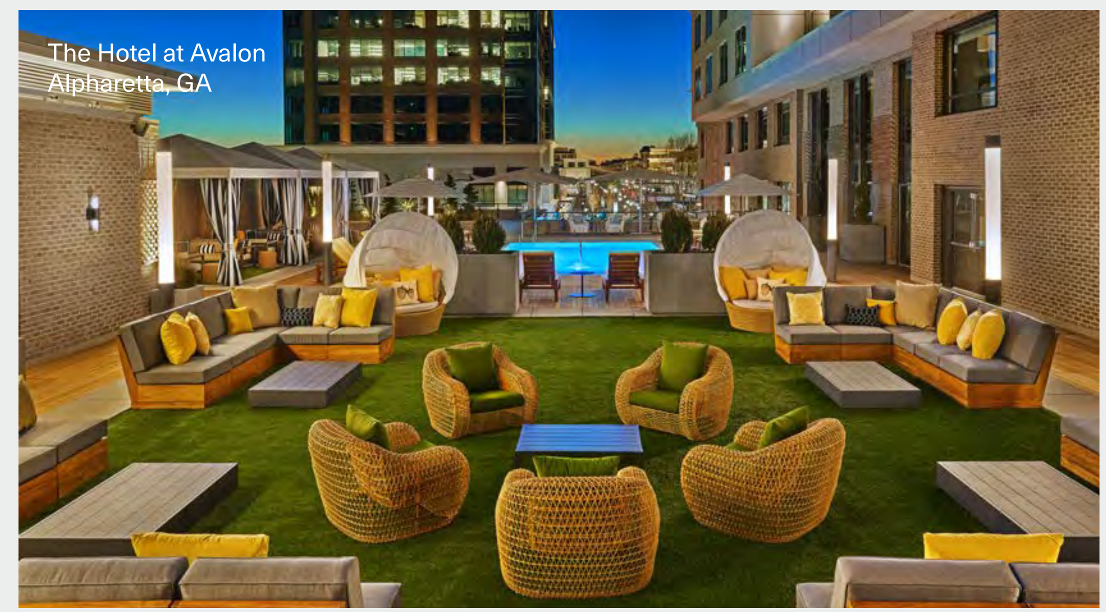
131
Projects Completed[1]

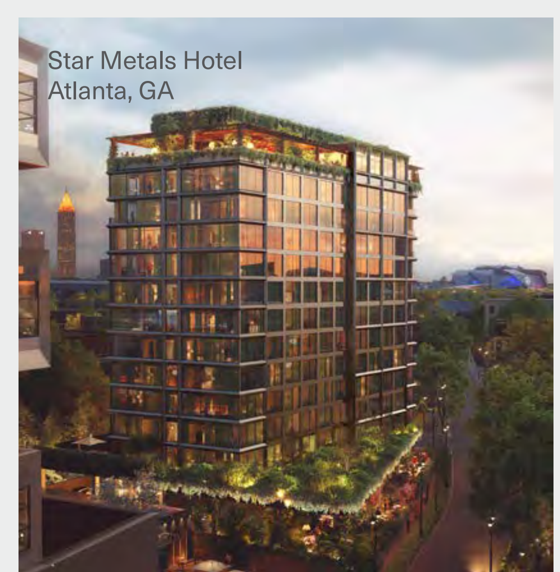
Over
12,000
Total Keys

Over
~$3.0Bn
In Hotels Investments

(1) Combined projects between Principals of Stormont Hospitality Group and The Allen Morris Company


Renaissance Atlanta Airport Gateway
Atlanta, GA


The Hotel at Avalon
Alpharetta, GA


Star Metals Hotel
Atlanta, GA


Midtown Union Hotel
Atlanta, GA

The AMS business model and company philosophy stems from our experienced perspectives as longtime owners, developers and operators.


SLS Lux
Miami, FL

Jim Stormont
Vice Chairman

As Vice Chairman of AMS Hospitality, Jim Stormont acts in an advisory role with specific focus on strategy, finance, public-private partnerships, and new business development.

Jim Stormont's 30+ year career in hotel development and finance brings a unique understanding and appreciation of the various components of the hotel investment business, having achieved success in numerous hotel cycles, including a national reputation for public/private hotel development expertise. Before starting AMS Hospitality, Jim re- established Stormont Hospitality Group (SHG) in 2012 to respond to the market's renewed demand for hotel development projects, serving as president and lead principal.

Prior to this, Jim served for five years as principal of Grove Street Partners, a multi-product real estate development company, during which time he led the development of five hotels totaling 1,154 rooms. Jim's career also includes positions as CFO and Principal of Stormont Trice Corporation, Executive Vice President of Noble Investment Group, LLC and President of Stormont Hospitality Group, LLC, and several years of hotel operations experience at Marriott International. Throughout his hotel career, Jim Stormont has gained substantial experience in all aspects of the development, operation and ownership of hotels, conference centers and resorts. He has played an instrumental role in the successful structuring, financing, and development of more than $2 billion of prominent hotel properties, including some of the most successful public/private hospitality projects in the U.S. A majority of these hospitality projects have involved structuring economically feasible, complex public/private partnerships requiring extensive legal and financial negotiations. Jim has been an active member of the Rotary Club of Atlanta for over twenty years and is along-time member of the Atlanta Country Club.

Education
B.A. Economics, Middlebury College
M.B.A, Cornell university

Peter DiCorpo
President

As President of AMS Hospitality, Peter DiCorpo oversees all activities of the company, including underwriting, finance, accounting, administration, design & construction, asset management, and all hotel operating activities before and after opening. His focus is on streamlining the company's processes and procedures, and on positioning the company for planned growth: both in its existing lines of business as well as in new ventures. Additionally, he manages the process for capital raising and reporting. Peter has more than 24 years of experience in real estate, investment, and operations. He served as Chief Operating Officer of Waypoint Residential where he managed corporate and property operations focused on the rental housing sector. During his tenure, he oversaw significant growth in the firm's portfolio, expanded the property management division to include student housing and significantly upgraded infrastructure operations using emerging technology solutions. Prior to that, Peter served as President of the $10billion U.S. Core Investment Platform at CBRE Global Investors and as Chief Administration Officer of AIG Global Real Estate. Peter also serves as Board of Director and Treasurer of the Westchester Land Trust and as Board Member and prior Chairman of the National Association of Real Estate Investment Managers (NAREIM).

Education
B.A.M. Athematical Economics, Colgate University
M.B.A. Professional Accounting, New York University
M.B.A. Accounting, University of Hartford

John Cooper
Chief Development Officer

As Chief Development Officer of AMS Hospitality, John Cooper is responsible for all construction, budgeting, design, and development activities. John's career in hospitality spans more than 27 years in all phases of the hotel development and renovation process. Prior to his role as Chief Development Officer at AMS Hospitality, John served as Senior Vice President of Design and Development at Rockbridge, Principal & Executive Vice President of Noble Development Group, LLC, and Vice President of Design and Construction of Stormont Trice Corporation (a predecessor to AMS Hospitality). John has had a senior role in the development, renovation, programming and design of over $2B of high-profile, full-service and lifestyle hotel, conference center and resort properties throughout the U.S. John's expertise in budgeting, scheduling, negotiating and construction have resulted in the consistent on-time and on-budget delivery of his hotel projects.

Education
B.S. Construction Management, Arizona State University

Ken Martin, AIA NCARB
Project Manager

Ken Martin currently serves as Development Project Manager at AMS Hospitality. Ken's 27+ year career in hospitality programming, planning and design has included leadership positions at several global design firms such as Principal and Hospitality Leader at DLR Group, Kansas City; and most recently as Vice President and Managing Principal of Leo A Daly's Dallas office, which specialized in hospitality and mixed use design. Ken has been involved in over 60 hospitality projects resulting in over $1 billion in construction and representing all major hotel brands across the country. Having worked on projects in over 20 states including Hawaii, Ken brings a broad range of knowledge in both jurisdictional approvals and working with communities.

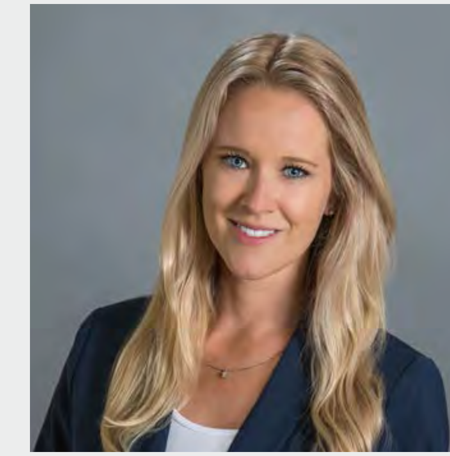
His experience in programming and planning hotels has led to working directly with numerous ownership groups on hotel brand and site selection. These collaborations focus on developing specific criteria based on guest demographics, hotel service levels and location to inform the design and achieve a successful project for all. Throughout his career Ken has lead teams in the delicate balance of design, budget and the overall guest experience to produce the highest return on investment for owners and to achieve the best product in any location.

Education
B.A. Architecture, University of New Mexico

Elizabeth Bryan
Vice President of Finance & Administration

As Vice President of Finance & Administration, Elizabeth manages corporate accounting, finance, administration, and human resources at AMS Hospitality. In addition, she oversees asset management and project accounting for the hotels. Her focus is on improving process and reporting efficiencies and optimizing system automation. Elizabeth brings six years of real estate experience to the team. Before joining AMS, Elizabeth was the Director of Program Management for the Global Real Estate and Procurement department at RELX, a FTSE 100 company based in London.

Most notably, Elizabeth led the global implementation of the new lease accounting standard for RELX's property portfolio, consisting of 350+ leases across 40+ countries. Elizabeth started her career in assurance services at Ernst & Young and amongst her audit clients was a multinational hotel company. Elizabeth is a Certified Public Accountant, holds a Six Sigma Green Belt Certification and achieved the CoreNet Global MCR (Master of Corporate Real Estate) designation.

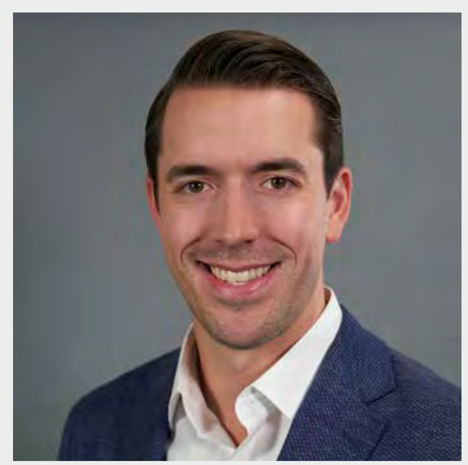


Education
B.S. Accounting, Florida State University
Master of Accounting, Florida State University

Will Woodworth
Vice President of Investments

As Vice President of Investments, Will Woodworth is responsible for all aspects of the deal origination process, including sourcing, underwriting, brand and management relations and financial structuring. Will Woodworth brings over 10 years of experience to his role as Vice President of Investments. He previously held an acquisitions position at Rockbridge, a hospitality private equity firm based in Columbus, Ohio where he originated debt and equity investments totaling over $500M across the United States. Additionally, Will worked as a relationship manager with the Hospitality Finance Group at Wells Fargo Bank in Charlotte, North Carolina, where his core responsibilities included portfolio management and new business development with private developers, owner/operators, private equity funds and public REITs throughout the U.S.

Will has managed the sourcing, structuring, and underwriting processes for hotel opportunities, deploying capital via debt and equity vehicles, with experience evaluating opportunities across the U.S. and representing over $1.5B in debt originations and $500M of asset value in equity investments across hotel segments and brands. Will serves as Treasurer for the Atlanta Hospitality Alliance, a non-profit group supporting the Atlanta-area hospitality community.

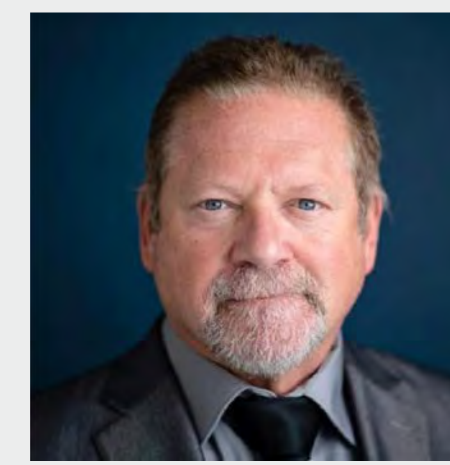


Education
B.S. Management, Georgia Institute of Technology
M.B.A., Cornell University

Steve Laski
Vice President of Construction

As Vice President of Construction at AMS Hospitality, Steve Laski is responsible for oversight of all construction-related activities, including maintaining project schedules and budgets. Steve has over 30 years of construction and development experience and has built a reputation for successful management and execution. His reputation has resulted in his becoming an industry resource and consultant for numerous top hospitality ownership groups and franchisers.

Prior to joining AMS, Steve co-founded Acumen Development Partners, a national provider of turn-key real estate development services with extensive expertise in upscale and mid-scale hospitality. Steve remains involved in overseeing field operations and providing oversight to corporate business functions, as a principal at Acumen. His project bandwidth ranges from $1 million to $250 million dollars in project size. Steve also served as Vice President of Construction with Noble Investment Group, and began his career as a project director with JA Jones Construction.



Education
B.S. Mechanical Engineering, Western Kentucky University

W. Allen Morris
Chairman & CEO
The Allen Morris Company

W. Allen Morris has led AMCO since 1980, after taking the helm of the real estate company his father established in 1958. Today, the company is one of the largest diversified real estate companies in the southeast with offices around Florida and Georgia, and over 80 successful development projects to its credit. Some of his key projects have won resounding praise, such as the landmark Alhambra Towers in Coral Gables named the "Top Commercial Project in Florida," among 8 other awards. Allen is a recognized leader in commercial real estate having won numerous awards including: 2019 Lifetime Achievement Award by the Greater Miami Chamber of Commerce; 2014 Business Leader of the Year Award from The Coral Gables Chamber of Commerce; 2011 REAL Trend Setter Award from the Greater Miami Chamber of Commerce; and 2009 South Florida Business Leader of the Year Award in Real Estate.

Allen is also Executive Chairman of AMS Hospitality (AMSH).

Education
B.A. Business Psychology Georgia Institute of Technology
Executive MBA, Harvard University

Spencer Morris
Chief Investment Officer
The Allen Morris Company

As Chief Investment Officer of The Allen Morris Company, Spencer Morris is responsible for overseeing the company's $1.2 billion development pipeline. His focus is on strategic planning, acquisitions, as well as structuring and financing mixed-use projects throughout the Southeast. Since joining the firm in 2016, Spencer has acquired and developed key assets in Georgia. Previously, Spencer served as Assistant Project Manager on the 58-story, 1.3 million square foot SLS LUX-Brickell hotel and condominium as well as on other projects with The Related Group in Miami, Florida. Spencer was born and raised in Coral Gables. He graduated with an International Baccalaureate diploma from The American School in Switzerland.

Spencer is also an active Principal of AMS Hospitality (AMSH).

Education
B.S. Political Science and Spanish, Boston University

Midtown Union Hotel
Atlanta, GA

AMS HOSPITALITY

A Partnership between Industry Leaders

Our vision is to create differentiated and impactful projects, memorable experiences for both our guests and the surrounding community, and to provide long-term value for our shareholders.

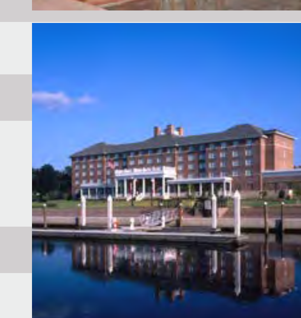
A Mission Statement we live by:
Inspire people with the beauty of our projects
Impress them with the excellence of our service
Improve the quality of life of all those we touch

The Allen Morris Company (AMCO)
The 62 year-old, family-run real estate firm specializes in commercial, multi-family and mixed-use developments, leasing and brokerage as well as property management. With offices throughout Florida and Georgia, The Allen Morris Company has served its business and investment clients with over 85 projects. Allen Morris has a build-to-own mentality and currently has a development pipeline of $1.25 billion.

Stormont Hospitality Group (SHG)
Led by Jim Stormont, SHG has partnered in, executed, and launched more than $2 billion in prominent hotel properties over the past 30 years. The principals of SHG bring their inclusive approach and best-in-class management style to every project: from branding, design, engineering, construction and project management to financing, accounting, legal, and operations. SHG has successfully led and completed over 12 hotel and conference centers through Public-Private Partnerships.

Development Track Record of Principals

Service Type	Property	Year Complete	Location	Keys
Full-Service/ Conference	UNC Charlotte Marriott Hotel & Conference Center	2021	Charlotte, NC	226
	The Hotel at Avalon (Autograph Collection)	2018	Alpharetta, GA	330
	Renaissance Atlanta Airport Gateway	2017	College Park, GA	204
	Atlanta Airport Marriott Gateway	2010	College Park, GA	403
	Macon Marriott City Center	2009	Macon, GA	220
	Raleigh Marriott City Center	2008	Raleigh, NC	400
	Sugar Land Marriott Town Square	2005	Sugarland, TX	300
	Baltimore Waterfront Marriott	2001	Baltimore, MD	750
	Franklin Marriott Cool Springs	1999	Franklin, TN	300
	Hyatt Regency Wichita	1997	Wichita, KS	303
	Renaissance Portsmouth Hotel and Waterfront Conference Center	1997	Portsmouth, VA	250
	Emory Conference Center	1995	Atlanta, GA	325
	Marriott Norfolk Waterside	1991	Norfolk, VA	407
Resort	JW Marriott San Antonio Hill Country Resort	2010	San Antonio, TX	1002
	The Lodge and Spa at Callaway Gardens	2007	Pine Mountain, GA	150
	Horseshoe Bay Resort Marriott	2006	Horseshow Bay, TX	350
	Brasstown Valley Resort	1995	Young Harris, GA	134
Select-Service	Hyatt House Atlanta Cobb Galleria	2013	Atlanta, GA	149
	Aloft Hotel Charlotte Uptown	2009	Charlotte, NC	175
	SpringHill Suites Atlanta Airport Gateway	2009	College Park, GA	147
	Fairfield Inn & Suites SeaWorld	2009	Orlando, FL	200
	SpringHill Suites Orlando at SeaWorld	2009	Orlando, FL	200
	Courtyard Birmingham Downtown at UAB	2005	Birmingham, AL	122
	Hilton Garden Inn Suffolk	2005	Suffolk, VA	150
	Courtyard Baltimore Downtown/Inner Harbor	2000	Baltimore, MD	205
	Residence Inn Gwinnett Place	1997	Atlanta, GA	131
	Residence Inn Lenox Park	1997	Atlanta, GA	150
Urban Boutique	Midtown Union Hotel	2022	Atlanta, GA	230
	SLS LUX Condo-Hotel	2018	Miami, FL	84



Jaredian Design Group (JDG)
Company Overview & Case Studies

Jaredian Design Group (JDG)
Company Overview

The Jaredian Design Group is a St. Thomas based Architectural and Engineering Firm formed in 1992 by Messers, John P. Woods, AIA, NCARB and LeRoy V. Smith Jr., P.E. Our Qualification Statement and list of current projects show the diversity of the project base we have developed over the past 28 + years. The Jaredian Design Group is well known and respected in the Virgin Islands construction industry as a leader in public and private sector development.

Some of our projects have included the Roy Lester Schneider Hospital, Omar Brown Fire Station, GERS Head Quarters Building on St. Croix, Charles W. Turnbull Regional Library, Veterans Drive Development, Main Street Enhancement, Christiansted Board Walk, etc. Our Collective Team is anchored by local Virgin Islands professionals with many years of experience.

We have a design presence on the three major islands in the Territory.

John P. Woods
Principal of Jaredian Design Group (JDG)

Professional Experience
Total Years: 30
Years with JDG: 29

Education

Bachelor of Architecture, 1979
Cooper Union for the Advancement of Science and Art Cooper Square, New York City, NY

Diploma

Salutatorian, 1974
Charlotte Amalie High School, Charlotte Amalie, St. Thomas, U. S. Virgin Islands

Registration

Registered Architect, United States Virgin Islands/No. 437A

Experience

October 1992 through Present – Principal of Jaredian Design Group, St. Thomas, U. S. Virgin Islands

December 1989 through September 1992 – Associate Principal, DeJongh Associates, St. Thomas, U. S. Virgin Islands

July 1989 through September 1992 – Deputy Program Manager, deJongh/Williams, St. Thomas, U. S. Virgin Islands

July 1982 through November 1989 Staff Architect, DeJongh Associates, St. Thomas, U. S. Virgin Islands

January 1982 – August 1982 – Graduate Architect, Daniel Goldner & Associates, New York, USA

November 1979 through December 1981 – Graduate Architect, Juan Montoya Design Corporation, New York, USA

Summer 1974 through 1978 – Architect Intern, DeJongh Associates,

Selected Project Experience

October 1992 through Present
Jaredian Design Group
St. Thomas, U. S. Virgin Islands
Principal of a seven (7)-person architectural/engineering firm providing comprehensive architectural/engineering design and management services throughout the Virgin Islands. Specific duties include management of architectural design activities from project concept development through project closeout. Directly responsible for the management of the design studio. Some of our most accomplished design work includes the noteworthy award-winning presentations for architectural design for the Quarters "B" project and the Roosevelt Park Renovations.

Employment Highlights Cont'd
July 1989 through September 1992
DeJongh/ Williams Joint Venture
St. Thomas, U. S. Virgin Islands
Associate Principal of a 50-person architectural/engineering firm providing comprehensive architectural/engineering design and management services throughout the Virgin Islands.
Supervised the firm's project architects, as well as engineering and CAD support personnel.
Deputy Program Manager for joint venture of two (2) architectural/engineering firms providing Program Management Services on a $330 million Capital Improvement Program for the Government of the Virgin Islands. Directly responsible for management of Pro- ject Managers, Project Engineers and inspectors, as well as activities of the Program Controls Group. The Program Controls Group provided project reporting, cost tracking and scheduling services.

September 1982 through June 1989/DeJongh Associates – Architects, Engineers and Planners
St. Thomas, U. S. Virgin Islands
Director of Architecture and Associate for a 30-person architectural/engineering firm providing comprehensive architectural/ engi neering design services. Directly responsible for the management of the design studio.

January 1982 through August 1982
Daniel Goldner & Associates
New York, USA
Graduate Architect for an architectural/engineering firm specializing in residential and commercial renovations. Directly responsible for design development and production coordination.

November 1979 through December 1981
Juan Montoya Design Corporation
New York, USA
Graduate Architect for an interior design firm, specializing in residential and commercial interior design. Directly responsible for de sign development and production coordination. Hired into a newly created position. Took initiative to develop requirements and standards for design production. Project included major interior design renovations for Jones New York, Government of Columbia Headquarters – New York City, and the New York residences of painter Francisco Botero and developer Jack Parker. Mr. Montoya's work was widely published in Architectural Digest, Interior Design and Town and Country between 1979 and1982.

Leroy V. Smith, JR., PE
Principal of Jaredian Design Group (JDG)

Professional Experience
Total Years: 35+
Years with JDG: 29

Education

Bachelor of Science, 1973
Illinois Institute Of Technology For Mechanical and Aerospace Engineering
Chicago, Illinois

Miscellaneous Training

Bell System School For Technical Education
Lisle, Illinois:
1973 – Basic Building Design •1974 – Building Mechanical Design
1975 – Building Electrical Design •1976 – Engineering Economics

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Educational Training

Inter-American University, San German, Puerto Rico

Diploma

Charlotte Amalie High School, Charlotte Amalie,
St. Thomas, U.S. Virgin Islands 1968

Registration

Registered Professional Engineer, United States Virgin Islands/No. 556E

Experience

-October 1992 through Present—Principal of JAREDIAN DESIGN GROUP, St. Thomas, U.S. Virgin Islands

June 1990 through September 1992—Project Manager, deJONGH ASSOCIATES, St. Thomas, U.S. Virgin Islands

October 1988 through May 1990—Site Engineer/Area Manager, 3D International, Dar Al Riyadh, Riyadh, Saudi Arabia

May 1984 through March 1987—Senior Mechanical Engineer, LEO A. DALY CO., (Stationed in Saudi Arabia), Omaha, Nebraska

August 1981 through February 1983—Senior Mechanical Engineer, T-CAS INC., Falls Church, Virginia

July 1973 through July 1981—Construction Engineer (USA), ILLINOIS BELL TELEPHONE COMPANY, Chicago, Illinois

February 1979 through October 1979—Construction Engineer, WESTERN ELECTRIC INTERNATIONAL, Riyadh, Saudi Arabia

Selected Project Experience

October 1992 through Present/
JAREDIAN DESIGN GROUP
St. Thomas, U.S. Virgin Islands
Principal of an eight (8)-person architectural/engineering firm providing comprehensive architectural/engineering design and management services throughout the Virgin Islands. Specific duties include management of Quality Control of Architectural De-sign Activities from Project Concept Development through Project Closeout, as well as management of construction activities from Bidding through Project Closeout.

June 1990 through September 1992/
deJONGH ASSOCIATES
St. Thomas, U.S. Virgin Islands
Project Manager for Architectural/Engineering firm providing Program Management Services on a $300 million capital im-provement program for the Government of the Virgin Islands. Directly responsible for the renovation/reconstruction of all major Health facilities in the United States Virgin islands as part of the Government $300 million Capital Improvement Program and post Hurricane Hugo reconstruction effort. Provided overall technical and administrative management, from project inception to project completion, of several ongoing hospital construction/ renovation projects in the $15-$25 million range. Supervised several Project Engineers and Project Inspectors.

Dar Al Riyadh, Saudi Arabia
Site Engineer/Area Manager for International Architectural/Engineering firm providing inspection and Engineering Services for the U.S. Air Force on a USA to Saudi Arabia, foreign military sales contract. Responsible for implementation of the Inspection and Engineering services contract in the western region of Saudi Arabia on the Royal Saudi Air Force Peace Shield project. Duties included monitoring the construction of all Peace Shield Facilities in the western Region of Saudi Arabia. These facilities included

October 1988 through May 1990/3D-International
Dar Al Riyadh, Saudi Arabia Cont'd
four long range radar stations, four HF communication sites and a main underground sector control and operations center. The total dollar value of these construction projects is in excess of $150 million.

May 1987 through October 1988/3D-International
Dar Al Riyadh, Saudi Arabia
Mechanical/Electrical Engineer for International A/E firm providing inspection and Engineering Services for the USAF on a USA to Saudi Arabia, government foreign military sales contract. The total cost of the above listed projects is approximately 50 mil-lion U. S. dollars.

March 1984 through February 1987/
Leo A. Daly Company Saudi Arabia
Senior Mechanical Engineer for consultant team supervising design and construction of Saudi Arabian National Guard Mili-tary Cities at Khasm Al-Aan and Dirab consisting of 5,000 Soldiers Villas and all Infrastructure. Held overall responsibility for all me-chanical works associated with the above. Headed-up Mechanical Department and directly supervised one Mechanical Engineer and Mechanical Inspector.

August 1981 through February 1983/T - CAS Inc.
Nigeria, Africa
Senior Mechanical Engineer working in the Federal Ministry of Communications, Lagos, Nigeria. Reported directly to the Project Manager/Contracting Officer for national communications projects. Main responsibilities were to advise and assist the project manager and his local staff on the mechanical aspects of various projects. These aspects included the standby power generators, fire protection systems, air-conditioning systems and piping systems.

July 1977 through July 1981/ILLINOIS Bell
Telephone Company, United States of America
Construction Project Engineer Working in the Real Estate Engineering Department of Illinois Bell Telephone Company. Coordinated and supervised the design and installation of mechanical, electrical and structural facilities for building construction pro-jects in telecommunication buildings. Worked with architects and contractors during the design and construction phases of each project, to solve design and on-site engineering problems. Handled all administrative items associated with each project, including total responsibility for all architectural and construction activities from the birth of the project To contract award through the final ac-ceptance of each project.

Veterans Drive
St. Thomas, U.S. Virgin Islands

Client
GVI

Project Data
2-mile Road/Highway

Services
CZM Permits,
Hardscape, Landscape

Completed
Phase I Design: Completed Construction: 80%
Phase II Design 90%
Construction: TBD

Providing local project coordination and urban and architectural design for the Virgin Islands Government-Department of Public Works Veterans Drive Improvement Project. The final project will be approximately three miles long when it is completed and will be the largest road project undertaken in the Territory. This project has included an extensive Public Involvement Program.

The Jaredian Design Group is part of the project team, which includes the internationally renowned Engineering firm of PB Americas, Inc. as the prime contractor. Construction of the Phase I portion of the project started in May 2018 and it is almost completed. Phase II is expected to start shortly after. The entire Construction Cost is estimated to be 120 Million Dollars.

The Villa “Whydah”
St. Thomas, U.S. Virgin Islands

Client
Tom Hudson

Project Data
19,000SF
4.4 acres

Services
Full Architectural: Permitting, Design, Construction Management

Completed
2012

The Jaredian Design Group is the Architect-of-Record for Villa “Whydah.” The Jaredian Design Group led a de-sign team for this exclusive residence that included interior design by Twila Wilson, kitchen design by Clive Chris-tian and landscape design by Springline Architects. Villa “Whydah” is located on the secluded western tip of St. Thomas in the 397-acre gated community of The Preserve at Botany Bay. Whydah has 270 degree views over the surrounding cays, two exquisite half moon bays and the meeting place of the Atlantic Ocean and Caribbean Sea. This private, top-of-the line 19,000 square foot home has six bedrooms, eight bathrooms, a caretaker house and two guest cottages along with a four car garage, custom tiled pool and spa, and a large formal kitchen.

The main building upper level consists of the master suite, children’s room, great room, formal dining room, and a large for-mal kitchen. The lower level contains an in-law suite and laundry room. On the upper level of the pool house, decks extend where you will find a full outdoor kitchen, bar and gas grill. To note, the Jaredian Design Group received the highly commended award for “Architecture Single Residence” by the International Property Awards—Caribbean Properties 2013-2014.

Edge of Architecture (EOA)
Company Overview & Case Studies

Edge of Architecture (EOA)
Company Overview

Our aim with every project is to design empathetically. Our focus is linear, goal-oriented. It is about strong branding and clear direction. It is about strategy, about understanding all the factors which influence the decision-making process. It is about operations, about back of house, about fluidity of movement, about symbiosis of spaces. It is about maximizing the guest experience, cinematically, emotionally. It is not just about amazing design, but about maximizing the clients' returns - designing with clear, realistic and targeted budget parameters while strongly focusing on revenue generation.

I, Malcolm Berg, founded EoA, Inc. in 2008. The name, Edge of Architecture, was derived from the obvious need in the Hospitality industry to revert back to a design process which encompassed all disciplines within the boundary (Edge) of Architecture. To develop a group that would intimately choreograph all phases of design, from Master Planning to Art consultation, with equal degree of care and diligence. The Mission is unequivocally about the product, about providing outstanding quality and tremendous value to our clients - value not only in aesthetics, but also in Return on Investment. Our cadre is comprised of highly seasoned professionals. We are, to that end, not just a group of Architects and interior Designers - we are a group of thinkers who happen to excel at Architecture and Interior Design.

All work we do is carefully considered, thought through and choreographed with the surroundings. We design very much in context, both physical, financial and conceptual. Our work is not only conceived, but is carefully detailed to make sure it is executed to follow design intent. We are relentless in defending the Owner's vision, but extremely malleable and inclusive of other team members' input. When Ian Schrager's office saw a lack of coordination between their Architects and Interior Designers on a major project, they called on us, specifically to intervene and bridge the gap. We see the fact that our team is comprised of Architects and Interior Designers as a tremendous asset, as our architecture and interior designs are conceived in term of sensorial experience, not simply iconic recognition.

Although it might be hard to quantify the intangible contributions, our Philosophy states them well.

We believe in taking Architecture and Design to the edge, in exploring and unifying the boundaries of all the design disciplines which shape our surroundings and populate our senses. We believe Landscape, Art and Architecture are meant to establish dialogues that are not only visual, tactile and generally sensorial, but also inextricably emotional. We aim to blur the conventional margins denoting interior and exterior spaces, to embrace literal and theoretical thresholds and apply them in a fluidly cinematic experience.

We seek to be challenged with problems requiring innovation, to be engaged in experimentation and to be fully immersed in the boundaries of convention. We believe it is this which keeps us, and our clients, ahead of a world of accelerating change.

We offer a comprehensive approach to project ideation, design and execution. Each project is unique, as is every client, therefore our process is routinely adapted to specific situations – our consistency lies in the delivery of projects which are exemplary, which not only realize but rather exceed our clients' programmatic needs and visionary expectations. In today's environment, where non-complacent competition is the norm, we aim to deliver value beyond the expected. Beyond the predictable implementation of programmatic staples lie the intangible contributions, the narratives, the overt gestures and subtle nuances which solidify the link between individual, place and moment. We believe design is, ultimately and primarily, a human experience.

Malcom Berg
Design Director
of Edge of Architecture
(EOA)

Professional Experience
Total Years: 30 Years
Years with EOA: 13 Years

Education

Harvard University, Boston, MA - Master of Architecture, 1999
Massachusetts College of Art, Boston, MA - BFA, Architecture, 1993

Registration

AIA # 30172116
NCARB

Affiliations

American Institute of Architects
NCARB - National Council of Architectural Registration Boards
International Interior Design Association
NEWH – Hospitality Industry Network
Hospitality Design Leadership Team
AOPA – Aircraft Owners & Pilots Association

Biography

Malcolm Berg is the founder, President and Design Director of EoA, Inc. Malcolm received his Master of Architecture degree from Harvard University's Graduate School of Design, and his Bachelor of Fine Arts degree, with Concentration in Architecture, from the Massachusetts College of Art. His strong visual arts background, paired with a Master's thesis which eroded thresholds between architecture and landscape, developed into a strong career in experiential design. To that end, Resort Hospitality design emerged as a distilled medium to bring Architecture, Landscape and Interior Design into one experiential discipline. His focus on design is unequivocally about the narrative, about the human element – about the intimate relationship people have with their environment.

"There's a story in every project, or at least there should be. The story is not about the Architecture, nor about the furniture or the artwork. It is about the dialogue, about the synergy created by disparate components in any landscape. It is about cinema envelopment, about sensorial stimulation - about creating a mental image of a liquid moment. To that end I founded Edge of Architecture, to bridge the gap between disciplines, to bring the focus back to narrative, to the human element - and to the intimate relationship people ultimately have with their environment." Malcolm Berg

Selected Project Experience

Miami Beach Convention Center Hotel , FL
Interior Design for Pool Amenity Deck and Restaurant

Curio Hotel Nashville, TN
Interior Design Hotel and Common Areas

Westin Wilmington, NC
Interior Design for entire hotel

Hyatt Regency Cocobeach, Rio Grande, Puerto Rico
Common Area Interior Design

Broward County Convention Center Hotel, FL
interior Design, 800 keys

Waldorf Boca Resort
Guestroom Renovation Interior Design

Ritz Carlton Amelia Island
Pool Area Renovation Arch and Interior Design

1 Hotel Beach Club
Renovation Arch and ID

JW Marriott Grande Lakes Resort
1,000 Key Guestroom Renovation Interior Design

Virgin Voyages Destination Beach Club
Architecture & Interiors

Ritz San Juan, Puerto Rico
Guestroom & common areas renovation

Hilton Curio, Omaha, NE
Interior renovation for all public spaces and guestrooms

Autograph West Palm Beach, FL
Interiors for New Build, Architectural Design and Branding Consultation

The Fives, Playa del Carmen, Mexico
Master Planning of Resort, New Build Beach Units & Pool Amenity Areas

JW Mexico City, Mexico City
Renovation of Ballrooms and Meetings Rooms

Cheeca Lodge Resort & Spa, Islamorada, FL
Renovation of Lobby, Tiki Bars and Pool

Hilton Marco Island, Marco Island, FL
Renovation: Lobby, Restaurant, Bars, Ballroom/ Meeting Rooms Guestrooms & Pool Terrace

Hyatt Confidante, Miami Beach, FL
Renovation of Ballroom, Pool Deck refresh and New Restaurant Arch. & Interiors

Sheraton Key West/La Capitana, Key West, FL
Complete renovation of Guestrooms and Common Areas, Arch. & Interiors

JW Marriott Marco Island, Marco Island, FL
New 400,000 SF Resort Conference Center and Guestroom Tower, Arch. & Interiors

Royal Caribbean Cruise Lines, Miami, FL
Izumi Restaurant

Ritz Carlton Bal Harbour, Bal Harbour, FL
Softgoods renovation, Interior Design

JW Marriott Marco Island, Marco Island, FL
PIC for Guestroom, 700+ keys, Presidential Suite softgoods renovation, Arch. & Interiors

Infinite Energy Center, Atlanta, GA
PIC for renovation, Interiors

Miami Marlins Diamond Dex Club, FL
PIC for renovation, Interiors

Autograph, Daytona Beach, FL
PIC of full Hotel renovation, Interiors

Dewar's Lounge Club, American Airlines Arena, FL
PIC renovation, Arch. & Interiors

Canopy Hilton, West Palm Beach, FL
New Hotel, Rooftop Pool and Restaurant, Branding, Interior Design & Arch. Consultation

Wild Dunes, Isle of Palms, SC
New Condo/hotel Resort Conference Center and Tower, Master Planning, Arch. Design & Interior Design

Hilton Resort Aruba, Palm Beach, Aruba
Resort renovation, 600 keys, Arch. & Interior Design

Shore Club, Turks & Caicos
New Hotel Resort Conference Center and Guestroom Tower, Interior Design & Arch. Consultation

MARK WALLACE
Senior Architect & Project Manager of Edge of Architecture (EOA)

Professional Experience
Total Years: 35 Years
Years with EOA: 3 Years

Education

University of Florida, FL. Graduate Studies, School of Architecture, 1993
Architectural Association, London, England – Graduate Studies, 1988
University of Florida, FL. Bachelor of Architecture with
High Honors, School of Architecture, 1986

Professional Background

EoA Group, Miami, FL
2019–Present, Senior Architect

Gensler, Miami, FL
2015-2019, Senior Project Manager

EoA Group, Miami, FL
2014–2015, Senior Architect

Wallace + Perdomo, Miami, FL,
2002–2014, Vice-President

Universal Realty & Develpment, Miami, FL,
1998–2002, V.P., Planning & Development

McDevitt Street Bovis, miami, FL,
1997–1998, Planning and Development Coordinator

Jonathan Andrew Construction, Inc., Miami, FL
2009-2011, Senior Project Manager

MDM Services, Inc Miami, FL
1996 – Jul 1997, Project Manager

Selected Project Experience

1 Hotel, South Beach – New outdoor Beachside Bar,
Retail, Private Club, and Event Space and Penthouse

Broward County Convention Center Hotel, FL
Interior Design for 800 keys Hotel

Jungle Island Park, FL
Master Planning and Pool Resort Design

Infinite Energy Center Westin Hotel, GA
Interior Design Guestrooms and all Common Areas

Bacardi Ocho, American Airlines Arena, FL
PIC renovation Architecture and Interiors

Washington Hotel Park, FL
Renovation of 182 key hotel

Edition Hotel South Beach, FL
Hotel remodel of a historic building

Newport Marriott, Newport Rhode Island
Renovation of 320 guest rooms, suites and public areas

JW Marriott Marco Island Resort, Marco Island, FL
PIC, $3 Million renovation of Mtg. Rms.,
Lobby and Lobby Lounge, A&I

Southeast Bank Prototype, FL – Developed three
prototype building for free standing banks

Tew Garcia Predosa, FL
Intercontinental building in downtown
Miami, interior remodel

City Of Westpoint Downtown,GA
Urban architecture

Encore, Tampa, FL
Oversaw implementation of $35M for
infrastructure improvements.

The Shore Club
Long Bay Beach, Turks & Caicos

Client
The Hartling Group

Project Data
Lobby
Pools & Outdoor Amenities
Cabanas
Bar & Restaurants

Services
Master Planning
Interior architecture
Interior Design

Completed
2017

Turks and Caicos offers spectacular beaches and crystalline waters, but also provides a consistently idyllic climate. The unceasing ocean breezes promote a lifestyle of openness, a state of relaxed, carefree placidity. An environment conducive to thought, to introspection, to story-telling and story-writing. Where community supersedes technology, where conversation and laughter drown out thoughts of faraway, tumultuous places. Upon describing it one would use terms like utopian, Babylonian. According to legend Nebuchadnezzar built the Hanging Gardens of Babylon for his wife, Queen Amytis, as a gesture of love and devotion. Regardless of the story's veracity, these gardens were a product of a dreamer's imagination, an attempt to create a poetically nurturing space.

The space was to be self-referential, contemplative, luxurious yet consciously un-pretentious. To that end we embraced the notion of Hanging Gardens, of building an understated palace for a deserving queen. Rather than building architecture in conventional form, our intention was to start with the open space – to create a series of patios, a garden which happened to host a series of disparate functions.

JW Marriott
Marco Island, Florida

Client
Barings Hotel Group

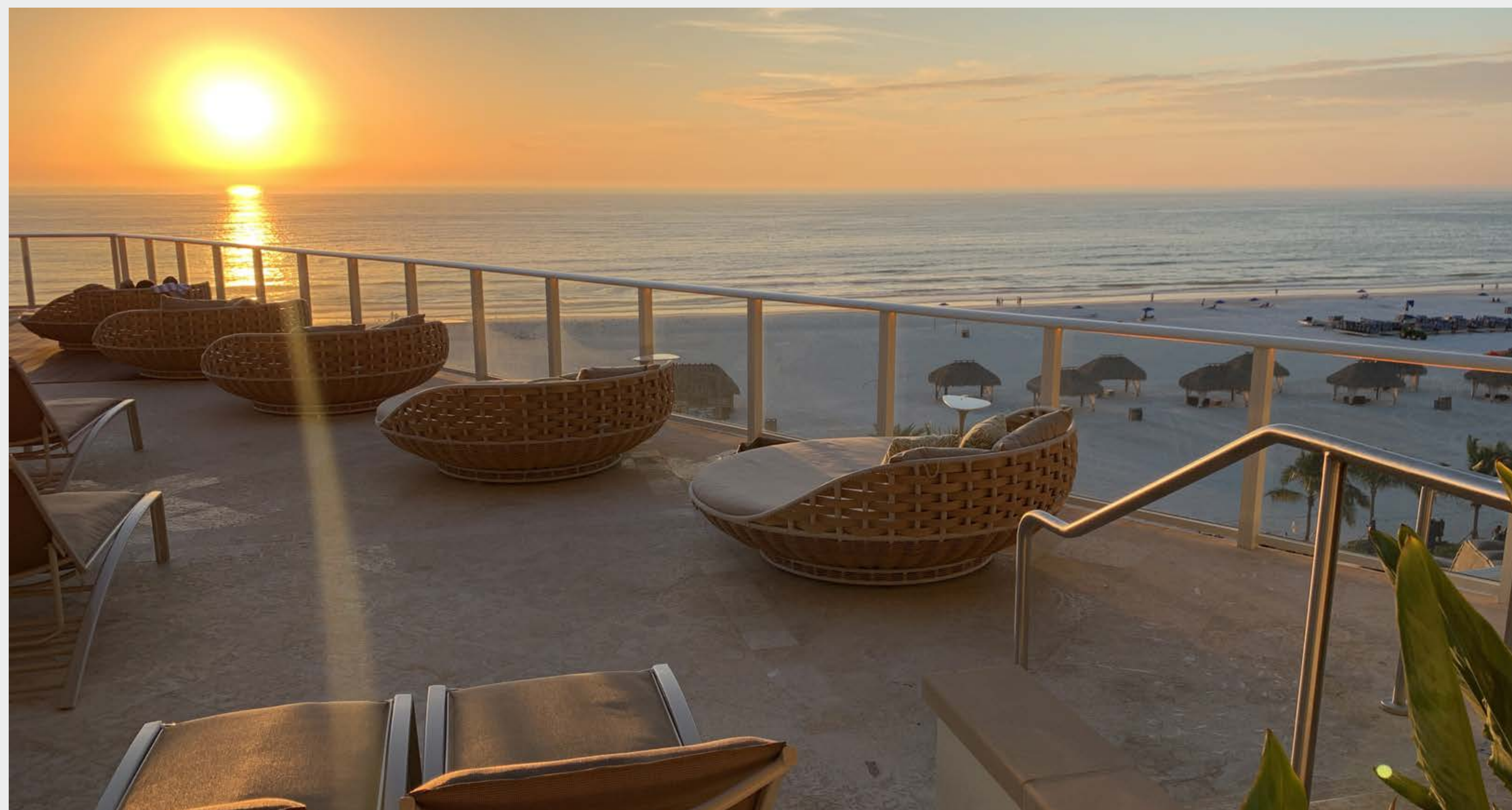
Project Data
New Guest tower
Ballroom
Pools & Oceanfront Amenities
Bar & Restaurants

Services
Master Planning
Architecture
Interior Design

Completed
2010 – Current

The property, in its inception, was conceived as an "island within an island" – a Balinese inspired, self-referential resort nestled in the vast sandy beaches of Marco Island. Passing years, multiple owners, and changing fashions layered the initial intent, leaving behind a diluted version of the initial concept. We were asked to consolidate thoughts, to distill the property's essence and define the design direction. To that end, we steered all further design towards the modern Indonesian aesthetic. This property is not meant to be a cartoonish replica of a Balinese establishment, but rather a progressive, welcoming, upscale interpretation of modern Balinese Architecture and Interior Design.

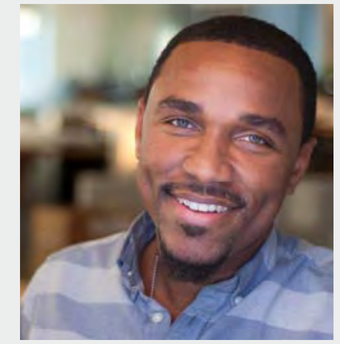
To that end, the Porte Cochere was expanded from a simple A-frame, which emulated alpine architecture, to a sweeping, gestural structure. We added curved, natural wood rafters to support the roof's lateral expansion, allowing air to flow freely through the previously stifling space. Upon entering the lobby, the wood rafters continue rhythmically inwards, the rafter tails becoming the supports for the sculptural pendant light fixtures. The intention was to infuse the space with natural materials, natural expressions, taking our cues from an organic world in harmony with otherwise relentless, linear architecture. The main A-frame rafters are spanned by a hovering, backlit perforated metal pattern. These panels emulate a magnified, desiccated leaf structure. The entire choreography is intended to allow the guest to enter the space and immediately view the spectacular pool and expansive beaches beyond. The lobby is now a moment of reflection, a moment of pause in anticipation of what lies ahead.



Design District Architects (DDA)
Company Overview

Design District Architects (DDA)
Company Overview

Design District, PLLC is a Virgin Islands based architectural fi rm with global experience and specialized designers. Our culture encourages the exploration of possibilities and makes room for great ideas to flourish. Our holistic approach to problem solving, our refined use of technology, and our commitment to transparency give our clients the edge in making critical decisions about their projects.



Clarence E. Browne, RA, AIA
Founding Principal of Design District Architects (DDA)

Professional Experience
Total Years: 15
Years with DDA: 2

Crucian architect, Clarence Browne, leads this fi rm with over 13 years experience as a design professional. Since obtaining his Masters in Architecture from Andrews University, he has worked on a wide range of public and private sector projects within and outside of the territory. From a $230M hotel and apartment complex in the heart of Washington, D.C., the masterplanning of a resort on St. Croix, installation inspection for the territory's fi ber optic netowrk, to the rehabilitation of hurricane damaged homes in the territory, he has a proven record of design and delivery. Mr. Browne is responsible for design management, client and stakeholder management, project delivery and management of the fi rm's resources.

Education

Masters in Architecture, Andrews University,
Berrien Springs Michigan 2006
Bachelors in Architecture, Andrews University,
Berrien Springs, Michigan 2005

Professional Experience

Project Architect, Cooper Carry, Inc. | Atlanta, GA | August 2014-2019
Architect, Jaredian Design Group | St. Thomas,
VI | March 2010- August 2014
Designer, William M. Karr & Associates | St. Croix VI | 2007-2009
Intern Architect, Springline Architects | St. Thomas, VI | 2004-2006
Independent Designer/Architectural Consultant | 2004-2010

Skills & Qualifications

Registered Architect - U.S. Virgin Islands
Over 13 years professional experience in Design & Construction Industry
Experience with large scale complex construction projects
Experience with Public & Private sector projects
Excellent graphic and presentation skills
Profi cient in multiple CAD and BIM programs
Analytical, pro-active and resourceful
Lived and worked in both St. Croix and St. Thomas-St. John districts
Technical Skills in CAD/BIM, PM Software, Adobe
CS, Microsoft Offi ce, Prezi-Powerpoint

Applied Technology & Management (ATM)
Company Overview & Case Studies

Applied Technology & Management (ATM) Company Overview

Founded in 1984, ATM provides waterfront, coastal, and water resources engineering services throughout the southeastern U.S. and internationally. ATM maintains full-service offices in Gainesville (our corporate office), West Palm Beach and St. Augustine, Florida; Mount Pleasant, South Carolina; and Dubai, United Arab Emirates.

Since 1990, we have provided services on more than 4,000 waterfront and coastal projects throughout the U.S. and internationally, involving a spectrum of planning, feasibility, engineering, design, permitting, and environmental investigations.
Our 36 domestic employees include 15 licensed professional engineers, four PhD-level scientists, a licensed professional coastal geologist (PG), a licensed professional surveyor and mapper (PSM), a certified land planner (AICP), and two engineering interns (EIs). More than half (26) of our employees have advanced degrees in a coastal engineering or related science discipline. ATM's workforce is notably stable, with an average company staff tenure of over 12 years. This stability is further mirrored in our five managing principals, who together have over 110 years of collective experience working for ATM.

ATM's overall mission is focused on water-related design, consulting, and engineering. Our technical diversity allows us to provide effective studies and solutions for any water-related issue. From projects involving coastal construction to marina design, we provide customized planning, design, permitting, engineering, and engineering solutions.
Waterfront Engineering and Marina Development
The complexity of waterfront projects typically involves hydrodynamic loading, potential ecological impacts, market drivers and functional requirements, state and federal resource permitting, sovereign submerged lands authorization, and construction limitations due to wetlands, critical resources, etc. ATM's 37 years of working in and around the marine environment provides our team with valuable insight and experience throughout project planning, design and construction. Further, ATM team members (15) possess advanced degrees in coastal/ocean engineering, each with a distinct understanding of the technical issues that are required for design. ATM's engineers and supporting technical professionals provide practical experience in marina market studies, planning, financial studies, design and construction oversight. ATM has been involved in the construction phases of waterfront projects valued at nearly $400 million.

We are recognized as an international leader in the development and design of marinas and waterfront structures. Our waterfront engineering capabilities include shoreline stabilization (seawalls, revetments, breakwaters, bulkheads, and living shorelines); planning, design, permitting and construction phase services of marinas, fixed and floating docks, boat ramps and fishing piers; and inspection of waterfront and coastal facilities, including boardwalks, dune walkovers, overlooks, trails, and mooring facilities. ATM Principal, Timothy Mason, PE, is a co-author of ASCE's Manual of Practice 50 (2012) "Planning and Design Guidelines for Small Craft Harbors". Associate Principal Esteban L. Biondi is the Chairman of the Recreational Navigation Commission of PIANC (The World Association for Waterborne Transport Infrastructure) - the marina group within the most prestigious professional organization dedicated to developing international guidelines for the design of navigation infrastructure.

Marina Planning/Feasibility Studies
ATM has developed a proven, holistic approach to fully understand project feasibility and successfully applies it to waterfront developments around the world. While each location brings unique factors into play, an integrated approach to assessing the feasibility of waterfront development answers key questions critical to moving forward. Local market factors are analyzed, and demand is forecasted. Physical and environmental conditions/constraints are assessed from an engineering perspective. Regulatory constraints are evaluated, and regulatory agency input is sought. Utilizing this information, an optimized facility layout is created. Finally, financial feasibility is evaluated using ATM's proprietary economic projection models developed specifically for the recreational marina industry. The feasibility effort results in a marina development plan that is optimized for the market, technically sound, environmentally conscious, and tested for economic viability.

Waterfront/Marina Market Analysis
As part of the marina planning/feasibility process, ATM conducts market research on recreational marina projects throughout the country (and beyond). Our market analysts pioneered this field of research and developed a formal, proven approach to marina market analysis. This approach is continually evolving as the marina industry reacts to global, national and regional economic and demographic changes. We remain at the forefront of the field and many industry consultants attempt to emulate our approach to market analysis.

“ATM specializes in coastal engineering studies and design, including numerical modeling to evaluate hurricane impacts (storm surge and waves)”

Waterfront/Marina Planning

ATM is regarded as one of the leading marina/waterfront planning specialists in the industry. Our planning process involves a holistic approach to the integration of upland and waterside elements of any given project. Careful circulation analysis of these intertwined elements, segregation of user groups (including motorized and non-motorized vessels, shore-based fishermen, pedestrians, etc.) and thoughtful location of upland amenities can reduce conflict and vastly increase safety, efficiency and user enjoyment of waterfront property. Our planning efforts incorporate the findings of our marina market evaluations, environmental and regulatory considerations, operational factors, engineering assessments, and financial planning tools to develop the most efficient and economical plan for our clients.

Financial Analysis and Pro Forma Modeling

Building upon our expansive knowledge of marina design, waterfront development and operations, ATM developed a pair of proprietary pro forma analysis tools that can be modified for specific marina/waterfront projects. These models can project income and expenses over time (usually 10 to 20 years) to determine cash flow and key financial indicators such as projected annual revenue and internal rate of return. The model maintains the flexibility to include a wide variety of input assumptions and revenue streams. We have successfully adapted our models to numerous municipal marina projects and have included detailed analysis of bond funding and other debt service tools.

Hydrodynamic and Water Quality Modeling Capabilities

ATM specializes in performing hydrodynamic and water quality monitoring and modeling of receiving waters and watersheds. We have a long history of developing, applying and reviewing hydrodynamic modeling systems to predict circulation and transport in the coastal and estuarine environments, as well as freshwater river, lake and reservoir environments. Our expertise covers all areas of surface water monitoring and modeling, including hydrologic and hydrodynamic, stormwater, pollutant transport and water quality, and natural resource impact. We provide both screening-level and detailed dynamic evaluations of watershed hydrology, hydraulics and pollutant loadings.

Wave Modeling and Coastal Risk Analysis

ATM specializes in coastal engineering studies and design, including numerical modeling to evaluate hurricane impacts (storm surge and waves), as well as increased flooding and erosion impacts resulting from sea level rise. These studies provide design parameters for marina and coastal structures, as well as planning recommendations for resilient upland development in coastal zones.

Industry Affiliations

ATM is associated with a number of industry organizations to keep current with trends in the waterfront/marina development industry. Our affiliations include:

- **PIANC (The World Association for Waterborne Transport Infrastructure):** ATM is an active corporate member in PIANC, the global organization providing guidance for sustainable waterborne navigation infrastructure. This organization provides a forum for global professionals and develops technical guideline documents on cost-effective, reliable and sustainable navigation infrastructure. ATM staff hold leadership roles in the organization and participate in recreational navigation working groups and events.
- **AMI (Association of Marina Industries):** An organization that provides “the independent voice for the marina industry at the national level on all related legislative and regulatory issues.”
- **NMMA (National Marine Manufacturers Association):** A trade organization that represents the U.S. recreational boating industry.
- **ASCE (American Society of Civil Engineers):** ATM waterfront staff are among the authors for ASCE publication 50, “Planning and Design Guidelines for Small Craft Harbors.”
- **ULI (Urban Land Institute):** ATM staff are active members of this professional organization that is dedicated to “provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide.” ATM staff is member of national and regional product councils and serve in committees focused on the Caribbean and coastal resilience.
- **SOBA (States Organization for Boating Access):** ATM is an active member and our staff are regularly featured speakers at SOBA’s national conferences. We also contribute to SOBA publications on public water access and grant funding.

Timothy P. Mason, PE
Principal of Applied Technology & Management (ATM)

Professional Experience
Total Years: 28
Years with ATM: 27

Areas of Specialization

- Marina and Coastal Engineering
- Waterfront Project Master Planning and Feasibility
- Environmental Siting Studies
- Technical Requirements and Specifications for Fixed/ Floating Docks and Marina Utilities
- Shoreline Protection and Restoration
- Design and Construction Documents
- Construction Contract Administration
- Environmental Impact Evaluation
- Monitoring and Mitigation Plans

Education

- ME, Coastal and Oceanographic Engineering, University of Florida, 1993
- BS, Ocean Engineering, Florida Atlantic University, 1991

Professional Registration

- Prof. Engineer, FL, No. 74424, 2012
- Prof. Engineer, SC, No. 18341, 1997
- Prof. Engineer, DE, No. 12271, 2001
- Prof. Engineer, NC, No. 29747, 2004
- Prof. Engineer, NJ, No. 24GE05079100, 2013
- Prof. Engineer, U.S. Virgin Islands, No. 0-13896-1B, 2002

Professional Affiliations

- American Society of Civil

Summary of Qualifications

Mr. Mason has extensive experience in coastal and waterfront engineering, development, and management projects, focusing on coastal feasibility evaluations, engineering, and environmental assessment. His experience includes all phases of project implementation: planning and feasibility, permitting, design, plans and specifications, tendering/ bidding, construction, monitoring, and mitigation planning. Project experience and locations extend along the east coast from Rhode Island to Florida, the Gulf of Mexico coast, Pacific coasts of Mexico and Central America, the Caribbean, Europe, and Middle East.

Mr. Mason has been a project manager for more than 20 years on projects ranging from community boat ramp/waterfront access projects to large-scale, multi-faceted resort destination development projects.

Summary of Qualifications

He is responsible for international field data collection and analysis in support of engineering design and environmental impact evaluations from small docking and marina facilities to large-scale resort developments, wave and oceanographic modeling for waterfront projects, beach nourishment and coastal structures design, market studies for small craft and megayacht facilities, and due diligence for waterfront facilities. He has significant experience in geotechnical evaluations for beach nourishment projects, docking system design and specification (fixed and floating structures), and shoreline stabilization structures for both public and private clients.

Mr. Mason's coastal work includes development of comprehensive beach/shoreline management plans, tidal inlet studies and management planning, coastal flood hazard/risk evaluations, and dredging and reclamation projects. He also provides affidavits, expert analysis/reporting, and expert witness services. Mr. Mason is a co-author of American Society of Civil Engineers (ASCE's) Manual of Practice 50 (2012) "Planning and Design Guidelines for Small Craft Harbors," specifically Chapter 3 which includes inner harbor structures, shoreline stabilization, docks and piers. He was also a contributing author to PIANC's Working Group report 134, "Design and Operational Guidelines for Superyacht Facilities (2013)" and contributing author to the report of Working Group 149 on marina design.

Selected Project Experience

Yacht Haven Grande Marina, St. Thomas, USVI: Completed planning and market feasibility studies for $16 million+ marina redevelopment. Designed 1,900 feet of rock revetment for shoreline stabilization, dredging for mega yacht access, and demolition project components. Developed in-slip utilities requirements including shore power, potable water, fire suppression, fueling, and sewer pump out. Prepared plans, specifications, and bid documents for site work, as well as performance specifications and plans for pier structures to handle vessels to 350 feet. Project manager during design process and construction phase support. Evaluated alternatives and design conditions for Phase 2 of the project, including field wave monitoring and modeling. In 2012-2013, provided technical support and planning level cost estimates for alternatives for mooring larger vessels in A Dock slips, including fixed mooring points with buoys and mooring dolphins.

North Sound Yacht Club (YCCS Virgin Gorda), Virgin Gorda, BVI: Project manager and lead engineer for a mega yacht berthing facility for vessels of 100-300 feet length overall. Work included facility planning and layout alternatives, project phasing, and upland program recommendations for the marina associated with the Oil Nut Bay development. Directed numerical modeling of wind and wave conditions at the project site and developed design criteria for the docking system. Prepared performance specifications for fixed pier design (design/build) and managed detailed design of marina electrical and plumbing systems. Developed performance specifications for floating dock option. Provided construction phase support via contract and submittals review, as well as limited field site visits and coordination with contractor and government.

Oil Nut Bay Marina, Virgin Gorda, BVI: Principal engineer and project manager who oversaw detailed wave modeling to determine project design criteria. Completed detailed design plans and technical specifications for the Phase 1 facility in late 2013, including a unique structure for the service barge landing, helipad, and boat ramp, as well as a fixed pier for berthing of 22 vessels ranging from 30-80 feet in overall length. Design work included shoreline stabilization (steel sheet pile bulkheads, rock revetment), land reclamation, concrete boat ramp and floating staging dock, concrete barge land and helipad, concrete fixed docks with steel pipe piles, and all associated utilities (electrical service, potable water, and sewer pump out). ATM also coordinated the design of the lighting and marking of the helipad. Phase 1 construction commenced in 2014 and was completed in 2015. Also provided limited Phase 2 improvements design refinements and construction support from 2015-2017.

Dock Maarten Marina Improvements, Philipsburg, St. Maarten: Provided engineering technical support for planning, design, and tendering for the renovation and expansion of the existing Dock Maarten marina facility. The expanded marina included dredging, land reclamation, sheet pile bulkheads, revetment, fixed piers, and utilities to service vessels to 300+ feet.

Steven J. Peene, PhD
Principal Modeler and Scientist of Applied Technology & Management (ATM)

Professional Experience
Total Years: 32
Years with ATM: 26

Areas of Specialization

- Sea Level Rise–Coastal Surge Modeling
- Modeling and analyses in support of total maximum daily load (TMDL) evaluations, environmental impact studies, NPDES permitting and design alternative evaluation
- Multidimensional circulation, transport and water quality modeling and analyses of watersheds, rivers, lakes, estuaries, offshore, and beach processes
- Design and implementation of hydrodynamic and water quality monitoring programs in support of circulation, transport and water quality studies

Education

- PhD, Coastal and Oceanographic Engineering, University of Florida, 1995
- MS, Coastal and Oceanographic Engineering, University of Florida, 1987
- BS, Civil Engineering, Lehigh University, 1982

Professional Registration

- Florida Stormwater Association
- Southeast Stormwater Association
- The Water Research Foundation – Member, Advisory Committee on Receiving Water Linkages in Water Quality

Summary of Qualifications

Dr. Peene has extensive experience in water resources analysis including sea level rise–coastal surge modeling, watershed planning, stormwater management planning, NPDES MS4 permitting, evaluation of non-point and point source pollution in surface water systems, hydrologic, hydrodynamic, sediment transport and water quality modeling for lakes, rivers, estuaries, coastal embayments, and offshore; evaluation of impacts to ecological resources in surface waters; design and implementation of monitoring in surface water systems; and hydrologic and water quality restoration. He is experienced in the management and coordination of large interdisciplinary projects involving public and agency participation and has managed a number of major projects for clients that examine the effects of physical, chemical, and hydrologic changes in surface water systems, both freshwater and estuarine.

