Managing Land Based Pollution Threats in St. Croix's East End Marine Park, U.S. Virgin Islands

Call Order EA133C-17-BA-0054/1305M220FNCNP0321

March 2024

PREPARED FOR:

NOAA Coral Reef Conservation Program

PREPARED BY:

Horsley Witten Group, Inc

Contents

Introduction

This project builds on long-term investments to reduce land-based sources of pollution (LBSP) in the east end watersheds of St. Croix, U.S. Virgin Islands. In 2011, the St. Croix East End Watersheds Management Plan (2011 WMP) was produced and identified over 50 site-specific structural, as well as a dozen watershed-wide programmatic management actions to reduce LBSP impacts to the STXEEMP[1]. In 2023 the updated St. Croix East End Watersheds Restoration Strategy 2023 -2028 identified 24 sites for restoration focus moving forward. Out of the 24 identified sites, 4 were given priority due to the presence of vulnerable coral reef species, the focus on coral restoration efforts, and where stakeholders have supported potential watershed restoration projects that focus on LBSP[2]. Two of the four sites, Boiler Bay and Goat Hill Rd., were selected to begin advancing restoration efforts and progress is discussed below. Both sites were also priorities from the 2011 WMP.

Objectives & Deliverables

The objectives of this call order were to advance LBSP management in the STXEEMP by:

1. Identifying 1-2 priority restoration projects;
2. Coordinating partners and developing project designs; and
3. Constructing 1-2 restoration projects.

Another key element of this effort is to demonstrate how to apply the new stormwater standards adopted in the USVI to restoration projects.

Accomplishments

We were able to coordinate with partners, property owners, and permitting agents on two (2) priority restoration projects in the STXEEMP, Boiler Bay and Goat Hill Road. Existing conditions survey, draft memorandum of agreement, permit-ready design plan, and a CZM minor permit package were completed within the period of performance.

At the Boiler Bay site, we coordinated with partners and developed engineering design plans for an exposed parking area, and two eroding trails, where one trail is currently used for vehicular access to the beach. We collaborated on restoration design concepts and conducted onsite visits with partners to discuss the design concepts and permitting requirements while in the field. Discussions and feedback were integrated into the design

Endangered coral and sea turtle nesting site in STXEEMP. Eroding trail used as a dirt road to access beach.

[1] Horsely Witten Group (2011) St. Croix East End Watersheds Management Plan. Accessed March 24, 2024.

[2] Horsley Witten Group (2023) St. Croix East End Watersheds Restoration Strategy 2023 – 2028. Accessed March 24, 2024.

concepts and further revised. Property management is currently being transferred from the Dept. of Sports, Park, and Recreation to the new Division of Territorial Parks and Protected Areas (DTP) under the Department of Planning and Natural Resources. We met with the Director of DTP and CZM staff to walk through the design concepts and solicit further input. We are currently working on the permit application and navigating through property transfer for this project. A memorandum of agreement is under development to allow for access to the site for restoration activities and to transfer long-term maintenance responsibilities to the DTP.

Access to Goat Hill Road off East End Rd. 2024.

Goat Hill Road and trail was also a priority site for erosion control. The Nature Conservancy (TNC) owns the land and trail system above the satellite dish, but the GVI owns the road entrance up to the first bend in the road uphill. It is currently uncertain if the deed will be transferred to the new division of Territorial Parks and Protected Areas from the Department of Sports, Parks, and Recreation. We had a site visit with TNC to discuss potential solutions to erosion and vehicular access at this site. They confirmed that the road still contributes sediment during rain events to the bay below Cramer's Beach. The preferred restoration concept at this site includes blocking vehicular access, narrowing the road to a 3-4 ft wide pedestrian trail by planting native trees, installing water bars and turnouts to get water off the trail surface, and encouraging low-impact parking options for access to the trail at the satellite dish.

Boulders were installed at the starting point to TNC's trail to prevent vehicular access.

Example of a hybrid road closure technique in Culebra used to close roads.

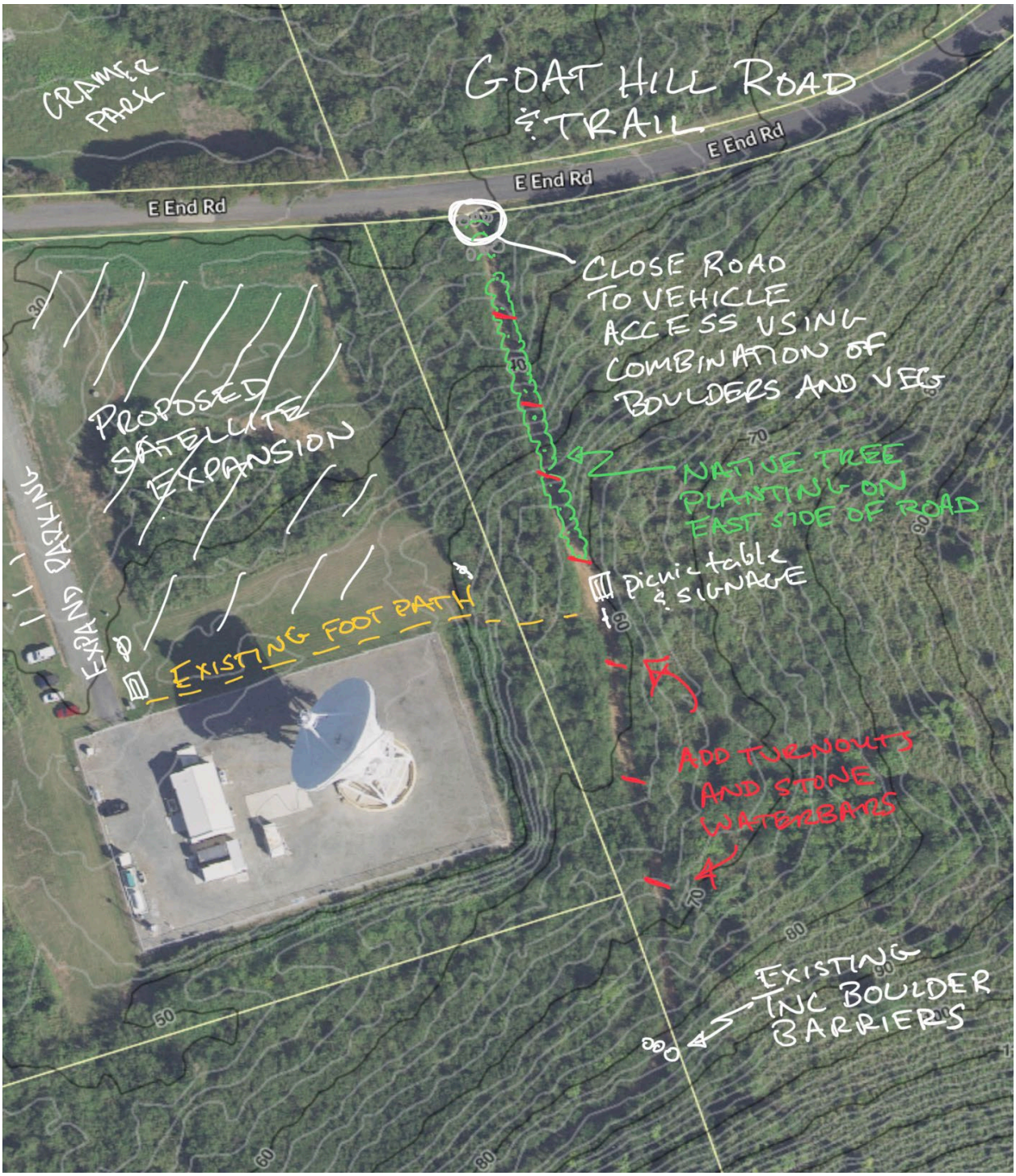

Figure 1. Conceptual sketch of improvements to Goat Hill Rd, which provides access to the TNC managed trail.

Due to timing of the St. Croix East End Watershed Restoration Strategy, restructuring of the USVI Territorial Park and Protected Area system, staff changes at the STXEEMP, and change in property ownership, we were unable to pursue construction activities at Boiler Bay within the time constraints of the call order. Construction dollars were returned to NOAA. A similar change in land authority of the

Goat Hill Rd. site also has sidelined that project, despite enthusiasm of TNC and DPNR over proposed restoration activities.

Budget

A total budget of $188,500 was allocated for this project.

Activity	Activity Name	Deliverable	Budget (approximate)
1	Identify 1-2 priority restoration projects	100% complete	$5,000
2	Project designs and coordination	• Preliminary designs • Permit ready designs • Site access • MOA • Permit-ready plans • CZM permit package	$50,000*
3	Construct 1-2 restoration projects	• Construction • Pictures of pre- and post- installation	$110,000*
4&5	Admin	• Meetings and partner coordination • Progress reports • Summary report	$8,000
	Travel and direct costs		$15,500*
		Call Order Total	$188,500

* Not fully expended

Boiler Bay Improvements

Existing Site and History

Boiler Bay is located within the St. Croix East End Marine Park (STXEEMP), which is designated as a Marine Protected Area (MPA) and an Area of Particular Concern (APC) for the protection of significant marine resources, striking unspoiled beauty and a myriad of threatened and endangered species that are found there. Three federally listed threatened and endangered (high risk of extinction in the wild) sea turtle species, green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricatause*) and leatherback (*Dermochelys coriacea*) nest on the beaches and feed nearshore. Many of the listed threatened and endangered coral reef species, such as staghorn (*Acropora cervicornis*), elkhorn (*Acropora palmata*) and boulder star (*Orbicella franksi)* are known to be in and near Boiler Bay. In 2023, St. Croix and the entire Caribbean experienced extreme marine heat stress causing wide-spread coral bleaching (Figure 1). On April 15th, 2024 NOAA confirmed the 4th global coral bleaching event on record and scientists estimate that it will become the largest coral bleaching event in history. Increased anthropogenic sources of terrestrial erosion in Boiler Bay continue to exasperate these already fragile ecosystems.

For over a decade, Boiler Bay has been recognized as a site of concern, due to an eroding trail that during rain events, flushes out the beach berm and directly discharges sediment-laden runoff onto nearshore seagrass meadows and coral reefs. Boiler Bay was identified and listed as a priority site in the 2011 WMP. Between 2009 – 2014, a series of studies measured sediment loading, particulate organic matter and sediment plumes in Boiler Bay, resulting from anthropogenic sources of terrestrial erosion. These studies suggested that vegetation cover density was the greatest contributing factor controlling erosion[3]. Disturbed trail surfaces with little vegetation and moderate slopes (mean 11.3%) exhibited erosion rates that were 1,680 times higher than the undisturbed hillslopes, which had exceedingly steeper slopes (mean 44.3%)[4]. During a tropical storm the trail in Boiler Bay generated an estimated 159 kg (351 lbs) of sediment and produced a sediment plume with turbidity values of just under 20 NTU (Figure 3), well above the regulatory limit of 3 NTU[5].

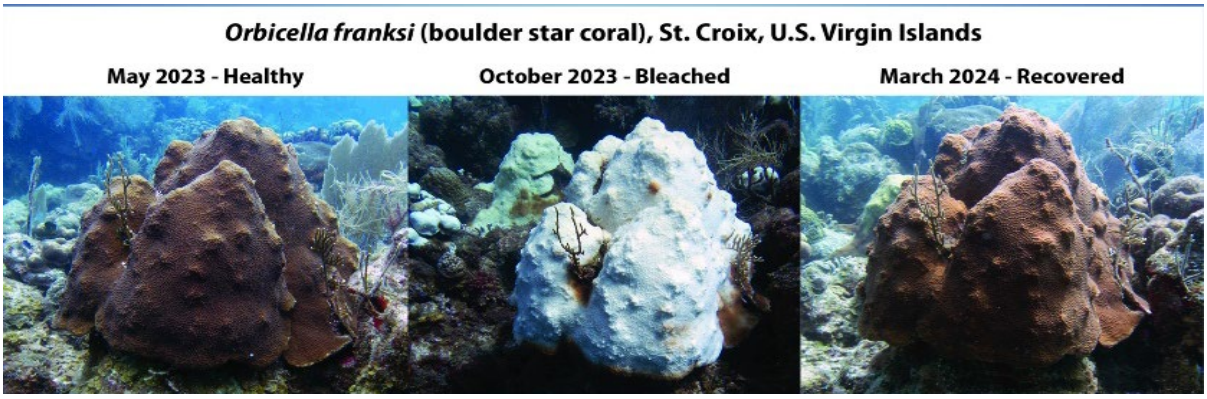

Figure 1. Boulder star coral in St. Croix following extreme marine heat stress in 2023. (Image credit: NOAA)

Problem Being Solved

Reducing LBSP in coastal areas, such as the sediment-laden runoff into the bays is crucial for the health of sea turtle nesting habitats and coral reefs. Sediment reduction can mitigate coastal erosion, which is a significant threat to sea turtle nesting sites, as it can lead to the loss of critical nesting beaches. For coral reefs, decreased sedimentation improves water clarity, allowing more sunlight to penetrate, which is essential for the photosynthesis process that sustains coral and the marine life that depends on them. Additionally, less sediment in the water means corals are less likely to suffer from smothering, abrasion, and other physical damages that can impede their growth and reproduction. Decreasing anthropogenic sources of erosion into the bays is a vital part of conserving these sensitive marine ecosystems.

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[3] Reale-Munroe K, Castillo, B, Ramos-Scharron, C (2011) *Measurement of Particulate Organic Material and Erosion Rates in Small Subtropical Watersheds on the East End of St. Croix, U. S. Virgin Islands.* University of the Virgin Islands, St. Croix, VI. Unpublished.

