TETRA TECH

Oyster Reef Creation – Project Design and Implementation in Hillsborough Bay, Florida

Tampa Bay Regional Planning Council Agency on Bay Management Meeting

National Oceanic and Atmospheric Administration (NOAA) / Mulberry Phosphate Trustee Council

September 10, 2015

Craig J. Kruempel, Tetra Tech, Inc.
Dr. Ann Hodgson, Resource Designs, Inc.
Jason Manthey, PE, NOAA Restoration Center
Sean Meehan, NOAA Restoration Center
Daphne Boothe, NOAA Restoration Center

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Presentation Outline

- The Tetra Tech Team
- Project Approach
- Schedule
- Completed Project Siting and Design
- Implementation

Tetra Tech Team

- Tetra Tech, Inc.
  - Design, Permitting, and Construction Implementation
- Resource Designs, Inc.
  - Habitat Surveys, Permitting, and Restoration Alternatives
- Audubon Florida
  - Migratory Bird Protection Liaison
- Florida Dredge and Dock, LLC
  - Design Support, Constructability, and Project Implementation

Project Purpose and Need

Source: NOAA, SCOPE OF WORK DESIGN AND IMPLEMENTATION OF OYSTER REEF CREATION IN HILLSBOROUGH BAY, FLORIDA. JANUARY 2, 2013

Project Goals

- To create the maximum possible oyster reef habitat area within the suitable shallow intertidal areas adjacent to the eastern shoreline of Spoil Island 2D in Hillsborough Bay.
- To protect existing resources - mangroves and their roots (pneumatophores or prop roots), oysters, and the off-shore seagrass beds.
- To protect/prevent interference with nesting shorebirds during reef installation.
- To conserve existing habitats: Spoil Island 2D is a 30+ year old dredged spoil material island comprised of upland, wetland and beach habitats.

Project Purpose and Need

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Background

- December 7, 1997, the wall of a phosphogypsum stack located at the MPI phosphoric acid/fertilizer production facility in Mulberry, Polk County, Florida breached.
- Approximately 50-56 million gallons of acidic process water flowed into and through Skinned Sapling Creek into the Alafia River.
- The released process water caused a fish kill in the Alafia River, readily observable injuries to shoreline and upland vegetation in some areas in Polk County, and injuries to other natural resources, including losses of resource services.
- A Final Damage Assessment and Restoration Plan and Environmental Assessment (DARP/EA) was developed by State, County and Federal agencies and released to the Public on July 21, 2000.
- Since release of the Final DARP/EA, the Restoration Council, consisting of the FDEP, NOAA, and the EPC of Hillsborough County, have completed additional work to more specifically identify appropriate sites, materials and methods for oyster reef restoration.
  - oyster reef pilot project & pilot project monitoring,
  - an oyster reef restoration feasibility report and meetings with local partners.