Selected Project Experience

Vessup Point Marina Redevelopment Flushing Study, St. Thomas, USVI: Project manager of a flushing model of Vessup Bay that included development and application of a hydrodynamic model and field data collection to support model development and calibration.

Masters Harbour Flushing Study, Exuma, Bahamas: Project manager for the development of a 3-D Environmental Fluid Dynamics Code (EFDC) hydrodynamic model to assess the flushing characteristics of a proposed series of interior canals and a marina basin on Exuma, Bahamas. Tasks included development and testing of the hydrodynamic model and model scenario runs to determine the time of exchange for the interior canal system and marina basin.

Ritz Carlton Flushing Assessment, Cayman Islands: Developed hydrodynamic model of a series of lagoons adjacent to the Ritz Carlton on Grand Cayman Island. The model was used to assess the degree of flushing within the lagoons and to aide in the design of potential pumping system to improve the overall flushing and water quality within the system.

February Point Flushing Model, Georgetown, Bahamas: Developed hydrodynamic model of a proposed upland marina basin and its connection to Lake Victoria. The model was utilized to assess the degree of flushing of the basin based upon the connection to Lake Victoria and offshore. This work was done in support of an environmental impact assessment (EIA) for a resort development which included the proposed upland marina basin.

Mathew Town Basin Flushing Model, Mathew Town, Inagua, Bahamas: Developed hydrodynamic model of a small existing marina basin. The model was utilized to assess the degree of flushing of the basin following modifications of depth and entrance configuration. This work was done in support of an EIA for the marina project.

Rum Cay Marina, Bahamas: Developed hydrodynamic model to evaluate the flushing characteristics within an enclosed marina basin on Rum Cay. Modeling was used to support an EIA for the marina project.

West End Project, Bahamas: Developed hydrodynamic model to evaluate the flushing characteristics within a series of interconnected marina basins on Grand Bahama Island. Modeling was used to support an EIA for the overall development and marinas.
North Creek Hydrodynamic Modeling, Turks and Caicos: Developed a 3-D EFDC hydrodynamic model to assess the changes to water levels within the interior embayment and exchange associated with expansion and deepening of the North Creek channel. North Creek is located on the north end of Grand Turk and feeds into an approximately 250-acre interior lagoon.

Leeward Going Through Hydrodynamic Model, Turks and Caicos: Project manager and lead modeler in charge of the development of a 3-D hydrodynamic model of the Leeward Going Through Channel. The purpose of the model was to assess the impacts of proposed dredging of the channel on local velocities and potential erosion of the areas surrounding the inlet system. The modeling was used to support an EIA for the proposed dredging.

Sedimentation Modeling for Belle Isle Yacht Club, Georgetown, SC: Developed and calibrated a 3-D EFDC hydrodynamic and sediment transport model which included the Waccamaw River, Winyah Bay, the Belle Isle Marina Basin, and areas offshore. The model was utilized to assess changes in sedimentation within the marina basin under varying entrance design conditions and alteration of freshwater inflows. The model was calibrated to available hydrodynamic data within the river and estuary along with measured sedimentation rates and patterns within the Marina Basin. The modeling showed that the design alterations recommended by ATM would significantly reduce sedimentation rates in the basin.

Bohicket Creek Marina Expansion Bacteria Modeling, Bohicket Creek, SC: Project manager for the development of a 3-D EFDC hydrodynamic model to evaluate the impacts of a proposed marina expansion on the extent of the shellfish closure area in the vicinity of the existing marina. Work included development and testing of the hydrodynamic and water quality model; modeling of the baseline extent of fecal coliform concentrations surrounding the marina under the existing number of boats; and modeling of the fecal coliform concentrations after the proposed marina expansion. Coordinated extensively with personnel from SCDHEC and the FDA throughout the model development and application process.

Esteban L. Biondi
Senior Waterfront Consultant of Applied Technology & Management (ATM)

Professional Experience
Total Years: 28
Years with ATM: 19

Areas of Specialization

- Waterfront Development Planning, Engineering and Feasibility Studies
- Marina Planning and Design
- Cruise and Yacht Destination Planning and Feasibility
- Marina Market and Feasibility Studies
- Nautical Tourism and Sustainable Marina Planning
- Site Assessment and Project Due Diligence
- Environmental Impact Studies and Permitting
- Design of Coastal Structures
- Coastal Resiliency and Sea Level Rise Adaptation

Education

- Harvard University Graduate School of Design. Executive Education - NCI Charrette System Program, 2015
- Master of Ocean Engineering (MOcE), Oregon State University, 1998
- Fulbright Fellowship (1996) and Kenneth Holland Award (1997)
- Ingeniero Civil, Universidad Católica Argentina, 1990 (6-year Civil Engineering degree)

Professional Registration

Professional Civil Engineer No.14453 (CPIC, Argentina)
Graduate Member No. 93512843 (GMICE, UK)

Professional Affiliations

- PIANC – The World Association for Waterborne Navigation Infrastructure Chairman of RecCom (Recreational Navigation Commission)
- Member of Jury for "Working with Nature" Certification and Award
- Member of WG 149 Guidelines for Marina Design
- Chairman of WG 148 Marina Sustainability
- Chairman of WG 132 Dry Storage (completed)
- Urban Land Institute (ULI)
  - Full Member
- Member of Travel Experience and Trends Council
- Member of Florida Hospitality & Recreation Product Council
- Member, the SE Florida/Caribbean District's Caribbean
- Council and the Resiliency Committee
  - Co-Chair of SE Florida Leadership Institute Day
  - Program Sustainability and Resilience (2018-19)

Languages

All professional services provided in English and Spanish

Summary of Qualifications

Mr. Biondi has over 25 years of experience in ocean, coastal, and waterfront projects ranging from marina developments and cruise destinations to port structures and environmental impact studies. Since 1993, he has worked as a consultant on projects throughout the Caribbean, Latin America, U.S., Middle East, Europe, and Asia. Mr. Biondi has been involved in approximately 200 marina consulting assignments since 2002, managing more than 120 of them.

He directs yachting and marina market and feasibility studies, as well as planning, design and engineering consulting services for municipal, private, and resort marinas and recreational navigation infrastructure systems. He also conducts site assessments, develops plans, and directs services for the construction of marina projects all over the world.

He has experience coordinating engineering and environmental technical services in support of resort master planning, bridging the gap between international resort developer's plans and local engineering capabilities. He directs and supports coastal engineering, environmental design, environmental impact, and stormwater management studies for resorts, urban waterfronts, and marinas; and specializes in using these studies for planning and design optimization. Mr. Biondi provides services on private island cruise destination studies and expansion projects in the Caribbean, as well as assessment, strategic planning and development studies of public cruise destinations in Latin America and Asia.

Mr. Biondi has an extensive involvement in professional institutions; he holds leadership roles in PIANC and is an active full member of ULI. He is a speaker at various real estate development, hospitality, marina conferences, and cruise events. He has published book contributions, conference papers, articles in industry publications, and a paper in a peer reviewed journal.

Selected Project Experience

Vessup Point Marina, St. Thomas, USVI (2019-ongoing): Project director responsible for marina planning, engineering assessment and feasibility report. Conducted marina market assessment, site reconnaissance, environmental review of existing habitat mapping, and marina master plan workshop with resort planners. Developed marina plans, cost estimates and a comprehensive marina feasibility report. Directed wave modeling and coastal risk analysis, including sea level rise impacts on hurricane vulnerability. Supported scoping of water quality and flushing studies. Developed mooring field strategy and directed planning, feasibility studies and design.

Runaway Beach Marina Master Plan, Antigua (2018): Project manager and lead marina designer. Responsible for marina planning, marina basin and dock layout concept development, engineering assessment, and feasibility report. Conducted site reconnaissance, environmental review, marina market assessment, and marina master plan charrette with resort planners. Directed wave modeling, flushing modeling, marina design and cost estimates, and compiled marina feasibility report.

Hyatt Ziva Carlisle Bay Coastal Impact Assessment, Barbados (2020): Project manager and lead coastal designer. Coordinated coastal vulnerability studies, including sea level rise impact quantitative analysis. Directed wave modeling to recommend setbacks and to produce a coastal impact assessment. Responsible for conceptual design recommendations of resilient coastal development.

Choc Bay Coastal and Hydrologic Assessment, St Lucia (2019-2020): Project manager and lead coastal designer. Coordinated watershed and coastal vulnerability studies, including sea level rise impact quantitative analysis. Directed wave modeling, environmental preliminary review, and stormwater assessment to improve water quality and flood controls. Responsible for conceptual design of resilient coastal development.

Esteban L. Biondi
Senior Waterfront Consultant of Applied Technology & Management (ATM)

Confidential Marina Infrastructure System Planning Project, Middle East (2018-2019): Project Manager and Lead Marina Designer for the development of the Conceptual Master Plan and Detailed Master Plan of a large-scale regional marina and yachting infrastructure system in a sensitive environmental area. Worked with a large development, planning, architecture and engineering team to develop marina facilities comprising more than 30 facilities and almost 2,000 berths for recreation, tourism, guest transport and services in more than 20 islands and coastal sites. Responsible for marina market study, planning, engineering studies, economic studies, design guidelines and reports. Proposed and developed strategic documents on marina environmental design, marina social sustainability and sustainable use of natural habitats for yachting destinations.

Norman's Cay Marina Market Assessment, Pro Forma, Design Revisions, Design Development and Tender Documents, Exumas, Bahamas (2014-2016): Project director and marina consultant responsible for marina market evaluation, in the context of a project master plan revision. Responsible for the coordination of all design development analysis, construction permit drawings, final design of marina basin and shoreline structures, and bid documents for marina and utilities of the resort marina. Coordinated all design revisions resulting from construction contract negotiations and provided technical support to the owner representative regarding negotiation of technical modifications for contracting.

Ritz Carlton Grand Cayman Master Plan Revision, Grand Cayman, Bahamas (2014): Project manager and senior marina consultant for marina master plan and concept feasibility of resort marina development in existing basin and mangrove restoration. Developed mangrove restoration and use enhancement concept plan with resort architect. The project was selected as the only Caribbean project in ULI's publication "Returns on Resilience, the Business Case". Developed diagnosis and mangrove restoration strategy, and for coordination of resort amenity improvements associated to the mangrove restoration.

Yacht Haven Grande
St. Thomas, U.S. Virgin Islands

Heath Hansell, PE
Professional Engineer of Applied Technology & Management (ATM)

Professional Experience
Total Years: 10
Years with ATM: 9

Areas of Specialization

- Coastal and Marina Engineering
- Coastal Processes - Shoreline Evaluation, Protection and Restoration
- Marina and Waterfront Development Feasibility and Planning
- Coastal Structures
- Coastal Hazard and Resiliency Analysis
- Field Investigations and Instrumentation
- Flood Risk Assessments
- FEMA Flood Zone Remapping
- Due Diligence and Post-Storm Damage Assessments
- Permitting
- Drone Operations and Mapping

Education

- MS, Ocean Engineering, Florida Institute of Technology, 2012
- BS, Civil Engineering, Mississippi State University, 2009

Professional Registration

- Prof. Engineer, SC, No. 32927, 2015
- Prof. Engineer, MS, No. 28545, 2017
- Prof. Engineer, GA, No. 042340, 2017
- Prof. Engineer, ME, No. PE15751, 2018
- PADI Open Water SCUBA

Professional Affiliations

- USACE Coasts, Oceans, Ports, and Rivers Institute (COPRI)
- American Academy of Underwater Sciences (certified diver)
- American Shore and Beach Preservation Association
- States Organization for Boating Access

Summary of Qualifications

Mr. Hansell's expertise encompasses a broad range of technical activities associated with coastal and waterfront engineering projects. He specializes in the prediction and evaluation of project performance in the physical water environment including comprehensive site evaluations; field data collection and statistical analyses of oceanographic conditions, wave-structure interactions, coastal processes and structural design; and project development. He applies his background in civil and coastal engineering to the planning, design, permitting, construction, and monitoring of beach nourishments, coastal and erosion control structures, wetland mitigation, dredging, and waterfront development.

Summary of Qualifications

His diverse experience includes flood risk assessments, FEMA flood mapping, coastal hazard analysis, resilient design, and numerical modeling and analysis of hydrodynamic, wave, flushing, and coastal processes in support of coastal and waterfront projects. Project experience and locations extend along the east coast from Maine to Florida, the southeast U.S. and Gulf Coast, Canada, Central and South America, the Caribbean, and Middle East.

Selected Project Experience

Island Global Yachting Marina Condition Assessment, St. Thomas, USVI: Performed detailed condition assessment of aging marina facility. Developed and oversaw dive inspection of underwater pile and substructure conditions. Assessed shoreline treatment, fixed pier structures and related marina elements. Developed detailed pier-by-pier, element-by-element condition documentation, including life/safety issues and rehabilitation planning and costing scenarios for marina redevelopment. Coordinated conceptual rehabilitation plans to utilize local materials and methods. Developed alternative phased rehabilitation and replacement plan for marina redevelopment.

Elbow Cay Marina, Marina and Tidal Datum Projects Abacos, Bahamas: Provided coastal and waterfront technical services in support of the planning and design of a new waterfront development and marina facility. Developed and oversaw bathymetric surveying, marine geotechnical investigations, and tidal gauge deployment to develop site-specific tidal datums for project elevation references. Managed and directed statistical tidal datum analysis, level 1 storm surge numerical modeling effort, and coastal hazards modeling analysis. Developed construction recommendations, including setbacks and finished floor elevations throughout the upland development area for a variety of return period interval storm scenarios and sea level rise considerations. Coordinated with owners, upland planners and local marine contractors on layout, planning and preliminary design of marina facility, including fixed pier and wave screen structure, floating docks, shoreline bulkhead, and other marine elements.

Marina Feasibility, Coco Beach, Puerto Rico: Conducted financial pro forma analyses of marina elements for a proposed large-scale coastal resort and marina. Evaluated seasonal slip occupancies; commercial, residential, and transient uptake; rates and revenues; and construction costs of numerous project alternative permutations. Developed cost/revenue metrics for value engineering and maximizing return on investment for developer consideration.

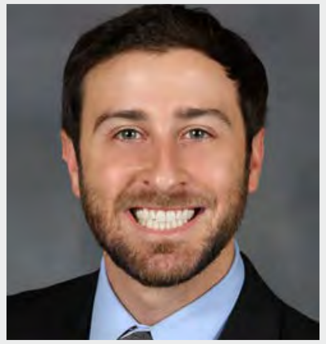
Palmas Del Mar Yacht Club, Puerto Rico: Provided coastal engineering support for investigation of agitation and seiching issues in an existing marina basin. Reviewed design conditions, numerical model results, and supported development and analysis of several alternatives to provide acceptable tranquility within the basin.

Baha Mar Marina Feasibility, Nassau, Bahamas: Provided consulting services related to proposed marina facility. Performed statistical offshore wave analysis and nearshore transformations related to several inlet location alternatives. Provided recommendations on inlet location, navigability, seasonality, and coordination related to alternatives.

Norman's Cay Marina Design, Norman's Cay, Bahamas: Performed hydrodynamic flushing model alternatives analysis for proposed marina. Investigated observed long period swell concerns at the complex island location via numeric modeling and desktop analysis to specify entrance configuration and protection alternatives. Oversaw coastal risk and mapping analysis, including extreme event storm surge, waves, and sea level rise scenarios. Delineated shoreline types, setbacks, design elevations, and construction recommendations for island development based on coastal risk analysis.

February Point Flushing Study, Great Exuma, Bahamas: Planned and executed a site assessment and instrumentation deployment. Collection and analysis of tidal fluctuations within the bay and between several hydraulically connected lagoons was performed in support of a flushing analysis for a proposed marina development.

Oil Nut Bay Marina Development, Virgin Gorda, British Virgin Islands: Performed large-scale offshore wave model and nested nearshore project site wave modeling in support of facility design. Developed breakwater design specifications, including a helipad on the structure. Performed material estimates and specifications based on locally available materials and construction methods.



Marc Gold, EI
Engineering Associate of Applied Technology & Management (ATM)

Professional Experience
Total Years: 5.5
Years with ATM: 5.5

Areas of Specialization

- Coastal Processes and Sediment Transport
- Wave Modeling
- Sediment Transport and Shoreline Modeling
- Marina Tranquility Analysis
- Oceanographic Engineering
- Assessment of Coastal Structures
- Field Data Collection
- FEMA Risk Analysis
- Data Analysis and GIS

Education

- MS, Coastal and Oceanographic Engineering, University of Florida, 2015
- BS, Physics, University of Florida, 2013

Professional Registration

Engineer Intern, No. 52941, 2015

Professional Affiliations

- USACE Coasts, Oceans, Ports, and Rivers Institute (COPRI)
- American Academy of Underwater Sciences (certified diver)
- American Shore and Beach Preservation Association
- States Organization for Boating Access

Summary of Qualifications

Mr. Gold specializes in the analysis of processes along coasts, wetlands and estuarine environments including sediment transport and nearshore hydrodynamics. His experience includes permitting, numerical modeling, statistical and time series analysis, and international field data collection. Mr. Gold utilizes his coastal engineering background to perform assessments and design of coastal structures, FEMA flood zone and risk analysis remapping, beach nourishment design and monitoring, and coastal conditions assessments for marina design.

Selected Project Experience

Vessup Point Marina Feasibility Studies, St. Thomas, USVI: Performed a coastal conditions study used for preliminary marina breakwater design as well as beach construction setbacks, and conducted FEMA-based hazard mapping methodology to provide building elevation recommendations. Analysis included gathering extreme offshore wave data from NOAA's WaveWatchIII, performing statistical return period analysis to establish extreme offshore wave conditions, of various return period events. Developed a nested SWAN wave model grid to necessarily propagate the extreme offshore waves to the site to establish preliminary breakwater design conditions. Provided oversight to technical team to input these results to the nearshore SBEACH model and FEMA WHAFIS model to analyze overland wave propagation and assess erosion at the site's beach amenity under extreme surge and wave conditions.

Runaway Beach Marina Master Plan, Antigua: Performed detailed wave modeling for a marina entrance and breakwater design configuration, and assessed flood hazard risks using FEMA methodology to develop coastal setbacks for construction at the site. Conducted statistical analysis of offshore wave data to develop extreme wave height conditions for various return periods. Performed site-specific wave modeling using CMS-Wave and utilized the FEMA wave model, WHAFIS, and SBEACH to assess shoreline erosion, surge, sea level rise scenarios, and wave runup and overtopping effects to develop FEMA based hazard zones at the site's planned beach amenity. Developed a site CMS-Wave model of alternatives to design an optimal breakwater layout at the site's planned marina.

Norman's Cay Marina Design, Exumas, Bahamas: Assessed flood hazard risks and delineated FEMA-based flood zoning. Conducted statistical analysis of offshore wave data to develop extreme wave height conditions for various return periods. Performed site-specific wave modeling and utilized the FEMA wave model, WHAFIS, and assessed shoreline erosion, surge, sea level rise scenarios, and wave runup and overtopping effects to develop FEMA-based hazard maps.

Indigo Landing Design, Tortola, British Virgin Islands: Evaluated the coastal conditions for a proposed marina. Calculated the potential wind-waves that could reach the site from the critical fetch directions using local wind speeds for "extreme" event return periods. Used regional offshore WaveWatchIII data as input for a 2D STWAVE model and conducted a wave diffraction analysis to assess the site's vulnerability to offshore, long-period, storm swell.

Pier Engineering Support, Great Stirrup Cay, Bahamas: Processed and analyzed wave and current velocity data from two ADCP gauges deployed at the project location to assess the coastal conditions and utilized this data in model calibration and for loading calculations on a proposed fixed pier. Offshore wave data was extracted from NOAA's WaveWatchIII, performed return period statistical analyses to develop extreme offshore wave conditions. Also implemented the CMS modeling system (CMS-Wave and CMS-Flow) to bring the offshore waves to the nearshore and assessed operational and extreme wave and current conditions at the location of a planned fixed pier and processed these outputs to be used in ship simulation modeling and evaluated potential impacts of the fixed pier on sediment transport at the site using CMS-Flow.

Lighthouse Point Cruise Ship Siting Assistance and Environmental Impact Assessment (EIA), Eleuthera, Bahamas: Set up, programmed and assisted in the deployments of oceanographic instruments including two ADCP gauges, tide gauges and CTDs at the project location to assess typical coastal conditions at the site. Processed ADCP wave and current data and water level data recordings from tide gauges to develop site tidal datums and processed and assessed salinity readings from the CTDs deployed in the site's salt pond to support the project's EIA. Assisted and performed sand probes in support of an offshore borrow area search for the project site's planned beach amenity.

Grand Turk Berth Dredging and Impact Analysis, Turks and Caicos: Applied the two-dimensional STWAVE model to the site given operational and extreme conditions to assess the impacts of a conceptual cruise ship berth expansion. Analyzed STWAVE model predicted wave heights and directions at the proposed dredging location to determine potential shoreline changes because of the proposed berth expansion.

Yacht Haven Grande
St. Thomas, U.S. Virgin Islands

Client
Global Yachting

Project Data
48-Slip Marina
16,000 LF Berthing Capacity
1,500 LF Revetment Rehabilitation

Services
Marina Planning and Feasibility
Marina Design, Engineering and Construction Documents
Construction Administration

Completed
2006

Located next to the cruise terminals in St. Thomas Harbor, the Yacht Haven Grande facility was designed to become a world-class yachting destination. As the primary marine consultant for the harbor restoration project, ATM evaluated the market for the proposed facility, recommended a design layout based on market demand, and assessed the financial viability for the proposed restorations. ATM conducted a comprehensive market study in the vicinity of the Virgin Islands and Puerto Rico, as well as an investigation of megayacht cruising patterns in the Caribbean basin. Results of ATM's analyses included identification of the pertinent market factors and forces projected to drive the demand, absorption, and physical features of the facility.

Engineering design and construction oversight were provided for the final marine facility that offers more than 16,000 linear feet of total berthing capacity and incorporates two distinct components: one targeted to megayacht demand and the other to traditional marina tenants.

The megayacht basin provides flexibility for varying characteristics, including 48 slips that include dedicated slips for vessels between 80 and 175 feet, docks that allow alongside-berthing of vessels of varying lengths (up to 350 feet), enhanced site security, in-slip fueling, waste oil recovery and pumpout service, high-capacity electrical supply (up to 600A), and segregated docking facilities to provide owners and guests with the level of exclusivity they demand. Complete design and construction documents were developed for the demolition, dredging and revetment rehabilitation along the 1,500 linear feet of shoreline.

ATM also completed detailed design of the marina electrical system and provided design criteria, review, and coordination of marina pier and plumbing utility design-build project components. Construction phase support was provided during all aspects of project construction.

Yacht Haven Grande
St. Thomas, U.S. Virgin Islands

Christophe Harbour Marine
St. Kitts, West Indies

Client
Christophe Harbour
Development Company

Project Data
180 Acres
200-Slip Marina
3,500 LF Berthing Capacity
3,700 LF Bulkhead

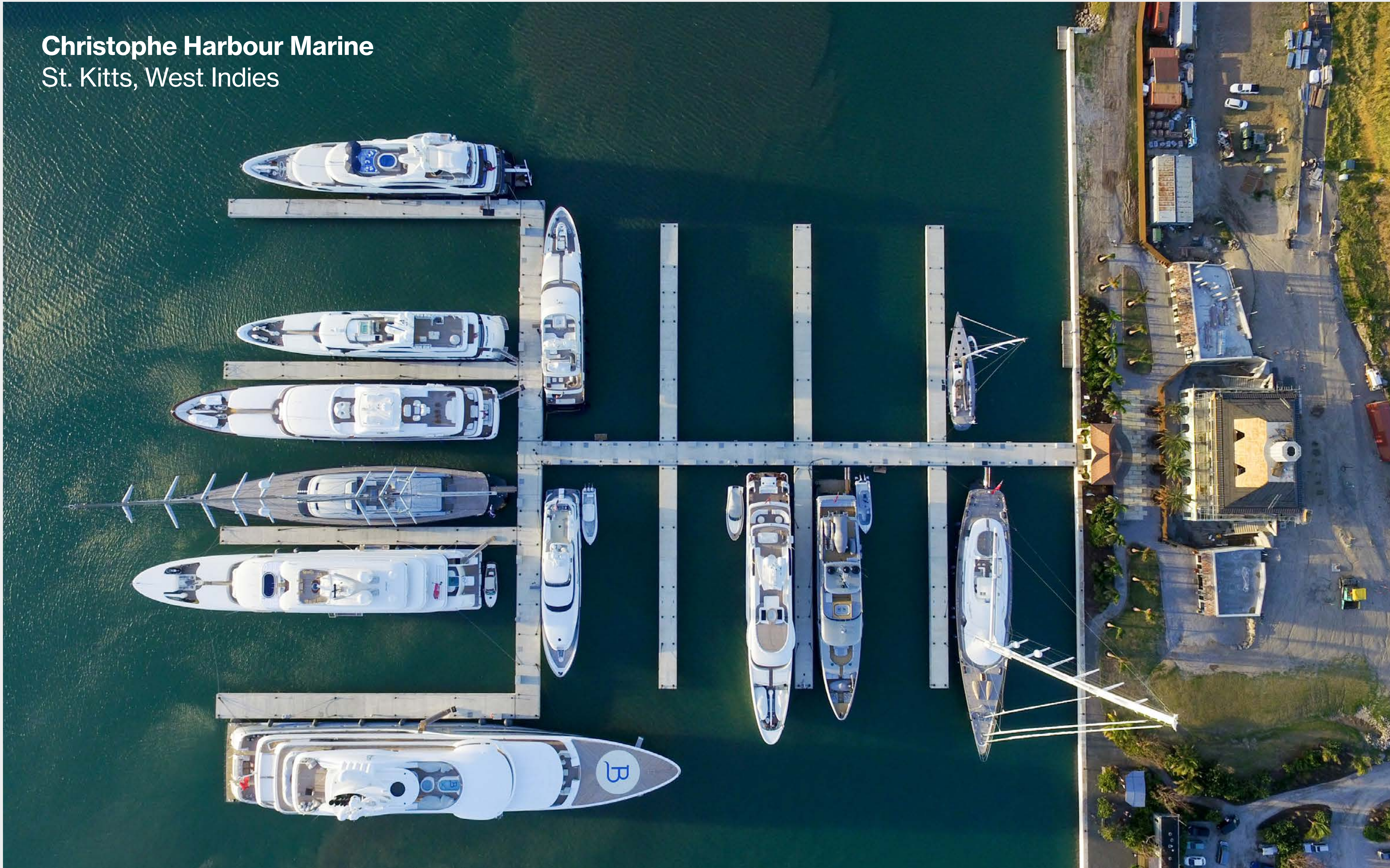
Services
Marina Planning and Feasibility
Marina Design, Engineering and
Construction Documents
Coastal Engineering
Water Quality Modeling
Construction Administration

Completed
2015

Christophe Harbour Development Company, Limited, began planning for the Christophe Harbour resort development on the Southeastern Peninsula (SEP) of St. Kitts in 2007. The project involves the creation of a harbor, lagoon, and islands from the Little Salt Pond and Great Salt Pond that occupied much of the SEP. The completed Christophe Harbour features a state-of-the-art megayacht marina capable of accommodating vessels up to 300 feet LOA, a Mediterranean-inspired marina village, several 5-star hotels, various upscale residential products, as well as a Fazio signature golf course.

The evolution of the project-wide earthwork effort required close coordination between Design Works (land planning consultant), S&ME (geotechnical consulting), Thomas & Hutton (site civil consultant), and ATM.

Development of the marina plan has required several numeric modeling tasks to determine appropriate flood elevations, size and orientation of entrance jetties, and evaluation of harbor and lagoon water quality. The Marine Construction and Earthwork project at Christophe Harbour consisted of approximately 180-acres of reclaimed/improved land, a marina harbor featuring more than 200 dedicated slips, over 3,500 linear feet of side-tie berthing, and over 3,700 linear feet of vertical bulkhead. The harbor and lagoon shoreline plans include sloped rock revetment and littoral shelves planted with native, salt-tolerant vegetation as well as two large rock jetties with armor units of up to 25 tons.



Christophe Harbour Marine
St. Kitts, West Indies

Scrub Island Resort Development
Scrub Island, British Virgin Islands

Client
Mainsail Development Group

Project Data
67-Slip Marina
Barge Landing

Services
Marina Planning and Feasibility
Marina Design, Engineering and Construction Documents
Coastal Engineering
Environmental Planning, Permitting and Mitigation

Completed
2007

ATM worked on the planning and conceptual design of a luxury resort marina associated with the Scrub Island Resort in the British Virgin Islands (BVI). This was the first new full-service marina facility to be built in the BVI in decades. Scrub Island is a 230-acre island just northeast of Tortola, in close proximity to Beef Island and Trellis Bay. Mainsail Development Group, Inc. retained ATM to provide marina planning and design services to the project development team. The final concept included a 67-slip fixed pier marina, marina utilities, breakwater protection, as well as barge landing and coastal improvements.

The marina compliments the boutique resort which includes hotel, multi-family and single family estate residences, spa, restaurant, and marina village. The site will cater to sportfishing enthusiasts, as Scrub Island Marina will be the closest full-service facility to the famed North Drop, which is the location of the Virgin Islands' best billfishing. The marina will accommodate vessels to 150 feet and includes a full complement of utilities.

ATM also completed the EIA in accordance with the Terms of Reference established by the Town and Country Planning Department. The work included:
- Terrestrial and marine biological characterizations
- Bathymetric and oceanographic surveys and geotechnical investigations
- Hydrodynamic, wave, and water quality modeling
- Quantification of potential environmental impacts of the project
- Development of monitoring and mitigation planning, including coral and seagrass transplanting
- Public consultation support

As part of the approvals process, ATM also provided technical support to the development team during government liaisons and public meetings. Following approvals, ATM completed schematic design for the marina elements in conjunction with development of a design-build approach to project construction, and also provided limited support to the project team during pre-construction monitoring efforts, in compliance with the government approvals, including coral and seagrass transplanting/relocation.

Scrub Island Resort Development
Scrub Island, British Virgin Islands

Harris Civil Engineers (HCE)
Company Overview & Case Studies

Harris Civil Engineers (HCE)

HCE is located in Orlando, Florida with an innovative staff of professionals, advance technological support, and a solid reputation to provide our clients with the highest quality service in a cost efficient manner. The firm currently employs a staff consisting of professional civil engineers, designers/technicians, andadministrative staff.

Harris Civil Engineers (HCE) has six LEED certified professional engineers that have experience in sustainable project design. The staff is supported by complete computer, Internet, software networks. Our projects are modeled in three dimensions forfull client and consultant coordination.

HCE has worked on projects in the Caribbean since early 1993. Our first project was the civil engineering portions of the due diligence of Paradise Island. HCE then provided design for modifications to the Atlantis Resort and Casino. This lead to many other projects on Paradise Island, throughout the Bahamas and may other islands in the Caribbean.

Our professional services include:
- Civil engineering
- Site development engineering
- Roadway design
- Transportation engineering
- Utility & drainage design
- Feasibility studies
- Water supply facilities design
- Wastewater facilities design
- Reuse system design
- Permitting

Joseph Harris, PE, LEED AP
Managing Principal of Harris Civil Engineers (HCE)

Professional Experience
Total Years: 44
Years with HCE: 35

Education

MBA, Finance Loyola College, 1982
BSCE, Civil Engineering University of Delaware, 1977

Registration

Professional Engineer:
Arizona #31476
California #55622
Florida #34517
Virgin Islands 768-E

Affiliations

American Society of Civil Engineers
National Council of Engineering Examiners
LEED Certified Professional

Biography

Mr. Harris has an extensive background in civil engineering with project management, project planning and design, including site layout, drainage, environmental analysis, roadway alignment and geometry, erosion control practices and construction documents. His responsibilities have ranged from financial analysis and transportation planning, to preparation of bid documents and design of land development and drainage projects.

Selected Project Experience

Yacht Haven Grande, St Thomas– Civil Engineering for Yacht Haven Grande, the premier marina facility for mega yachts within the Caribbean. Located alongside the scenic Charlotte Amalie Harbor in St. Thomas, USVI, the spectacular facility encompasses a 48-slip mega-yacht marina complemented by 80,000 square feet of retail space, exciting dining and entertainment options, recreational amenities and seaside residences. Harris Civil Engineers provided utilities design and coordination for water, wastewater, electricity and fuel for the docked vessels.

American Yacht Harbor, St. Thomas– Civil engineering design for the expansion of the harbor complex located in the Red Hook area of St. Thomas. The project included improvements to the marina after the Hurricane Hugo destruction of 1989, and building/site improvements to the retail complex. The remodeled retail complex included a new 60,000-square foot, multi-story retail/ office space and an underground parking garage.

Baker's Bay Golf & Ocean Club, Abaco, Bahamas– Provided design services for the 585-acre private development that features 180-slip marina that accommodates up to 200-foot mega yachts. Utilitiy, drainage, roadway, subdivision and other landside civil engineering design was provided for this remote island community. A significant effort was involved with environmental issues to be make sure the development had the smallest possible effect on the surrounding ecology.

The Harvest Cayes, Belize– 75-acre development that includes a floating pier, island village, a marina, a lagoon for water sports and a beach. Mr. Harris provided site development that included grading, drainage and utilities to support the back of house facilities, a marina, shopping village, restaurants, beach villas and tourist amenities. Utilities included direct sea intake package reverse osmosis salt water treatment plant and a membrane bioreactor waste water treatment plant to support approximately 6,000 daily guests and crew.

Pier Park, Tortola, British Virgin Islands– The $75 million waterfront development with 17 buildings with a terminal, welcome center, two restaurants, a market, chapel, boat museum and a pier bar along with an additional 18 kiosks. The expansion project also included lengthening, widening and strengthening of the current pier to accommodate ships over 170,000 gross tons. Provided civil engineer design which included site layouts, grading, stomwater management and utilities. In addition, provided design of the back of house civil engineering elements and construction administration.

Ocean Club Residences & Marina, Paradise Island, Bahamas– The project featured four six-story buildings, with 88 condominiums with underground and surface parking, a private marina on Nassau Harbour, a full-service beach club, 2 swimming pools, a fitness center and a golf course. Mr. Harris provided full civil engineering design, construction plans and permitting as well as associated construction phase services.

David Taylor, PE
Project Manager of Harris Civil Engineers (HCE)

Professional Experience
Total Years: 21
Years with HCE: 21

Education
BSCE, Civil Engineering
Florida Institute of Technology, 1999

Registrations
State of Florida #60928,
US Virgin Islands #7020

Affililations
American Society of Civil Engineers

Biography

Mr. Taylor has 21 years civil engineering experience in the planning and preliminary and final design of potable water, reuse water, wastewater collection and treatment systems, grading, drainage, and stormwater collection systems. His responsibilities have included planning, designing, analyzing, and hydraulic modeling of potable water/fire water distribution systems, reclaimed water irrigation systems, gravity flow and lift station/force main collection systems, site grading and drainage, and stormwater collection and storage.

Selected Project Experience

Yacht Haven, St. Thomas, U.S. Virgin Islands– Provided complete civil engineering and assistance on the CZM permit. The design included underground cistern storage of potable and gray water.

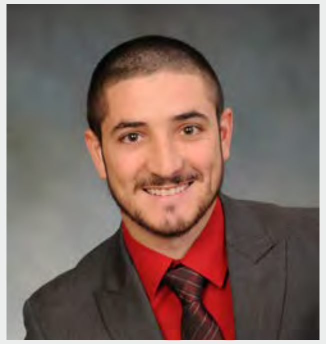
Schooner Bay Resort Phase I, Abaco, Bahamas– A revolutionary, sustainable real estate development and mixed-use harbour village that features 300 lots. The harbour functions as the center of the community and is surrounded by shops, restaurants, and other mixed-use buildings. Provided the design of the landside portions of the cooling system, consisting of deep water wells for raw sea water intake and disposal.

Ocean Club Residences & Marina, Paradise Island, Bahamas– Project utilities engineer for the four six-story building resort. The development includes 88 condominiums with underground and surface parking, a private marina on Nassau Harbour, a full-service beach club, 2 swimming pools, a fitness center and golf course.

Frenchman's Cove, St Thomas, U.S. Virgin Islands– Project Engineer for this project on 13-acres of steeply sloping waterfront property. Performed the the civil engineering tasks for the Major Land CZM permit required for the project. The engineering documents include site geometry, paving, grading, water, wastewater, storm drainage, and specifications. A significant related challenge was the protection of the environment by control of stormwater runoff and erosion both during and after construction. The utilities systems includes cisterns to relieve demands on the public water supply and a wastewater treatment plant that provides reclaimed water for landscape irrigation.

Botany Bay Phase I, St. Thomas, U.S. Virgin Islands– Project Engineer for this residential development including a seawater reverse osmosis water treatment plant and wastewater treatment plant. Provided civil engineering tasks related to the Coastal Zone Management permit application.

Baker's Bay Golf & Ocean Club, Abaco, Bahamas– Provided design services for the 585-acre private development that features 180-slip marina that accommodates up to 200-foot mega yachts. Utilitiy, drainage, roadway, subdivision and other landside civil engineering design was provided for this remote island community. A significant effort was involved with environmental issues to be make sure the development had the smallest possible effect on the surrounding ecology.



Neil Wolfe, EI
Project Engineer of Harris Civil Engineers (HCE)

Professional Experience
Total Years: 6
Years with HCE: 6

Education

B.S.C.E., Civil Engineering,
University of Central Florida 2013

B.S.C.E., Construction Engineering,
University of Central Florida 2013

Affiliations

American Society of Civil Engineers

Biography

Primary responsibilities are in civil engineering and his professional experience includes various aspects of land development including paving, grading and drainage design, utility systems design and coordination, construction administration, specifications review & compilation, client and age.

Selected Project Experience

Harvest Caye, Belize– Norwegian Cruise Lines invested $50 million to establish a cruise port on the Belize island of Harvest Caye The development includes a floating pier, island village with raised-platform structures, a marina, a lagoon for water sports and a beach. As project engineer Mr. Wolfe helped with the utilities routing and sizing, wastewater and potable water drinking plants, and lift station design.

Pier Park, Tortola, British Virgin Islands– The $75 million Pier Park Development includes a new 20-foot boardwalk along the southern coastline of Tortola. Included in the waterfront development is approximately 17 buildings that will include a terminal, welcome center, two restaurants, a market, chapel, boat museum and a pier bar along with an additional 18 kiosks. The expansion also includes the lengthening, widening and strengthening of the current pier to accommodate ships of over 170,000 gross registered tons. Mr. Wolfe helped with the design of the stormwater and potable water systems, including a large above ground cistern.

One Cable Beach Site Redevelopment, Nassau, Bahamas– This project includes the development of a new building, parking lot, and stormwater utilities. Mr. Wolfe was responsible for the design of the secondary stormwater system.

Frenchman's Cove Sale Center Building, St. Thomas, US Virgin Islands– A proposed sales center building for the existing Frenchman's Cove Resort to include grading, site work, utilities and parking development. Mr. Wolfe helped with each of these phases of development.

Westin St. John Renovation and Villa Expansion, St John– Mr. Wolfe served as Project Engineer for the $35 million renovation that included the conversion of 79 existing hotel rooms into 54 villas, which is part of the resort's vacation ownership program. The newest project, overlooking Great Cruz Bay, included 30 two-bedroom villas, six two-bedroom lofts and 18 studio villas. The project also includes renovation to the public areas, restaurants, meeting space and remaining hotel rooms. Other projects at the Westin include the design of a large stormwater retaining wall along the southern portion of the site. A new retaining wall and sidewalk was also designed preventing flooding from the northern end of the site into the main site downstream.

Wyndham's Margaritaville Vacation Club, St. Thomas, US Virgin Islands– Jimmy Buffett partnered with Wyndham Vacation Ownership to open a 262-unit resort, located at the former Renaissance Grand Beach Resort in Smith Bay on St. Thomas. The first phase - includes renovation of the main administration buildings, restaurant, common areas and the units by the pool. Phase two will include hillside units, which will not be started until the units renovated in phase one are sold. As Project Engineer Mr. Wolfe helped review plans and shop drawings for the entire site.

Yacht Haven Grande
St. Thomas, U.S. Virgin Islands

Client
Insiginia Development Group

Project Data
48 Slip Marina
12 Residences
Office Space
Retail & Dining

Services
Civil Engineering
Construction Admin.

Completed
2007

Yacht Haven Grande is the premier marina facility for mega yachts within the Caribbean located alongside the scenic Charlotte Amalie Harbor in St. Thomas, US Virgin Islands. This mixed-use yachting destination combines a 48-slip mega yacht marina, 12 ultra-luxury residences and international quality office space with an array of retail, dining and entertainment facilities.

Harris Civil Engineers provided complete civil engineering design services including parking lots, driveways and intersection modifications at the project entry and necessary utility and drainage infrastructure to support the project. HCE also provided coordination with the architect and landscape architect to provide a world class waterside venue.

Ocean Club Residences & Marina
Paradise Island, Bahamas

Client
Kerzner International

Project Data
Private Marina
4-Six Story Buildings
Beach Club
Underground Parking
2 Pools
Golf Course

Services
Civil Engineering
Construction Admin.

Completed
2007

The Ocean Club Residences & Marina are located on the eastern end of Paradise Island, Bahamas. The project features four six-story buildings that are arranged to take full advantage of the striking ocean views. The development includes 88 condominiums with underground and surface parking, a private marina on Nassau Harbour, a full-service beach club, 2 swimming pools, a fitness center and a Tom Weiskopf designed golf course.

HCE provided full civil engineering design, construction plans and permitting as well as associated construction phase services.

Tortola Pier Park
Tortola, The British Virgin Islands

Client
BVI Port Authority

Project Data
4-Acre Waterfront
Development

Services
Site Layout
Stormwater Design
Utilities

Completed
2016

The $75 million Pier Park Development includes a new 20-foot boardwalk along the southern coastline of Tortola. Included in the waterfront development is approximately 17 buildings that will include a terminal, welcome center, two restaurants, a market, chapel, boat museum and a pier bar along with an additional 18 kiosks. The Tortola Pier Park will feature two key buildings, each about 8,000 square feet. The expansion project also includes the lengthening, widening and strengthening of the current pier to accommodate ships over 170,000 gross tons.

HCE provided civil engineer design which included site layouts, grading, stomwater management and utilities. In addition, provided design of the back of house civil engineering elements and construction administration.

Ritz Carlton Resort Expansion
St. Thomas, U.S. Virgin Islands

Client
Marriott Vacation Club

Project Data
27-Acre Site
48-Key Hotel
80-Unit Timeshare

Services
Civil Engineering
Site Geometry
Storm Drainage
RO Plant
Permitting
Construction Admin.

Completed
2007

This project is a 48-room hotel expansion combined with a 80-unit timeshare project on 27-acres of beach front.

Our services included complete civil engineering design, including site geometry, grading, water, wastewater, storm drainage and specifications. The project also included the expansion of the reverse osmosis water treatment plant and a reuse water distribution system. We assisted with the completion of the CZM permit environmental permitting, building permits for the civil engineering work, and coordinated with local agencies. Construction phase services were also provided.

Paul Ferreras, P.E. (PFPE)
Company Overview

Paul Ferreras, P.E. (PFPE)
Company Overview

Paul has more than 40 years of professional experience in the design, planning and construction management of structural and civil engineering for projects of varying size and complexity. Paul has extensive experience in forensic investigation, structural failure investigation, remedial design, and rehabilitation of structures. He has conducted in-depth structural engineering analysis of commercial, individual & residential properties and adaptive reuse of existing properties.

He has expertise in structural systems, foundation and underground structures, construction inspection and supervision. Paul performs Property Condition Assessments, Construction Document Reviews, Construction Budget Evaluations, and construction monitoring services for a wide range of multi-family, commercial, industrial properties, and marine facilities.

Paul Ferreras, P.E.
Structural Engineer of (PFPE)

Professional Experience
Total Years: 40

Education

Degree Earned – Bs Engineering
Rutgers College of Engineering
Years Attended – 1974 – 1978
New Brunswick, New Jersey

Registrations

New York – PE 59450, New Jersey – GE 32849, US Virgin Islands – RE481E, Florida – PE 56408

Certifications

1157-0705, American Society of Civil Engineers
ACI – American Concrete Institute
AISC – American Institute of Steele Construction
SEI – Structural Engineering Institute

Qualifications

Paul has more than 40 years of professional experience in the design, planning and construction management of structural and civil engineering for projects of varying size and complexity. Paul has extensive experience in forensic investigation, structural failure investigation, remedial design, and rehabilitation of structures. He has conducted in-depth structural engineering analysis of commercial, individual & residential properties and adaptive reuse of existing properties. He has expertise in structural systems, foundation and underground structures, construction inspection and supervision. Paul performs Property Condition Assessments, Construction Document Reviews, Construction Budget Evaluations, and construction monitoring services for a wide range of multi-family, commercial, industrial properties, and marine facilities.

Experience

New Construction – Structural Engineering:
Margaritaville – St. Thomas, USVI
FAA Radar Facility – St. Thomas, USVI
University of the Virgin Islands - 90 bed
4 story Dormitory – St. Thomas, USVI
Reliance Housing – Altona Rental
Apartments, Grandview Rental
Apartments – St. Thomas, USVI
Hospital Ground Rental Apartments – St. Thomas, USVI
Our Lady Help of Christians – New Church
Staten Island, NY
Market Place – Commercial Shopping
Center – St. John, USVI
Surf Side Village Sewage Treatment
Plant – Staten Island, NY
Gymnasium for University of the Virgin
Islands – St. Thomas, USVI
Frenchtown Evangelical Assembly
Church – St. Thomas, USVI
T. Tunick – New 5 Story Office
Building – St. Thomas, USVI
Plaza Extra – New Store and
Warehouse – St. Croix, USVI
University of the Virgin Islands – Field
House – St. Thomas, USVI
Bluebeard's Beach – Hotel Expansion
St. Thomas, USVI
Heery International – VI School Program
St. Thomas, USVI
Grand Bay – 5 Story Resort Complex – St. John, USVI
Mango Terrace – Multi Story Apartment – St. John, USVI
Sea Chest – Commercial Building - St. Thomas, USVI
Petrus Commercial Building – St. Thomas, USVI

Rehabilitation/ Alterations – Structural Engineering:
Starwood – Westin - Coral Vista Vacation Rentals
St. John, USVI
ICMC Rehab - #2 Beltjen Place Rehab
St. Thomas, USVI
Alton Adams Residence – ICMC Rehab
St. Thomas, USVI
Frenchman's Reef Resort – Rehab – St. Thomas, USVI
Coral World – Hurricane Rebuild – St. Thomas, USVI
St. Luke's Church – Hurricane Rebuild
St. Thomas, USVI
Gleacher Residence – 5th Ave – New York, NY
Project Head start – Rehab of Commercial
Building – St. Thomas, USVI
Harvey Center – Rehab – Dorm/Admin
Building – St. Thomas, USVI
Margaritaville – Wyndham – St. Thomas, USVI

Hurricane Rehabilitation Projects:
Frenchman's Reef Marriott – St. Thomas, USVI
Ritz Carlton – St Thomas, USVI
Westin Hotel – St. John, USVI
Mahogany Run Golf Condo Complex – St. Thomas, USVI
Cowpet Bay East Condos – St. Thomas, USVI
Bluebeards Castle Resort – St. Thomas, USVI
Elysian Condo & Wyndham – St. Thomas, USVI
Sapphire Village Condo – St. Thomas, USVI

DPNR – 3Rd Party Inspection Reports:
Magen's Junction
Westin St. John
Bluebeards Beach Club – Wyndham
COMMERCIAL CONSTRUCTION –
STRUCTURAL ENGINEERING:
VIWAPA – New 2 MGD Reverse Osmosis
Plant – St. Thomas, USVI
VIWAPA – New 3 MGD Reverse
Osmosis Plant – St. Croix – USVI
VIWMA – Generator Station – Bovoni – St. Thomas, USVI
VIWMA – Transfer Station – St. Croix, USVI
Crown Bay Commercial Center – St. Thomas, USVI
Yacht Haven – St. Thomas, USVI
Red Hook Ferry Terminal – Redesign
Foundation – St. Thomas, USVI
WICO – New 2 Story office Administration
Building – St. Thomas, USVI
VI Wapa – Rolling Crane Design – St. Thomas, USVI
VI Wapa – Seawater Intake Replacement
– St. Thomas, USVI
Antilles School – New Gymnasium – St. Thomas, USVI
Gift Hill School Gym – St. John, USVI
Tutu Park Wind Generators – St. Thomas, USVI
Westin Resort – New waterline/ Dock
Rehabilitation – St. John, USVI

Commercial Pool Projects – Consulting Engineer (Sample Projects):
Seminole Indian Reservation – Hard Rock
Hotel – Pools/ Sauna – Tampa, FL
Los Olas – High Rise – Custom multiple
pools and Spa – Fort Lauderdale, FL

Bioimpact, Inc. (BI)
Company Overview

Bioimpact, Inc. (BI)
Company Overview

Bioimpact, Inc. is a Virgin Islands Corporation licensed to do business in the Virgin Islands Since 1986.

Bioimpact, Inc. is qualified to conduct and prepare both terrestrial and marine Environmental Assessment Report required by the Department of Planning and Natural Resources, Division of Coastal Zone Management, and the U.S. Army Corps of Engineers. Amy Claire Dempsey, principal of Bioimpact, Inc. is certified in wetland delineation by the National Wetland Science Training Cooperative to establish wetland jurisdictional limits for the U.S. Army Corps of Engineers.

Bioimpact, Inc. is experienced in the creation and implementation of wetland mitigation programs. Bioimpact, Inc. is experienced in preparing Environmental Assessments for federal permitting and the issuance of Findings of No Significant Impact.

Bioimpact, Inc. is experienced in the preparations of Phase I Environmental Site Assessments as set forth in the ASTM Standard Practice Designation E 1527-13 and All Appropriate Inquires and Phase II Environmental Site Assessments as set for in ASTM E1903 – 11. Bioimpact, Inc. is experience in the development and implementation of sampling plans to detect and delineation hazardous materials and petroleum products.

Amy Claire Dempsey, M.A.
President/Principal Investigator/Owner
Bioimpact, Inc. (BI)
Vice President/Owner
Ocean Systems Laboratory, Inc.

Education

M.A. Biology, 1984 (University of Texas)
B.A. Biology, 1979 (University of Texas)

Registrations

E.P.A. Certified Laboratory Analyst/Supervisor/Quality Assurance Officer
E.P.A. Certified Water Sampler
National Wetland Science Training Cooperative Certified Wetland Delineator
P.A.D.I. Dive Instructor

Fields of Specialization

Amy Claire Dempsey has been president and owner of BIOIMPACT, INC. a Virgin Islands Corporation, licensed to do business in the Virgin Islands since 1986. She is qualified to conduct and prepare both terrestrial and marine environmental assessment reports as required by the Department of Planning and Natural Resources, Division of Coastal Zone Management, and U.S. Army Corps of Engineers. She is experienced in the establishment of wetland jurisdictional limits for the U.S. Corps of Engineers and is experienced in the creation and implementation of wetland mitigation programs. Ms. Dempsey is experienced in the development and implementation of water quality monitoring programs, and long-term photographic monitoring of the benthic community. Ms. Dempsey is highly experienced in underwater video and inspection. Ms. Dempsey Ms. Dempsey is experienced in the preparation and implementation of coral and seagrass transplanting programs. Ms. Dempsey is experienced in identifying Endangered Species Act listed species in both the terrestrial and marine environments in the U.S. Virgin Islands.

Ms. Dempsey is experienced in preparing Biological Assessments and assisting NMFS in the preparation of Biological Opinions and has received take permits for various species and is experienced including the relocation of ESA listed species. Ms. Dempsey is experienced in establishing undersea cable and pipeline routes and monitoring cable installation. Ms. Dempsey is a certified laboratory analyst and has served as the laboratory director of Ocean Systems Laboratory, Inc. an E.P.A. Certified Laboratory. Ms. Dempsey is experience in designing and implementing sampling programs for Recognized Environmental Concerns (RECs), including pesticides, herbicides, metals, asbestos, mold, fungus and bacterial contamination. Ms. Dempsey is experienced in developing and implementing sampling plans following EPA, NMFS and COE guidelines and preparing and implementing Quality Assurance Program Plans (QAPP) following EPA guidelines.

Experience

Large Scale Water Quality and Benthic Monitoring Studies

Development and Implementation of the Water Quality Monitoring and Compensatory Mitigation Plans for the Installation of a SPM at the Limetree Bay Terminal on St. Croix.

Development and Implementation of the Water Quality Monitoring and Compensatory Mitigation Plan for the Construction of Veterans Drive, St. Thomas for Virgin Islands Department of Public Works.

Development and implementation of the Water Quality Monitoring and Coral Transplant Monitoring for Improvements to the Frederiksted Pier, Crown Bay Marine Terminal, Crown Bay Marina, Enighed Pond and Molasses Dock for the Virgin Islands Port Authority.

Development and implementation of the Water Quality Monitoring and Seagrass Transplanting for the Dredging of the Charlotte Amalie Harbor for the Virgin Islands Port Authority.

Development and implementation of the Water Quality Monitoring Program for the construction of the GCL and ATT Cable Landing Facilities, and Placement of Submarine Cables Mitigation Programs

Implementation of the Coral Transplanting for the installation of the Mangrove Lagoon Sewage Outfall for LTI, contracted to the Virgin Islands Department of Public Works.

Development and implementation of a plan for the creation of 2.8 acres of wetland for the Virgin Islands Port Authority at Enighed Pond, St. John

Development and implementation of a plans for the creation of wetlands and enhancement of wetlands for the Puerto Rico Highway and Transit Authority for PR 20, PR 5, PR 22 and Tren Urbano.

Environmental Assessment Reports

Since 1986, Ms. Dempsey has worked on over 150 Environmental Assessment Reports in the U.S. Virgin Islands, as well as, Puerto Rico, Florida, and the British Virgin Islands. The scope of projects ranges from major industrial activities, submarine cables, hotels, and marine facilities to mariculture farms and artificial reef creation.

Phase I Environmental Assessments/Hazardous Materials Sampling/Bacteria/Mold/Fungus

Ms. Dempsey has served as principal field investigator and sampler with Bioimpact, Inc. and Ocean Systems Laboratory, Inc., for the sampling of lead, copper, asbestos, pesticides, hydrocarbons, PCB's, other hazardous materials, bacterial contamination, mold and fungus.

Diver Surveys

Ms. Dempsey has conducted diver surveys for cable landings, harbor obstructions, piling and bulkhead inspections, and vessel damage.

Primary Area of Expertise

Ms. Dempsey has served as principal field investigator for the last 33 years with Bioimpact, Inc. Her responsibilities include field surveys, identification of fauna and flora, both terrestrial and marine, underwater photography, inspection and video, wetland delineations, and the development and implementation of mitigation, sampling and monitoring programs. She has worked diligently with clients to help develop environmental sensitive projects, which in turn helps facilitate permitting.

Teaching Experience

Ms. Dempsey has taught Oceanography, as well as labs in Estuarine Ecology and Marine Microbial Ecology at the University of Texas.

Research Experience

Ms. Dempsey has conducted research on bacterial communities within the gut of shrimp, distribution of molds and yeast in estuarine communities in Laguna Madre and distribution of contaminants in cisterns in the USVI.

APPENDIX B

Appendix B

Mooring Field Management Plan

VESSUP BAY and MULLER BAY MOORING FIELD

Contents

Name:	**Vessup Bay and Muller Bay Managed Mooring Field**
Address:	
Phone:	
Fax:	
E-mail:	

Latitude:
Longitude:
Water Body:
Permit No.:

Facilities:

Muller Bay Mooring Balls:	72
Dinghy Dock Muller Bay:	
Vessup Bay Mooring Balls:	14
Dinghy Dock Vessup Bay:	
Pumpout Station in Marina Fuel Dock	
Shower Bathroom Suites (#):	xxx
Dedicated Restrooms (#):	xxx
Washers and Dryers:	xxx

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1 Intent of Management Plan

It is the intent of this Management Plan is to identify key management and environmental issues for the Managed Mooring Field. It is the stated purpose of this project is to provide a Managed Mooring Field with amenities to accommodate the needs of as many responsible boaters as possible, while providing protection to swimmers and sensitive benthic habitats, and improving water quality and navigation safety.

The Managed Mooring Field is comprised of two mooring field areas (Vessup Bay and Muller Bay), as well as dinghy docks, access to pumpout services, upland amenities / supporting services, and management office.

All the moorings will be available for rent to the public on a first-come, first-served basis. Some moorings may be reserved for short-term rentals (transients and seasonal users), while others will be available for long-term rent (annual contracts), as defined in section 5.1.

This plan may be modified and changed as needed to address new environmental issues or regulations and to improve services and operational efficiency, as deemed necessary by the management.

These rules shall apply to any **vessel, its owner(s), crew, and guests** entering the Managed Mooring Field. Failure to comply with these rules shall be a violation of rules established in the plan and be sufficient for ejection from the Managed Mooring Field.

2 Managed Mooring Field Rules

2.1 Authority

The primary designee shall be the **Mooring Field Manager**, or other employee designated by the Marina Owner.

The Mooring Field Manager has the right to assign moorings. No vessel shall occupy any mooring without the approval of the Mooring Field Manager.

Subleasing of moorings or transfer of vessels from one mooring to another without the approval of the Mooring Field Manager is prohibited. Tenants wishing to transfer their boat to a mooring other than the one assigned shall obtain the prior authorization of the Mooring Field Manager and complete the required forms to be obtained in the management office. The Mooring Field Manager may move any vessel from the assigned mooring to any other one at its sole discretion.

Any violation of these rules may void the lease agreement for use of the mooring and may result in the ejection of the vessel, as well as the forfeiture of any part or all the security deposit, if deemed appropriate, at the sole discretion of the Mooring Field Manager. The decision or interpretation of these rules shall be the responsibility of the Mooring Field Manager.

The Mooring Field Manager is responsible for environmental compliance and implementation of Territorial environmental policy applicable to the use of this area, permit special conditions, and rules set forth in this plan. The Mooring Field Manager has authority to enforce compliance of this plan by vessel, its owner(s), crew, and guests.

2.2 Operational vessels only allowed.

Only vessels that are deemed to be in compliance with the United States Coast Guard regulations and safety standards shall be allowed within the Mooring Field.

Only vessels in good operational condition, capable of maneuvering under their own power, and with current registration and acceptable documentation, shall be allowed within the Mooring Field. The decision of whether a vessel is considered to be in good operational condition capable of maneuvering under its own power shall be the sole discretion of the Mooring Field Manager.

Vessels without integral mechanical power for propulsion, excluding dinghies, are not allowed to remain in the Mooring Field unless approved by the Mooring Field Manager.

2.3 Equipment requirements for vessels.

All vessels should have a dinghy or other small craft as an alternative method of conveyance to enable access to the dinghy dock and Mooring Field Manager's office. Absent this, the vessel owner shall communicate the absence of a dinghy to the Mooring Field Manager. The lack of such a dinghy shall not be cause to refuse the rental of a mooring.

The Mooring Field Manager may allow the use of a dinghy for the vessel occupants to access the upland property if such a dinghy is available and on the condition that the use of that dinghy is and remains at the sole risk of the user.

It is the sole responsibility of vessel occupants to provide their own conveyance to the upland facilities. Under no circumstances is the Managed Mooring Field responsible for owning, operating, or maintaining a dinghy for the exclusive use of mooring patrons.

2.4 Mooring of vessels.

The Managed Mooring Field will accommodate a maximum of 86 vessels, excluding any dinghies that may be attached to parent vessels.

All vessels moored in the Managed Mooring Field must register at the management office or by telephone within twelve (12) hours of arrival. The method of mooring of vessels at each mooring shall be by tying the vessels to the bow only. No vessel shall be moored to the buoys at the stern. Rafting or mooring of more than one vessel to any buoy is **prohibited** without the prior approval of the Mooring Field Manager. Tying up to two moorings is **prohibited** without the prior approval of the Mooring Field Manager.

2.5 Abandonment of vessels.

If a vessel is left unregistered with the Managed Mooring Field Manager and unattended for more than twenty-four (24) continuous hours without the express approval of the Mooring Field Manager, the boat shall be considered abandoned. If any boat is abandoned, it may be placed in a secure location or commercial marina for storage for thirty (30) days, during which time the Mooring Field Manager shall make a reasonable, diligent effort to locate the vessel owner. If it is not reclaimed by that time, the vessel shall be sold at fair market value to cover the cost of unpaid rental fees, relocation, as well as any fees due for storage. If the vessel is reclaimed by the owner, all fees associated with the impoundment of the vessel shall be the responsibility of the vessel owner.

2.6 Placement of anchors.

There shall be no dropping of anchors from any vessel within the Managed Mooring Field area boundaries. All vessels shall utilize the mooring mechanism provided by the Managed Mooring Field.

It shall be considered unlawful for any unauthorized person to place a mooring anchor or device in the Managed Mooring Field area without prior consent from the Mooring Field Manager. This includes devices for dinghies.

2.7 Use of dinghy dock.

The dinghy dock is for the exclusive use of dinghies, not vessels, and the only place where dinghies are allowed to tie in this facility. Dinghies are not to be moored or pulled ashore for any reason. No dinghy may use any other dock of the Marina under any circumstance without specific permission from the Mooring Field Manager.

Use of the dinghy dock is restricted to Mooring Field tenants for such reasonable time limits to be established by the Mooring Field Manager. No dinghy shall be left at the dinghy dock for more than twenty-four (24) continuous hours without the prior permission of the Mooring Field Manager.

2.8 Vessel fueling.

Fueling of vessels within the Managed Mooring Field or at the dinghy dock is **prohibited**. Vessel fueling is permitted only at the Marina fuel dock or other designated fueling station.

3 Responsibilities of Tenants

3.1 Liability of Owner or designee for use of the Managed Mooring Field.

The Managed Mooring Field and its designated personnel assume absolutely no responsibility for personal possessions, any vessel, dinghy, or their contents or use while said vessels are located within the Managed Mooring Field area or its facilities.

3.2 Safe operation of vessels within the Managed Mooring Field.

Reckless operation of any vessel, including any recreational vessels or dinghies, when in the judgment of the Mooring Field Manager it is an endangerment to life, property, or other vessels, shall be grounds for immediate ejection from the Managed Mooring Field.

3.3 Use of sewage pumpout facilities.

Upon entering the Mooring Field, all vessels with **Type III Marine Sanitation Devices (MSDs)** shall secure their sewage holding tanks, which must be emptied into the sewage pumpout facilities at the Marina upon arrival, or as soon as reasonably practical as determined by the Mooring Field Manager, and no later than within twenty-four (24) hours after arrival.

Absolutely no discharge of sewage in any area within the Managed Mooring Field or other surrounding waters shall be allowed except at the pumpout station, a pumpout vessel provided by the Mooring Field or approved by the Mooring Field Manager, or other approved pumpout station.

The Mooring Field Manager is authorized to utilize dye tab testing to ensure the compliance with this Management Plan.

All vessels with live-aboard occupants will be required to have their tanks pumped out not less than every seven (7) days without fail. The Mooring Field Manager shall maintain a log of all pumpouts performed by staff, and the log will be made available to authorities for inspection, as required.

