MODIFICATION TO CZT-04-11(L) AND CZT-9-14(W)
ENVIRONMENTAL ASSESSMENT REPORT
SHORELINE ENHANCEMENT AND DOCK MODIFICATIONS
FRENCHMAN'S REEF & MORNING STAR RESORT
ST. THOMAS, US VIRGIN ISLANDS

SUBMITTED TO

THE DIVISION OF COASTAL ZONE MANAGEMENT
DEPARTMENT OF PLANNING AND NATURAL RESOURCES

PREPARED FOR

CREF3 USVI Hotel Owner, Inc.

PREPARED BY

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MAY 2022

ENVIRONMENTAL ASSESSMENT REPORT
A MAJOR PERMIT MODIFICATION
FRENCHMAN'S REEF

1.0 NAME AND ADDRESS OF APPLICANT

CREF3 USVI Hotel Owner, Inc.
Fortress Investment Group,
135 6th Avenue, 46 Floor
New York, NY 10105

2.00 LOCATION OF PROJECT

The Frenchman's Reef Resort is located at the eastern side of the entrance channel into Charlotte Amalie Harbor, St. Thomas, U.S. Virgin Islands. The resort is located on Parcel No 5-A Estate Bakkero No. 5 Frenchman's Bay Quarter, Submerged Lands Parcel 4F and Submerged Land Parcel 5F Estate Bakkero No. 5 Frenchman's Bay Quarter. The property is located at 18.320758°N Latitude and -64.921693°W Longitude. The Harbor View/Pacquereau Bay dock modification and proposed beach/shoreline enhancement is located at 18.321662°N Latitude and -64.922440°W Longitude.

The following location map and agency review map depicts the projects in reference to adjacent zoning and jurisdictional line of the Department of Planning and Natural Resources, Division of Coastal Zone Management. The vicinity map also follows showing the regional context and vicinity in the U.S. Virgin Islands.

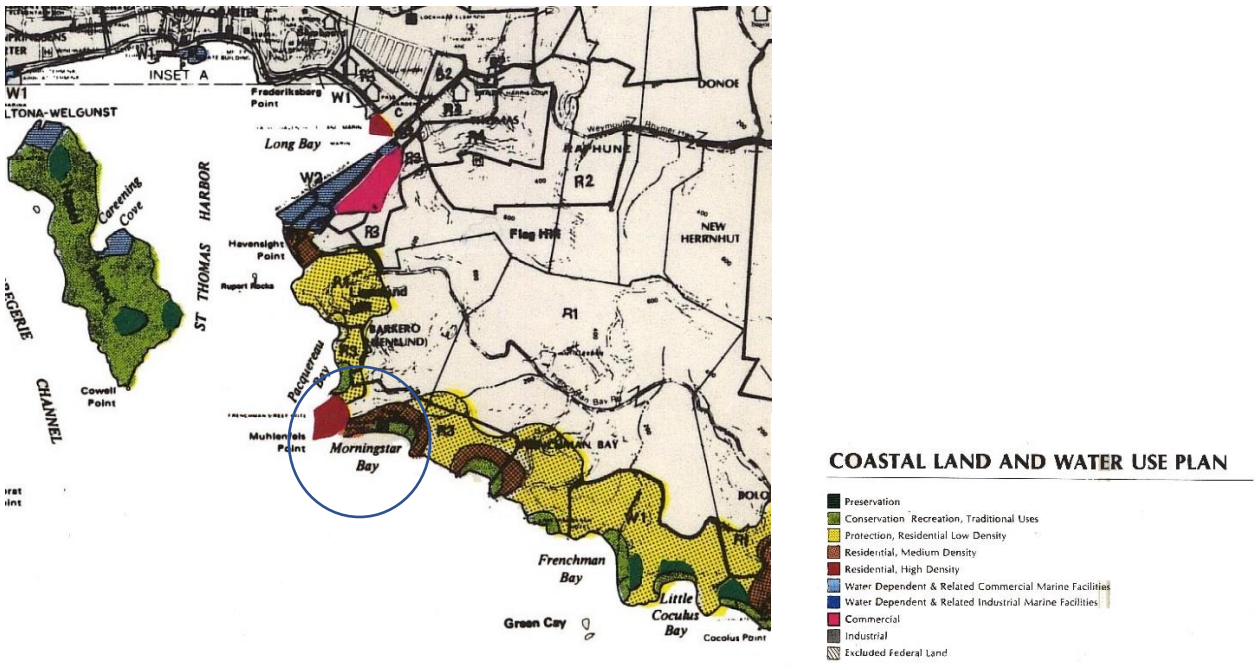


Figure 2.00.1 Location and Agency review map, showing the Coastal Zone Management jurisdiction in color.

Figure 2.00.2 Location map showing the projects location within the Frenchman's Reef property.

3.00 ABSTRACT

CREF3 USVI Hotel Owner, Inc. (CREF3) is seeking to modify CZT-04-11(L) and CZT-9-14(W) to enhance the shoreline/beach area for guest use and to modify the permitted dock project to install a 65ft by 6ft wide dock with a 40ft by 6ft wide L-shaped extension. This 600ft^2 dock would replace the permitted 30ft extension to the northeast of the dock which was intended to house the seawater intake structures.

The shoreline/beach enhancement area is to the east of the exiting dock in an area which was once used as storage by Frenchman's Reef's water sports operator. The area has a cut roadway in the hillside and at one time had several 40ft trailers and was used for boat repair and storage. The area was left in poor condition by the water sports company and the area was further damaged by the hurricanes of 2017. Post hurricane cleanup the boat debris and trailers were removed. CREF3 proposes to groom the small cobble/sand beach, and place sand placed landward the mean high waterline. The existing large dry stacked stone/boulder wall would be repaired and enhanced and would continue to protect the perched bench through which there is a dirt road. Sand and landscaping would be installed in this area creating a perched beach and lounging area. The steep slope up to the dock access roadway would be stabilized by bougainvillea, palms, and other landscaping. Two sets of wooden stairs with 8 risers would be placed from the perched area to the beach to allow for beach for access.

CREF3 also proposes to construct an L-shaped dock extending from the northern side of the existing pier with a 65 ft. by 6 ft. wide pier and a 40 ft. by 6 ft. wide "L" shaped extension. This dock would have a

600ft^2 footprint supported by twelve 12" diameter steel pile pilings. The dock extension would be utilized to provide vessel access to guests.

CREF3 also will be repositioning the propane storage tank which will service the microturbines to allow for easier access for fuel loading and to minimize conflicts with vehicular access during fueling. The location is the area previously permitted to place the new WWTP.

4.00 STATEMENT OF OBJECTIVES SOUGHT BY THE PROPOSED PROJECT

The objective of this modification is to provide upgraded amenities for the guest when the resort reopens. CREF3 wishes to modify of CZT-04-11(L) to enhance the Harbor View (Pacquereau Bay) shoreline area to create an amenity for guest. CREF3 wish to modify the dock currently permitted under CZT-9-17(W) to add a 600ft^2 "L" shaped pier to be used by charter vessels dropping off and picking up guest. The permitted propane storage tank will also be relocated to make the fuel delivery more efficient and less disruptive to the main access roadway.

5.00 DESCRIPTION OF PROJECT
5.01 Summary of Proposed Activity

Shoreline/Beach Enhancement

East of the exiting dock is an area which was once used as storage for the water sports operator. The water sports operator had trailers and boat parts and all sorts of boat related equipment scattered throughout the area. The area had two large storage containers full of boat parts and accessories. This area was abandoned following the 2017 hurricanes. The broken trailers and debris were removed as part of the post hurricane cleanup and CREF3 proposes to reuse this area as an amenity. The small cobble/sand beach would be groomed, and sand placed landward of the mean high waterline. This is a small area and would require approximately 25 cubic yards of sand. The existing dry stacked stone wall would be used to transition to the existing roadway cut. The dry stacked stone wall 2-3' in height protects and stabilizes the benched area. Two sets of steps would be built into the wall for the transition. Sand would then be placed on the roadway and surrounding benched area creating a small, perched beach/lounging area. This would require approximately 160 cubic yards of sand. CREF3 would like to use the sand which has built up inland adjacent to the Morningstar reception building. The sand is the same grainsize as the existing sand on the small beach. The sand in the source area is continually building up due to beach grooming and wind. The steep slope up to the dock access roadway would be stabilized by planting of bougainvillea, palms, and other landscaping.

Permitted Dock Modifications

In 2019 Diamond Rock Frenchman's Owner (DRFO) proposed and received approval to incorporate their seawater intake within the existing dock. The intake structure was to be located in a concrete structure adjacent to the existing concrete pad and the dock would be expanded to encompass and protect the intake (a 30ft extension of the platform to the east). The cost to relocate the infrastructure to support the relocation of the intake turned out to be cost prohibitive therefore CREF3 will not move forward with that portion of the project at this time.

The existing filled dock structure was undermined and damaged by the hurricanes of 2017 and boulders, gravel and sand were pushed around the point and deposited in the dock's berthing area. The small finger pier was destroyed and only its metal pilings remained. DRFO received approval to repair the dock structure and resituate the boulders and riprap which were displaced by the storm and dredge approximately 155 cubic yards of material to restore the berthing area and to clear the existing boat ramp. A portion of this work has been completed to-date and CREF3 is currently about to remove the old metal finger pier pilings.

Proposed Dock Modification

CREF3 proposes to construct an L-shaped dock extending from the northern side of the existing pier at a 90-degree angle with a 65 ft. by 6 ft. pier and a 40 ft. by 6 ft. L-shaped extension. This dock would have a 600ft^2 deck supported by twelve 12" diameter pipe pilings. The pipe piles would be driven to set in them into the weathered rock layer beneath the sand veneer and then a rock bit will be driven into the underlying hard rock layer and 0.40 W/C grout would be injected through a hollow injection bar. The dock extension would have concrete pile caps and decking.

Relocation of Permitted Propane Tank

The propane tank will be relocated from south of the parking garage to the northeast and an access loop road will be constructed that will allow the delivery truck to easily access the tank for the offloading of fuel. The tank will be in an enclosure and an unloading skid with lie to the northeast of the tank enclosure. A fence with sliding access gates will be place along the roadway to protect the tank and fueling area. This is the area previously permitted to place the new WWTP.

5.01a Purpose of Project

CREF3 wishes to modify of CZT-04-11(L) to enhance the Harbor View (Pacquereau Bay) shoreline area to create an amenity for guest. CREF3 wish to modify the dock currently permitted under CZT-9-17(W) to add a 600ft^2 "L" spaced extension to be used by charter vessels dropping off and picking up guest. The LPG tank will be relocated, and an access road created to facilitate the unloading of fuel.

5.01b Presence and Location of Critical Areas

The terrestrial environment of the Frenchman's Reef has been highly altered over time through cutting, filling, the construction of buildings, roads, parking and infrastructure and landscaping. The proposed beach enhancement area has been highly altered, and there are no remaining natural resources in the project impact footprint.

The shoreline east of the dock had been "benched" to create a roadway and a place to work on boats. The area had slowly overgrown overtime and more debris accumulated. Post-hurricanes during the cleanup, numerous 40-yard bins of debris were removed.

The extremely narrow shoreline beach is not a turtle nesting beach (too narrow) and benched roadway

has only some opportunistic weedy species. The steep slope up to the existing dock access road will be stabilized with landscaping.

Muhenfels Point area has sensitive marine environs. The marine environment surrounding the property has scattered diverse hard and soft coral communities. Including scattered *Acropora palmata, A. cervicornis, Orbicella annularis, O. franksi, O, faveolata,* and *Dendrogyra cylindrus* all of which are on the endangered species list. The hardbottom habitat which surrounds the point to the west is protected as a critical habitat for acropiod coral. The proposed dock extension is to the east. There are some corals within area, including several *Orbicella*s in the wider area but they area outside the area of impact during construction. There are 4 corals (3 *Siderastrea* and 1 *Porites astreoides*) within 15ft of the dock. These are outside the footprint of the dock and pilings, and the contractor will be made aware of their presence to minimize potential impact. Piles will be driven, and grouting and filling of piles will be enclosed within the piling and should not result in water quality degradation sufficient to impact these corals or the surrounding seagrass.

The proposed beach enhancement involves minimal earthwork related to the placement of landscaping and repair and enhancement of the stone wall on the beach. The sand will be placed above the MHW line and will have no impact on the marine environment. During storm events sand from the beaches may be introduced into the environment. The sand is of appropriate grain size for the area and the amount of introduction should not be sufficient to have a significant impact in suspended sediments during storm events.

There is seagrass within the project area and 24ft^2 of seagrass lies within the piling footprints this includes *Thalassia* may be lost due to wave turbulence.

5.01c Method of Land Clearing

The only clearing associated with the beach enhancement will be associated with removing the *Sansevieria* and other opportunistic species from the hillside and edge of the benched roadway. These will be done as part of the landscaping. A small trackhoe may be used.

The largest area of clearing will be associated with the relocation of the LPG tank. A portion of this area is landscaped, and a portion is overgrown with small trees and scrubs. This is the area previously permitted to place the WWTP.

5.01d Provisions Preserve Topsoil and to Limit site Disturbance

The areas that will be impacted have already been altered in the past. Topsoil impacts should be minimal.

5.01e Erosion and Sedimentation Control Devices to be Implemented

Silt fencing will be installed prior to any earthwork associated with the beach enhancement in the beach area and around the area of clearing and grading for the Propane fuel storage tank.

5.01f Schedule for Earth Change Activities and Implementation of Erosion and Sediment Control Measures.

Silt fencing will be installed prior to any earth work on the shoreline behind the beach and the area which will be cleared for the relocation of the propane storage. Turbidity barriers will be placed offshore to surround the area of construction to minimize any turbidity impacts. Barriers are currently deployed as a part of the ongoing construction.

5.01g Maintenance of Erosion and Sediment Control Measures

Silt fencing will be inspected daily, and after all rainfall events and repairs made immediately if necessary. The entire project will take less than 1 month. Barriers are currently deployed as a part of the ongoing dock construction. Barriers will be maintained throughout in-water construction

5.01h Method of Stormwater Management

There will be no change to the existing stormwater facilities within the property.

5.01i Maintenance Schedule for Stormwater Facilities

The resort typically checks and cleans stormwater drains and features after all heavy rainfalls and storm events to ensure that they do not become blocked during rainfall. The project will have no impact on existing stormwater facilities.

5.01j Method of Sewerage Disposal

Guest utilizing the beach and dock will utilize the existing resort facilities.

5.01j Method of Construction

A portion of the new dock will be done from the dock structure itself as is the ongoing construction. Further offshore a crane mounted on a barge will be used to complete the dock.

501k Schedule for Construction and Implementation of Sediment Control Devices

A double set of proper length (1’ from the seafloor) turbidity barriers will be installed prior to any in-water.

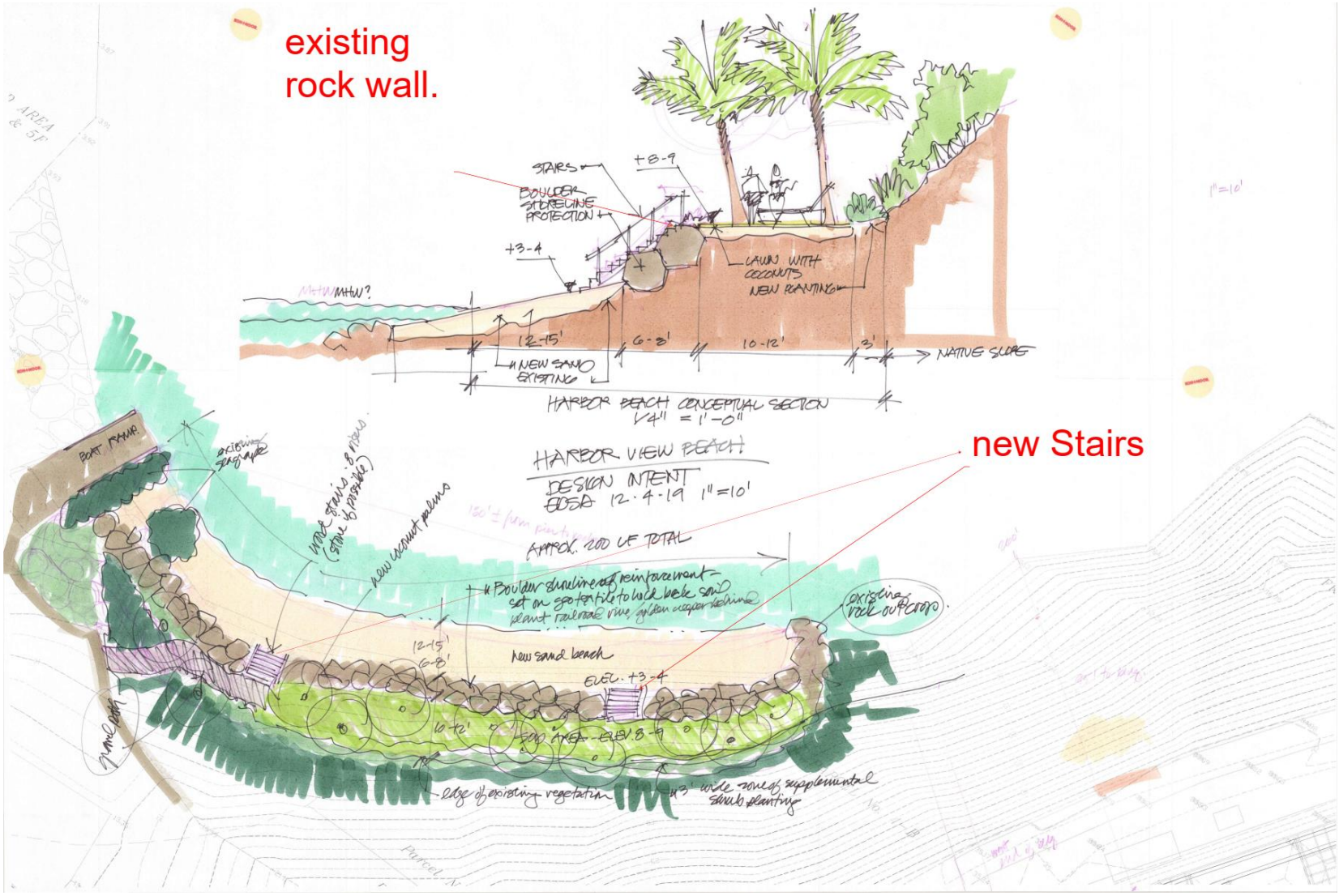
5.01l Maintenance Schedule for Sediment and Siltation Control Devices

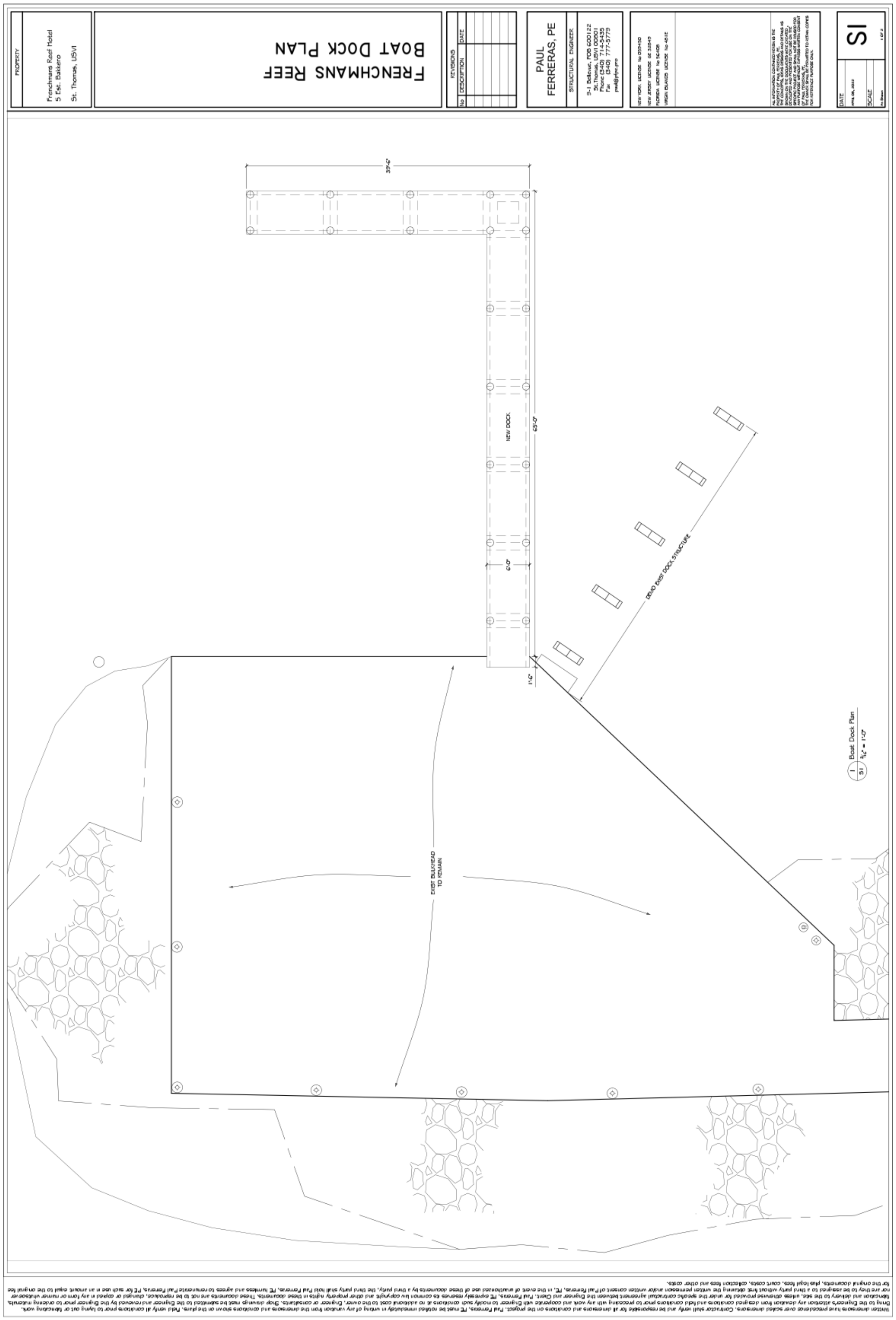
Turbidity barriers will be monitored continually during all in-water work, if curtains become damaged or are not working properly repairs will be made. A water quality monitoring plan will be undertaken during all in-water work. If curtains are found to be ineffective in containing the turbidity additional measures including addition curtains, slowing work or even periodically stopping work to allow for turbidity to settle will be implemented.