[4] Reale-Munroe K, Castillo, B, Ramos-Scharron, C (2012*) Quantifying Sediment and Organic Material Production Rates from Surface Erosion Processes and the Effect on Marine Water Quality in Small Subtropical Watersheds on the East End of St. Croix, USVI.* University of the Virgin Islands, St. Croix, VI. Unpublished.

[5] Reale-Munroe K, Castillo, B, Ramos-Scharron, C (2014) Terrestrial Sediment Delivery and Nearshore Water Turbidity – A Case Study from the East End of St. Croix, USVI. University of the Virgin Islands, St. Croix, VI. Unpublished.

Sedimentation event. Boiler Bay. 2013.

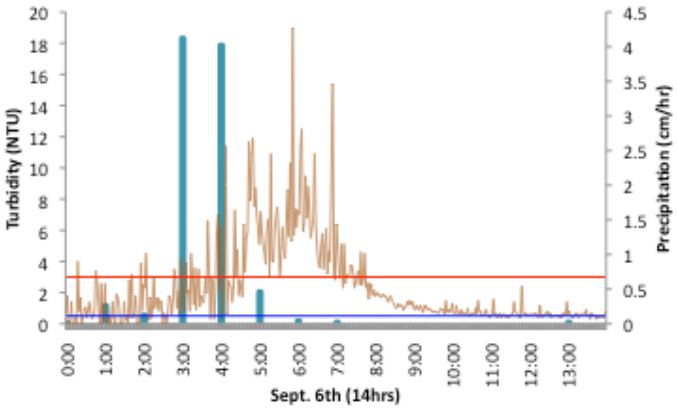


Figure 3. Turbidity (brown) in Boiler Bay following a sedimentation event in 2013. Regulatory limit of 3 (red).

Design Summary

The objective of this project is to advance LBSP management in the STXEEMP by stabilizing two trails and a parking area to reduce anthropogenic sources of sediment into the bays (see Appendix A for design plans). A secondary goal is to protect sea turtle nesting beaches from vehicles. There are three main components included in the restoration design for Boiler Bay: 1) the east trail (currently a dirt road), 2) the west trail, and 3) the parking area in between the two trails (Figure 4).

Annual rainfall at St. Croix's east end historically has been 25 inches or less. Table 1 shows the 24-hr precipitation amounts for standard storm frequencies from the Cotton Valley 2 (ID# 67-1810) rain gauge. Soils in the parking lot and along the trails range are shown in Figure 5 and summarized in Table 2. While we are not expecting a significant amount of infiltration to occur with this design, we do anticipate a reduction of runoff volume due to storage below permeable pavers and in the bioretention area; reduced site erosion and sedimentation, and increased evapotranspiration.

Figure 4. Site locations at Boiler Bay: 1) East Trail, 2) West Trail, 3) Parking Area

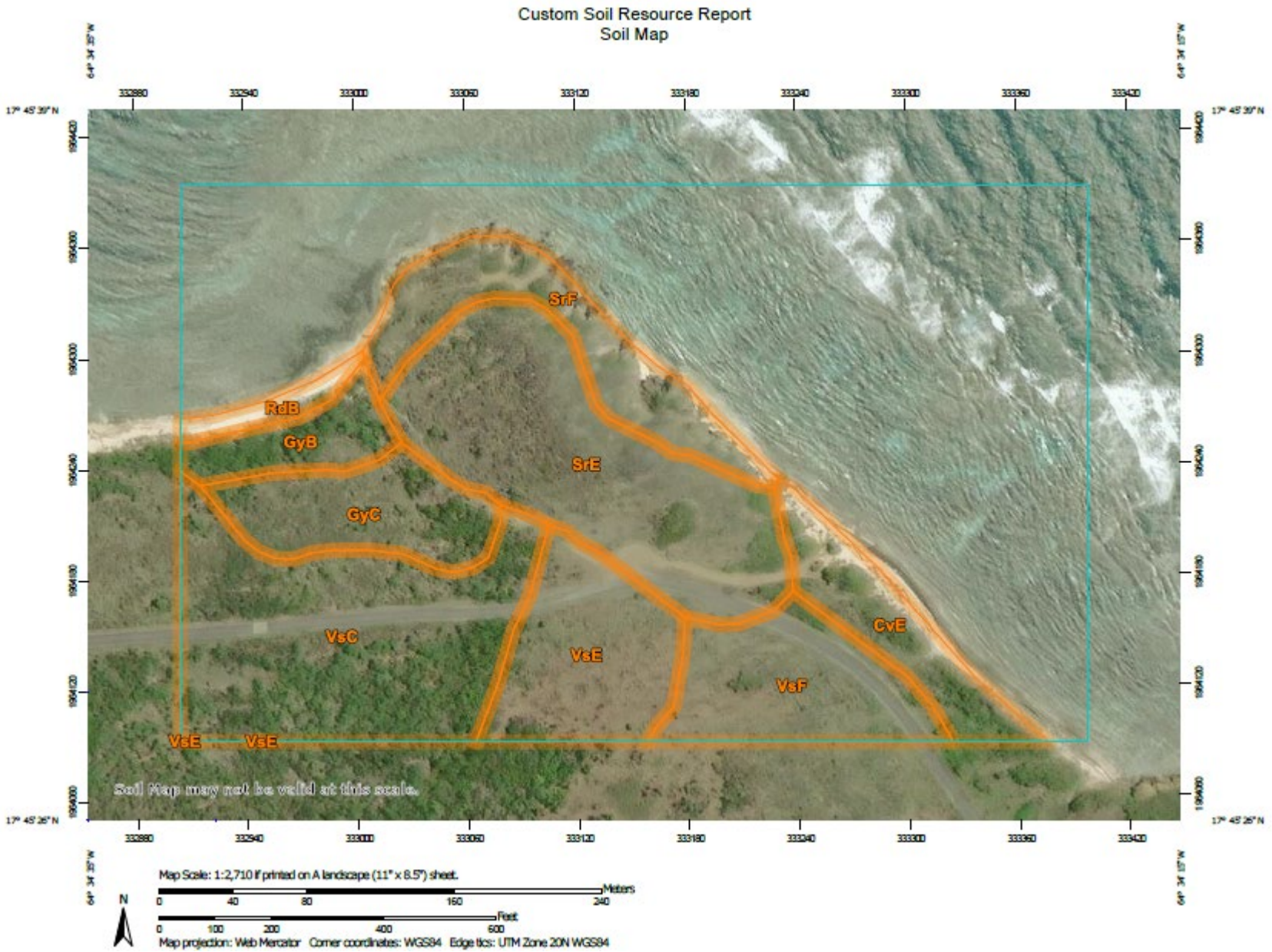


Figure 5. USGS Soil Survey Map

Table 1. Rainfall amounts (inches)

Avg Recurrence Intervals (YR)	1	5	10	25	100
24-hr Duration	**3.45** (2.72-4.33)	**7.09** (5.58-8.80)	**9.10** (7.09-11.2)	**12.1** (9.32-14.9)	**17.4** (13.1-21.3)

Table 2. Soil types found at the site

	Name & Description	Hydrologic Soils Group
SrE	Southgate-Rock outcrop complex, 20 to 40 percent slopes, HSG D	D
VsC	Victory-Southgate complex, 2 to 12 percent slopes, very stony, HSG C	C
VsE	Victory-Southgate complex, 20 to 40 percent slopes, very stony; HSG C	C
CvE	Cramer-Victory complex, 20 to 40 percent slopes, very stony; HSG C	C
GyB	Glynn gravelly loam, 2 to 5 percent slopes ; HSG C	C
GyC	Glynn gravelly loam, 5 to 12 percent slopes; HSG C	C
RdB	Redhook extremely stony sand, 0 to 5 percent slopes, rubbly HSG A	A

East Trail (Unpaved Road)

This project aims to reduce the amount of sediment entering the bay by narrowing and stabilizing a 400 ft long, 15-25 ft wide unpaved road with an average slope of 12.5% (~20% in steepest section) that vehicles currently use to access the beach. This road was once a narrow foot trail blocked by a guardrail; however, the guardrail no longer exists, and vehicles can drive down onto the beach.

Existing conditions. East Trail/Dirt Road. 2024.

The plan includes the installation of a series of waterbars in the upper portion of the unpaved segment to slow water flow from the top, divert runoff into existing vegetation, and reduce erosion of the unpaved surface. In the lower segment, a drainage swale will be used to convey flows. A series of check dams will be used to slow concentrated flows in the ditch to reduce erosion and to convey flows to a small basin at the bottom. The basin will trap sediment and temporarily pond runoff. A stone spillway will help dissipate and infiltrate any overflows and protect the beach from scouring.

A 4-ft foot wide trail is proposed to remain to allow pedestrian access to the beach from the east. No further materials will be added to form the trail. Remaining exposed surfaces not designated as walking trail will be revegetated or allowed to naturally regenerate with grasses and native flora that are typical of the dry scrub subtropical forest of the east end of St. Croix.

West Trail

Existing conditions. West Trail. 2024.

The existing foot trail that is used to access the beach and Boiler Bay to the west side of the parking area is approximately 580 ft long, 2 – 4 ft wide, with a slope of ~7%. There is an eroded gully in the trail leaving the parking lot.

Flow from the parking lot will be prevented from running down the trail by installation of a small dryscaped raingarden managing parking lot runoff. To reduce the amount of remaining flow down the trail, a series of waterbars will be placed to direct water towards the natural gut along to the north of the trail. This drainageway conveys runoff from the vegetated knoll of Whale Pt. Flows cross the trail closer to the beach, and erosion along the northern edge of the trail is evident for a segment of the trail. To stabilize the trail, stone check dams and slope protection at several key locations and a stabilized dip at the flow crossing are proposed.

Parking Area

Existing conditions. Parking Area. 2024

The existing parking area is a 5,500 ft^2 unpaved surface used for informal parking (~8 vehicles). This area contributes erosive runoff down both the west and east trails/road, as evidenced by erosive gully formations down path surfaces. To reduce the amount of runoff leaving the parking area and to enhance recreational access, a smaller, permeable parking area (2,500 ft^2) is proposed with 6 parking spaces, including a designated handicap accessible space. Parking spaces are set back from the road's edge to allow for an extended backout/pull in egress. The parking lot will be slightly graded to direct any runoff towards a dryscaped bioretention facility to allow for increased infiltration and diversion of overflows into the natural gut rather than onto the trail.

A handicapped accessible parking area is provided with access to an overlook area, picnic table and educational signage.

Examples of key elements of the proposed improvements at Whale Pt.

Construction Estimate

A preliminary engineering construction estimate is provided below. This estimate will be refined after permitting. We anticipate requesting quotes from several on-island construction companies.

	Line item	Cost (Planning Level)
1	Site Prep/Mobilization/ Demobilization	$10,000
2	Erosion Control (high vis fencing, silt sock, cleanout sediment)	$12,000
3	Grading	$8,000
4	Bioretention Areas	$8,000
5	Permeable Pavers and curbing in parking lot	$70,000
6	Water bars, check dams, stone	$15,000
7	Picnic Tables and signage, accessories	$5000
8	Landscaping	$20,000
	25% Contingency	$37,000
	Total construction	$185,000
	Construction Oversight	$20,000
	Total Project	$205,000

Next Steps

We were able to collaborate with stakeholders and landholders on two key restoration initiatives within the STXEEMP, specifically at Boiler Bay and Goat Hill Road. These collaborative efforts were pivotal in advancing the restoration objectives prioritized during the development of the 2023 St. Croix East End Watersheds Restoration Strategy 2023 – 2028. The next steps will be to secure permits and construct the restoration project at Boiler Bay. We anticipate completing construction for Boiler Bay under the next call order for St. Croix East End implementation funds and will seek additional support for the Goat Hill Road project with TNC. Table 3 summarizes the next steps to implementation.