Type III MSD holding tanks shall be properly configured to prohibit discharge of sewage as designed to meet Coast Guard Regulation 33 CFR 159. Types I and II MSDs shall be made available for inspection to assure the system is treating wastewater as designed by the manufacturer to meet Coast Guard Regulation 33 CFR 159.121.

A pumpout service is available at the Marina Fuel Dock a**t no additional charge for Managed Mooring Field tenants**. At the discretion of the Mooring Field Manager, **a pumpout vessel** may provide regularly scheduled pumpout services to vessels in the Managed Mooring Field. Tenants may be required to allow the pumpout by this service.

The rules under this section will be strictly enforced by the Mooring Field Manager and violations will result in the immediate ejection from the Managed Mooring Field, forfeiture of security deposit, and reporting to the environmental authorities.

3.4 Discharge of waste or any other materials

Discharge of any solid or liquid waste into the waters within the Managed Mooring Field is **prohibited.** Violators are subject to immediate ejection from the Managed Mooring Field, and the Mooring Field Manager will notify the appropriate authorities for enforcement action.

Garbage and recyclable goods from vessels moored at the Managed Mooring Field must be transported and deposited ashore in the designated receptacles provided at the Marina. Vessel owners shall contact the Mooring Field Manager regarding proper disposal of waste oil, rags, bilge socks, absorbents, anti-freeze, used fuel, and batteries. The Managed Mooring Field does not accept any hazardous waste or materials from tenants for disposal.

Grey water generally includes water from showers, laundry, and sinks. Tenants shall avoid the discharge of any nutrients, phosphates, or other pollutants from their boats into surrounding waters. To minimize discharges, all Managed Mooring Field users are urged to use the laundry and showers available at the upland support facilities.

3.5 Vessel cleaning.

Cleaning or washing vessels with detergents containing phosphates, chlorine, or petroleum distillates is prohibited within the Managed Mooring Field.

3.6 Repairs within the Managed Mooring Field.

Major repairs or refitting of vessels, including any activity that could result in the deposition of materials into the waterway or within the Managed Mooring Field area, is strictly prohibited. Minor repairs or mechanical adjustments may be conducted **only with prior approval of the Mooring Field Manager**. Boat hull scraping and painting are strictly prohibited.

Only authorized staff or their designees/contractors shall undertake and accomplish any repairs to docks, piers, moorings, or any other common area structures or appurtenances. Any unauthorized activity in violation of the above may result in ejection from the Managed Mooring Field and forfeiture of security deposit.

3.7 Conduct of tenants.

Tenants shall use discretion in using any sound-producing devices or machinery, not limited to televisions, radios, and stereos, so as not to create a nuisance to other tenants. Generators, blowers, drills, saws, or other noisy machinery shall not be operated between the hours of 7:00 p.m. and 9:00 a.m. Disorderly, boisterous, or rowdy conduct by a vessel owner, crew, or guests that disturbs the peace of other boat occupants in the Mooring Field shall be cause for ejection of the vessel from the Mooring Field.

3.8 Feeding wildlife.

It is **prohibited** for any vessel owner, crew, or guest to feed or leave food for any wildlife, particularly birds, fish or threatened or endangered species.

3.9 Non-tenant use of Managed Mooring Field.

It is prohibited for any non-tenant vessel to tie onto a mooring or buoy within the Managed Mooring Field without the prior authorization of the Mooring Field Manager.

3.10 Boarding by Law Enforcement personnel.

Vessel owner shall fully comply with the directions of the Managed Mooring Field Manager or law enforcement personnel. Further, any vessel within the Managed Mooring Field shall allow the Mooring Field Manager or law enforcement personnel full access to board or inspect their vessel, as necessary.

3.11 Emergency repairs in tenants' absence.

The tenant will be required to grant consent that in the event of an emergency, the Mooring Field Manager has the authority to have necessary repairs made as economically as possible. The emergency shall include, but not be limited to, the breakdown of a bilge, fuel, sewage pump, or other leak and chaffed or broken lines. The cost of these repairs, parts, and labor will be charged to the vessel owner and payable within twenty-four (24) hours of the vessels owner’s return or as provided by the Mooring Field Manager.

3.12 Unauthorized departure of vessels.

It is unlawful for vessel owners to vacate their mooring stations without the permission of the Mooring Field Manager when said vessel has a delinquency in its account. The Mooring Field Manager has the right and authority to secure the vessel to prevent its removal until the delinquency is satisfactorily addressed. Additionally, as part of the leasing agreement, the vessel owner tenant shall grant a lien on the vessel for the cost of the unpaid fees or charges lawfully assessed by the Managed Mooring Field.

3.13 Use of parking lot.

Only parking facilities designated for the Mooring Field shall be used by vessel owners and guests. All vehicles must be operable and properly licensed and insured. All vehicles must be removed within twenty-four (24) hours after the vessel vacates the Mooring Field unless otherwise approved by the Mooring Field Manager.

The Marina upland area may include designated bicycle racks for use by Managed Mooring Field tenants. All bicycles must be kept only at the bicycle rack provided when not in use.

3.14 Reporting of fuel/oil spills.

Vessel owners shall contact the management office and USCG Sector San Juan - Marine Safety Detachment (MSD) St. Thomas (phone: 340-776-3497 Email: STTInspections@uscg.mil) when an oil/fuel spill is discovered. Oil-absorbent pads and containment booms are located at the management office and are available for deployment in the event of a spill. The use of detergents to break up oil spills is strictly prohibited.

4 Amenities and Services

4.1 Misuse of any amenity – grounds for ejection.

If any tenant, crew, or guest damages any property, equipment, or amenities due to neglect, misuse, failure to follow stated instructions, or vandalism, they shall be held responsible for the cost of repair and replacement, as well as any civil or criminal charges for the activity.

4.2 Use of upland laundry, restrooms, and showers.

Laundry facilities and showers designated for use by Managed Mooring Field tenants are provided. Restrooms will be provided for the convenience of tenants in the same upland area designed to support tenants and will be available in other parts of the Marina.

5 Mooring Lease

5.1 Mooring lease agreement.

All tenants of the Managed Mooring Field shall be required to execute a mooring lease agreement within twelve (12) hours of anchoring in the Managed Mooring Field.

Agreements shall include short- and long-term contracts, as established by the Mooring Field Manager. Categories may include daily (overnight to 1 week in length); weekly (7 to 30 days); monthly, seasonally and/or annually. Daily agreements require the tenant to report to the management office immediately upon arrival and execute a user lease agreement within 6 hours of arrival.

The agreement shall contain whatever reasonable language is deemed necessary by the Mooring Field Manager to enforce compliance with the provisions of this Management Plan.

5.2 Tenant information required.

The Mooring Field Manager shall obtain the name and address of the vessel owner or captain and, if appropriate, the name of all crew and guests aboard the vessel. The vessel operator shall provide the Mooring Field Manager with the name and telephone numbers at which they can be reached in the event of an emergency. Copies of the documentation of the vessel and vessel insurance may be obtained for the duration of the tenancy.

The Mooring Field Manager may decline to sign a lease agreement and not grant access to the Managed Mooring Field to users that who do not provide required information or to vessels that do not meet the requirements of this Management Plan.

5.3 Right to rent unoccupied moorings.

Vessel owners must notify the Mooring Field Manager of their approximate time of return before departure and twenty-four (24) hours prior to their return. The Mooring Field Manager reserves the right to lease any unoccupied mooring when an assigned vessel is absent for twenty-four (24) hours or more.

The Mooring Field Manager may lease or allocate the use of abandoned moorings or moorings with abandoned vessels at its discretion.

5.4 Existing Mooring Permits.

Vessels with current mooring or anchoring permits granted by the USVI Department of Planning and Natural Resources (DPNR) in compliance with V.I. Code tit. 25, § 405 (2019) within the boundaries of the Managed Mooring Field and its vicinity shall be granted the opportunity to become tenants of the Managed Mooring Field under the conditions set forth by DPNR for the transition period, unless terminated or discontinued by DPNR, in accordance with the Code or other applicable regulations. All vessels operating in the Managed Mooring Field shall comply with all requirements of this Management Plan, no matter their status.

Upon expiration of the pre-existing lawful permit, any special conditions established for the transition shall be voided, and the vessel owner shall sign a standard mooring lease agreement, or the vessel will be required to vacate the Managed Mooring Field.

6 Hurricane Plan

6.1 Evacuation requirement for storm events

All vessels shall evacuate the Managed Mooring Field at or before the time that a tropical storm warning is issued. Tenants shall be advised that mooring equipment provided in the Managed Mooring Field is not intended to withstand hurricane or tropical storm conditions, including associated wind, waves and/or storm surge. Tenants shall respond immediately to instructions of the Mooring Field Manager regarding the implementation of the hurricane evacuation plan.

All Managed Mooring Field tenants are solely and totally responsible for any and all damages to the mooring apparatus, Managed Mooring Field, Marina, other facilities, their vessel and personal property and other persons, vessels, or property caused by their failure to remove their vessels from the Managed Mooring Field in a timely fashion. It is the Tenant responsibility to plan and make accommodations for the evacuation of the Managed Mooring Field.

7 Managed Mooring Field Area

The **Vessup Bay and Muller Bay Managed Mooring Field** is authorized under an agreement for the use of the submerged land for this purpose.

The area boundary includes the over-water surface area of the Managed Mooring Field and the areas necessary for the dinghy dock and its operation.

7.1 Vessup Bay Mooring Field

	NORTHING (ft)	EASTING (ft)
POINT #1	837034.95	1205203.57
POINT #2	836635.49	1204623.02
POINT #3	836569.73	1204135.80
POINT #4	836761.30	1204057.97
POINT #5	836696.75	1203899.09
POINT #6	836367.41	1204037.73
POINT #7	836445.58	1204228.63
POINT #8	836505.52	1204697.92
POINT #9	836804.82	1205343.85

MOORING FIELD TOTAL AREA: 6.34 acres

7.2 Muller Bay Mooring Field

	NORTHING (FT)	EASTING (FT)
POINT #1	838266.69	1207382.87
POINT #2	837660.62	1206264.82
POINT #3	837129.70	1206568.54
POINT #4	836766.66	1207080.43
POINT #5	837241.01	1207947.76
POINT #6	837691.69	1208292.98

. *MOORING FIELD TOTAL AREA*: 39.27 acres

7.3 Dinghy Docks

Appropriate water areas for the dinghy docks and other services provided by the Managed Mooring Field will be defined as part of the agreement.

This management plan is incorporated as part of the Coastal Zone Management permit and area use agreement.

Appendix B

Marina Hurricane Preparation Guidelines

Contents

Name: Latitude 18 Marina
Address:
Phone:
Fax:
E-mail:

Latitude:
Longitude:
Water Body:
Permit No.:
SL Lease No.: ___________

Hurricane Preparation Guidelines

1 Introduction

This section is not intended to be a comprehensive hurricane preparedness plan, but to outline considerations that should be included in the plan.

The marina management (includes both marina dockage and mooring fields) will establish a hurricane preparation plan, which shall be designed to ensure that protecting the lives and safety of boaters and staff is the priority. These guidelines are intended to also prevent catastrophic failure of the marina water structures, to minimize major structural damage to the marina, and to prevent boat damages.

2 Design Approach

Marina docking structures are subject to substantially larger forces when boats are on their slips, compared to an empty slip condition. Due to the marina exposure, it will be required that all wet berthing and mooring buoys be evacuated in preparation for a tropical storm or hurricane.

2.1 Marina and Mooring Field Elements

It has been shown in the past that the lack of knowledge by boat owners and marina managers of the marina design assumptions may result in wrong decisions that may lead to severe damage to property. This section is intended to summarize the design criteria and emphasize the need for evacuation.

The marina berthing infrastructure is primarily comprised of concrete fixed docks, with only the dinghy docks being floating docks. The marina also includes a floating wave attenuator, which will be designed to improve boaters' comfort under operational conditions but will not be designed to provide wave protection during tropical storm or more severe conditions.

2.2 Hurricane Regulations

This marina is not considered a "hurricane hole." Therefore, the marina and mooring field facility structures will be designed to be empty during a hurricane event. Boat owners should accept this condition as part of their lease contract and are responsible for taking any necessary precautions so that boats are removed from the facility before a hurricane.

Specific procedures shall be defined in a hurricane management plan and the slip or mooring lease agreement.

2.3 Engineering Design Background

The wave design condition will be defined as an event with a 25- to 50-year return period, in accordance with standard professional practice. Performance specifications will require that the docks and structures be designed to withstand wind and wave forces created by these conditions in an unloaded scenario, that is, with no vessels moored in the basin during these conditions.

The fixed docks main structural components will be designed to survive a major storm. However, utilities, furniture and ancillary elements may be damaged due to splashing, wave impacts and inundation, depending on the storm severity.

The mooring buoys will be designed to be evacuated, but the dinghy docks may be damaged depending on the storm severity.

The floating wave attenuator will be designed to be removed in preparation for a storm and/or on a schedule (within the hurricane season).

3 Evacuation and Hurricane Storage

While the marina will try to facilitate planning for the relocation of vessels with a marina lease agreement, Marina Management is not responsible for finding a relocation place for these vessels.

The marina may offer a “Hurricane Club” membership that includes relocation and storage services for marina tenants.

- The Marina Management may – at its sole discretion – develop a plan for relocating vessels to a nearby hurricane hole. If offered, this service will include securing space at the hurricane hole and establishing the staff requirements to achieve the relocation. This service will be offered to marina tenants prior to the initiation of hurricane season but may be limited by the ability to secure safe relocation spots. This is only to assist vessels owners in the compliance with lease contract requirements but is not required.
- The Marina Management will offer upland storage for certain size vessels, under specific commercial agreements. This service will be offered to marina tenants prior to the initiation of hurricane season.

Boats tend to suffer less damage if they are stored on the upland. Upland storage capabilities will be determined by the Marina Management based on equipment and storage areas available on an annual basis.

The Marina Management will develop a plan in advance for the boats that shall be stored on land, based on the contracted services.

4 General Hurricane Preparation

The plan should consider users and staff, as well as the boats, docks, buildings, office, and office supplies. Protecting the lives and safety of boaters and staff is the priority of the plan.

4.1 General Staffing

- Designate hurricane team, staff members, roles, responsibilities

- Prepare training material to maintain staff aware of their roles

4.2 Communications

Cooperation from boat owners is essential:

- Marina contracts shall include explicitly the boat owners' responsibilities in the event of a hurricane.
- Every effort to provide boat owners with a convenient way to comply with their contractual requirements will greatly facilitate cooperation.
- Specific hurricane preparation requirements should be written down now so that they can be posted on the marina's website, in addition to in the contracts.
- Updated records should be maintained for contacts, owner and alternative person(s) who can prepare the boat in the owner's absence. This will allow owners to contact someone else, in the event that he or she will not be able to prepare their own boats.
- Marina contracts shall specify that an owner will be billed for any services necessary to prepare a boat in their absence.
- The marina workboats should be included in the preparation plan.
- A list of nearby hurricane holes should be developed, in coordination with Emergency Response, and posted on the marina website.

4.3 Documents

- Maintain updated information about insurance, coverage, requirements, etc.
- Make duplicate copies of important documents, e.g., insurance policies, financial records, vendor list, etc.
- Routinely back up all computer office files.
- Take photos of facilities, inventory, machinery and valuable tools for insurance purposes.
- Make laminated photo ID tags to give to the Hurricane Team. This may help to get staff access into restricted areas after the hurricane.

4.4 Supplies

- Consider what gear is essential to preparing the marina for a hurricane. Examples include smaller emergency generators, plywood, and nails, all of which will be in short supply once a warning is posted.
- Have enough jack stands to support boats stored on land during a storm. Additional stands and tie down will be required.
- Determine other necessary equipment, including flashlights, communication radios, batteries, pumps, yellow caution tape, extra fuel, duct tape, boat hooks, water, drinks and food. The latter can be used to feed staff during clean up after a storm.

4.5 Recovery Preparation

- Maintain contact information and communications with boat salvors.
- Maintain contact information and communications with engineers, equipment suppliers and/or building and marine contractors.
- Making arrangements in advance allows for quick response after the storm.

5 Tropical Storm Preparation Plan Outline

This plan will be triggered by the issuance of tropical cyclone advisory that has potential of affecting the facility or its operations.

Tropical storm or hurricane watch declaration, which is an announcement that tropical storm or hurricane conditions are possible within the specified coastal area within 48 hours, will trigger additional specific actions.

The plan shall provide adequate time for any boat owners and staff to conduct preparation and seek shelter. The procedures listed below shall be considered a guide, are not all inclusive, and shall be followed when and where practicable:

The following time line should be used whenever practical:

5.1 72 hours out:

This plan will be triggered by the issuance of tropical cyclone advisory that has potential of affecting the facility or its operations, which is prior to the official storm warning.

- **Communications**
  - Monitor hurricane track and alert employees of pending storm.
  - Post updated storm information outside the main office and on the website.
  - Inform vessel owners of hurricane preparation and evacuation plans
  - Encourage transients to relocate
  - Check business disaster plan for up-to-date phone numbers.
  - Remind employees of the need for them to have family disaster plans.
  - Review company plan with employees.
  - Check on availability of work force based on vacations and equipment based on operability.
  - Pay close attention to local TV and radio broadcasts
  - Call/ take calls from owners. Complete as many special instructions as possible.
  - Update inventory list of all business equipment and furniture.
  - Evaluate machines and machinery.
  - Allow all employees to take care of personal needs, supplies, food, shutters, etc.
  - Check stock bottled water and ice.
- **Dock and Boats Preparation**
  - Trigger floating attenuator preparation / relocation plan
  - Trigger "Hurricane Club" planning verifications (number of boats, haul out capacity, staffing, etc.)
- **Fuel**
  - Secure fuel supplies to:
    - Top off fuel tanks.
    - Top off fuel in all machinery.
    - Top off generators with fuel, test and service under load.
    - Top off fuel in all vehicles and maintain at full or near full level. Fill spare containers.
- **Wind Preparation**
  - Remove any loose materials from the roof.
  - Remove all flags, banners and signs.

- Quick check of tree risks. Note that trimming or any hurricane yard work shall be completed prior to hurricane season.

5.2 <u>Tropical Storm / Hurricane Watch Declaration, 48 hours out:</u>

- **Communications**
  - Submit evacuation plan notices and follow up to enforce compliance
  - Recheck team member list and contacts.
  - Move all hazardous materials to a safer location on high ground.
  - Videotape or photograph interior and exterior of your buildings.
  - Place loose papers, books, hanging plants in desk drawers or storage cabinets.
  - Change batteries in cell phones, radios, flashlights, etc.
- **Dock and Boats Preparation**
  - Dismantle floating attenuator and safely store in the designated upland area
  - Relocate "Hurricane Club" member boats to designated upland storage area
  - Relocate "Hurricane Club" member boats to off-site hurricane hole (if that service is provided)
  - Enforce evacuation plan notices
  - Secure dock utility equipment
- **Wind Preparation**
  - Remove canvas covers from tents.
  - Move all outside trash cans and any other moveable items to interior.
  - Tie down dumpsters and other items that cannot be brought inside.
- **Office Preparation**
  - Install shutters and building hurricane protection, as needed
  - Check all emergency equipment (flashlights, first aid kits, etc.) Replace missing or faulty items.
  - Move merchandise, equipment, and furniture away from windows and sky lights.
  - Take down pictures and plaques from the walls.
  - Make arrangements to pay employees with cash, if necessary.
  - Set up a petty cash fund for emergency purchases.
  - Alert suppliers of closing.

5.3 <u>Tropical Storm / Hurricane Warning Declaration, 36 hours out:</u>

- All actions should be monitored to ensure compliance with the plan and emergency measures should be initiated as soon as feasible.

5.4 <u>The Hurricane or Emergency, 24 hours out (or before):</u>

- **Dock and Boats Preparation**
  - Verify floating attenuator storage and finalize securing
  - Verify "Hurricane Club" boat upland storage
  - Shut off all marina utilities.
  - Remove any boat in violation of the evacuation plan

- **Office Preparation**
  - Move all remaining records away from windows and floors. Place on shelves, file cabinets and/or counter tops.
  - Relocate boxes, computers and other office equipment if possible to the innermost portion of the building or to a designated offsite safe place.
  - Complete installation of shutters over doors and windows.
  - If possible, forward work numbers to answering service outside hurricane alert area.
  - Notify local authorities if building will be vacant and if a guard/ security will be present.
  - Check standby electrical generator switches and controls for automatic switch over.
  - Disconnect all electrical appliances/ equipment that are not to run on emergency generator.
  - Post “Notice of Closing” at front entry and entry for supply deliveries.
  - Post evacuation map showing major roadways to evacuate area and locations of local hurricane or emergency shelters.
  - Lock all doors when leaving.

5.5 Operations Restart / Hurricane Recovery

- Photo document damage for insurance purposes. If possible, contact your insurer.
- Rig oil containment booms around all sunken boats.
- Contact engineers, equipment suppliers and/or contractors needed to rebuild / repair.
- Determine safe conditions to initiate clean up and when/if volunteers will be allowed access.
- Begin debris clean up. Make two piles—debris that is reusable and debris that will be hauled away.
- Boat owners may volunteer to help clean up. Prepare to support their activities by having availability of food, water, restrooms, etc.
- Keep customers and suppliers apprised of your rebuilding schedule.

APPENDIX C

CZM APPENDIX
DRAFT

VESSUP POINT MARINA

COASTAL VULNERABILITY ASSESSMENT AND CLIMATE ADAPTATION PLAN

Summary Report

CZM Application Appendix

Rev.1 March 25, 2021
Rev.0 February 19, 2021

DESIGN ENGINEERING CONSULTING
www.appliedtm.com

Coastal Vulnerability and Adaptation

Table of Contents

Introduction and Methodology

Introduction

Approach

The coastal vulnerability and adaptation analysis was conducted to assess the siting of coastal project elements.

The analysis quantified coastal impacts due to design storms under present conditions and future sea level rise scenarios, providing insights into the site's coastal vulnerability over time and tools to develop a climate adaptation strategy.

ATM used wave transformation modeling tools, local inundation and beach erosion models, engineering judgment, and experience to recommend setbacks and adaptation strategies.

The analysis was done for wave conditions with a 1% probability of exceedance each year (100-year return period), which is the standard design condition in the US as prescribed by FEMA. The 100-Year Base Flood Elevation is the wave crest elevation envelope, which includes the wave action on top of the 100-year still water elevation (total SWEL, comprised of the combined surge, tide, and wave induced setup at the site).

Contents

The technical analysis includes 2 main sections:

- the property area in the vicinity of the peninsula, and
- the beachfront area

The first part of each section evaluates the vulnerability under existing conditions, then analyzes the initial proposal of building footprints by the land planners and finally evaluates proposed alternatives or climate adaptation strategies.

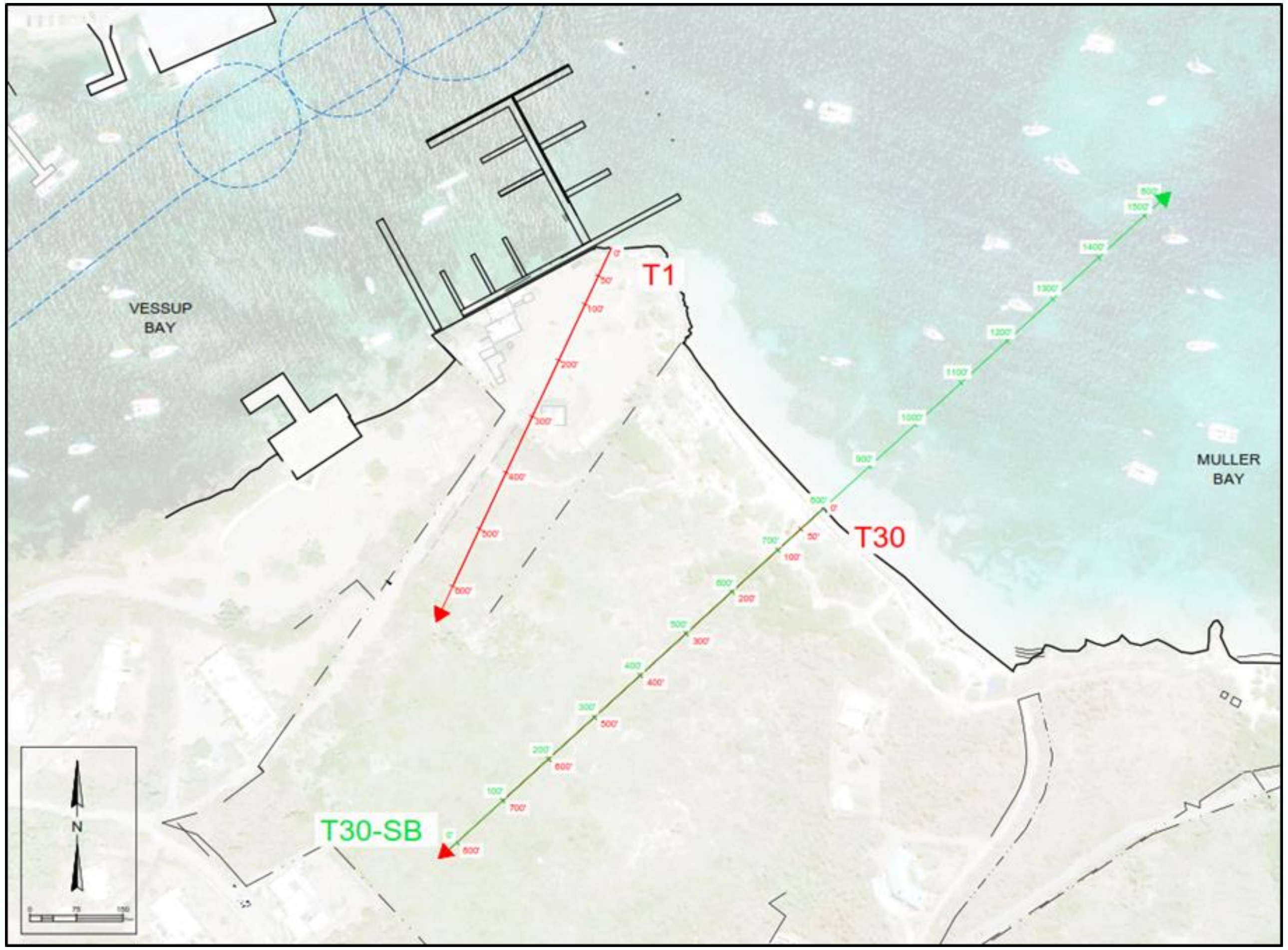
This analysis builds upon previous coastal flood hazard assessments at the project site and specifically assessed increased risks due to two sea level rise (SLR).

SLR scenarios of increased mean sea levels of 1ft and 2ft are considered to evaluate site resiliency options, adaption strategies, and to aid in future risk management decisions.

Analysis Methodology

The methodology for this analysis included:

- Estimation of extreme water levels due to storm surge based on available regional sources.
- Calculation of offshore wave parameters with 100-year return period, using wave transformation model results. Special consideration was given to FEMA 100-year storms conditions.
- Calculation of coastal flood hazards following US FEMA flood mapping guidelines, using the WHAFIS numerical model.
- Calculation of wave effects in the nearshore area under present conditions: beach erosion, and maximum wave height envelope using the SBEACH model on a beachfront transect within the property (T30-SB).
- Recalculation of these impacts for two Sea Level Rise scenarios (+1ft and +2ft of SLR).
- Analysis of adaptations strategies to provide protection under extreme events and future sea level rise, based on the general understanding of the project development plans.



Principles and Analytical Tools

SBEACH Profile Erosion Modeling

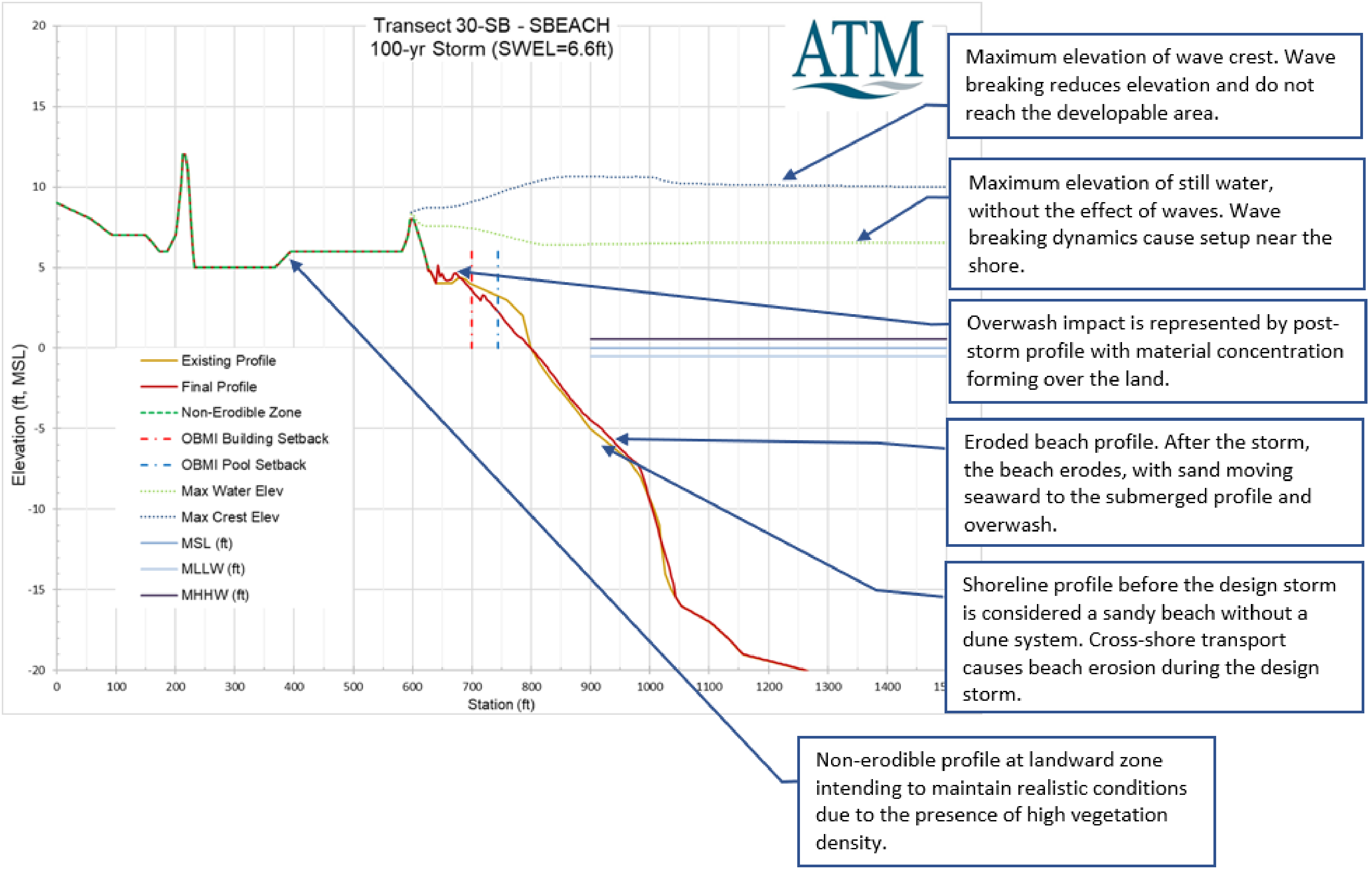
Introduction

ATM utilized SBEACH (Storm induce-BEACH Change) numerical model to simulate storm waves, water levels (including wave setup), and cross-shore beach, berm, and dune erosion along transect T30.

For transect T30, ATM studied 100-year storm erosion impacts under existing conditions. Analogous with project site's FEMA flood insurance study, a significant wave height of 4 feet, a wave period of 11 seconds, and a total SWEL of 6.6 ft was analyzed.

Sea level rise scenarios were analyzed primarily to evaluate the coastal vulnerability due to future changes in water elevation along project site's coast.

Key to Interpretation of SBEACH Results Graphs



WHAFIS Profile Storm Inundation Modeling

Introduction

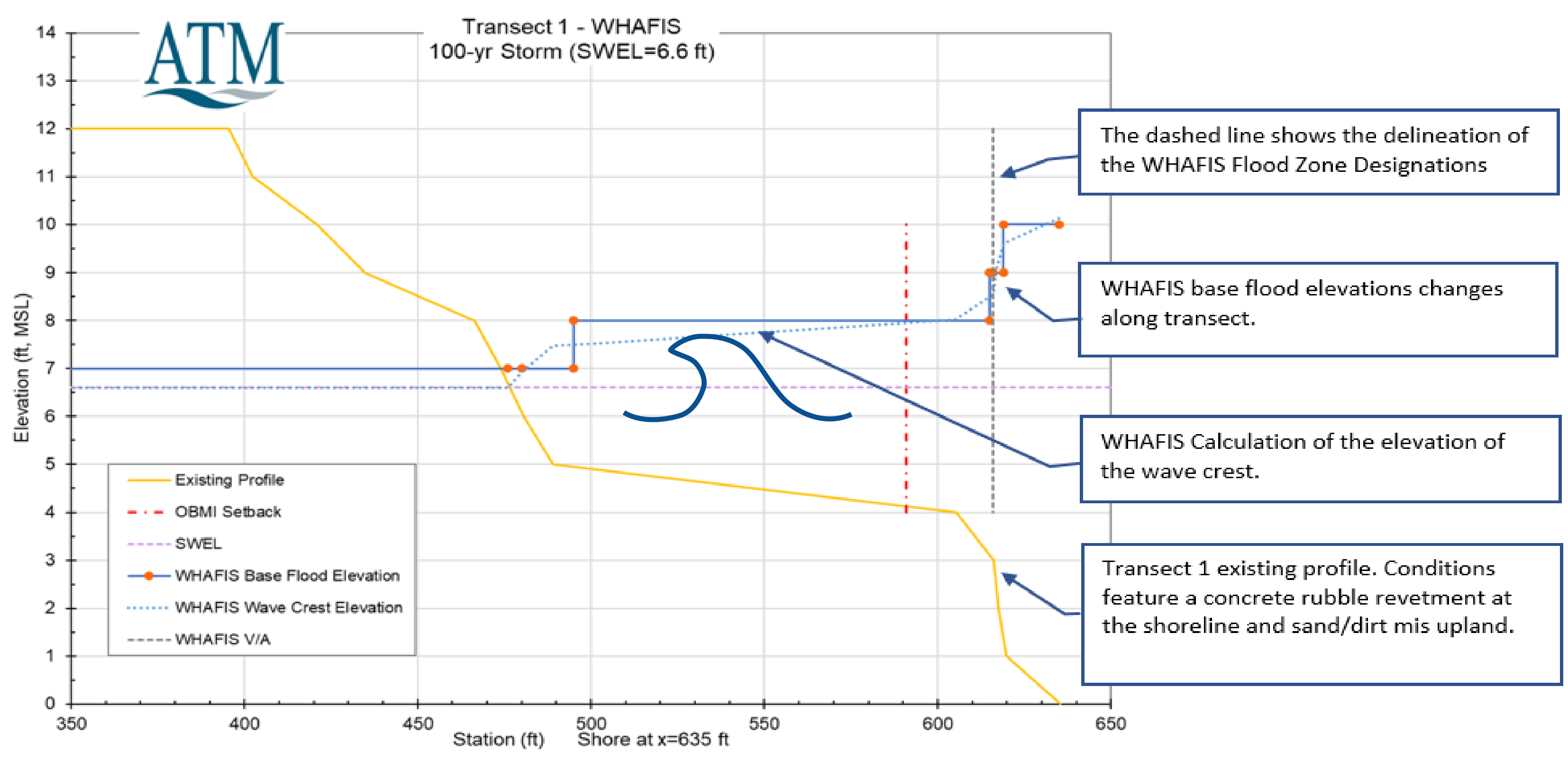
This model evaluates inundation and overland impacts due to waves during a large storm or hurricane. It is used in the US by FEMA to develop floor risk maps.

ATM used this same model to evaluate overland impact under existing conditions for Transect 1 and Transect 30. Similar 100-year storm conditions with a significant wave height of 4 ft, wave period of 11 seconds, and a total SWEL of 6.6 ft was analyzed.

FEMA has guidelines to evaluate the potential erosion of the profile for the use of this model. The results of the WHAFIS model on the eroded analysis profiles are shown graphically in the figures in the report.

Regarding climate change coastal impact adaptation, overland impacts due 1 ft and 2 ft increase of sea level rise were studied.

Key to Interpretation of WHAFIS Results Graphs



FEMA Principles and Mapping

FEMA: Maximum Wave Crest Elevation

The maximum elevation of still water level plus wave height is known as the Maximum Wave Crest Elevation. This is the critical elevation to which wave crest heights can reach and serve as a basis for FEMA's Base Flood Elevations (BFE). BFE and wave heights are critical variables for coastal construction guidelines.

FEMA's WHAFIS model was used for the various scenarios and the output BFEs based on maximum wave crest elevations.

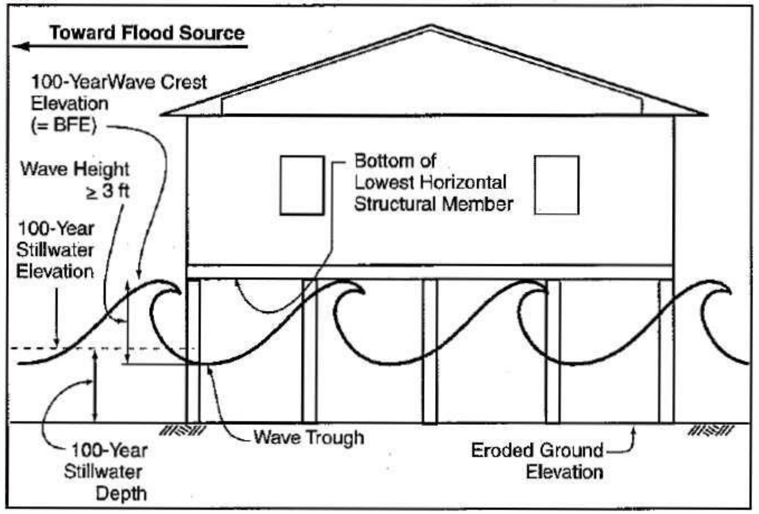
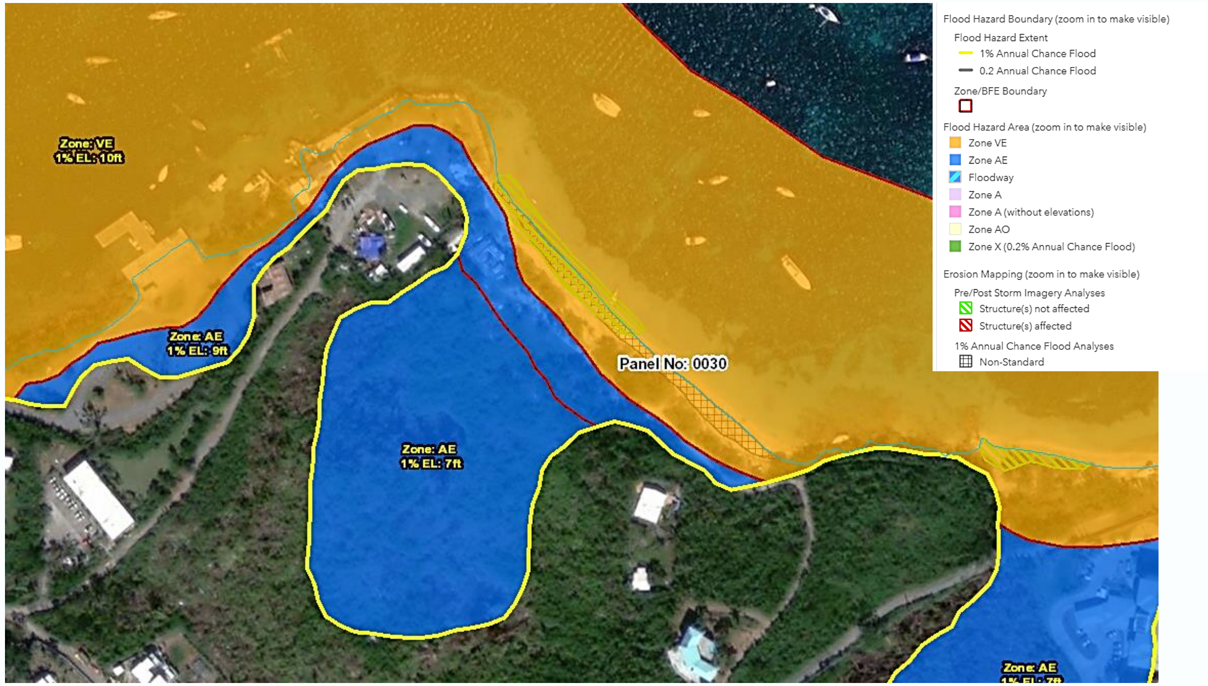


Figure: FEMA diagram showing waves riding on SWEL, and showing schematic freeboard of building lowest horizontal structural member above Maximum Wave Crest Elevation

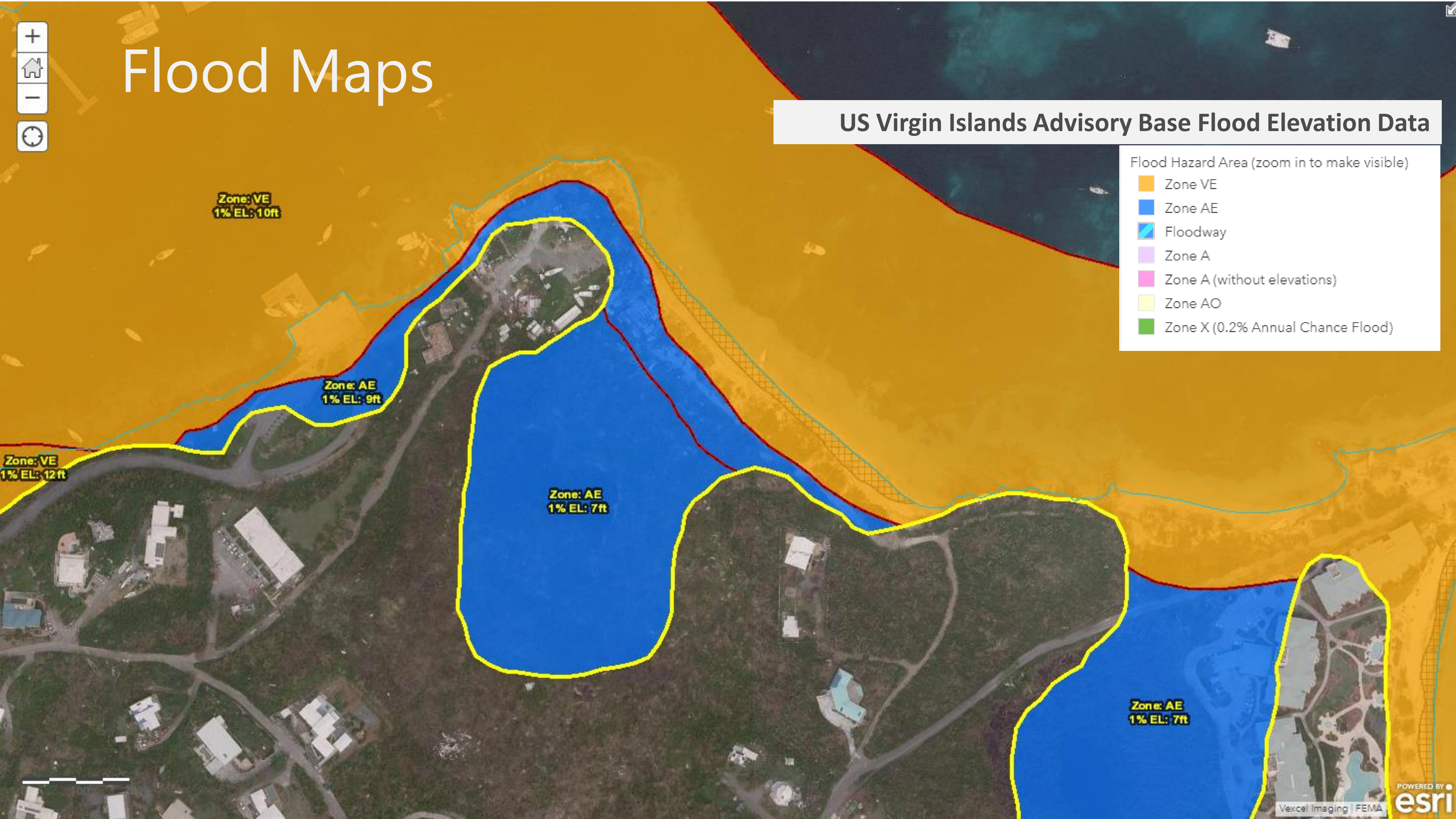
FEMA Flood Map

In the past, FEMA flood maps were used for planning purposes, even if their original mandate was to generate information for insurance purposes. However, because the maps are based on historical data and statistical analysis, they do not account for sea level rise or other climate change effects.

Sea level rise now needs to be considered for planning purposes.



Flood Maps


US Virgin Islands Advisory Base Flood Elevation Data
Flood Hazard Area (zoom in to make visible)
Zone VE
Zone AE
Floodway
Zone A
Zone A (without elevations)
Zone AO
Zone X (0.2% Annual Chance Flood)
Zone: VE
1% EL: 10ft
Zone: AE
1% EL: 9ft
Zone: VE
1% EL: 12ft
Zone: AE
1% EL: 7ft
Zone: AE
1% EL: 7ft
Vexcel Imaging | FEMA
POWERED BY esri

Flood Maps


National Flood Hazard Layer (Official)
Zone VE
(EL 10 Feet)
Zone AE
(EL 9 Feet)
Zone AE
(EL 7 Feet)
Zone AE
(EL 7 Feet)
AREA OF MINIMAL FLOOD HAZARD Zone X
Vexcel Imaging
POWERED BY esri

Flood Maps


National Flood Hazard Layer (Official)
VE +10ft
AE +9ft
AE +7ft
Vexcel Imaging
POWERED BY esri

Data

Water Levels

Astronomical Tides

Tidal Datums	Water Level (ft, MSL)
MHHW	+0.57
MHW	+0.43
MSL	0.00
MLW	-0.39
MLLW	-0.52

Extreme Event Water Elevations - Storm Surge

Return Period (Year)	FEMA* (ft, MSL)	GAR** (ft, MSL)
10	3.4	4.1
25	4.43	5.4
50	5.2	6.8
100	6.6	7.4

* FEMA Flood Insurance (FIS) Report for US Virgin Islands
** Global Risk Assessment (GAR,2015)

Adopted Total Still Water Elevation

Return Period (Year)	Water Elevation Condition	SWEL (ft, MSL)
100	Present-day Conditions	6.6
	Present-day Conditions + 1 ft of SLR	7.6
	Present-day Conditions +2 ft of SLR	8.6

Beach Profiles

ATM studied 2 transects within the project property:

Transect 1

- Represents the peninsula development area. It was used for the WHAFIS model.

Transect 30

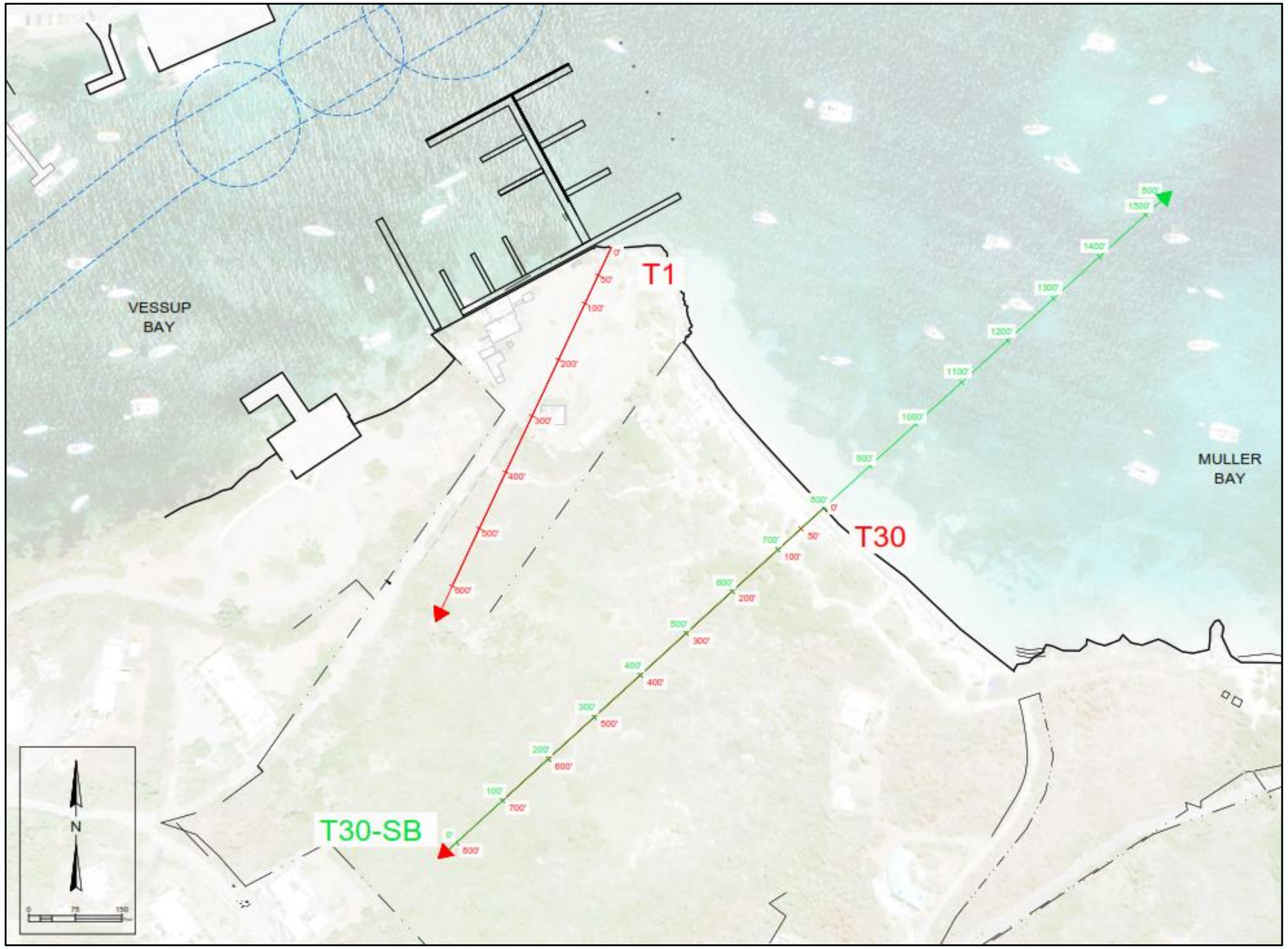
- Represents the beachfront development area. It was selected in the same location as the transect studied by FEMA, in order to directly compare ATM WHAFIS model results with the FEMA results shown in the FIS report for this area. This is the only transect that was modeled for the FIS in this property.

Transect 30-SB

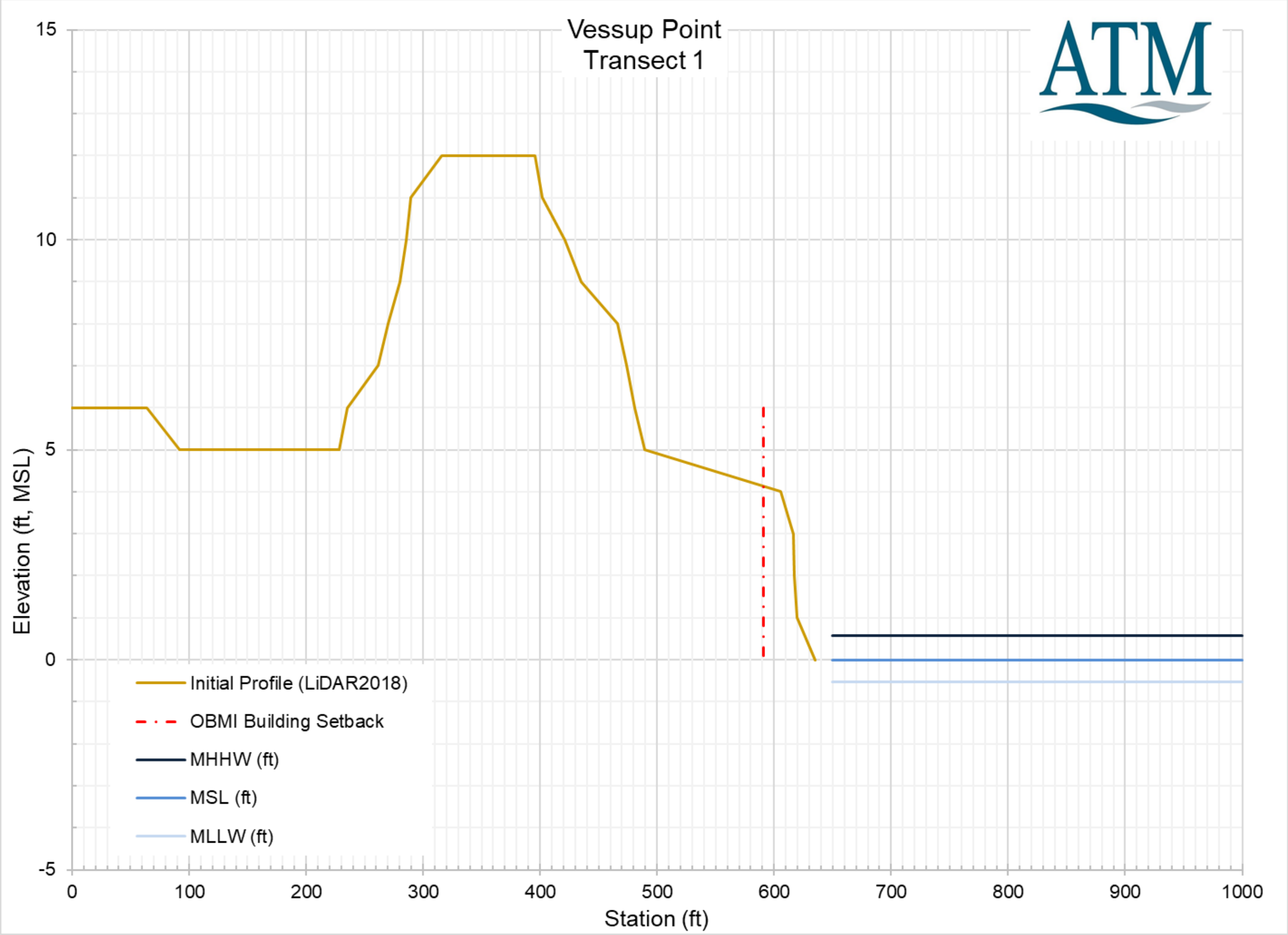
- This is in the same location as the FEMA transect. Used for SBEACH modeling, it runs offshore in order to analyze beach erosion.