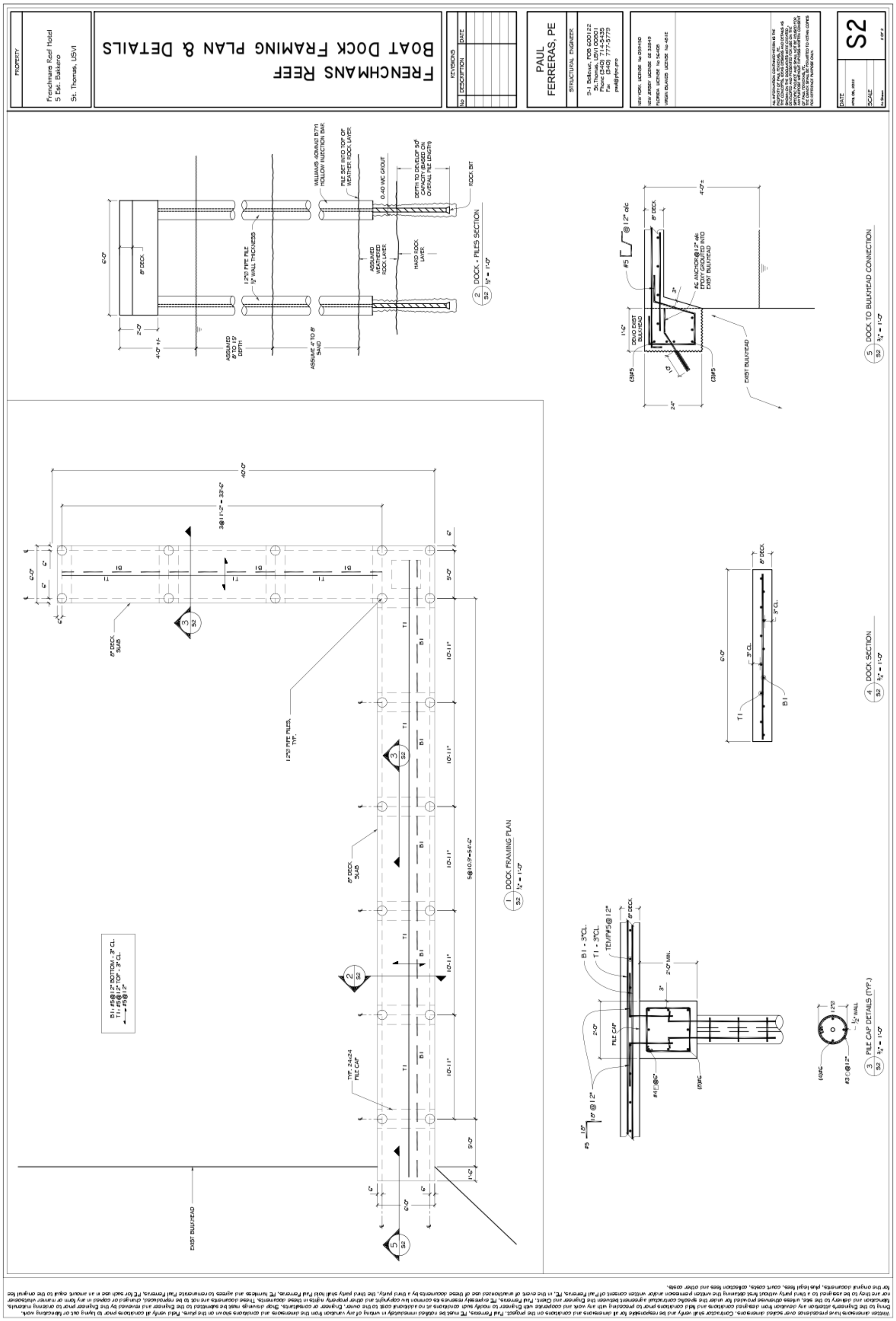
5.02 DRAWINGS AND PLANS

existing
rock wall.

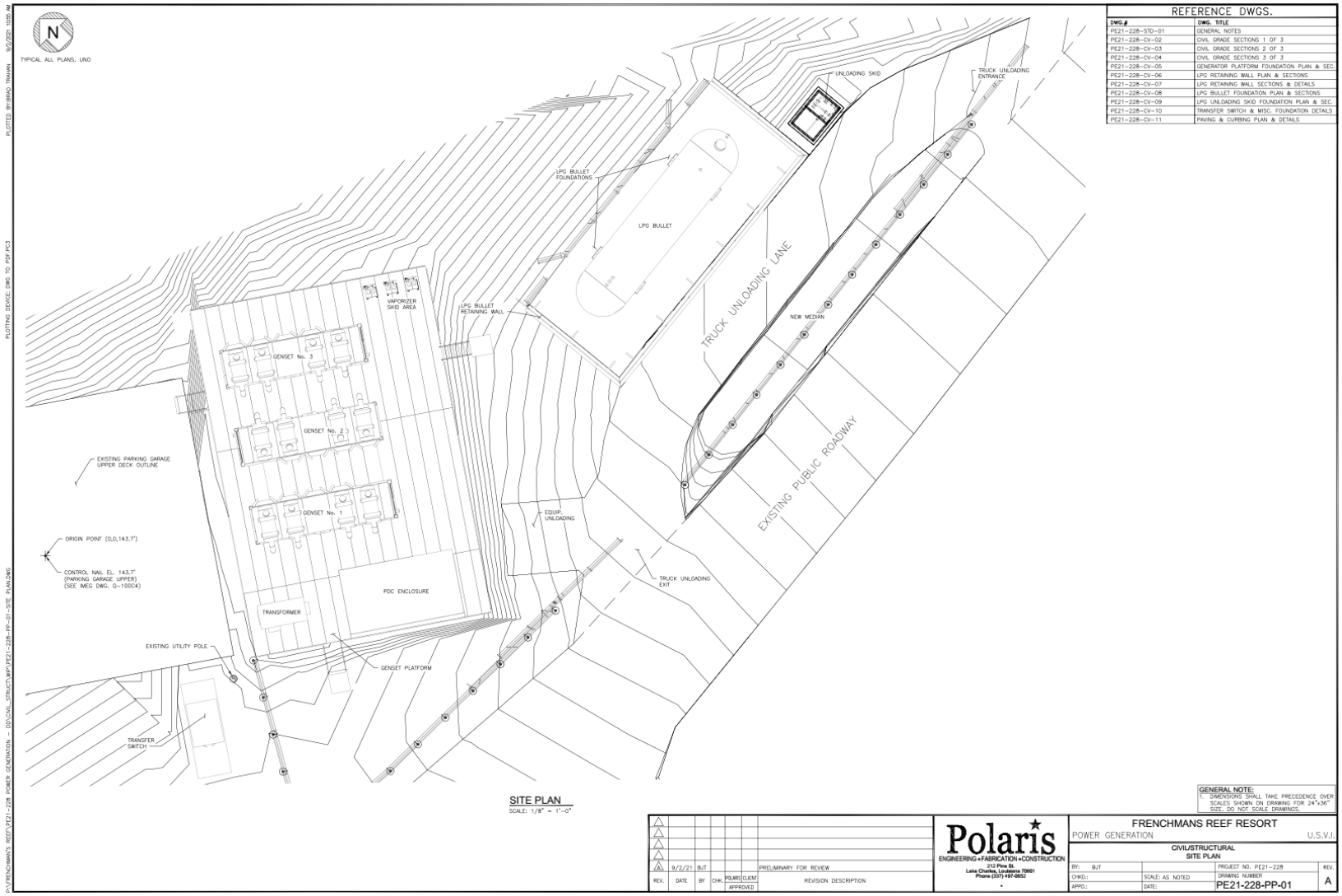
new Stairs




FRENCHMANS REEF
BOAT DOCK PLAN
PAUL FERRERAS, PE
STRUCTURAL ENGINEER
NEW DOCK
EXIST BULKHEAD TO REMAIN
DEMO EXIST DOCK STRUCTURE
Boat Dock Plan
S1



FRENCHMANS REEF
BOAT DOCK FRAMING PLAN & DETAILS
PAUL
FERRERAS, PE
STRUCTURAL ENGINEER
S2
1 DOCK FRAMING PLAN
2 DOCK - PILES SECTION
3 PILE CAP DETAILS (TYP.)
4 DOCK SECTION
5 DOCK TO BULKHEAD CONNECTION



SITE PLAN
SCALE: 1/8" = 1'-0"

REFERENCE DWGS.	
DWG.#	DWG. TITLE
PE21-228-STD-01	GENERAL NOTES
PE21-228-CV-02	CIVIL GRADE SECTIONS 1 OF 3
PE21-228-CV-03	CIVIL GRADE SECTIONS 2 OF 3
PE21-228-CV-04	CIVIL GRADE SECTIONS 3 OF 3
PE21-228-CV-05	GENERATOR PLATFORM FOUNDATION PLAN & SEC.
PE21-228-CV-06	LPG RETAINING WALL PLAN & SECTIONS
PE21-228-CV-07	LPG RETAINING WALL SECTIONS & DETAILS
PE21-228-CV-08	LPG BULLET FOUNDATION PLAN & SECTIONS
PE21-228-CV-09	LPG UNLOADING SKID FOUNDATION PLAN & SEC.
PE21-228-CV-10	TRANSFER SWITCH & MISC. FOUNDATION DETAILS
PE21-228-CV-11	PAVING & CURBING PLAN & DETAILS

GENERAL NOTE:
1. DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED SHOWN ON DRAWING FOR 24"x36" SIZE. DO NOT SCALE DRAWINGS.

REV.	DATE	BY	CHK	POLARIS	CLIENT	REVISION DESCRIPTION
1	9/2/21	BJT				PRELIMINARY FOR REVIEW
					APPROVED	

Polaris
ENGINEERING • FABRICATION • CONSTRUCTION
212 Pine St.
Lake Charles, Louisiana 70601
Phone (337) 497-0652

FRENCHMANS REEF RESORT
POWER GENERATION — U.S.V.I.
CIVIL/STRUCTURAL
SITE PLAN

BY: BJT		PROJECT NO. PE21-228	REV.
CHKD.:	SCALE: AS NOTED	DRAWING NUMBER	A
APPD.:	DATE:	PE21-228-PP-01	

PLOTTED BY:BRAD.TRAHAN 9/2/2021 10:58 AM
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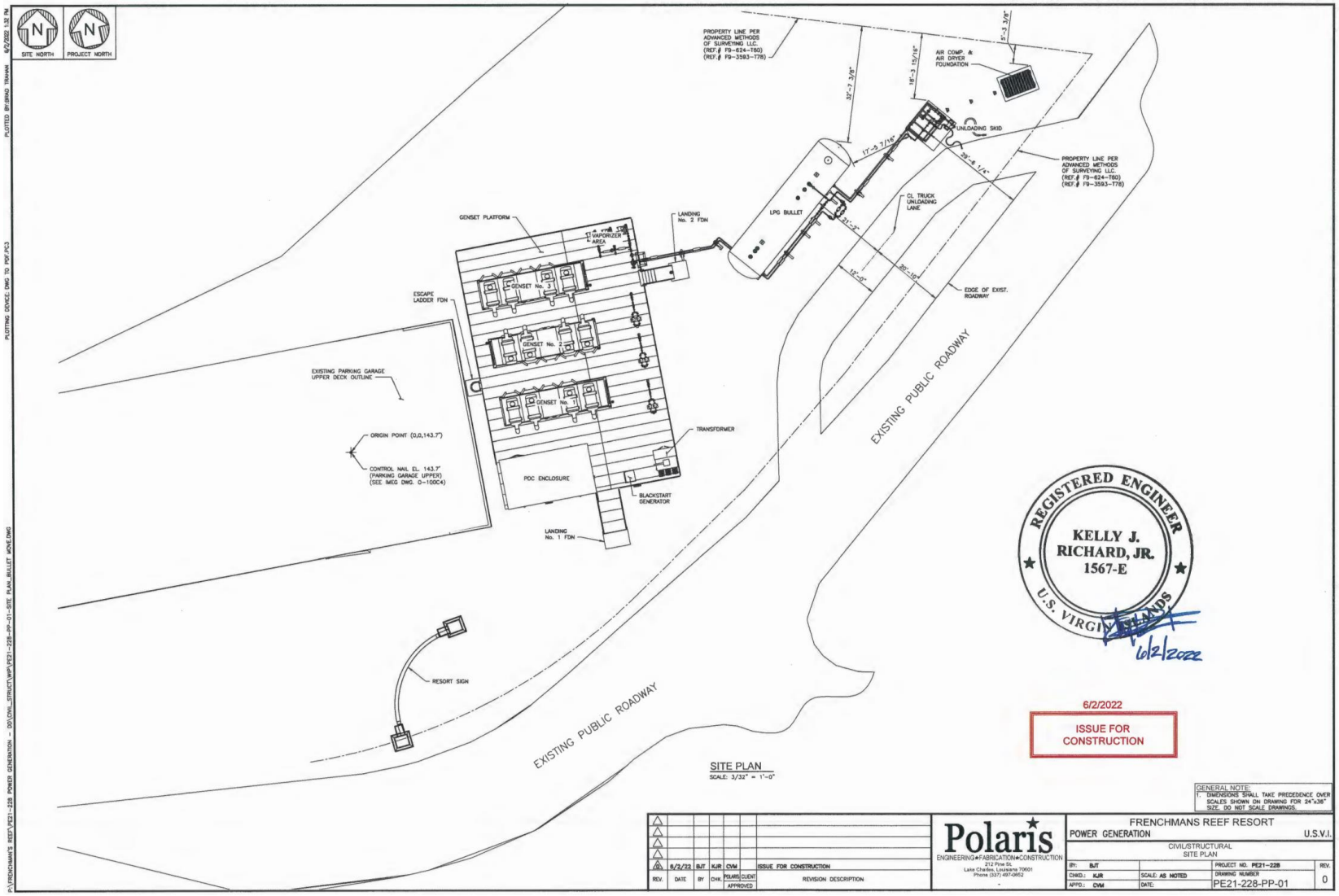
O:\FRENCHMANS REEF\PE21-228 POWER GENERATION - DEV\CIVIL_STRUCT\MKP\PE21-228-PP-01-SITE PLAN.DWG


SITE NORTH
PROJECT NORTH
PROPERTY LINE PER ADVANCED METHODS OF SURVEYING LLC. (REF.# F9-624-T60) (REF.# F9-3593-178)
AIR COMP. & AIR DRYER FOUNDATION
UNLOADING SKID
PROPERTY LINE PER ADVANCED METHODS OF SURVEYING LLC. (REF.# F9-624-T60) (REF.# F9-3593-178)
LPG BULLET
CL TRUCK UNLOADING LANE
EDGE OF EXIST. ROADWAY
GENSET PLATFORM
VAPORIZER AREA
LANDING No. 2 FDN
ESCAPE LADDER FDN
GENSET No. 3
GENSET No. 2
GENSET No. 1
EXISTING PARKING GARAGE UPPER DECK OUTLINE
ORIGIN POINT (0,0,143.7')
CONTROL NAIL EL. 143.7' (PARKING GARAGE UPPER) (SEE IMEG DWG. 0-100C4)
TRANSFORMER
POC ENCLOSURE
BLACKSTART GENERATOR
LANDING No. 1 FDN
EXISTING PUBLIC ROADWAY
RESORT SIGN
EXISTING PUBLIC ROADWAY
SITE PLAN
SCALE: 3/32" = 1'-0"
REGISTERED ENGINEER
KELLY J. RICHARD, JR.
1567-E
U.S. VIRGIN ISLANDS
6/2/2022
6/2/2022
ISSUE FOR CONSTRUCTION
GENERAL NOTE:
1. DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALES SHOWN ON DRAWING FOR 24"x36" SIZE. DO NOT SCALE DRAWINGS.
6/2/22 BJT KJR CVM ISSUE FOR CONSTRUCTION
REV. DATE BY CHK. POLARIS CLIENT APPROVED REVISION DESCRIPTION
Polaris
ENGINEERING • FABRICATION • CONSTRUCTION
212 Pine St.
Lake Charles, Louisiana 70601
Phone (337) 497-0852
FRENCHMANS REEF RESORT
POWER GENERATION
U.S.V.I.
CIVIL/STRUCTURAL
SITE PLAN
BY: BJT
CHKD.: KJR
APPD.: CVM
PROJECT NO. PE21-228
SCALE: AS NOTED
DATE:
DRAWING NUMBER
PE21-228-PP-01
REV. 0
6/2/2022 1:39 PM
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P:\FRENCHMAN'S REEF\PE21-228 POWER GENERATION - 001\CIVIL_STRUCT\MAPS\PE21-228-PP-01-SITE PLAN_BULLET MOVE.DWG

5.03 PROJECT WORK PLAN AND SCHEDULE

Upon approval of this application for the beach enhancements work will begin on the small beach area. The dry stack stone wall will be repaired and improved. And landscaping will be undertaken on the adjacent slopes. The beach area will be groomed, and sand placed above the MHW line and on the benched area. Finally, the stairs would be installed. The beach work will take approximately 1 month.

Once permits are issued and as soon as the dredging work is completed in the new dock area the new pilings will be driven and grouted and then the pile caps and decking will be installed. The dock work should take no more than 3 months.