Project Purpose and Need

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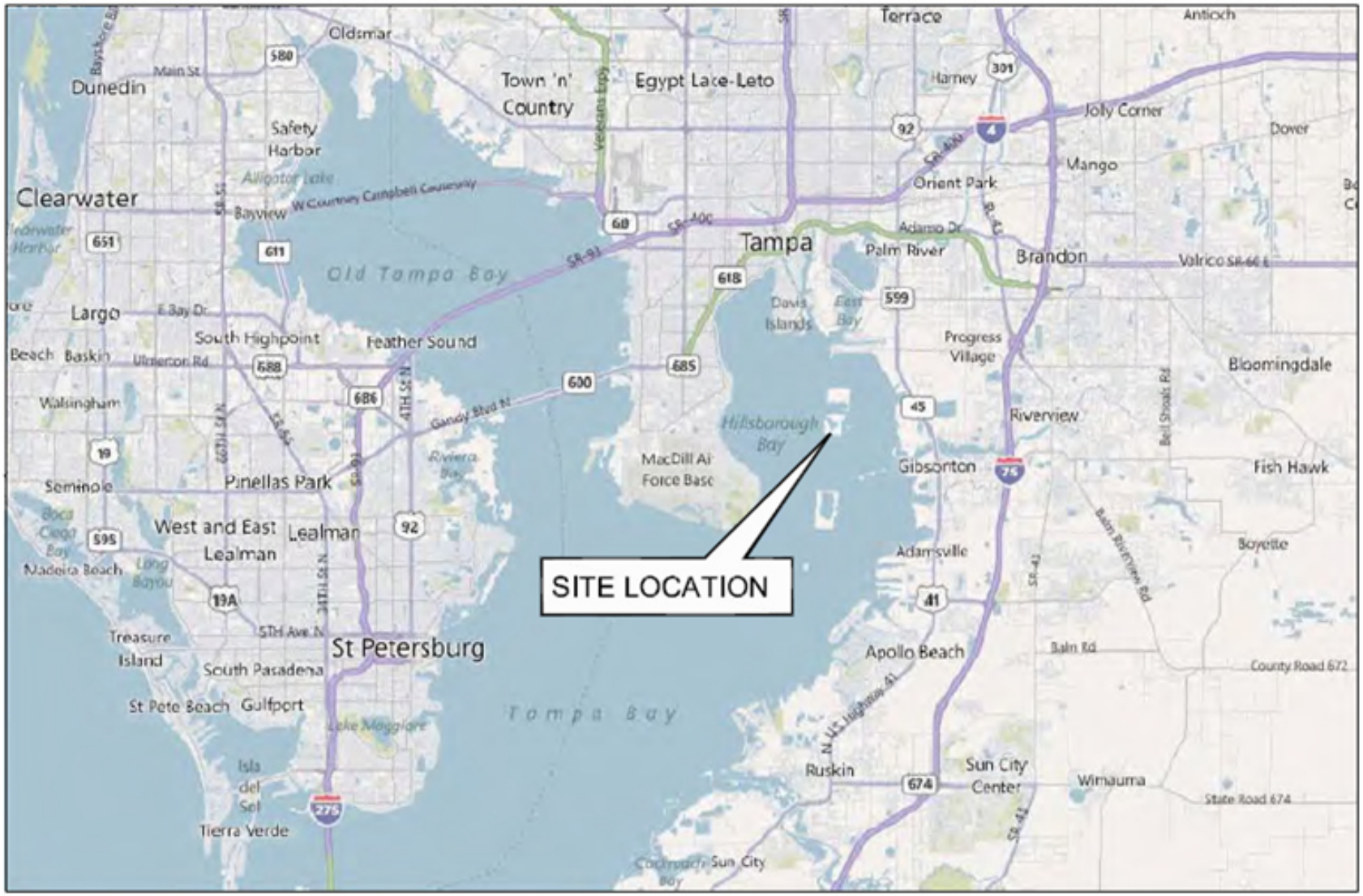
Final Estuarine Restoration Implementation Plan for the December 7, 1997 Alafia River Spill (ERIP):

- Sites: Spoil Islands 2D and 3D in Hillsborough Bay selected as project locations for oyster reef restoration.
- Designs based on pilot projects and Trustee monitoring
- Spoil Island 2D is owned and managed by Port Tampa Bay (formerly the Tampa Port Authority - TPA); Spoil Island 3D is owned by Port Tampa Bay and managed by the Corps of Engineers, Jacksonville District.
- The Agency Trustees determined that restoration on the eastern side of Spoil Island 2D will achieve project goals.