Beach profiles were generated from:

- Topography elevations based on USGS Puerto Rico and USVI LiDAR 2018 study.
- ATM bathymetry dataset, utilized as input for the wave transformation analysis done for the feasibility study of Latitude 18 marina project

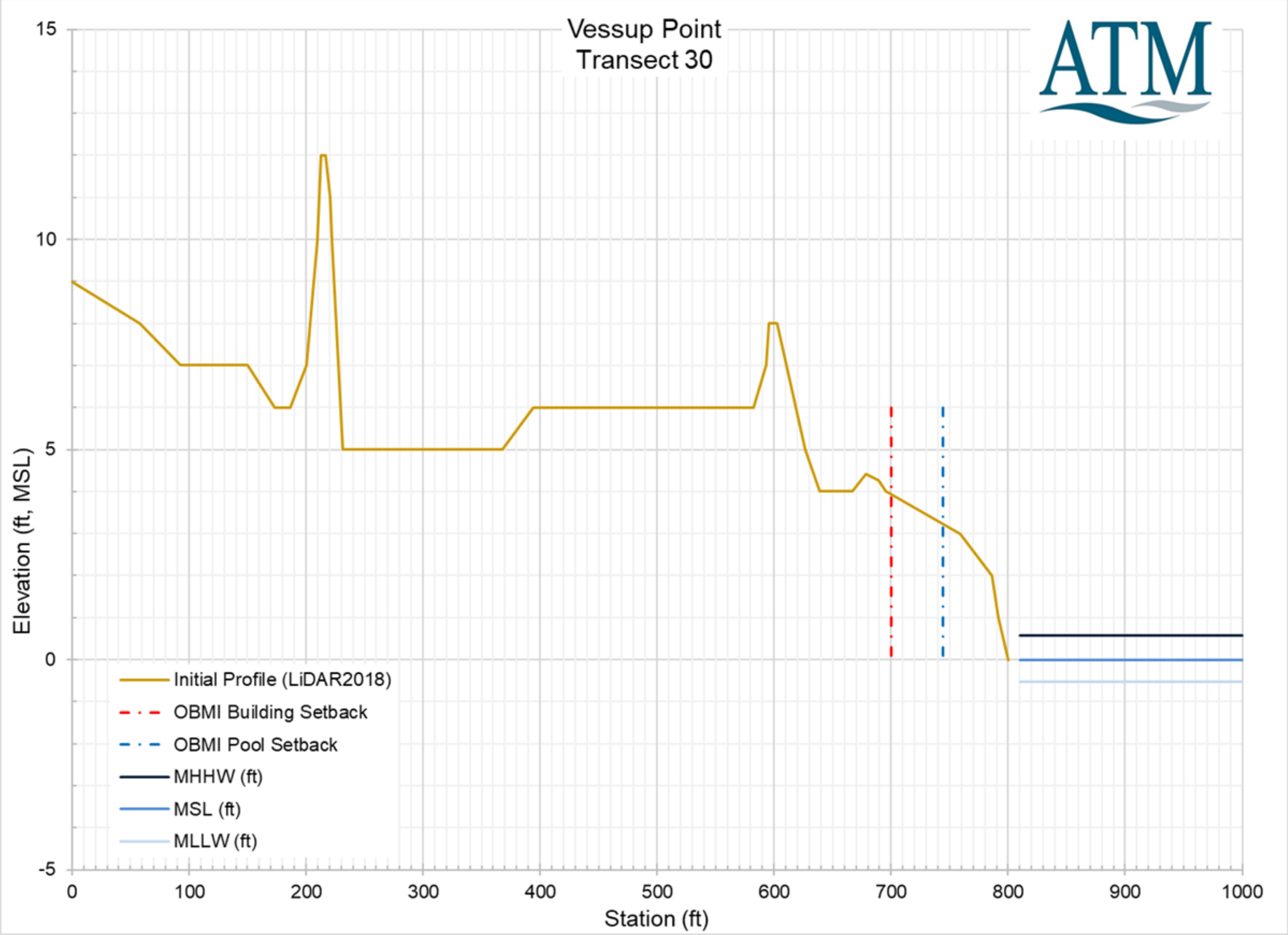


Transect 1



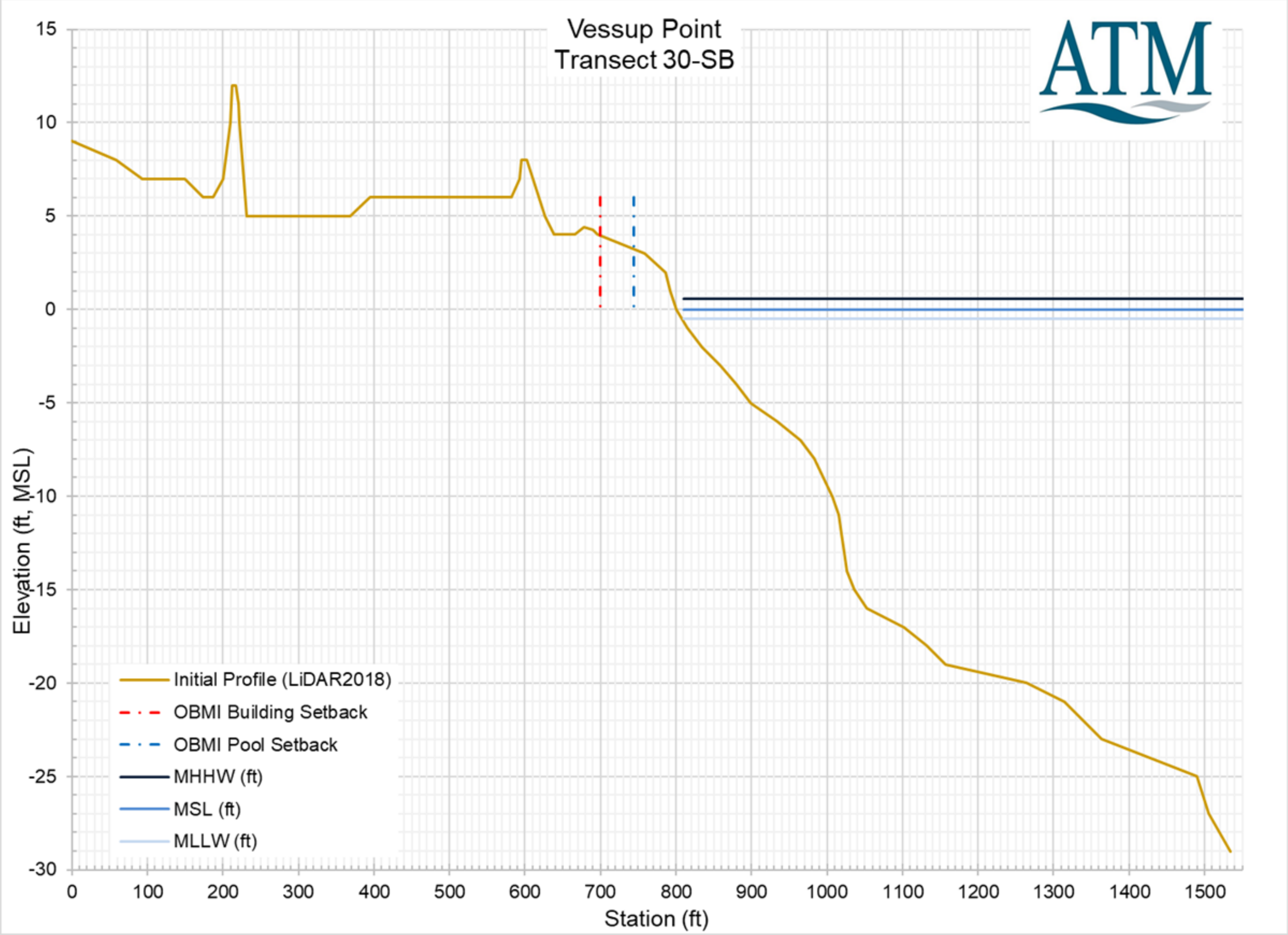
Vessup Point
Transect 1
ATM
Elevation (ft, MSL)
15
10
5
0
-5
Station (ft)
0
100
200
300
400
500
600
700
800
900
1000
Initial Profile (LiDAR2018)
OBMI Building Setback
MHHW (ft)
MSL (ft)
MLLW (ft)

Transect 30

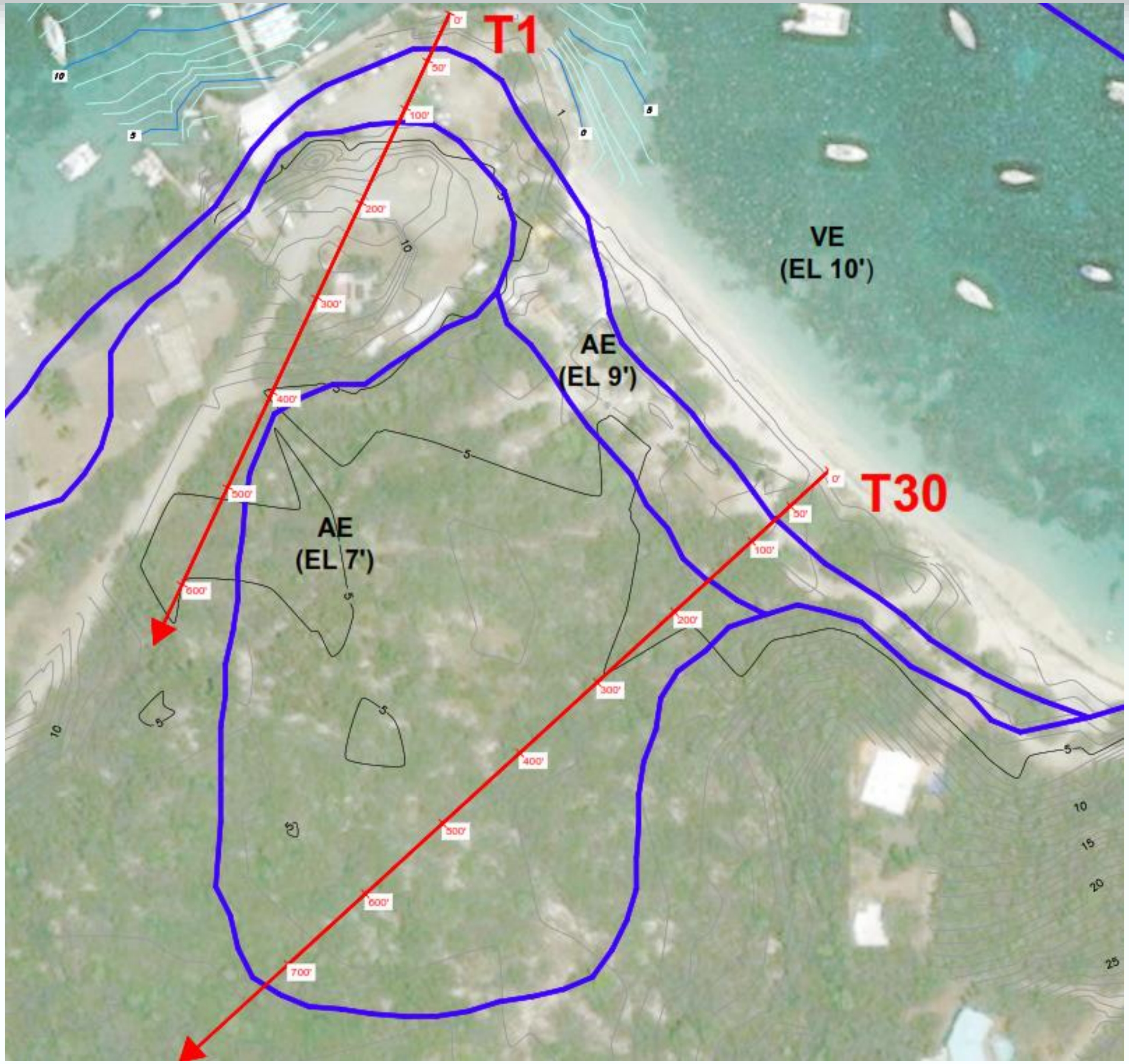


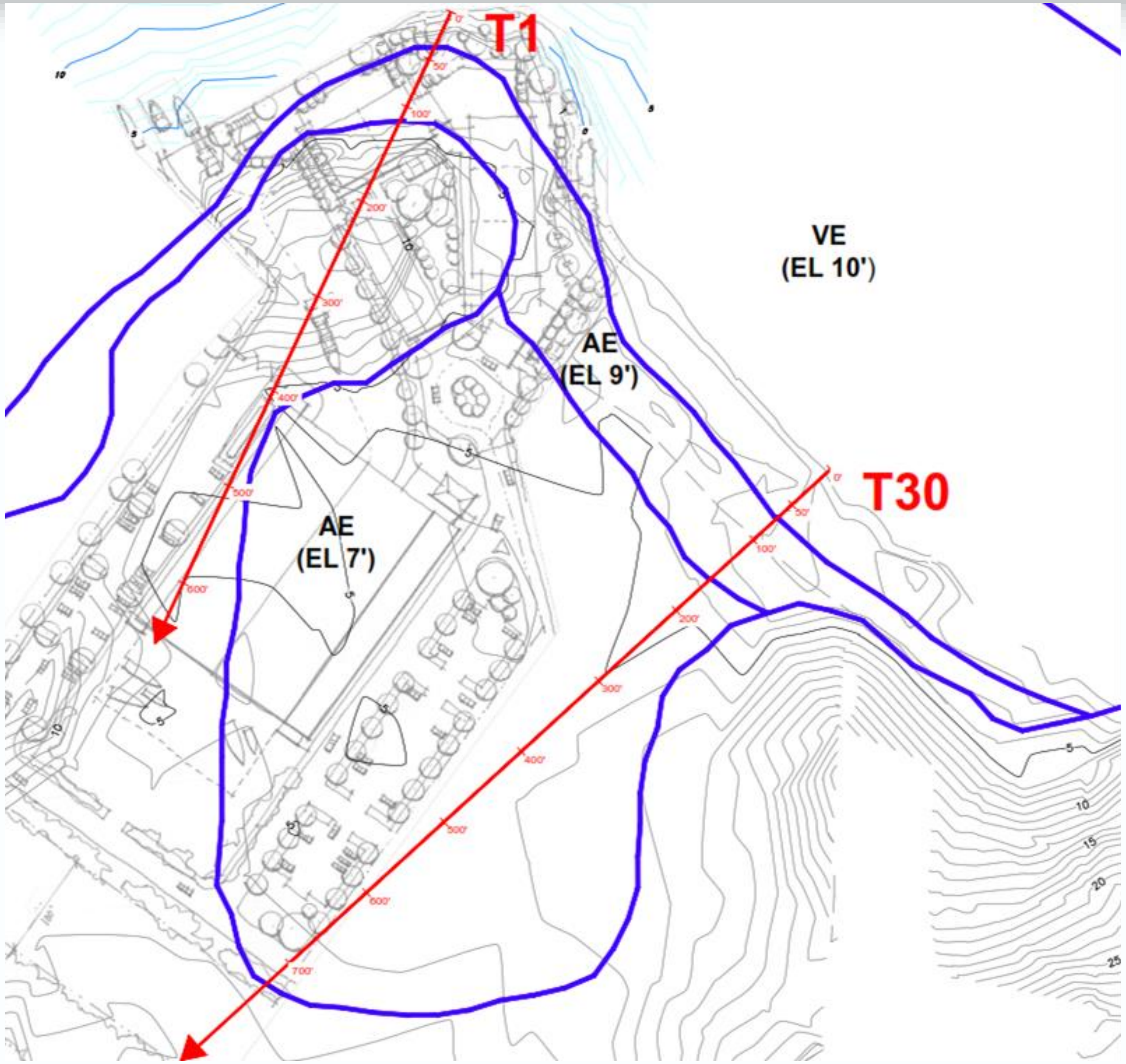
Vessup Point
Transect 30
Elevation (ft, MSL)
Station (ft)
15
10
5
0
-5
0
100
200
300
400
500
600
700
800
900
1000
Initial Profile (LiDAR2018)
OBMI Building Setback
OBMI Pool Setback
MHHW (ft)
MSL (ft)
MLLW (ft)

Transect 30-SB



Flood Maps and Project Transects





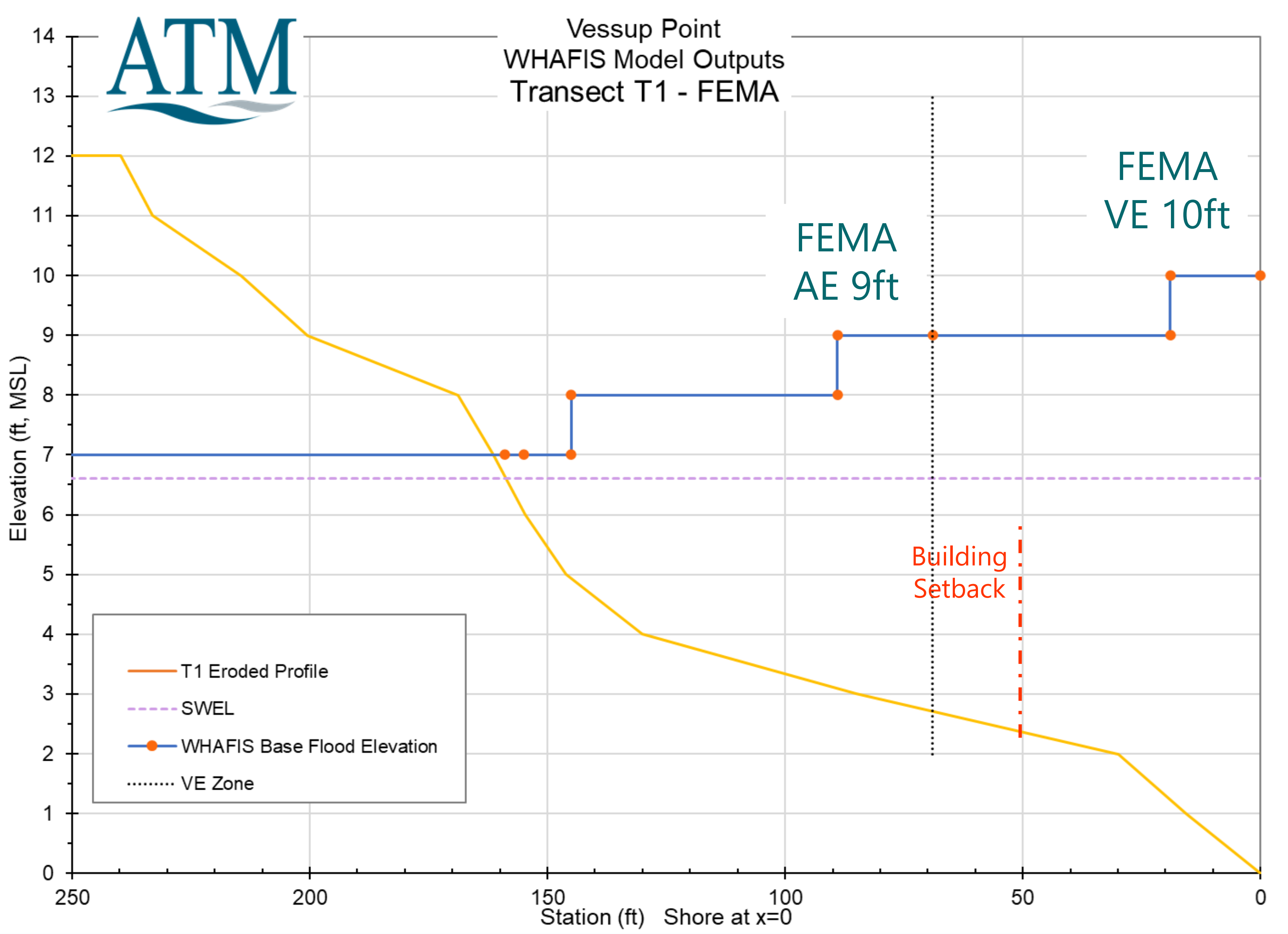
Peninsula Development Area

Transect 1

Existing Conditions

Terrain conditions compatible with FEMA Flood Map

Transect 1 (FEMA): 100-year storm



Existing Site Conditions / Site Analysis

"Eroded Profile" Model Run to reproduce FEMA Flood Map

Wave Condition 1% annual exceedance

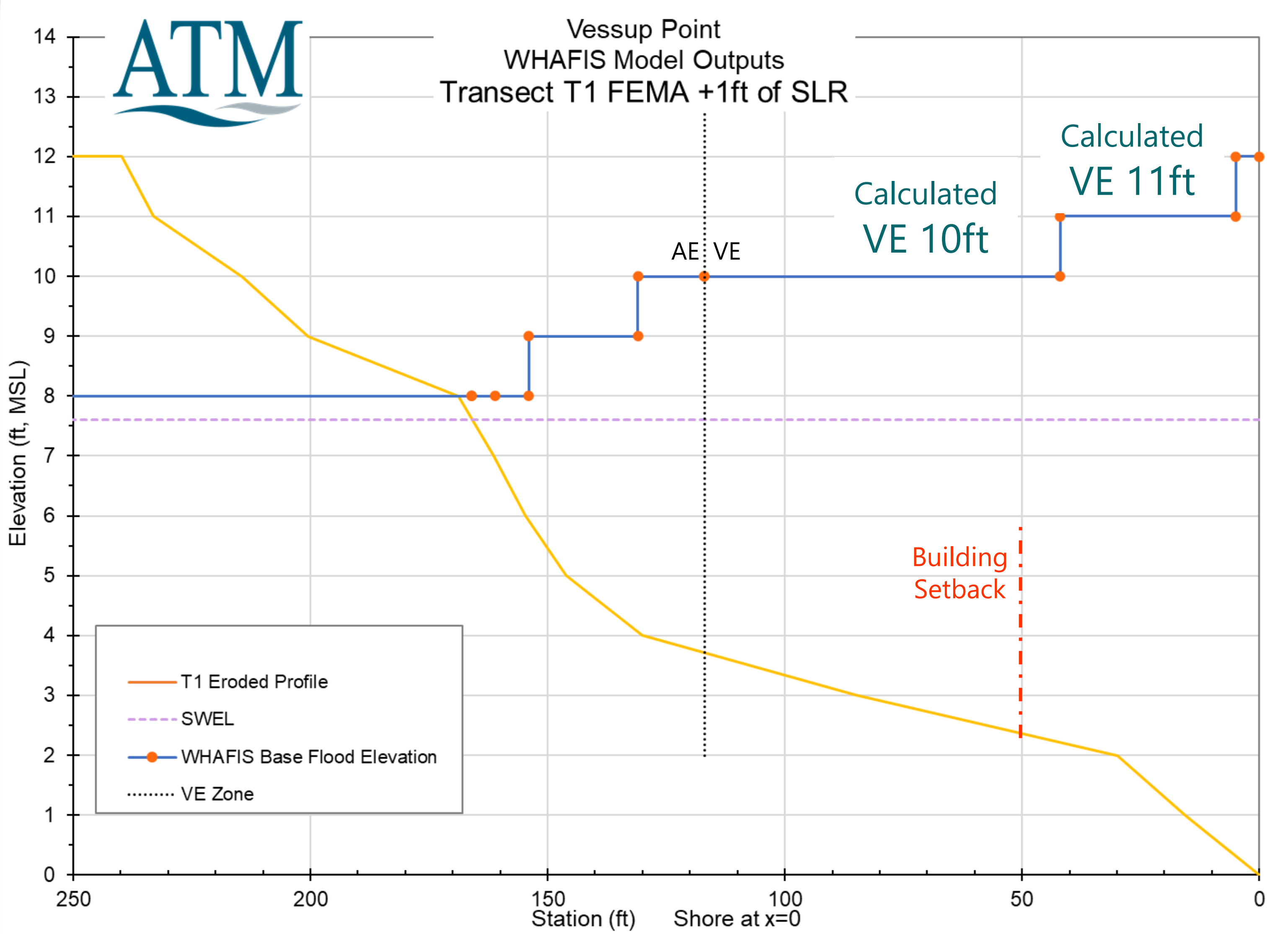
SWEL 6.6ft (FEMA 100-year still water elevation)

Hazard at the proposed building setback:

Calculated as VE +9 ft, adjacent to a AE +9ft

FEMA Flood Map AE +9ft

Transect 1 (FEMA): 100-year storm + 1ft SLR



Existing Site Conditions / Site Analysis

"Eroded Profile"

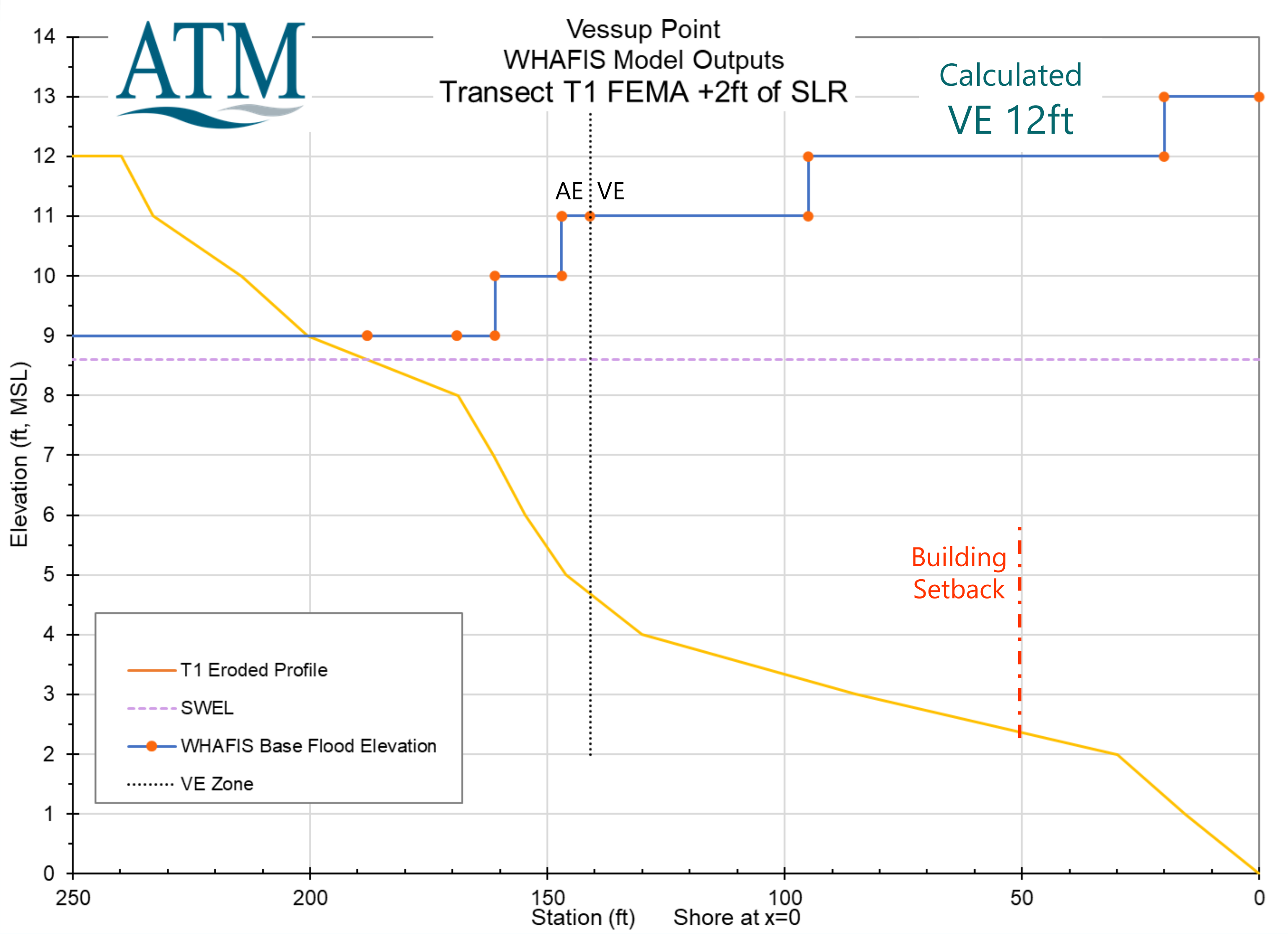
Wave Condition 1% annual exceedance

SWEL 7.6ft (FEMA 100-year still water elevation + 1 ft SLR)

Hazard at the proposed building setback:

Flood Map VE 10 ft / VE 11 ft

Transect 1 (FEMA): 100-year storm + 2 ft SLR



Existing Site Conditions / Site Analysis

"Eroded Profile"

Wave Condition 1% annual exceedance

SWEL 8.6ft (FEMA 100-year still water elevation + 2 ft SLR)

Hazard at the proposed building setback:

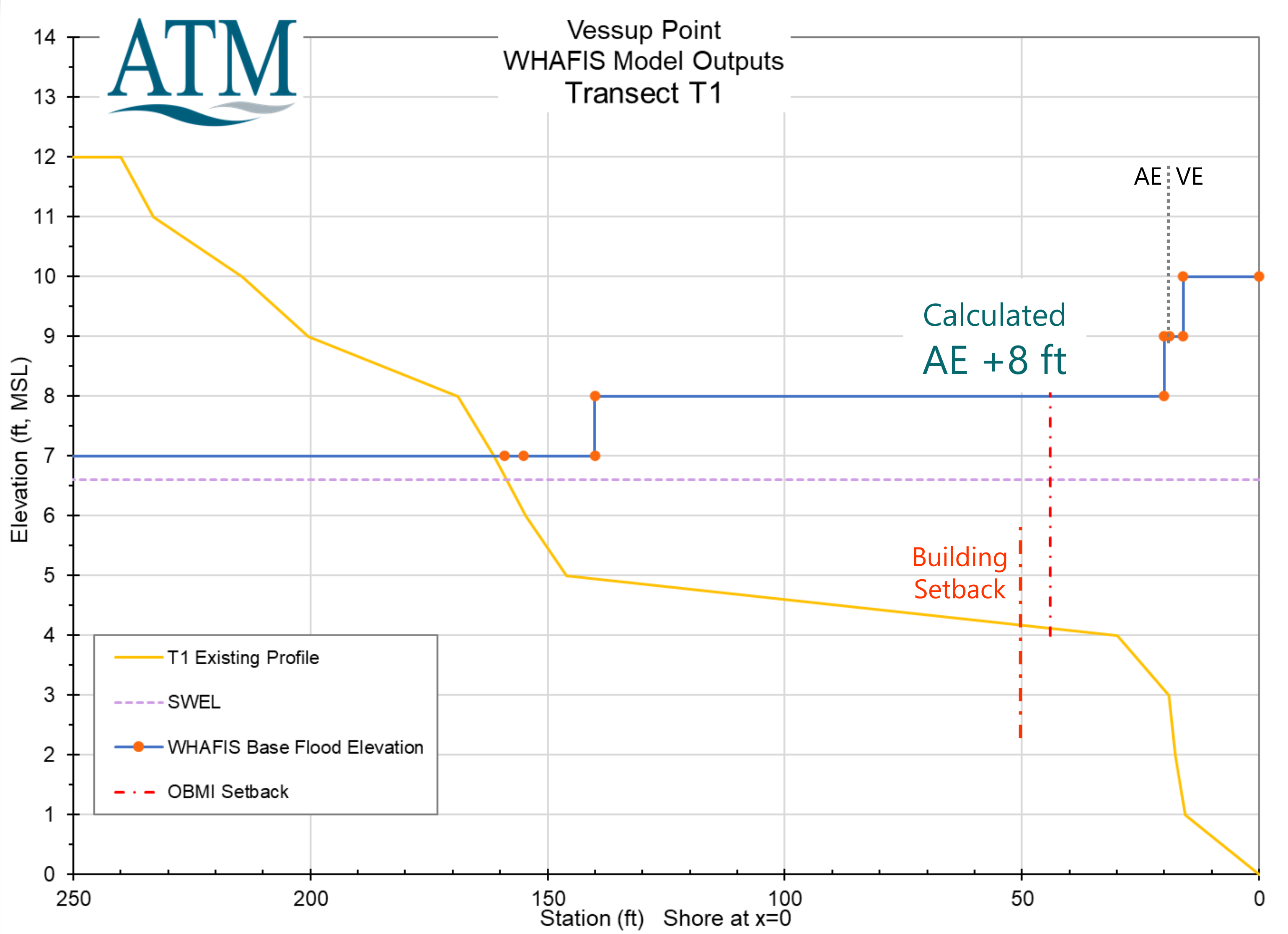
Flood Map VE 12 ft

Existing Conditions

Modified Terrain conditions

Not compatible with FEMA Flood Map

Transect 1: 100-year storm



Existing Site Conditions / Site Analysis

"Non-Eroded Profile"

Wave Condition 1% annual exceedance

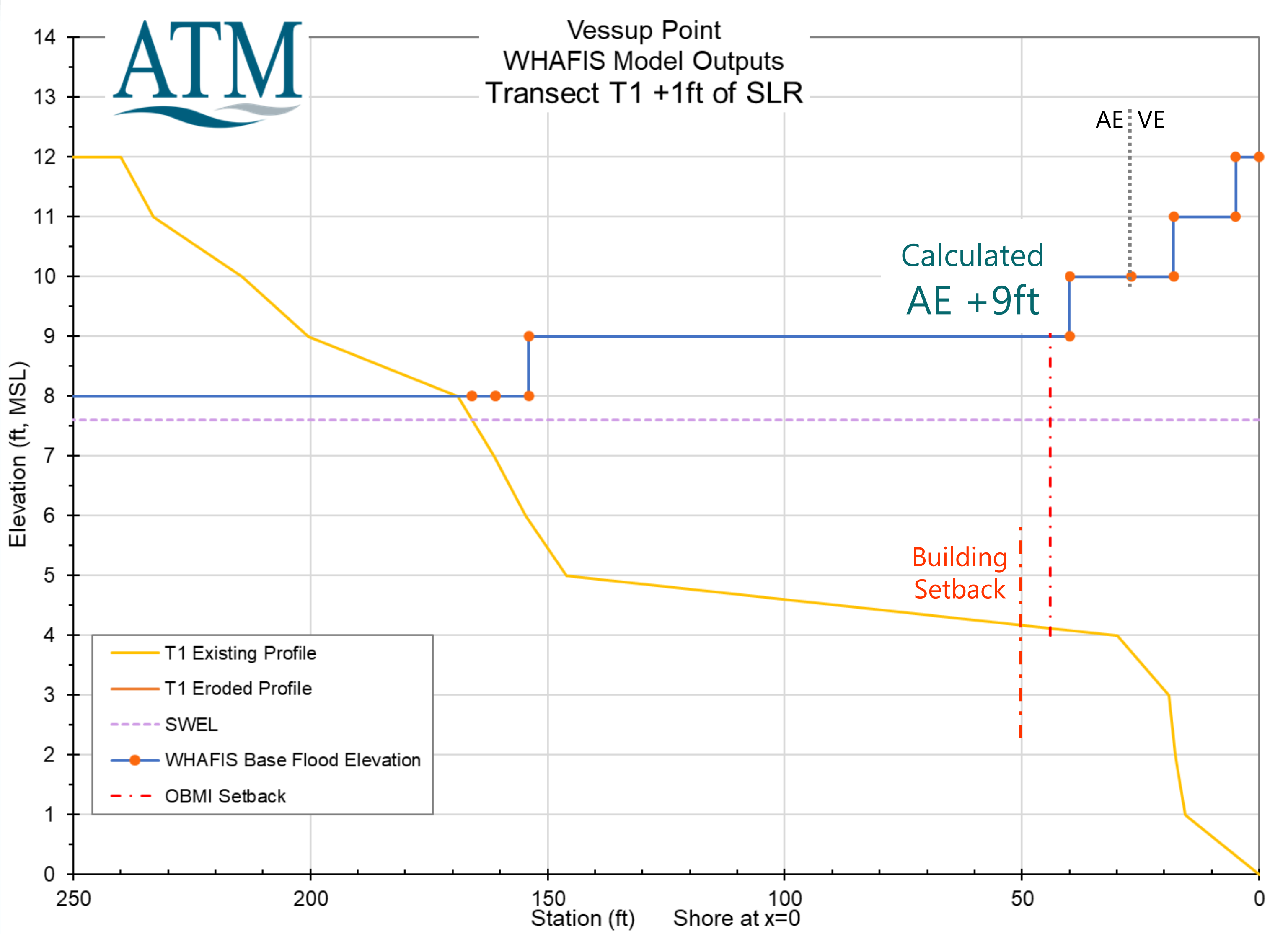
SWEL 6.6ft (FEMA 100-year still water elevation)

Hazard at the proposed building setback:

Proposed setback is in a calculated 'AE' zone with Base Flood Elevation (BFE) of +8 ft, MSL

FEMA Flood Map AE +9ft

Transect 1: 100-year storm + 1ft SLR



Existing Site Conditions / Site Analysis

"Non-Eroded Profile"

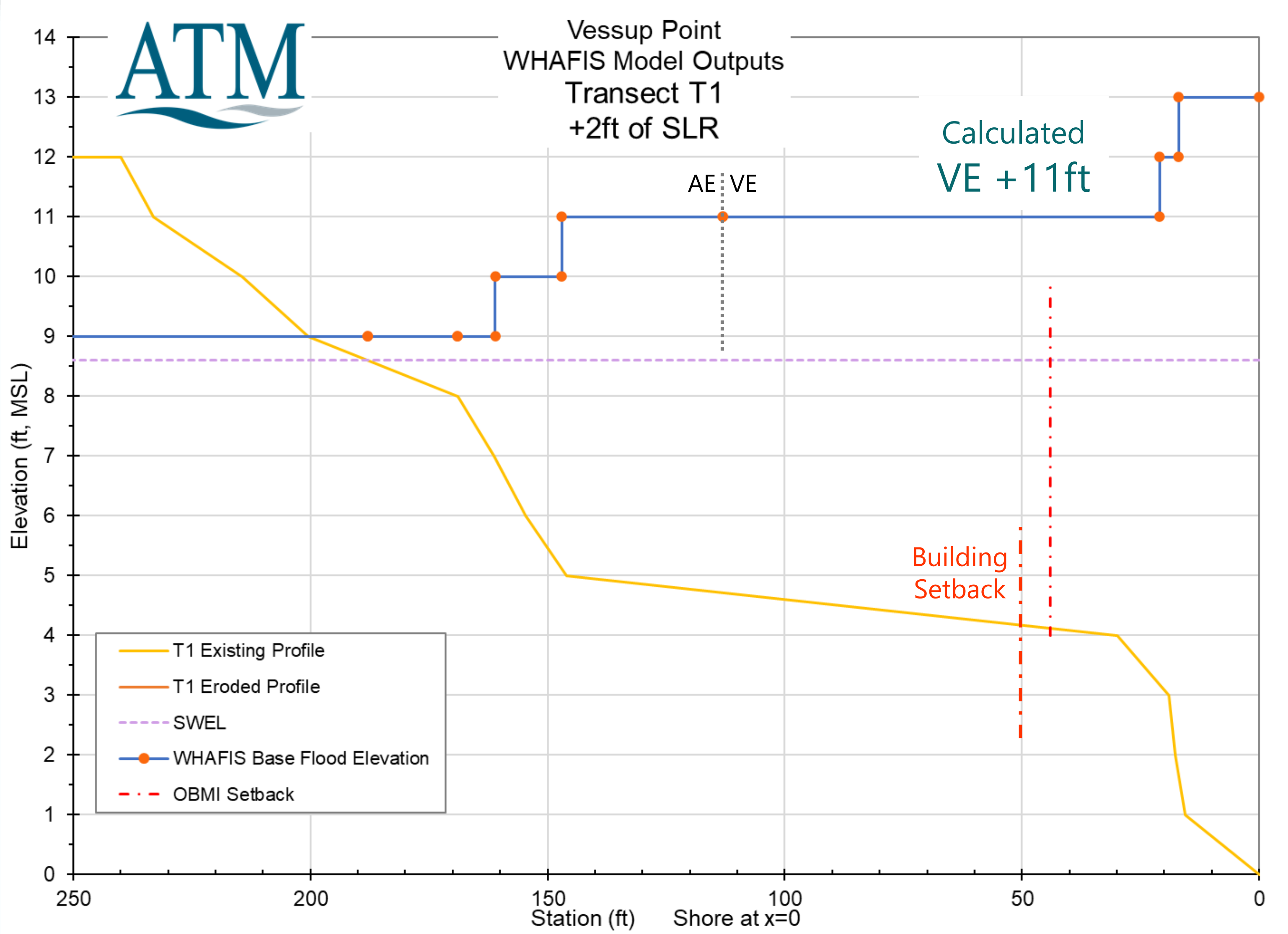
Wave Condition 1% annual exceedance

SWEL 7.6ft (FEMA 100-year still water elevation + 1 ft SLR)

Hazard at the proposed building setback:

Proposed setback is in a calculated 'AE' zone with Base Flood Elevation (BFE) of +9 ft, adjacent to an AE +10 ft.

Transect 1: 100-year storm + 2 ft SLR



Existing Site Conditions / Site Analysis

"Non-Eroded Profile"

Wave Condition 1% annual exceedance

SWEL 8.6ft (FEMA 100-year still water elevation + 2 ft SLR)

Hazard at the proposed building setback:

Proposed setback is in a calculated 'VE' zone with Base Flood Elevation (BFE) of 11 ft, MSL.

Adaptation Analysis

Modified Conditions to Provide Wave Impact Protection

Option 1

Climate Change Coastal Impact Adaptation

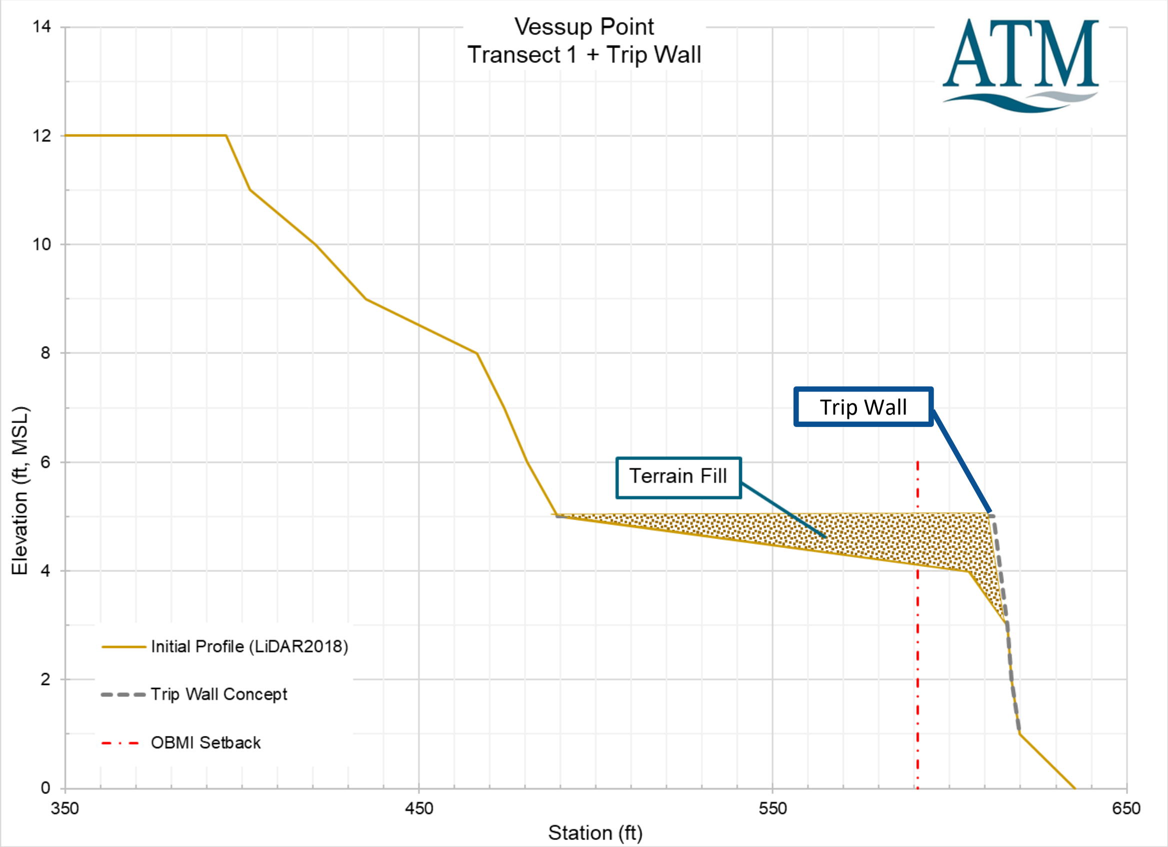
A project climate adaptation is proposed to improve the conditions in the peninsula, along Transect 1. Terrain fill and a structural element to induce wave breaking will allow for improved conditions for real estate development.

It should be noted that the originally proposed construction setback was compatible with FEMA maps and present hazard.

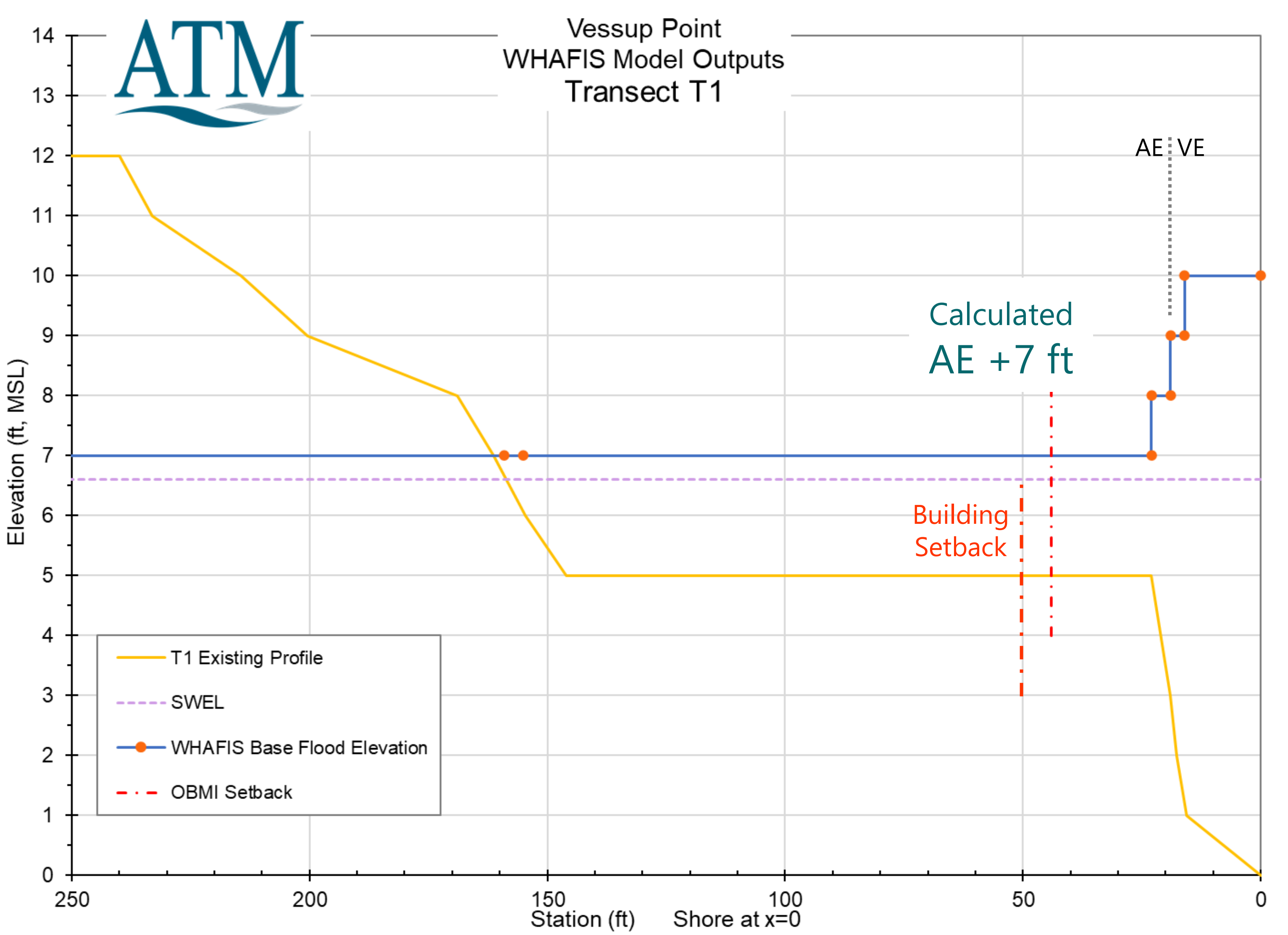
The proposed trip wall concept is a continuous structure, apart from openings for access to a planned walking path. The purpose of a trip wall is to break the incoming waves, to result in waves less than 3 ft prior to reaching the footprint of the building (the foundation or waterward-most structural projection) and, hence, result in an AE zone rating (versus VE zone).

Alternative elevations or additional steps may also be considered for design.

The trip wall must be designed and constructed and certified to withstand FEMA 100-yr storm conditions. Although not required by FEMA, ATM recommends SLR allowances also be considered in design and structural loading calculations, unless adaptation measures can be implemented later to address those future conditions.



Transect 1 + Trip Wall 5') - 100-year storm



Proposed Trip Wall at +5ft Elevation

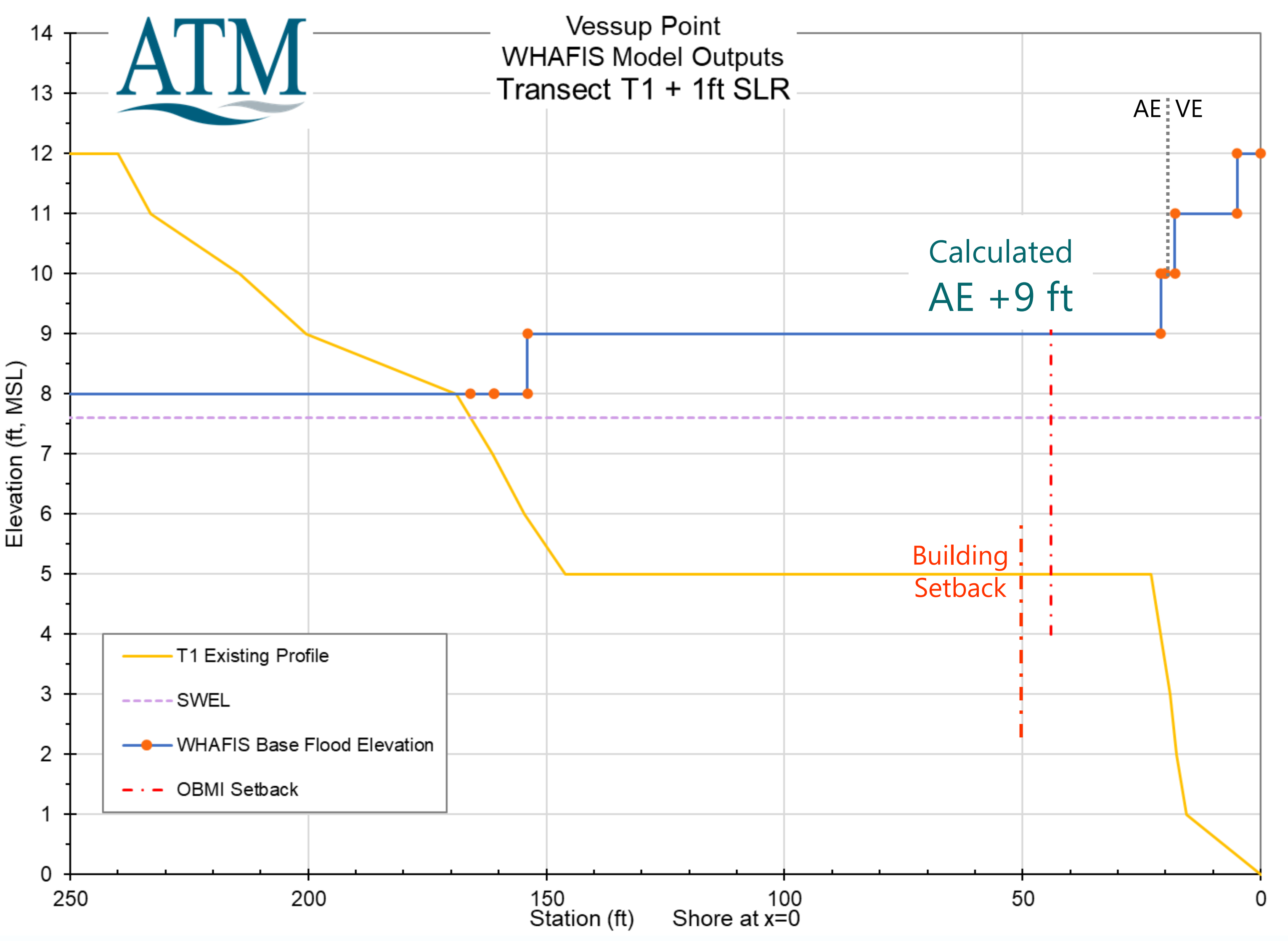
Wave Condition 1% annual exceedance

SWEL 6.6ft (FEMA 100-year still water elevation)

Hazard at the proposed building setback:

Proposed setback is in a calculated 'AE' zone with Base Flood Elevation (BFE) of 7 ft, MSL.

Transect 1 + Trip Wall (5') - 100-yr + 1ft SLR



Proposed Trip Wall at +5ft Elevation

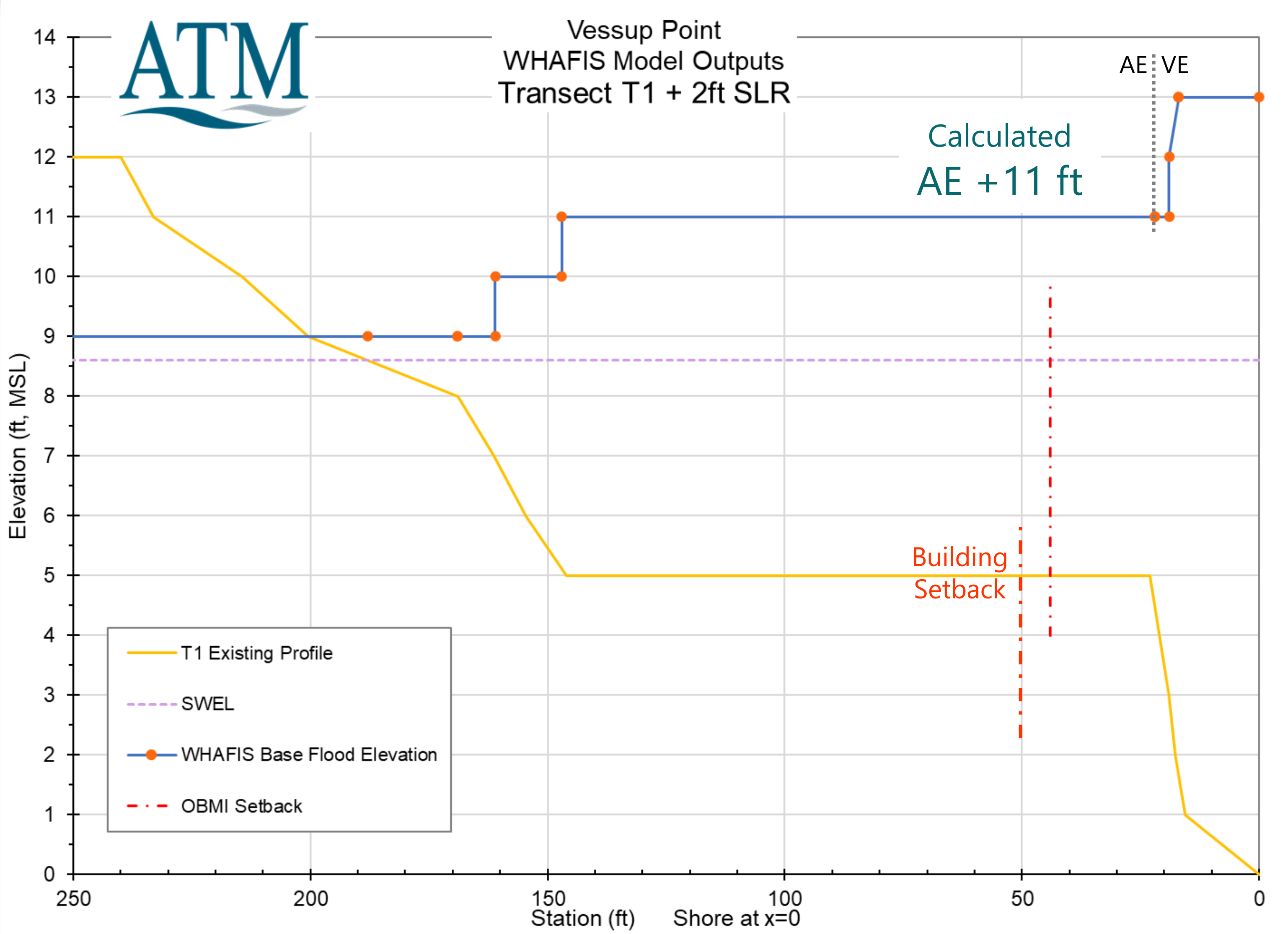
Wave Condition 1% annual exceedance

SWEL 7.6ft (FEMA 100-year still water elevation + 1 ft SLR)

Hazard at the proposed building setback:

Proposed setback is in a calculated 'AE' zone with Base Flood Elevation (BFE) of 9 ft, MSL.

Transect 1 + Trip Wall (5’) - 100-yr + 2ft SLR



Proposed Trip Wall at +5ft Elevation

Wave Condition 1% annual exceedance

SWEL 8.6ft (FEMA 100-year still water elevation + 2 ft SLR)

Hazard at the proposed building setback:

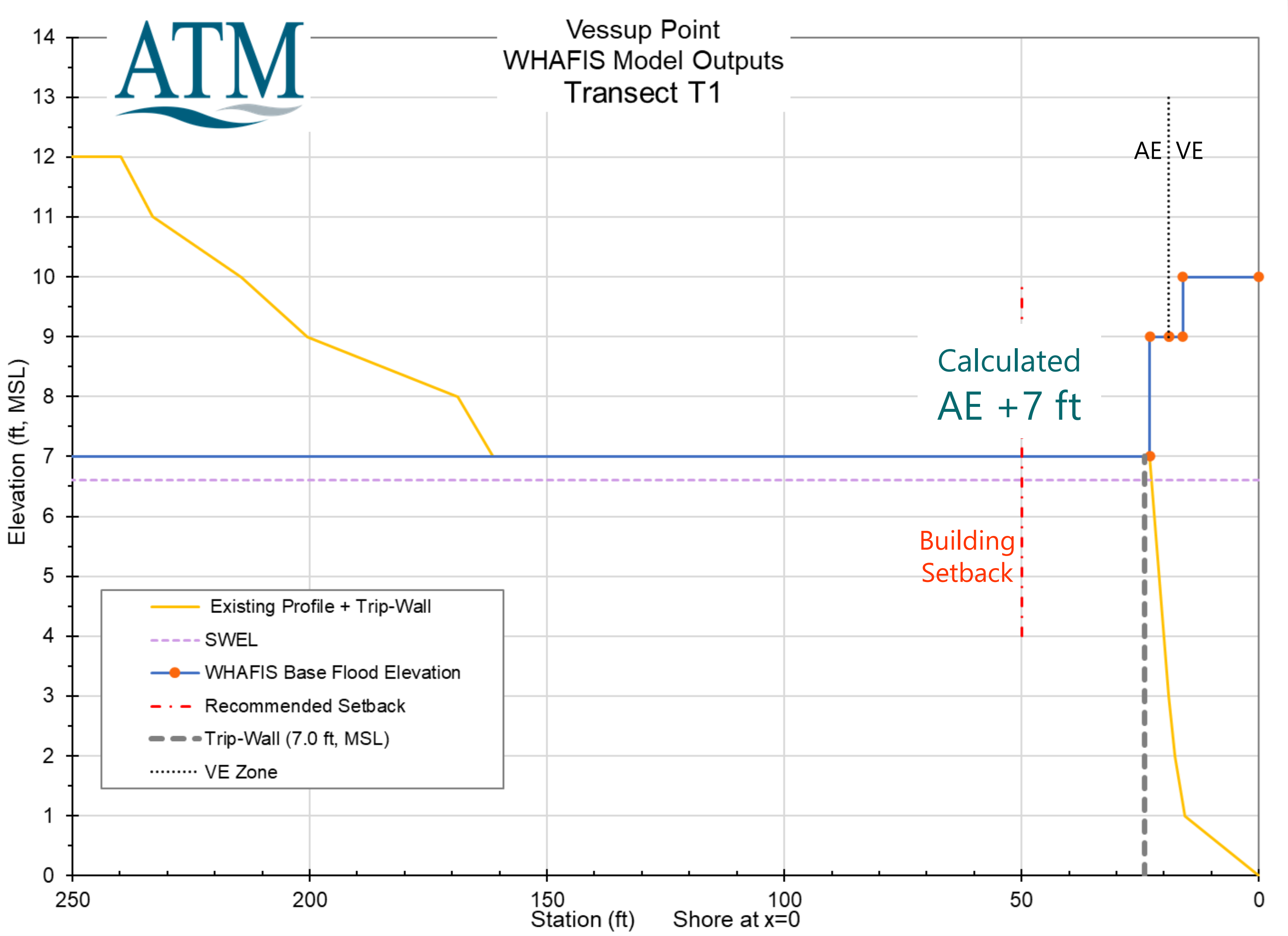
Proposed setback is in a calculated ‘A’ zone and a Base Flood Elevation (BFE) of 11 ft, MSL.

Adaptation Analysis

Modified Conditions to Provide Wave Impact Protection

Option 2

Transect 1 + Trip Wall (7') - 100-year storm



Proposed Trip Wall at +7ft Elevation

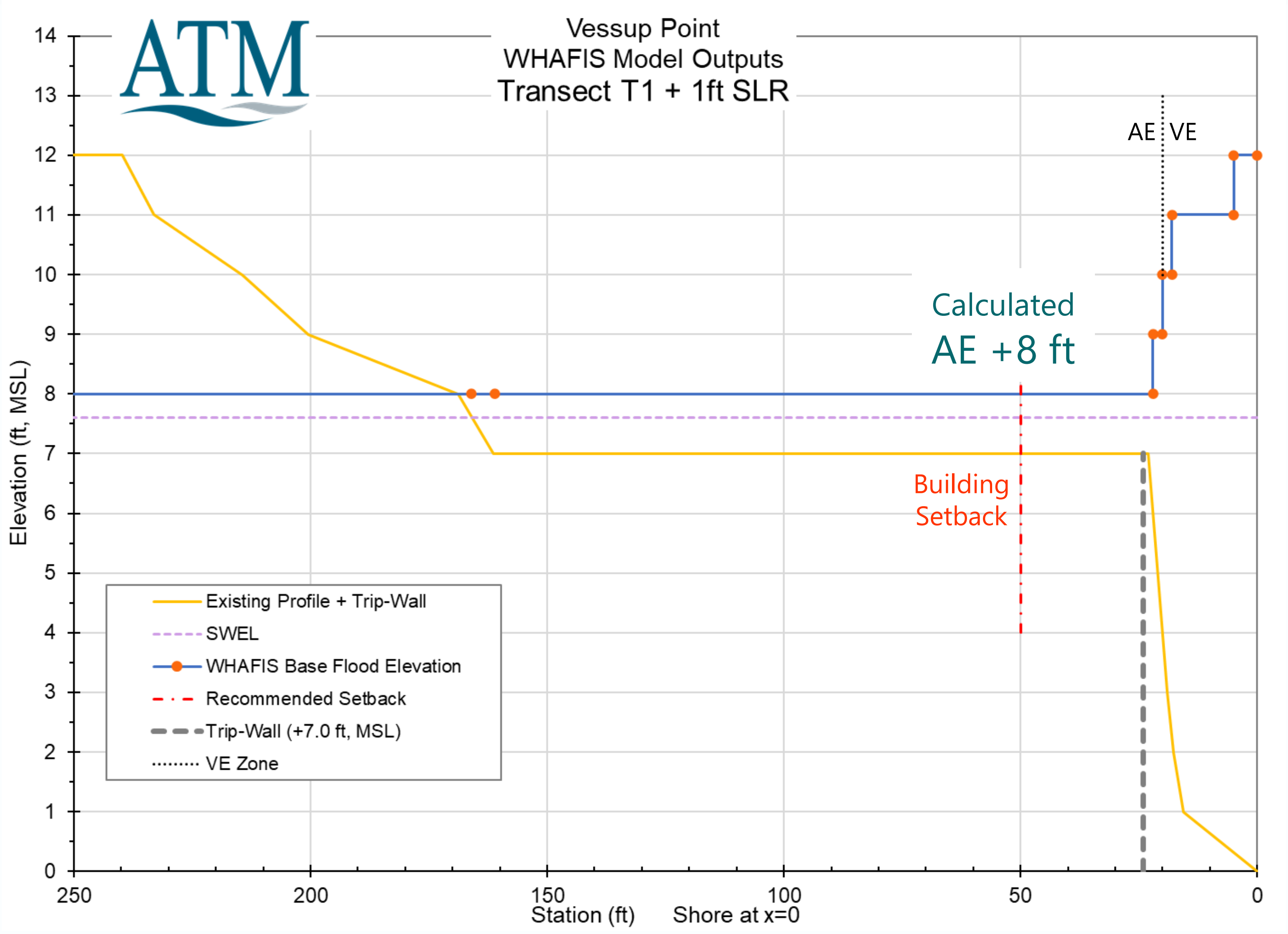
Wave Condition 1% annual exceedance

SWEL 6.6ft (FEMA 100-year still water elevation)

Hazard at the proposed building setback:

Proposed setback is in a calculated 'AE' zone with Base Flood Elevation (BFE) of 7 ft, MSL.

Transect 1 + Trip Wall (7’) - 100-yr + 1ft SLR



Proposed Trip Wall at +7ft Elevation

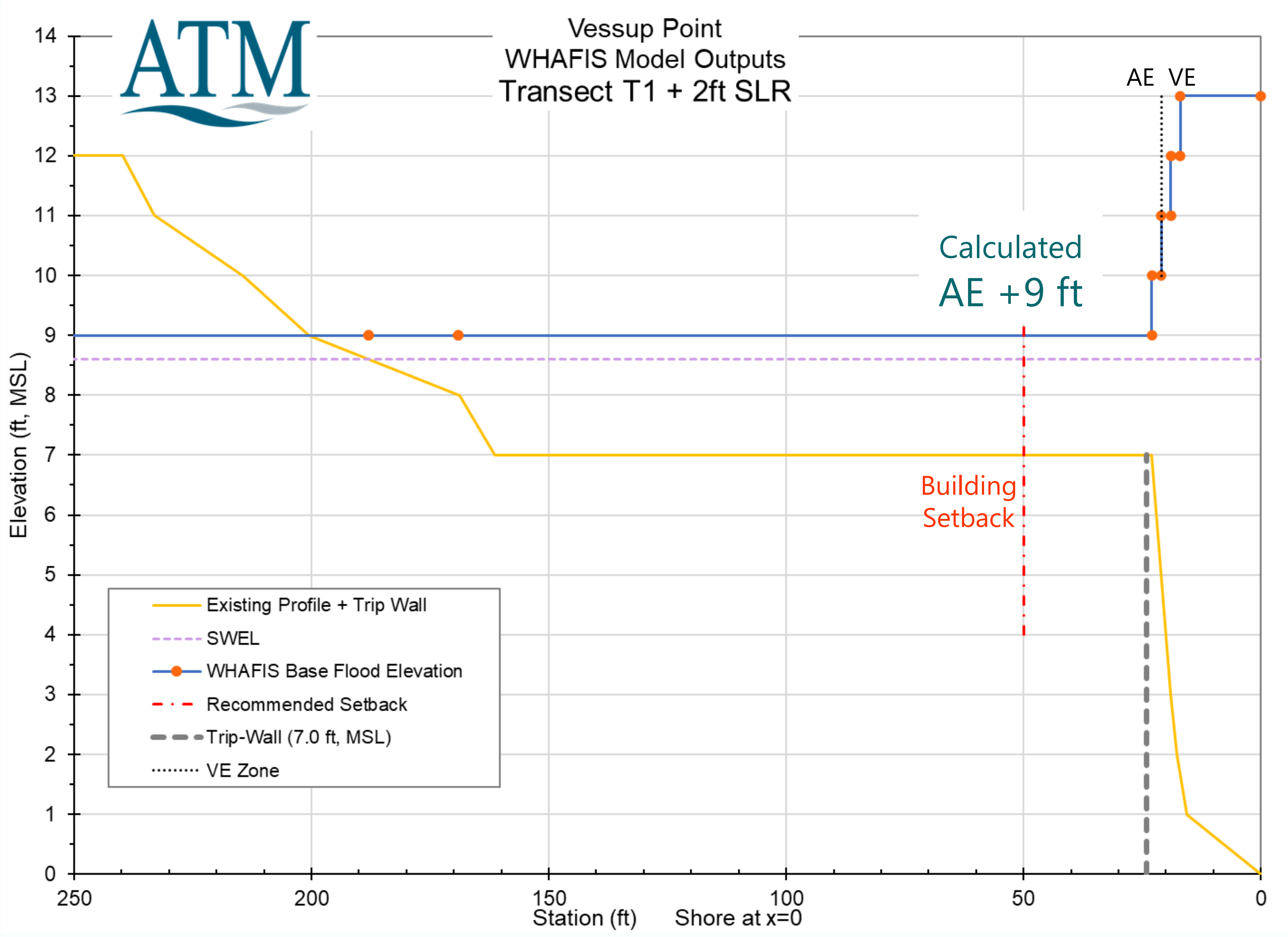
Wave Condition 1% annual exceedance

SWEL 7.6ft (FEMA 100-year still water elevation + 1 ft SLR)

Hazard at the proposed building setback:

Proposed setback is in a calculated ‘AE’ zone with Base Flood Elevation (BFE) of 8 ft, MSL.

Transect 1 + Trip Wall (7’) - 100-yr + 1ft SLR



Proposed Trip Wall at +7ft Elevation

Wave Condition 1% annual exceedance

SWEL 8.6ft (FEMA 100-year still water elevation + 2 ft SLR)

Hazard at the proposed building setback:

Proposed setback is in a calculated ‘AE’ zone with Base Flood Elevation (BFE) of 9 ft, MSL.