Upon approval of permit, work will begin on clearing and grading for the placement of the fuel tank. Foundations will be poured and the walls, fencing and tank will be installed.

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 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. These storms are accompanied by intermittent rains, clouds and low visibility.

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.

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 used to be one in sixteen years (Bowden, 1974). However, the Virgin Islands were hit with two Category V hurricanes within a two-week period in 2017. The passage of those hurricanes is responsible for the damage of the existing dock and existing seawater intake structure.

Climate

The average annual rainfall on St. Thomas is approximately 45 inches, ranging from 35 inches toward the eastern end of the island to more than 55 inches at the higher elevation to the west. 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). The Frenchman's Reef area receives between 39 inches of rainfall annually. The average rainfall received in Charlotte Amalie which is located approximately 1.35 miles to the northwest between 1972 and 2009 is found in the following table.

CHARLOTTE AMALIE HAR, VIRGIN ISLANDS (678905)

Period of Record Monthly Climate Summary

Period of Record : 1/12/1972 to 4/30/2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	84.7	85.0	85.5	86.4	87.4	89.1	89.9	90.1	89.5	88.6	87.0	85.5	87.4
Average Min. Temperature (F)	72.3	72.2	72.7	74.2	76.3	77.7	78.0	78.1	77.6	76.6	75.1	73.3	75.3
Average Total Precipitation (in.)	2.03	1.45	1.46	2.74	3.35	2.75	2.66	3.83	5.42	5.94	5.54	2.84	40.01
Average Total Snowfall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 84% Min. Temp.: 83.6% Precipitation: 80.9% Snowfall: 80.1% Snow Depth: 76%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Southeast Regional Climate Center, sercc@climate.ncsu.edu

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.

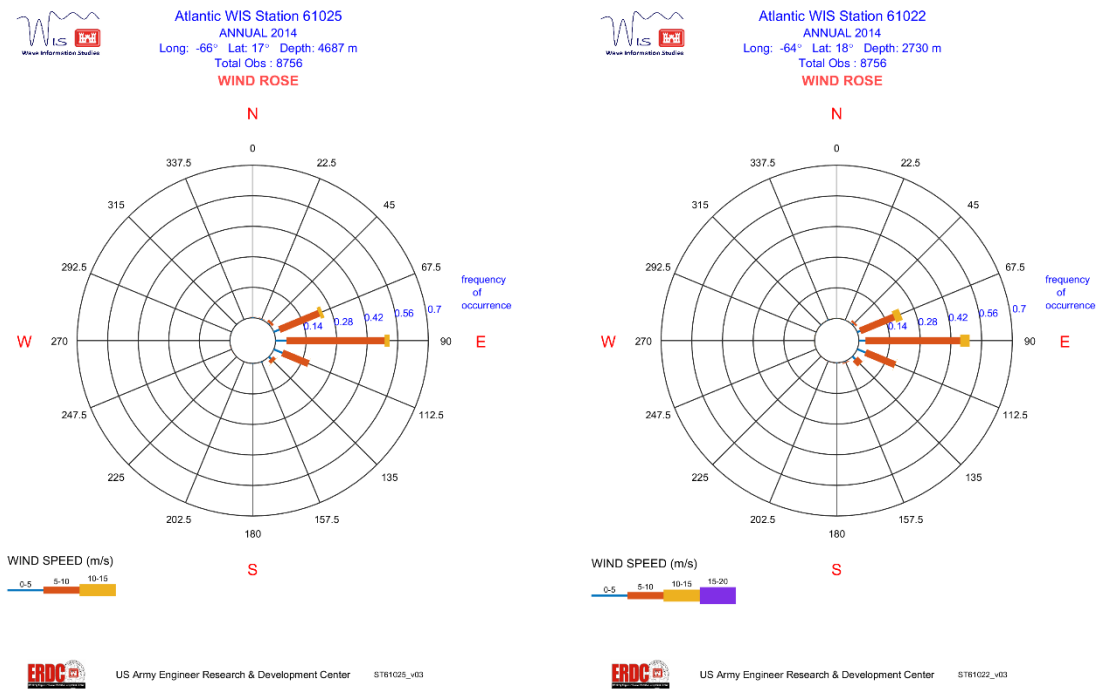
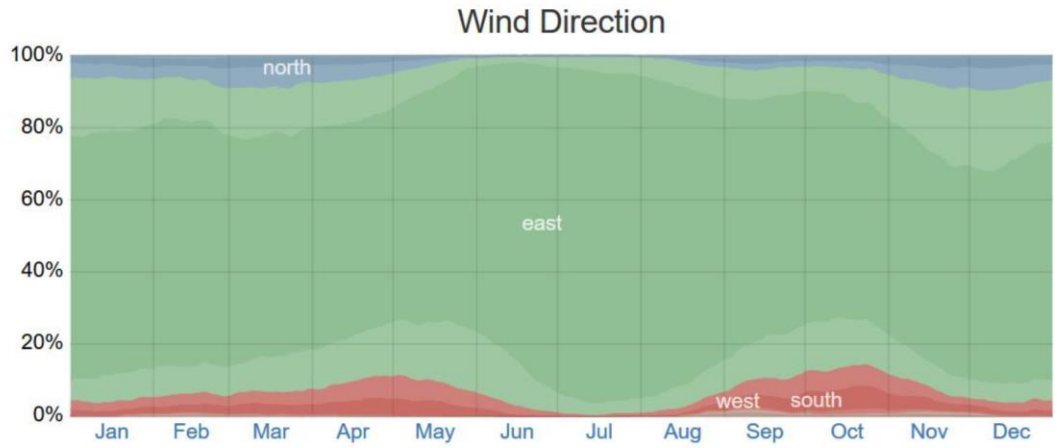


Figure 6.01.1 Wind Roses from the USACE showing the predominant easterly trade winds from the two closest buoys.



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

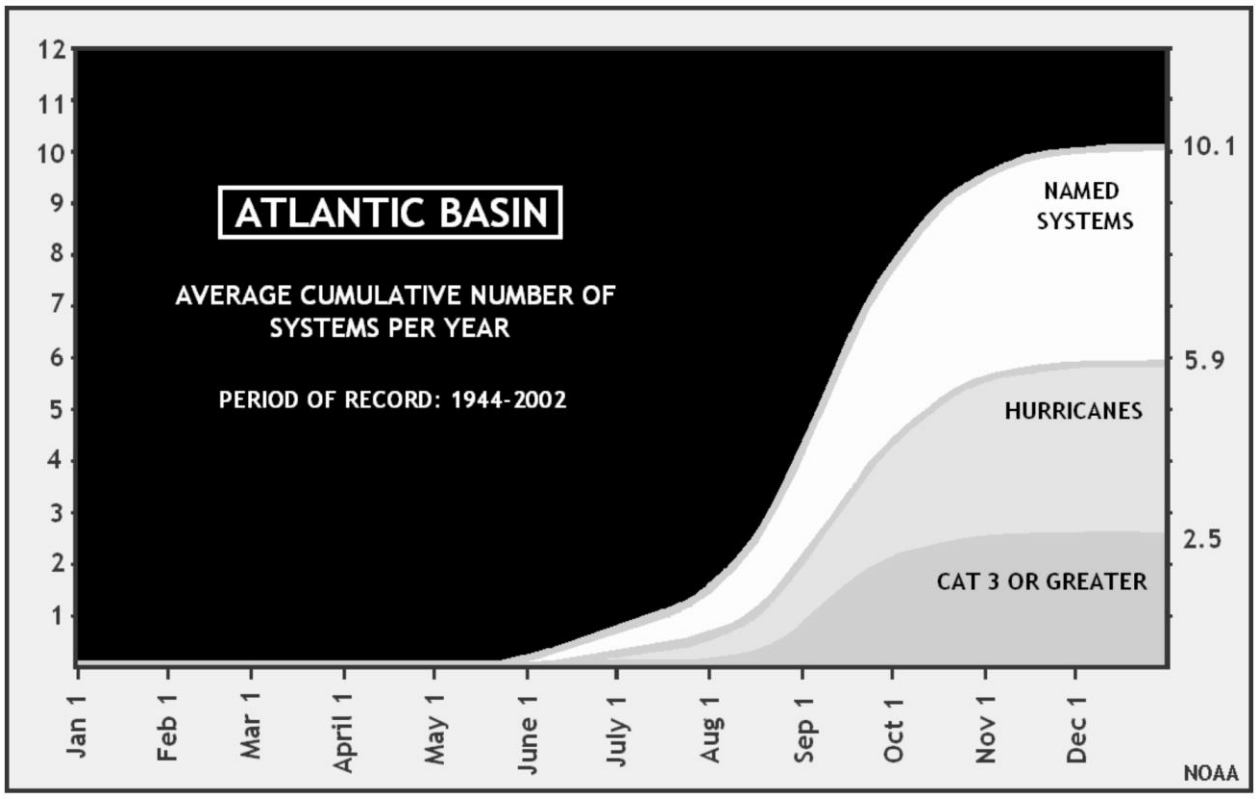


Figure 6.01.3 Tropical Cyclone Frequencies in the Atlantic (National Weather Service)

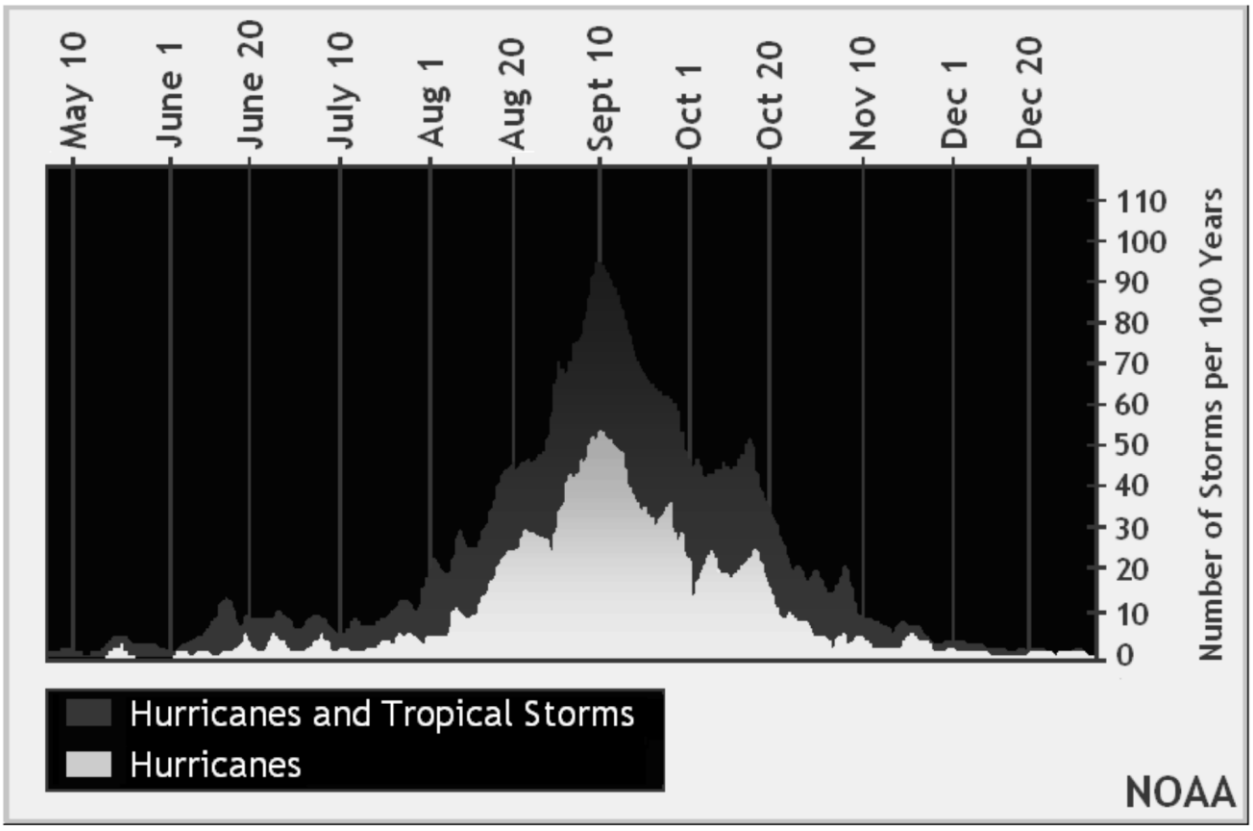
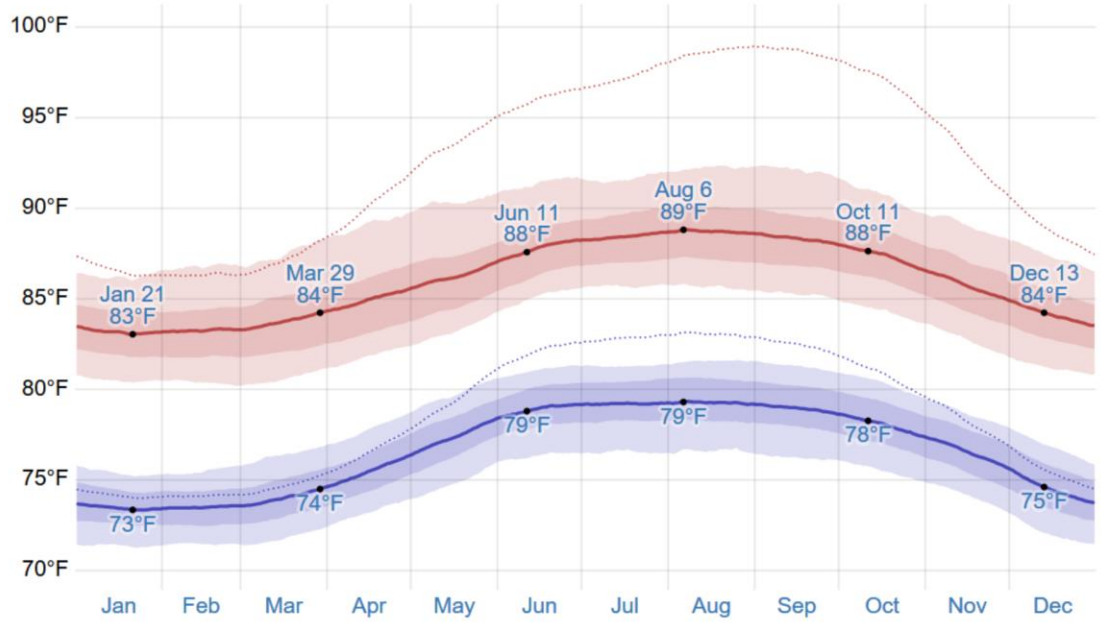


Figure 6.01.4 Tropical Storm and Hurricane Occurrences in the Atlantic (National Weather Service)

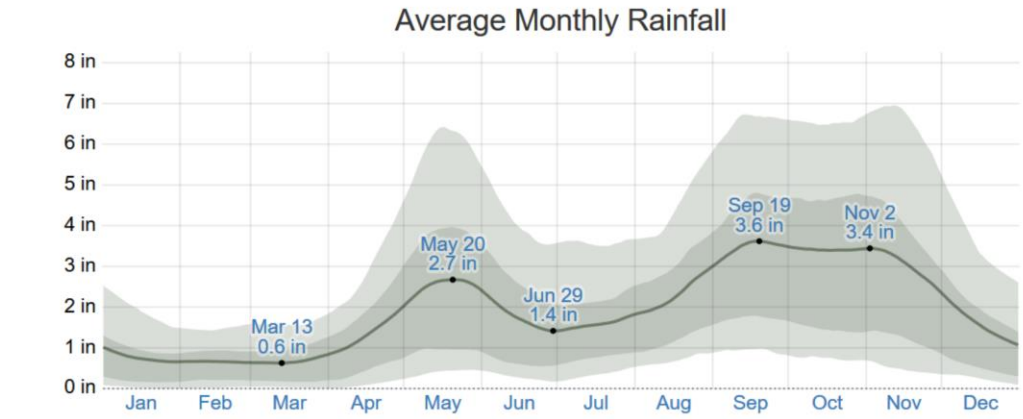
Average High and Low Temperature



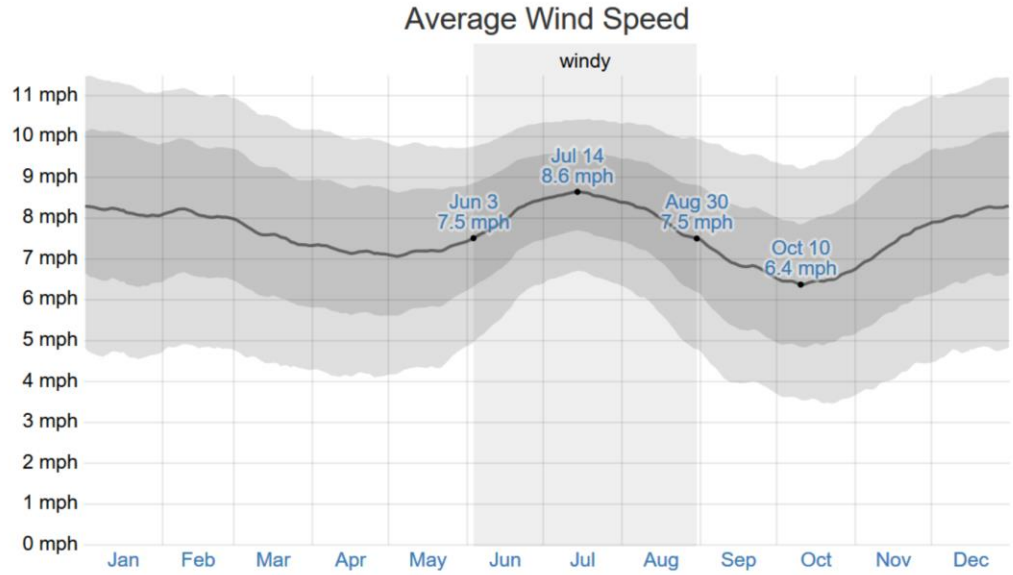
The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Daily Chance of Precipitation

The percentage of days in which various types of precipitation are observed, excluding trace quantities: rain alone, snow alone, and mixed (both rain and snow fell in the same day).



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average liquid-equivalent snowfall.



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

Figure 6.01.5 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

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. Thomas is composed of stratified volcanic and volcaniclastic rocks with minor limestone of the Early Cretaceous (Albain) to possibly the late Cretaceous Age (Donnelly 1966). These rocks are granitic composition, some of which may be as young as Tertiary (Kesler and Sutter, 1979). 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 volcaniclastic 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 of the volcaniclastic rocks of St. Thomas were deposited in a relatively short period of time spanning 10 to 15 million years approximately 100 million years ago (D. Rankin 1988).

St. Thomas is characterized by an irregular coastline, numerous bays, steep, slopes and small drainage areas. For the most part the topography is very mountainous and coastal plains are almost completely absent.

GEOLOGY OF FRENCHMAN'S REEF

Muhlenfels Point is located on the Rohde Bank east of the entrance to Charlotte Amalie Harbor. Muhlenfels Point is surrounded by rocky shores which extend out into the sea. On the south and western side of the point the steep rocky shoreline drops quickly into the sea, the northern slopes are more gentle. Off the northwest end of the point there was a submerged rocky outcropping extending into the sea. Significant amounts of fill were placed in this area to create the existing dock and surrounding land. The 1954 high resolution aerial, below, when compared to the existing topography shows how significantly the area has been changed.

Muhlenfels Point 1954

Muhlenfels Point 2018

HISTORIC USE

The site has gone through numerous developments. It was first developed by the Navy who built the first small dock on the site and later was involved in filling to create the formation which is there now. Holiday Inn once had a resort on the site. As noted on the photographs, there was a significant amount of filling on the south side of the point. During the surveys in April 2010 a large pipeline was found to the east of the current intake and outfall lines. The area has been developed for more than 60 years.