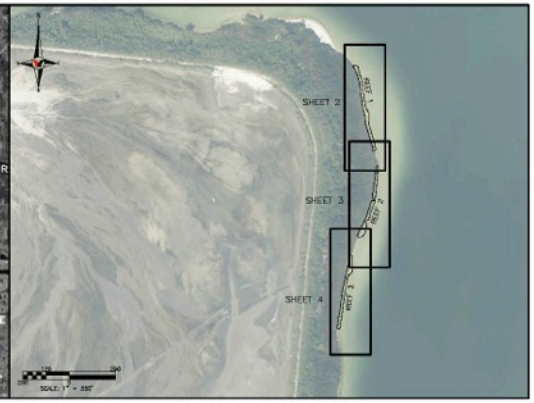
Project Location



Project Location

NOAA MULBERRY
DESIGN & IMPLEMENTATION OYSTER REEF CREATION
RECORD SURVEY

HILLSBOROUGH COUNTY, FLORIDA
SECTIONS 8 & 17
TOWNSHIP 30, RANGE 19



VICINITY MAP **SHEET INDEX MAP**

SPOIL ISLAND 2D, HILLSBOROUGH BAY, FLORIDA

LEGEND

AC	Acres
FDOT	Florida Department of Transportation
GNSS	Global Navigation Satellite System
LB	Licensed Business
LS	Licensed Surveyor
NGS	National Geodetic Survey
NOAA	National Oceanographic and Atmospheric Association
PID	Permanent Identifier
PSM	Professional Surveyor and Mapper
RTK	Real-Time Kinematic
SQ FT.	Square Feet
SRL	Survey Reference Line
	Proposed Reef Limits
	As-built Reef Limits

SURVEY NOTES:

1. Record Survey of three oyster reef segments created as part of the NOAA Mulberry Oyster Reef Creation Design and Implementation Project.
2. Proposed reef segment limits shown hereon were provided by Tetra Tech, Inc. in AutoCAD format.
3. The survey reference lines shown hereon were not monumented and are for reference purposes only. Stationing is of each line is arbitrary and bears no relationship to the other reference lines.
4. Horizontal coordinates are in U.S. survey feet and are referenced to the West Zone of the Florida State Plane Coordinate System, North American Datum of 1983 (NAD 83), 2011 adjustment. Horizontal control was established using Network RTK GNSS methodology. Positioning was verified using NGS control point 'KANEY' (PID DG8976), having a published Northing of 1,272,237.69 and Easting of 530,664.06.
5. Elevations are in feet and are referenced to the North American Vertical Datum of 1988 (NAVD 88). Vertical control is based on NGS benchmark '872 6632 A TIDAL' (PID AG7469), having a published elevation of 5.54.
6. Aerial photography is from 2014 and was provided by FDOT.
7. Per email from Craig J. Kruempel of Tetra Tech, Inc. on 6/16/15, seagrass community boundaries were inspected by qualified marine scientists from the Tetra Tech, Inc. team prior to the commencement of material placement in compliance with the project terms. Representatives of George F. Young, Inc. were not present at time of inspection.
8. This survey is not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.
9. Additions or deletions to survey maps or reports by other than the signing party or parties is prohibited without written consent of the signing party or parties.

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	INITIALS	DATE
DESIGNED	LP	6/24/15
DRAWN	DE	6/25/15
CHECKED	JRP	6/26/15
FIELD BOOK	HYDRO-LU	
FIELD DATE	6/24/15	

PREPARED FOR:
Florida Dredge and Dock
1040 Island Avenue
Tarpons Springs, FL 34689
727-942-7888

George F. Young, Inc.
Since 1919

NOAA Mulberry
Design & Implementation Oyster Reef Creation
Record Survey

JOB NO. 15\08501SU
SHEET NO. 1 of 4

Overview of Completed Approach

- **Phase I**
  - Review Existing Information (Literature and Data)
  - Preliminary Site Investigations (Seagrass Mapping, Sediment Samples, Bathymetry)
  - Project Initiation & Scoping Meeting
  - Stakeholder and Trustee Coordination
  - Final Design
  - Permitting & Regulatory Approval
- **Phase II**
  - Project Implementation – Reef Creation
  - Project Reporting

Constraints

Migratory Bird Management

- Needs: coordinate with Port Tampa Bay Migratory Bird Interagency Protection Committee; provide nesting season protection
- Audubon provided project liaison to the MBIPC, and daily bird monitoring
- Reef Creation: May – June 2015

Constraints

Seagrass, Mangroves, and Oysters

- Nearly continuous **sparse (<10%)** shoalgrass near-shore
- Established mangroves, underlain by narrow oyster reef