Table 3. Next steps

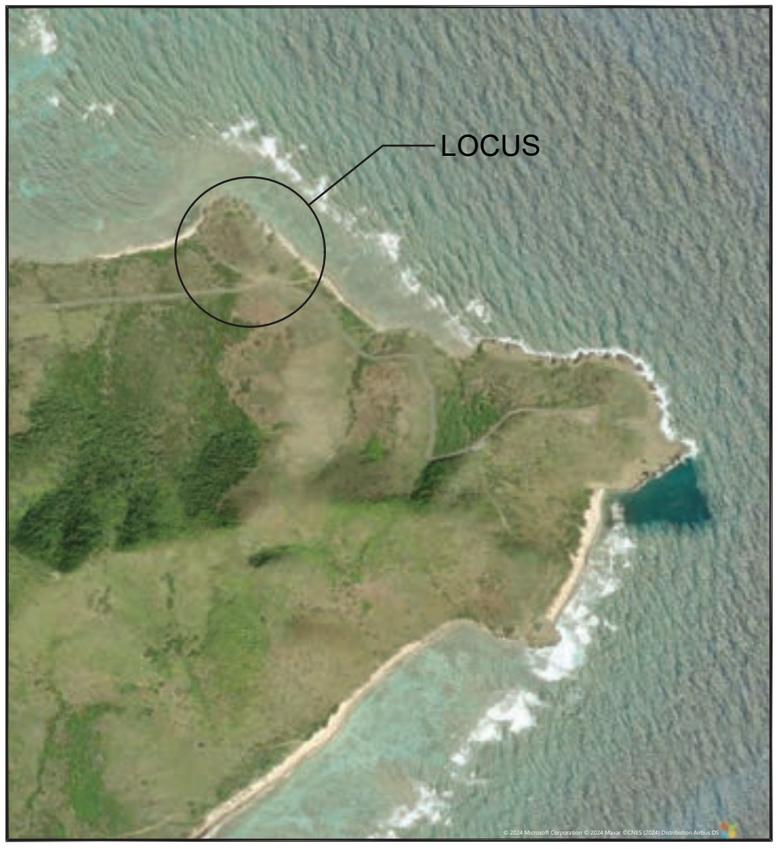
Action	Schedule
Submit CZM Minor Permit and NEPA with the support of partners and permitting staff.	May 2024
Final construction plans and contractor selection	June 2024
The deed transfer between the Department of Sports, Parks, and Recreation to the new DPNR Division of Territorial Parks and Protected Areas (for Boiler then for Goat Hill Rd.)	TBD
Finalize the draft Memorandum of Agreement (MOA)	June 2024
Construction	August-Sept 2024
Educational signage development	TBD
Additional collaborations with TNC are needed to seed funds to implement restoration at Goat Hill Rd.	TBD

Appendix A. Design Plan: Boiler Bay/Whale Point

WHALE POINT PARKING AND TRAIL IMPROVEMENTS
PERMITTING PLANS
EAST END, ST. CROIX
MAY 22, 2024

ST. CROIX (USVI)
Graphic Scale
0 20000
SCALE IN FEET
1:20000

EAST END
Graphic Scale
0 2000
SCALE IN FEET
1:2000



VICINITY MAP
Graphic Scale
1-inch = 500-feet

Sheet List Table	
Sheet Number	Sheet Title
1	COVER
2	EXISTING CONDITIONS
3	EROSION AND SEDIMENT CONTROL
4	EAST- SITE, GRADING, PROFILES & NOTES
5	WEST- SITE, GRADING, PROFILES & NOTES
6	TYPICAL DETAILS
7	PLANTING PLAN
8	PLANTING DETAILS

GENERAL NOTES:
1. THIS PLAN SET IS FOR PERMITTING ONLY AND NOT FOR CONSTRUCTION.
2. THE PROJECT SITE IS LOCATED WITHIN TEAGUE BAY WATERSHED.
2. THE PROJECT SITE IS LOCATED WITHIN COASTAL ZONE MANAGEMENT TIER 1.

PERMITTING SET ONLY
NOT FOR CONSTRUCTION

Plan Set:
WHALE POINT PARKING AND
TRAIL IMPROVEMENTS
PERMITTING PLANS
EAST END, ST. CROIX

Prepared For:
NOAA Office for Coastal Management
Coral Reef Conservation Program
2234 South Hobson Avenue
Charleston, SC 29405

Prepared By:
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Boston, MA 02109
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1 Turks Head Place, Suite 300
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Date Issued: MAY 22, 2024
Designed By: EWH
Drawn By: EWH
Checked By: MW
Registration: MICHELLE WEST 14621 PROFESSIONAL ENGINEER U.S. VIRGIN ISLANDS

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

Project Number: 22091
Sheet Number: 1 of 8
Drawing Number: C - 1

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SURVEY NOTES

1. THE TOPOGRAPHY AND EXISTING SITE CONDITIONS DEPICTED HEREON ARE THE RESULT OF AN ON THE GROUND FIELD SURVEY CONDUCTED BY THE HORSLEY WITTEN GROUP, INC. ON MAY 11, 2023.
2. HORIZONTAL DATUM IS ASSUMED.
3. THE ELEVATIONS DEPICTED HEREON WERE BASED ON AN ASSUMED VERTICAL DATUM.
4. THE PROPERTY IS LOCATED WITHIN F.I.R.M ZONES VE AND A, AS SHOWN ON COMMUNITY PANEL NO. 7800000076G, DATED 4/15/2007.

LEGEND:

GENERAL	SYMBOLS
CONTOUR - MINOR	BENCHMARK
CONTOUR - MAJOR	FLOW DIRECTION ARROW
EDGE OF PAVEMENT	BOLLARD
GUARD RAIL	SIGN
PATHWAY	
UNPAVED AREA	
TREE LINE	
ENVIRONMENTAL	
EDGE OF WATER	
MEAN HIGH WATER	
MEAN HIGH WATER BUFFER (50 FT)	
GUT CENTERLINE	
GUT BUFFER (30 FT)	
FEMA FLOOD ZONE A / FEMA FLOOD ZONE VE (EL. 13)	
FEMA FLOOD ZONE VE (EL. 15)	

PERMITTING SET ONLY
NOT FOR CONSTRUCTION

GRAPHIC SCALE
30 0 15 30 60 120
(in feet)
1 INCH = 30 FEET

Revisions				
Rev.	Date	By	Appr.	Description
1	---	---	---	---
2	---	---	---	---
3	---	---	---	---
4	---	---	---	---
5	---	---	---	---
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7	---	---	---	---
8	---	---	---	---

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
90 Route 6A Sandwich, MA 02563
www.horsleywitten.com
508-833-6600

Checked By: MW
Drawn By: GSG
Designed By: -
Date: MARCH 2024

Plan Set: WHALE POINT PARKING AND TRAIL IMPROVEMENTS PERMITTING PLANS EAST END, ST. CROIX

Plan Title: EXISTING CONDITIONS

Prepared For:
NOAA Office for Coastal Management
Coral Reef Conservation Program
2234 South Hobson Avenue
Charleston, SC 29405
Phone: ----

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02536
Phone: 508-833-6600
Dated: ----

Registration:
MICHELLE WEST
16601
5/22/24

Project Number: 22091
Sheet : 2 of 8
Sheet Number: EX - 2

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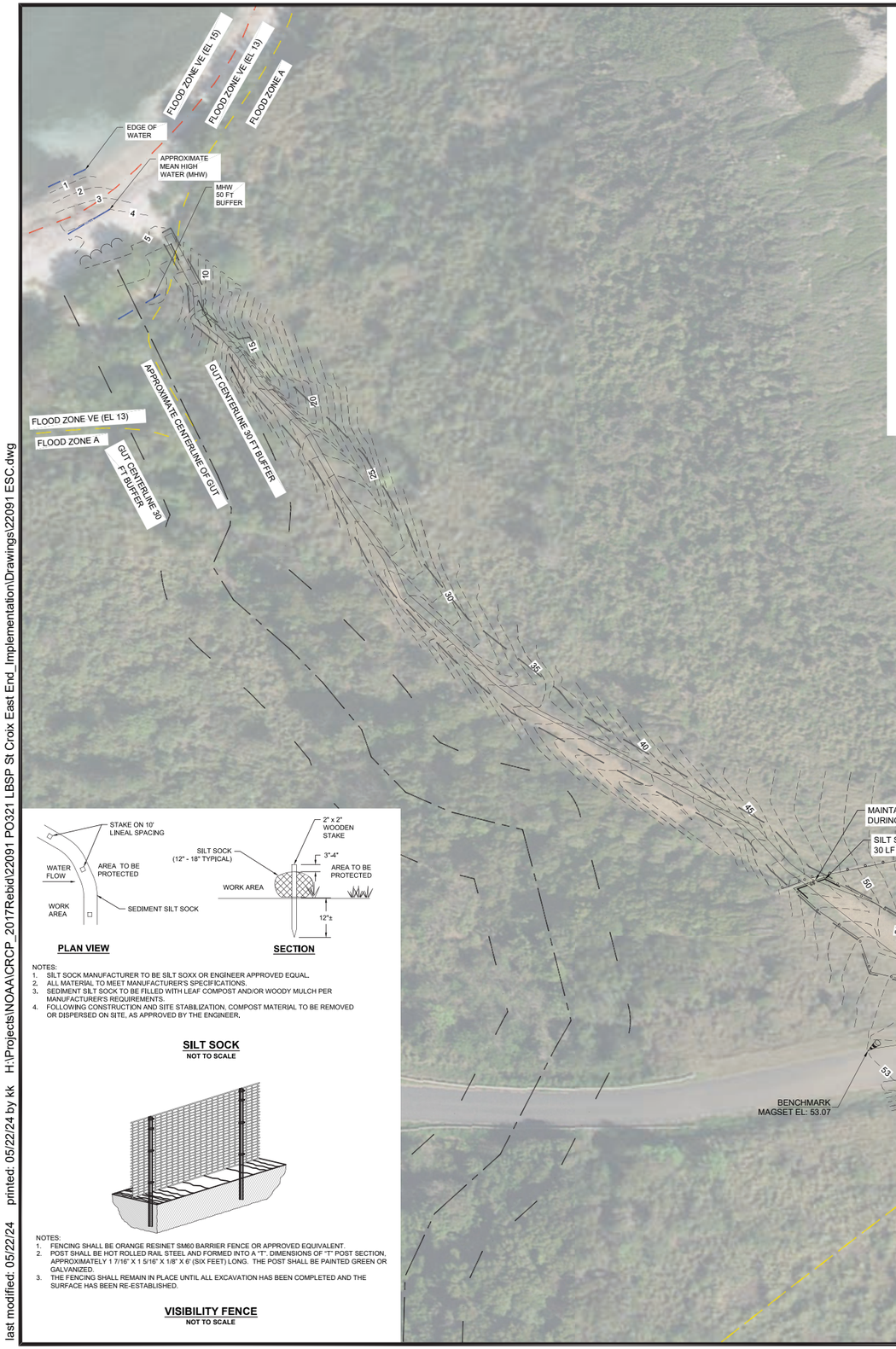
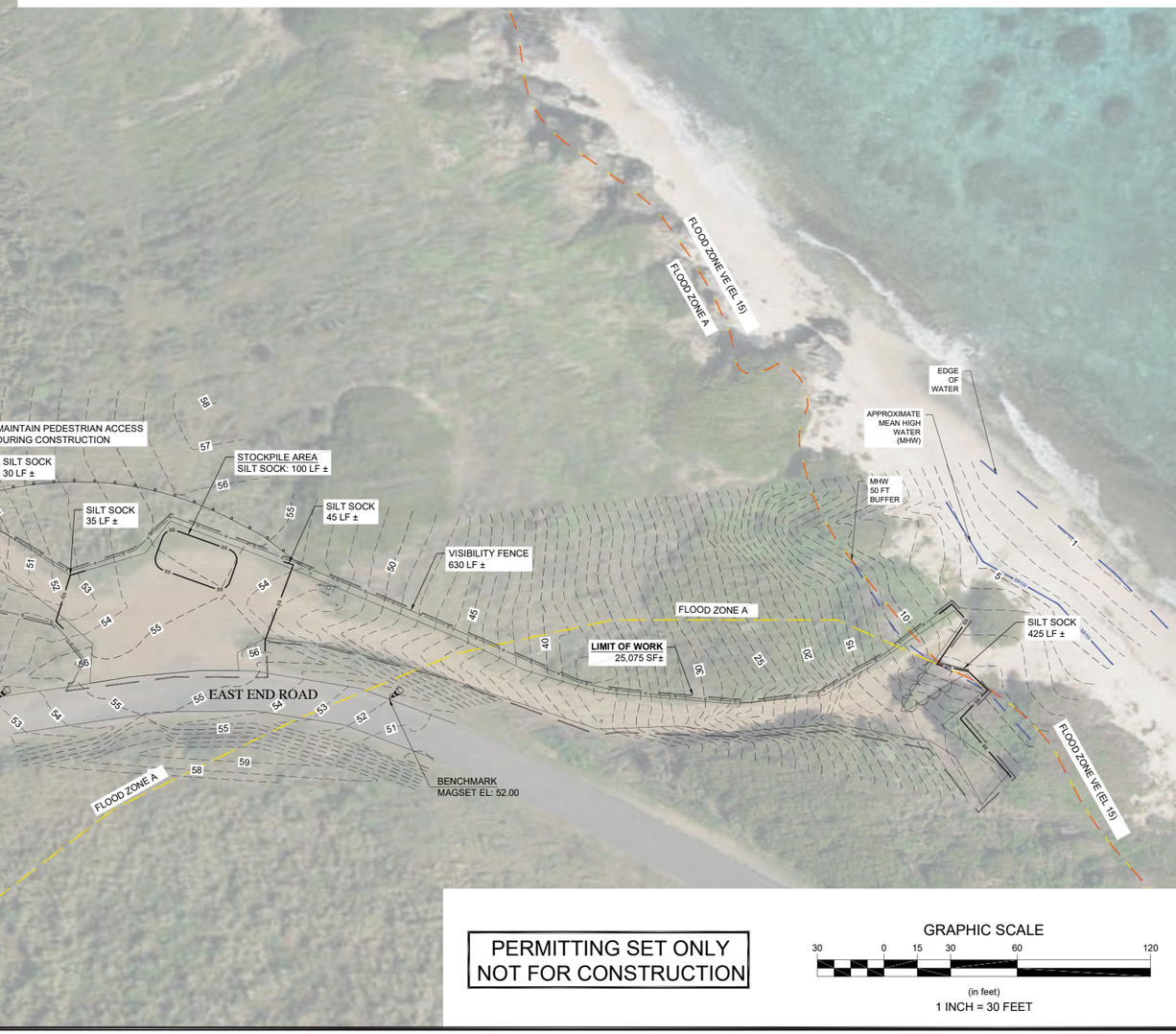
EROSION & SEDIMENT CONTROL NOTES:

1. DESIGNATE THE SITE CONSTRUCTION FOREMAN AS THE ON-SITE PERSONNEL RESPONSIBLE FOR THE DAILY INSPECTION AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS AND IMPLEMENTATION OF ALL NECESSARY MEASURES TO CONTROL EROSION AND PREVENT SEDIMENT FROM LEAVING THE SITE.
2. INSTALL ALL EROSION AND SEDIMENT CONTROL (ESC) MEASURES AS INDICATED ON DRAWINGS IN CONSULTATION WITH THE ENGINEER BEFORE ANY CONSTRUCTION ACTIVITIES BEGIN. INSPECT, MAINTAIN REPAIR AND REPLACE THE LIMIT OF WORK AND EROSION CONTROL MEASURES, AS NECESSARY, DURING THE ENTIRE CONSTRUCTION PERIOD OF THE PROJECT. INFORM ALL PERSONNEL WORKING ON THE SITE THAT NO CONSTRUCTION ACTIVITY IS TO OCCUR BEYOND THE LIMIT OF WORK AT ANY TIME THROUGHOUT THE CONSTRUCTION PERIOD.
3. MAINTAIN A MINIMUM SURPLUS OF 100 FEET OF EROSION CONTROL BARRIER (SILT FENCE &/OR SILT SOCK) ONSITE AT ALL TIMES.
4. PROTECT THE EXISTING DRAINAGE INFRASTRUCTURE FROM SEDIMENTATION DURING PROJECT CONSTRUCTION UNTIL ACCEPTANCE BY THE OWNER & IN CONFORMANCE WITH THE PERMIT CONDITIONS.
5. KEEP THE LIMIT OF GRADING AND DISTURBANCES TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION AND EXISTING BARE AREAS. PROPERLY INSTALL THE SEDIMENTATION CONTROLS PRIOR TO BEGINNING ANY CONSTRUCTION RELATED WORK.
6. MONITOR LOCAL WEATHER REPORTS DURING CONSTRUCTION AND PRIOR TO SCHEDULING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES WHICH LEAVE LARGE DISTURBED AREAS UNSTABILIZED. IF INCLEMENT WEATHER IS PREDICTED, USE BEST PROFESSIONAL JUDGEMENT AND GOOD CONSTRUCTION PRACTICES WHEN SCHEDULING CONSTRUCTION ACTIVITIES AND ENSURE THE NECESSARY EROSION CONTROL DEVICES ARE INSTALLED AND FUNCTIONING PROPERLY TO MINIMIZE EROSION FROM ANY IMPENDING WEATHER EVENTS.
7. INSPECT EROSION AND SEDIMENT CONTROL DEVICES AND STABILIZED SLOPES ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT OF .25 INCH OR GREATER. REPAIR IDENTIFIED PROBLEMS WITHIN 24 HOURS TO ENSURE EROSION AND SEDIMENT CONTROLS ARE IN GOOD WORKING ORDER. RESET OR REPLACE MATERIALS AS REQUIRED.
8. SURROUND THE PERIMETER OF SOIL STOCKPILES WITH SILT SOCK, SILT FENCE, OR A COMBINATION, AS DETERMINED NECESSARY.
9. CONTAIN ALL SEDIMENT ONSITE. SWEEP ALL EXITS FROM THE SITE AS NECESSARY INCLUDING ANY SEDIMENT TRACKING. SWEEP PAVED AREAS AS NEEDED TO REMOVE SEDIMENT AND POTENTIAL POLLUTANTS ACCUMULATED DURING SITE CONSTRUCTION.
10. REGULARLY REMOVE ACCUMULATED SEDIMENT FROM ALL TEMPORARY PRACTICES AND AFTER RAIN EVENTS TO MAINTAIN PROPER DRAINAGE. DISPOSE OF IN A PRE-APPROVED LOCATION.
11. PROVIDE ON SITE OR MAKE READILY AVAILABLE THE NECESSARY EQUIPMENT AND SITE PERSONNEL DURING CONSTRUCTION HOURS FOR THE DURATION OF THE PROJECT TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER. IF SITE WORK IS SUSPENDED DURING THE WINTER MONTHS THE CONTRACTOR MUST CONTINUE TO PROVIDE PERSONNEL AND EQUIPMENT EITHER ON SITE OR READILY AVAILABLE TO PROPERLY MAINTAIN AND REPAIR ALL EROSION AND SEDIMENTATION CONTROL DEVICES IN A TIMELY AND RESPONSIBLE MANNER
12. PRIOR TO THE INSTALLATION OF FILTER FABRIC AND MEDIA WITHIN THE BIORETENTION AREAS, REMOVE AND PROPERLY DISPOSE OF SEDIMENT ACCUMULATED IN ANY PARTIALLY CONSTRUCTED OR TEMPORARY BIORETENTION/DRAINAGE AREA USED FOR SEDIMENT CONTROL DURING CONSTRUCTION. PROVIDE A SURFACE ELEVATION AT A MINIMUM 1-FOOT ABOVE THE BOTTOM OF MEDIA ELEVATION. THIS ALLOWS FOR AN OVER-DIG OF THE COLLECTED SEDIMENT FROM WITHIN THE BIORETENTION AREA PRIOR TO MEDIA/FABRIC INSTALLATION.
13. CONTROL DUST BY WATERING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER.
14. THE CONTRACTOR IS RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE DURING CONSTRUCTION OF ALL STORMWATER FACILITIES INSTALLED OR AFFECTED BY THE PROJECT. REMOVE SEDIMENT OR DEBRIS COLLECTED WITHIN THESE FACILITIES AS REQUIRED FOR PROPER FUNCTION AND CONTROL OF SITE RUNOFF DURING CONSTRUCTION AND PRIOR TO THE OWNER'S ACCEPTANCE.

LEGEND:

ENVIRONMENTAL	PROPOSED
EDGE OF WATER	LIMIT OF WORK
MEAN HIGH WATER (MHW)	EROSION & SEDIMENT CONTROL
MEAN HIGH WATER BUFFER (50 FT)	VISIBILITY FENCE
GUT CENTERLINE	SILT SOCK
GUT BUFFER (30 FT)	
FEMA FLOOD ZONE A / FEMA FLOOD ZONE VE (EL. 13)	
FEMA FLOOD ZONE VE (EL. 15)	





NOTES:
1. SILT SOCK MANUFACTURER TO BE SILT SOXX OR ENGINEER APPROVED EQUAL.
2. ALL MATERIAL TO MEET MANUFACTURER'S SPECIFICATIONS.
3. SEDIMENT SILT SOCK TO BE FILLED WITH LEAF COMPOST AND/OR WOODY MULCH PER MANUFACTURER'S REQUIREMENTS.
4. FOLLOWING CONSTRUCTION AND SITE STABILIZATION, COMPOST MATERIAL TO BE REMOVED OR DISPERSED ON SITE, AS APPROVED BY THE ENGINEER.

SILT SOCK
NOT TO SCALE

NOTES:
1. FENCING SHALL BE ORANGE RESINET SM60 BARRIER FENCE OR APPROVED EQUIVALENT.
2. POST SHALL BE HOT ROLLED RAIL STEEL AND FORMED INTO A "T". DIMENSIONS OF "T" POST SECTION, APPROXIMATELY 1 7/16" X 1 5/16" X 1/8" X 6' (SIX FEET) LONG. THE POST SHALL BE PAINTED GREEN OR GALVANIZED.
3. THE FENCING SHALL REMAIN IN PLACE UNTIL ALL EXCAVATION HAS BEEN COMPLETED AND THE SURFACE HAS BEEN RE-ESTABLISHED.

VISIBILITY FENCE
NOT TO SCALE

PERMITTING SET ONLY
NOT FOR CONSTRUCTION

GRAPHIC SCALE
30 0 15 30 60 120
(in feet)
1 INCH = 30 FEET

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

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Checked By: MW
Drawn By: EWH
Designed By: EWH
Date: MAY 22, 2024

Plan Set: WHALE POINT PARKING AND TRAIL IMPROVEMENTS PERMITTING PLANS EAST END, ST. CROIX

Plan Title: EROSION AND SEDIMENT CONTROL

Prepared For:
NOAA Office for Coastal Management
Coral Reef Conservation Program
2234 South Hobson Avenue
Charleston, SC 29405
Phone: ----
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Survey Provided By:
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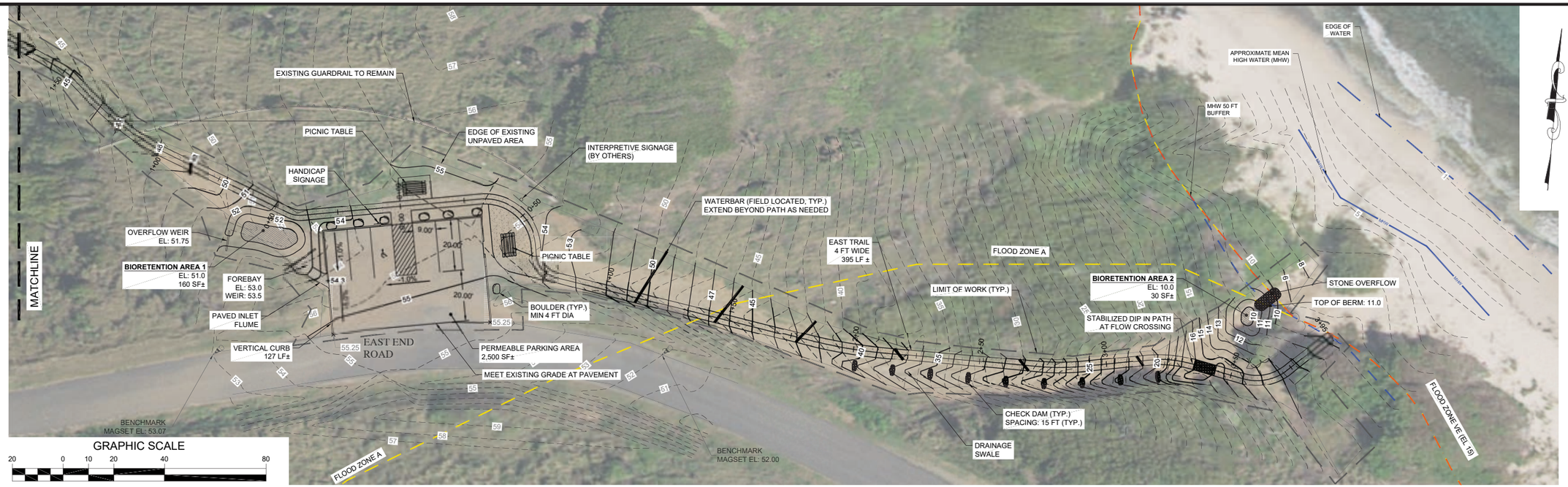
Dated: ----

Registration:
MICHELLE WEST 14668 REGISTERED PROFESSIONAL ENGINEER 5/22/24

Project Number: 22091
Sheet: 3 of 8
Sheet Number: C - 3



GRAPHIC SCALE

20 0 10 20 40 80

(in feet)

LEGEND: 1 INCH = 20 FEET

GENERAL		SYMBOLS	
44	CONTOUR - MINOR		BENCHMARK
50	CONTOUR - MAJOR	EL:98.45	EXISTING SPOT GRADE
	PERMEABLE PAVERS	EL:95.00	SPOT GRADE
	LIMIT OF WORK		STONE APRON
	PATHWAY		SIGN
	STONE		PICNIC TABLE
	BIORETENTION AREA		
ENVIRONMENTAL			
	EDGE OF WATER		
MHW	MEAN HIGH WATER		
	MEAN HIGH WATER BUFFER (50 FT)		
	GUT CENTERLINE		
	GUT BUFFER (30 FT)		
	FEMA FLOOD ZONE A / FEMA FLOOD ZONE VE (EL. 13)		
	FEMA FLOOD ZONE VE (EL. 15)		

GENERAL CONSTRUCTION NOTES:

1. ALL SITE WORK TO COMPLETE THIS PROJECT, AS INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS AND AS DESCRIBED BELOW IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
2. IMMEDIATELY CONTACT AND COORDINATE WITH THE ENGINEER AND OWNER IF ANY DEVIATION OR ALTERATION OF THE WORK PROPOSED ON THESE DRAWINGS IS REQUIRED.
3. UTILIZE ALL PRECAUTIONS AND MEASURES TO ENSURE THE SAFETY OF THE PUBLIC, ALL PERSONNEL AND PROPERTY DURING CONSTRUCTION IN ACCORDANCE WITH OSHA STANDARDS, INCLUDING THE INSTALLATION OF TEMPORARY FENCING BARRICADES, CONES, AND OTHER SAFETY MEASURES AS DETERMINED NECESSARY BY VI DPNR.
4. MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS, PAY ALL FEES AND POST ALL BONDS, IF NECESSARY, ASSOCIATED WITH THE SAME, AND COORDINATE WITH THE OWNER AND THE ENGINEER.
5. ALL EXISTING CONDITIONS SHOWN ARE APPROXIMATE AND ARE BASED ON THE BEST INFORMATION AVAILABLE. PRIOR TO THE START OF CONSTRUCTION VERIFY THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLING ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.
6. MAINTAIN ALL EXISTING UTILITIES IN WORKING ORDER AND FREE FROM DAMAGE DURING THE ENTIRE DURATION OF THE PROJECT. REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR ALL COST RELATED TO THE REPAIR OF UTILITIES. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES MUST BE DONE BY HAND.
7. IMPORT ONLY CLEAN MATERIAL.
8. ESTABLISH AND MAINTAIN ALL CONTROL POINTS AND BENCHMARKS DURING CONSTRUCTION INCLUDING BENCHMARK LOCATIONS AND ELEVATIONS AT CRITICAL AREAS. COORDINATE WITH THE ENGINEER THE LOCATION OF ALL CONTROL POINTS AND BENCHMARKS.
9. SITE LAYOUT SURVEY REQUIRED FOR CONSTRUCTION MUST BE PROVIDED BY THE CONTRACTOR AND PERFORMED BY A REGISTERED PROFESSIONAL LAND SURVEYOR. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE SURVEYOR FOR ALL SITE SURVEY WORK.
10. MAINTAIN ALL GRADE STAKES SET BY THE SURVEYOR. GRADE STAKES ARE TO REMAIN UNTIL A FINAL INSPECTION OF THE ITEM HAS BEEN COMPLETED BY THE ENGINEER. RE-STAKING OF PREVIOUSLY SURVEYED SITE FEATURES IS THE RESPONSIBILITY (INCLUDING COST) OF THE CONTRACTOR.
11. PROVIDE ALL CONSTRUCTION SERVICE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING NOISE, VIBRATION, DUST, SEDIMENTATION CONTAINMENT, AND TRENCH WORK.
12. COLLECT SOLID WASTES AND STORE IN A SECURED DUMPSTER. THE DUMPSTER MUST MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS.
13. RESTORE ALL SURFACES EQUAL TO THEIR ORIGINAL CONDITION AFTER CONSTRUCTION IS COMPLETE PER SPECIFICATIONS. LEAVE ALL AREAS NOT DISTURBED BY CONSTRUCTION IN THEIR NATURAL STATE. TAKE CARE TO PREVENT DAMAGE TO SHRUBS, TREES, OTHER LANDSCAPING AND/OR NATURAL FEATURES. WHEREAS THE PLANS DO NOT SHOW ALL LANDSCAPE FEATURES, EXISTING CONDITIONS MUST BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF THE WORK.
14. REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. PROMPTLY REMOVE ALL DEMOLITION DEBRIS FROM THE SITE TO AN APPROVED DUMP SITE.
15. ALL TRUCKS LEAVING THE SITE MUST BE COVERED.
16. DO NOT WASH ANY CONCRETE TRUCKS ONSITE. REMOVE BY HAND ANY CEMENT OR CONCRETE DEBRIS LEFT IN THE DISTURBED AREA.
17. BURIAL OF ANY STUMPS, SOLID DEBRIS, AND/OR STONES/BOULDERS ONSITE IS PROHIBITED.
18. AT THE END OF CONSTRUCTION, REMOVE ALL CONSTRUCTION DEBRIS AND SURPLUS MATERIALS FROM THE SITE. PERFORM A THOROUGH INSPECTION OF THE WORK PERIMETER. COLLECT AND REMOVE ALL MATERIALS AND BLOWN OR WATER CARRIED DEBRIS FROM THE SITE.

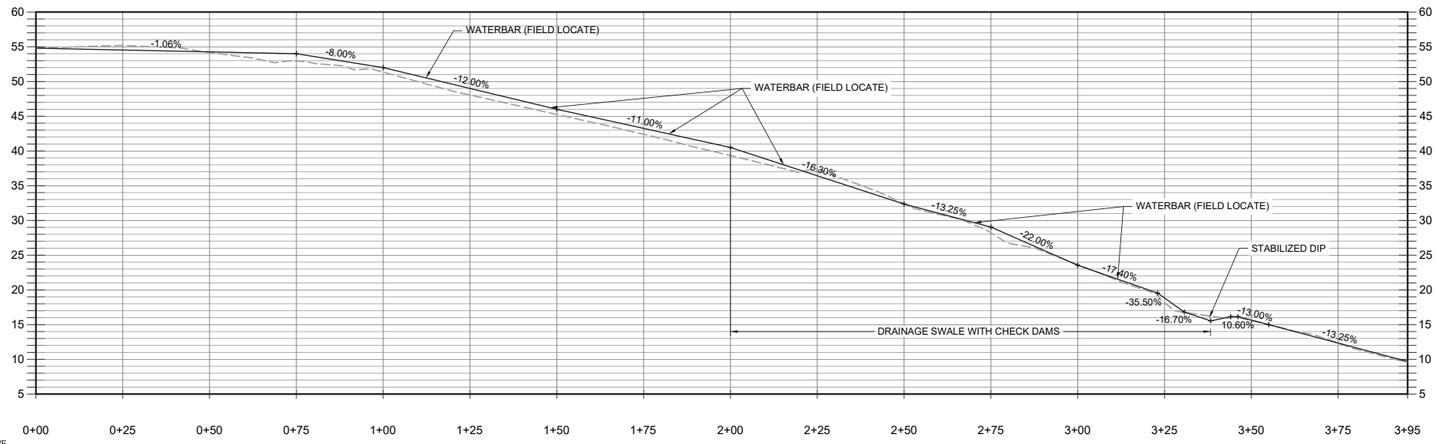
BASIC CONSTRUCTION SEQUENCE:

THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE USED AS A GENERAL GUIDELINE. COORDINATE WITH THE OWNER, ENGINEERS, AND LANDSCAPE ARCHITECT AND SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

1. SURVEY AND STAKE THE PROPOSED LIMIT OF DISTURBANCE AND LIMIT OF SEDIMENTATION BARRIERS.
2. PLACE SEDIMENTATION BARRIERS AS INDICATED ON DRAWINGS AND STAKED OUT IN THE FIELD. UNDER NO CIRCUMSTANCES IS THE LIMIT OF WORK TO EXTEND BEYOND THE SEDIMENTATION BARRIERS/LIMIT OF DISTURBANCE AS INDICATED ON DRAWINGS.
3. BEGIN SITE PREPARATION, CLEARING AND DEMOLITION AS REQUIRED. TOPSOIL IS TO BE STRIPPED FROM THE AREA OF THE PROPOSED STORMWATER MANAGEMENT AREAS AND STOCKPILED IN APPROVED LOCATIONS. STOCKPILES MUST BE PROTECTED BY A SEDIMENT BARRIER.
4. SURVEY AND STAKE CENTERLINE OF THE PROPOSED PATHS, STORMWATER MANAGEMENT AREAS, AND DRAINAGE SWALES.
5. EXCAVATE AND ROUGH GRADE THE PROPOSED STORMWATER MANAGEMENT AREAS AND ANY ADDITIONAL TEMPORARY BASINS NECESSARY TO CONTROL SITE RUNOFF AND SEDIMENTS. TEMPORARILY STABILIZE/SEED PERMANENT STORMWATER MANAGEMENT AREAS AS NECESSARY TO REDUCE SIDE SLOPE EROSION AND SEDIMENT ACCUMULATION.
6. INSTALL CONVEYANCE DEVICES (SWALES, CHECK DAMS, ETC.) AS NECESSARY TO CONVEY RUNOFF TO TREATMENT AREAS.
7. BEGIN ROUGH GRADING AREA FOR PARKING. BRING ROUGH GRADING TO PROPER ELEVATIONS AS SOON AS PRACTICABLE. COORDINATE WORK TO MINIMIZE TIME SOILS ARE UN-STABILIZED.
8. BEGIN PARKING CONSTRUCTION PER SITE DRAWINGS. PLACE COMPACTED GRAVEL FOUNDATION AND ROUGH GRADE THE PARKING AREAS IN ACCORDANCE WITH DRAWINGS WITH APPLICABLE TERRITORIAL REGULATIONS AS SOON AS POSSIBLE.
9. FINISH PERMANENT STABILIZATION. COMPLETE PERMANENT STORMWATER MANAGEMENT AREA PLANTING AFTER THE CONTRIBUTING AREA TO THE BASIN HAS REACHED A MINIMUM OF 80% STABILIZATION AND IS NO LONGER REQUIRED AS A CONSTRUCTION SEDIMENTATION BASIN.
10. COMPLETE ALL REMAINING PLANTING AND SEEDING.
11. SWEEP THE ROADWAY TO REMOVE ALL SEDIMENTS. REPAIR DRAINAGE OUTLETS AND BASINS AS REQUIRED. REMOVE ALL ACCUMULATED SEDIMENTS IN THE STORMWATER MANAGEMENT AREAS.
12. ENGINEER TO APPROVE THE REMOVAL OF ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES FOLLOWING VEGETATIVE ESTABLISHMENT OF ALL DISTURBED AREAS AND DETERMINE WHEN THE CONTRIBUTING AREA HAS REACHED A MINIMUM OF 80% STABILIZATION.

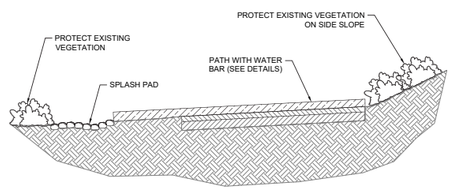
GENERAL GRADING AND DRAINAGE NOTES:

1. ALL CUT AND FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
2. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
3. PROPOSED GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
4. PROPOSED ELEVATIONS ARE SHOWN TO FINISH PAVEMENT OR GRADE UNLESS NOTED OTHERWISE.

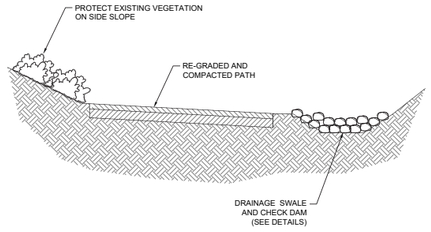


EAST PATH PROFILE
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'

PERMITTING SET ONLY
NOT FOR CONSTRUCTION



EAST PATH TYPICAL SECTION (STA 0+75 TO 2+00)
NOT TO SCALE



EAST PATH TYPICAL SECTION (STA 2+00 TO 3+50)
NOT TO SCALE

Revisions

Rev.	Date	By	Appr.	Description
1	05/22/24	KK		Permitting Plans

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Checked By: MW
Drawn By: EWH
Designed By: EWH
Date: MAY 22, 2024

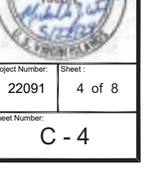
Plan Set:
Plan Title: EAST- SITE, GRADING, PROFILES & NOTES

WHALE POINT PARKING
AND TRAIL IMPROVEMENTS
PERMITTING PLANS
EAST END, ST. CROIX

Prepared For:
NOAA Office for Coastal Management
Coral Reef Conservation Program
2234 South Hobson Avenue
Charleston, SC 29405
Phone: ----
Fax: ----

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02536
Phone: 508-833-6600
Fax: 508-833-3150
Dated: ----

Registration:



Project Number: 22091
Sheet: 4 of 8
Sheet Number: C - 4

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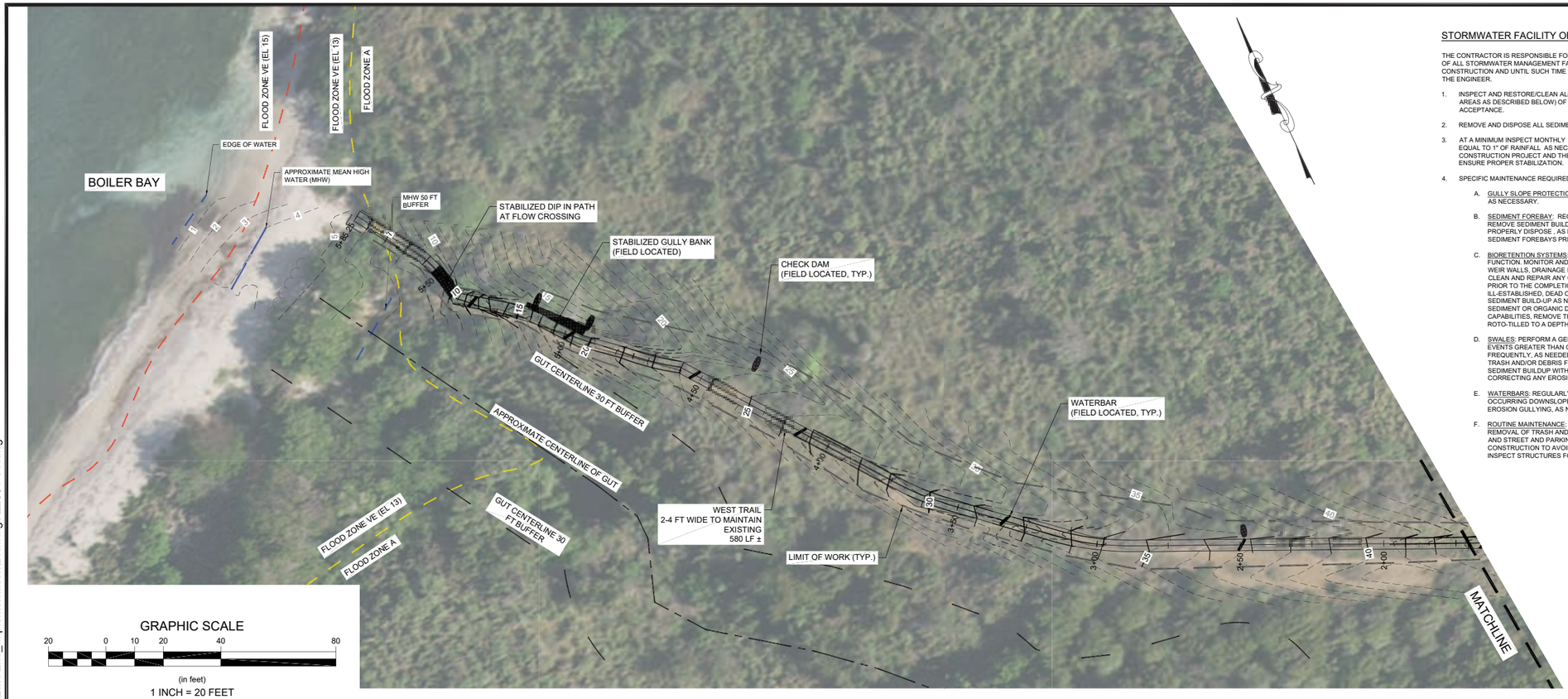