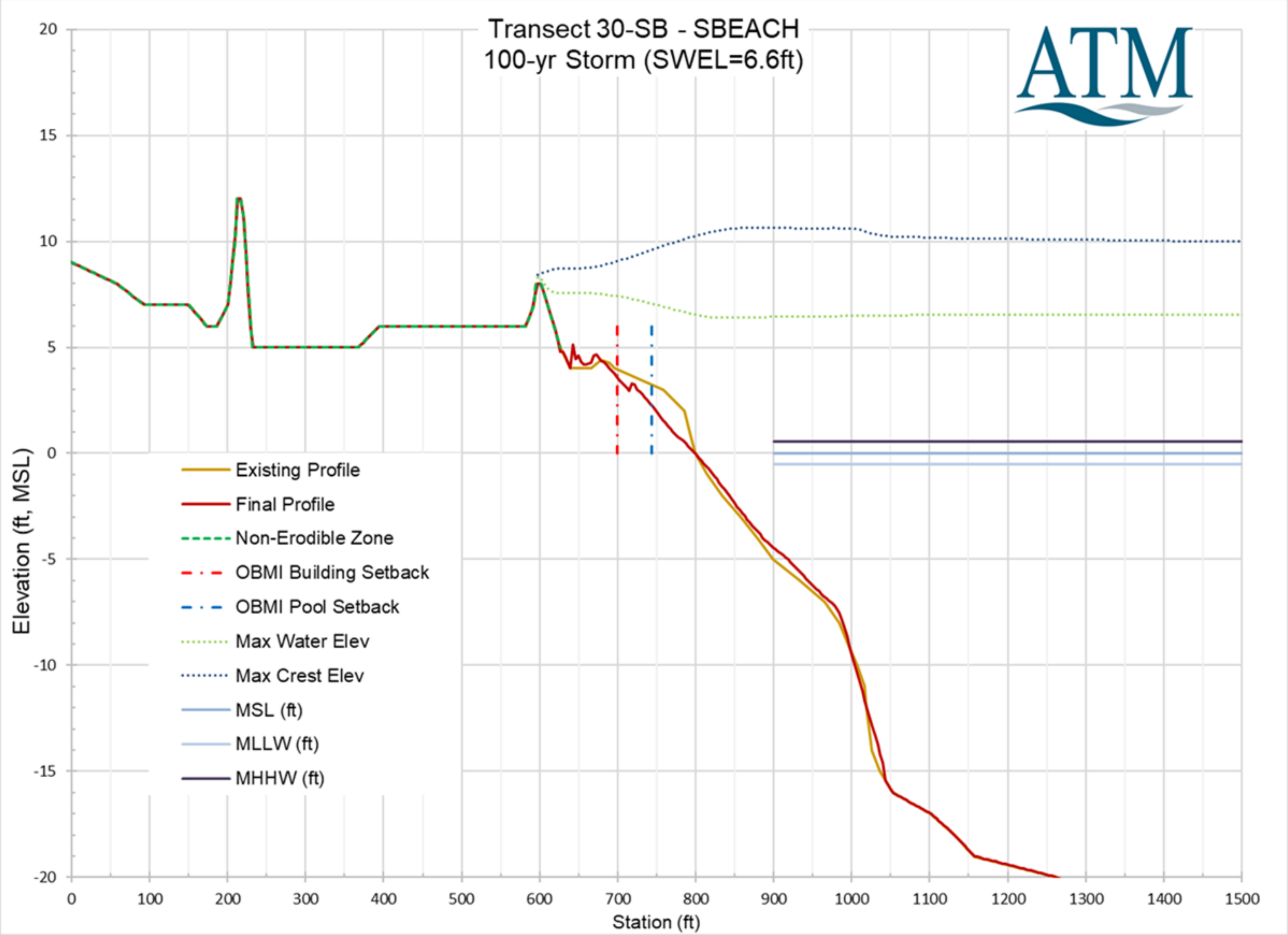
Beachfront Development Area

Transect 30 – Existing Conditions

Existing Conditions

Transect 30

Transect 30: 100-year storm



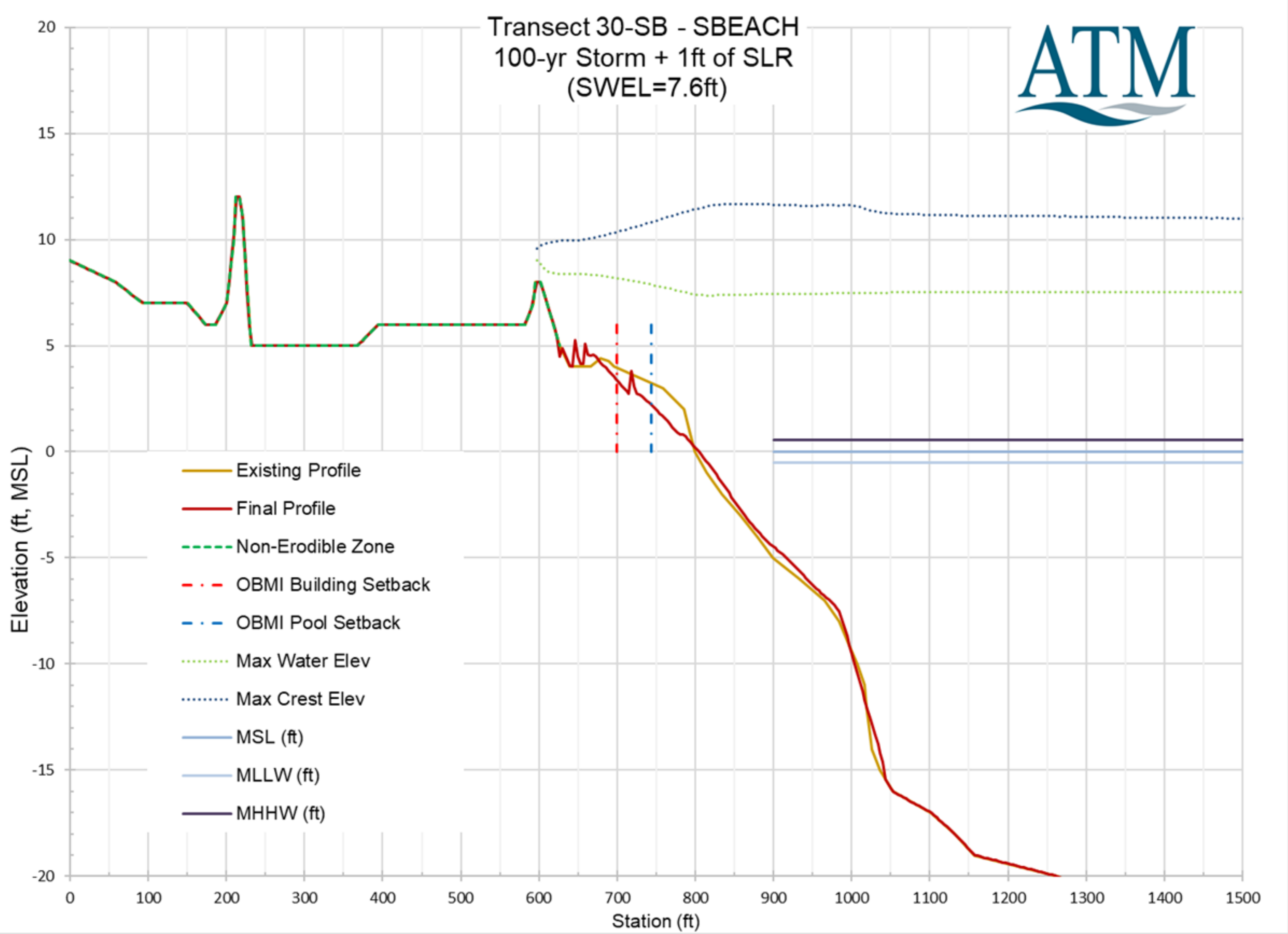
Existing Site Conditions

Wave Condition 1% annual exceedance

SWEL 6.6ft (FEMA 100-year still water elevation)

Erosion and inundation occur landward of the originally proposed building footprint (STA 700). Additional setback is recommended.

Transect 30: 100-year storm + 1ft SLR



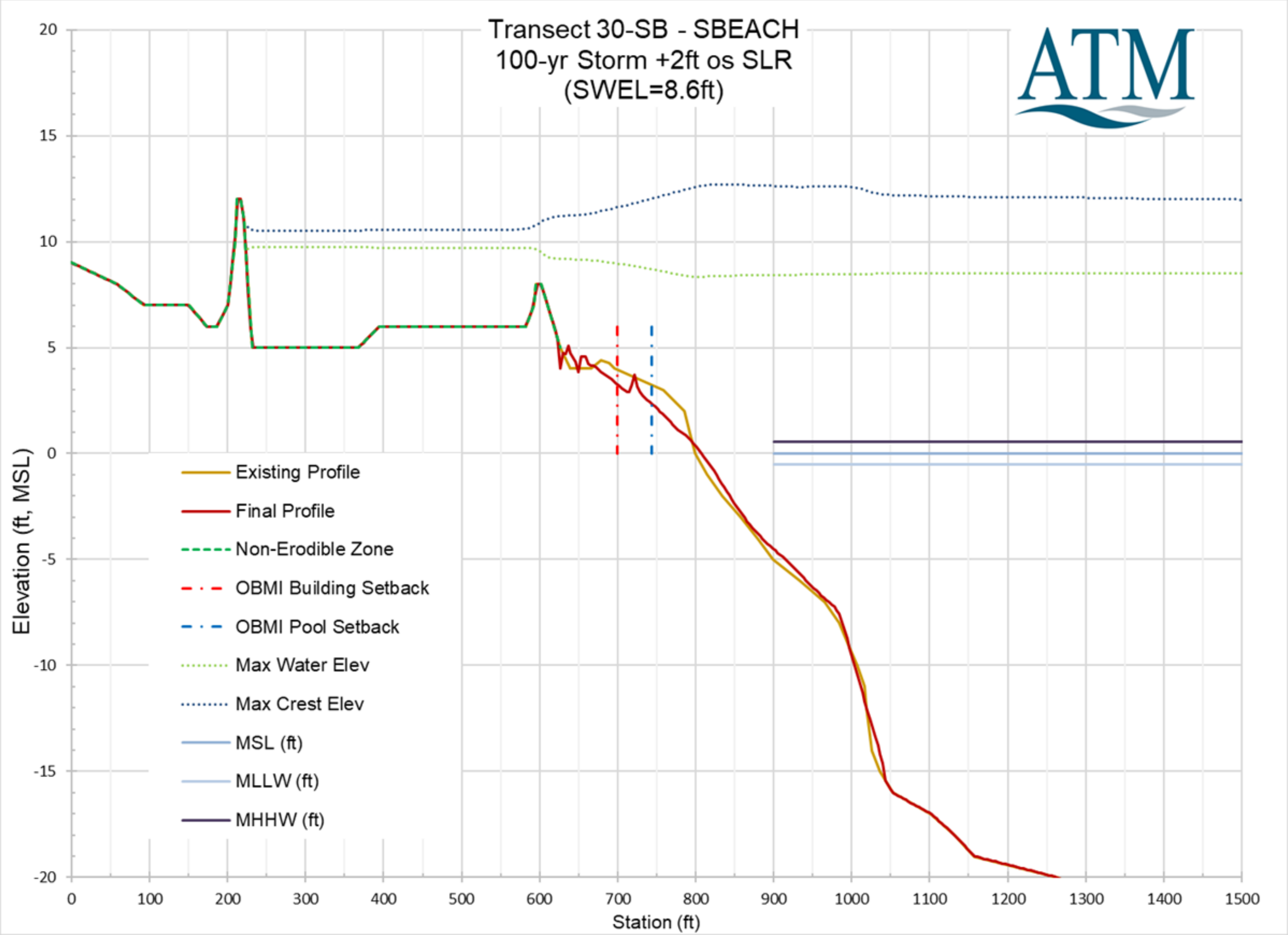
Existing Site Conditions

Wave Condition 1% annual exceedance

SWEL 7.6ft (FEMA 100-year still water elevation + 1ft SLR)

Erosion and inundation occur landward of landward of the originally proposed building footprint (STA 700). Additional setback is recommended.

Transect 30: 100-year storm + 2 ft SLR



Existing Site Conditions

Wave Condition 1% annual exceedance

SWEL 8.6ft (FEMA 100-year still water elevation + 2ft SLR)

Erosion and inundation occur landward of the originally proposed building footprint (STA 700). Additional setback is recommended.

Conclusions and Recommendations

Conclusions and Recommendations

Transect 1 – Peninsula

The proposed trip wall at +7ft elevation and development elevation of +11ft is recommended .

With this approach, the project complies with FEMA present regulations and includes an embedded adaptation to withstand the same design storm with a 2ft SLR scenario.

A minimum construction 30ft setback from the trip wall crest is recommended.

While additional setback in transect 1 would be desirable, the project setback with development reinforcement is considered acceptable.

The recommendations are based on assumptions, model simulations and engineering judgement, under significant uncertainty.

Coastal Development Risk and Resilience

These are minimum recommendations based on the best available information and methods at this time. While these calculations and recommendations are based on recognized methodologies and coastal engineering practice, the developer should understand that design conditions described herein can be exceeded.

There is always some risk of damage in a coastal facility. The 100-year storm condition is an arbitrary standard adopted in the US for coastal insurance purposes. It means that the event has a 1% chance of occurrence in any year and is based on historical records. Statistically, there is a 26% chance of a 100-year design condition occurring or being exceeded over a consecutive 30-year period. Similarly, there is a 9.6% chance over a consecutive 10-year period.

The predicted water level elevations (for a 100-year storm) are not bound. Extreme storms may cause conditions which exceed the calculated design parameters at any time during the lifespan of the facility. Such an occurrence can cause severe damage.

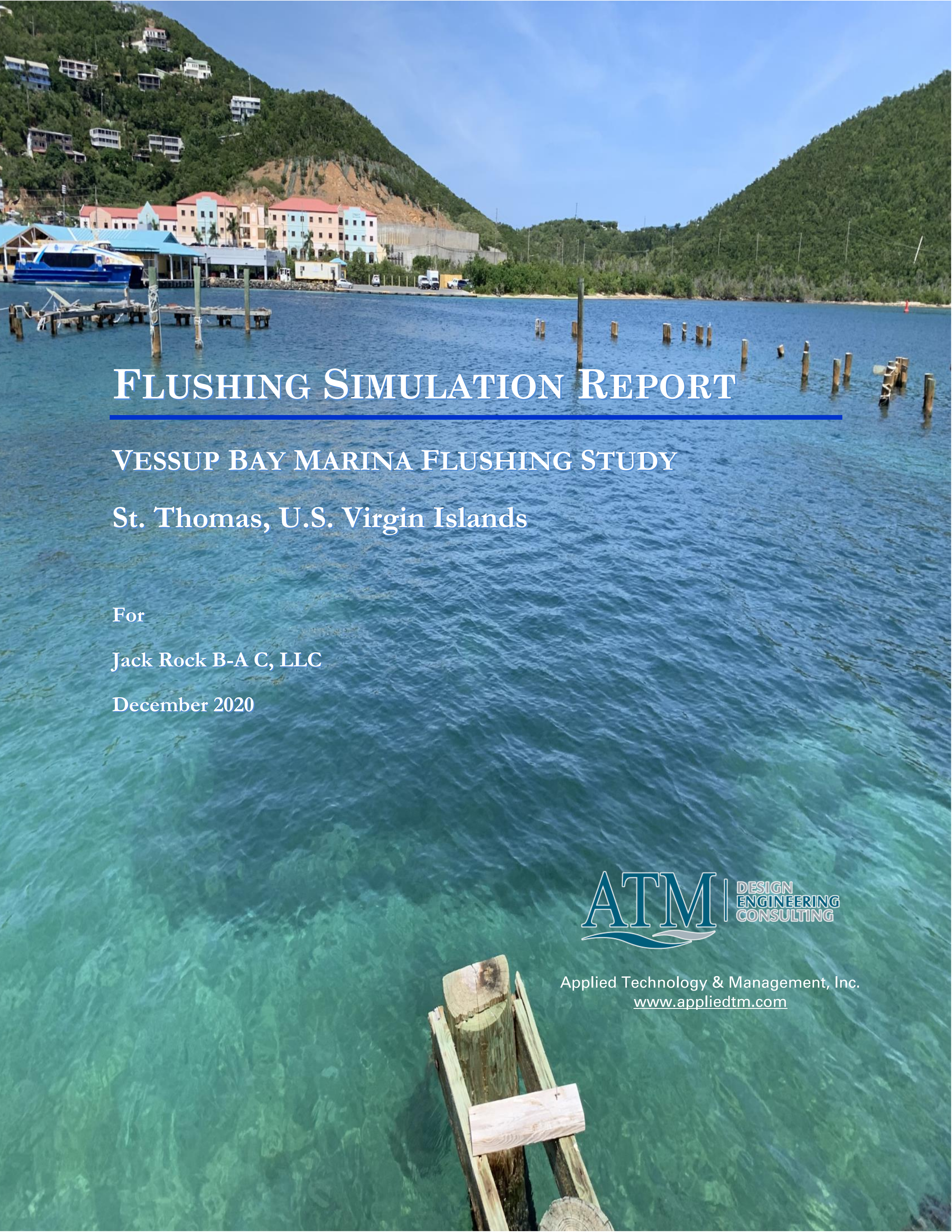
Not included in the models used, climate change is expected to modify the statistical properties of the storms. If storms are more frequent and/or more intense than in the past, impacts will be more severe than shown in the calculation results.

Resilience is defined by the ability of a system to absorb and recover after the effects of an extreme event. Main structures should not sustain catastrophic failure, but only incremental damage, when design conditions are exceeded. Recovery, repairs and return to operational conditions should be relatively inexpensive, simple and fast.

Resilience also implies that the project will be able to "bounce forward", by including adaptations to better respond to future impacts, as opposed to rebuilding with the same conditions and performance standards as the damaged facilities.

The owner/developer must consider insurance requirements and adopt detailed design and operational procedures to address the risks associated with facility siting within a coastal zone influenced by tropical storms. This analysis and the adoption of the recommendations would assist in obtaining better insurance terms, in demonstrating the consideration of climate risks in the design, and in providing technical input to climate-related financial disclosures.

The owner/developer of any coastal site vulnerable to extreme event hazards must ultimately balance economics, aesthetics, local requirements, other variables with acceptable risk levels.



FLUSHING SIMULATION REPORT

VESSUP BAY MARINA FLUSHING STUDY

St. Thomas, U.S. Virgin Islands

For

Jack Rock B-A C, LLC

December 2020

ATM | DESIGN ENGINEERING CONSULTING

Applied Technology & Management, Inc.
www.appliedtm.com

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Cover photograph in 2020 by C. Mueller, Applied Technology & Management, Inc.

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List of Abbreviations and Acronyms

ADCP	acoustic Doppler current profiler
ATM	Applied Technology and Management, Inc.
cm/s	centimeters per second
CTD	conductivity temperature depth
EFDC	Environmental Fluid Dynamics Code
EPA	U.S. Environmental Protection Agency
K1	lunar diurnal
m	meter
m/s	meters per second
M2	lunar semidiurnal
mi^2	square mile
mg/L	milligrams per liter
MLW	mean low water
NDBC	National Data Buoy Center
NOAA	National Oceanic and Atmospheric Administration
ORD	Office of Research and Development
SA	solar annual
USACE	U.S. Army Corps of Engineers
USVI	U.S. Virgin Islands

1.0 Introduction

Jack Rock B-A C, LLC (the Owner), at the request of Mr. Lee Steiner, retained Applied Technology and Management, Inc. (ATM) to provide a marina flushing study to evaluate the potential impacts of a marina wave protection structure on the flushing of Vessup Bay. This task was part of the studies for the permitting of the marina at Vessup Point in St Thomas, U.S. Virgin Islands (USVI).

ATM has worked with OBMI International in the planning for redevelopment of the marina at Vessup Point. Pre-application meetings by the project environmental consultant with the U.S. Army Corps of Engineers (USACE) resulted in the request to assess impacts of the marina project on the flushing of Vessup Bay. ATM's proposed marina concept plan, which includes a wave protection structure, was evaluated using a flushing model.

1.1 Study Area and Project Description

Vessup Bay is located on the eastern end of St. Thomas in the USVI (Figure 1-1). The planned marina is located at Vessup Point. Vessup Point juts out to the north at the Vessup Bay entrance. Vessup Bay is connected to Muller Bay and Redhook Bay (Figure 1-1). The distance from Vessup Point to the west end of Vessup Bay is about 0.47 mile, and the width at the east entrance at Vessup Point is about 0.12 mile. The area of Vessup Bay is about 0.05 square mile (mi^2).

Figure 1-2 presents a view of Vessup Bay with the proposed marina docks and the final design of the wave protection structure. Various alternative layouts of the wave protection structure were evaluated and are presented in this report. The final wave protection structure design will extend from the surface down to the bottom and will have two components. One component will sit perpendicular to the shoreline, with a length of around 190 feet. A gap of approximately 70 feet will exist between the barrier and the shoreline to allow flow to pass through. This gap was identified through the alternative analyses presented later. The second component will run parallel to the shoreline at the end of the perpendicular barrier. This barrier is approximately 260 feet in length.

1.2 Objectives

To inform the marina design and in response to the regulatory requirement, ATM conducted the following tasks.

1. Collect desktop and field data for the model setup and calibration.
2. Develop a hydrodynamic model that is capable of simulating the circulation within, and exchange between, Vessup Bay with the adjacent waters of Muller Bay, including the proposed marina area.
3. Utilize the model to assess the degree of flushing/exchange in Vessup Bay under the present conditions and the conditions after construction of the marina and the installation of the wave protection structure.
4. Evaluate alternative conditions for the design of the wave protection structure to minimize changes in the overall flushing of Vessup Bay.
5. Prepare a technical report to support the permit application.

1.3 Report Outline

The report is presented in 3 sections following this introduction. Section 2 presents the field data studies conducted to support the model development. Section 3 outlines the development of the hydrodynamic model. Section 4 presents the flushing simulations performed and the findings from the study.

Figure 1-1. Vessup Bay and Marina Location Map

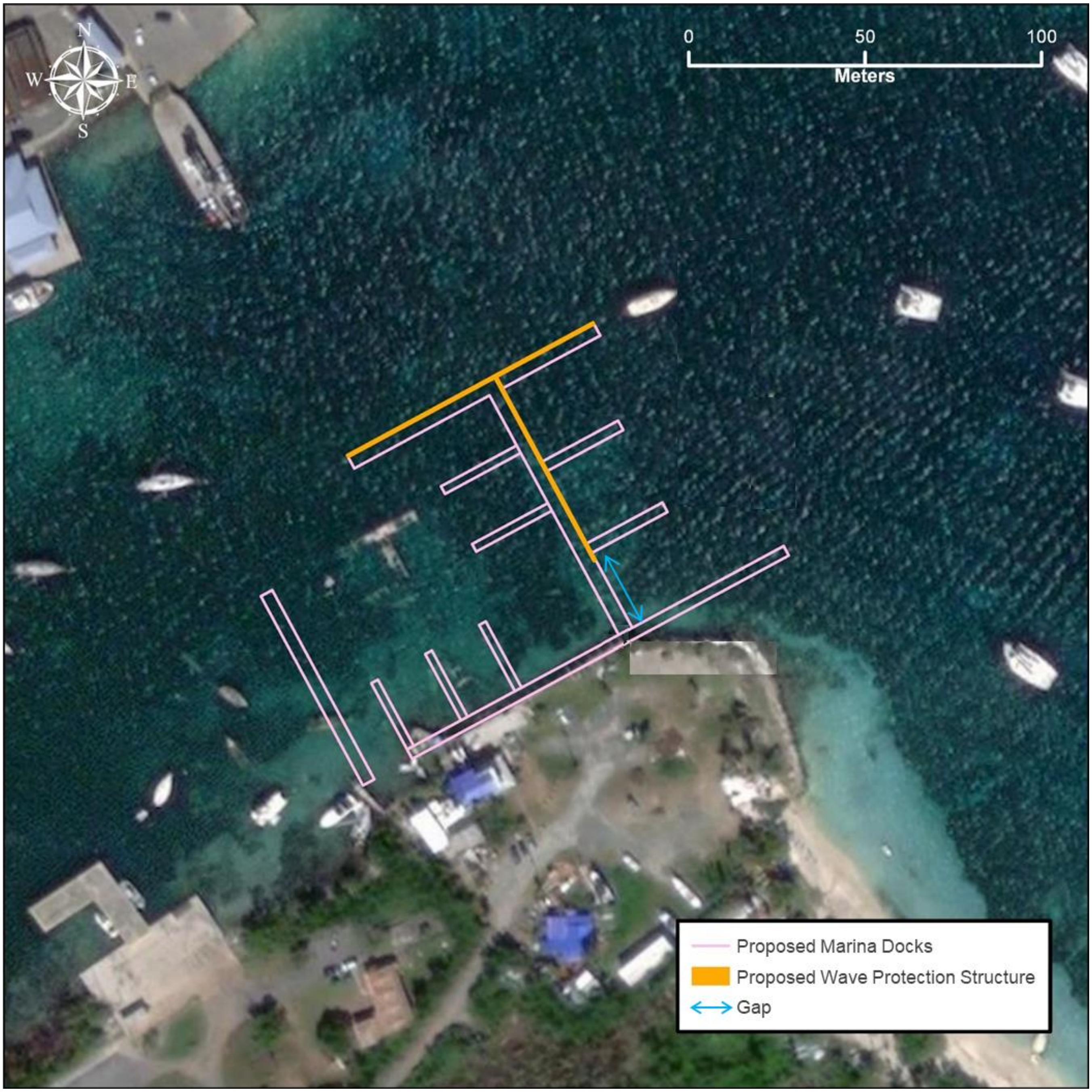


Figure 1-2. Vessup Point Plan View with Proposed Marina Location and Wave Protection Structure (Design Condition)

2.0 Field Studies

ATM conducted field studies within Vessup Bay for the purpose of providing data to validate that the hydrodynamic model is reasonably simulating the circulation and exchange conditions within Vessup Bay. The primary goal was to collect water level data at various locations and characterize the velocity and circulation characteristics in the vicinity of the proposed marina area.

Field data were collected during two trips. The first trip was from September 8 to September 11, 2020. The second trip was from October 7 to October 8, 2020. Due to the relatively small tidal amplitudes in the area, along with the dead-end nature of Vessup Bay, the velocities at the entrance are very small and generally more driven by winds than tides. This was an issue that impacted the field data collection described in the following paragraphs.

On the first trip, instruments to measure conductivity, temperature, and depth (CTD) were installed at three locations as shown in Figure 2-1. The CTDs recorded water levels, temperature and salinity. In addition, a barometric pressure sensor was installed at Vessup Point to provide pressure readings to be utilized to correct the data from the CTDs. In addition to the CTD data, a towed acoustic Doppler current profiler (ADCP) was utilized to record velocities along a transect at the proposed project site (Figure 2-1). Due to issues with one of the frequency sensors on the ADCP, along with the very low velocity magnitudes, the ADCP data from this deployment was determined to not be useable.

The second trip, from October 7 to October 8, was designed to collect useable ADCP data. As such, only one CTD was installed at the CTD-2 location. For this work, the methodology for collecting the transect data was modified. First, instead of using the ADCP in towed mode, it was boat mounted to provide a more fixed and stable mount. Wind chop, experienced on the first trip, was such that, given the very low nature of the velocities (near the capabilities of the ADCP accuracy), the movement of the sensor in the towed array was unacceptable. Second, the ADCP data collection was alternated between running transects and measuring at a fixed location (anchored boat) for periods of 15 minutes. This allowed point velocity readings that were averaged over time to help reduce the impact of noise on the results and provide a better assessment of net flows. The point velocity measurements were taken in the vicinity of the marina basin, the middle of the cross-section, and on the northern side of the transect. A CTD was installed at Vessup Point to record water levels through the ADCP data collection. Figure 2-1 presents the locations of the transect, the point velocity measurements, and the installation of the CTD (CTD-2).

Figure 2-2 presents plots of the data collected by the CTDs during the first trips. Figure 2-3 presents the CTD data from the second trip. The data show that there is no significant variation in the tidal signal from the offshore station to the upper end of Vessup Bay, i.e. no damping or amplification. The salinity data show that other than the first part of the measurements in September, where the salinities at the offshore station are low, the salinity gradient between the offshore and nearshore is very small with salinity levels near ocean conditions [35 parts per thousand (ppt)]. Salinities at the interior station are slightly higher indicating little freshwater inflow and the potential for evaporation creating higher salinity levels. Temperatures fluctuate as expected with the response to the heating a cooling throughout the day more pronounced at the more interior stations reflective of the shallow stagnant nature of the waters.

Figures 2-4 a,b through 2-6 a,b present the point velocity measurements throughout the day for each of the three point stations respectively (North, Middle and South). Figure 2-7 presents the transects collected on October 8 plotted over one another. Hand-held wind measurements were taken during the times of the point and transect measurements.

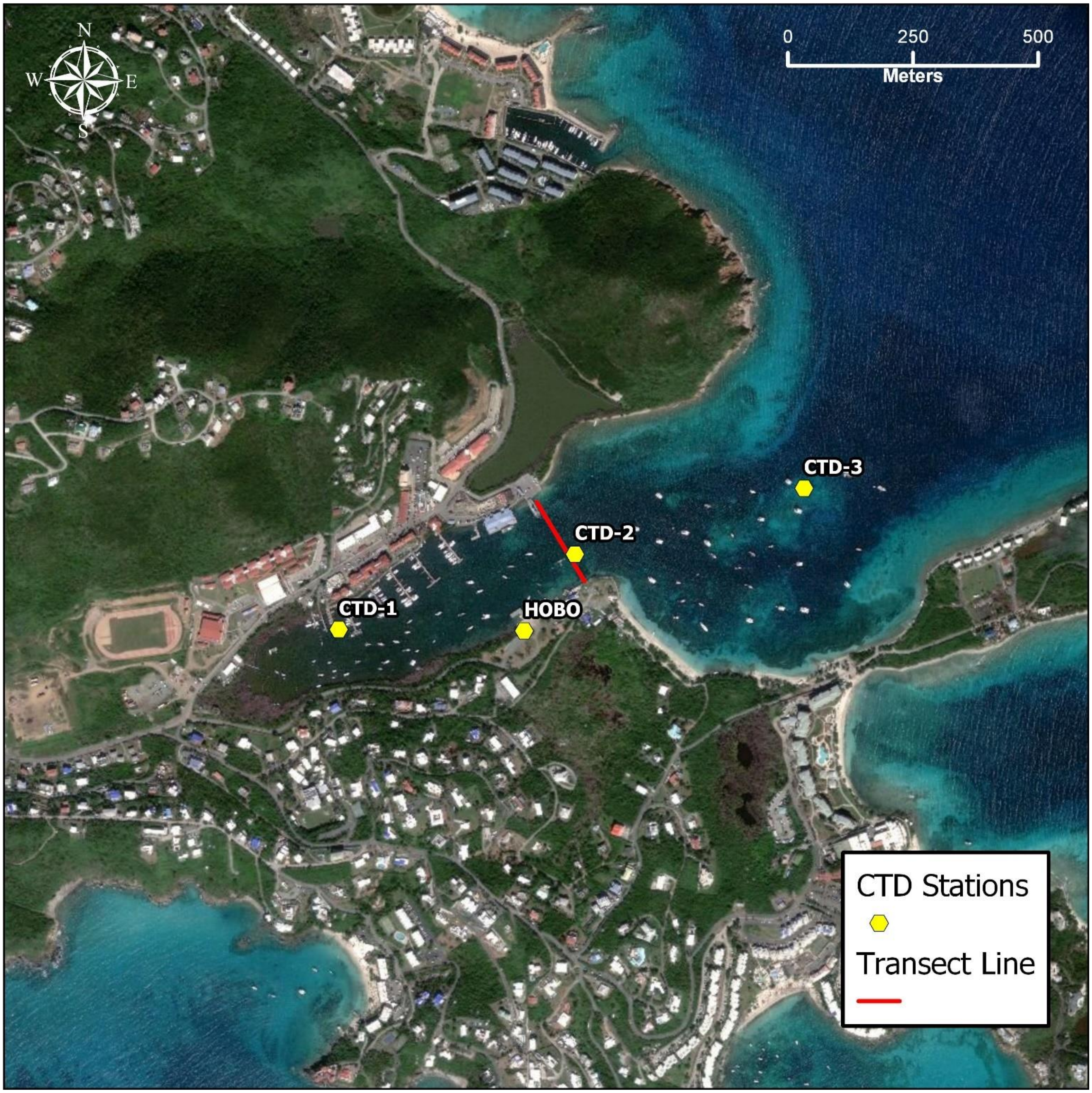


Figure 2-1. Locations of Data Collection for September 8 to 11, 2020 and October 7 to 8, 2020 Trips

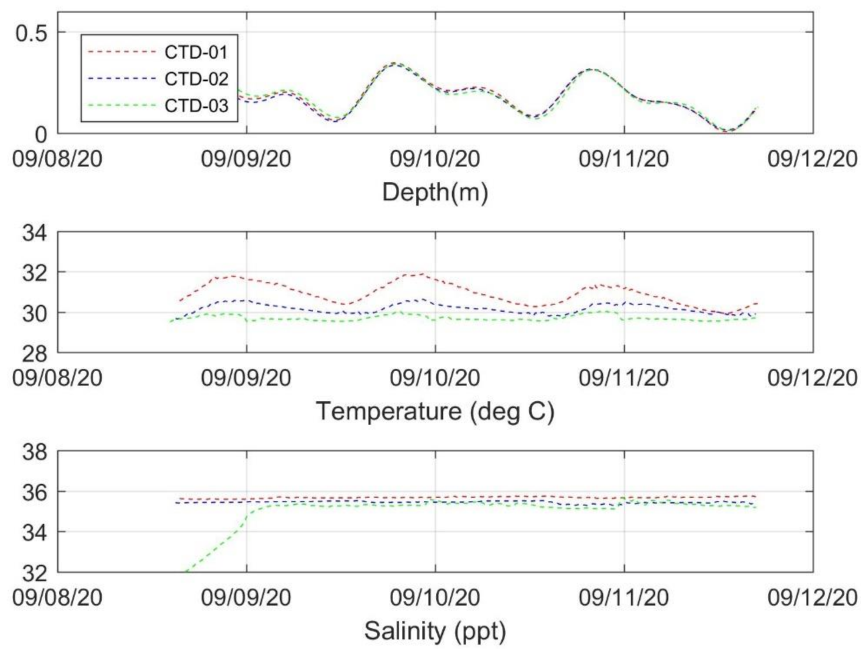


Figure 2-2. Measured Water Level, Temperature and Salinity for September 8 through 11, 2020 Trip

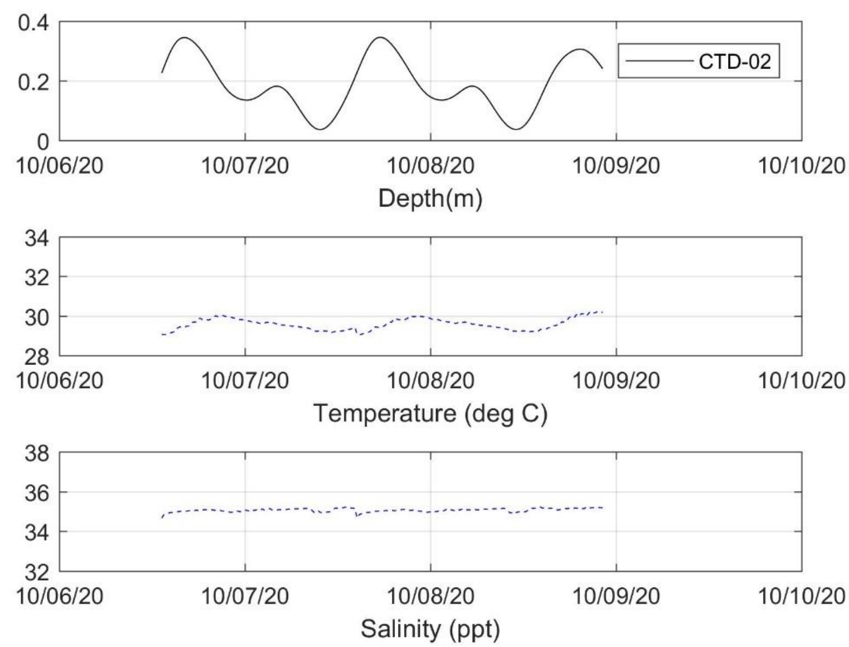


Figure 2-3. Measured Water Level, Temperature and Salinity for October 7 and 8, 2020 Trip

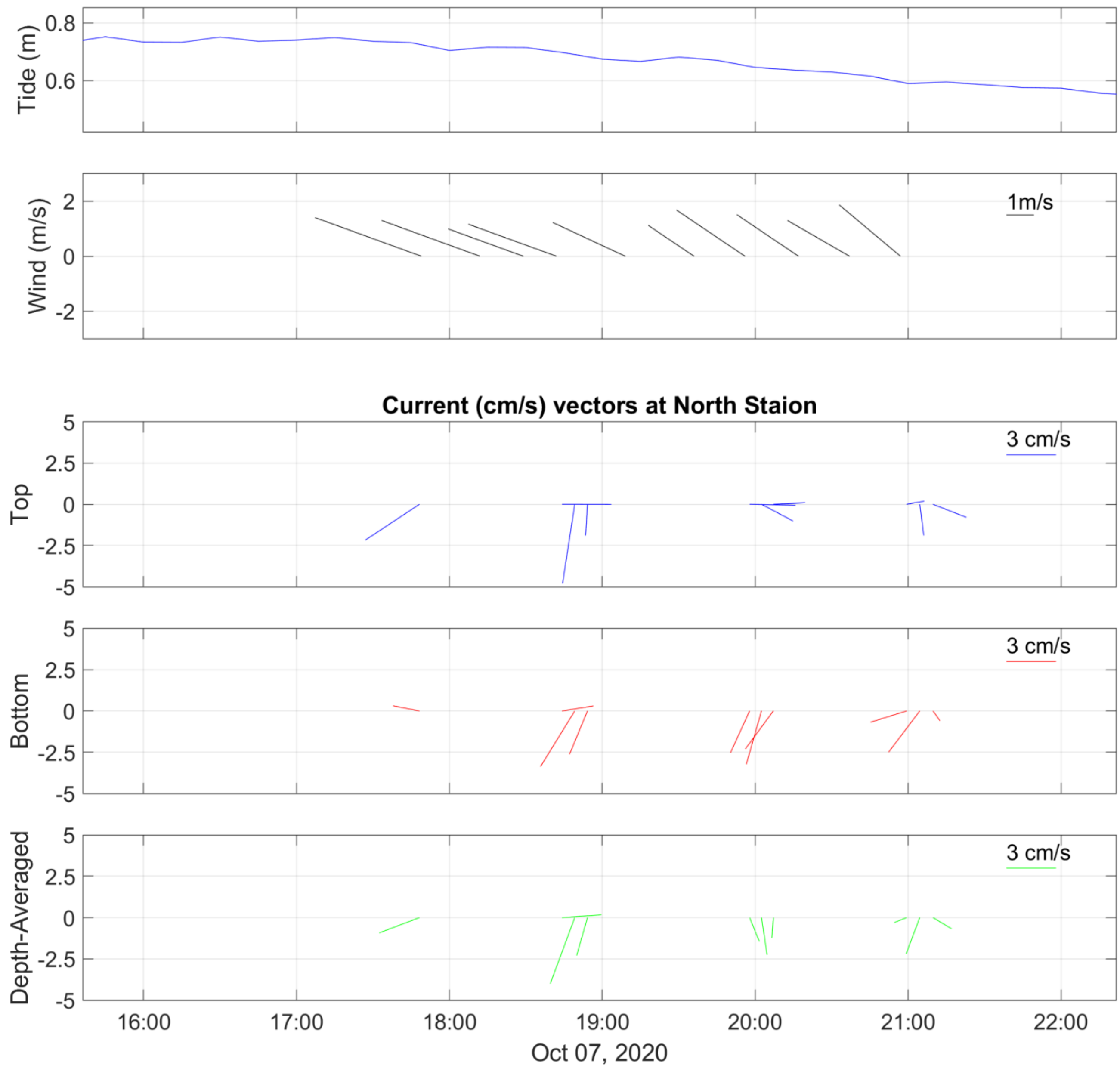


Figure 2-4a. Point Current Measurements at the North Station October 7, 2020

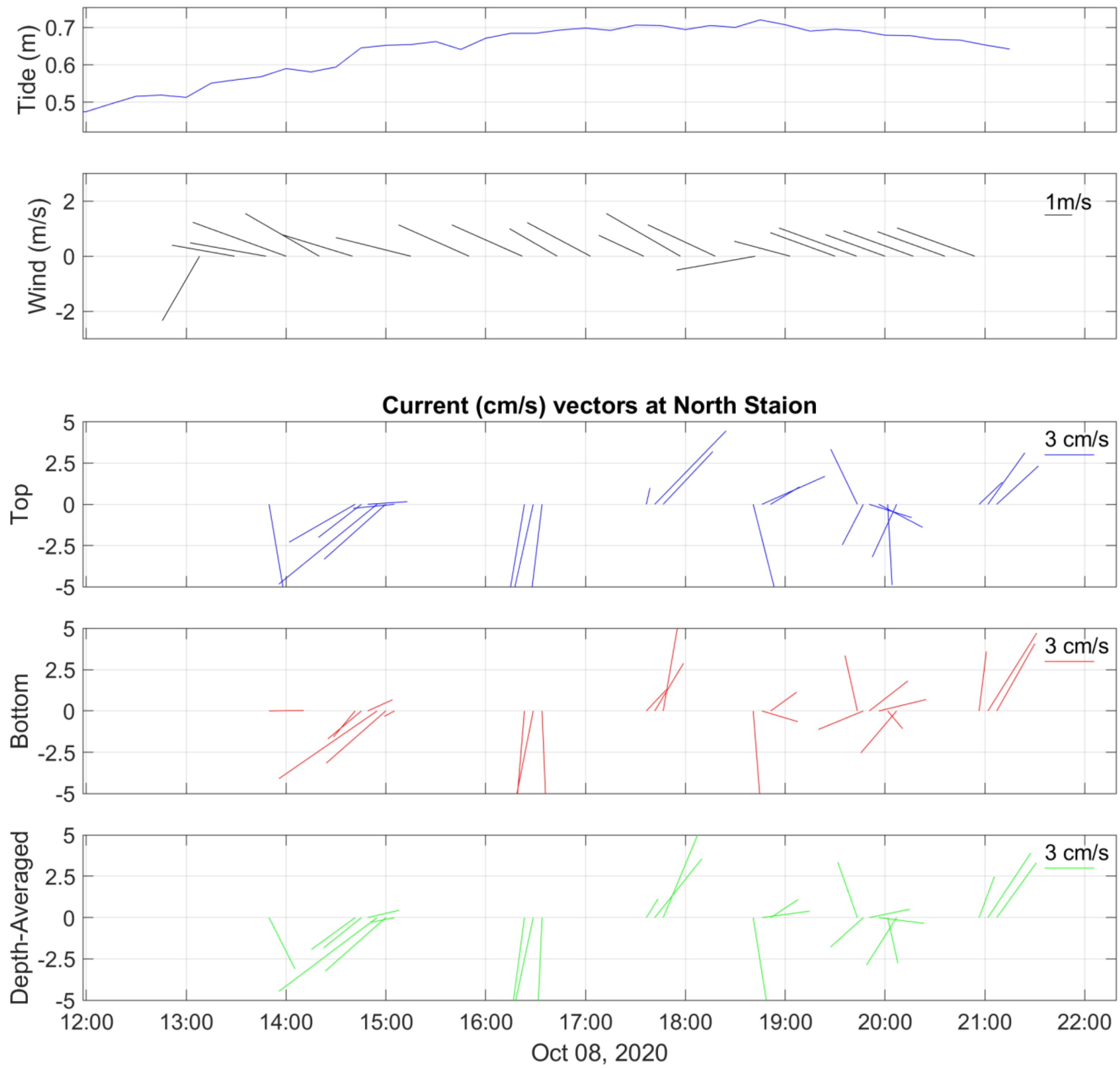


Figure 2-4b. Point Current Measurements at the North Station October 8, 2020

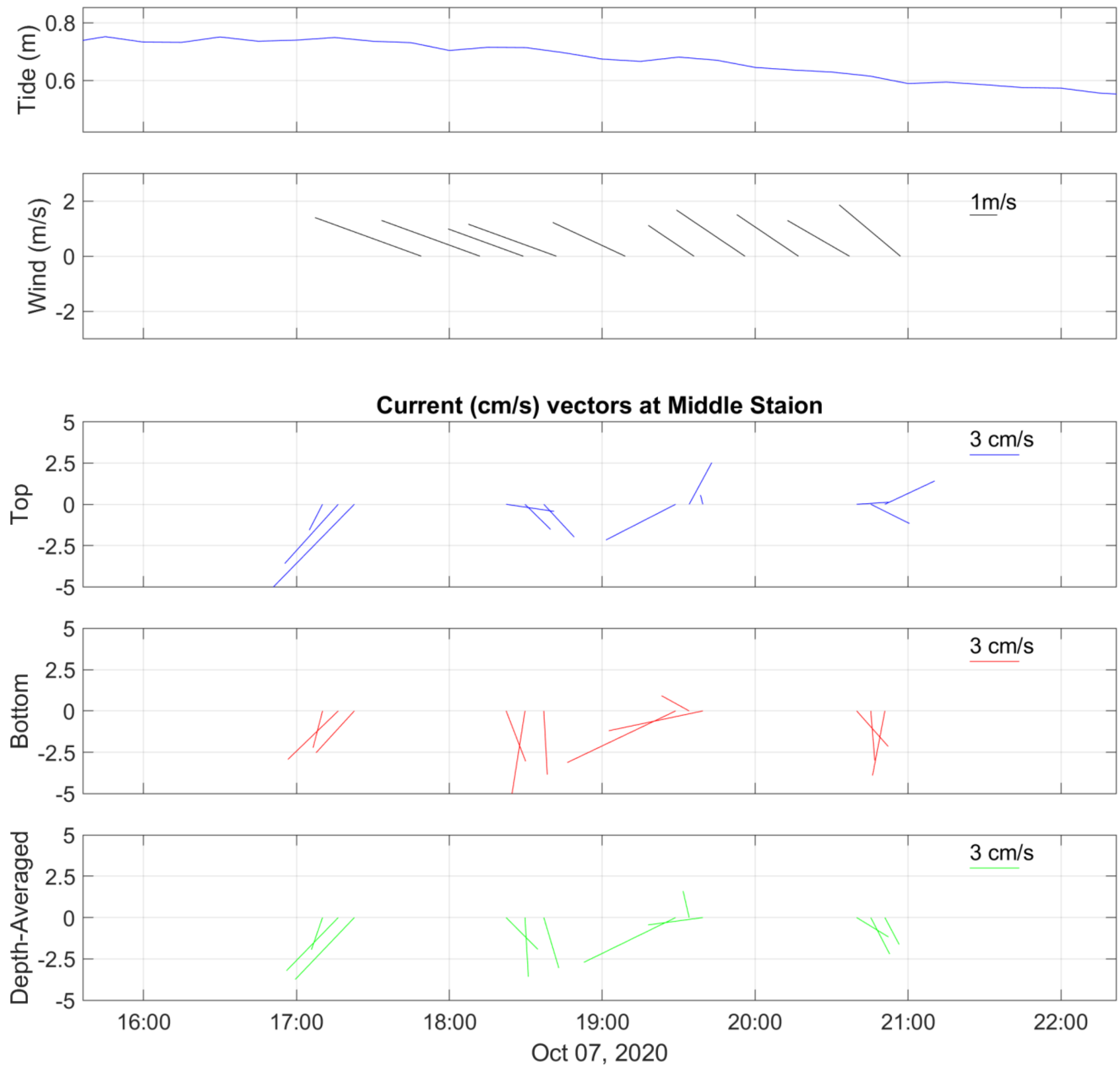


Figure 2-5a. Point Current Measurements at the Middle Station October 7, 2020

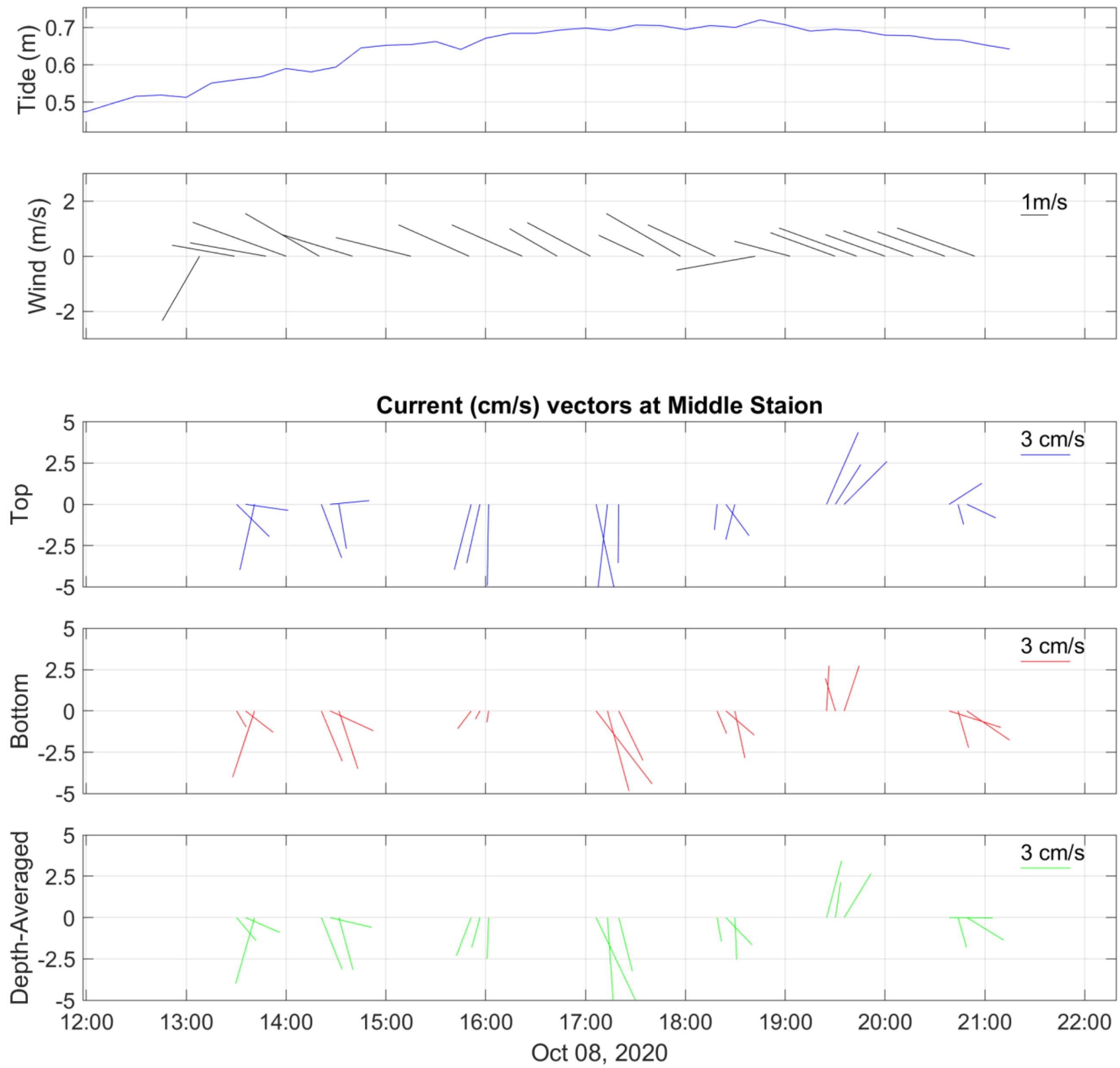


Figure 2-5b. Point Current Measurements at the Middle Station October 8, 2020

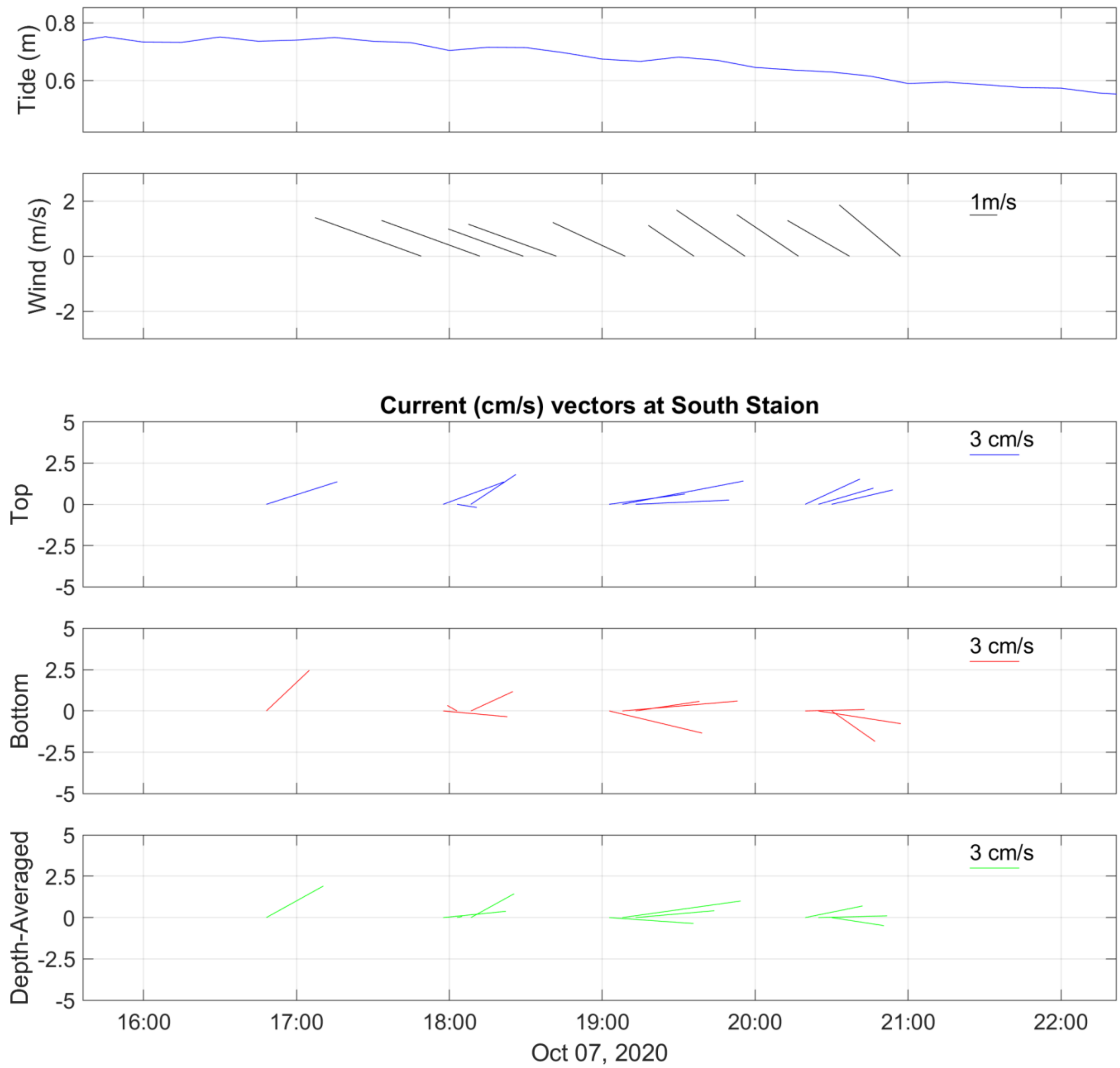


Figure 2-6a. Point Current Measurements at the South Station October 7, 2020

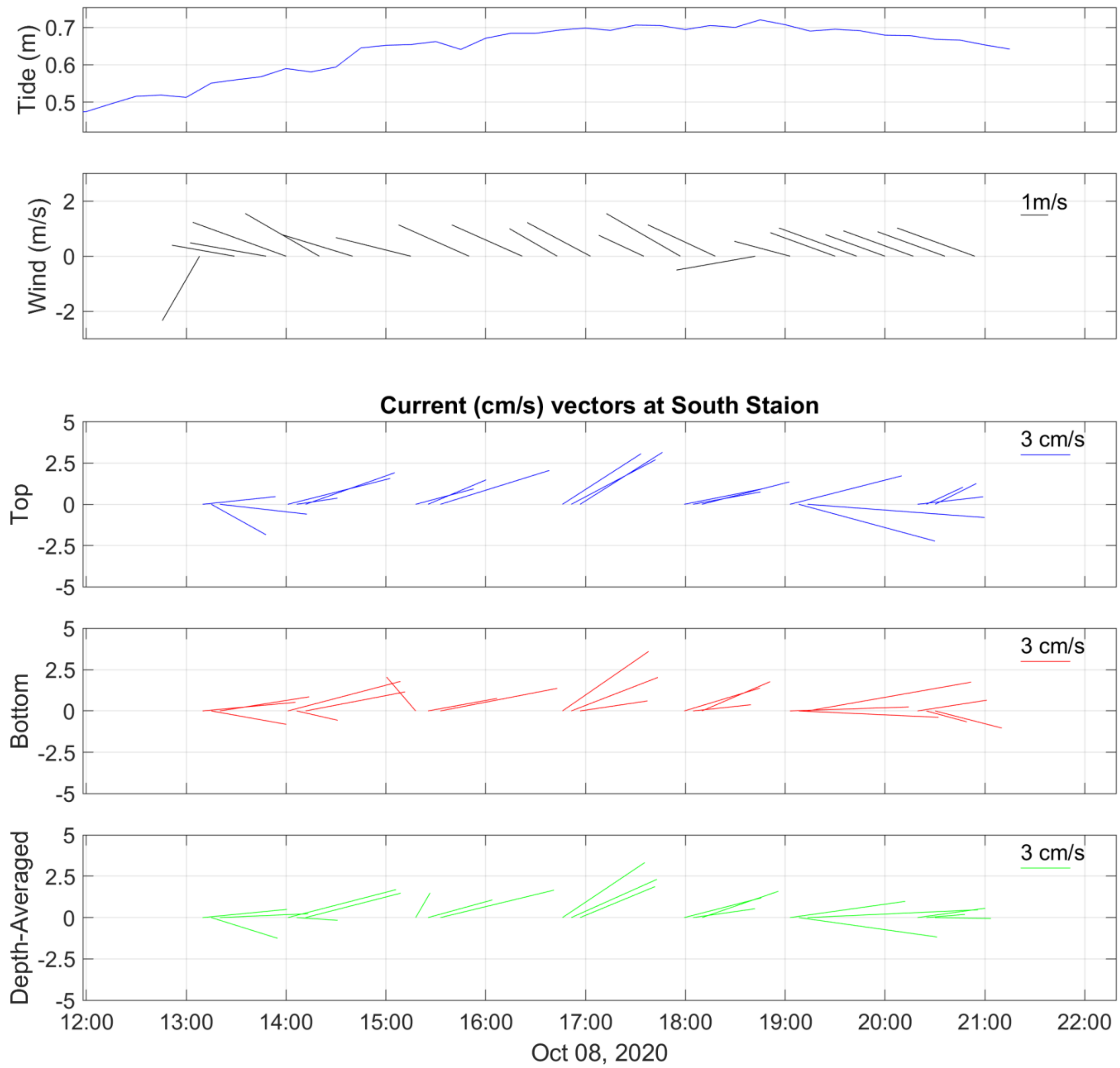


Figure 2-6b. Point Current Measurements at the South Station October 8, 2020

Table 2-1. Wind Speed and Direction

Date	Time	Speed (mph)	Direction (degrees from)
10/7/2020	17:49	9.2	110
	18:12	8.5	110
	18:29	6.5	110
	18:42	7.6	110
	19:09	6.5	115
	19:36	4.5	124
	19:56	6.7	124
	20:17	6.0	124
	20:37	5.8	120
	20:57	6.5	130
10/8/2020	13:08	6.0	30
	13:29	5.1	100
	13:48	6.3	100
	14:00	8.1	110
	14:20	6.9	120
	14:40	6.0	107
	15:15	6.3	104
	15:50	6.3	114
	16:22	6.3	114
	16:43	4.5	120
	17:03	5.8	118
	17:35	4.0	115
	17:57	6.9	120
	18:18	6.0	115
	18:42	6.5	80
	19:03	4.7	105
	19:30	5.6	110
	19:43	6.7	110
	20:00	5.1	110
	20:17	6.0	110
	20:36	5.8	110
	20:54	6.7	110

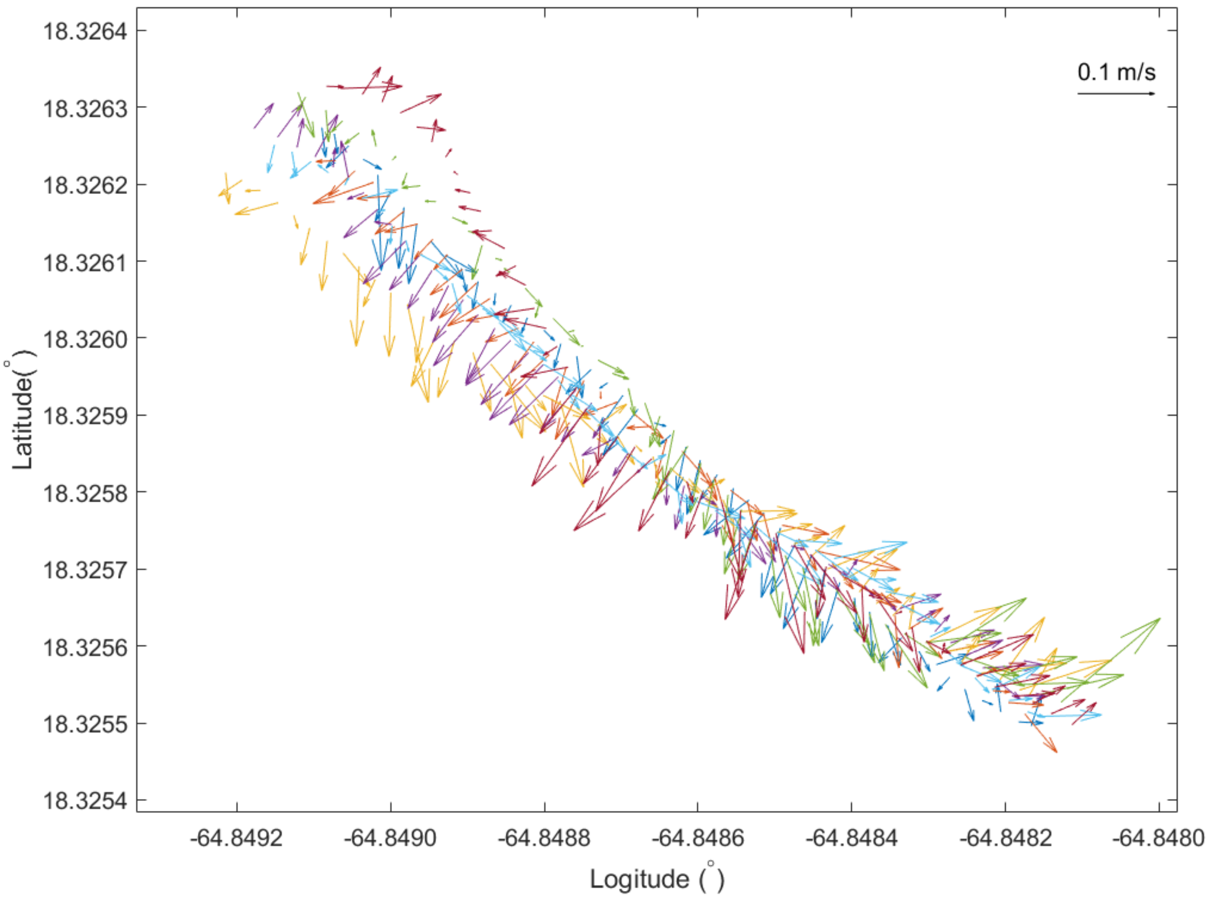


Figure 2-7. Velocity Transects October 8, 2020

Examination of the measured currents shows that first the velocities are very low overall, generally at or near 3 centimeters per second (cm/s). This is close to the measuring capability of the ADCP current meter. Examination of the current measurements as a collective, illustrates the development of a counterclockwise gyre forming at the entrance due to the winds coming out of the ESE. This make sense as the winds are blowing at an angle to the entrance from the south and setting up a gyre coming off Vessup Point. This creates currents that are generally pushing in on the north side, varied from pushing in to rotating southward in the middle, and then flowing out near the tip of Vessup Point. This can also be seen in the transect data presented in Figure 2-7. While there is noise in the data and variation, this is the overall pattern that was seen during the measurements. This pattern will be the primary aspect to represent in the results presented within the model validation section (3.4).