Project Implementation - Vessel Access

TETRA TECH

Schedule

Activity	Start Date	End Date
Phase I – Data Acquisition, Site Investigations, Design, & Permitting		
Notice of Solicitation	January 2, 2013	February 15, 2013
Request for Proposal (RFP) Submittal		February 15, 2013
Notice to Proceed		June 7, 2013
Historical Data Acquisition and Review	June 7, 2013	August 31, 2013
Site Investigations & Natural Resource Mapping	June 24, 2013	June 27, 2013
Project Kickoff Meeting and Site Visit		June 26, 2013
Design Engineering & Permit Application Development	June 28, 2013	September 25, 2013
Regulatory Agency Pre-Application Meeting		August 21, 2013
Agency on Bay Management (ABM) Committee Meeting		September 12, 2013
SWFWMD ERP Permit Review and Issuance	September 25, 2013	October 14, 2013
PTB Minor Work Permit Review and Issuance	September 25, 2013	December 4, 2013
NMFS PRD Concurrence Letter		January 29, 2014
USACE NW-27 Permit Review and Issuance	September 25, 2013	January 30, 2014
Project Funding Coordination – Trustees	February 1, 2014	June 26, 2014
Phase II – Project Implementation & Reef Creation		
Phase II Proposal Development & Contractor Coordination	July 29, 2014	January 13, 2015
PTB Right of Entry Agreement Issuance		November 17, 2014
Notice to Proceed	February 24, 2015	February 24, 2015
Subcontracting & Mobilization	March 11, 2015	April 13, 2015
Migratory Bird Interagency Protection Committee Meeting		March 9, 2015
Agency Coordination	March 15, 2015	June 25, 2015
Site Layout and Seagrass Buffer Confirmation		April 14, 2015
Initial Material Deployment at Reef Creation Site		April 20, 2015
PTB Minor Work Permit Revision (Operations During Nesting)		April 20, 2015
PTB Minor Work Permit Revision #1 (Mangrove Trimming)		April 22, 2015
NOAA Field Adjustment Report JM-001 (Additional Reef Creation)		May 5, 2015
PTB Approval for Additional Reef Creation		May 19, 2015
SWFWMD Approval for Additional Reef Creation		May 20, 2015
PTB Minor Work Permit Revision #1 (Additional Reef Creation)		May 26, 2015
USACE Approval for Additional Reef Creation		May 26, 2015
NOAA Field Adjustment Report JM-002 (Excess Materials)		June 2, 2015
Project Services Completion		June 4, 2015
FDEP Trustee Approval for Additional Reef Creation		June 12, 2015
Draft report preparation	June 8, 2015	July 13, 2015
NOAA review of draft report	July 13, 2015	July 27, 2015
Final report preparation	July 28, 2015	August 4, 2015

Baseline Investigations

- Seagrass Mapping
- Sediment Samples
- Bathymetry

Stability Analysis

Wave Analysis and Rock Stability

Model perimeter armor stone for oyster reef substrate.

Design wave conditions - Calculation HYD-01 Design Conditions

Wave height and period - Calculation HYD-02 Design Wave Conditions

- Design – reef substrate stable under 25 year wave conditions
- Wind – 25-year average wind speed over the fetch - 82.2 mph (36.7 m/s)
- Water level – Still water level at +2.1 feet MLLW - top surface of the reef substrate will be periodically exposed to wave action.
- Waves – a depth-limited wave with a height of 2.0 ft and a period of 3.0 seconds

Conservative (higher wave loading) non-overtopping analysis – calculated armor stone size of 14 inches for the D50 stone.

Table 1 - Exterior Reef Riprap Gradation Requirements

Maximum		50%		Minimum	
Inches	Pounds	Inches	Pounds	Inches	Pounds
15	300	14	240	13	180

Implemented Project

Permitted Project Design & Footprint

- 16 individual oyster reefs within approved Project area
- 28,350 square feet (0.65 acre) of reef substrate

Contracted Project Design & Footprint

- 2 individual oyster reef installations
- 1,200 cubic yards of limestone
- 12,975 square feet (0.29 acre) of reef substrate

Implemented Project Design & Footprint

- Changed site conditions = more effective use of material
- 3 individual oyster reef installations
- Agency coordination allowed combining permitted Reef Segments 2, 3, and 4 into a single unified installation
- 1,100 cubic yards of limestone
- 21,470 square feet (0.49 acre) of reef substrate created
- No increase in Project cost
- 76% of permitted reef was created.