GRAPHIC SCALE

20 0 10 20 40 80

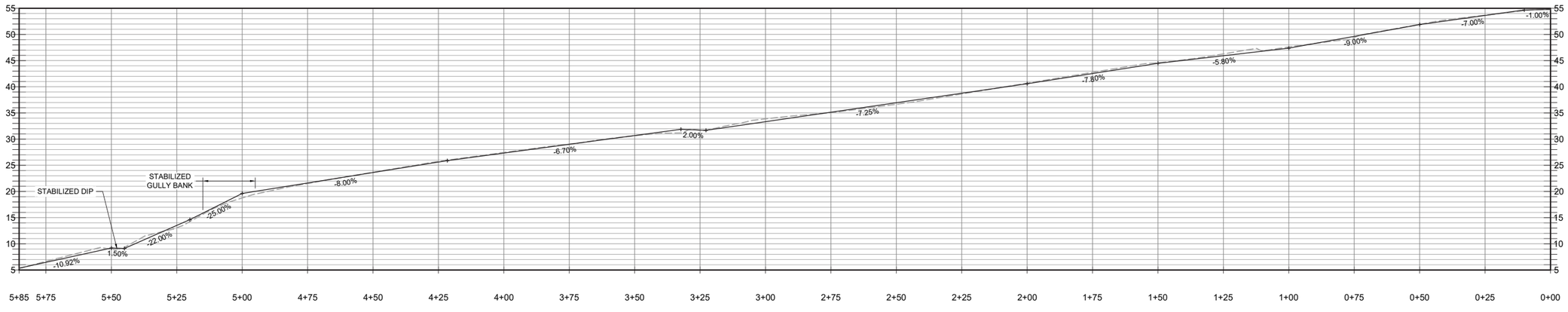
(in feet)

1 INCH = 20 FEET

STORMWATER FACILITY OPERATION & MAINTENANCE:

THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSPECTION AND MAINTENANCE OF ALL STORMWATER MANAGEMENT FACILITIES AS OUTLINED BELOW DURING CONSTRUCTION AND UNTIL SUCH TIME THAT THE SITE IS ACCEPTED BY THE OWNER AND THE ENGINEER.

1. INSPECT AND RESTORE/CLEAN ALL FACILITIES (INLETS, STORMWATER MANAGEMENT AREAS AS DESCRIBED BELOW) OF SEDIMENT AND DEBRIS PRIOR TO THE OWNER'S ACCEPTANCE.
2. REMOVE AND DISPOSE ALL SEDIMENT AND DEBRIS TO A PRE-APPROVED LOCATION.
3. AT A MINIMUM INSPECT MONTHLY AND AFTER STORM EVENTS GREATER THAN OR EQUAL TO 1" OF RAINFALL AS NECESSARY. FOR THE ENTIRE DURATION OF THE CONSTRUCTION PROJECT AND THE FIRST 3 MONTHS AFTER CONSTRUCTION TO ENSURE PROPER STABILIZATION.
4. SPECIFIC MAINTENANCE REQUIRED DURING CONSTRUCTION:
   - A. GULLY SLOPE PROTECTION: MONITOR, REGULARLY INSPECT AND REPAIR AS NECESSARY.
   - B. SEDIMENT FOREBAY: REGULARLY INSPECT TO ENSURE PROPER FUNCTION. REMOVE SEDIMENT BUILD-UP ON THE FLOOR OF THE FOREBAY AND PROPERLY DISPOSE , AS NECESSARY, TO LIMIT CLOGGING. CLEAN SEDIMENT FOREBAYS PRIOR TO COMPLETION OF CONSTRUCTION.
   - C. BIORETENTION SYSTEMS: REGULARLY INSPECT TO ENSURE PROPER FUNCTION. MONITOR AND INSPECT STRUCTURAL COMPONENTS, INCLUDING WEIR WALLS, DRAINAGE INLETS, OUTLETS, FOR PROPER FUNCTION. CLEAN AND REPAIR ANY CLOGGED STRUCTURES DURING INSPECTIONS. PRIOR TO THE COMPLETION OF CONSTRUCTION, REMOVE AND REPLACE ILL-ESTABLISHED, DEAD OR SEVERELY DISEASED PLANTS, REMOVE SEDIMENT BUILD-UP AS NEEDED, AND REPLACE SOIL WHEN NECESSARY. IF SEDIMENT OR ORGANIC DEBRIS BUILD-UP LIMITS THE INFILTRATION CAPABILITIES, REMOVE THE TOP 6" OR GREATER AND SURFACE ROTO-TILLED TO A DEPTH OF 12".
   - D. SWALES: PERFORM A GENERAL INSPECTION OF THE SWALE AFTER STORM EVENTS GREATER THAN OR EQUAL TO 1" OF RAINFALL OR MORE FREQUENTLY, AS NEEDED. MAINTENANCE CONSISTS OF REMOVAL OF ANY TRASH AND/OR DEBRIS FROM THE BOTTOM OF THE SWALE, REMOVAL OF SEDIMENT BUILDUP WITHIN THE SWALE AND BEHIND CHECK DAMS. CORRECTING ANY EROSION GULLYING, AS NECESSARY.
   - E. WATERBARS: REGULARLY INSPECT TO ENSURE NO EROSION IS OCCURRING DOWNSLOPE OF THE WATERBARS, CORRECTING ANY EROSION GULLYING, AS NECESSARY.
   - F. ROUTINE MAINTENANCE: OTHER ROUTINE MAINTENANCE INCLUDES THE REMOVAL OF TRASH AND LITTER FROM PAVED AND PERIMETER AREAS, AND STREET AND PARKING LOT SWEEPING UPON COMPLETION OF CONSTRUCTION TO AVOID EXCESSIVE ACCUMULATION OF SEDIMENT. INSPECT STRUCTURES FOR SEDIMENT ACCUMULATION AND PROPER FLOW.



WEST PATH PROFILE
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 10'

PERMITTING SET ONLY
NOT FOR CONSTRUCTION

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
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Checked By: MW
Drawn By: EWH
Designed By: EWH
Date: MAY 22, 2024

WHALE POINT PARKING
AND TRAIL IMPROVEMENTS
PERMITTING PLANS
EAST END, ST. CROIX

Plan Set:

Plan Title: WEST- SITE, GRADING, PROFILES & NOTES

Prepared For:
NOAA Office for
Coastal Management
Coral Reef Conservation Program
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Survey Provided By:
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Dated: ----

Registration:

Project Number: 22091

Sheet: 5 of 8

Sheet Number: C - 5

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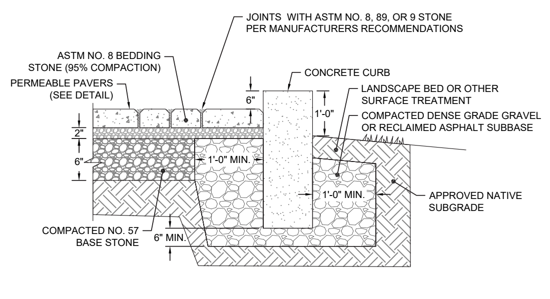
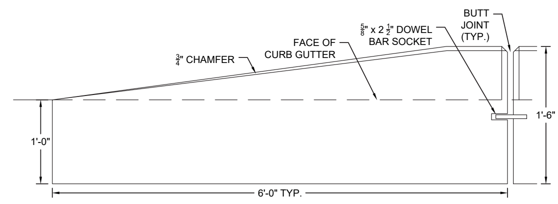
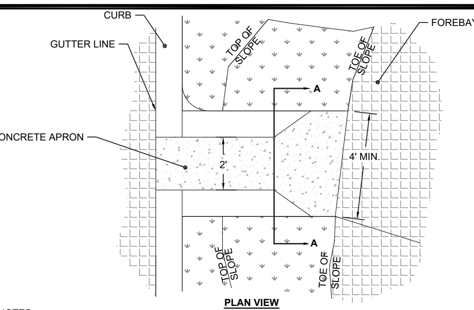


VERTICAL CURB (WITH PAVERS)
NOT TO SCALE

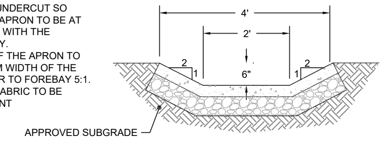


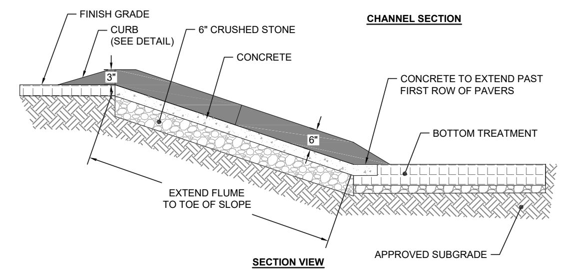
NOTES:
1. DRAWING SHOWS TRANSITION CURB FOR ONE DIRECTION. FOR OTHER DIRECTION, USE OPPOSITE HAND & INCLUDE A $\frac{3}{4}$" Ø x 4" EPOXY COATED DOWEL.
2. EXPOSED EDGES WILL HAVE $\frac{3}{4}$" CHAMFER.
3. EXPOSED SURFACES WILL HAVE SPONGE FLOAT FINISH.
4. CURB WILL HAVE A MINIMUM CONCRETE STRENGTH OF 4,000 PSI.
5. CURB WILL BE INSTALLED IN ACCORDANCE WITH SECTION 501 OF THE 1995 MHD STANDARD SPECIFICATIONS FOR HIGHWAYS & BRIDGES BUT TO THE REVEAL & SLOPE SHOWN IN THE DETAILS.

CONCRETE TRANSITION CURB
NOT TO SCALE

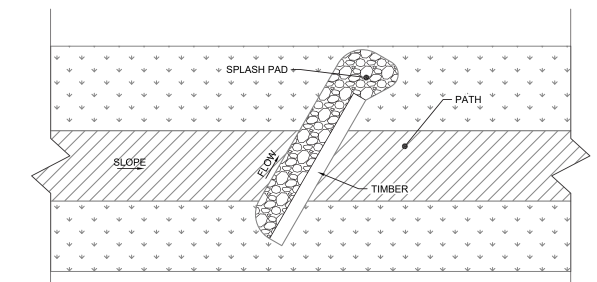


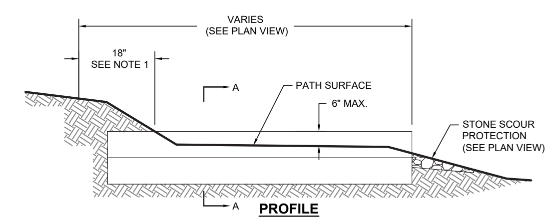
NOTES:
1. THE END SECTION TO BE UNDERCUT SO THAT THE INVERT OF THE APRON TO BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE FOREBAY.
2. THE WIDTH OF THE END OF THE APRON TO BE EQUAL TO THE BOTTOM WIDTH OF THE FOREBAY. MAXIMUM TAPER TO FOREBAY 5:1.
6. THE GEOTEXTILE FILTER FABRIC TO BE MIRAFI 140N OR EQUIVALENT

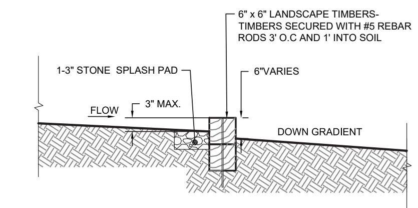




PAVED INLET FLUME
NOT TO SCALE

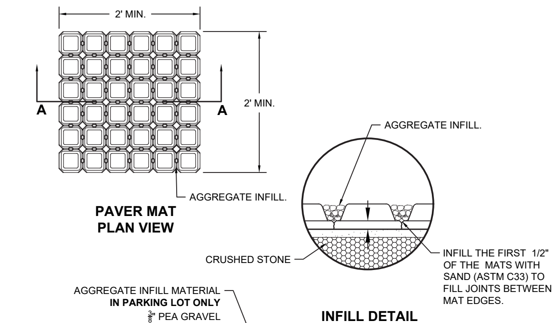


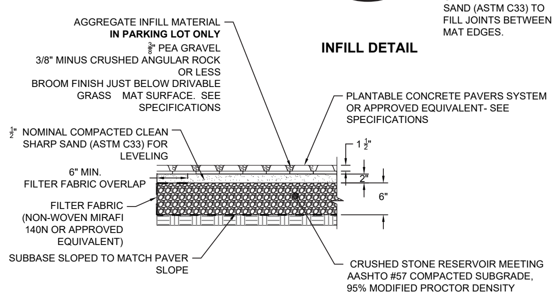




NOTES:
1. KEY TIMBERS INTO THE PATH BANKS AND EXTEND INTO THE ABUTMENTS A MINIMUM OF 18" TO PREVENT FLOW FROM DIVERTING THE WATERBAR.
2. FIELD LOCATE WATERBARS.