ADVERSE SITE CONDITIONS

The typical wave and wave patterns affect Muhlenfels Point. The southern shoreline in front of Morningstar has some protection from the offshore reef, but Muhlenfels Point is exposed. The existing dock is somewhat protected from the southeasterly prevailing currents and wave climate by Muhlenfels Point. The dock is exposed to seas coming from the southwest and is impacted by waves which wrap around the point from the south. The shoreline areas are in Zone AE, areas of the 100-year coastal flooding in which base flood elevations have been determined to be 11 ft. The offshore area is Zone VE, areas of the coastal flood zone with velocity hazards (wave action) (Flood Insurance Rate Map, Panel 42 of 94, revised April 16, 2007).

Figure 6.02.1 The FEMA FIRM Map dated April 16, 2007.

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 2022 marks the 155th 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. The dock is being constructed with seismic considerations in mind.

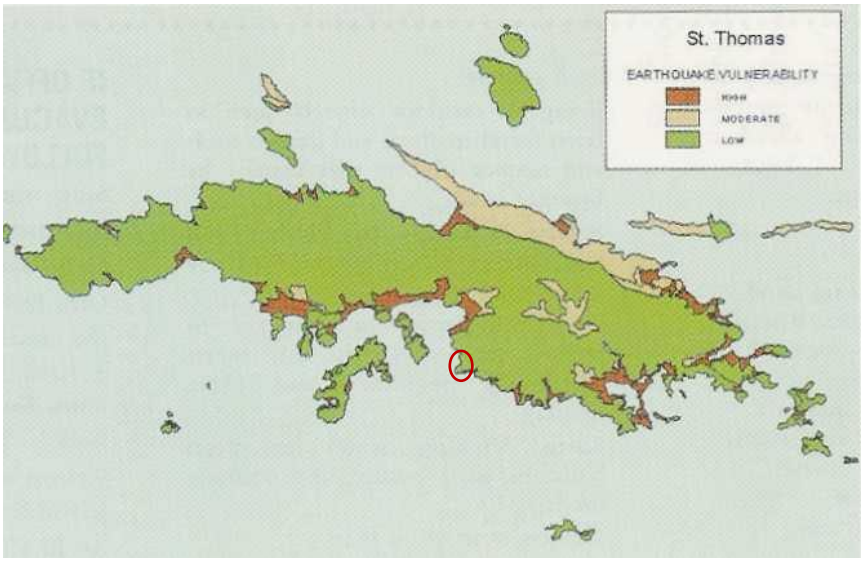


Figure 6.02.3 Earthquake probability map.

IMPACT OF PROPOSED ACTIVITIES

Enhancement of the beach area does not involve grading or alterations to the existing topography. The existing dry stack stone wall will be enhanced to stabilize the roadway bench cut on the northern beach. The project will introduce beach sand into what is now a dirt roadway.

The relocation of the fuel tank is being placed where the new WWTP was permitted, this will require grading to create the foundation for the tank placement.

6.03 Drainage, Flooding and Erosion Control
6.03 a Existing Drainage Patterns

There are two main watersheds on the Frenchman's Reef property to the north and south of the point. TPDES permitted stormwater discharge 002 discharges across the filled lands to the north and drains the water to the north and west of the ridge line. To the south and east of ridge line, the water flows to the south and to the sea. There are several drainage ways across the Frenchman's Reef property on the east side of the ridge. There is a drainage gut at the eastern end of Morningstar, and a drainage which carries runoff from around the Seacliff Building between the slope and the existing tennis courts. On the western side of the ridge, there is a large drainage area which flows down the slope to the south of the dock access road (Location of TPDES Outfall #002).

6.03 b Alterations to Existing Drainage Patterns

The beach enhancement, tank relocation and dock addition will not affect the existing drainage patterns.

6.03c Relationship of the project to the coastal floodplain

The typical wave and wave patterns affect Muhlenfels Point. The dock beach area is somewhat protected

from the southeasterly prevailing currents and wave climate by Muhlenfels Point. The shoreline area is in Zone AE, areas of the 100-year coastal flooding in which base flood elevations have been determined to be 11 ft. The offshore area is Zone VE, areas of the coastal flood zone with velocity hazards (wave action) (Flood Insurance Rate Map, Panel 42 of 94, revised April 16, 2007).

Figure 6.03.1 The FEMA FIRM Map dated April 16, 2007.

6.03 d Peak Flow Calculations

The beach enhancement and dock addition will have no impact on stormwater flows.

6.03 e Existing Storm Water Disposal Structures

The roadways have swales and runoff from the Seacliff building is directed to a swale to the west of the existing tennis courts. Runoff from the main entrance drive flows down the roadway between the main Ocean Tower Building and Harbor View Building and is intercepted by a grate drain which takes it to discharge point #002. This intercepts water flowing towards the proposed beach.

6.03 f Proposed Storm Water Facilities

No new storm water disposal structures are proposed as a part of the beach enhancements.

6.03 g Maintenance of Storm Water Control Facilities

The resort typically checks and cleans stormwater drains and features after all storm events to ensure that they do not become blocked during rainfall.

6.03 h Method of Land Clearing

The only clearing associated with beach enhancement will be removing the *Sansaveria* and other opportunistic species from the hillside and edge of the benched roadway. These will be done as part of the placement of the landscaping. The secondary growth within the footprint of the disturbance for the tank relocation will be done with a small track hoe.

6.03 i Provisions Preserve Topsoil and to Limit site Disturbance

The areas that will be impacted have already been altered in the past. Minimal topsoil should be impacted. If any topsoil is collected it will be utilized in landscaping around property.

6.03 j Presence and Location of Critical Areas

The terrestrial environment of the Frenchman's Reef has been highly altered over time through cutting, filling, the construction of buildings, roads, parking and infrastructure and landscaping. The proposed beach enhancement area has been highly altered, and there are no remaining natural resources in the project impact footprint.

The shoreline east of the dock had been "benched" to create a roadway and a place to work on boats. The area had slowly overgrown overtime and more debris accumulated. Post-hurricanes during the cleanup, numerous 40-yard bins of debris were removed.

The extremely narrow shoreline beach is not a turtle nesting beach (too narrow) and benched roadway has only some opportunistic weedy species. The steep slope up to the existing dock access road will be stabilized with landscaping.

Muhenfels Point area has sensitive marine environs. The marine environment surrounding the property has scattered diverse hard and soft coral communities. Including scattered *Acropora palmata, A. cervicornis, Orbicella annularis, O. franksi, O, faveolata,* and *Dendrogyra cylindrus* all of which are on the endangered species list. The hardbottom habitat which surrounds the point to the west is protected as a critical habitat for acropiod coral. The proposed dock extension is to the east. There are some corals within area, including several *Orbicella*s in the wider area but they area outside the area of impact during construction. There are 4 corals (3 *Siderastrea* and 1 *Porites astreoides*) within 15ft of the dock. These are outside the footprint of the dock and pilings, and the contractor will be made aware of their presence to minimize potential impact. Piles will be driven, and grouting and filling of piles will be enclosed within the piling and should not result in water quality degradation sufficient to impact these corals or the surrounding seagrass.

The proposed beach enhancement involves minimal earthwork related to the placement of landscaping and repair and enhancement of the stone wall on the beach. The sand will be placed above the MHW line and will have no impact on the marine environment. During storm events sand from the beaches may be introduced into the environment. The sand is of appropriate grain size for the area and the amount of introduction should not be sufficient to have a significant impact in suspended sediments during storm events.

There is seagrass within the project area and 24ft^2 of seagrass lies within the piling footprints. It is probably that close to 40ft^2 of Thalassia will be lost due to wave turbulence.

6.03 k Erosion and Sedimentation Control Devices to be Implemented

Silt fencing will be installed prior to any earthwork associated with the beach enhancement and relocation of the propane tank.

6.03 l Maintenance of Erosion and Sediment Control Measures

Silt fencing will be inspected daily, and after all rainfall events and repairs made if necessary. The enhancement should be completed within a month and the fuel tank placement will take approximately 3 months.

6.03 m Impacts of Terrestrial and Shoreline Erosion

The proposed modifications will have a negligible impact on terrestrial erosion and shoreline erosion. The project proposes to nourish the small beach which is currently a mix of sand and cobble. All nourishment will be above the MHW line.

6.04 Fresh Water Resources

There are no sources of fresh water on the Frenchman's Reef site. The facility relies on a combination of public potable water and reverse osmosis. The beach enhancement and propane tank placement will have no impact on freshwater resources.

6.05 Oceanography

6.05a Sea Bed Alteration

The modification includes the enhancement of a shoreline area to create small, perched pocket beach and modification to an existing dock to create a 600ft^2 "L" shaped pier.

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 around Frenchman's Reef are primarily semi-diurnal in nature, with two cycles of high and two of low water every 24 hours. The mean tides range from 0.8ft. to 1.0 ft. and the spring tidal ranges reach up to 1.3 ft (IRF 1977). . The mean tides range from 0.8ft. to 1.0 ft. and the spring tidal ranges reach up to 1.3 ft (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 and has recorded water levels since 1975. The high tide recorded on September

18, 1989 (Hurricane Hugo) was +3.35ft., in 1995 during Hurricane Marilyn the Charlotte Amalie tide station recorded the highest tide height 3.98' above Mean Lower Low Water. The lowest tide recorded was on February 6, 1985 and was -1.44ft.

The tidal ranges of the station are as follows:

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

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 Stream (Figure 6.05.1). 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, 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 (Figure 6.05.3). The current flows along the south side of St. Thomas in a westerly direction. Water flows into the harbor between the site and Hassel Island.

Currents were measured off the property with a Flowtech current meter at a depth of 1'during the months of March, April and May 2010 both off the existing dock and off the south shore of the point. The results of the current readings are shown in the table below.

Date	North (Dock)	South (Intake)
March 4, 2010	0.05m/s N	0.2m/s W
March 9, 2010	0.1m/s N	0.3m/s W
March 22, 2010	0.0m/s	0.2 m/s W
March 31, 2010	0.05 m/s N	0.2 m/s W
April 1, 2010	0.05 m/s N	0.1 m/s W
April 5, 2010	0.02 m/s N	0.1 m/s W
April 14, 2010	0.04 m/s N	0.2 m/s W
April 20, 2010	0.02 m/s N	0.2 m/s W
April 23, 2010	0.02 m/s N	0.3 m/s W
April 27, 2010	0.03m/s N	0.2 m/s W
May 4, 2010	0.02 m/s N	0.2 m/s W
May 6, 2010	0.01 m/s N	0.15m/s W

During the course of the study, the currents were always moving to the north adjacent to the dock and to the west off the south shore of the resort.

A plume study was undertaken in association with the modeling for the increase in flow associated with the chiller. The current study collected data at the site using the Flowtech Current meter, dyes and drogues is shown in the table below. The currents were found to flow to the west throughout the survey period and averaged 0.1m/s.

Date	Conditions		Speed Heading									Temperature
7/13/2010											Waterfall	33.8°
	Water 30.0°	Drogue 1									Stream	33.4°
	Wind NE26kt	Surface									Shoreline	32.30°
	Gusts to 5 kts										Rockline	29.4°
	Seas: 3 SE										Offshore	nt
(Charlotte Amalie)	Low tide 15:00	- 0.22 ft.										
	High tide 07:24	0.73 ft.										
7/14/2010											Waterfall	33.4°
	Water 30.1°	Drogue 1	Speed	Heading	Current Meter	Drogue 2	Speed	Heading	Current Meter		Stream	32.9°
	Wind ESE 2kt	Surface	0.1m/s	265.2°	0.1 m/s	Surface	0.13m/s	270.0°	0.1 m/s		Shoreline	31.1°
	Gusts to 6 kts		0.11m/s	272.1°	0.1 m/s		0.10m/s	273.2°	0.1 m/s		Rockline	29.9°
	Seas: 2-3 SE		0.1m/s	269.2°	0.1 m/s		0.11m/s	278.1°	0.1 m/s		Offshore	29.9°
(Charlotte Amalie)	Low tide 15:46	-0.05 ft.	0.09m/s	277.0°	0.1 m/s		0.1m/s	277.5°	0.1 m/s			
	High tide 08.55	0.66 ft.										
7/19/2010											Waterfall	33.3°
	Water 29.3°	Drogue 1	Speed	Heading	Current Meter	Drogue 2	Speed	Heading	Current Meter		Stream	32.6°
	Wind E 2kt	Surface	0.09m/s	271.3°	0.1 m/s	Surface	0.11m/s	278.2°	0.1 m/s		Shoreline	30.6°
	Gusts to 3 kts		0.1m/s	274.2°	0.1 m/s		0.14m/s	281.1°	0.1 m/s		Rockline	29.6°
	Seas:		0.12m/s	273.2°	0.1 m/s		0.11m/s	278.1°	0.1 m/s		Offshore	29.3°
(Charlotte Amalie)	Low tide 09:01 am		0.11m/s	276.6°	0.1 m/s		0.12m/s	273.2°	0.1 m/s			
	High tide 19:04 pm											
7/22/2010											Waterfall	32.9°
	Water 29.0°	Drogue 1	Speed	Heading	Current Meter	Drogue 2	Speed	Heading	Current Meter		Stream	32.5°
	Wind ESE 2kt	Surface	0.07m/s	272.7°	0.1 m/s	Surface	0.1m/s	274.7°	0.1 m/s		Shoreline	30.6°
	Gusts to 3 kts		0.07m/s	267.9°	0.1 m/s		0.08m/s	278.4°	0.1 m/s		Rockline	29.2°
	Seas: 2 ESE		0.06m/s	271.8°	0.1 m/s		0.07m/s	272.1°	0.1 m/s		Offshore	29.3°
(Charlotte Amalie)	Low tide 11:43	-0.28 ft.	0.08m/s	281.5°	0.1 m/s		0.06m/s	276.4°	0.1 m/s			
	High tide 20:58	0.84										
8/5/2010	Air 31,1°	Drogue 1	Purple			Drogue 2	Yellow				Waterfall	33.6°
	Water 30.4°	Surface	0.1m/s	266.45°	0.1 m/s	Surface	0.65m/s	259.51°	0.1 m/s		Stream	33.5°
	Wind ESE 6kt		0.09m/s	262.49°	0.1 m/s		0.145m/s	268.15°	0.1 m/s		Shoreline	31.4°
	Gusts to 17 kts		0.123m/s	288.68°	0.1 m/s		1.2m/2	290.62°	0.1 m/s		Rockline	30.2°
	Seas: 2-3 SE		0.13m/s	280.1°	0.1 m/s		0.17m/s	298.47°	0.1 m/s		Offshore	30.2°
(Charlotte Amalie)	Low tide 09:48 am											
	High tide 19:45 pm											

6.05C WAVES

The deep-water waves off St. Thomas are primarily driven by the northeast trade winds that blow most of the year (Figure 6.05.5). Waves average from 1 to 3 ft. from the east, 42% of the time throughout the year (IRF, 1977). For 0.6% of the time easterly waves reach 12 ft. 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 dock site and beach enhancement area are relatively protected from waves from the east and southeast by Muhlenfels Point and form waves from the west and southwest by Hassle Island and Water Island.

6.05D MARINE WATER QUALITY

The Pacquereau Bay dock location area enjoys good water quality through not as clear as the open ocean to the south. Cruise ship traffic and previous dredging activities have resulted in reduced clarity of the surrounding waters. Water samples taken during the studies in March April and May 2010 are found in the table below. The intake site (South) is located 300ft offshore south of Muhlenfels Point.

Date	North (Dock)	South (Intake)
March 4, 2010	0.97 NTU/5.5 mg/l DO	0.67 NTU/4.5mg/l DO
March 9, 2010	1.24 NTU/4.3 mg/l DO	0.87 NTU/4.2 mg/l DO
March 22, 2010	0.88 NTU/3.7 mg/l DO	0.54 NTU/5.1 mg/l DO
March 31, 2010	1.22 NTU/4.1 mg/l DO	0.66 NTU/3.8 mg/l DO
April 1, 2010	1.02 NTU/3.8 mg/l DO	0.51 NTU/3.9 mg/l DO
April 5, 2010	0.95 NTU/4.4 mg/l DO	0.54 NTU/4.1 mg/l DO
April 14, 2010	0.58 NTU/4.9 mg/l DO	0.31 NTU/3.9 mg/l DO
April 20, 2010	1.34 NTU/4.0 mg/l DO	0.44 NTU/4.4 mg/l DO
April 23, 2010	0.99 NTU/5.1 mg/l DO	0.38 NTU/3.2 mg/l DO
April 27, 2010	0.59 NTU/5.3 mg/l DO	0.39 NTU/3.9 mg/l DO
May 4, 2010	1.21 NTU/4.5 mg/l DO	0.46 NTU/4.1 mg/l DO
May 6, 2010	0.98 NTU/4.0 mg/l DO	0.73 NTU/3.2 mg/l DO

The turbidity is higher near the dock and the DO is lower near the intake. The lower dissolved oxygen was probably due to the elevated nutrients of the discharge prior to the upgrade of the WWTP and the increased flow.

With the upgrading of the WWTP in 2011 and subsequent cessation of any WWTP effluent the dissolved oxygen increased and when the chiller began operation water quality offshore increase substantially.

Post Discharge Monitoring

9/28/2012

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	29.27C	35.0‰	0.67NTU	4.2mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	29.90C	34.8‰	1.23NTU	4.3mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	29.81C	34.9‰	1.15NTU	4.5mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	29.86C	34.8‰	1.24NTU	4.3mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	29.90C	34.8‰	1.29NTU	4.5mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	29.33C	35.0‰	0.68NTU	4.7mg/l	>3m

10/29/2012

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	29.98C	35.0‰	0.86NTU	5.4mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	30.0C	34.5‰	2.02NTU	5.4mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	30.6C	34.9‰	1.19NTU	5.7mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	29.99C	34.6‰	1.58NTU	5.4mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	29.87C	35.0‰	2.00NTU	5.3mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	29.88C	35.0‰	0.65NTU	5.3mg/l	>3m

11/29/2012

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	29.23C	35.2‰	0.41NTU	4.7mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	29.43C	35.0‰	0.97NTU	4.8mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	29.65C	35.0‰	1.06NTU	5.0mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	29.67C	35.1‰	0.90NTU	5.0mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	29.54C	35.1‰	0.93NTU	5.1mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	29.31C	35.1‰	0.59NTU	5.2mg/l	>3m

12/20/2012

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	28.22C	34.9‰	0.79NTU	6.0mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	28.65C	35.0‰	0.81NTU	5.2mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	28.98C	34.9‰	0.89NTU	5.3mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	29.00C	35.0‰	0.92NTU	5.2mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	28.72C	35.0‰	0.83NTU	5.2mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	28.19C	35.0‰	0.68NTU	5.2mg/l	>3m

1/17/2013

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	27.23C	35.1‰	1.08NTU	4.7mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	28.13C	35.1‰	1.08NTU	4.8mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	28.16C	35.0‰	1.21NTU	4.9mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	28.13C	35.0‰	1.24NTU	4.7mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	28.23C	35.0‰	1.00NTU	4.8mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	27.31C	35.0‰	0.89NTU	4.9mg/l	>3m

3/7/2013

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	28.11C	35.1‰	0.66NTU	5.7mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	28.16C	35.1‰	0.58NTU	5.5mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	28.17C	35.1‰	0.65NTU	5.1mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	28.13C	35.1‰	0.64NTU	5.5mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	28.23C	35.1‰	0.75NTU	5.8mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	27.14C	35.1‰	0.72NTU	5.6mg/l	>3m

6/8/2013

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth

Control W	18°19'9.97"N 64°55'20.70"W	29.17C	35.1‰	0.91NTU	6.1mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	29.65C	35.1‰	0.86NTU	5.8mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	29.98C	35.1‰	0.88NTU	5.8mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	29.54C	35.1‰	0.94NTU	5.9mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	29.87C	35.1‰	0.95NTU	5.9mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	29.09C	35.1‰	0.92NTU	5.8mg/l	>3m

8/8/2013

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	30.11C	35.3‰	0.87NTU	5.6mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	30.14C	35.3‰	1.01NTU	5.2mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	30.14C	35.3‰	1.08NTU	5.8mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	30.23C	35.4‰	1.12NTU	5.1mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	30.45C	35.4‰	1.24NTU	5.3mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	30.13C	35.3‰	1.19NTU	5.1mg/l	>3m

10/8/2013

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	30.78C	35.6‰	0.67NTU	5.2mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	30.91C	35.6‰	0.87NTU	5.1mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	31.21C	35.6‰	0.56NTU	5.6mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	31.02C	35.7‰	0.78NTU	5.6mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	30.98C	35.5‰	0.87NTU	5.3mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	30.83C	35.6‰	0.84NTU	5.4mg/l	>3m

5/7/2013

Sample	Location	Temperature	Salinity	Turbidity	Dissolved Oxygen	Secchi Depth
Control W	18°19'9.97"N 64°55'20.70"W	28.9C	35.1‰	0.81NTU	6.1mg/l	>3m
1	18°19'10.78"N 64°55'19.09"W	29.4C	35.3‰	0.85NTU	6.3mg/l	>3m
2	18°19'10.54"N 64°55'18.72"W	29.6C	35.3‰	0.86NTU	6.2mg/l	>3m
3	18°19'10.51"N 64°55'18.09"W	29.5C	35.2‰	0.89NTU	6.4mg/l	>3m
4	18°19'10.76"N 64°55'17.72"W	29.8C	35.3‰	0.88NTU	6.3mg/l	>3m
Control E	18°19'9.46"N 64°55'16.04"W	29.0C	35.2‰	0.89NTU	6.4mg/l	>3m

The temperature in the mixing zone continues will be less than 1°C higher than the surrounding water, no other differences were evident.