Implemented Project Siting & Design

NOAA MULBERRY
DESIGN & IMPLEMENTATION OYSTER REEF CREATION
RECORD SURVEY

HILLSBOROUGH COUNTY, FLORIDA
SECTIONS 8 & 17
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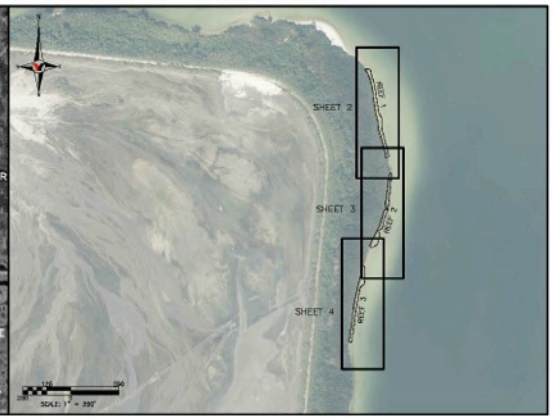
VICINITY MAP



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Jared R. Phillips PSM 156894
DATE

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Design & Implementation Oyster Reef Creation
Record Survey

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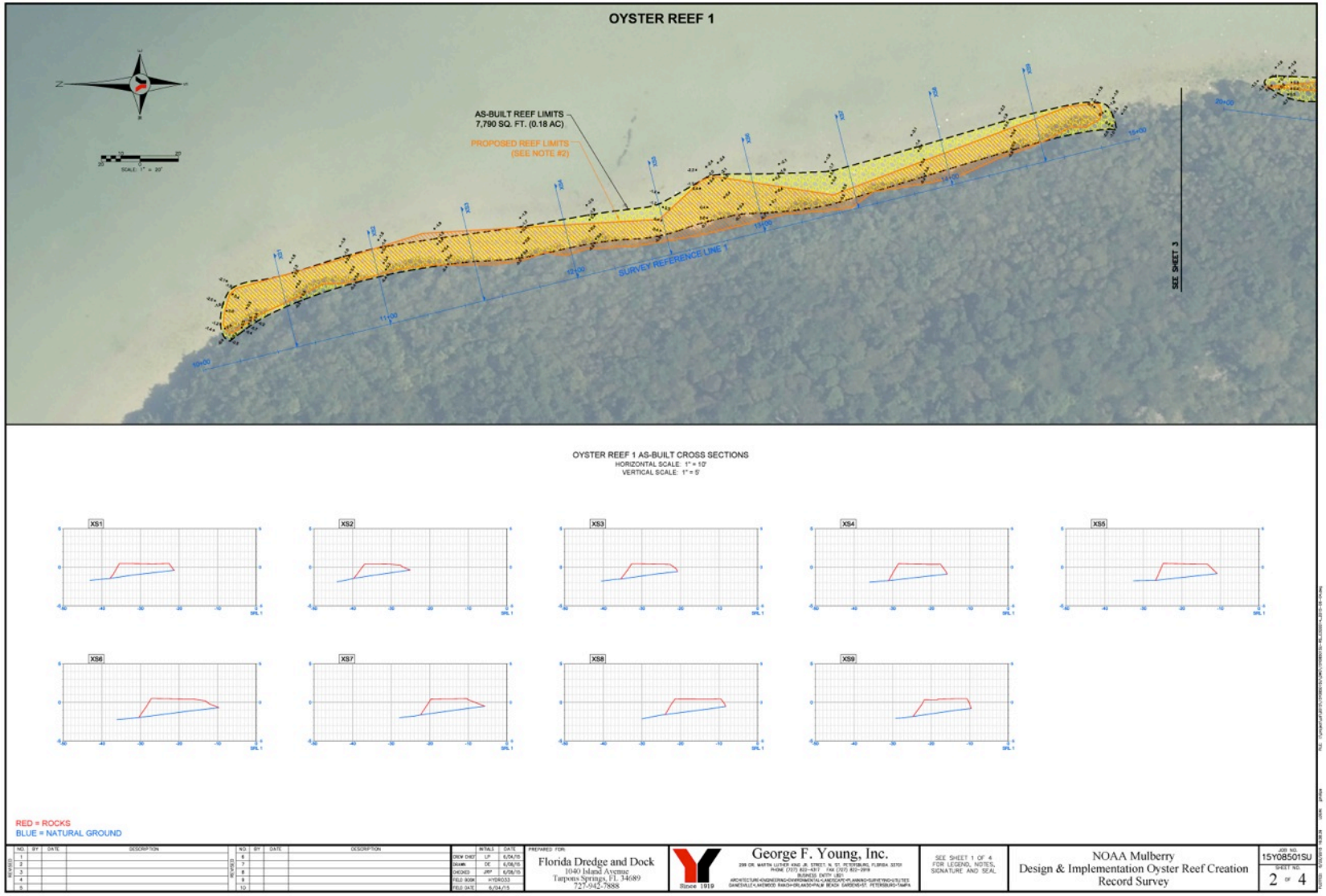
SHEET NO. 1 of 4