Table 2-1 presents the measured winds. Throughout the measurements the winds were coming from an ESE direction.

3.0 Hydrodynamic Model Development

ATM studied the hydrodynamics of both the base conditions (existing) of Vessup Bay, various alternative designs for the wave protection structure, and the final proposed design condition with the wave breaker that will exist after the proposed infrastructure construction. The objective of the hydrodynamic study was to characterize circulation in the bay and flushing of constituents from Vessup Point to the south end of Vessup Bay, forced by tide and wind. The objective is to quantify any changes in the baseline flushing due to the installation of the structure.

ATM used a numerical model to simulate circulation and the time to flush a conservative tracer from Vessup Bay to Redhook Bay. The model is described in Section 3.1. The simulation grid and bathymetry are described in Section 3.2. Boundary conditions are described in Section 3.3. The validation of the reasonableness of the simulations based on the data described in Section 2 is presented in Section 3.4.

3.1 Model Description

ATM used the Environmental Fluid Dynamics Code (EFDC) to simulate hydrodynamics and flushing of a conservative tracer. EFDC is a general-purpose hydrodynamic model, typically used to simulate two-dimensional and three-dimensional flow, circulation, transport, and biogeochemical processes in surface water systems, including rivers, lakes, estuaries, reservoirs, wetlands, and nearshore-scale to continental-shelf-scale coastal systems. EFDC is open-source software in the public domain, currently supported by the U.S. Environmental Protection Agency (EPA) Office of Research and Development (ORD).

EFDC solves three-dimensional, hydrostatic, free-surface, turbulent-averaged equations of motions for a variable-density fluid. Dynamically coupled transport equations for turbulent kinetic energy, turbulent length scale, salinity, and temperature are also solved. Two turbulent transport equations implement the Mellor-Yamada level 2.5 turbulence closure scheme. EFDC uses a grid with a stretched or sigma vertical geometry and curvilinear, orthogonal, horizontal geometry.

EFDC solves the equations of motion with a second-order accurate spatial finite differencing scheme on a staggered or C grid. The model's time integration employs a second-order accurate three-time-level, finite difference scheme with an internal-external mode splitting procedure to separate the internal shear or baroclinic mode from the external free-surface gravity wave or barotropic mode. The external mode solution is semi-implicit and simultaneously computes the two-dimensional surface elevation field by a preconditioned conjugate gradient procedure. The external solution is completed with the calculation of depth-average barotropic velocities using the new surface elevation field. The model's semi-implicit external solution allows large time steps constrained by stability criteria of either the explicit central difference scheme, or by a higher-order upwind advection scheme used for nonlinear accelerations. Horizontal boundary conditions for the external mode solution include options for simultaneously specifying the surface elevation only, the characteristic of an incoming wave, free radiation of an outgoing wave, or the normal volumetric flux on arbitrary parts of the boundary.

3.2 Simulation Grid and Bathymetry

ATM developed an overall model grid that covers a much larger region including Vessup Bay, Muller Bay, Redhook Bay, and portions of St. Johns Bay (Figure 3-1). The larger-scale domain allows currents to develop in hydrodynamic stability that force Vessup Bay and Redhook Bay domains. The larger-scale domain also allows the transport and dispersion of conservative dye tracer into a region that is not influenced by boundary conditions.

ATM discretized the domain with 3,689 horizontal grid cells and four vertical layers. The base grid is fit to the shoreline based upon aerial photography. The base grid represents present or existing conditions, prior to proposed construction. Figure 3-2 presents a zoomed-in view of the grid including Vessup Bay for the base conditions, with the proposed docks and the final design barrier outlined. The only changes on the grid for the design condition and the alternatives is that barriers are identified within the model domain blocking the grid faces that the barrier extends along.

Bathymetry for the base modeling was taken from a combination of National Oceanic and Atmospheric Administration (NOAA) navigation charts and measured bathymetry in the vicinity of the project. The bathymetry in the vicinity of the proposed dock structures was not altered from the base bathymetry. Figure 3-3 shows the overall model bathymetry, and Figure 3-4 shows a zoomed-in view of the bathymetry for Vessup Bay. The datum for the bathymetry and the water levels was mean low water (MLW).

3.3 Boundary Conditions

3.3.1 Offshore Water Levels

ATM forced the simulation with tides on the eastern open boundary of the domain. The data from the field studies was of a relatively short duration and used primarily for the model validation presented in Section 3.4. To perform longer simulations, ATM performed a least-square analysis to compute tidal harmonics with the high-low tides provided from NOAA Tides & Currents at Redhook Bay. The blue solid line presents the harmonic tide above MLW, which is calculated by the high-low tides in red circles (Figure 3-5) for a period of time in February 2020. The range of the harmonic tides was 0.45 meters (m) from February 5 to March 10, 2020, with the dominance of lunar diurnal (K1). Using this methodology, harmonic tide conditions were generated for the periods of the simulations presented in Section 4.

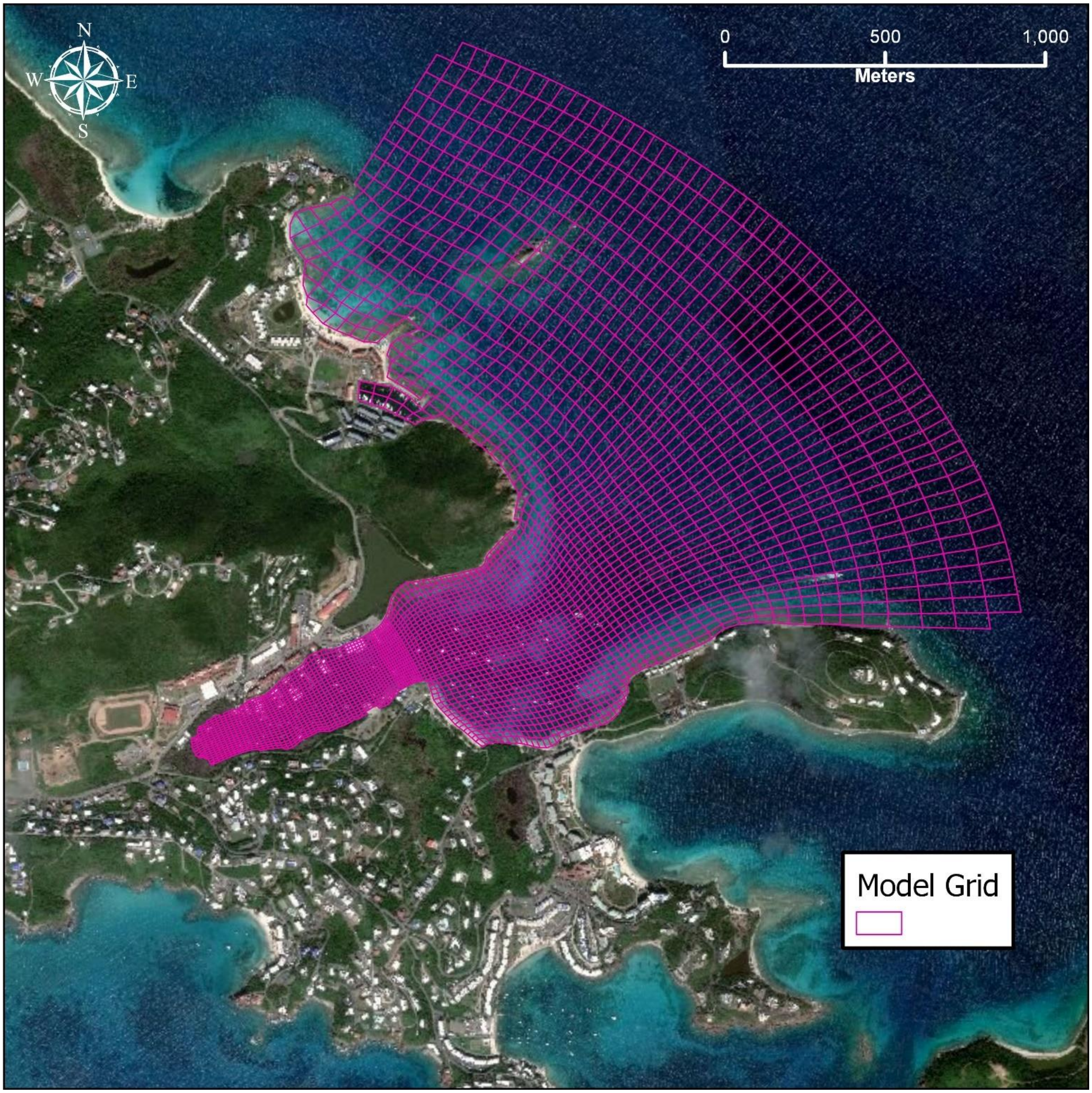


Figure 3-1. Overall Model Grid

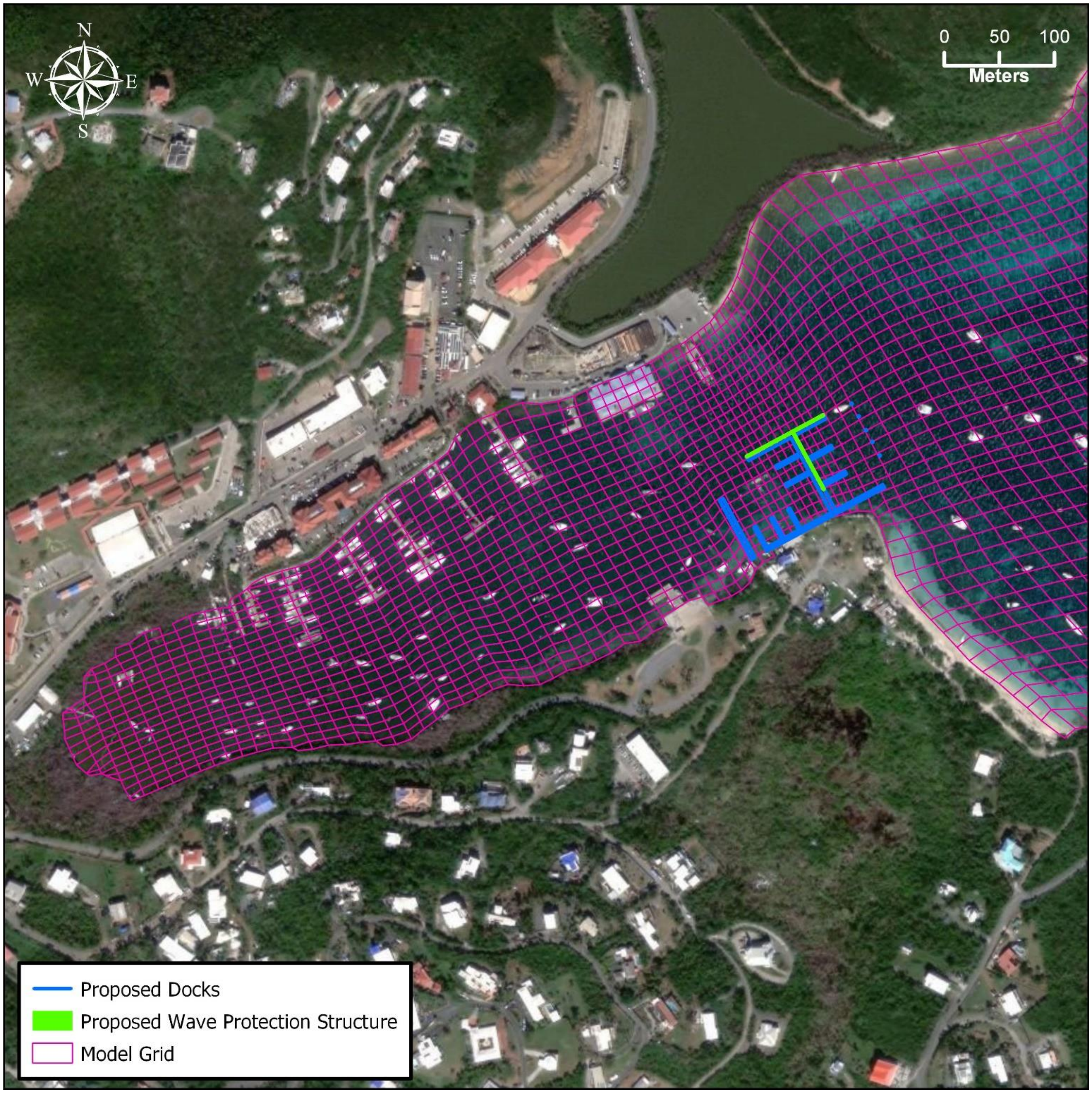


Figure 3-2. Model Grid within Vessup Bay

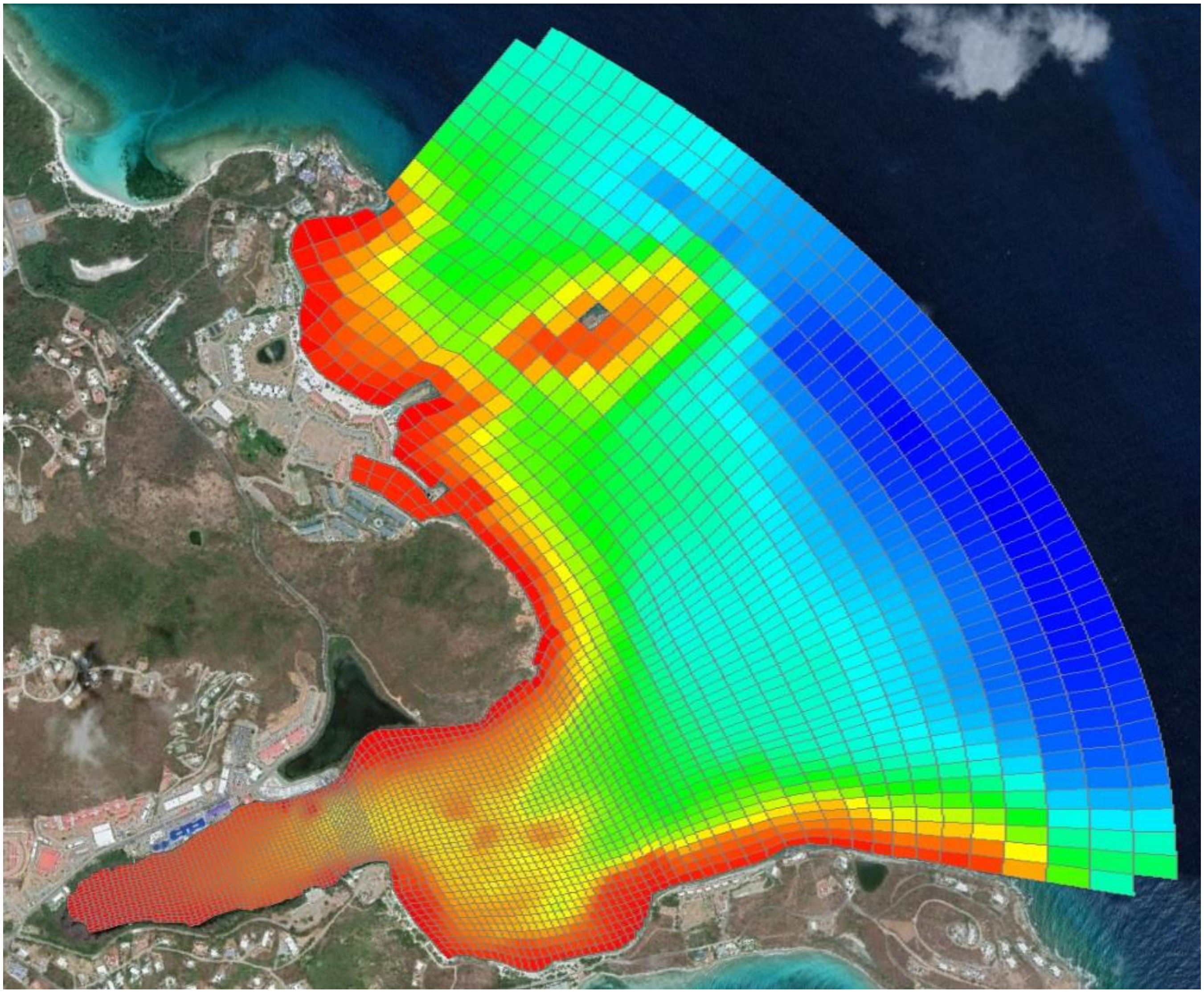


Figure 3-3. Overall Model Bathymetry

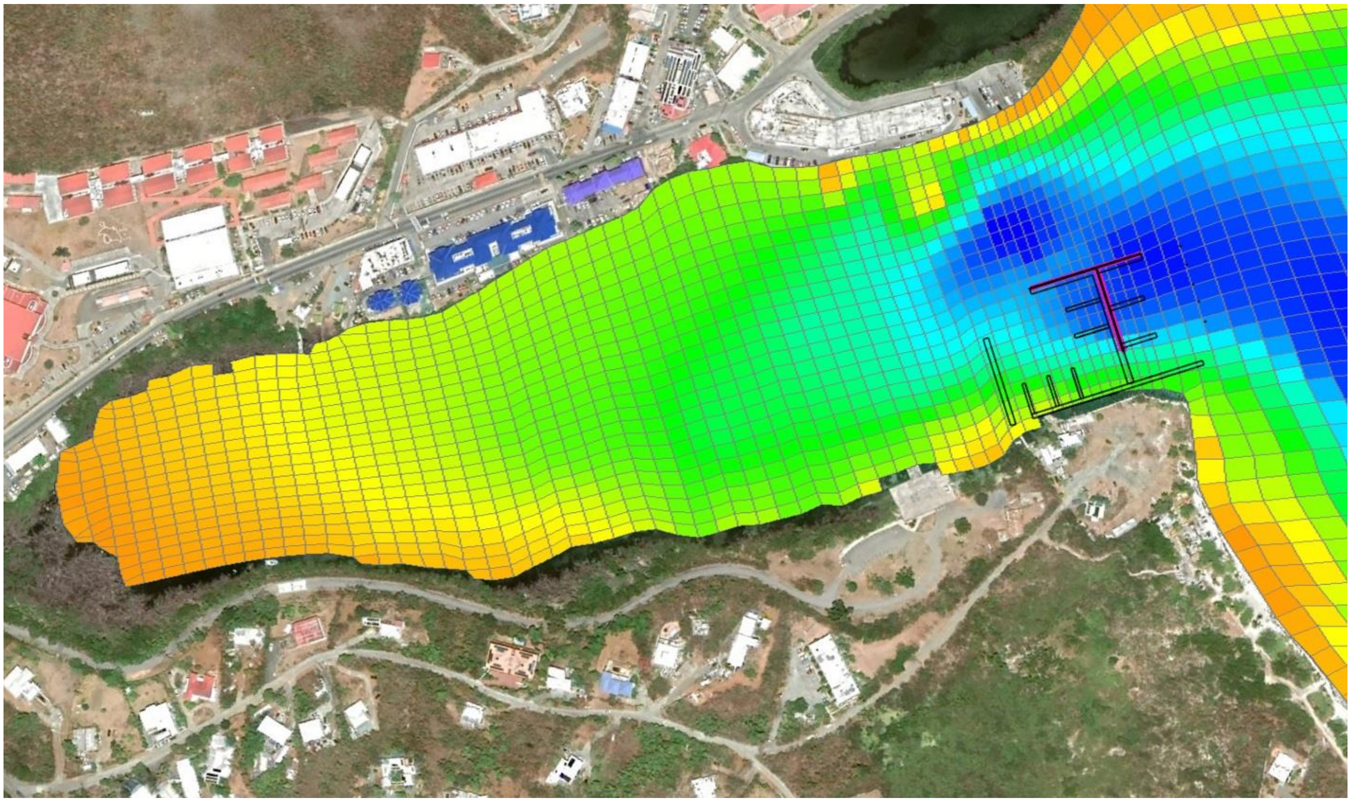


Figure 3-4. Model Bathymetry within Vessup Bay

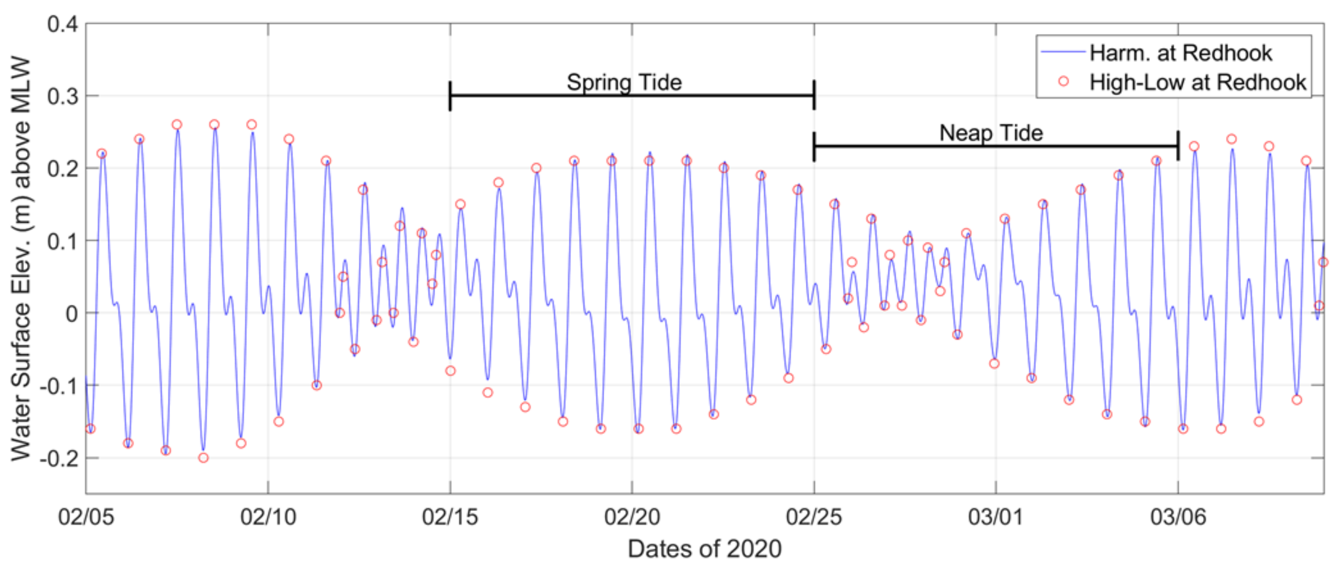


Figure 3-5. Predicted Tide (in blue solid line) Computed from NOAA High-Low tide Prediction (in red circle) at Redhook Bay

3.3.2 Winds

In addition to the tidal forcing, wind conditions were utilized to simulate hydrodynamics and transports of conservative dye tracers. Wind data for this project were obtained from Charlotte Amalie, USVI, where 6-minute interval data were available from 2005 to 2017 (NOAA, 2020a). ATM analyzed the available wind data to develop wind conditions for use in the simulations presented in Section 4.

ATM performed a statistical analysis for approximately 10 years of wind data from January 2007 to September 2017, since the wind data were not recorded from June 2011 to January 2012. The wind rose (Figure 3-6) presents the distribution of wind speed and direction. Wind direction is expressed at a point from which the wind blows, for example, a northerly wind direction blows from the north. The frequency of wind direction over a time period is described by a polar coordinate system (the circle in Figure 3-6), with color band showing the range of wind speed. Most of the wind directions were oriented from the east, which indicate the wind blew onshore. The most dominant direction, with 15 percent of the total, was 80° clockwise from the north, and the 10-year average wind speed was 1.95 meters per second (m/s). The data were analyzed to define the average monthly wind (Figure 3-7), which was averaged by month for 10 years. This plot shows that winds are stronger in the summer and weaker in the winter.

From the statistical analyses of the data, 10-day wind periods were defined from the record that reflected low wind conditions, average wind conditions, and high wind conditions. The periods were based on 10-day moving averages of the data and choosing time periods which reflect the average of the full record (average wind), 90th percentile (high wind) and 10th percentile (low wind). The time series for these 10-day periods were used in the simulations in Section 4.

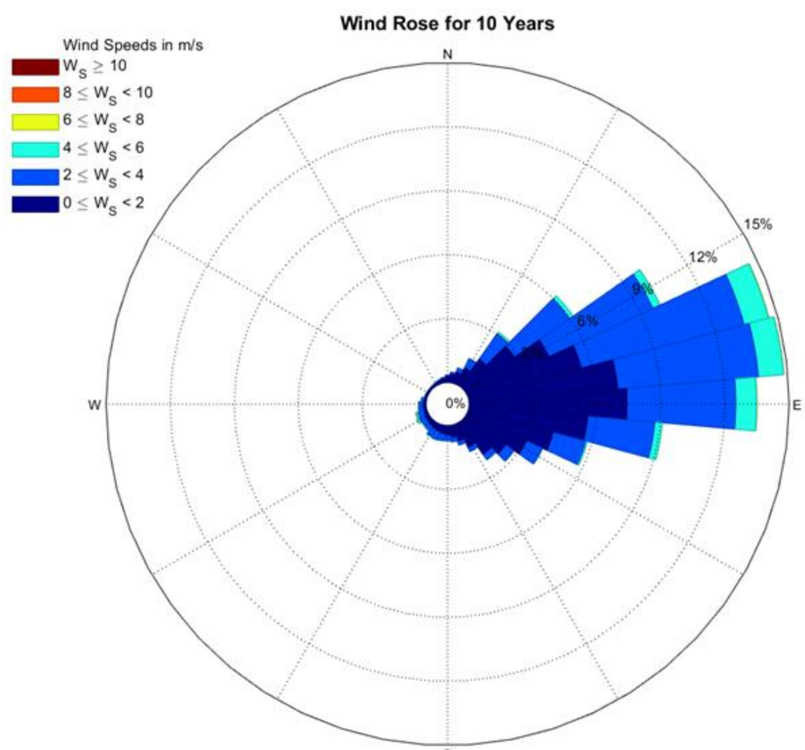


Figure 3-6. Wind Rose from January 2007 to September 2017

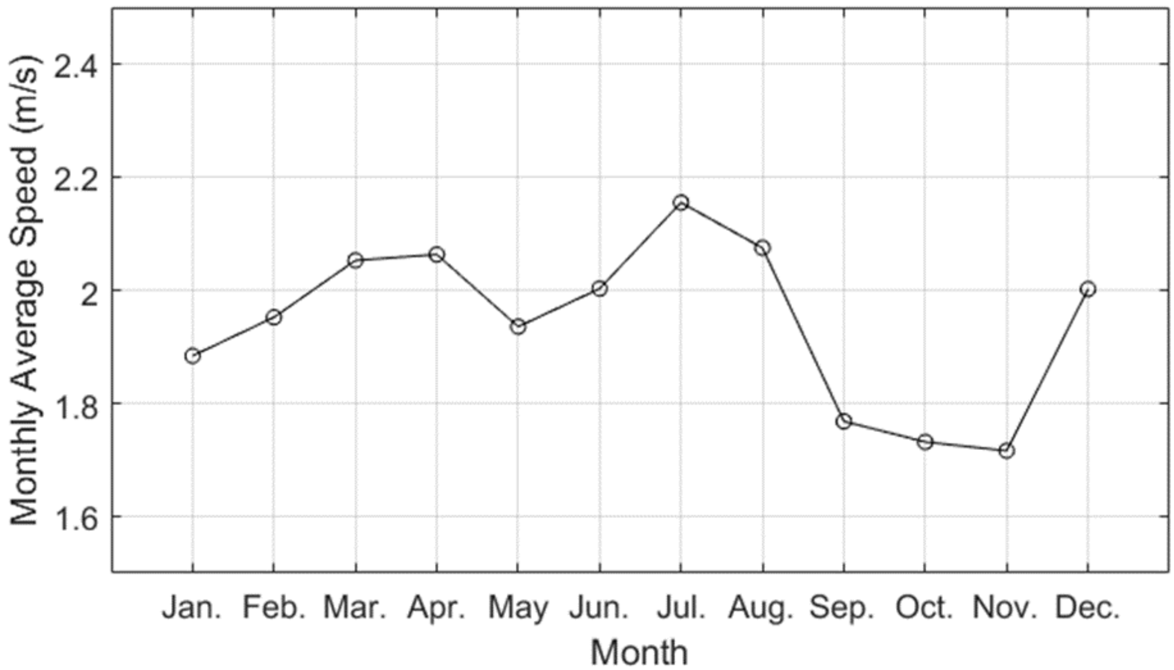


Figure 3-7. Monthly Average Wind Speed (m/s) for 10 Years

3.4 Model Validation

Based on the nature of the measured velocities presented in Section 2, the validation of the model came from comparisons of the overall current patterns within the model with those seen in the measured data. The currents in Section 2 identified the existence of a gyre at the mouth of the bay with the flows going out along the shoreline areas and flowing in for the middle.

The model was run for the conditions which existed at the time of the successful velocity measurements in October. Figures 3-8a and 3-8b present vector plots showing shapshots of the simulated velocity vectors. The plots show the gyre with the flows out along the edges with the flows moving into the bay in the middle. The gyre, based on the winds out of the southeast, exists at the mouth with velocity magnitudes similar to those measured in the field. In order to get the model to reproduce this condition, wind shading was applied to the more nearshore areas. This allowed the pattern found in the measurements to be simulated as shown in the figures. This provides qualitative and somewhat quantitative validation of the model simulations.

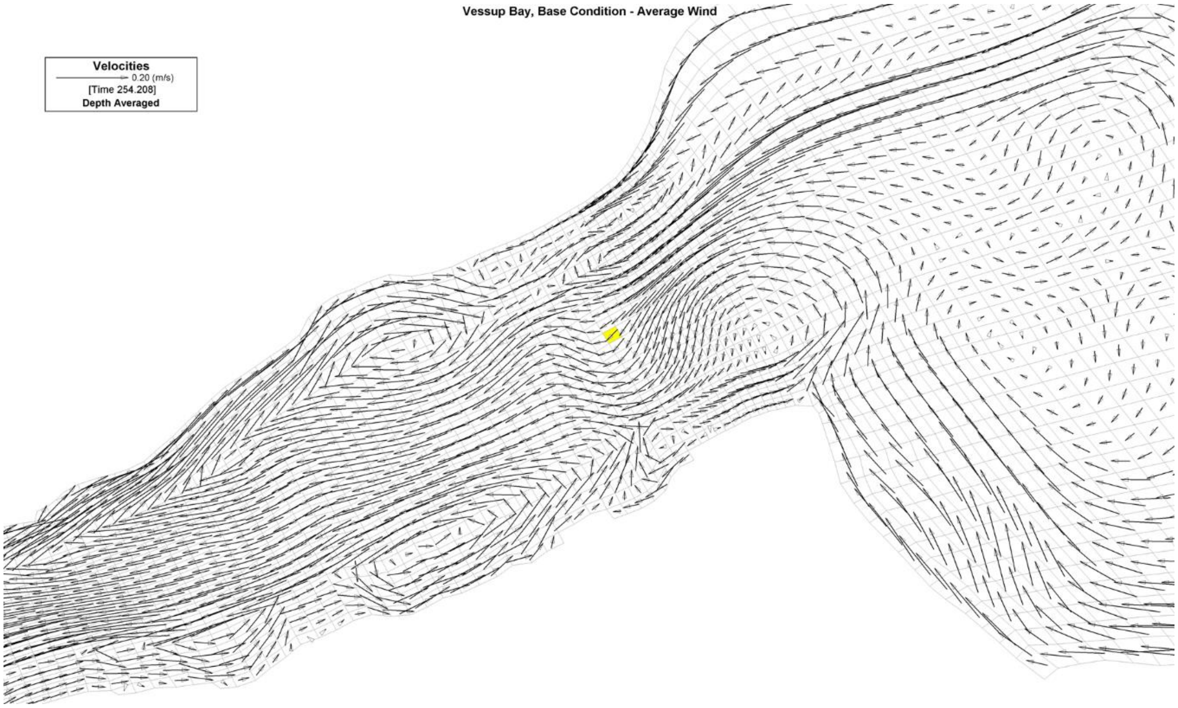


Figure 3-8a. Velocity Vectors in Mouth of Vessup Bay (Time 254.208)

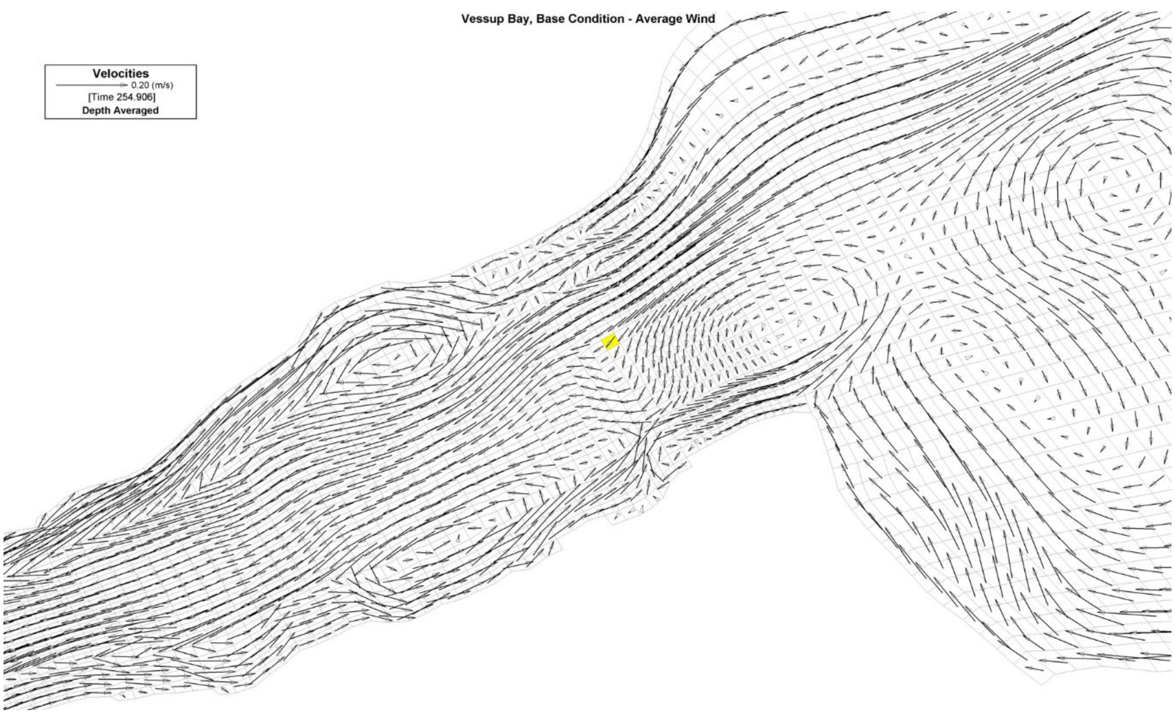


Figure 3-8b. Velocity Vectors in Mouth of Vessup Bay (Time 254.208)

4.0 Flushing Assessment

4.1 Methods

Using the model described in Section 3, ATM performed flushing evaluations through a spring-neap tidal cycle under varying wind conditions. ATM simulated the concentration of a synthetic, hypothetical tracer initialized in the Vessup Bay area with a dye concentration of 100. As stated previously, the goal is to determine differences in the flushing between the existing (base) condition and the conditions following installation of the wave protection structure (design).

The concentration of the hypothetical, synthetic tracer was nominally 100 milligrams per liter (mg/L) at the beginning of each scenario simulation. The tracer was uniformly distributed in a 0.05-mi^2 area in Vessp Bay Marina. The concentration decreased as tracer in the marina was transported to Muller Bay and Redhook Bay, and as water in Muller Bay and Redhook Bay mixed with water in Vessup Bay.

ATM simulated concentration of a conservative tracer forced by harmonic tide and winds. The model configurations in Table 4-1 describes the wind conditions for each scenario as the low, average and high winds as defined in Section 3.3.2 along with the design conditions and alternatives. The tide conditions cycle through a spring/neap condition for the simulations. Figure 4-1 presents the tides for the 10-day simulations presented below. The simulations start at neap tide conditions. As the tidal influence is low, and the goal is to provide a relative comparison of the flushing between the base, design and alternative conditions, rather than an absolute assessment of the flushing times, these conditions are reasonable for the analyses.

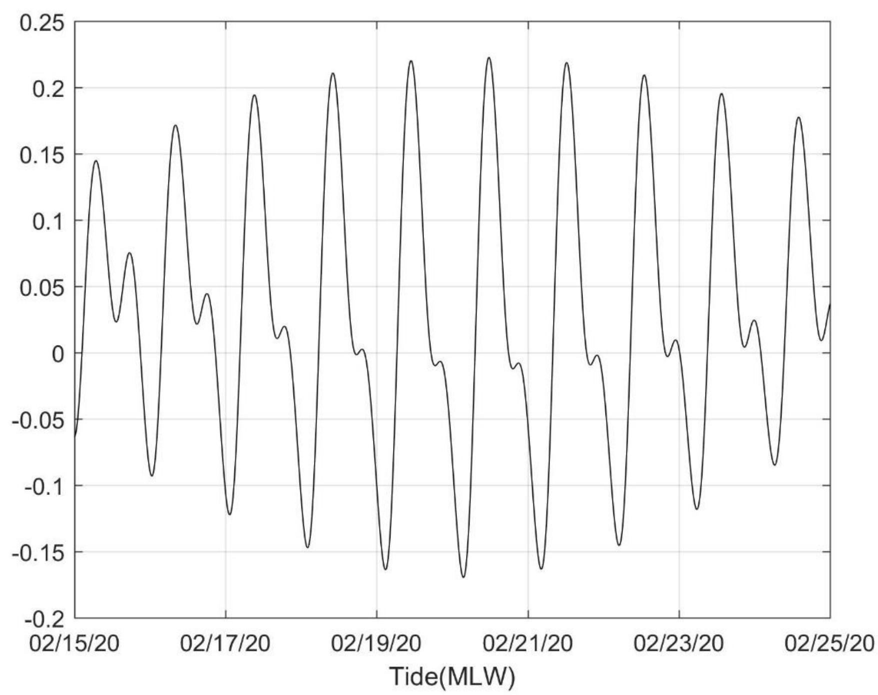


Figure 4-1. Tide Conditions for Flushing Simulations

Table 4-1. Model Configurations

Simulation Name	Base or Design	Tide Condition	Wind Condition
VSSP-LWND-BASE	Base	Neap to Spring	Low Wind
VSSP-LWND-DSGN	Design	Neap to Spring	Low Wind
VSSP-LWND-DSGNA1	Alternative 1	Neap to Spring	Low Wind
VSSP-LWND-DSGNA2	Alternative 2	Neap to Spring	Low Wind
VSSP-LWND-DSGNA3	Alternative 3	Neap to Spring	Low Wind
VSSP-AWND-BASE	Base	Neap to Spring	Average Wind
VSSP-AWND-DSGN	Design	Neap to Spring	Average Wind
VSSP-AWND-DSGNA1	Alternative 1	Neap to Spring	Average Wind
VSSP-AWND-DSGNA2	Alternative 2	Neap to Spring	Average Wind
VSSP-AWND-DSGNA3	Alternative 3	Neap to Spring	Average Wind
VSSP-HWND-BASE	Base	Neap to Spring	High Wind
VSSP-HWND-DSGN	Design	Neap to Spring	High Wind
VSSP-HWND-DSGNA1	Alternative 1	Neap to Spring	High Wind
VSSP-HWND-DSGNA2	Alternative 2	Neap to Spring	High Wind
VSSP-HWND-DSGNA3	Alternative 3	Neap to Spring	High Wind

4.2 Alternatives Assessment

For the wave protection structure, various alternatives were simulated. Initially, the design looked to extend the portion of the barrier that was shore parallel all the way to the shoreline to provide the maximum protection for the boats on the inside of the marina area (Alternative 1). Initial flushing simulation results showed that this would increase the overall flushing times within Vessup Bay significantly. Two other alternatives were run. The first had a gap of 23 feet between the shoreline and the wave protection structure (Alternative 2). The second had a gap of 46 feet (Alternative 3). The final runs looked at the Design condition with a gap of 70 feet (Figure 1.2).

- Base Condition – no structures
- Design condition - gap of 70 feet between the shoreline and the wave protection structure
- Alternative 1 – wave panels connecting to the shoreline
- Alternative 2 – gap of 23 feet between the shoreline and the wave protection structure
- Alternative 3 - gap of 46 feet between the shoreline and the wave protection structure

Figures 4-2a through 4-2c present graphs of the percent mass remaining for the average wind, high wind, and low wind conditions for each alternative compared to the baseline condition. Examination of the figures shows that a gap of 70 feet (Design condition) is required between the shore perpendicular wave protection structure and the shoreline in order to not significantly impact the flushing in Vessup Bay. Section 4.3 presents a more detailed presentation of the design results.

4.3 Detail Results for Design Simulation

Detailed results for the design condition simulation runs versus the baseline are presented in the series of Figures from 4-3 to 4-5. The graphics presented include snapshot plots of the vertically averaged dye concentrations at different points through the simulation. Results are presented for the starting condition (day 0) then for days 1, 4, 7, and 10. The snapshot plots show how for each of the wind and physical (base versus design) conditions the dye concentration distribution changes over time as the waters between Vessup Bay, Muller Bay, and Redhook Bay mix. The base and design plots are presented on the same page for each time and condition to allow comparison between the two. The design plots show the location and extent of the wave protection structure under the design condition.

Figures 4-2a through 4-2c present the plots of the time series of the percent mass remaining for the base and design conditions that are shown in the snapshot plots. This provides the direct quantitative comparison of the differences in the flushing with and without the wave protection structure.

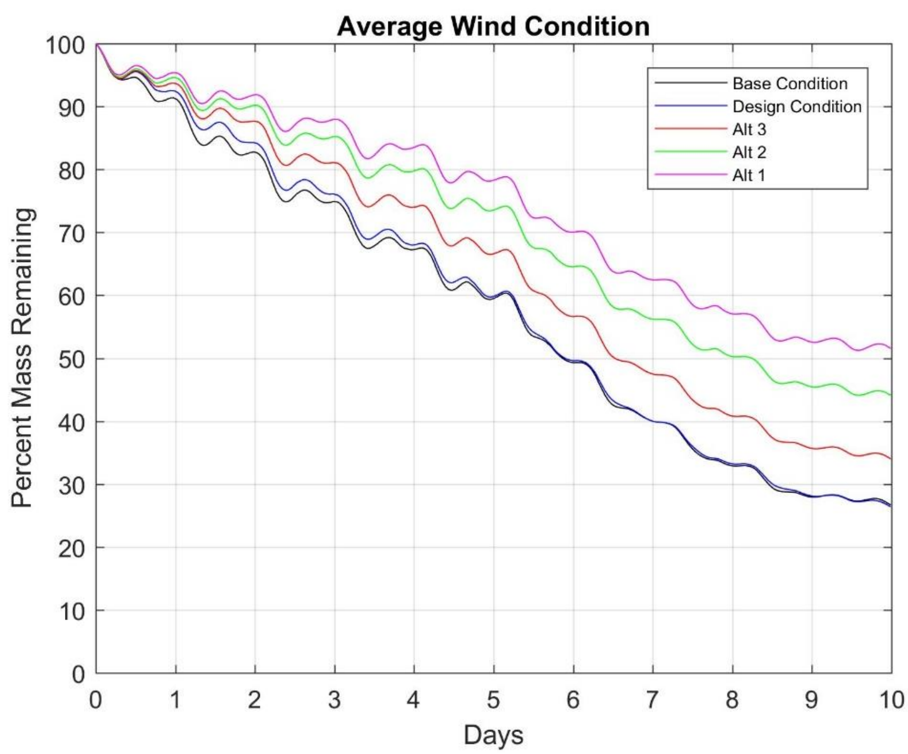


Figure 4-2a. Comparison of the Percent Mass Remaining for the Alternatives, the Design Condition and the Baseline Condition under Average Wind Conditions

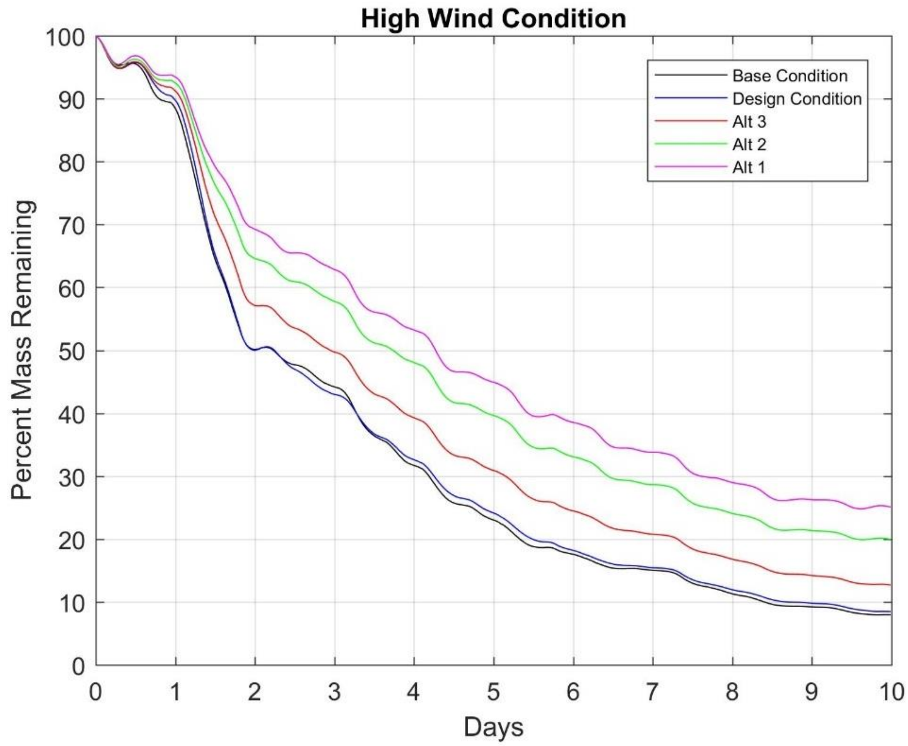


Figure 4-2b. Comparison of the Percent Mass Remaining for the Alternatives, the Design Condition and the Baseline Condition under High Wind Conditions

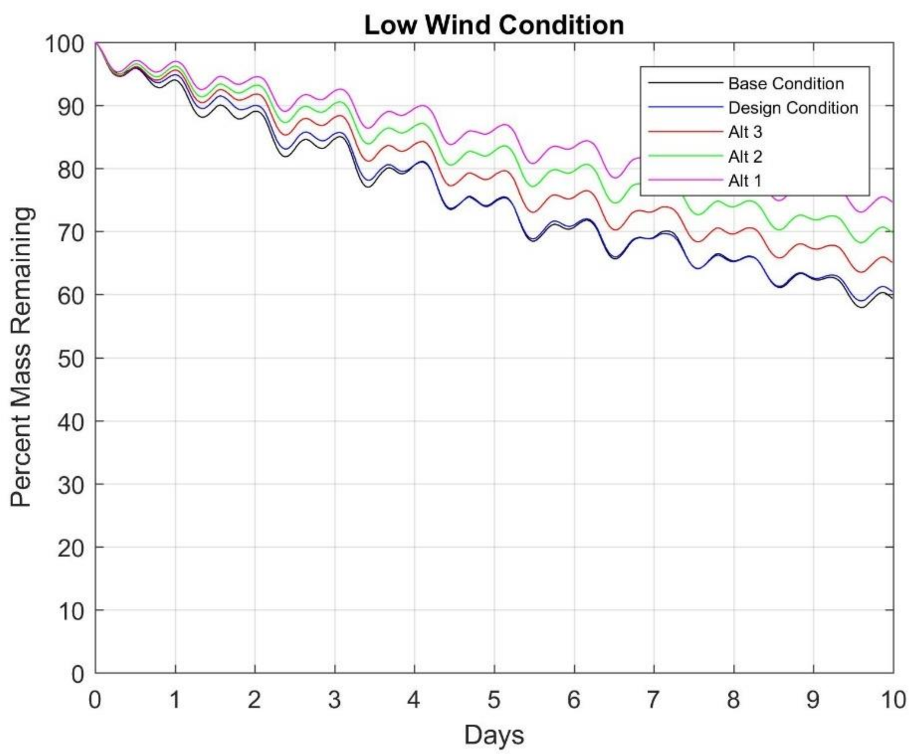
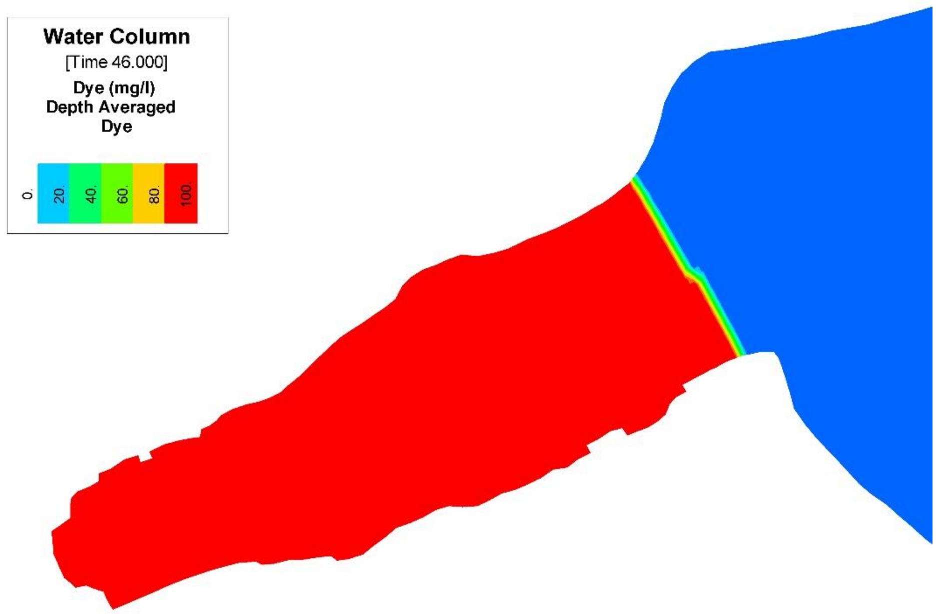


Figure 4-2c. Comparison of the Percent Mass Remaining for the Alternatives, the Design Condition and the Baseline Condition under Low Wind Conditions

Vessup Bay, Base Condition - Low Wind



Vessup Bay, Design Condition - Low Wind

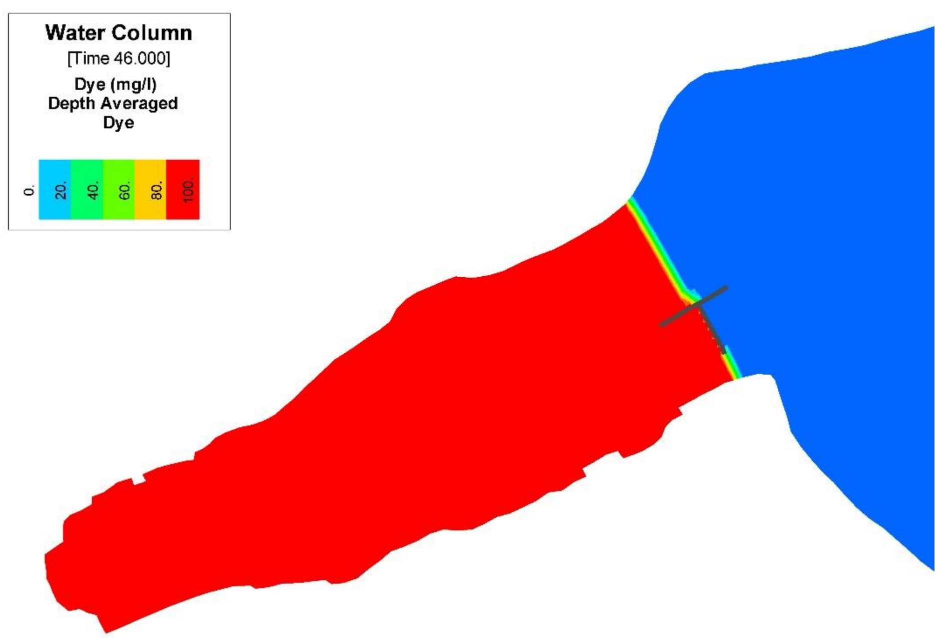
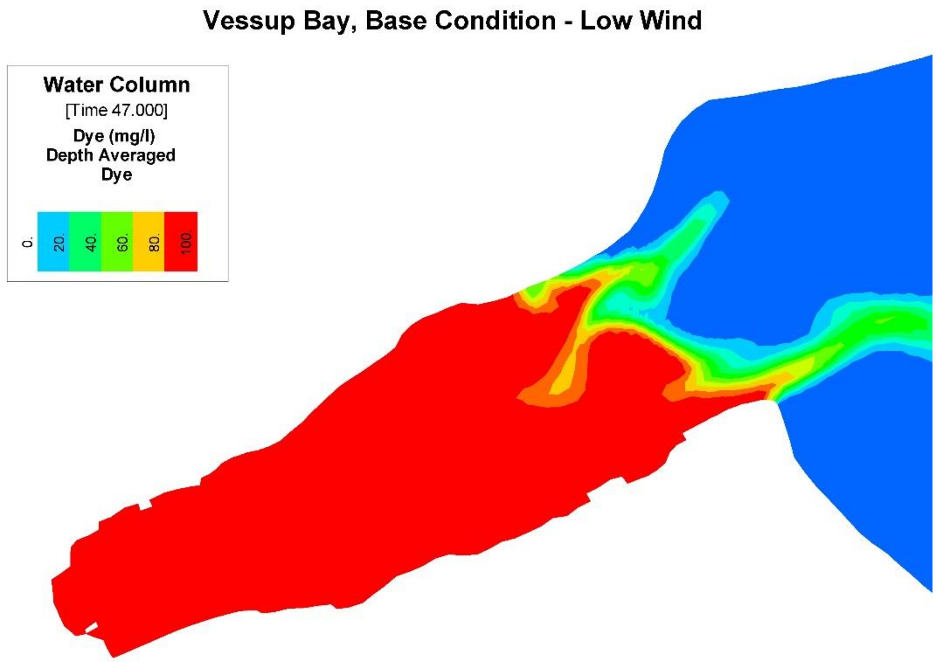


Figure 4-3a. Base and Design Vertically Averaged Dye Concentrations for Low Wind Simulation (Day 0)



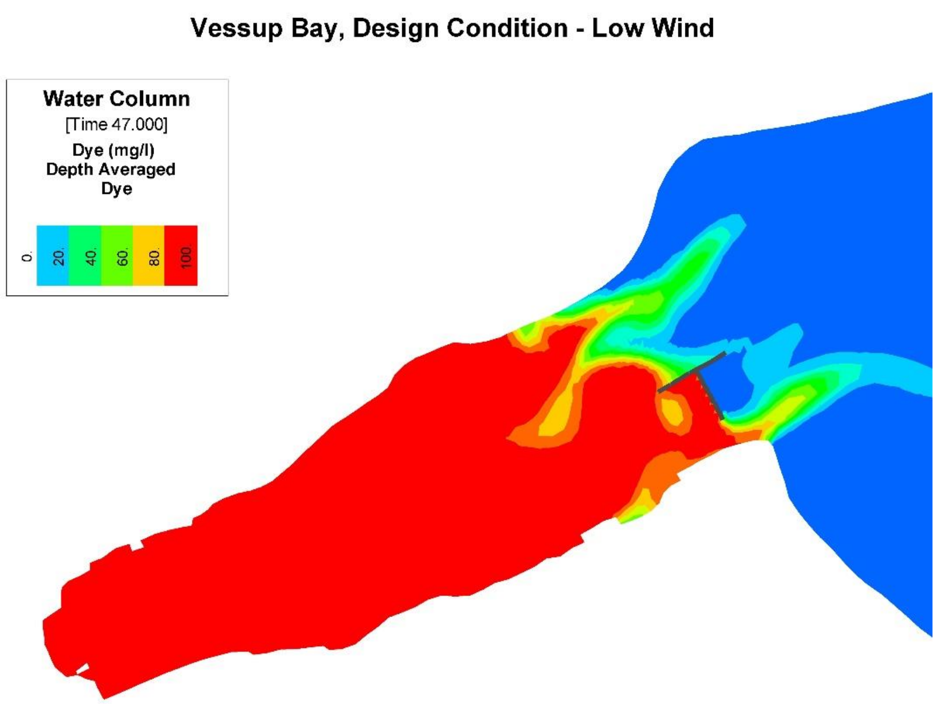
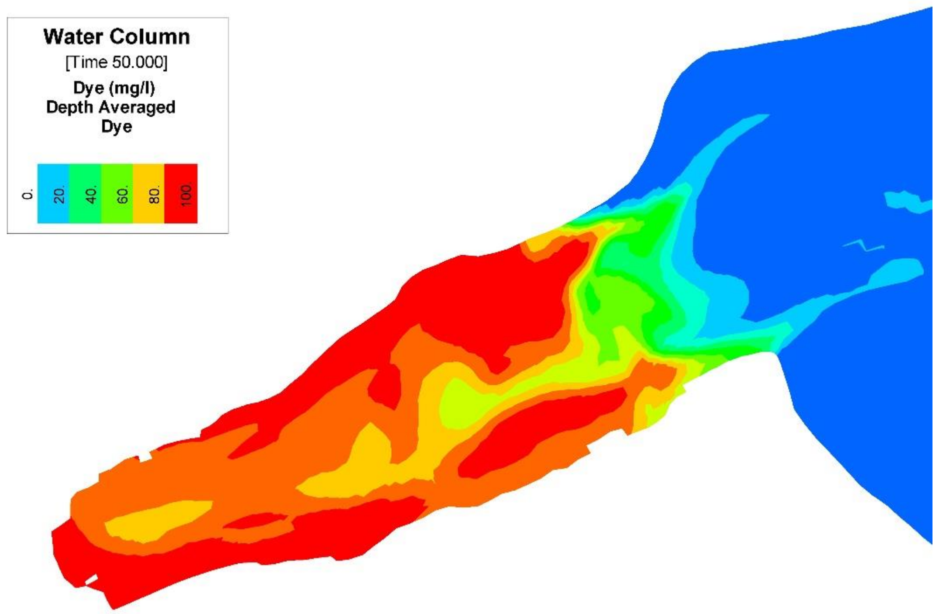


Figure 4-3b. Base and Design Vertically Averaged Dye Concentrations for Low Wind Simulation (Day 1)

Vessup Bay, Base Condition - Low Wind



Vessup Bay, Design Condition - Low Wind

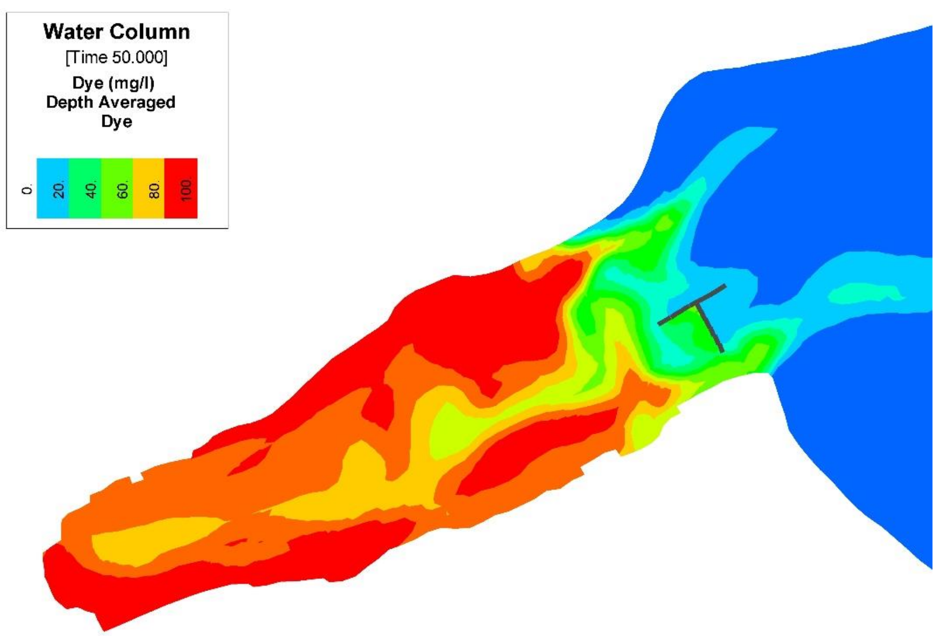
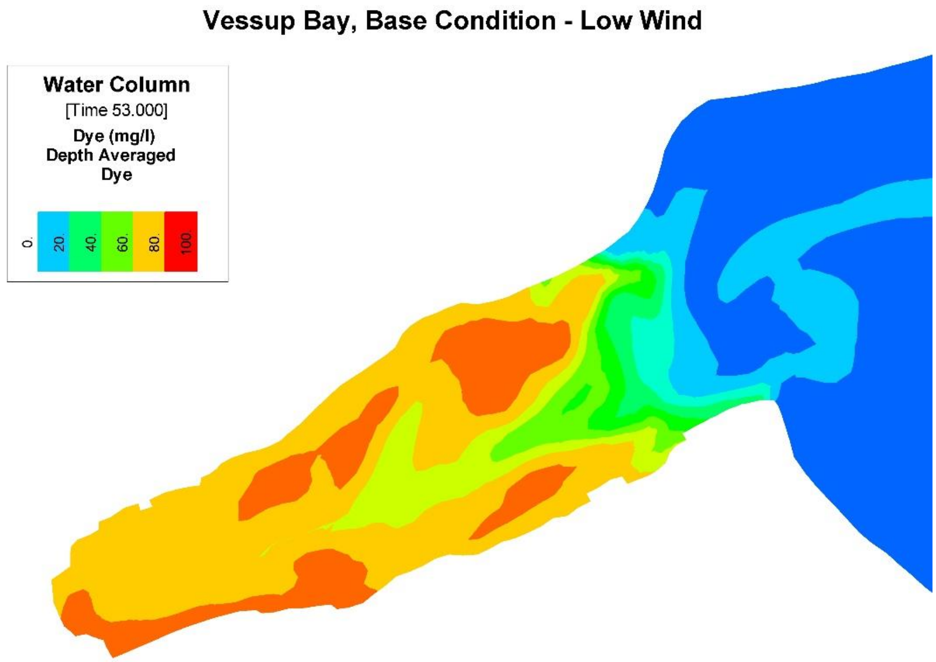