WATERBAR
NOT TO SCALE

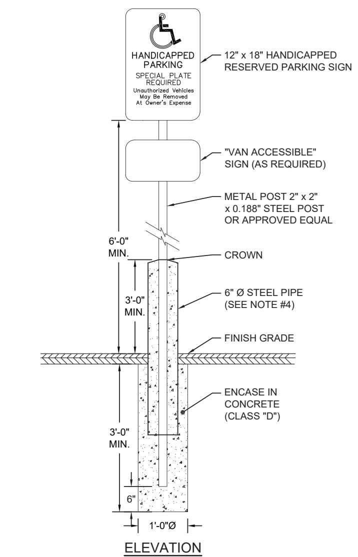




PERMEABLE CONCRETE PAVER

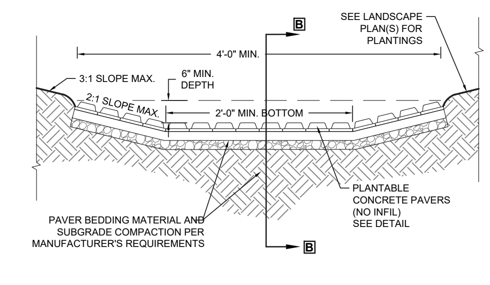
NOTES:
1. SEE SPECIFICATIONS FOR PERMEABLE PAVER REQUIREMENTS.
2. REFER TO MANUFACTURERS REQUIREMENTS FOR ADDITIONAL INSTALLATION REQUIREMENTS
3. FILTER FABRIC AROUND PERIMETER AND BOTTOM OF STONE BASE. KEY IN MINIMUM 6".

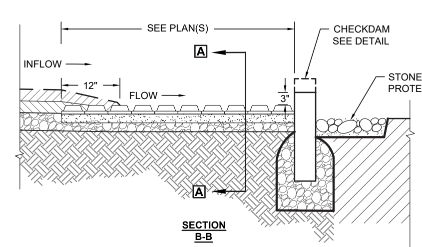
PERMEABLE PAVERS
NOT TO SCALE



NOTES:
1. SIGN LAYOUT, COLORS, SYMBOL & LETTERING WILL BE *AASHTO* STANDARD.
2. TO BE LOCATED ON SITE AT ALL HANDICAP SPACES AS SHOWN ON PLAN.
3. METAL POST WILL BE MANUFACTURER PAINTED WITH EXTERIOR BLACK ENAMEL OR APPROVED EQUAL.
4. STEEL PIPE TO BE USED WHERE SIGN IS INSTALLED IN PAVED AREA.

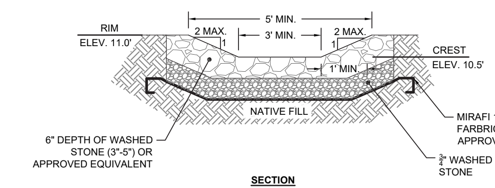
HANDICAP SIGN
NOT TO SCALE

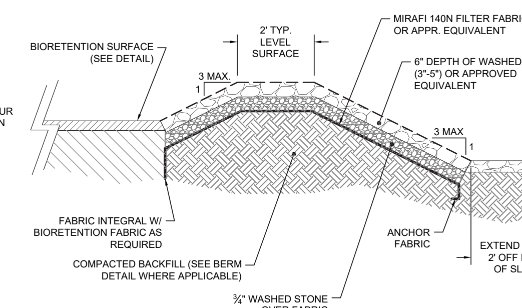




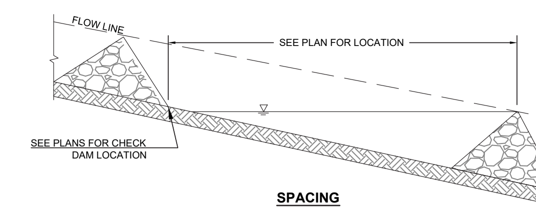
NOTES:
1. SEE PLANTABLE CONCRETE PAVERS DETAIL AND SPECIFICATIONS FOR PLANTABLE PAVER REQUIREMENTS.
2. INSTALL PLANTABLE/PERMEABLE PAVER SYSTEM PER MANUFACTURERS REQUIREMENTS.
3. PROVIDE TRAPEZOIDAL CHANNEL WITH MIN. 6" SIDE SLOPE DEPTH. DO NOT EXCEED 2:1 SIDE SLOPES FOR PAVER AREA AND 3:1 FOR SURROUNDING LANDSCAPED AREA.

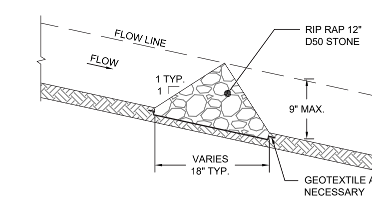
SEDIMENT FOREBAY
NOT TO SCALE

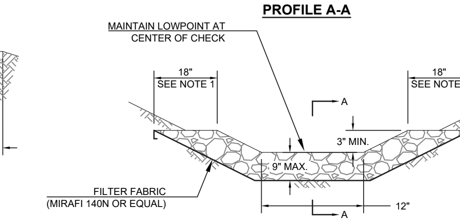




STONE OVERFLOW
NOT TO SCALE

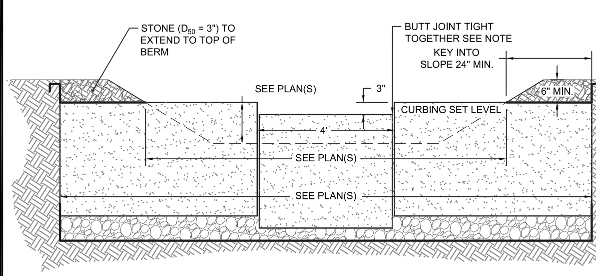


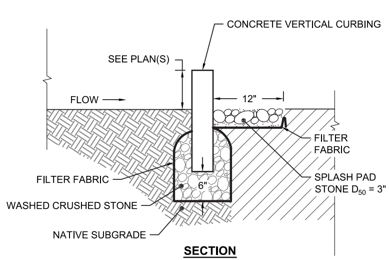




NOTES:
1. KEY STONE INTO THE SWALE/DITCH BANKS AND EXTEND INTO THE ABUTMENTS A MINIMUM OF 18" TO PREVENT FLOW FROM DIVERTING THE CHECK DAM.
2. SEE SITE PLAN FOR CHECK DAM PLACEMENT AND SPACING.

CHECK DAM FOR SWALE
NOT TO SCALE

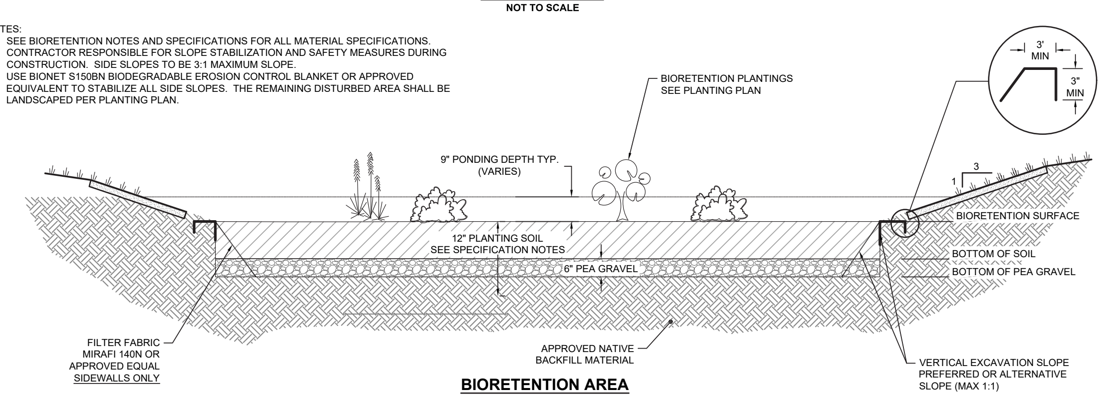




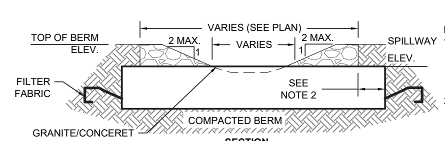
NOTES:
1. KEY CHECKDAM INTO FOREBAY SIDE SLOPES A MINIMUM OF 24" TO PREVENT FLOW FROM DIVERTING THE CHECK DAM.
2. SEE PLAN(S) FOR CHECKDAM DIMENSIONS AND LAYOUT.

FOREBAY WEIR
NOT TO SCALE

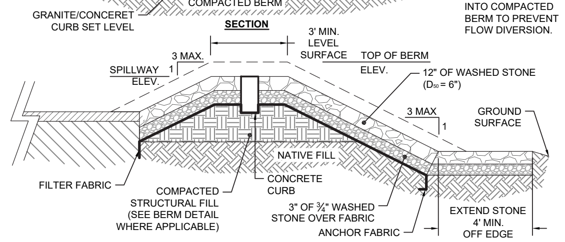
NOTES:
1. SEE BIORETENTION NOTES AND SPECIFICATIONS FOR ALL MATERIAL SPECIFICATIONS.
2. CONTRACTOR RESPONSIBLE FOR SLOPE STABILIZATION AND SAFETY MEASURES DURING CONSTRUCTION. SIDE SLOPES TO BE 3:1 MAXIMUM SLOPE.
3. USE BIONET S150BN BIODEGRADABLE EROSION CONTROL BLANKET OR APPROVED EQUIVALENT TO STABILIZE ALL SIDE SLOPES. THE REMAINING DISTURBED AREA SHALL BE LANDSCAPED PER PLANTING PLAN.



BIORETENTION AREA
NOT TO SCALE



NOTES:
1. STONE IN SPILLWAY CHANNEL TO BE SET LEVEL WITH TOP OF CURB.
2. KEY CURB A MINIMUM OF 18" INTO COMPACTED BERM TO PREVENT FLOW DIVERSION.



OVERFLOW WEIR
NOT TO SCALE

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last modified: 05/16/24 printed: 05/22/24 by kk H:\Projects\NOAA\CRCP_2017Rebid\22091 P0321 LBSP St Croix East End_Implementation\Drawings\22091 DE.dwg

Revisions

Rev.	Date	By	Appr.	Description

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com
90 Route 6A, Unit 1
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508-833-6600 phone
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Date:	Designed By:	Drawn By:	Checked By:
MAY 22, 2024	EWH	EWH	MW

Plan Set:
WHALE POINT PARKING AND TRAIL IMPROVEMENTS
PERMITTING PLANS
EAST END, ST. CROIX

Plan Title:
TYPICAL DETAILS

Prepared For:
NOAA Office for Coastal Management
Coral Reef Conservation Program
2234 South Hobson Avenue
Charleston, SC 29405
Phone: ----
Fax: ----

Survey Provided By:
Horsley Witten Group, Inc.
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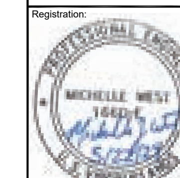
Sandwich, MA 02536
Phone: 508-833-6600
Fax: 508-833-3150
Dated: ----

Registration:



Project Number:	Sheet:
22091	6 of 8

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C - 6

LEGEND

- BEACH/BIORETENTION AREA 2 - TREES/VINES/GRASSES
- PARKING LOT - TREES/SHRUBS/VINES/GROUNDCOVER
- BIORETENTION AREA 1 - SHRUBS/VINES/GROUNDCOVER
- NATURAL REGENERATION

BEACH/BIORETENTION AREA 2 PLANT SCHEDULE

BOTANICAL NAME	COMMON NAME	SIZE	CANOPY
TREES			
Coccoloba uvifera	Sea Grape	#5	6'
Colubrina arborescens	Greenheart	#5	6'
GROUND COVERS			
Ernodea littoralis	Golden Creeper	#15	36" O.C.
Ipomoea pes-caprae	Beach Morning Glory	#3	36" O.C.
Sesuvium portulacastrum	Shoreline Seapurslane	#3	36" O.C.

NOTES:

*FEDERALLY ENDANGERED PLANT SPECIES.

PARKING LOT PLANT SCHEDULE

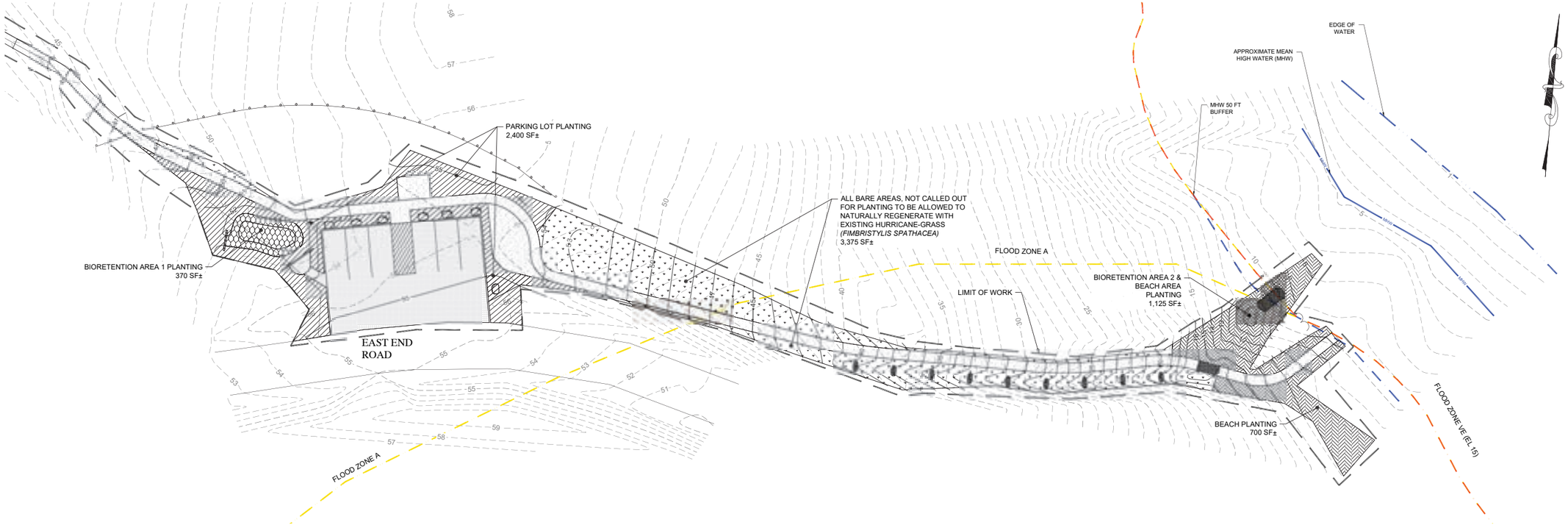
BOTANICAL NAME	COMMON NAME	SIZE	CANOPY
TREES			
Coccoloba uvifera	Sea Grape	#5	6'
Plumeria alba	White Frangipani	#3	6'
SHRUBS			
Melocactus intortus	Turk's Cap	#3	48" o.c.
Opuntia spp.	Prickly Pear	#5	48" o.c.
Pilosocereus royenil	Pipe Organ Cactus	#5	48" o.c.
Agave eggersiana*	Eggers' Century Plant	#5	36" O.C.