Implemented Project Siting & Design



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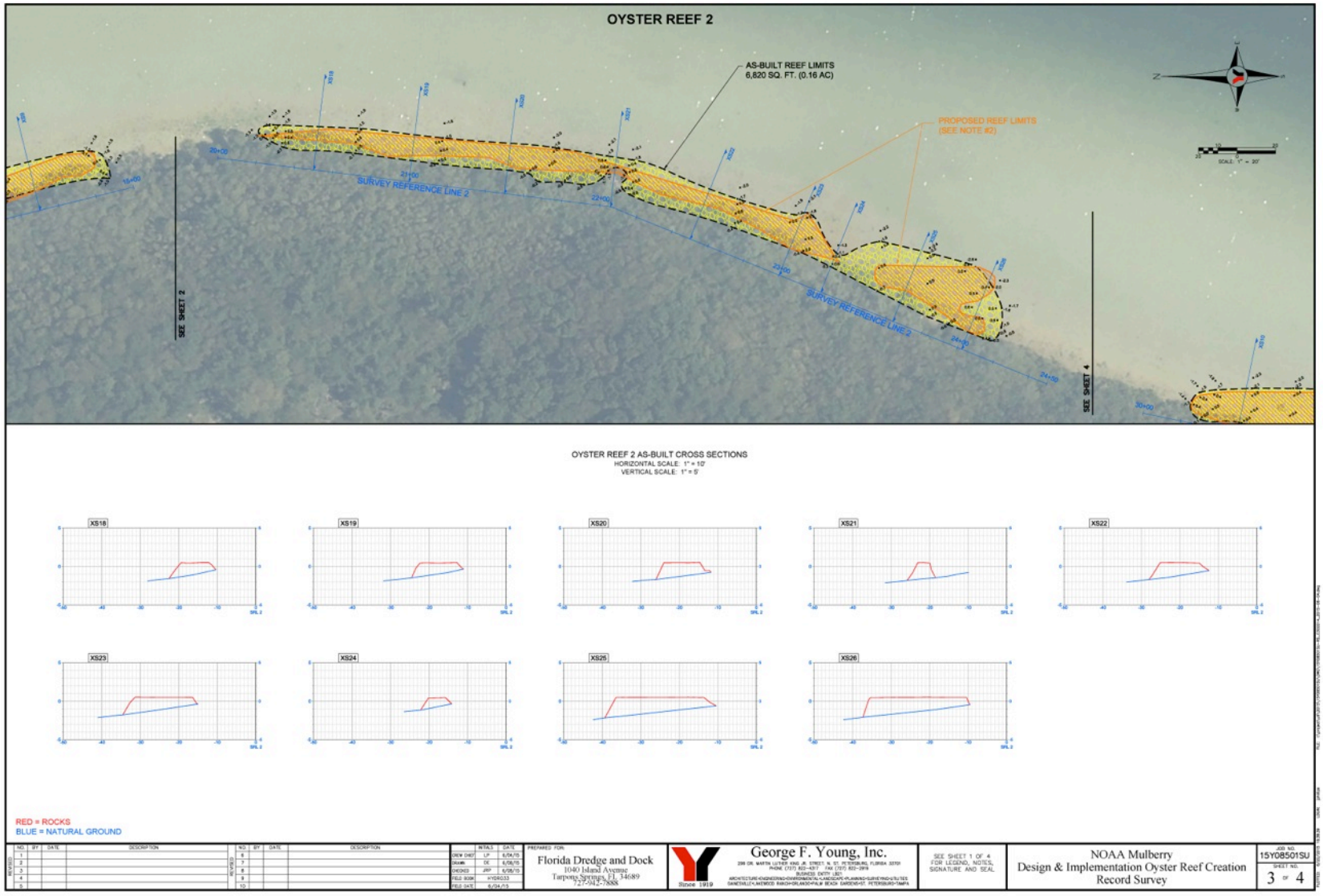