Figure 4-3c. Base and Design Vertically Averaged Dye Concentrations for Low Wind Simulation (Day 4)



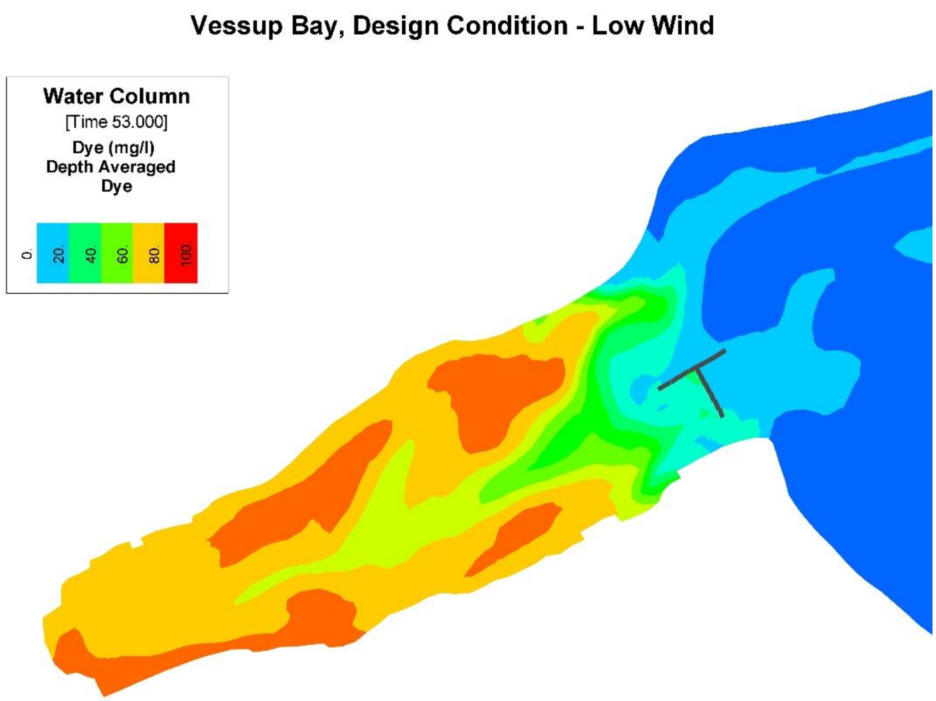
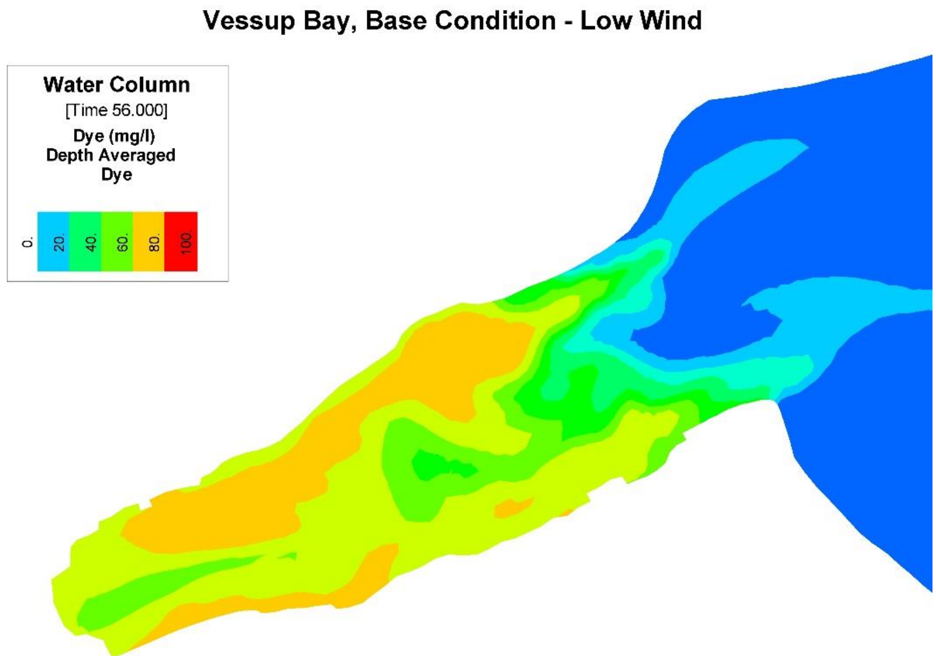


Figure 4-3d. Base and Design Vertically Averaged Dye Concentrations for Low Wind Simulation (Day 7)



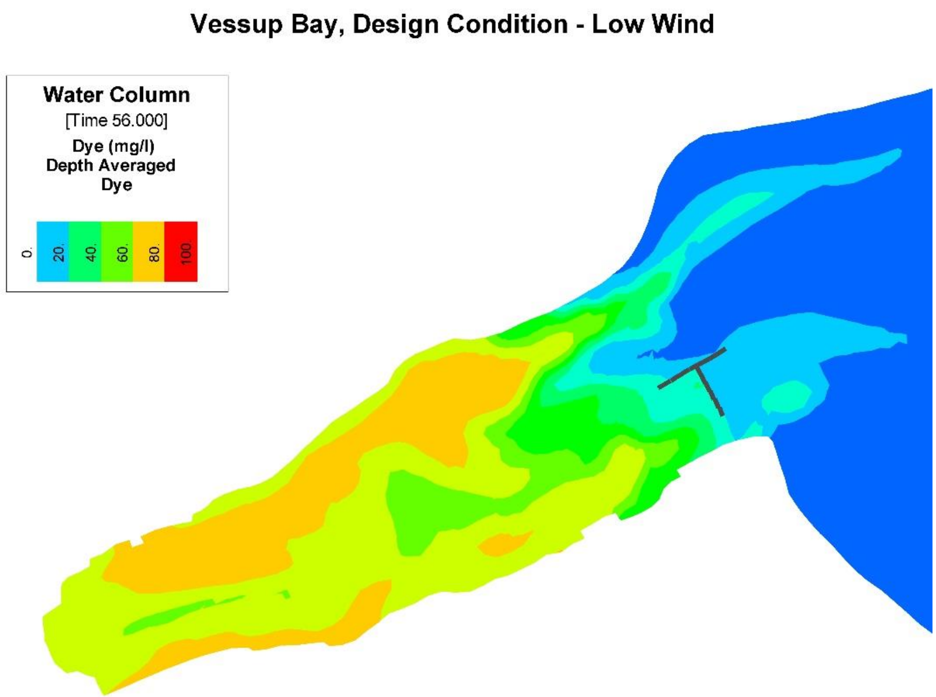
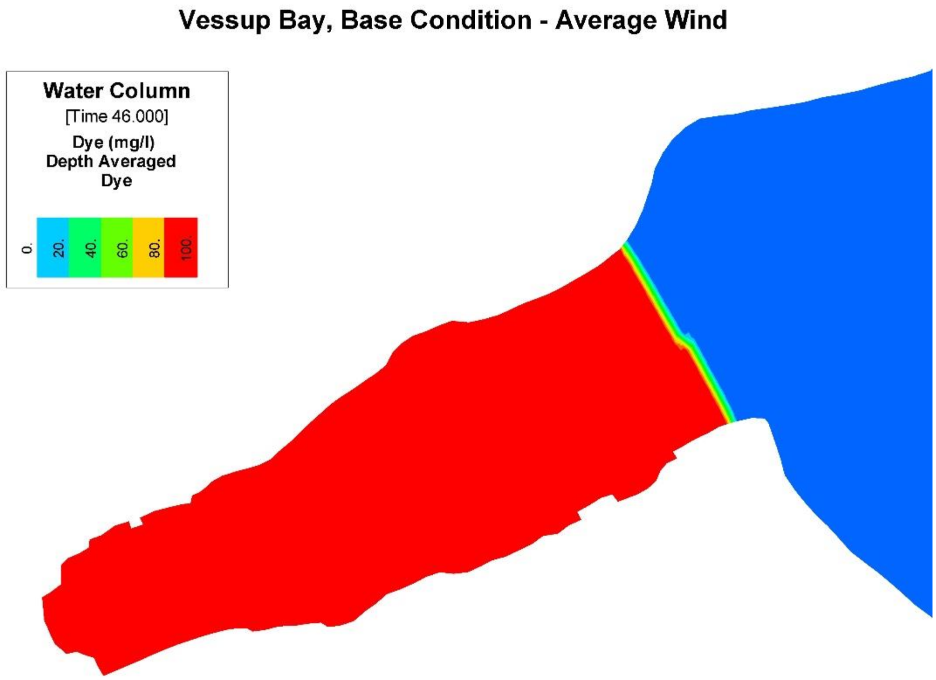


Figure 4-3e. Base and Design Vertically Averaged Dye Concentrations for Low Wind Simulation (Day 10)



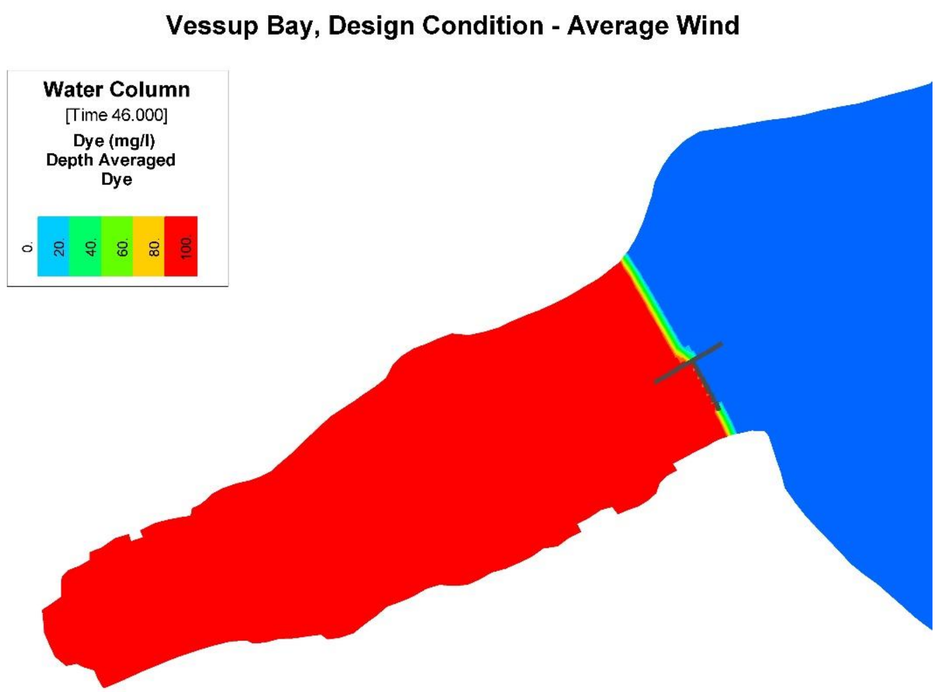
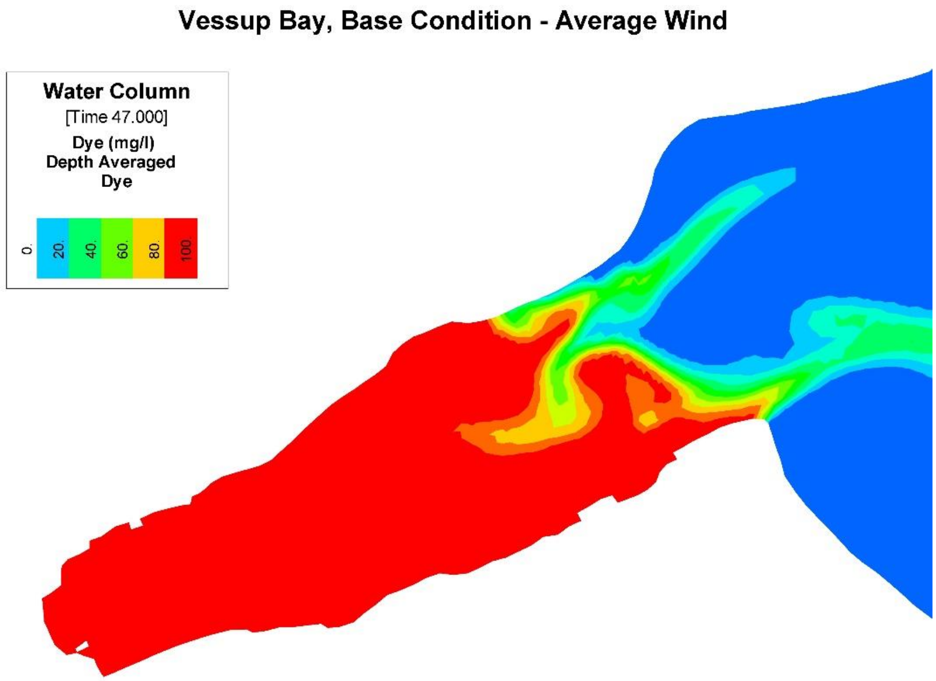


Figure 4-4a. Base and Design Vertically Averaged Dye Concentrations for Average Wind Simulation (Day 0)



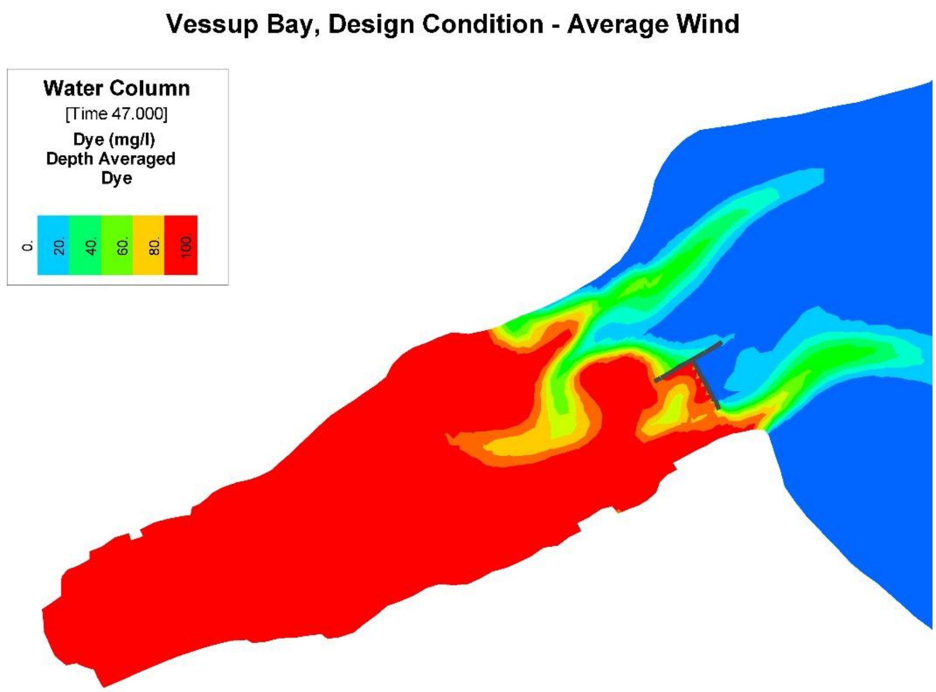
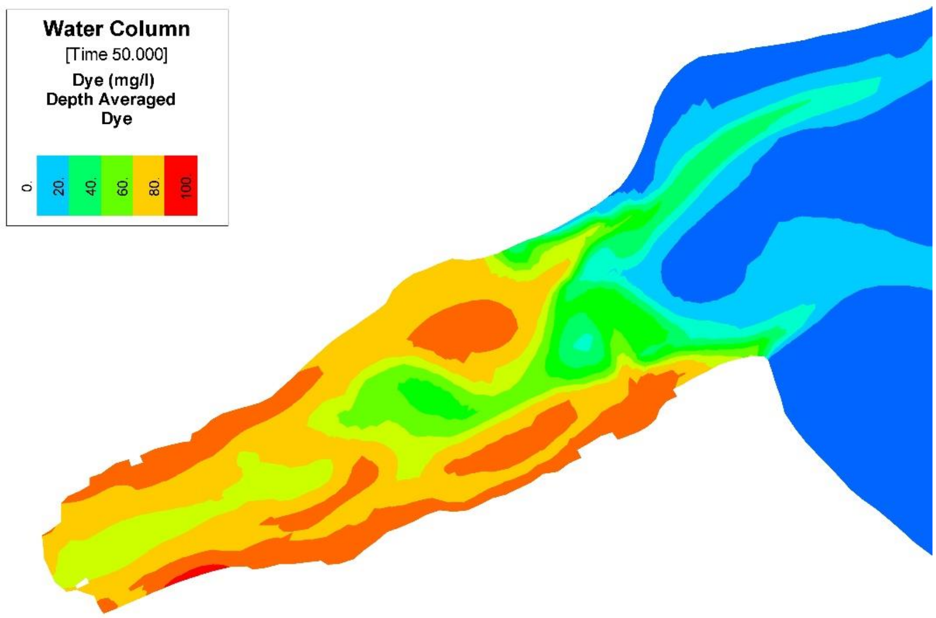


Figure 4-4b. Base and Design Vertically Averaged Dye Concentrations for Average Wind Simulation (Day 1)

Vessup Bay, Base Condition - Average Wind



Vessup Bay, Design Condition - Average Wind

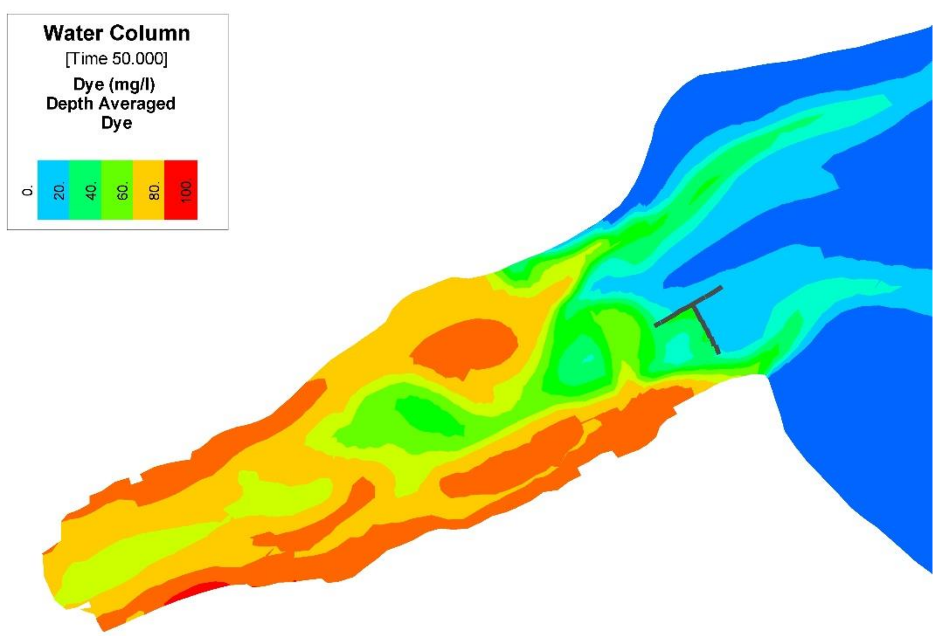
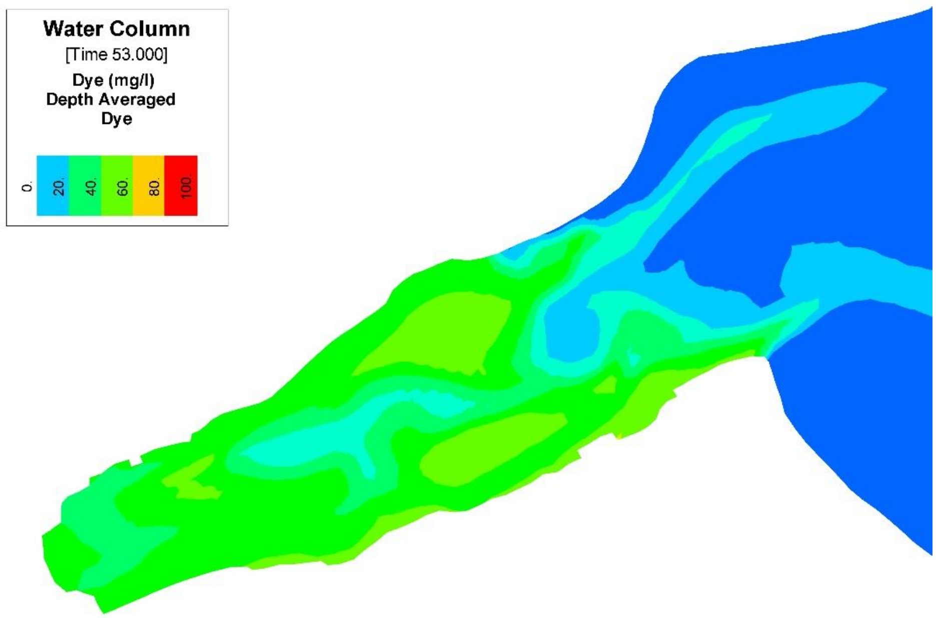


Figure 4-4c. Base and Design Vertically Averaged Dye Concentrations for Average Wind Simulation (Day 4)

Vessup Bay, Base Condition - Average Wind



Vessup Bay, Design Condition - Average Wind

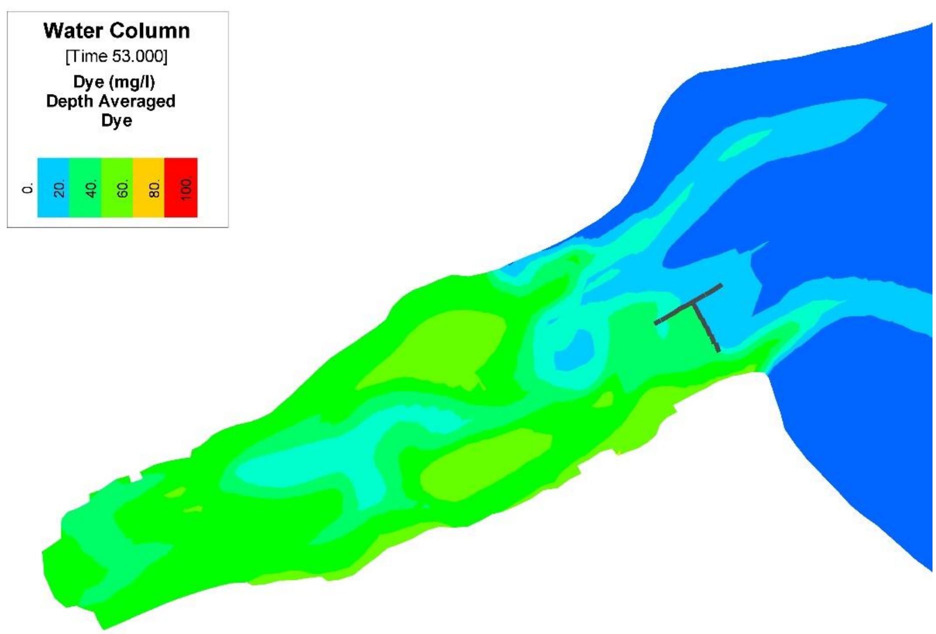
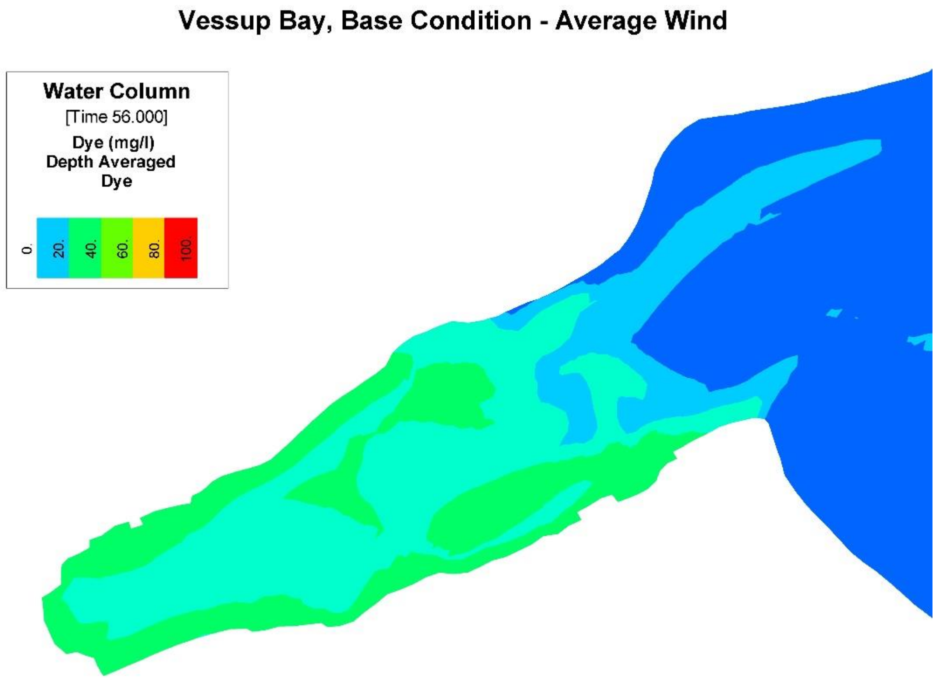


Figure 4-4d. Base and Design Vertically Averaged Dye Concentrations for Average Wind Simulation (Day 7)



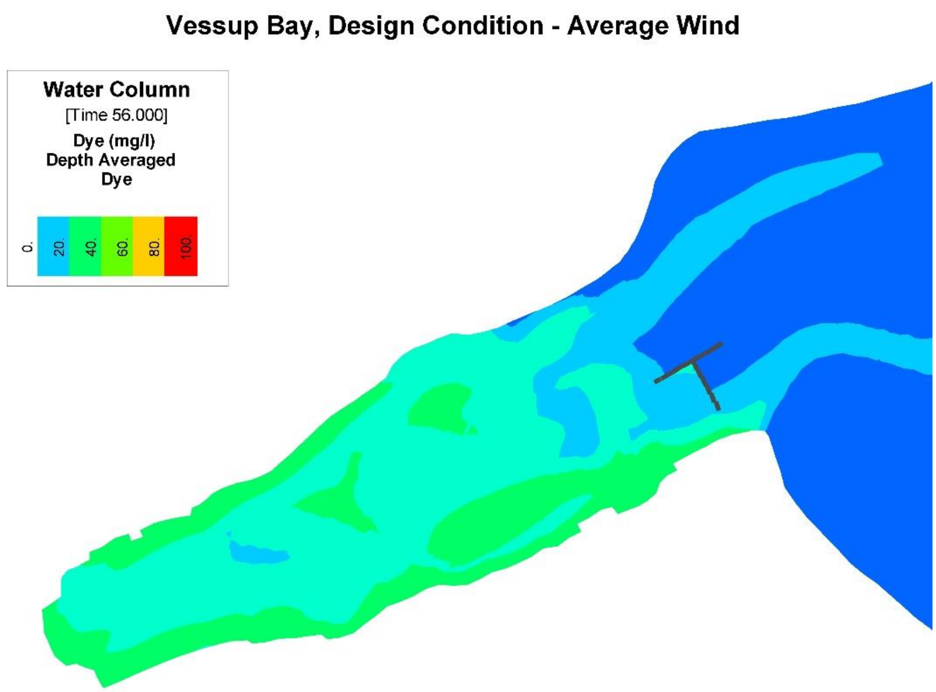
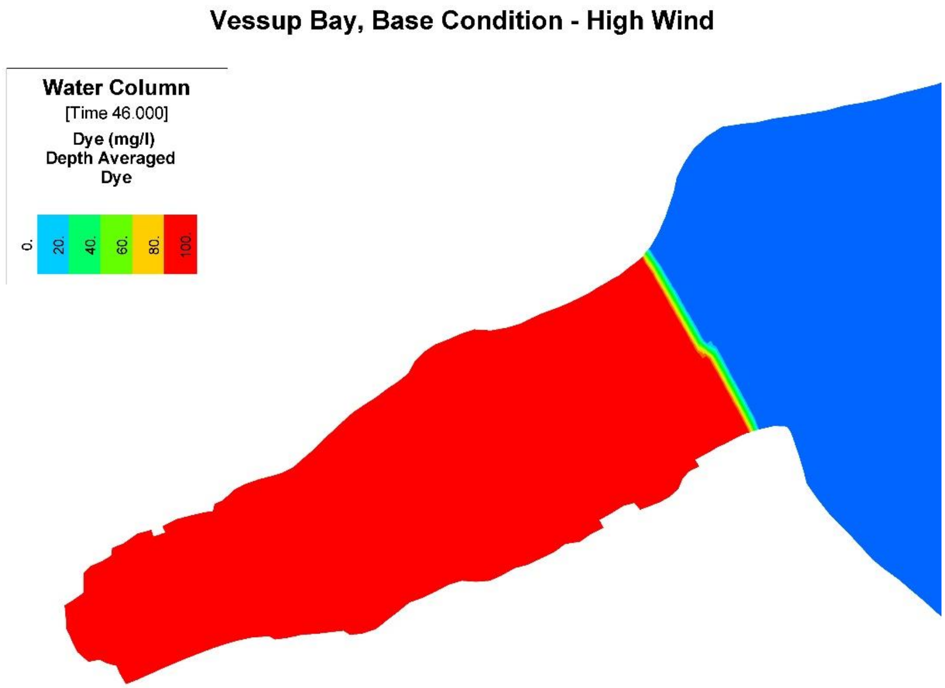


Figure 4-4e. Base and Design Vertically Averaged Dye Concentrations for Average Wind Simulation (Day 10)



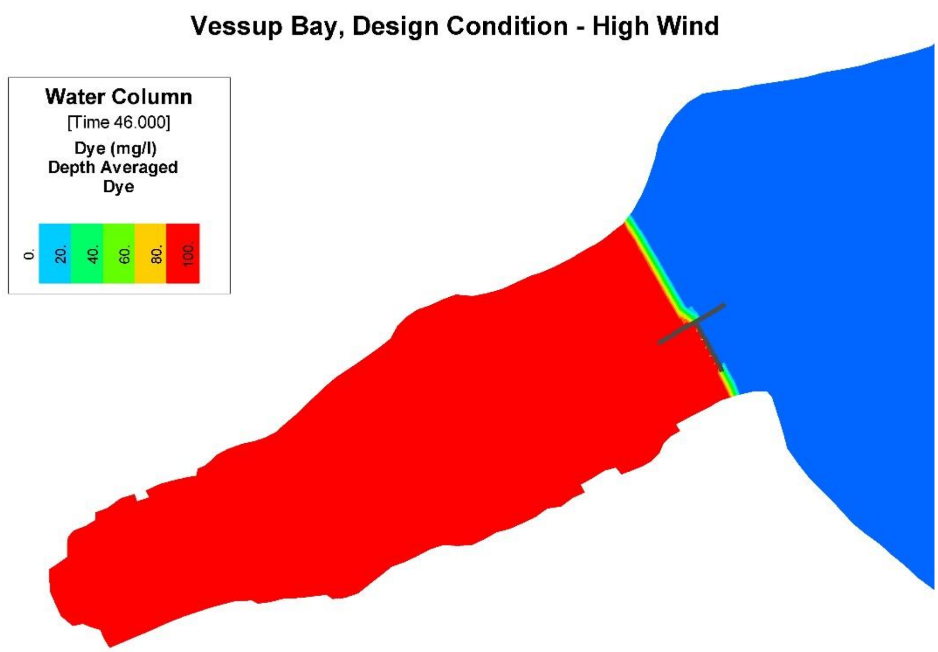
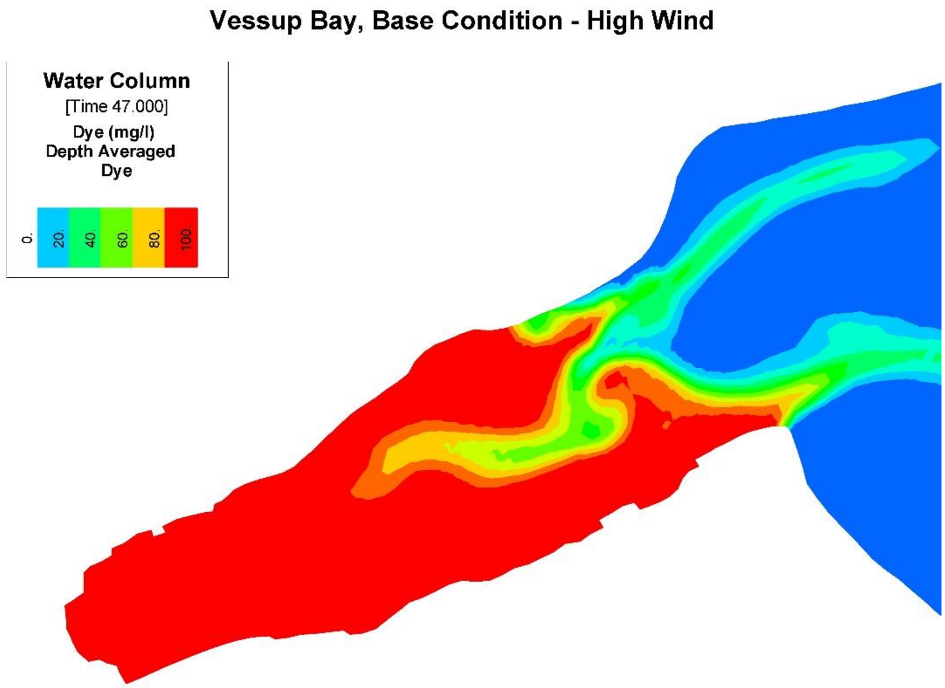


Figure 4-5a. Base and Design Vertically Averaged Dye Concentrations for High Wind Simulation (Day 0)



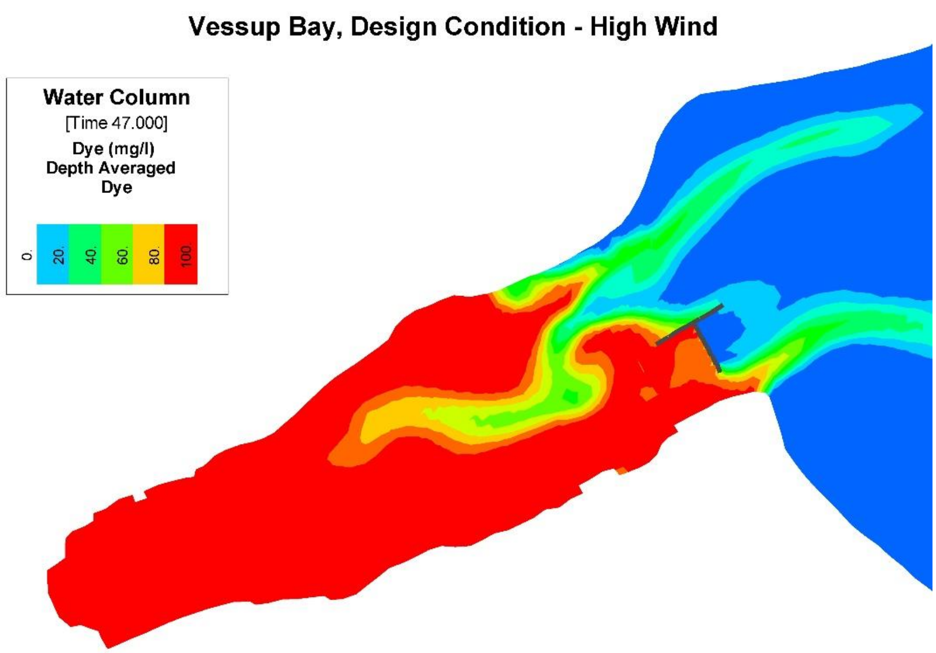
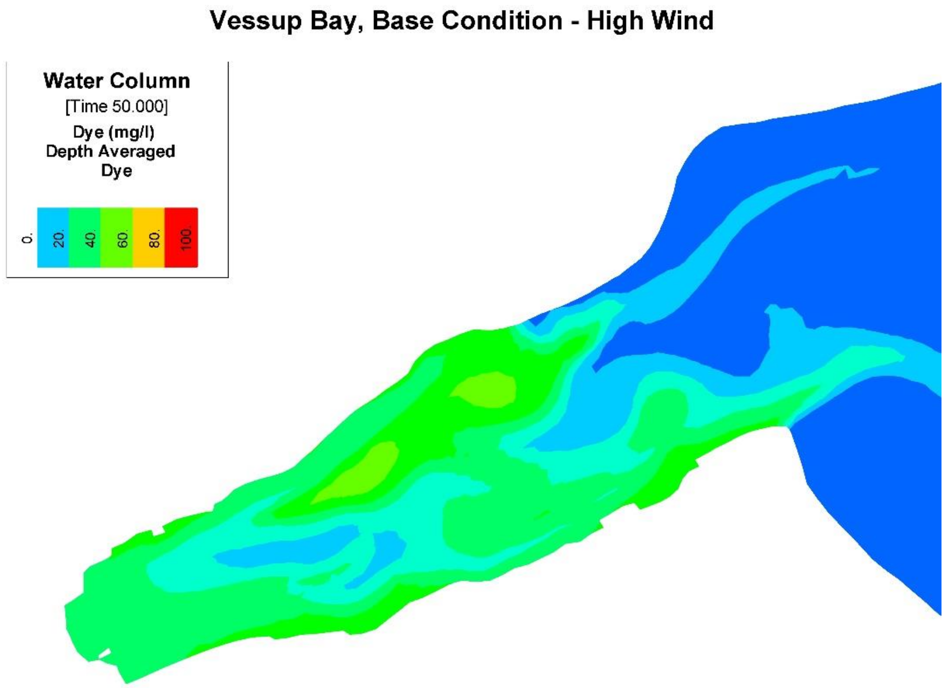


Figure 4-5b. Base and Design Vertically Averaged Dye Concentrations for High Wind Simulation (Day 1)



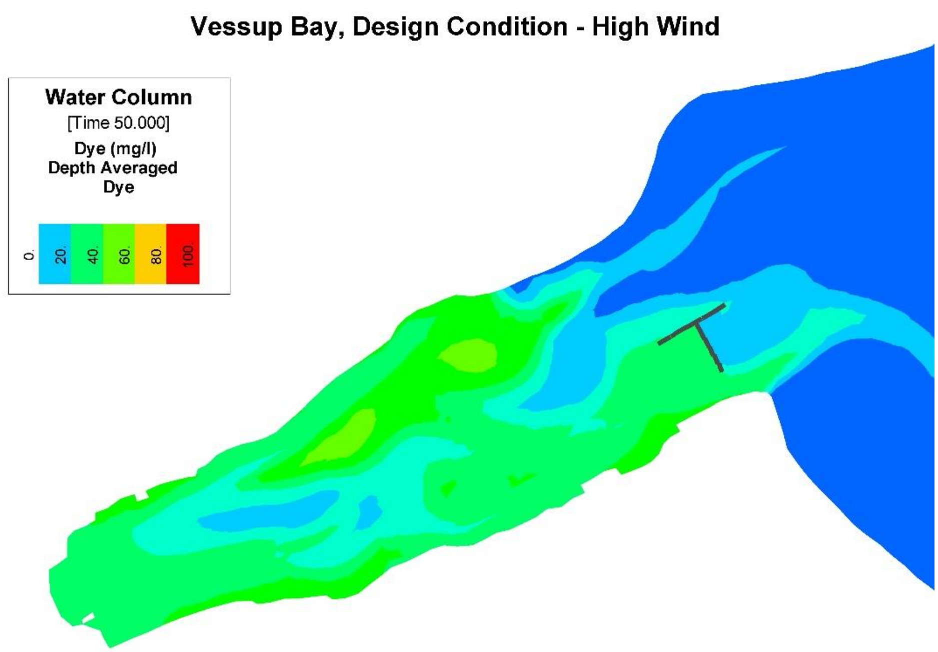


Figure 4-5c. Base and Design Vertically Averaged Dye Concentrations for High Wind Simulation (Day 4)

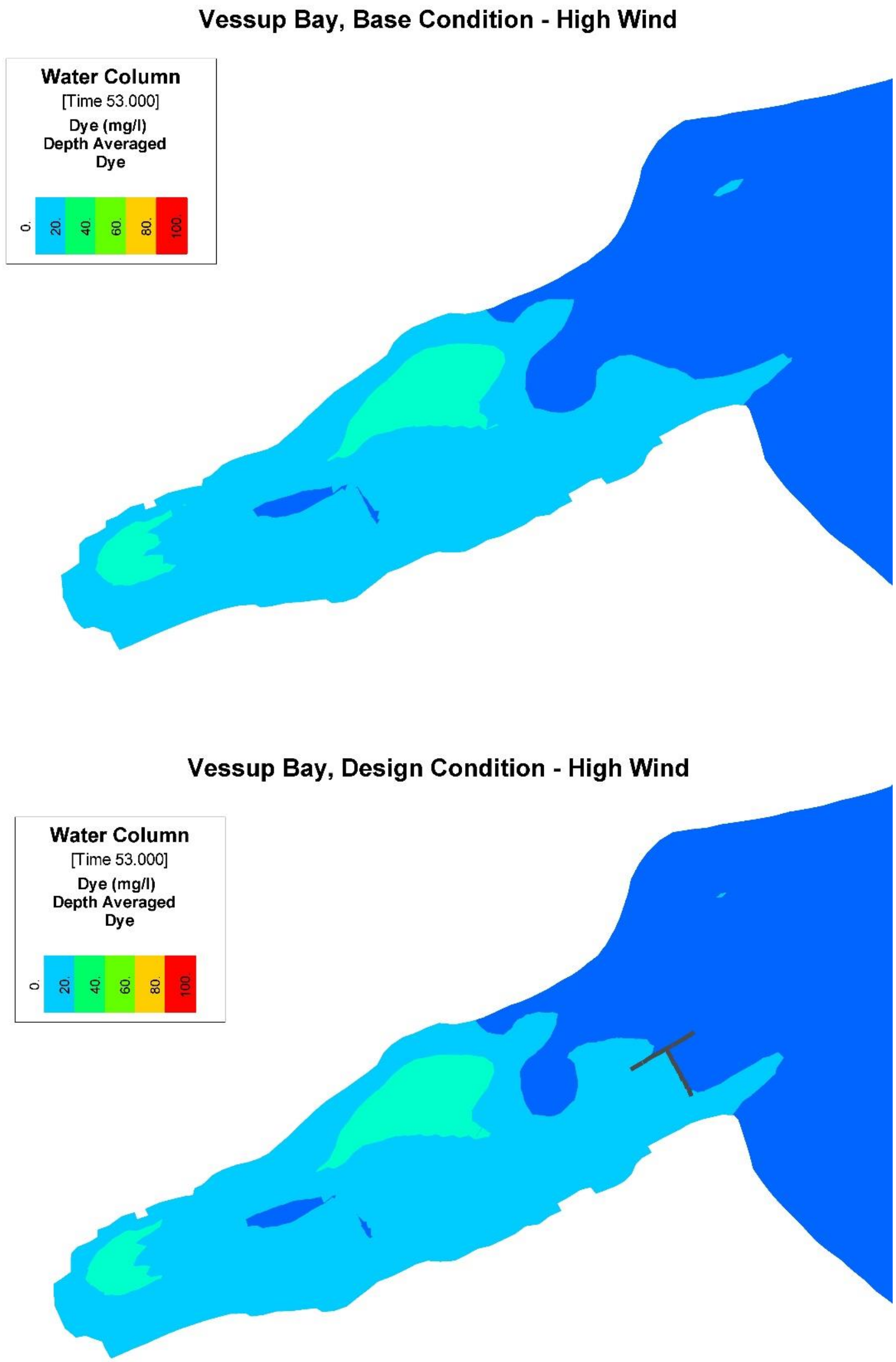
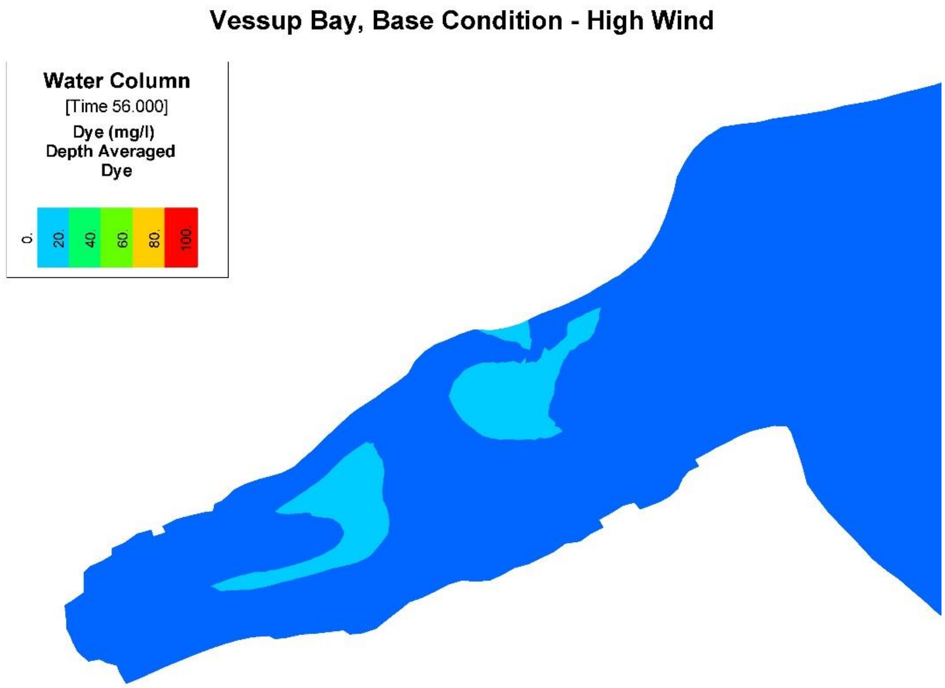


Figure 4-5d. Base and Design Vertically Averaged Dye Concentrations for High Wind Simulation (Day 7)



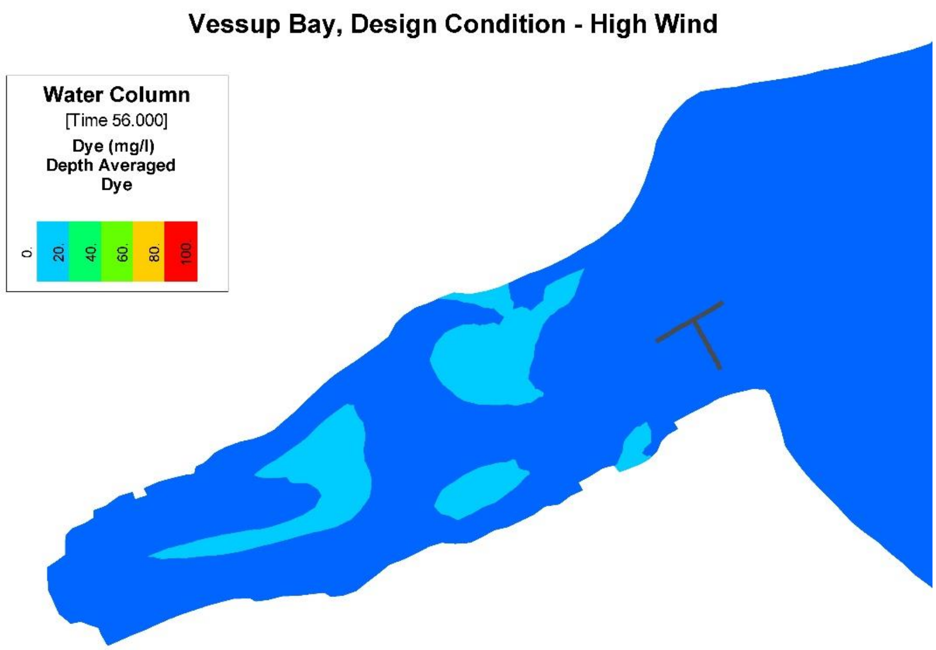


Figure 4-5e. Base and Design Vertically Averaged Dye Concentrations for High Wind Simulation (Day 10)

Examination of the plots shows a number of aspects. First, the patterns of the movement of the dye exchanging into and out of the system reflect the findings from the field observations with the general pattern of movement into the bay through the middle and out of the bay along the edges. This is also the case with the design wave protection structure in place. Second, the degree of flushing in the system is a function of the wind conditions, with the highest level of flushing occurring during the higher wind conditions and the overall level of flushing decreasing as the lower winds are used in the simulations.

The most significant finding from the results is that the inclusion of the wave protection structure, under the proposed design condition with the 70-foot gap, does not significantly impact the overall flushing of the bay. While the snapshot plots show some trapping that occurs in the area of the structure and its influence is clearly seen in the local dye patterns in the immediate vicinity, the overall levels of exchange are not altered in a significant way. The time series plots for all the wind conditions show only minor differences, with the overall percent mass remaining at the end of the 10-day periods nearly identical for all wind conditions.

4.4 Findings

Based on the simulations presented in Section 4.2, no significant differences were found in the degrees of flushing within Vessup Bay between the base simulations and the simulations with the wave barrier in place (design condition with 70 foot gap). This was the case for all three wind conditions simulated. Based on this, it is determined that the installation of the wave protection structure in the design condition will not impact the present level of flushing within Vessup Bay.

5.0 References

National Oceanic and Atmospheric Administration (NOAA). 2020a. Accessed April 9, 2020 at National Data Buoy Center (NDBC) https://www.ndbc.noaa.gov/station_history.php?station=chav3.

National Oceanic and Atmospheric Administration (NOAA). 2020b. NOAA Tides & Currents, Accessed April 9, 2020 at https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=9751540.

United States Environmental Protection Agency (EPA). 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, accessed April 8, 2020 at https://www.epa.gov/nps/guidance-specifying-management-measures-sources-nonpoint-pollution-coastal-waters.

APPENDIX D

WATER QUALITY MONITORING AND SEA TURTLE PROTECTION PLAN

FOR THE
LATITUDE 18 VESSUP BAY MARINA
ST. THOMAS, U.S. VIRGIN ISLANDS

INTRODUCTION

Jack Rock B-AC LLC and Redhook Hayes B Rem LLC purchased parcels 9C and 9B-Consolidated, Estate Nazareth with the intention of developing a World Class Marina with an upland mixed use commercial development. Parcels 9-C and 9B-Consolidated comprises a total of 17.83 acres. The entire area is zoned W-1-Waterfront Pleasure. The Proposed Development is permitted by the Virgin Islands Code as a matter of right. The project site contains a peninsula that forms the southern entrance to Red Hook Bay. That peninsula is a rocky abutment that extends to the National Park Service property on the East side and abuts the Vessup Beach area to the south.

The project area was the site of the Latitude 18 Marina. This Marina has been through significant damages as a result of the Hurricanes over the past 25 years, specifically Hurricane Marilyn in 1995 and Hurricanes Irma and Maria in 2017. The original Marina was never fully restored after Hurricane Marilyn in 1995. The viability of the property as a Marina has continually diminished over time, finally closing from damages as a result of the 2017 Hurricanes. The Development Plan intends to take advantage of this unique promontory at the entrance to Red Hook Bay. The Development Plan is supported by environmental studies that is basis for the location and development of upland, shoreline and overwater structures. The inclusion of a wave attenuator in the Marina Development Plan is intended to create calmer water under operational conditions. The Marina dock layout encompasses the area occupied by the previous Marina. The upland Development Plan includes significant area reserved for natural drainage courses and preserved vegetation to address endangered species such the Tree Boa. A total of 45% of the lot areas are devoted to undisturbed vegetation, drainage areas, and landscaping.

The overall Development Plan includes a Managed Mooring Field that will have approximately 14 buoys in Vessup Bay and 70 buoys in Muller Bay. Pump Out Facilities and showers will be available for the clients that lease moorings in the Mooring Field. Managed mooring fields throughout the United States are amongst the means to have proper anchorage for moored vessels and proper environment management within the Bay through the on-land Pump Out Facilities. This mooring Field will be an example of sound environmental practices in the Bay.

Figure 1. Project Location

PROJECT SETTING

The subject parcels are within the Vessup Bay/ East End Red Hook Area of Particular Concern (APC) (Figure 2). The Vessup Bay/Red Hook APC is located on the eastern end of St. Thomas and includes Nazareth, Muller, Vessup, Red Hook, Great Bay, Cowpet Bay, Cabrita, Beck and Water Point, Great St. James, Little St, James, and Dog Island.

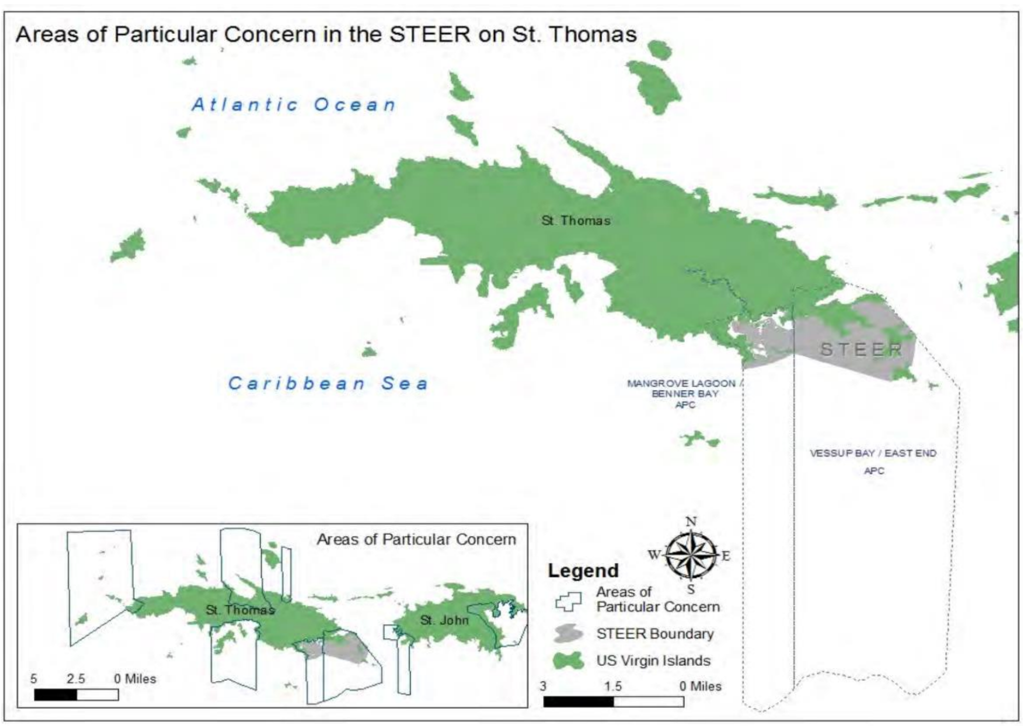


Figure 2. Areas of Particular Concern (STEER (2011) St. Thomas East End Reserve Management Plan. St. Thomas, USVI.

The Latitude 18 marina has been developed since the 1980s. The docks were severely damaged by hurricane Hugo (1979), were repaired, and then were damaged again by hurricane Marilyn (1995), and only a portion would be rebuilt (CZT-7-95W). The marina was completely destroyed by hurricanes Irma and Maria 2017.

At one time dense seagrass, *Thalassia testudinum* was found in the eastern portion of the marina, however over time it has become less abundant, and the area is now fully mixed with the invasive seavine *Halophila stipulacea*. In early 2000 there was a *Dendrogyra cylindrus*, a coral which is now listed on the endangered species list, found on the riprap which rap around the point at the northeastern end of the property. Surveys in 2008 did not find this coral and no other ESA corals have been found on the shoreline revetment since that time. The piles and the shoreline revetment which faces north and is in Vessup Bay proper, is degraded habitat with significant algal colonization. These hard structures would not be considered critical habitat due to the amount of algal colonization. A few *Siderastrea spp*. and *Psuedodiploria spp.* are found in this area.

The riprap revetment which extends around the point into Muller Bay enjoys much better water quality and can be considered critical habitat. No construction is proposed for this area. There are scattered corals on the hardbottom although many of the corals were damaged due to a sailboat grounding on the riprap. The sailboat is still aground against the riprap.

There are emergent hard bottom areas to the east in Muller Bay, and there is sparse coral colonization on the emergent rock including *Orbicella faveolata* and *O. annularis* ESA listed coral species. The coral colonization increases to the east, and corals become abundant to the east of the proposed Managed Mooring Field. Each mooring location proposed has been surveyed and positioned to avoid hard bottom impact and impact to corals. Two buoy locations originally planned were removed from the proposed plan due to potential impacts on corals, while three remain in an area generally classified as hardbottom habitat but will not impact corals or hardbottom as they have been located in sand pockets. All lines and tackle will be floated so as not to damage the seafloor or the corals.

While the invasive seavine is found through Vessup, Muller and Red Hook Bay, there are still expanses of *Thalassia testudinum* and *Syringodium filiforme*. These sea grass beds are damaged by existing mooring practices, anchoring, dragging lines and debris.

The managed mooring field should help to alleviate these impacts and should facilitate recolonization by these species.

The area is known habitat to protected sea turtles and marine mammals and as such NOAA’s Sea Turtle and Smalltooth Sawfish Construction Conditions will be followed as well as NOAA’s Vessel Strike Avoidance Measures and Reporting for Mariners during the construction of the dock and installation of the moorings.

While most of the site has gentle gradients, the existing paved roadway onto the site has excessive slopes that should be taken into considered from a construction standpoint. Access to the site will be carefully planned to allow for construction activities to occur with minimal disruption to the local roadways and neighboring properties.

Vessup Bay and Muller Bay are directly downstream of the proposed construction site. Erosion control BMP's will be implemented to ensure the turbidity remains under the acceptable levels throughout construction. Also, constant attention will be required to ensure that erosion control measures are in place and maintained to protect the water quality of the bay below.

The offshore waters are classified as Class B and the best usage of the water is listed as the propagation of desirable species of marine life and for primary contact recreation (swimming, water skiing, etc.). The quality criteria include dissolved oxygen not less than 5.5mg/l from other than natural conditions. The pH must not vary by more than 0.1 pH unit from ambient; at no time, shall the pH be less than 7.0 or greater than 8.3. Bacteria (fecal coliform) cannot exceed 70 per ml, and turbidity should not exceed a maximum nephelometric turbidity unit of three (3) NTU.

Water sampling has occurred on the site over the last several of years in order to establish a baseline of water quality conditions. Samples were taken with a calibrated YSI EXO multi-meter and were taken at a depth of 1 meter. The samples from 2019 and the beginning of 2020 were focused within the marina. As the idea of a managed mooring field was considered additional sampling locations were added (Table 1). Samples were also taken during the current study which are provided in Table 2. The map below shows the location of the samples.

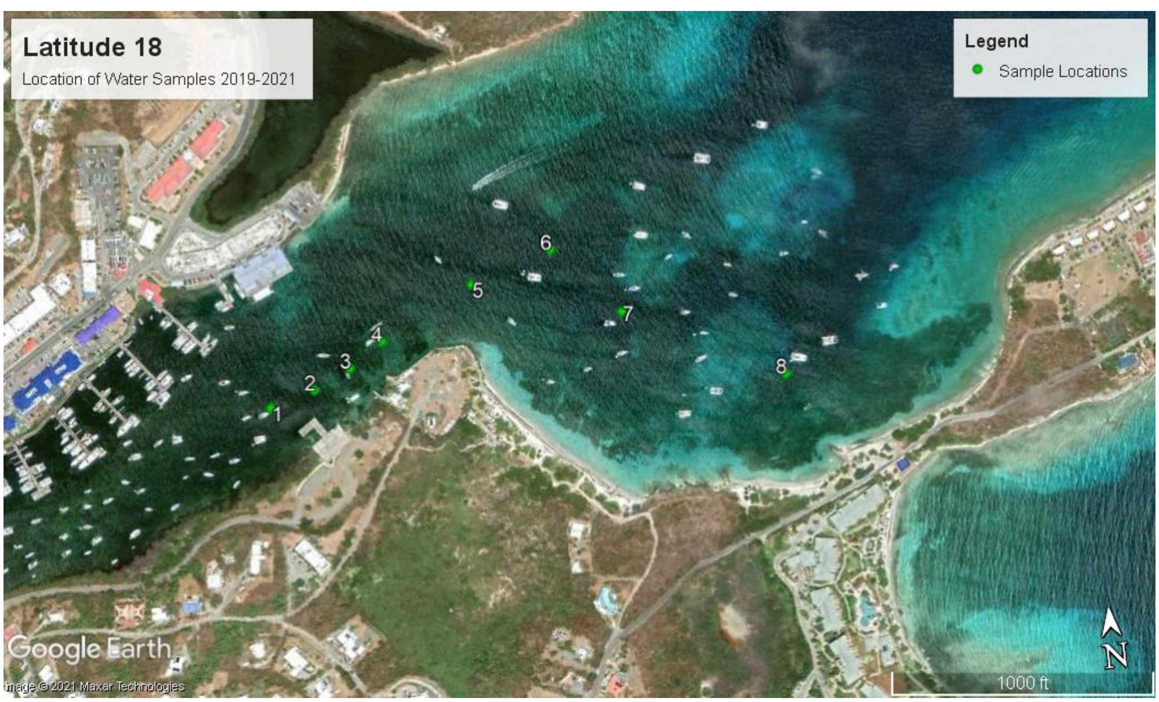


Figure 3 Location of samples taken between 2019 and 2021

		Turbidity NTU														
Station	Location	5/13/2019	6/15/2019	8/22/2019	9/19/2019	10/22/2019	12/5/2019	3/17/2020	5/15/2020	8/20/2020	11/1/2020	12/3/2020	1/14/2021	2/20/2021	3/17/2021	4/19/2021
1	18.324763°-64.849718°	2.11	3.26	5.6	2.99	1.77	2.16	2.76	6.78	3.32	0.98	1.23	2.09	1.12	2.14	0.78
2	18.324904°-64.849217°	1.12	0.87	2.13	1.23	1.18	1.43	1.09	2.76	2.14	0.47	0.98	1.34	0.87	1.16	0.87
3	18.325089°-64.848813°	1.08	0.67	1.78	1.01	0.97	0.88	1.25	2.34	2.03	0.46	0.99	0.86	0.78	1.43	0.67
4	18.325330°-64.848435°	0.86	0.56	2.08	0.94	0.89	1.1	0.98	0.88	2.09	0.68	1.02	0.67	0.78	1.34	0.87
5	18.325815°-64.847384°	0.82	0.65	1.59	0.96	1.11	0.92	0.65	0.67	1.34	0.73	0.78	0.56	0.67	85	0.81
6	18.326089°-64.846486°												0.77	0.62	0.54	0.76
7	18.325368°-64.845776°												0.81	0.31	0.56	0.81
8	18.324541°-64.844065°												0.65	0.78	0.45	0.51
		Dissolve Oxygen mg/l														
Station	Location	5/13/2019	6/15/2019	8/22/2019	9/19/2019	10/22/2019	12/5/2019	3/17/2020	5/15/2020	8/20/2020	11/1/2020	12/3/2020	1/14/2021	2/20/2021	3/17/2021	4/19/2021
1	18.324763°-64.849718°	4.66	3.31	4.13	5.12	3.54	4.41	5.11	4.98	4.63	5.56	5.37	4.61	3.21	4.11	4.89
2	18.324904°-64.849217°	6.49	5.26	5.26	4.63	6.43	6.66	6.38	6.18	5.99	6.09	6.06	6.06	4.79	3.60	5.18
3	18.325089°-64.848813°	6.46	6.06	6.06	4.56	6.45	6.70	6.29	6.05	6.11	6.21	6.32	6.32	2.32	5.46	5.97
4	18.325330°-64.848435°	4.31	6.32	6.32	5.33	5.67	5.20	6.55	6.00	6.12	6.19	6.85	6.85	6.59	4.84	5.74
5	18.325815°-64.847384°	4.10	6.85	6.85	5.26	5.78	5.29	6.51	5.86	6.14	6.06	6.45	7.11	6.72	4.58	5.68
6	18.326089°-64.846486°												6.11	6.21	6.12	5.78
7	18.325368°-64.845776°												6.04	6.09	6.23	6.01
8	18.324541°-64.844065°												5.99	6.07	6.00	6.03
		pH														
Station	Location	5/13/2019	6/15/2019	8/22/2019	9/19/2019	10/22/2019	12/5/2019	3/17/2020	5/15/2020	8/20/2020	11/1/2020	12/3/2020	1/14/2021	2/20/2021	3/17/2021	4/19/2021
1	18.324763°-64.849718°	8.34	8.20	8.39	8.31	8.38	8.37	8.11	8.37	8.33	8.40	8.38	8.36	8.33	8.29	8.37
2	18.324904°-64.849217°	8.20	8.33	8.39	8.31	8.35	8.40	8.29	8.34	8.31	8.36	8.38	8.31	8.31	8.26	8.37
3	18.325089°-64.848813°	8.39	8.34	8.30	8.35	8.35	8.37	8.26	8.33	8.34	8.31	8.38	8.33	8.34	8.23	8.40
4	18.325330°-64.848435°	8.38	8.33	8.30	8.35	8.28	8.40	8.23	8.25	8.38	8.33	8.40	8.33	8.38	8.33	8.37
5	18.325815°-64.847384°	8.25	8.33	8.40	8.38	8.26	8.40	8.33	8.25	8.40	8.33	8.37	8.38	8.40	8.37	8.40
6	18.326089°-64.846486°												8.38	8.40	8.34	8.40
7	18.325368°-64.845776°												8.38	8.36	8.33	8.11
8	18.324541°-64.844065°												8.40	8.31	8.25	8.29

Table 1. Water samples taken in the vicinity of the dock and mooring field between 2019 and 2021.