The water is classified as Class B and the best usage of the water is listed as the propagation of desirable

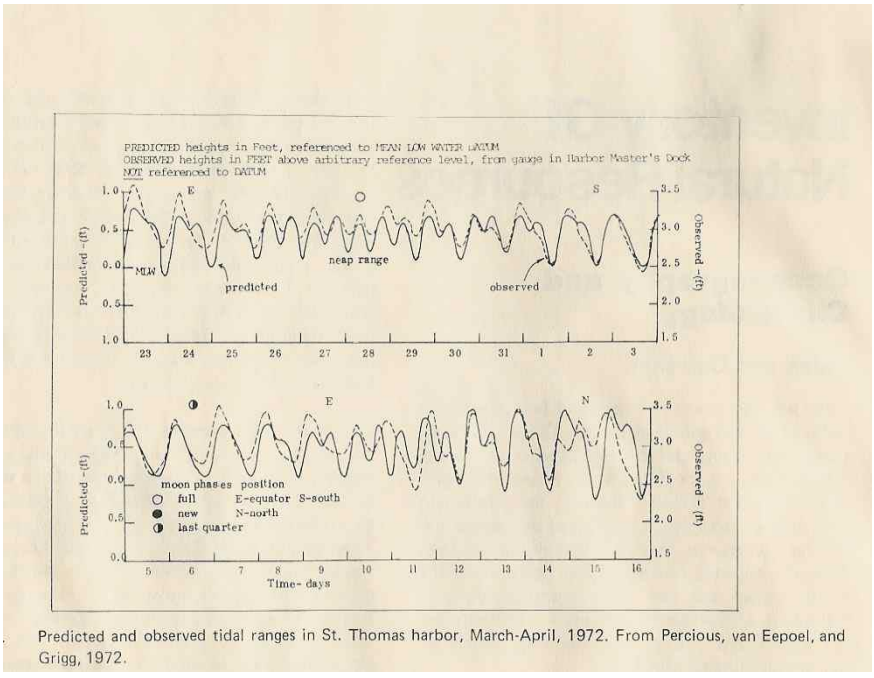
species of marine life and for primary contact recreation (swimming, water skiing, etc.). The quality criteria include, dissolved oxygen not less than 5.5mg/l from other than natural conditions. The pH must not vary by more than 0.1 pH unit from ambient; at no time shall the pH be less than 7.0 or greater 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.

The Department of Planning and Natural Resources Division of Environmental Protection takes quarterly water quality samples at station 29a Frenchman's Bay, 30 Morningstar Beach, and 31a Frenchman's Cove located at the site as shown in Figure 6.05.5. At no time does the water quality exceed Class B water quality standards.

IMPACT OF PROPOSED MODIFICATIONS

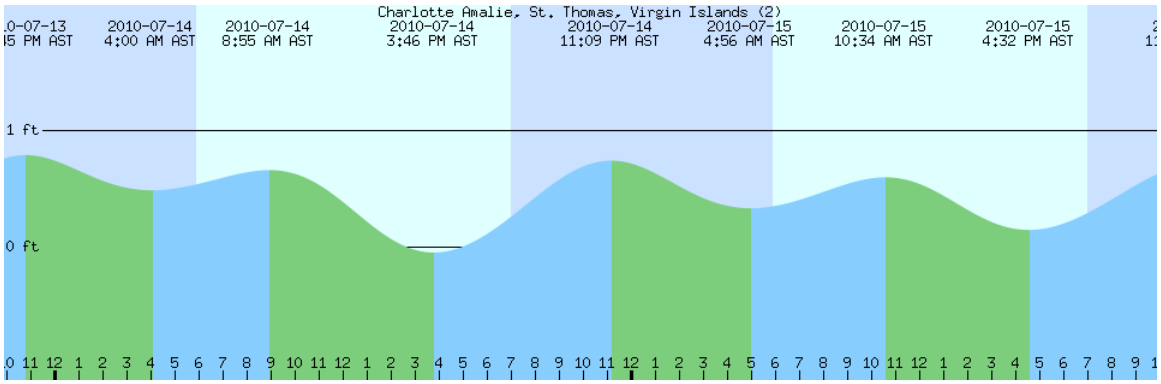
Sand will only be placed above the mean high-water line and should have a negligible impact on marine water quality. During storm events sand from the enhanced beach may be introduced into the water, the introduction of the sand into the systems during a storm event sufficient enough to impact the perched beaches should not have significant impact on water quality.

For the dock construction the piles will be driven, and a concrete will be placed into the piles through a tube system which will minimize the release of concrete into the marine environment. Turbidity barriers will be deployed during all in-water work and a Water Quality Monitoring Plan will be implemented.



Predicted and observed tidal ranges in St. Thomas harbor, March-April, 1972. From Percious, van Eepoel, and Grigg, 1972.

Figure 6.05.1 Tides recorded in St. Thomas Harbor, IRF 1975.



6.05.2 Typical tide regime at the project site.

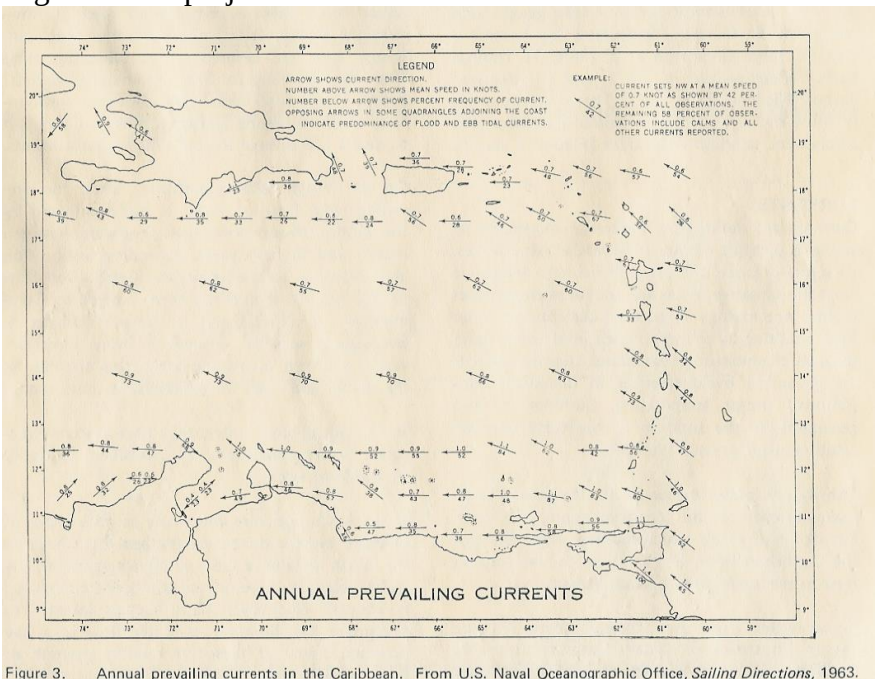


Figure 3. Annual prevailing currents in the Caribbean. From U.S. Naval Oceanographic Office, *Sailing Directions*, 1963.

Figure 6.05.3 Prevailing currents in the Caribbean, IRF 1975.

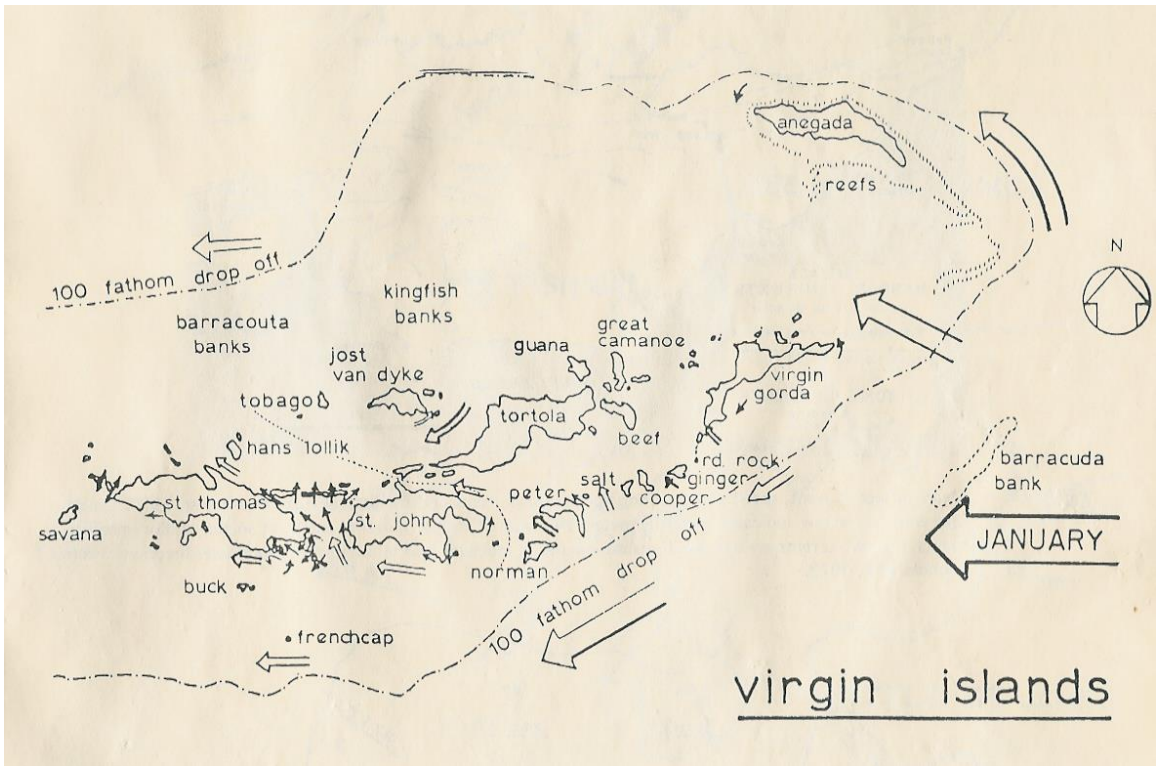
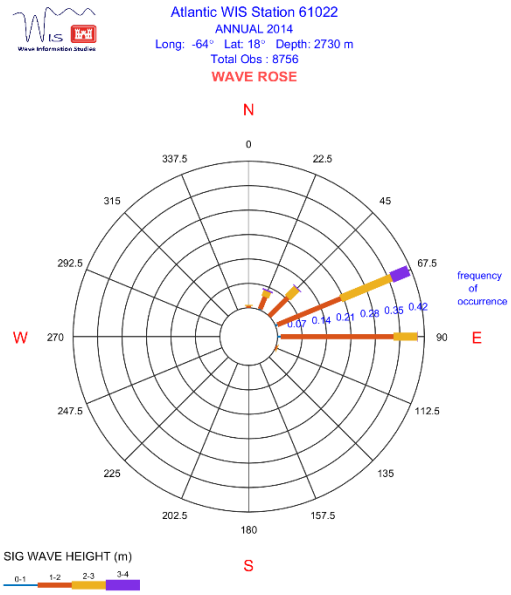
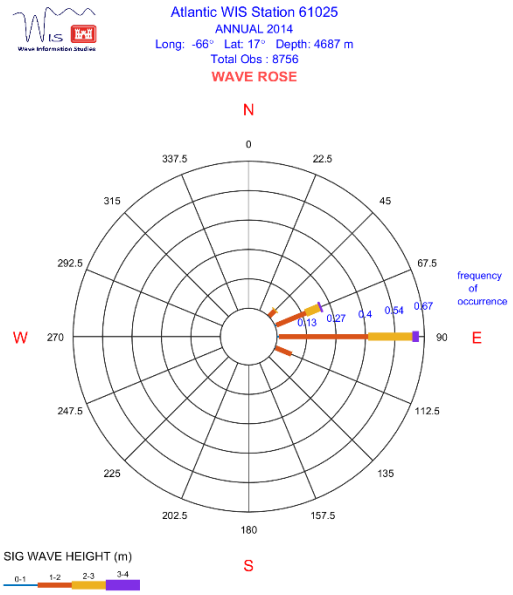
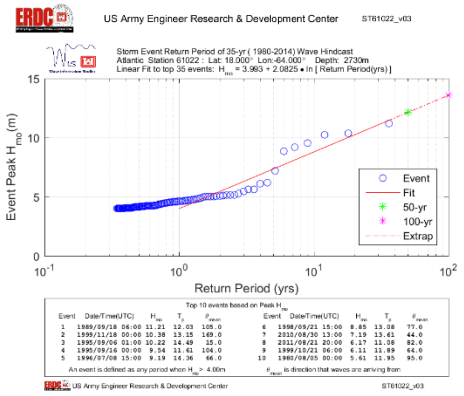
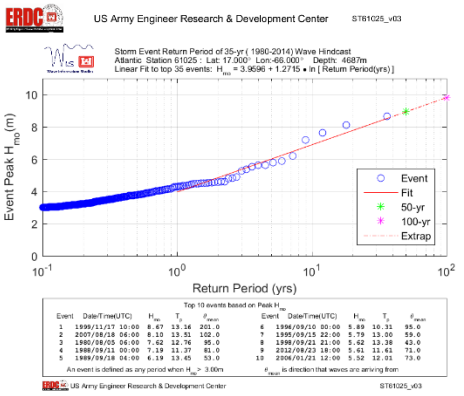


Figure 6.05.4 Prevailing current in Thomas, IRF 1975.









6.05.5 Wave Information for Station 61022 and 61025 (http://wis.usace.army.mil/hindcasts.html?dmn=atlantic)

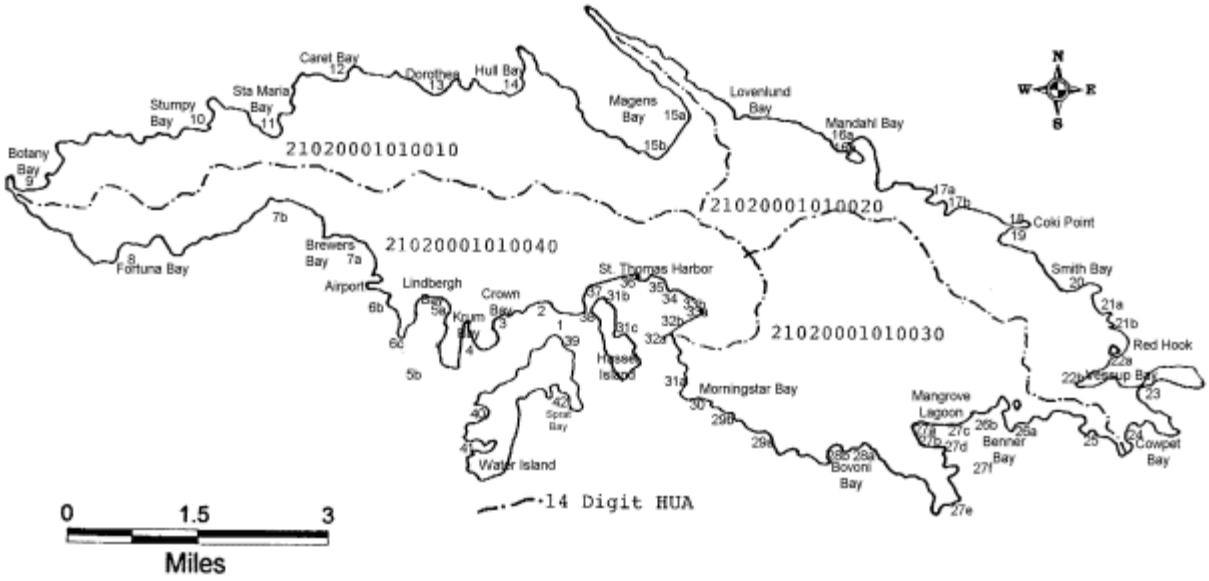


Figure 6.05.6 DPNR Ambient Water Quality Monitoring Stations around the Island of St. Thomas.

6.06 Marine Resources and Habitat Assessment

The modification includes the enhancement of the shoreline area to create a small perched pocket beach and modification to an existing dock which has permitted modifications.

The Frenchman's Reef is proposing to construct a dock extending from an existing filled dock structure located on the north side of Muhlenfels Point. The existing filled dock is an 160 ft. by 60 ft. solid concrete structure surrounded by approximately 25 ft. of riprap on the south and west sides. The proposed dock is an L-shaped dock with a 65 ft. by 6 ft. base and a 40 ft. by 6 ft. L-shaped extension. This dock has a 600 square foot footprint supported by twelve pilings that are 12 inches in diameter. The proposed dock extends from the northern side of the existing pier at a 90-degree angle.

A benthic survey was conducted by divers in Pacquereau Bay just north of Muhlenfels Point, St. Thomas on March 1, 2022. The objective of the benthic survey was to locate and identify benthic resources within the project area and footprint of the proposed dock. The survey results were then used to identify and quantify benthic impacts of the proposed dock at Muhlenfels Point.

Benthic Habitat Description
General

The dock is located in Pacquereau Bay which is part of the Rohde Bank located on the eastern side of entrance into Charlotte Amalie Harbor. The fill for the existing dock structure was placed on top of a rock outcropping in the sea and as such the western side of the structure is an area of coral colonized bedrock. To the north of the dock is sparsely coral colonized cobble/rubble and to the east of the dock beyond the berthing area there is a mixture of seagrass and coral colonized cobble. Seagrasses and cobble lie off the proposed beach enhancement area.

Methods

Divers surveyed approximately 28,000 square feet (0.26 ha) of seafloor north of the existing bulkhead. Using a handheld Garmin GPSMAP 78sc GPS, divers delineated the seagrass (Thalassia testudinum) boundary and identified, measured, and marked the location of all corals in the immediate area. If several corals were clustered within 3 feet of each other, each coral was accounted for, but one GPS location was marked to represent the cluster. The proposed dock configuration was overlaid onto maps with benthic resources to assess the potential impacts of each dock configuration. To assess the full construction impact zone, which is larger the dock footprint, a 15-foot impact buffer was placed around the dock configuration.