BIORETENTION AREA 1 PLANT SCHEDULE

BOTANICAL NAME	COMMON NAME	SIZE	SPACING
SHRUBS			
Capparis flexuosa	Limber Caper	#1	36" o.c.
Conocarpus erectus	Buttonwood	#5	72" o.c.
Lantana involucrata	Buttonsage	#3	36" o.c.
Solanum conocarpum*	Maron bacora	#5	48" o.c.
GROUND COVERS			
Capparis flexuosa	Limber Caper	#3	36" O.C.
Hymenocallis caribaea	Spider Lily	#3	36" O.C.

PLANTING NOTES:

1. FOR AREAS WITH MIXED GROUNDCOVERS (SHOWN AS HATCHED AREAS ON PLANS), DO NOT PLANT IN A PATTERN OR WITH LARGE AREAS OF THE SAME SPECIES. RANDOMLY PLANT AS INDICATED ON THE PLANTING PLANS INTO SMALL GROUPINGS OF THE SAME SPECIES TO CREATE A MORE NATURALISTIC APPEARANCE. PLANT THE SAME PLANT SPECIES IN GROUPS OF 3-7 AND NOT LARGER THAN 7, DEPENDING ON THE OVERALL NUMBER OF PLANTINGS.
2. ALL PLANTS TO BE GROWN WITHIN THE USVI. OTHER APPROPRIATE SPECIES CAN BE SUBSTITUTED DUE TO AVAILABILITY, PROVIDED THEY ARE LOCALLY PRODUCED AND APPROVED BY THE PROJECT'S ENVIRONMENTAL SCIENTIST.
3. SUBSTITUTIONS SHALL BE SUITABLE, DROUGHT ADAPTED NATIVE PLANTS.
4. STRING FENCING SHALL BE USED TO DELINEATE AREA FOR NATURAL REGENERATION AND TO PREVENT FOOT-TRAFFIC INTO THE NATURAL REGENERATION AREA.



GRAPHIC SCALE

20 0 10 20 40 80

(in feet)

1 INCH = 20 FEET

PERMITTING SET ONLY
NOT FOR CONSTRUCTION

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
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5				
6				
7				

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Date: MAY 22, 2024 | Designed By: KJK/BD | Drawn By: KJK/BD | Checked By: ACK/MW

Plan Set: WHALE POINT PARKING AND TRAIL IMPROVEMENTS PERMITTING PLANS EAST END, ST. CROIX

Plan Title: PLANTING PLAN

Prepared For:
NOAA Office for Coastal Management
Coral Reef Conservation Program
2234 South Hobson Avenue
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Survey Provided By:
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Dated: ----

Registration:

MICHELLE WEST 1440 PROFESSIONAL ENGINEER U.S. VIRGIN ISLANDS

Project Number: 22091 | Sheet: 7 of 8

Sheet Number: L - 1

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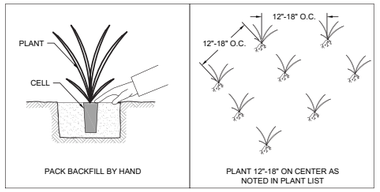
GENERAL PLANTING NOTES:

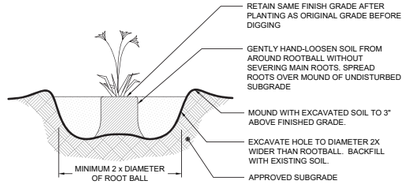
1. ALL PLANTS TO BE GROWN IN THE USVI.
2. THE FOLLOWING NOTES ARE PROVIDED AS GENERAL PLANTING GUIDELINES ONLY. THOROUGHLY REVIEW THE PROJECT SPECIFICATIONS FOR ALL LANDSCAPE REQUIREMENTS PRIOR TO THE COMMENCEMENT OF ANY LANDSCAPE WORK. SUBMIT IN WRITING TO THE ENVIRONMENTAL SCIENTIST/ENGINEER ANY QUESTIONS OR CLARIFICATIONS REQUIRED AT A MINIMUM OF 30 DAYS PRIOR TO ORDERING ANY MATERIALS OR BEGINNING ANY LANDSCAPE CONSTRUCTION.
3. SUBMIT TO THE ENVIRONMENTAL SCIENTIST/ENGINEER FOR REVIEW AND APPROVAL ALL REQUIRED LANDSCAPE SUBMITTALS AS DESCRIBED IN THE SPECIFICATIONS INCLUDING A PLANT LIST WITH PLANT SIZE AND QUANTITIES TO BE ORDERED PRIOR TO DELIVERY TO THE PROJECT SITE.
4. FURNISH AND INSTALL ALL PLANTS AS SHOWN ON THE DRAWINGS AND IN THE SIZE AND QUANTITIES SPECIFIED ON THE PLANTING SCHEDULE. PLANT SUBSTITUTION SELECTION MUST BE APPROVED BY THE ENVIRONMENTAL SCIENTIST/ENGINEER PRIOR TO INSTALLATION.
5. ALL PLANTS TO COMPLY WITH APPLICABLE REQUIREMENTS OF ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK." LATEST EDITION, PUBLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION INC.
6. PLANTS TO BE GROWN UNDER CLIMATIC CONDITIONS SIMILAR TO THOSE IN THE LOCALITY OF THE PROJECT FOR AT LEAST TWO (2) YEARS. USE HEALTHY NURSERY GROWN PLANTS THAT HAVE A WELL DEVELOPED ROOT SYSTEM. PLANTS MUST BE FREE OF DISEASE, INSECTS, EGGS OR LARVAE.
7. INSTALL PLANTS WITHIN ONE (1) WEEK OF PURCHASE. IF PLANTS ARE TO BE STORED AT THE SITE PRIOR TO PLANTING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THEY ARE PROPERLY MAINTAINED, STORED UNDER SHADE, WATERED, AND REMAIN HEALTHY.
8. PROCEED WITH PLANTING ONLY WHEN EXISTING AND FORECASTED WEATHER CONDITIONS PERMIT. SUBMIT TO THE ENVIRONMENTAL SCIENTIST/ENGINEER IN WRITING THE PROPOSED PLANTING SCHEDULE. OBTAIN APPROVAL OF PLANTING SCHEDULE FROM THE ENVIRONMENTAL SCIENTIST/ENGINEER PRIOR TO PERFORMING ANY WORK.
9. CONTRACTOR TO COORDINATE PLANTING TO ENSURE PLANTING DURING THE RAINY SEASON, AND TO PROVIDE IRRIGATION FOR PLANTS AS NEEDED.
10. GUARANTEE A WARRANTY FOR TREES, SHRUBS, AND GROUNDCOVER FOR ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE.
11. ALL TREES WITHIN 5'-0" OF PARKING AREA AND TRAILS TO HAVE A 6'-8" STANDARD BRANCHING HEIGHT.
12. INSPECT ALL AREAS TO BE PLANTED PRIOR TO STARTING ANY LANDSCAPE WORK. REPORT ANY DEFECTS SUCH AS INCORRECT GRADING, INCORRECT SUBGRADE ELEVATIONS OR DRAINAGE PROBLEMS, ETC. TO THE ENVIRONMENTAL SCIENTIST/ENGINEER PRIOR TO BEGINNING WORK. COMMENCEMENT OF WORK INDICATES ACCEPTANCE OF SUBGRADE AREAS TO BE PLANTED, AND THE LANDSCAPE CONTRACTOR ASSUMES RESPONSIBILITY FOR ALL LANDSCAPE WORK.
13. PROVIDE PROPER PREPARATION OF ALL PROPOSED PLANTED AREAS PER THE NOTES AND SPECIFICATIONS.
14. ALL PLANT LAYOUT AND ACTUAL PLANTING LOCATIONS ARE TO BE FIELD VERIFIED BY ENVIRONMENTAL SCIENTIST/ENGINEER PRIOR TO PLANTING. NOTIFY THE ENVIRONMENTAL SCIENTIST/ENGINEER AT A MINIMUM OF 48 HOURS IN ADVANCE PRIOR TO SCHEDULING ANY FIELD INSPECTIONS.
15. BALL AND BURLAP: REMOVE BURLAP AND WIRE BASKETS FROM TOPS OF BALLS AND FROM TOP HALF OF ROOTBALL AS INDICATED ON DRAWINGS. REMOVE PALLETS, IF ANY, BEFORE SETTING.
16. POTTED PLANTS: REMOVE THE PLANT FROM THE POT AND LOOSEN OR SCORE THE ROOTS BEFORE PLANTING TO PROMOTE OUTWARDS ROOT GROWTH INTO THE SOIL.
17. DIG THE THE PLANTING HOLE TO THE SAME DEPTH AS THE ROOT BALL AND TWO TO THREE TIMES WIDER. SCORE ALL SIDES OF THE HOLE, PLACE THE PLANT IN THE HOLE SO THE TOP OF ROOT BALL IS EVEN WITH SOIL SURFACE. FILL THE HOLE HALFWAY AND THEN ADD WATER ALLOWING IT TO SEEP INTO BACK FILLED MATERIAL. BE SURE TO REMOVE ALL AIR POCKETS FROM BACK FILLED SOIL. DO NOT SPREAD SOIL ON TOP OF THE ROOTBALL. IF SOIL IS EXTREMELY POOR, REPLACE BACK FILL WITH GOOD QUALITY TOP SOIL. AMEND THE SOIL, AS NECESSARY.
18. CREATE A 2" TO 4" BERM AROUND THE EDGE OF PLANTING HOLE WITH REMAINING SOIL TO RETAIN WATER.
19. REMOVE ALL PLANT TAGS AND FLAGS FROM THE PLANTS.
20. TRIM BROKEN AND DEAD BRANCHES FROM TREES AND SHRUBS AFTER PLANTING. NEVER CUT A LEADER.

WATERING NOTES:

1. PROVIDE PROPER PLANT CARE, MAINTENANCE AND WATERING ON SITE UNTIL SUCH TIME AS THE LANDSCAPING IS ACCEPTED BY THE PROPERTY OWNER AS SATISFACTORY PER THE SPECIFICATIONS OR AS DETERMINED BY ANY WRITTEN AGREEMENTS BETWEEN THE CONTRACTOR AND PROPERTY OWNER.
2. ESTABLISH AN APPROPRIATE WATERING SCHEDULE FOR ALL PLANT MATERIAL BASED UPON PLANT SPECIES REQUIREMENTS AND SITE CONDITIONS. PROVIDE SCHEDULE IN WRITING TO THE ENVIRONMENTAL SCIENTIST/ENGINEER AND OWNER FOR REVIEW AND APPROVAL. ADHERE TO THE APPROVED SCHEDULE UNTIL PLANTS ARE FULLY ESTABLISHED.



PLUG PLANTING
NOT TO SCALE



CONTAINER PLANTING
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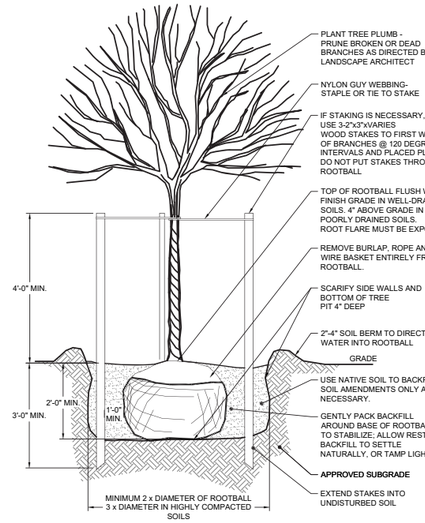

TREE PLANTING
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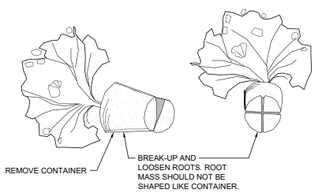
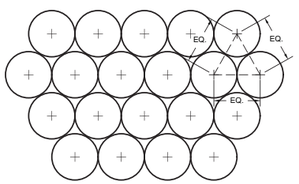


CONTAINER PLANT ROOTBALL TREATMENT
NOT TO SCALE



USE EQUIDISTANT TRIANGULAR SPACING FOR PLANTS - FOR ACTUAL SPACING SEE PLANS OR PLANTING SCHEDULE

PLANTING SPACING
NOT TO SCALE

PERMITTING SET ONLY
NOT FOR CONSTRUCTION

Revisions

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Checked By: ACK/MW
Drawn By: KJK/BD
Designed By: KJK/BD
Date: MAY 22, 2024

Plan Set: WHALE POINT PARKING AND TRAIL IMPROVEMENTS
PERMITTING PLANS
EAST END, ST. CROIX

Plan Title: PLANTING DETAILS

Prepared For:
NOAA Office for Coastal Management
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Registration:

Project Number: 22091
Sheet: 8 of 8
Sheet Number: L - 2

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