Location	Date	Turbidity	Dissolve Oxygen
18.324225°-64.837556°	8/15/2020	0.91 NTU	6.21mg/l
18.324225°-64.837556°	9/5/2020	0.76 NTU	5.99mg/l
18.324225°-64.837556°	9/12/2020	0.49 NTU	6.18mg/l
18.324225°-64.837556°	10/1/2020	0.68 NTU	6.32mg/l
18.324225°-64.837556°	11/3/2020	0.71 NTU	6.43mg/l
18.324225°-64.837556°	11/22/2020	0.47 NTU	6.17mg/l

Table 2 Water samples taken in dock footprint in 2020.

Existing conditions

Existing water quality in Vessup Bay is poor and it is listed as Impaired Waters under CWA Section 303(d).

Water exchange is very weak and highly dependent on wind conditions to force circulation and improve mixing, as tidal flows are extremely low.

Based on the calibrated circulation model implemented by ATM for Vessup Bay, water exchange under average wind conditions is less than 75% in 10 days. Exchange improves to 90% in 9 days for the high wind conditions but decreases to 40% in 10 days for low wind conditions.

In addition to poor circulation, Vessup Bay receives pollutant discharges, including a public WWTP and has no enforceable management of discharges by many of the boats anchored in the bay.

Water circulation improves in Mueller Bay due to increased mixing and better circulation given the larger water body and positive influence of wind-driven mixing.

The marina location in Vessup point is in the transition between the poorly flushed Vessup Bay and the better-mixed waters of Muller Bay.

The change in water quality is visible in the data collected overtime across the site. Turbidities are higher farther into Vessup Bay and dissolved oxygen is lower. Water quality shifts across the site with the changing tides.

POTENTIAL IMPACTS

During construction, the seafloor will be disturbed through the cleanup of debris, removal of existing pilings, and then by the dredging, de-watering and pile driving. This water quality plan will be implemented monitor control devices, and water quality and to ensure control features remain in good repair and that additional measures are added or implemented as necessary to maintain ambient water quality.

If properly executed there should be minimal impact to marine water quality.

A specific flushing study was conducted to determine the project design that will cause no negative impact to circulation in Vessup Bay. In addition to showing no negative impact, the proposed mooring field management includes the installation of a sewage pump out station and the enforcement of no-discharge requirements within the mooring field, which should improve water quality in Vessup Bay.

In any marine construction the potential for negative impacts to marine life and degradation of water quality exist**.** When sediments are suspended in the water column through dredging or deposition of fill, these suspended sediments add to the turbidity of the water. The lowering of the transparency of seawater can greatly affect sessile marine organisms that rely on the transmission of the light for their existence. Settling sediments can also smother coral colonies and prevent larval sediment of reef organisms. There are coral colonized hardbottom areas and seagrass beds close to the area which contain federally listed threatened species. Through careful planning and monitoring, such potential impacts can be minimized and abated. The purpose of this monitoring plan is to ensure that impacts are minimized to the greatest extent possible.

Best Management Practices

In order to ensure that water quality is maintained this water quality monitoring program will be implemented during all in-water work pile driving, pre-drilling, filling and concrete pours. This plan will monitor turbidity and look at the effectiveness of the sedimentation control. If any degradation of water quality is detected immediate measures will be taken to abate the impacts.

Proper length (1 ft. from seafloor) turbidity barriers will be installed around all area of in-water. A double set of curtains will be installed if necessary, with a minimum of 2 meters between them. The curtains will be attached to the bulkhead and held offshore by carefully placed traditional anchors or screw anchors. Divers will assist in the placement of all anchors to minimize impact. The curtains will be monitored on a daily basis and if at any time deficiencies or damage is noted it will be repaired immediately. A small work boat will be kept at the bulkhead so the curtains can be serviced quickly in the event of need.

On land silt fencing will be placed around all areas of earth disturbance to prevent sediment laden runoff from being carried into the sea. Silt fencing will be monitored on a daily basis and repair when and if damage or deficiencies are noted.

WATER QUALITY MONITORING

Monitoring Plan Design

The monitoring plan has been designed to help ensure that existing water quality is maintained and not degraded by the renovation of the marina. The plan has been designed to address all potential construction activities which effect water quality or create bottom disturbances which will in turn affect water quality.

Monitoring Objectives

The objective of the monitoring plan is the ensure that turbidity control is properly implemented and to assess where the implemented methods are effectively controlling water quality. If the implemented control is not adequately controlling turbidity, the monitor plan lays out additional steps that will b pie taken to minimize water quality degradation.

Monitoring Parameters

The proposed bulkhead reconstruction has the potential to impact water quality through the suspension of bottom sediments during dredging and dewatering, pile driving, offshore vessel movement, and anchoring or spudding, and installation of moorings. The project has the potential to impact water quality through de-watering, filling, and concrete pouring. These activities will affect the turbidity within the water column. Therefore, turbidity and water clarity are the parameters which will potentially be affected and will be monitored throughout construction of the project. Total suspended solid may also be impacted however this parameter requires laboratory analysis and cannot provide real-time monitoring. Turbidity will be measured with an EPA approved calibrated field nephelometer as Nephelometric Turbidity Units (NTU). Secchi disc readings will also be made as a measurement of water clarity.

Monitoring Sites

Water quality samples will be taken 5m outside the turbidity barriers immediately offshore of where the current work is ongoing. Three sites will be taken approximately 10m apart with the central point immediately off of the area of work. The monitor will also take samples in any plume that is noted coming through the turbidity barriers. The monitoring samples will be placed in the areas most likely to be impacted by the project. Control sites will be established in areas which should be exposed by the same ambient conditions but should not be impacted by the project's activities. Two control sites will be established one to the east and one to the west. These will be taken at Stations 1 and 8 shown in Figure 3.

Samples will be taken 1 meter below the surface and will be analyzed by either a Hach 2100 Turbidity meter or a YSI Multi-meter or other equivalent approved EPA meter. The meter must be calibrated daily prior to sampling.

A baseline of water quality conditions has been established of water quality conditions at the site prior to any work, eight samples were taken evenly spread along the length to the project area (Figure 3). This data will be used to compare with construction water quality.

During Construction

During construction sampling will occur a minimum of twice a day with samples spaced at least 4 hours apart. The monitor will also sample anytime a plume is noted escaping the turbidity barriers. During construction sampling will occur anytime in-water work is being undertaken, during all pile driving, all framing, dredging, all de-watering, all filling and all concrete pours. Weather and sea conditions will be recorded for each sampling time. The data from the baselineused to compare with data collected during the construction project to help assess whether readings are a result of the construction project or are due to ambient conditions.

As per the Virgin Islands Code, visual depth visibility readings (Secchi disk measurements) should not fall below 1 meter and turbidity may not exceed 3 NTU in Class C waters which is what the harbor is designated as.

All results will be recorded on field sheets. Wind speed and direction, wave height and direction, and rainfall will be recorded on the field at the time of sampling. GPS of the sampling points will be included on the field sheets. The monitor will take pictures as necessary as apart of the monitoring to document activities at the site and to document any incidents which may occur.

Turbidity Control

During all in-water work, which includes, pile driving, dredging, filling, framing and concrete pouring, a set of proper length (1ft from seafloor) turbidity barriers must be installed. The curtains must be maintained throughout all work. The contractor must have additional barriers so that they are available for deployment if the barriers become damage or if additional barriers are necessary to control turbidity. Silt fencing must be properly installed in all areas of upland soil disturbance and maintained until such time that the area has become revegetated or paved.

CORRECTIVE ACTIONS

During construction if the water samples show NTU readings in excess of the allowable limits and if it is determined that the elevated turbidity is the result of the project, the source of the problem will be identified, and methods worked out to reduce the turbidity. If elevated readings are encountered the construction will stop and any deficiencies in the deployed turbidity controls will need to be corrected. Work may resume once turbidity has fallen to allowable levels. If there are no deficiencies in the deployed turbidity control, additional curtains will need to be deployed around the area of work. If additional barriers are not effective the work may need to be slowed (ie – dewatering or fill behind the bulkhead slowed, dredging slowed, etc.) In-water work will have to stop until turbidities reach allowable levels before resuming. If the additional measures cannot be deployed which are adequate to control turbidity, then work will have to be shut down every time readings become elevated over acceptable ranges and will only be able to resume once they have fallen back into acceptable ranges.

REPORTING

Elevated Readings

During construction if the water samples show NTU readings in excess of the allowable limits, DPNR, DEP, NPS, COE and NMFS will be notified by email. The baseline samples will be utilized to determine if an increase in turbidity or suspended solids is a result of natural phenomena or if the monitoring sample is elevated above the ambient background as a result of the project. If it is determined that the elevated turbidity is the result of the project, the source of the problem will be identified, and methods worked out to reduce the turbidity. The construction contractor must always have someone at the construction site who has the authority to implement sediment control devices, so that the monitor can work with them to stop construction and implement additional turbidity control.,

If elevated readings are encountered the construction will stop and if any deficiencies in the deployed turbidity controls are encountered, they will need to be corrected. Work may resume once turbidity has fallen to allowable levels. If there are no deficiencies in the deployed turbidity control, additional curtains will need to be deployed or work may need to be slowed. In-water work will have to stop until turbidities reach allowable levels before resuming. If the additional measures cannot be deployed which are adequate to control turbidity, then work will have to be shut down every time readings become elevated over acceptable ranges and will only be able to resume once they have fallen back into acceptable ranges.

Weekly Reports

A weekly report will be provided to DPNR, DEP, NPS, COE and NMFS by email detailing the week's events and the results of all monitoring activities. The reports will include a summary of all actions taken and the results of those actions. The reports will include photographs of the activities which were undertaken during the week as well as photographs of any incidents which occurred.

SEA TURTLE AND MARINE MAMMAL PROTECTION PLAN

INCLUDING ACOUSTIC IMPACTS DURING PILE DRIVING ACTIVITIES

The project proposes a maximum of 286 concrete piles to be utilized. The piles' geometry may vary depending on the final project design details and geotechnical conditions. The pile diameter will be a maximum of 24 inches. Concrete piles will be required to be driven using an impact hammer and may be set in position via jetting to assist the driving. The maximum number of concrete piles to be driven with an impact hammer per day is 5. It may take approximately 60 days to install the piles.

All work will occur during daylight hours only and be conducted from land-based or barge-mounted equipment. All construction personnel will be responsible for observing water-related activities to detect the presence of protected species and avoid them. Turbidity curtains will be deployed, as required, during in-water work to minimize potential temporary impacts on local water quality.

Methods to Protect Sea Turtles and Marine Mammals

The following measures will be implemented to minimize impacts to protected species of sea turtles, and marine mammals.

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS (*smalltooth sawfish do not occur in USVI waters)

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824- 5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

In order to avoid and minimize an injury or death to marine mammals and sea turtles the following NMFS measures form the Vessel Strike Avoidance Measures and Reporting for Mariners will be taken by all vessels associated with the project:

1. Vessel operators and crews should maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel should attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Esonification of the Water Column

Underwater sound in the marine environment is generated by a broad range of sources, both natural and human (anthropogenic). Open ocean ambient sound has been recorded between 74 and 100 dB off the coast of central California (Heathershaw et al. 2001). Ambient noise levels for other water bodies based on surveys generally follows in this range. Based on deep-water studies in the Northeastern Pacific, low-frequency background sound has doubled each decade for the past forty years as a result of increased commercial shipping (Andrew et al. 2002, McDonald et al. 2006) resulting in a 15 to 20 dB increase in ambient conditions compared to preindustrial levels. Table 1 identifies ambient underwater sound levels at various open water and coastal water locations.

Environment	Location	Ambient Noise Levels (dB_{PEAK} unless noted)	Source
Open ocean	Central coast, CA	74 – 100	Heathershaw et al. 2001
Open ocean	Beaufort Sea, AK	80 – 83	Roth 2012
Coastal water	Prudoe Bay, AK	80 – 87	Roth et al. 2012
Marine surf	Fort Ord Beach, CA	138	Wilson et al. 1997
Large marine bay, heavy industrial use, and boat traffic	San Francisco Bay, CA	120 – 155 or 133 dB_{RMS}	Strategic Environmental Consulting, Inc. 2004
Large marine bay, heavy commercial boat traffic	Elliot Bay, WA	147 – 156 or 132 – 143_{RMS}	Laughlin 2006
Large marine bay, nearshore, heavy commercial, recreational boat traffic	Monterey Bay, CA	113	O'Neil 1998

Table 1: Ambient Noise Levels (RMS refers to rate-mean-square)

US Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS), have developed threshold values, values that elicit some response from a target species, for making effect determinations for Endangered Species Act (ESA) listed species as follows:

- Detectability threshold (where the noise is detectable, but reactions are not observable).
- Alert and disturbance threshold (alert is where the noise has been identified by the target species, interest is shown; disturbance is where the target species shows avoidance of the noise by hiding, moving, or postponing feeding).
- Harassment/injury threshold (where the target species is actually injured).

NMFS's current thresholds for impulse noises (ex. impact pile driving or in our case rock breaking) and non-impulse noises (ex. vibratory pile driving, dredging, etc.) for marine mammals are listed in the table below.

Criterion	Criterion Definition	Threshold
Level A	PTS (injury) conservatively based on TTS	190 dB_{rms} for pinnipeds 180 dB_{rms} for cetaceans
Level B	Behavioral disruption for impulsive noise (e.g., impact pile driving)	160 dB_{rms}
Level B	Behavioral disruption for non-pulse noise (e.g., vibratory pile driving, drilling)	120* dB_{rms}

All decibels referenced to 1 micro Pascal (re: 1μPa). Note all thresholds are based off root mean square (rms) levels.
* The 120 dB threshold may be slightly adjusted if background noise levels are at or above this level.

Based on recommendations of the Fisheries Hydroacoustic Work Group (FHWG) in June of 2008, the current sound thresholds from impulse noises (such as pile driving) that cause injury to fish are:

- 206 dBPEAK
- 187 dB cSELfor fish > 2 grams
- 183 dB cSEL for fish < 2 grams

The threshold for behavioral impacts for all fish is 150 dBRMS (FHWG 2008).

Cumulative SEL (cSEL): the energy accumulated over multiple strikes or continuous vibration over a period of time; the cSEL value is not a measure of the instantaneous or maximum noise.

The following measures will be implemented to minimize impacts to protected species of sea turtles, and marine mammal.

When a pile driving (impact) hammer strikes a pile, a pulse is created that propagates through the pile and radiates sound into the water, the ground substrate, and the air. Sound pressure pulse as a function of time is referred to as the waveform. In terms of acoustics, these sounds are described by the peak pressure, the root-mean-square pressure (RMS), and the sound exposure level (SEL).

Transmission Loss Calculations and NMFS Disturbance and Injury Thresholds

Type of Equipment	Peak sound level at 10 m (dB/1 μPa)	In-water sound level (RMS) at 10 m (dB/1 μPa)	Sound exposure level (SEL) at 10 m (dB/1 μPa ^{2}·s)	Distance to 150 dB sSEL fish injury threshold*	Distance to 150 dB RMS fish disturbance threshold*
Vibratory Hammer; 50-inch wide steel sheet pile	175	160	160	54 meters (177 feet)	80 meters (262 feet)

*Values for distances to fish injury and disturbance thresholds are based on use of impact hammer with nylon cushion blocks

The esonification could impact could result in behavioral disruption to sea turtles and marine mammals therefore a 500m safety zone shall be established around the outer limits of the project area for sea turtles and marine mammals. Trained observers will be used to visually monitor the safety zone for at least 30 minutes prior to beginning all noise creating in-water activities (pile driving). Buoys will be set at the edge of the safety zone as a reference for the observer. The observers will position them self in a position where the entire zone can be seen and will utilized binoculars to assist in the spotting of animals. The area must be clear for 30 minutes prior to any noise producing work commencing.

If at any time a sea turtle or marine mammal is observed in the safety zone the operation will be shut down until the animal has left the safety zone of its own volition.

Observations for protected species will occur at least twice a day during work to maintain watch for animals in the area. If at any time an animal is observed in the safety zone during the noise creating in-water activity, work shall cease until the animal has left the area of its own volition, or coordination with a DPNR representative has occurred, if the animal is injured.

Records will be maintained of all sea turtle and marine mammal sightings in the area, including date and time, weather conditions, species identification (if possible), approximate distance from the project area, direction and heading in relation to the project area, and behavioral observations. When animals are observed in the safety zone, additional information and corrective actions taken such as a shutdown of pile driving, duration of the shut-down, behavior of the animal, and time spent in the safety zone will be recorded. Reports will be provided to NPS, NMFS, COE, and CZM on a monthly basis.

References

Water Quality Standards for Waters of the Virgin Islands, Title 12, Chapter 7, Amendments to Subchapter 186, August 28, 2015 p26.

MITIGATION PLAN
FOR
LATITUDE 18 VESSUP BAY
MARINA AND MANAGED
MOORING FIELD
ST. THOMAS, U.S. VIRGIN ISLANDS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MAY 2021

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This plan follows the compensatory mitigation guidelines as set forth in 40 CFR Part 230, Compensatory Mitigation for Loses of Aquatic Resources: Final Rule. The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to the waters of the United States authorized by DA permits.

I. INTRODUCTION

The Marine Industry in the U.S. Virgin Islands has diminished over the past 30 years due to the emergence of other markets such as the British Virgin Islands and U.S. Coast Guard Requirements. The objective sought through this Application is to provide a World Class Marina with a complement of upland Food and Beverage Establishments, Retail and Support Facilities. This project will become a cornerstone in the Government of the U.S. Virgin Islands Marine Task Force Development. A further objective sought by this project is responsible Environmental Development through the preservation of Habitat for endangered species on the up-land development and the Managed Mooring Field that is proposed as a part of it. Managed mooring fields will include U.S. Coast Guard approved mooring balls, helix type anchors with floated lines, and requirements for sewage pump out stations that are a part of the Upland Development. These measures will have a significant improvement in the water quality in the Bay.

Marina

The proposed marine project is composed of docks and utilities, shoreline restoration and a managed mooring field.

The marina includes pile-supported fixed pier docks for the berthing of yachts. The marina will have 17 dedicated slips and 638 linear ft of alongside dockage, with a total capacity of 2,128 linear ft (approximately 26 vessels). The marina will provide permanent and transient berthing for a mix of vessels ranging from 60 to 200ft, with additional alongside berthing for smaller vessels.

The marina project lies in general location of a marina that was destroyed by previous storm events. The scope of work includes the removal of existing remaining structures, timber piles, sunken debris, and sunken vessels from the marina footprint.

The marina will have fuel service and fuel will provided by dispensers on the fuel dock, as well as in-slip fueling on the main docks slips.

The marina includes wave attenuation devices to provide comfort during operational conditions. A wave screen attached to the main fixed pier is proposed in areas that do not impede circulation flows. A floating wave attenuator is proposed to protect the marina slips facing Muller Bay and to reduce the need for wave screens.

Due to the elevation of the deck of the fixed piers, the docks which service smaller vessels, such as the fuel dock and smaller draft areas, will be provided with dock skirts to prevent small boats from going under the dock.

A new bulkhead will be built in front of the dilapidated existing bulkhead and rectifying the disturbed shoreline comprised of masonry irregular walls and a damaged pier structure, offering a stable water edge for access to the marina docks and marina operations. The seabed in the area adjacent to the new bulkhead will be excavated to achieve – 6.5ft MSL elevation, in order to provide safe draft for the intended operation.

Mooring Field

The mooring field includes 84 mooring buoys divided in two areas (14 in the Vessup Bay Mooring Field and 68 in the Muller Bay Mooring Field), over 96 LF of berthing on two floating docks for dinghies, and upland support facilities such as showers, restrooms, and solid waste collection bins. Vessels in the mooring field will have access to the pump out at the fuel dock and will be prohibited by their mooring lease contract to discharge sewage or other pollutants.

The mooring field area will be identified with new markers and additional navigation aids will be installed to better identify the navigation channels. The Port Authority was consulted to validate the navigation channel and location of navigation aids.

Proposed marina will maintain a high standard of operation, compatible with the vessel size and clientele expected. The marina operator will seek a Blue Flag, Clean Marina, or similar certification.

As part of its normal operation, the marina expects to:

- Establish and maintain a management plan that includes environmental management systems;
- Create and maintain an environmental policy that supports the implementation and updates of the environmental management plan;
- Display at the marina the code of conduct that reflects appropriate laws governing the use of the marina and surrounding areas;
- Display information relating to local eco-systems and the local environment;
- Provide marina and mooring lease agreements that include information about regulations, laws and permit conditions governing the use of the marina and its environmental management plan;
- Maintain the operation and promote the use of a sewage pump-out;
- Provide marina and mooring lease agreements that include the prohibition of discharge of sewage, bilge, oil or solid waste to the bay, as proper disposal procedures for fluid and solid waste will be available through the marina;
- Provide adequate and properly identified, segregated containers for the storage of waste oil and general solid waste;
- Provide adequate, clean, and well sign-posted sanitary facilities, including washing facilities are provided for the marina visitors and employees.
- Provide adequate and well signposted lifesaving, first-aid equipment, and fire-fighting equipment
- Prepare emergency plans in case of pollution, fire or other accidents as part of an Approved Spill Prevention Control and Countermeasure Plan. Post safety precautions and information at the marina.
- Provide electricity and water in all marina slips and in-slip fueling in selected marina berths;
- Provide accommodations for disabled people are in place.
- A map indicating the location of the different facilities is posted at the marina

The Latitude 18 marina has been developed since the 1980s. The docks were severely damaged by hurricane Hugo (1989), were repaired, and then were damaged again by hurricane Marilyn (1995), and only a portion would be rebuilt (CZT-7-95W). The marina was completely destroyed by hurricanes Irma and Maria 2017.

At one time dense seagrass, Thalassia testudinum was found in the eastern portion of the marina, however over time it has become less abundant, and the area is now fully mixed with the invasive seavine Halophila stipulacea. In early 2000 there was a *Dendrogyra cylindrus,* a coral which is now listed on the endangered species list, found on the riprap which rap around the point at the northeastern end of the property. Surveys in 2008 did not find this coral and no other ESA corals have been found on the shoreline revetment since that time. The piles and the shoreline revetment which faces north and is in Vessup Bay proper, is degraded habitat with significant algal colonization. These hard structures would not be considered critical habitat due to the amount of algal colonization. A few *Siderastrea spp*. and *Psuedodiploria spp*. are found in this area.

The riprap revetment which extends around the point into Muller Bay enjoys much better water quality and can be considered critical habitat. No construction is proposed for this area. There are scattered corals on this hardbottom although many of the corals were damaged due to a sailboat grounding on the riprap. The sailboat is still aground against the riprap.

There are emergent hard bottom areas to the east in Muller Bay, and there is sparse coral colonization on the emergent rock including *Orbicella faveolata* and *O. annularis* ESA listed coral species. The coral colonization increases to the east, and corals become abundant to the east of the proposed Managed Mooring Field and species such as *Acropora palmata, A. cervicornis, Dendrogyra cylindrus* and *Mycetophyllia ferox* are present, all ESA listed species. Each mooring location proposed has been surveyed and positioned to avoid hard bottom impact and impact to corals. Two buoy locations originally planned were removed from the proposed plan due to potential impacts on corals, while three remain in an area generally classified as hardbottom habitat but will not impact corals or hardbottom as they have been located in sand pockets. All lines and tackle will be floated so as not to damage the seafloor or the corals.

While the invasive seavine is found through Vessup, Muller and Red Hook Bay, there are still expanses of *Thalassia testudinum* and *Syringodium filiforme*. These sea grass beds are damaged by existing mooring practices, anchoring, dragging lines and debris.

The managed mooring field should help to alleviate these impacts and should facilitate recolonization by these species.

To minimize impacts the corals which are in the marina footprint which would be damaged by the dredging, demolition and construction will be transplanted to the hardbottom area to the east. To compensate for unavoidable impacts during construction, debris currently scattered throughout the proposed mooring field will be removed and properly disposed of at the Bovoni landfill.

II. OBJECTIVES

The objective of this mitigation plan is to minimize the impact of the marina and mooring field project and to compensate for unavoidable impacts.

III. SITE SELECTION

The intent is to transplant the 12 corals within the marina footprint to east to the large area of hardbottom. The area enjoys much better water quality than where the corals are currently located.

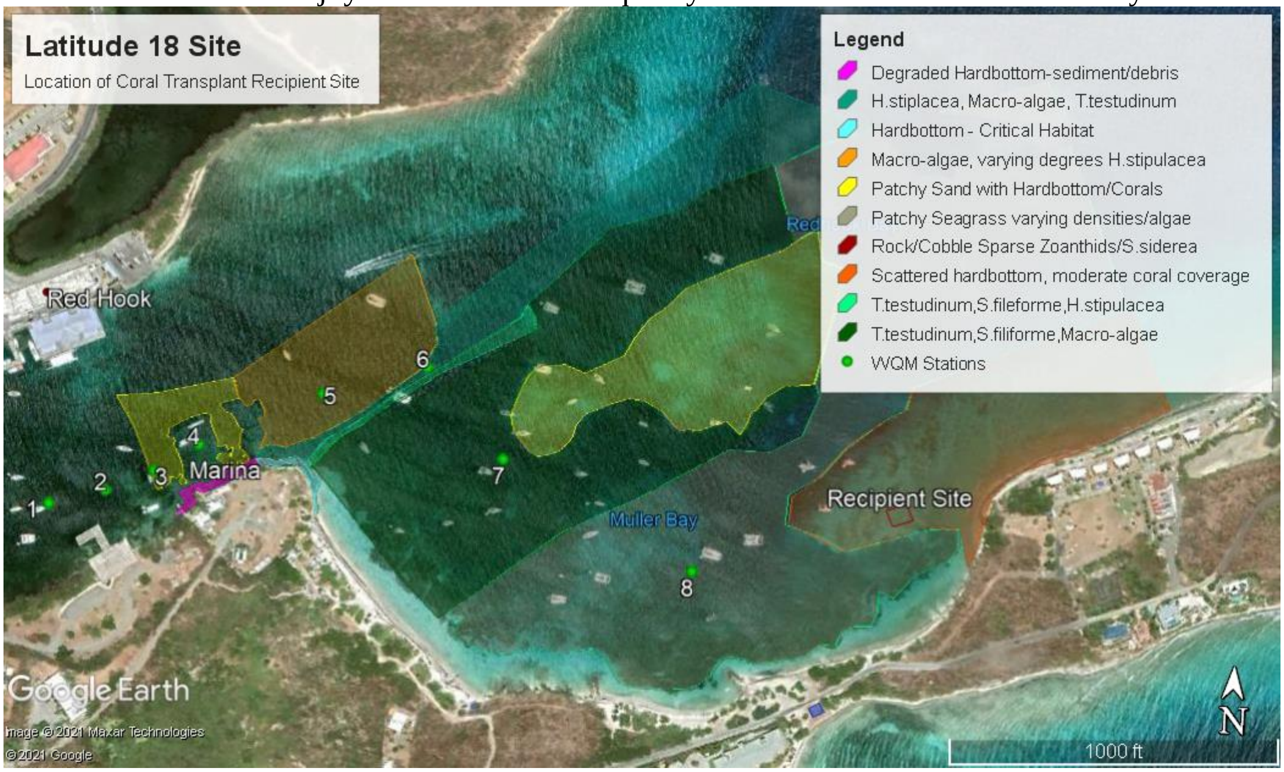


Figure 1. Location of transplant recipient site.

The recipient site is south of the proposed managed mooring field and is an area of broken pavement which enjoys excellent water quality. The corals will be planted at a similar depth from that they were taken from. The area has scattered *Pseudodiploria* and *Siderastrea.*

IV. SITE PROTECTION INSTRUMENT

In order to protect these beds two information buoys will be placed stating that the areas are mitigation site sand has shallow seagrass beds and coral reefs are within the area and no anchoring is allowed.

V. BASELINE INFORMATION

Benthic Habitat Description
General

The project site lies within Red Hook Bay at the intersection of Vessup and Mueller Bay, due to the differences of exposure, circulation and use the water quality to the north of the project site is extremely different that the water quality to the east. Vessup Bay is a very narrow bay which extends just under 0.5miles inland and is only 0.1mile at its widest. The discharge from the Vessup Bay WWTP is located at the very head of Vessup Bay. Vessup Bay is a heavily used for marine uses, with marinas and docks and the Red Hook Marine Terminal is located immediately across the bay from the project site. The Terminal includes the landing and facility for ferries transiting to St. John and the British Virgin Islands and the landing for car ferries from the island of St. John. Over the last few years Vessup Bay has been significantly impacted by *Sargassum* further impacting the water quality.

At the project site Red Hook Bay opens to 0.34 mile in with and Mueller Bay is located to the east and has significantly more flushing than Vessup Bay and has significantly improved water quality. During surveys, the turbid plume from Vessup Bay was observed moving into or out of the marina area.

Vessup Bay is mangrove lined on the southern shoreline and while the bay used to have relatively large *Thalassia testudinum* and *Syringodium filiforme* beds the bay bottom is now dominated by the Halophila *stipulacea* and macro algae. Only small, scattered seagrass beds remain. Very few corals are found on hard substrates within Vessup Bay, on the VIPA terminal across the bay there are a very few small *Diploria strigosa, S. siderea, S. radians* and *D. labyrinthiformis* on the pilings.

Offshore bay supports seagrass beds composed of *Thalassia testudinum, Syringodium filiforme, Halodule beaudettei, Halophila decipiens* and more recently *Halophila stipulacea*. There are ESA listed coral species which occur on the reefs that fringe each side of the bay and the rocky promontories at Redhook Bay's entrance.

Methods

The area was surveyed on both SCUBA. Mooring locations and corals were located by GPS and were mapped to assist in locating the proposed dock. Species were identified to species within the project area.

The NOAA NOS Benthic habitat map, depicts. This is an accurate description of the benthic habitats within the area. The NOAA NOS map is provided below followed by a benthic habitat map. Inner Vessup Bay is shown as mud with small areas of seagrass along the sides of the bay. The inner harbor is heavily algal colonized, and there is sparse seagrass along the edges. The area immediately off the marina site is shown as sand. This area is colonized by scattered algae and *H. stipulacea.* The NOS map shows seagrass 70-90% offshore, this area is more in the order of 30-40% and this area is highly impacted by *H. stipulacea,* anchors, ropes, and debris. The NOS map shows seagrass continuous along the eastern shoreline, again the seagrass is closer to 50%. The map shows an area of dredging in the bay which shows in the historic aerials shown in Section 6.02.

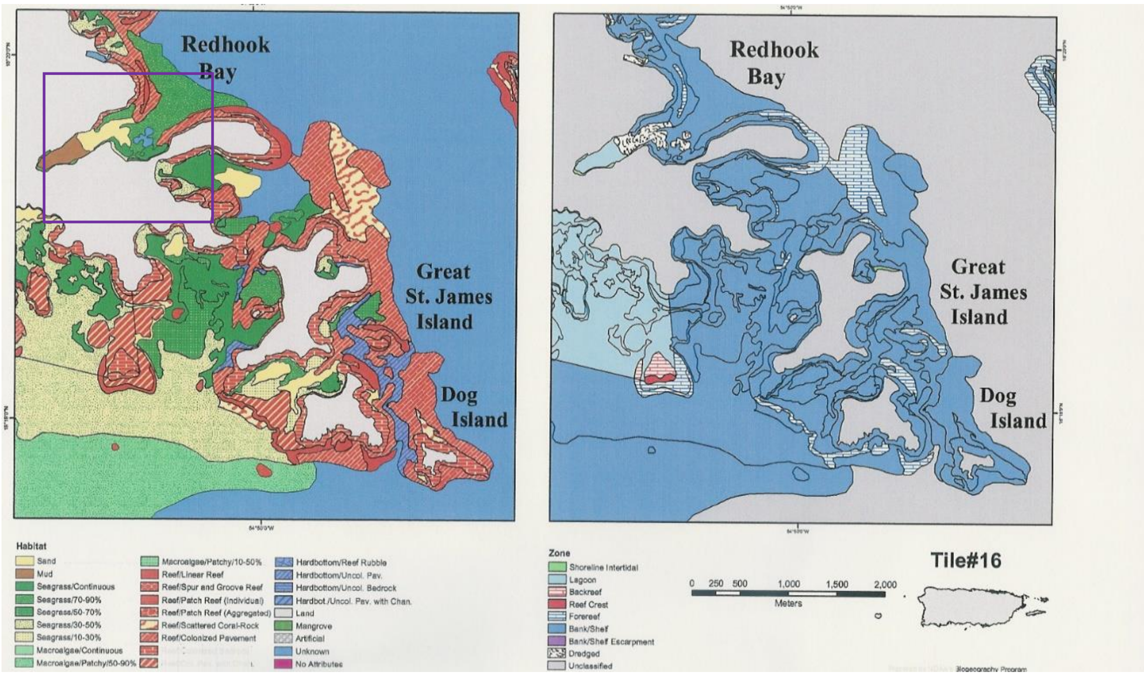


Figure 6.06.1. NOS Benthic Habitat Map Tile 16. Great Bay is shown within the blue box, and the project site is indicated by the red star.

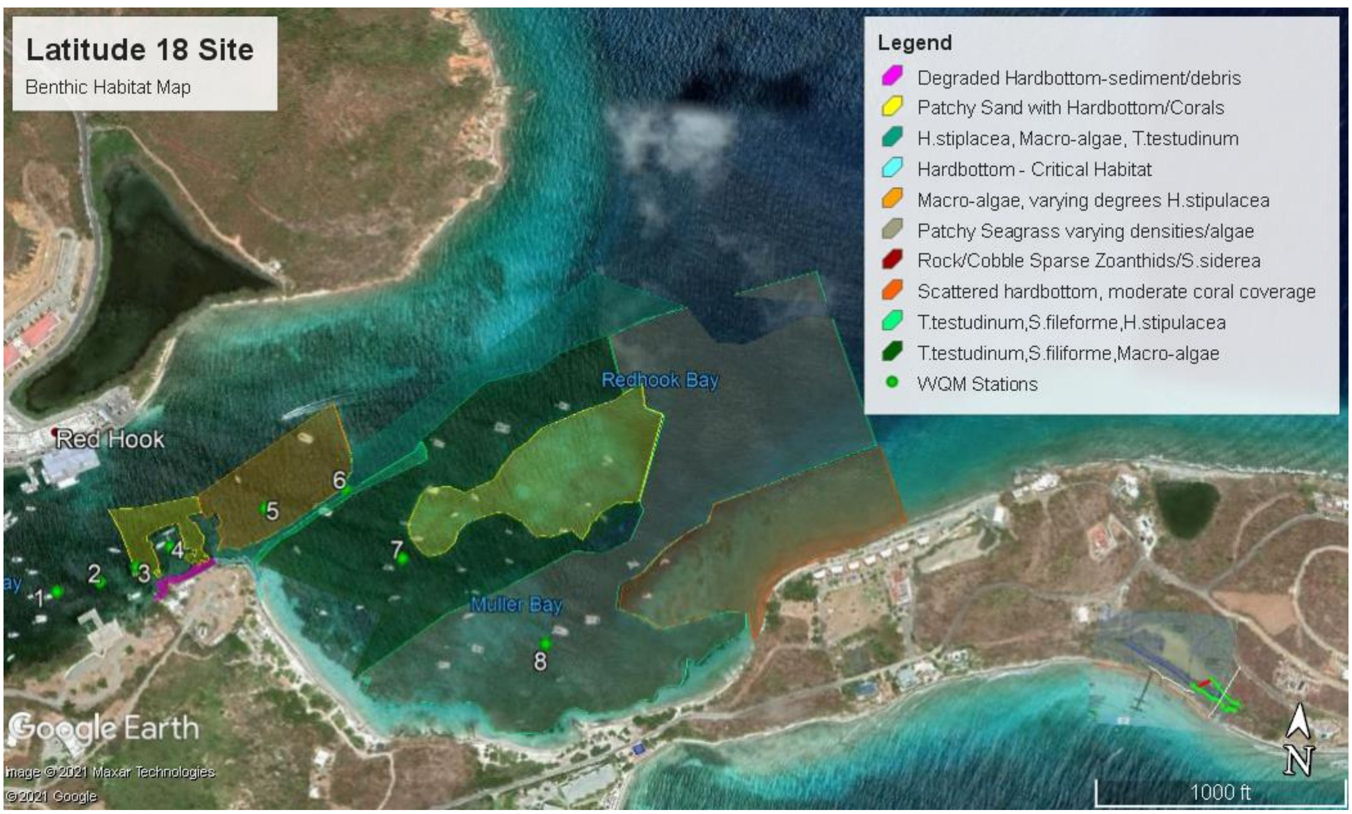


Figure 6.06.2 Benthic Habitat in the marina area

Vessup Bay

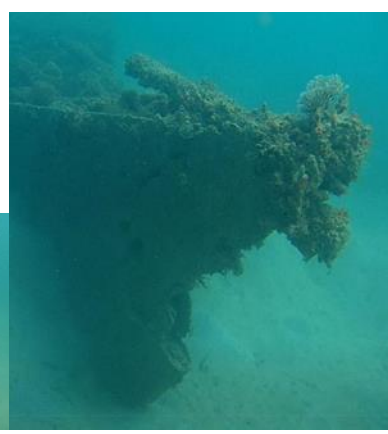
The project area is significantly impacted by the activities which occur within the bay, the boating, the marine vessel discharges, the debris from vessels, the suspension of vessels from propwash and vessels grounding and resuspending sediments and impacting bottom sediments and colonization.

The area is also subject to high nutrients from the WWTP effluent discharge. There are however impacts that are the result of natural phenomena, not just the hurricanes, but the accumulation of Sargassum weed in the head of the bay. The weed accumulates blocking light to benthic organism and then later settles on them as the algae losses its floats and slowly sinks. All of the shallows of the very inner bay have been impacted by the Sargassum.

In the areas shallower than 1' algae is the most abundant colonizer and *Enteromorpha flexuosa*, *Chaetomorpha sp.*, *Neomeris annulata*, *Laurencia*, *Avrainvillea nigricans*, *Penicillus capitatus*, *Caulerpa*, *Acetabularia*, *Hypnea*, *Dictoya*, *Wrangelia*, and *Halimeda* are all present. *Caulerpa spp.* are probably the most abundant. These are scattered amid exposed patches of mud and areas of disturbance. *Halophila stipulacea* has become the most abundant deeper than 1' and covers larger areas than the algae did in shallower water. There are large uncolonized areas, many of which look as though they were the result of vessel activities.   There are scattered pieces of debris and broken limbs throughout the Vessup bay.   Near the fringing mangrove there are patches of *Thalassia testudinum*.

Marina Footprint and Wave Attenuator

The marina area is impacted by water quality and by the heavy marine activity which has occurred in the area overtime. Offshore around the eastern portion of the old marina the area is a mix of sand and *H. stipulacea*.   The pilings and debris which remain in the area are heavily algal colonized with sparse sponge colonization. The stone bulkhead is heavily algal colonized with very sparse corals, palythoas and sponges which are found on bulkhead and stones which have been broken loose from the wall. *Siderastrea siderea*, *Pseudodiploria strigosa*, *Zoanthus puchellus* and *Palythoa caribbaeorum* are found on the bulkhead and loose rocks. Millepora alcicornis is found on some of the larger debris and on some of the cables. *Monanchora unguifera*, *Desmapsamma anchorata*, and *Spirastrella spp*. are found on debris and pilings. *Caulerpa*, *Cladophora*, *Cladosiphon occidentalis Acanthophora*, *Penicillus*, *Halimeda*, *Dictyota*, *Laurencia*, *Hypnea* and *Cheatomorpha* are all present within the marina footprint.


The seafloor is a mix of uncolonized sand, *Halophila stipulacea*, and scattered *Halimeda opuntia*, *Udotea flabellum* and *Penicillus capitatus*.

The sponges and corals represent less than 1% of the total bottom cover within the marina area.

Moving to the east there are scattered patches of *algae* amid denser *H. stipulacea*. Moving to the south around the point there is a mix *of Thalassia testudinum* and *H. stipulacea*.

Mooring field and Surrounding Area

There are vast seagrass beds within Muller Bay. The composition and densities of these beds vary with depth and disturbance. The seagrasses *Thalassia testudinum* is intermixed with *Syringodium filiforme* and a minimal amount *Halodule wrightii* can be found. There are some isolate areas where Syringodium is the dominant grass and others where *Thalassia* is the dominant grass. The invasive seagrass is most abundant to the north nearest the channel, but small areas of *H. stipulaceae* were found in the seagrass beds to the south. Found within these beds and within blowout areas are the algae *Caulerpa, Cladophora, Cladosiphon occidentalis Acanthophora, Penicillus, Halimeda, Dictyota, Laurencia, Hypnea* and *Cheatomorpha*. In the outer bay, the seagrass cover ranges between 20 to 100% per meter squared and have blade densities of 17 to 444 blades per m*2*. In the inner bay the coverage is lower due to impact by mooring and anchoring vessels and the maximum coverage is between 30-40%. *Thalassia* is more prevalent in the shallower areas and *Syringodium* dominates at depth.

Towards the east there becomes a mixture of coral colonized cobbles and exposed broken pavement in the grass beds and *Orbicella spp*. and *Porites astreoides* are common.

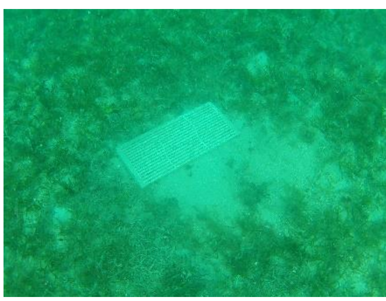
Within Muller Bay there are areas of dense *Thalassia testudinum* colonization often mixed with *Syringodium filiforme* and areas of dense colonization by invasive *Halophila stipulacea.* Green algae (*Halimeda spp., Udotea spp., Penicillus capitatus*) abundant in seagrass. *Dictyota pulchella* abundant in bushy tangled clumps among seagrass and green algae species.



The algae makes up as much as 50% of the bottom cover in some areas. Seagrass abundance varies from *T. testudinum* to *S. filiforme* as the most abundant.



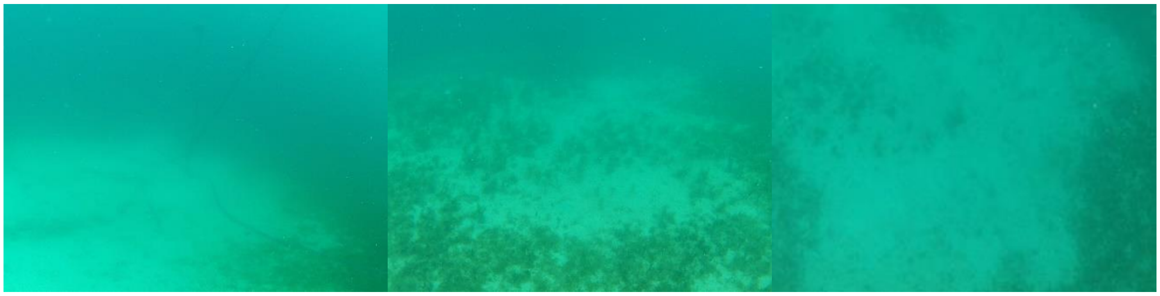
Debris is found throughout the seagrass and algal beds. There are sunked boats, and pieces of upland debris.



There are several sunken vessels, dinghies and even a historic anchor which someone was using as a mooring.



Tyere are large scars that are the result of moorings. These are the result of mooring ropes dragging on the bottom. Some of the areas are recolonizing with algae and *H. stipulacea*.

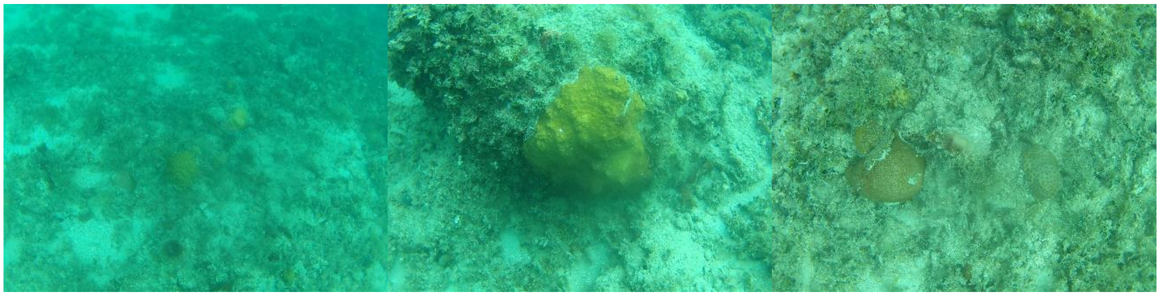


Some moorings use large rocks, other have three-point moorings which are resulting in large scour areas.

Moving to the east the area becomes intermixed with rocks and cobbles, slowly becoming a mix of emergent pavement with sand channels.   At the edge of the pavement there loose rocks which have scattered corals. As shown in the photograph there are scattered helix anchors which are scattered where they have pulled out of the shallow sand.

The more emergent rocks have been colonized by *Porites porites* and *Agarica agaricities. Orbicella faveolata* is present on scattered rocks and on the pavement to the east.

The largest corals are found on the pieces of rock which have the most vertical relief.



Corals and hard bottom become more abundant to the east. The moorings have been positioned to avoid all corals and all hardbottom areas.

Table 6.06 Species in the project area

Algae	Marina	Wave Attenuator	Mooring Site	Greater Area
Halimeda opuntia	X	X	X	X
Halimeda moline	X	X	X	X
Dictyota pulchella	X	X	X	X
Penicillus captitatus	X	X	X	X
Caulerpa mexicana	X	X	X	X
Laurencia papulosa	X	X	X	X
Galaxaura oblongata			X	X
Jania spp			X	X
Sargassum fluitans	XX		X	X
Halimeda copiosa			X	X
Ventricaria ventricosa			X	X
Wrangelia penicillata	X		X	X
Seagrass				
Thalassia testudinum		X	X	X
Syringodium filiforme		X	X	X
Halodule wrightii		X	X	X
Halophila stipulacea	X	X	X	X
Sponges				
Ircinia compana			X	X
Agelas confera			X	X

Aplysina cauliformis			X	X
Aplysina fulva			X	X
Aplysina insularis			X	X
Desmapsamma anchorata	X	X	X	X
Holopsamma helwigi	X	X	X	X
Neofibularia nolitangere			X	X
Xestospongia muta			X	X
Callispongia vaginalis			X	X
Cinachyrella kuekenthali	X		X	X
Ircinia strobilina	X		X	X
Niphates erecta			X	X
Verongula gigantea			X	X
Callyspongia plicifera			X	X
Monanchora unguifera	X		X	X
Spirastrella spp.	X		X	X
Corals				
Favia fragum			X	X
Siderastrea siderea	X		X	X
Siderastrea radians	X		X	X
Porites astreoides			X	X
Orbicella faveolata			X	X
Gorgonia ventalina			X	X
Meandrina meandrites			X	X
Montastrea cavernosa			X	X
Pseudeodiploria strigosa			X	X
Dichocoenia stokesi	X		X	X
Eusmilia fastiginia			X	X
Agaricia agaricites			X	X
Soft Corals				
Palythoa caribbaeorum	X			
Gorgonia flabellum			X	X
G. marina			X	X
Pseudoplexuara			X	X
Plexuara			X	X
Muricea			X	X
Invertebrates				

Echinometra lucunter	X		X	X
Diadema antillerum	X		X	X

VI. IMPACT OF PROJECT

Impact of Construction and Mooring Installation

The construction of the marina expansion will impact the marine environment physically through the placement of piles and could impact water quality through siltation and turbidity during construction, dredging and de-watering of spoils. A water quality monitoring plan will be implemented to monitor control devices and to ensure repairs are made when necessary and additional measures are taken with installed devices are not effective.

The marina and wave attenuator will impact areas that are colonized by algae and *Halophila stipulacea*. The removal of the piling will result in the loss of encrusting sponges and the placement of the new shee tpile wall will impact 12 corals (5 *Psuedodiploria strigosa* and 7 *Sidereastrea siderea*). The corals will be relocated as part of the mitigation for the project. The mitigation plan is found in Appendix D.

The dock will be providing slips for 28 vessels many larger than vessels currently within the area. The marina is designed so that vessels should have adequate depth for maneuvering and there should be minimal suspended sediment. The marina will have fuel service and the system designed has secondary containment, double wall fuel lines and leak detection systems. The marina will have a Terminal Facility License and a Spill Prevention Containment Countermeasure Plan. Fuel supplies will be situated at the main docks as well as on the dinghy dock in the event of inadvertent spills. Fueling of dinghies on the dinghy dock or in the mooring field will be prohibited.

No discharge from vessels at the marina will be allowed and the marina will have a pump out facility.

The moorings have been sited to avoid all hardbottom and corals. Some of the mornings will be in areas of mixed seagrass, and in areas with *H. stipulacea* and algae. The moorings will utilize helix type anchors and floating lines so there will be minimal impact on seagrasses after the moorings are installed. There may be some blade and rhizome lost during installation. Seagrass currently is thriving in the outer bay under vessels in the bay where ropes and anchors are not impacting the seafloor.

The implementation of the managed mooring field with proper moorings and the cleanup of the debris from the seafloor will allow for the recolonization of the damaged areas by sea grasses. Unfortunately, due to the presence of *H. stipulaceae* it may colonize many of the areas which are cleared or no longer swept by lines before *T. testudinum, S. filiforme* or *H. wrightii* can spread into the area.

Vessels are currently moored haphazardly through Vessup and Mueller Bay. Most have anchoring systems which are damaging the seafloor. Many of the vessels are live-a-boards who simply dump their waste straight into the sea. Some vessels have been allowed to sink on their moorings.

The introduction of a managed mooring field will not only stop many of the ongoing physically damaging things which are occurring, but it should help reduce the nutrient loading by providing pump out service and enforcing it in the managed mooring field.

Comparison Existing Mooring/Anchoring Conditions vs Managed Mooring Field Mooring Buoys	• mooring buoys installed by individuals • different technical solutions / equipment – weights, engine blocks, rocks, anchors • boat anchors and anchorage chains and ropes dragging seabed • short term anchoring • vessels deploying multiple anchors • no moorings available for short-term rental	• Engineered mooring buoys professionally installed • elastic mooring lines that do not impact seabed • Mooring buoys installed and maintained by Management • Short and long-term users have the mooring buoy system available for rent
Water Space Use	• Mooring locations only approximately located • No control on anchoring locations • Limited and unreliable markers • Encroachment into navigation channel • Boats close to the public beach	• Mooring field area with offset to beaches (approximately 300ft) • Mooring field area with offset to navigation channels • Mooring field area markers and mooring buoys precisely located • Additional navigation channel markers • Prohibition to drop anchor • Enforcement by Management
Sewage and Waste Management	• No control of boat discharges • No control over repair activities • Detriment to water quality	• prohibition of discharge of sewage, bilge, oil or solid waste to the bay • sewage pump out • solid waste bins • proper disposal procedures for fluid and solid waste will be available through the marina • Management provides control and enforcement
Upland services	• Some services provided at American Yacht Harbor	• Dinghy docks professionally installed • Dinghy docks maintained and repaired by Management • Restrooms, showers, and laundry • Authorized access to land • Car and bike parking • WIFI

VII. MITIGATION WORK

Corals

Divers will wear latex gloves for all coral handling and will immediately change gloves if they suspect they may have come in contact with a diseased coral. Divers will survey the marina footprint and will collect all the corals that have colonized rocks and pieces of debris and place them on the transport tray. Corals which are attached to the stone bulkhead will be carefully removed with a narrow chisel and hammer taking care not to break the coral. The coral will then be placed directly on the transport tray or in a basket on the transport tray. Where possible sponges, anemones, urchins, palythoa and other non-sessile organisms will be relocated. Once all 12 corals are on the tray, it will be lifted under the boat for transport to the recipient site. The boat will travel at less than 5 knots per hour to the recipient site and the tray will be lowered close to the seafloor. Divers will then remove the corals and find suitable attachment points for the corals which will not impact existing organisms and will allow for good attachment. The area for re-attachment will be thoroughly cleaned of all algae using a wire brush or chisel. The coral will then be re-attached with 2-part underwater epoxy. As of March 2021, no disease was noted on any of the 12 corals to be relocated. At the time of transplant if any of the corals show signs of disease they will not be relocated or handled. Corals will be re-attached the same day they are removed.

Compensatory Mitigation

In order to compensate for unavoidable impacts which may occur as a result of the construction or operation of the marina and mooring field, debris within the mooring field will be collected and disposed of at the Bovoni landfill. Small pieces of debris will be picked up by hand by divers and larger pieces will be collected utilizing lift bags. Care will be taken to ensure any fish or invertebrates in the debris are not accidently removed from the water. Any debris which is coral colonized will not be removed.

VIII. MAINTENANCE PLAN

Once the project is completed, the coral recipient sites will be surveyed on a bimonthly basis for a period of two months to ensure that the corals are remaining attached. Corals will be resituated or reattached, as necessary. After the first 2 months, the recipient site will be monitored on a bi-annual basis for a period of 5 years.

IX. ECOLOGICAL PERFORMANCE STANDARDS

The object of this mitigation is to minimize impact to benthic resources which provide high quality habitat to marine species. In order to objectively evaluate the mitigation project, ecological performance standards must be established.

It is the intent of this transplanting program to obtain at least 85% overall survival, with secure substrate attachment, five years after relocation. Overall survival of corals shall be defined as no net loss in pooled (by species) Live Tissue Area Index or an increase in pooled (by species) Live Tissue Area Index[1]. Latitude 18 is committed to put forth the greatest effort to see that the

[1] V.I. Department of Planning and Natural Resources Coral Relocation Mitigation Recommendations, https://dpnr.vi.gov/czm/programs-viczmp/coastal-zone-permitting-viczmp/

relocation is successful and that they obtain the greatest potential survival of transplanted coral.

X. MONITORING REQUIREMENTS

Monitoring the compensatory mitigation project site is necessary to determine if the project is meeting its performance standards, and to determine if adaptive measures are necessary to ensure that the project does meet its objectives.

As per the guidelines set forth in §230.96 Monitoring the mitigation project will be monitored for a minimum period of 5 years.

All 12 corals will be marked and photographed on a monthly basis for a monthly basis for a period of 2 months after the transplant after the first 2 months the corals will surveyed bi-annually for a period of 5 years. Corals will be monitored for health, disease, and sediment impacts.

XI. LONG TERM MANAGEMENT PLAN

As part of the management of the mooring field the area will be periodically surveyed and any new debris will be collected

XII. ADAPTIVE MANAGEMENT PLAN

In the event that there are difficulties with the mitigation or if the mitigation is deemed unsuccessful as planned, Latitude 18 is prepared to take additional steps to see that compensatory mitigation goal is achieved. If necessary, extended monitoring and maintenance or additional actions will be undertaken in order to meet the mitigation goal.

If the mitigation goal is not met, the applicant will prepare a detailed report of why the mitigation was not successful. Latitude 18 will meet with the permitting agencies to determine the additional compensatory mitigation needed to meet the mitigation goal.

XIII. FINANCIAL ASSURANCES

Latitude 18 is committed to conduct this compensative mitigation plan and will guarantee that the mitigation plan, maintenance, and monitoring will occur as proposed. Latitude 18 will secure a performance bond or some other type of financial guarantee that is accessible to the U.S. Army Corps of Engineers in the amount necessary to complete the transplant and required monitoring, long-term maintenance of the informational buoys as well as covering any contingencies that may occur. The bond will be prepared following the guidance set forth in the U.S. Army Corps of Engineers Regulatory Guidance Letter No. 05-1 dated 14 February 2005 SUBJECT: Guidance on the Use of Financial Assurances, and Suggested Language for Special Conditions for Department of the Army Permits Requiring Performance Bonds.

APPENDIX E

Tree Boa Protection Plan

Introduction

Jack Rock B-AC LLC purchased property within Estate Nazareth with the intention of developing a World Class Marina with an upland mixed use commercial development. Consolidated parcel 9B-A comprises a total of 5.556 acres. The entire area is zoned W-1-Waterfront Pleasure. The Proposed Development is permitted by the Virgin Islands Code as a matter of right. The project site contains a peninsula that forms the southern entrance to Red Hook Bay. That peninsula is a rocky abutment that extends to the National Park Service property on the East side and abuts the Vessup Beach area to the south.

The property lies within the range of the Virgin Islands tree boa (*Chilabothrus granti*, formerly *Epicrates monensis granti*) and the tree boa is known to occur in the immediate area. Much of the main marina site is cleared and offers little in the way of habitat for these species. Habitat with good interdigitation exists in the overgrown western portions of the property and in some of the areas of denser vegetation near the beach. All areas slated for development will follow Tree Boa protocols and will be hand cleared before any machine work ensues.

Proposed Minimization Methods

1. Prior to the start of the clearing activities DFW will conduct a VI Tree Boa training session for all individuals who will be involved with hand clearing of the project area. This will involve training on tree boa identification and what to do if a tree boa is encountered. This must be done before any site work is begun.

2. Prior to any construction activity, including removal of vegetation and earth movements, the boundaries of the project area and areas to be excluded and protected should be clearly marked in the project plan and in the field in order to avoid further habitat degradation into forested and conservation areas.
3. Photographs of the VI Boa will be prominently displayed at the site. A monitor will be designated who has been trained regarding the tree boa who can assist in helping protect the tree boa if they are encountered during hand clearing.
4. Hand clearing will commence from northeast to southwest allowing boas an opportunity to move towards the forested areas to the east and south. Vegetation should first be cut about one meter (36") above Vegetation should first be cut about one meter above the ground, prior to the use of heavy machinery for land clearing. Once land is cleared by hand, this will allow boas present on site to potentially move away on their own to adjacent available habitat.
5. Any stone walls or naturally occurring rock piles must be carefully dismantled by hand as these are refuges for the snake. This will allow any boas present to vacate the site without injury.
6. If a VI boa is found within any of the working or construction areas, activities should stop at the area where the VI boa is found and information recorded as to size, where it was found and if possible, include a photo of the animal (dead or alive) and its behavior .
7. Boas should be safely captured and relocated to a predetermined suitable habitat Potential boa relocation sites should be predetermined before the project starts and sites shared with the VIDFW for review.
8. Relocation of boas should be done by trained and designated personnel, and shall not harm or injure the captured boa. Activities at other work sites, where no boas have been found after surveying the area, may continue.
9. If boas are injured DFW or the monitor will be contacted immediately so that someone can retrieve the injured boa to get it to someone who can help it. No activity will occur in that area until VIDFW is contacted and what steps should be taken are discussed. Based on how the boa was injured protocol might to able to be adapted to minimize future injuries.
10. If a tree boa is killed the carcass is to be carefully collected by the monitor and put on ice and taken to DFW so that it can be frozen, and its DNA used to provide information regarding the boa.
11. When a brush or debris pile is encountered it will be taken apart by hand if at all possible to allow the boa to safely move away.
12. Another site visit will be performed by DFW to confirm that hand clearing has been complete, and waiting period starts after inspection.
    8. The site is to be left undisturbed for 14 days prior to the use of heavy machinery. However manual work may continue to be performed during this time and any vegetation may be moved by hand.
13. Measures should be taken to avoid and minimize VI boa casualties by heavy machinery or motor vehicles being used on site. Any heavy machinery left on site (in staging) or

near potential VI boa habitat (within 50 meters of potential boa habitat), needs to be thoroughly inspected each morning before work starts to ensure that no boas have sheltered within engine compartments or other areas of the equipment. If VI boas are found within vehicles or equipment, boas need to be safely captured and relocated accordingly.

By implementing these measures impact to the tree boas can be minimized.

APPENDIX F

VIRGIN ISLANDS PORT AUTHORITY
Post Office Box 302216

ST. THOMAS, VIRGIN ISLANDS U.S.A. 00803-2216
TEL: (340) 774-2250 • FAX (340) 777-9694
www.viport.com

February 22, 2021

Lee Steiner,
Vessup Operations LLC,

After reviewing the documents submitted regarding the potential footprint for the Latitude 18/Vessup Point Marina and mooring field in St. Thomas USVI, I can confirm that the proposed marina and moorings will not impede maritime traffic into the Urman Victor Fredericks Marine Terminal or into Vessup Bay.

The proposed managed mooring field layout will help resolve an ongoing issue with vessels mooring or anchoring at the edge of the navigational channel which in certain weather conditions creates difficult situations for passenger ferry captains maneuvering into the terminal.

The proposed plans will not only keep the navigation channel clear in all-weather conditions but will also provide a more defined and expanded mooring field for all vessels mooring in this area helping to increase safety a vessel maneuverability.

Capt. Matthew Berry
Virgin Islands Port Authority
Marine Manager STT/ STJ
C: 340-201-8518

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