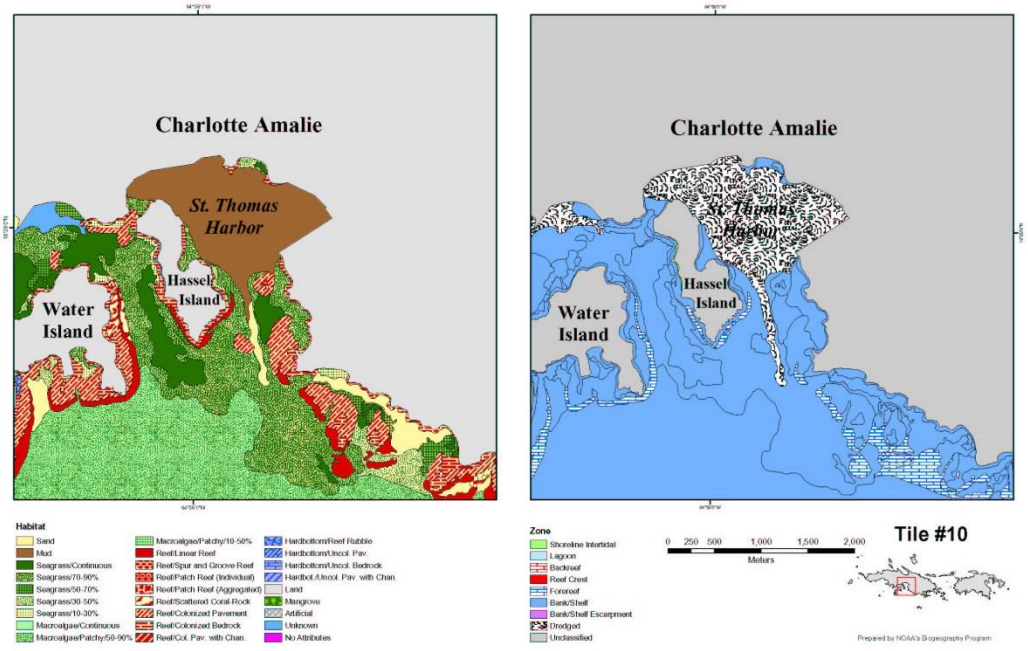


Figure 6.06.1. NOS Benthic Habitat Map Tile 10.

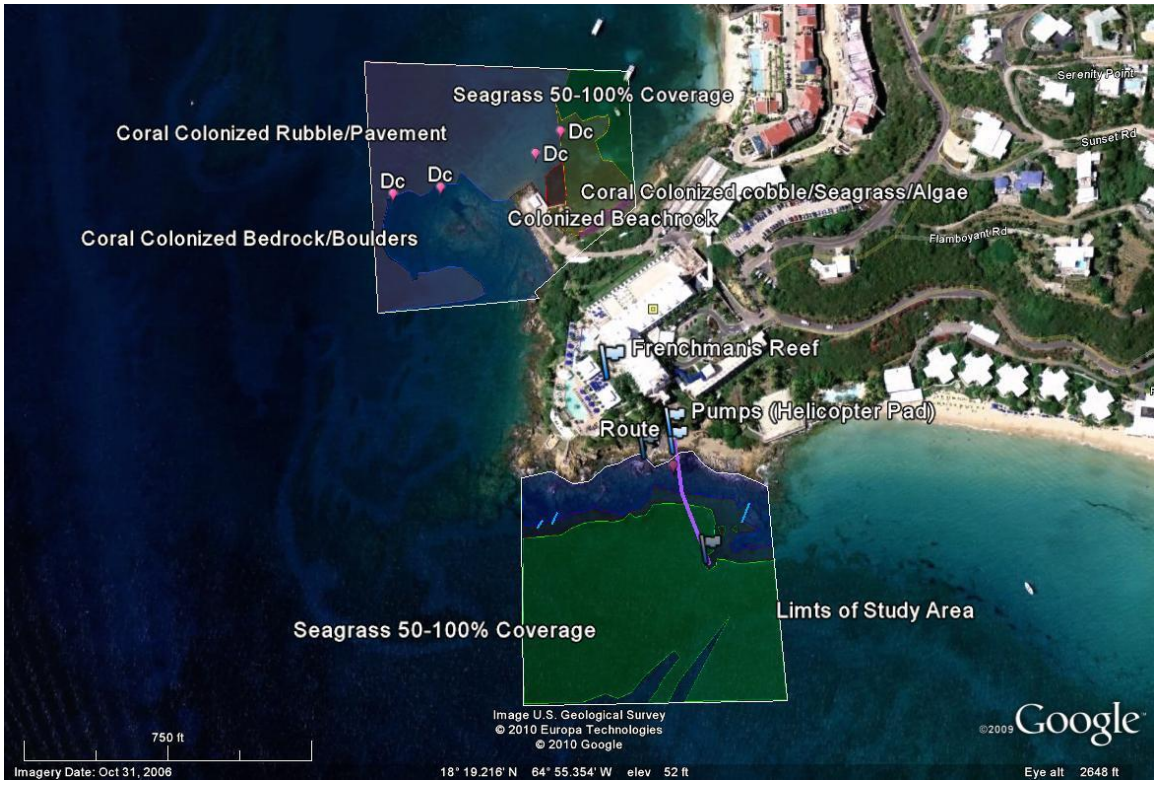


Figure 6.06.2 Benthic Habitats surrounding the areas of in water structures pre-2017 hurricanes.

Figure 6.06.3 Benthic habitats around the dock. Dc indicates the approximate location of *Dendrogyra cylindrus* colonies, Ap *Acropora palmata* colonies prior to 2017 hurricanes.

Benthic Habitat Description

The survey site is an area of 28,178 ft² (0.26 ha) located north and adjacent to the existing bulkhead north of Muhlenfels Point, St. Thomas. Fifty-one percent of the seafloor (14,410 ft² or 0.13 ha) at the survey site is colonized by seagrass. Approximately thirty-three percent (9,380 ft² or 0.09 ha) of the survey site is hardbottom habitat with sediments of various grain sizes occur within the survey site. The hardbottom habitat is unconsolidated hardbottom; there is no consolidated hardbottom present within the survey site. The remaining 16% of area within the survey site is sand habitat.

Directly adjacent to the existing bulkhead is a shallow berm made of gravel at the top and slopes down into cobble and small boulder habitat. There is an area with large and small scattered boulders in an approximately 30 ft. by 60 ft. area near the middle of the survey site. This is where most of the corals occur within the survey site. There are a few corals found colonizing isolated boulders within the seagrass, and a few corals found on boulders located on the seagrass/hardbottom boundary. Seagrass colonization begins about 55ft north of the existing bulkhead in the northeastern portion of the study site and continues right up to the boulder habitat near the center of the survey site. There is seagrass colonization close to the shoreline in the southern portion of the survey site. Sand occurs in small patches within the larger seagrass area and in areas northwest of the outer seagrass boundary in the survey area. There is also a small sandy area with some small boulders and cobble between the hardbottom berm surrounding the existing bulkhead and the seagrass boundary in the southeastern portion of the survey site.

Benthic Habitat Resources

Corals

Forty-six coral colonies from five coral species were identified within the general proposed dock site at Muhlenfels Point, St. Thomas. *Siderastrea siderea* is the most abundant coral species located in the survey area, followed by *Porites astreoides.* Twenty-five *S. siderea* coral colonies and fifteen *P. astreoides* coral colonies are in the survey area. Two ESA-listed coral species occur in the survey area: *Dendrogyra cylindrus* and *Orbicella annularis.* There is one *D. cylindrus* colony and four *O. annularis* colonies, making up five of the 46 coral colonies found in the survey. The largest corals seen are two approximately 2-foot-long *S. siderea.* Most of the corals were small; 54.3% of corals were ≤ 1.0 feet in length.

Table 1. Coral species, number, and average size of corals identified in site assessment

Species	Number of colonies	Average colony length (ft)
*Dendrogyra cylindrus**	1	1.0
Montastrea cavernosa	1	1.3
*Orbicella annularis**	4	1.1
Porites astreoides	15	0.6
Siderastrea siderea	25	0.9

Note: ESA-listed species are denoted with an asterisk (*).

There are no corals located within the dock footprint. A 15-foot buffer was placed around the dock footprint to establish a potential construction impact zone. During in-water construction, particularly when pilings are installed, water quality is often affected in the immediate area. Turbidity curtains are used to contain unsettled sediments, however corals falling within turbidity curtains are subjected to poor water quality and sunlight penetration could be effected.

There are four corals located within the construction impact zone. There are three *S. siderea* coral colonies and one *P. astreoides* colony. All corals within the impact zone are less than one foot in length. Corals within the construction impact zone should be minimally impacted if care is taken during construction. The corals should not have to be relocated if the contractor is made aware of their location and the monitor monitors their condition during construction.

Table 2. Corals within the construction impact zone of the proposed dock

Species	Colony length (ft)
Porites astreoides	0.8
Siderastrea siderea	0.8
Siderastrea siderea	0.5
Siderastrea siderea	0.5

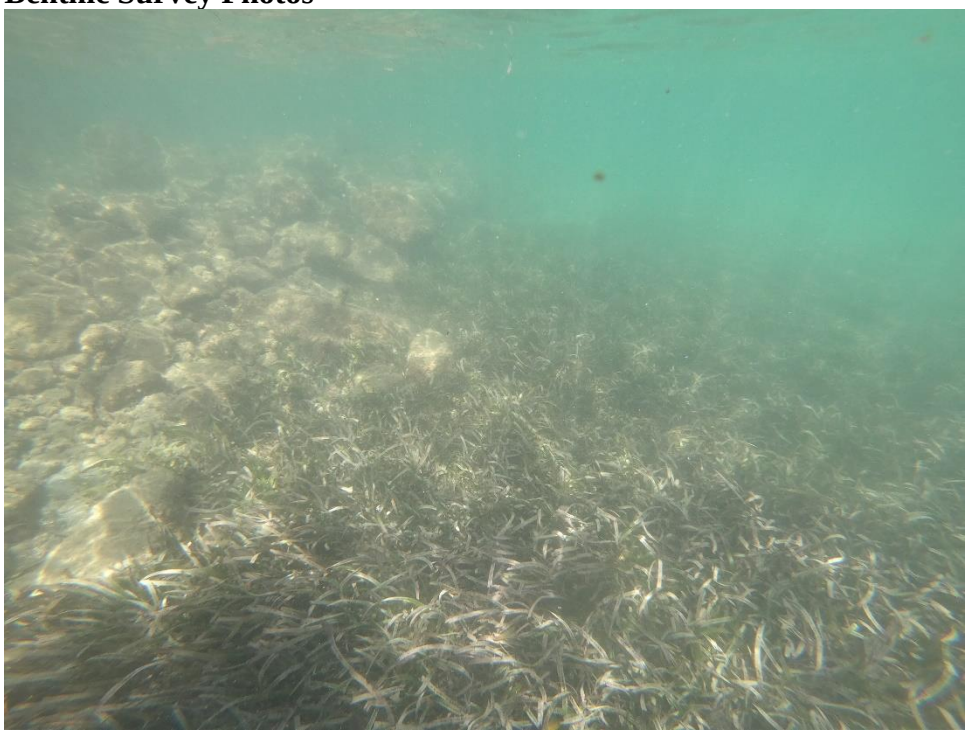
Seagrass

There is approximately 14,410 square feet (0.13 ha) of *Thalassia testudinum* (turtle grass) located in the survey area. Using the proposed dock configuration, 194.20 ft² of seagrass falls within the dock footprint. This seagrass will be indirectly affected from the dock decking that will shade the seagrass. The amount of seagrass that will be directly impacted is limited to the areas where pilings will be installed. Eight of the 12 pilings for the dock will fall within the seagrass beds. Each piling is 12 inches diameter and wave turbulence might affect another 18 inches. Therefore, the benthic impact to seagrass using a 12" piling will be 3 ft². In total, eight pilings installed in seagrass will directly affect 24 ft² of seagrass.
There is 2,295.59 ft² of seagrass located within the construction impact zone. Seagrass is more tolerant of lower light penetration, or solar irradiance. *Thalassia testudinum*, the primary seagrass on-site has a minimum light requirement range of 13 – 15% surface irradiance (Dennison et al. 1993, Fourqurean and Zieman, 1991). Because construction activities will only temporarily lower solar irradiance to levels withstand able by *T. testudinum*, it is not recommended to remove seagrass within the construction impact zone.

Hardbottom Habitat

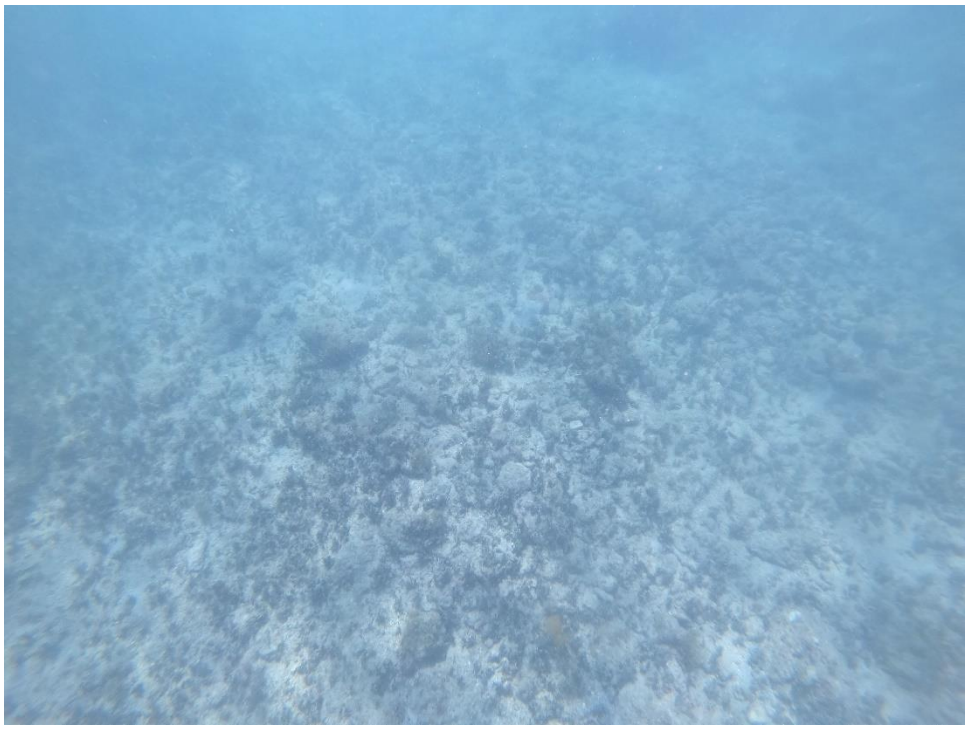
This dock configuration will cover approximately 144 square feet of unconsolidated hardbottom, and another 96 square feet of sand with small boulders. The direct impact to the unconsolidated hardbottom would be the installation of two 12" diameter pilings, which would impact 6 ft² of unconsolidated hardbottom. Indirect impact includes shading impact to 144 ft² of unconsolidated hardbottom.

Benthic Survey Photos



Seagrass extends almost to the shoreline in the southern portion of the survey site

Unconsolidated hardbottom (loose boulders) and seagrass



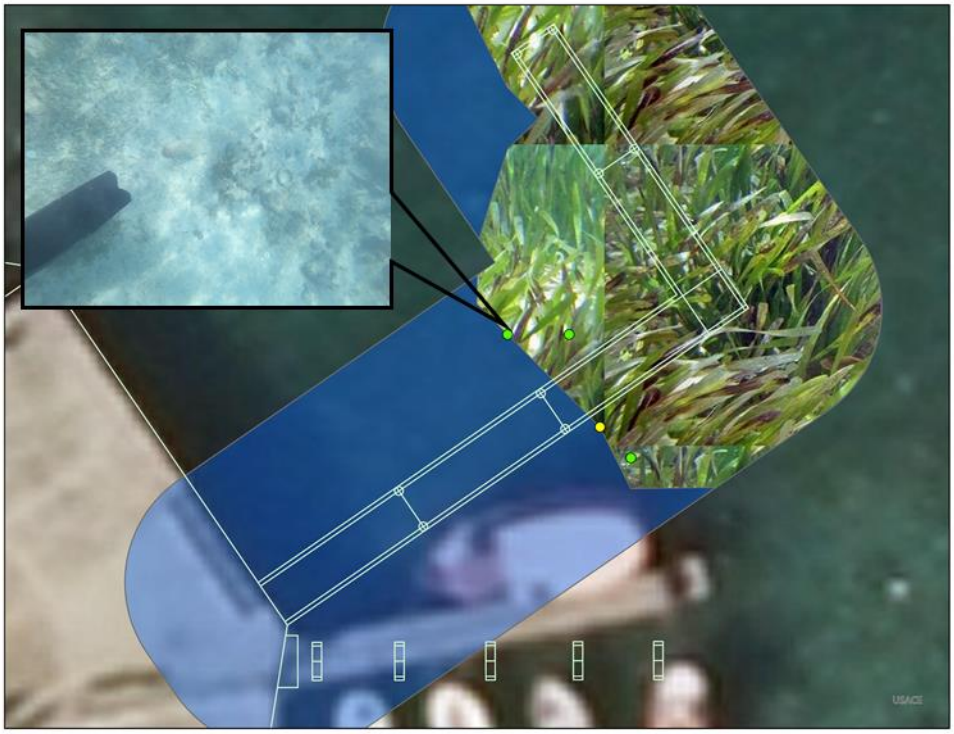
Unconsolidated hardbottom (boulders) and Halimeda algae

Large boulders at southwest side of survey site (west of proposed dock)

Seagrass/sand boundary running parallel to north side of existing bulkhead

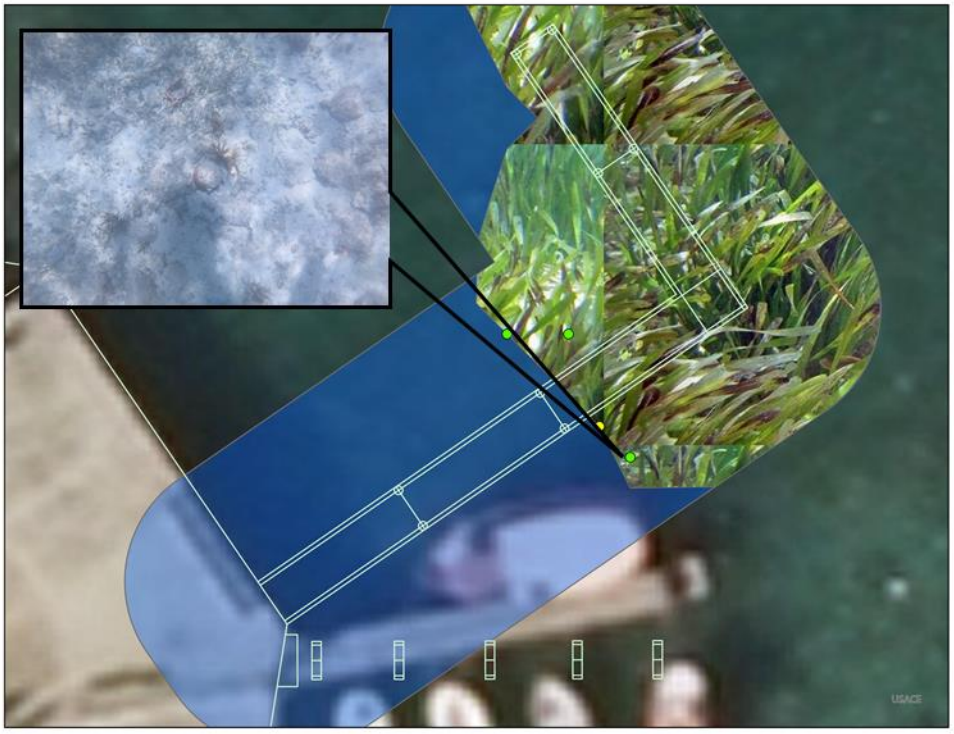
Thalassia testudinum seagrass (turtle grass)

Siderastrea siderea coral (Coral 1) located on seagrass boundary within construction impact zone



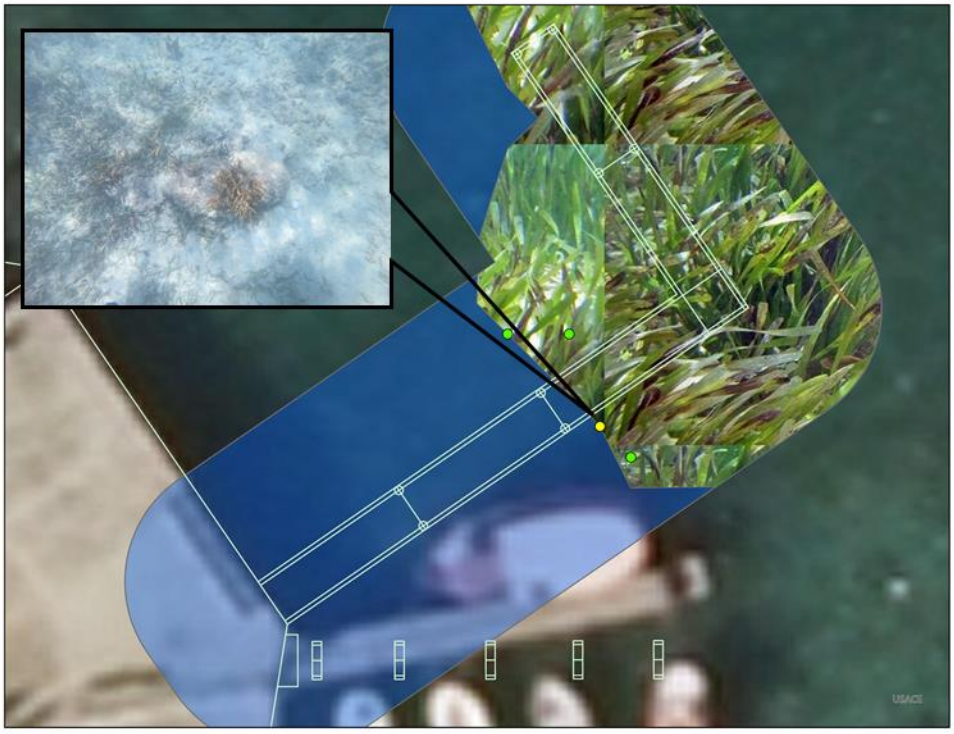
Siderastrea siderea coral (Coral 1) located on seagrass boundary within the potential construction impact zone

Siderastrea siderea coral (Coral 2) located on seagrass boundary within the potential construction impact zone



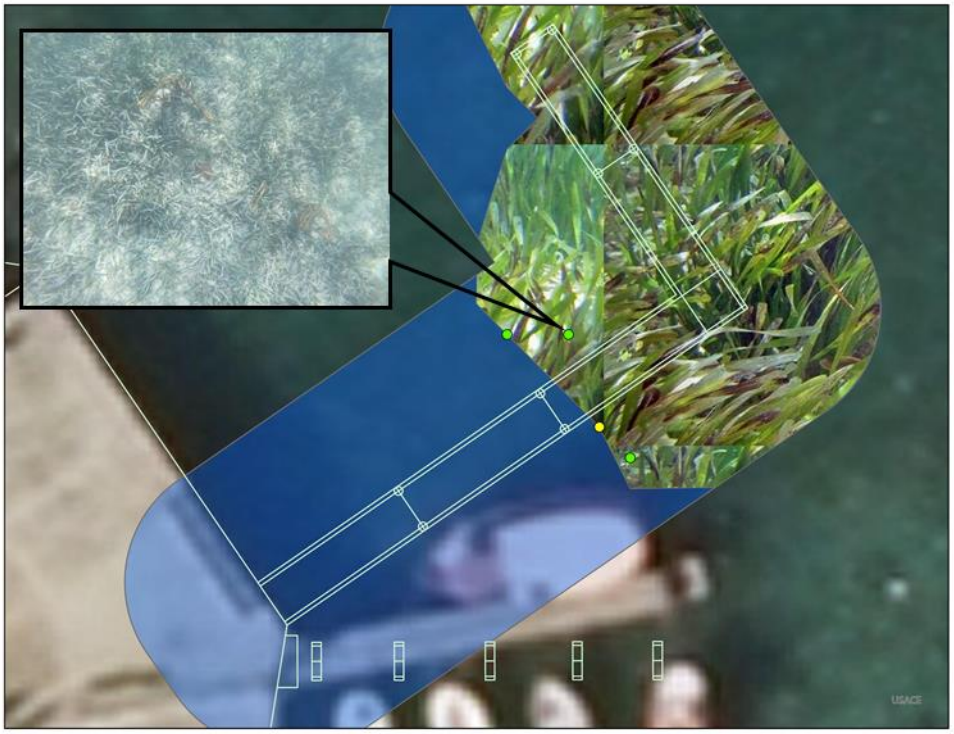
Siderastrea siderea coral (Coral 2) located on seagrass boundary within potential construction impact zone

Porites astreoides coral (Coral 3) and yellow rope sponge located on seagrass boundary within potential construction impact zone



Porites astreoides coral (Coral 3) and yellow rope sponge located on seagrass boundary within the potential construction impact zone

Siderastrea siderea (Coral 4) located in seagrass within the potential construction impact zone



Siderastrea siderea (Coral 4) located in seagrass within the potential construction impact zone

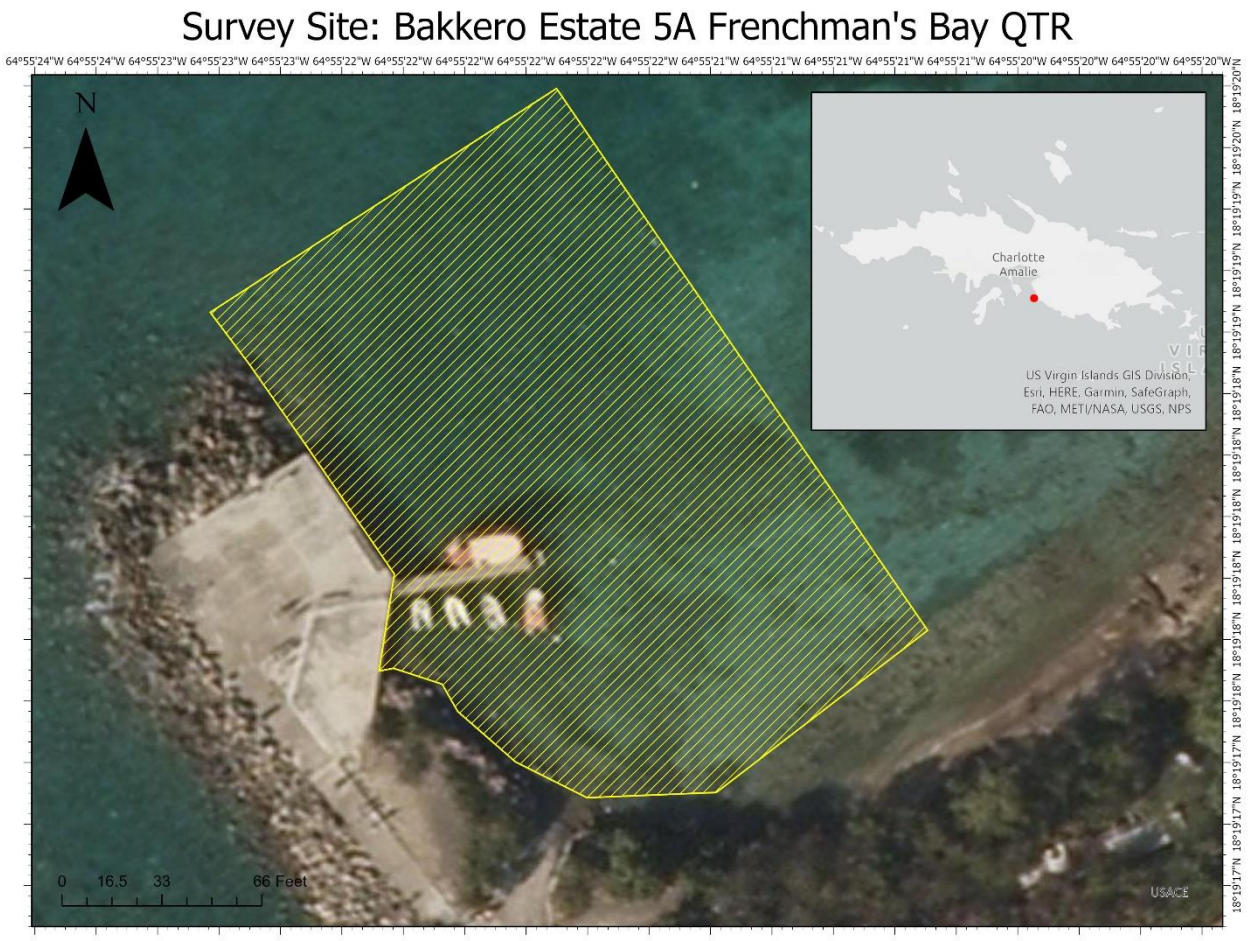


Figure 6.04. Survey Site at Estate Bakkero north of Muhlenfels Point

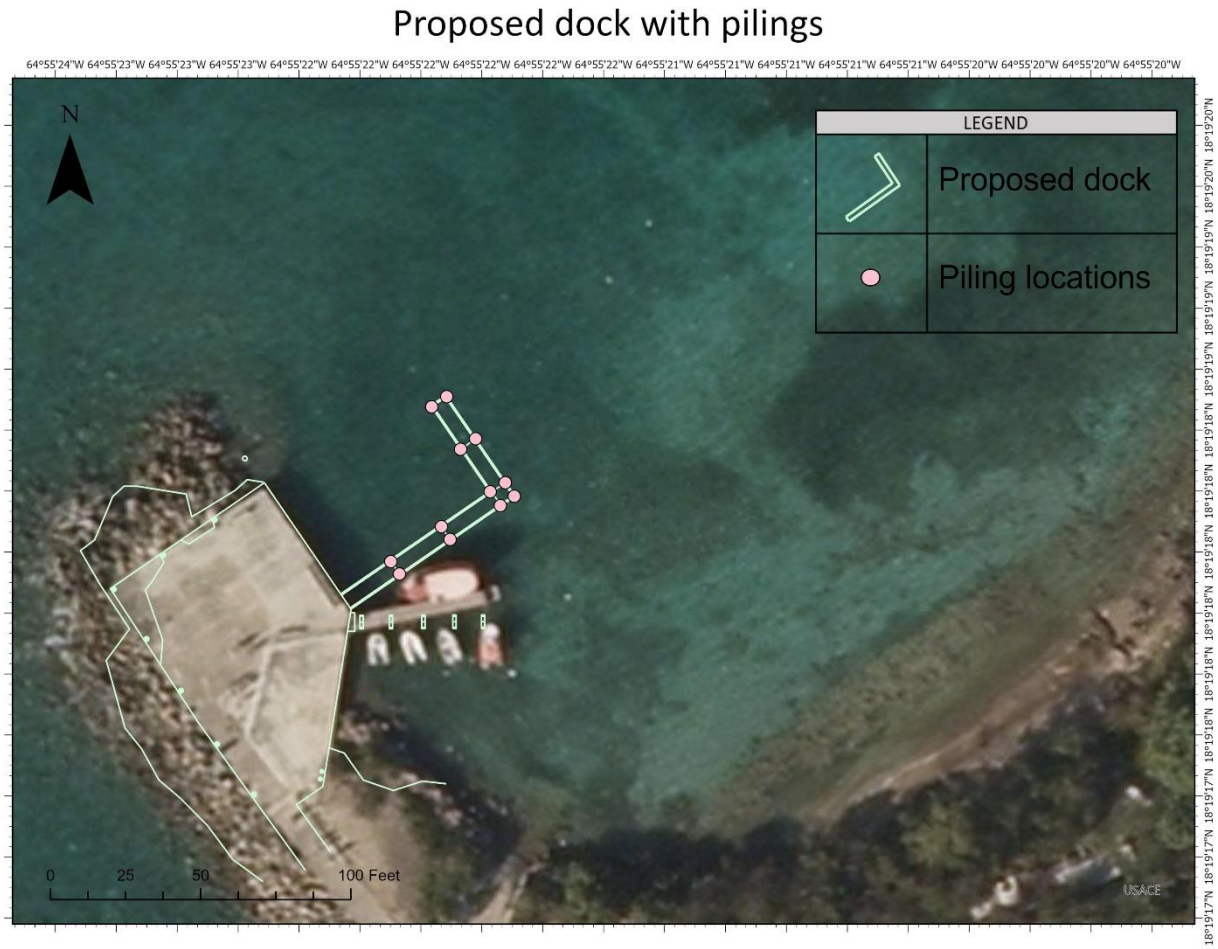


Figure 6.05. Proposed dock with pilings

Figure 6.06. Distribution of corals and seagrass at survey site. The Dendrogyra is probably a broken fragment from the large colony well to the north.

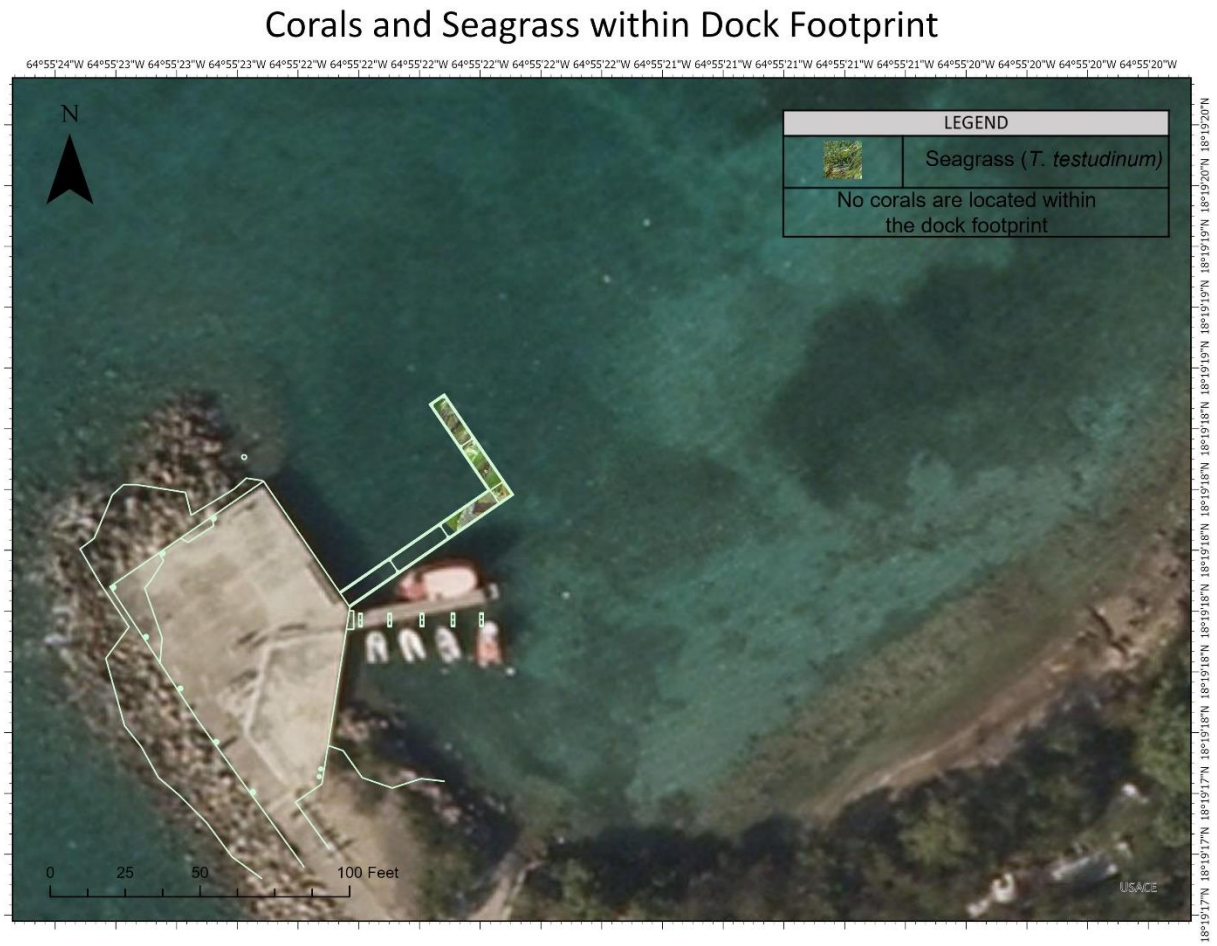


Figure 6.07. Seagrass located within the dock footprint

Figure 6.08. Corals and seagrass located within the construction impact zone

Coral Species located in Survey Area

ID	Lat	Lon	Species	Length (ft)
1	18.32172	-64.92252	*Orbicella annularis*	1.5
2	18.32170	-64.92251	*Siderastrea siderea*	0.8
3	18.32170	-64.92251	*Porites astreoides*	0.8
4	18.32179	-64.92256	*Porites astreoides*	0.5
5	18.32179	-64.92256	*Porites astreoides*	0.5
6	18.32179	-64.92256	*Porites astreoides*	0.5
7	18.32178	-64.92255	*Porites astreoides*	0.5
8	18.32178	-64.92255	*Porites astreoides*	0.5
9	18.32178	-64.92255	*Siderastrea siderea*	0.5
10	18.32178	-64.92257	*Siderastrea siderea*	1
11	18.32178	-64.92257	*Siderastrea siderea*	1
12	18.32178	-64.92257	*Porites astreoides*	0.5
13	18.32178	-64.92257	*Porites astreoides*	0.5

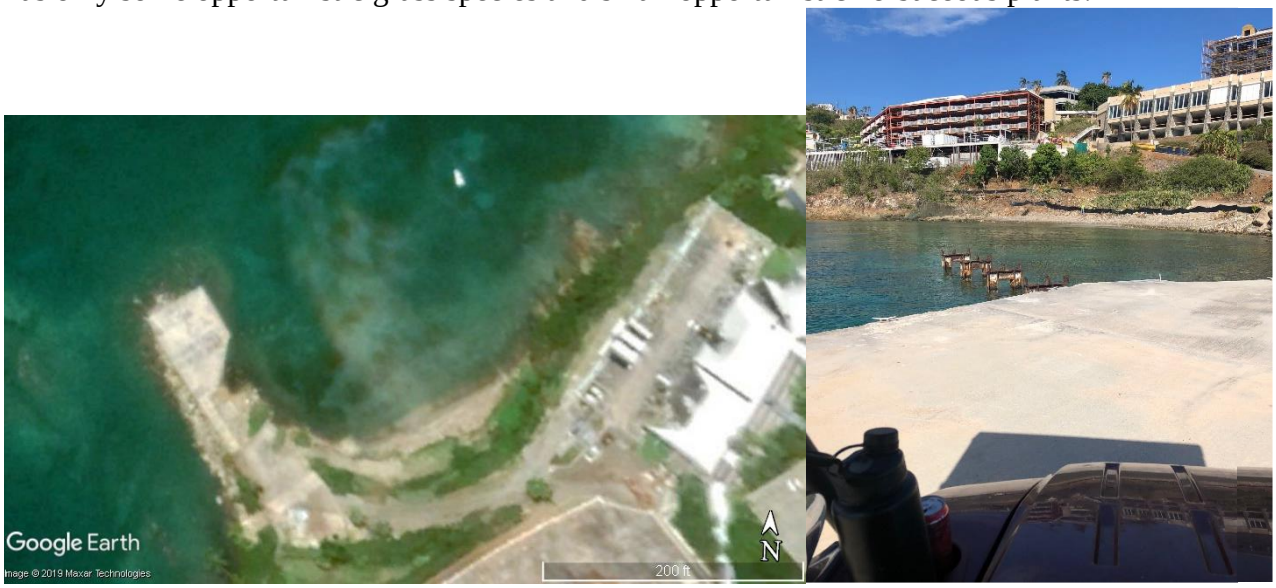
14	18.32178	-64.92257	*Porites astreoides*	0.5
15	18.32177	-64.92257	*Siderastrea siderea*	1.5
16	18.32177	-64.92257	*Siderastrea siderea*	1
17	18.32177	-64.92257	*Siderastrea siderea*	1
18	18.32179	-64.92259	*Siderastrea siderea*	1
19	18.32179	-64.92259	*Siderastrea siderea*	0.5
20	18.32179	-64.92259	*Siderastrea siderea*	1.5
21	18.32180	-64.92262	*Siderastrea siderea*	0.8
22	18.32180	-64.92262	*Siderastrea siderea*	0.5
23	18.32180	-64.92262	*Porites astreoides*	0.5
24	18.32178	-64.92265	*Montastrea cavernosa*	1.3
25	18.32178	-64.92265	*Siderastrea siderea*	1
26	18.32175	-64.92265	*Porites astreoides*	0.5
27	18.32174	-64.92263	*Porites astreoides*	1
28	18.32174	-64.92263	*Siderastrea siderea*	1
29	18.32174	-64.92263	*Porites astreoides*	0.5
30	18.32174	-64.92263	*Porites astreoides*	0.5
31	18.32178	-64.92266	*Siderastrea siderea*	1
32	18.32178	-64.92266	*Siderastrea siderea*	1
33	18.32177	-64.92268	*Siderastrea siderea*	1
34	18.32182	-64.92277	*Siderastrea siderea*	0.5
35	18.32182	-64.92275	*Siderastrea siderea*	0.8
36	18.32179	-64.92274	*Porites astreoides*	0.8
37	18.32178	-64.92273	*Siderastrea siderea*	0.5
38	18.32183	-64.92262	*Siderastrea siderea*	0.3
39	18.32183	-64.92262	*Siderastrea siderea*	0.3
40	18.32183	-64.92262	*Siderastrea siderea*	0.3
41	18.32183	-64.92256	*Siderastrea siderea*	2
42	18.32183	-64.92260	*Dendrogyra cylindrus*	1
43	18.32172	-64.92268	*Siderastrea siderea*	2
44	18.32169	-64.92262	*Orbicella annularis*	1
45	18.32169	-64.92262	*Orbicella annularis*	1
46	18.32169	-64.92262	*Orbicella annularis*	1

6.07 Terrestrial Resources

The shoreline east of the dock had been “benched” to create a roadway and a place to work on boats by the water sports operator who ran a water sports concession on the site before the hurricanes. A forty-foot container had been placed along the roadway and opened on the site to create a work area and several sheds had been constructed adjacent to the trailer. The area had slowly overgrown and more debris accumulated. Post-hurricanes during the cleanup, numerous 40-yard bins of debris were removed.

There are several *Thespesia populnea*, and *Guapira fragans* on the steep slopes that will not be removed. There are casha (*Acacia tortuosa*), limber caper *(Capparis flexuosa*), and *Sansevieria* which will be removed. The slopes will be planted with Bougainvillea and palms and other landscaping species to stabilize the slopes.

The extremely narrow shoreline beach is not a turtle nesting beach (too narrow) and benched roadway has only some opportunistic grass species and small opportunistic herbaceous plants.



The placement of the LPG Tank will impact a small section of vegetated slope that is not currently landscaped or developed. The vegetation on the slope which will be cleared is primarily secondary growth such as *Leucaena leucocephala* and *Acacia tortuosa*. But also present in low densities are ; *Bursera sumaruba, Pisonia subcordata, Citharexylum frutcosum, Capparis indica, Guapira fragrans* and *Capparis flexuosa*. About 3000sq.ft. will be cleared.

Once completed the area will be landscaped with *Bougainvillea glabra, B. spectabilis*, and *Cocoloba uvifera*.

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).

There are no terrestrial wetlands within the Frenchman's Reef property.

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*). And both green and hawksbill turtles have been seen during the monitoring of the construction and discharge. The offshore seagrass beds and coral reefs are foraging habitats for these species. The small beach on the north side of the property is not suitable for turtle nesting.

Muhenfels Point area has sensitive marine environs. The marine environment surrounding the property has scattered diverse hard and soft coral communities. Including scattered *Acropora palmata, A. cervicornis, Orbicella annularis, O. franksi, O, faveolata,* and *Dendrogyra cylindrus* all of which are on the endangered species list. The hardbottom habitat which surrounds the point to the west is protected as a critical habitat for acropiod coral. The proposed dock extension is to the east. There are some corals within area, including several *Orbicella*s and a *Dendrogyra* in the wider area but they area outside the area of impact during construction. There are 4 corals (3 *Siderastrea* and 1 *Porites astreoides*) within 15ft of the dock. These are outside the footprint of the dock and pilings, and the contractor will be made aware of their presence to minimize potential impact. Piles will be driven, and grouting and filling of piles will be enclosed within the piling and should not result in water quality degradation sufficient to impact these corals or the surrounding seagrass.

The Nassau Grouper (Epinephelus striatus) has been seen within the hardbottom community during surveys of the area. No Nassau Groupers were seen in the vicinity of the dock.

The beach enhancements will not impact on ESA listed plant or coral species. There are no ESA listed plant species (*Zanthoxylum thomasianum* – St. Thomas Prickly Ash) in the footprint of the LGP Tank.

6.10 Air Quality

All of 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).

The previously permitted modifications included the installation of a new TE Plant which will operate on LPG which will reduce the emissions from the previous diesel generation. Frenchman's Reef had gone to self-generation prior to the storm and utilized diesel powered generators. Post-hurricanes Frenchman's went back on to WAPA generated power when it became available.

7.00 IMPACTS ON THE HUMAN ENVIRONMENT

7.01 Land and Water Use Plans

The property is zoned "R-3" Residential Medium density; the proposed beach enhancements are in

keeping with the existing zoning as are the dock modifications.

The surrounding land is a mixture of land uses including residential, hotel and undeveloped land.

7.02 Visual Impact

The beach enhancements are intended to create new amenities for guest and will have a positive visual impact. There are no visual impacts due to the modification of the dock, the area already has a dock and had a pier extending off in the past. The relocation of the propane tank will put it in the footprint of the permitted WWTP, and it will be heavily landscaped and shielded to minimize impact.

7.03 Impact on Public Services

7.03a Potable Water

The modifications will have no impact on potable water use or production.

7.03b Sewage Treatment and Disposal

The modifications will have no impact on sewage treatment or disposal.

7.03c Solid Waste Disposal

There will be a minimal amount of vegetative debris during landscaping and clearing of vegetation for the LPG Tank. Debris will sorted and disposed of following current VI Waste Management Regulations. A permit will be sought for the disposal of these materials if necessary. Debris will be disposed of properly at the Bovoni Landfill.

Trash receptacles for guest will be provided for guest near each beach and these will be collected like the other receptacles on the property.

7.03d Roads, Traffic and Parking

The proposed modifications will not result in any increases in rooms or usage of the resort and therefore will not have an impact on roads, traffic or parking.

7.03e Electricity

The modifications will have no impact on electrical use.

7.03f Schools

The proposed modifications will not result in any increases in rooms or usage of the resort and therefore will not have an impact on number of operational employees and schools.

7.03g Fire and Police Protection

The proposed modifications will not result in any increases in rooms or usage of the resort and therefore will not have an impact on fire or police protection.

7.03h Public Health

The proposed modifications will not result in any increases in rooms or usage of the resort and therefore will not have an impact on number of operational employees and therefore should not increase the usage of public health facilities.

7.04 Social Impacts

The proposed modifications will not have a social impact.

7.05 Economic Impact

Frenchman's Reef was one of the largest employers in the USVI and the beach enhancements are to provide new guest amenities for the resort when it reopens later this year.

7.06 Impacts on Historical and Archeological Resources

The proposed modifications are within the previously developed Frenchman's Reef property and will not have an impact on any historical or archeological resources.

7.07 Recreational Use

The proposed modifications are going to have a positive impact on recreational use by creating additional recreational amenities for guest of the resort.

7.08 Waste Disposal

Waste associated with the proposed beach enhancement and clearing for the LPG tank will primarily be vegetative debris associated with landscaping. Debris will be sorted and disposed of following current VI Waste Management Regulations.

7.09 Accidental Spills

The only potential spills would be associated with the equipment used to repair the large rocks for the dry stack stone walls and the placement of sand. Vehicles will be inspected before use and will not be used if they show signs of leaks.

7.10 Potential Adverse Effects Which Cannot Be Avoided

The project involves the creation of a small, perched beach. The area that will be altered have been

highly altered in the past. The creation of the beaches will create the potential of additional sand entering the water during major storm events. This should have a negligible impact on the marine environment.

There are several *Thespesia populnea,* and *Guapira fragans* on the steep slopes that will not be removed. There are casha (*Acacia tortuosa*), limber caper *(Capparis flexuosa*), and *Sansevieria* which will be removed. The slopes will be planted with Bougainvillea and palms and other landscaping species to stabilize the slopes.

The placement of the LPG Tank will impact a small section of vegetated slope that is not currently landscaped or developed. The vegetation on the slope which will be cleared is primarily secondary growth such as *Leucaena leucocephala* and *Acacia tortuosa*. But also present in low densities are ; *Bursera sumaruba, Pisonia subcordata, Citharexylum frutcosum, Capparis indica, Guapira fragrans* and *Capparis flexuosa*. About 3000sq.ft. will be cleared. The construction of the new tank enclosure will result in the clearing of natural and secondary growth vegetation. The area will be landscaped once the project is complete. This will result in the loss of several common native trees.

Once completed the area will be landscaped with *Bougainvillea glabra, B. spectabilis*, and *Cocoloba uvifera*.

Using the proposed dock configuration, 194.20 ft² of seagrass falls within the dock footprint. This seagrass will be indirectly affected from the dock decking that will shade the seagrass. The amount of seagrass that will be directly impacted is limited to the areas where pilings will be installed. Eight of the 12 pilings for the dock will fall within the seagrass beds. Each piling is 12 inches diameter and wave turbulence might affect another 18 inches. Therefore, the benthic impact to seagrass using a 12" piling will be 3 ft². In total, eight pilings installed in seagrass will directly affect 24 ft² of seagrass.

This dock configuration will cover approximately 144ft^2 of unconsolidated hardbottom, and another 96ft^2 of sand with small boulders. The direct impact to the unconsolidated hardbottom would be the installation of two 12" diameter pilings, which would impact 6 ft² of unconsolidated hardbottom. Indirect impact includes shading impact to 144 ft² of unconsolidated hardbottom.

8.00 Mitigation Plans

Minimal impacts are expected due to the modifications. No Mitigation for impacts is proposed.

9.00 Alternatives to Proposed Action

The modification are intended to create additional recreation amenities for resort guest and visitors. The project could not be built, and the area could be left as is. The dock could not be built and once the permitted dredging is completed vessels could pull along side the filled structure, but this only provides limited dockage.

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

The proposed modifications are enhancements to an area of the shoreline which current are not used by guest or wildlife. Enhancement to areas to previously disturbed areas with minimal resources is a good short term use of the environment. The landscaping of the slopes is a good long-term measure to protect the marine environment. The proposed modifications are upgrades and improvements to the existing resort and in keeping with the rules and regulations of the Coastal Zone Management Program.

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APPENDIX II

Water Quality Monitoring Plan
MODIFICATIONS AND UPGRADES TO THE FRENCHMAN'S REEF & MORNING STAR RESORT

Introduction

DiamondRock Frenchman's Owner, Inc. (DRFO) is seeking to modify CZT-04-11(L) and CZT-08-14(W) to harden the Harbor View Building to meet FEMA 361-compliant safe rooms standards, enclose the outer wall and add an elevator, an elevator in Coco Joe's to provide ADA access, modify the existing tennis courts to create Palm Court, add a new welcome house, construct a new Wastewater Treatment Plant, construct a new power generation plant (Turbines), construct a new Seawater Reverse Osmosis Plant, create a new RO discharge, modify the Morningstar Pool, and add sitework and landscaping associated with new lift stations. The modifications will also include the relocation of the seawater intake from the south side of the property to a location adjacent to the existing dock off Muhlenfels Point in Pacquereau Bay, repairs to the dock, and removal of the existing intake structure. These modifications seaward of the MHW line also require the modification of SAJ-1990-50163(NW-EWG).

Sea Water Intake Structure

The existing seawater intake has been problematic since its installation. The environment off the south shore of Muhlenfels Point is extremely rough and as a result the intake line has been damaged repeatedly. Various attempts and modifications have been made to stabilize the structure, but without undertaking rock penning to the rocky shoreline, the intake line will continue to be damaged due to bad seas. Furthermore, the currents tend to push the intake basket towards the sand which results in the suction of large amounts of sand into the system.

A new seawater intake is proposed to be incorporated within the existing dock. This location is expected to:

1) Minimize impact to the surrounding marine environment

2) Improve intake water quality

3) Minimize the potential for damage from future hurricane events

4) Maximize the potential for mixing of the membrane concentrate

The intake structure will be located in a concrete structure adjacent to the existing concrete pad and the dock will be expanded to encompass and protect the intake. Water from submersible well pumps will be transported to the SWRO and to the chillers in flexible, inert high-density HDPE built into the dock and then buried. The structure will be designed to resist storm surge and seismic loading. Walls and top of the structure are anticipated to be 10-inch thick and reinforced with corrosion resistant epoxy coated bars. The top substructure will be designed to carry the load of all five of the submersible pumps. The top will contain all of the access hatches and be designed to carry the weight of pump service equipment as well as the load appropriate for the use of the dock structure. The seawater withdrawal system or intake will contain five submersible well pumps. Three pumps rated at 1200 gpm will be dedicated to feeding the chillers located under the Ocean Tower building. Two pumps will be operating the chillers and the third

pump used to alternate between the two. The other two pumps will be dedicated to feed the SWRO treatment units. The intake pumps are sized to deliver seawater to the desalination facility to meet both plant capacity and media filter backwashing requirements. The intake structure is to be a concrete box approximately 16 feet square with flat, well screens on three of the four sides designed to control the water intake to 0.5 foot per second through the screens thereby minimizing entrapment and impingement of organisms. Screens will be fastened to the intake box walls for easy removal for maintenance and cleaning. By raising the intake screens approximately 4 feet off the sea floor, the introduction of sand and debris can be minimized while also provide screening of marine life. The use of well screen also reduces the intake velocity to 0.5 foot per second. The pumps will be placed in pitless adapters inside the intake structure for easy removal for maintenance. The bottom of the pitless adapter will be fitted with well screens for further protection against the intrusion of sand and marine life.

The intake box will be designed to resist hurricane force wind and wave action and will be anchored to the sea floor. The delivery pipes will be placed along the concrete pad and pier and anchored securely at regular intervals. Both the piping and intake will be protected by the new dock and boardwalk. The anchoring system will be designed to restrain the outfall.

Dock Improvements and Maintenance Dredging

The existing filled dock structure was undermined and damaged by the hurricanes of 2017 and boulders, gravel and sand were pushed around the point and deposited in the dock's berthing area. The small finger pier was destroyed and only the metal pilings remain. DRFO proposes to place the seawater intake structure within the repaired dock structure, and repair the slab as described above. DRFO proposes to resituate the boulders and riprap which were displaced by the storm and dredge approximately 155 cubic yards of material to restore the berthing area and to clear the existing boat ramp. Only material deposited by the storms will be removed. The remaining piles of the old finger pier will be removed.

A piled structure would be built along the eastern side of the existing dock bulkhead extending out 30ft from the bulkhead and enclosing the proposed seawater intake structure (the dock will extend 15ft. beyond the intake). The new dock structure would extend length of the previous docking area, 39.13ft (east northeastern face of the existing bulkhead) and a 9ft. wide boardwalk would then extend 54.83ft along the eastern face of the bulkhead. The dock would be constructed on 12-inch diameter wooden piles on 10ft. centers and the pile caps, stringers and decking would be of wooden construction.

Construction Methods

The construction of the seawater intake structures, the dredging, and dock repairs will all be done from the dock structure itself. The material which needs to be dredged is within easy reach of an excavator on the dock. Material will be dredged and placed on the dock to de-water back within the turbidity barriers. After the material has dewatered sufficiently, it will be placed in trucks and carried on land to an area to dry.

A double set of proper length (one-foot from the seafloor) turbidity barriers will be installed prior to any dredging. The turbidity barriers will surround the dredge area and runoff from dewatering.

Turbidity barriers will be monitored continually during the dredging operation; if curtains become damaged or are not working properly repairs will be made. This water quality monitoring plan will be undertaken during all in-water work and dredging. If curtains are found to be ineffective in containing the turbidity, additional measures, including providing addition curtains, slowing the work, or even periodically stopping work to allow for turbidity to settle, will be implemented.

Water Quality Monitoring

Prior to the start of construction, a baseline of water quality conditions will be established. Location of the baseline sampling locations are shown below in Figure 1. During construction a total of four (4) sampling locations will be established within the potential impact footprint and two (2) control sites, one to the east and one to the west of the project area. The monitoring samples will be collected in the areas most likely to be impacted by the dredging and installation activities. The control sites will be located in areas which should be exposed by the same ambient conditions but should not be impacted by the construction project.

At each site the turbidity expressed as NTUs will be analyzed with a YSI meter or HACH meter and secchi disc readings will be taken. Samples will be taken at a depth of 1 meter. The meter will be calibrated daily before use. Samples will be taken on a weekly basis for two (2) months prior to the start of construction to establish a baseline. Baseline data will be used to compare with data collected during the construction to help assess whether readings are a result of the construction project or are due to ambient conditions.

The site locations for the baseline study are illustrated on Figure 1 which follows.

Figure 1- Water Quality and Environmental Monitoring Locations Baseline -Green points represent the control sites and red monitoring sites.

During Construction

During in water construction, four (4) samples will be taken immediately around the area of in-water work at the sample sites shown in Figure 1. Samples will be taken one (1) meter below the surface. and will be analyzed for turbidity expressed as NTU. Secchi disc readings will also be made. Samples will be taken no less than twice a day and at least 4 hours apart. Monitors will inform the contractors when they see issues with the turbidity control or see issues which may affect the surrounding environs.

The control samples will be utilized to determine whether elevated turbidity is a function of the project or due to ambient conditions. As per the Virgin Islands Code, visual depth visibility readings (Secchi disk measurements) should not fall below one (1) meter; NTU readings may not exceed three (3) NTU in class C waters.

Baseline samples will be utilized to determine if elevated readings are the result of sea conditions.

Wind speed and direction, wave height and direction, and rainfall will be recorded at the time of sampling.

If turbidity becomes elevated and exceeds 3 NTU activities will cease until the issue is resolved and turbidity falls below 3 NTU. In the event background or ambient turbidity levels exceed 3 NTU, activities will cease if samples around the construction area exceed the background levels. Activities will cease until turbidity falls back to ambient levels.

During construction, when the water samples show NTUs readings in excess of the allowable limits, Department of Planning and Natural Resources (DPNR), Division of Environmental Protection (DEP) and KMI will be notified by email. The baseline samples will be utilized to determine if an increase in turbidity is a result of natural phenomena or if the monitoring sample is elevated above the ambient background as a result of the construction activity. If it is determined that the elevated turbidity is the result of the construction activity, the source of the problem will be identified, and methods worked out to reduce suspended sediments in the future. If turbidity cannot be control by implementing additional measures the activity must slow down to limit introduction of fines and will have to stop every time turbidity exceeds 3 NTU and allow water to clear. A representative must be on hand at the site at all times who has the authority to implement sediment control devices, or stop construction so that problems can be solve or resolved.

Reporting

Weekly reports will be prepare documenting the activities and water quality sampling results and what actions were taken if elevated turbidity readings occurred or if any other impact was noted.