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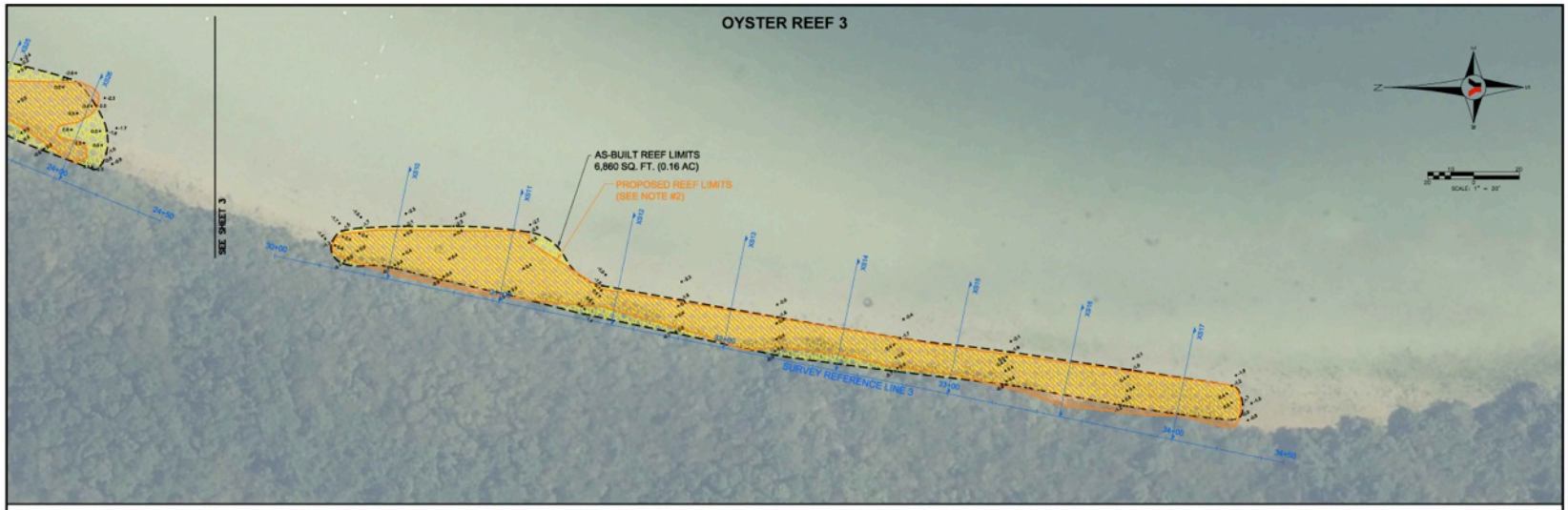
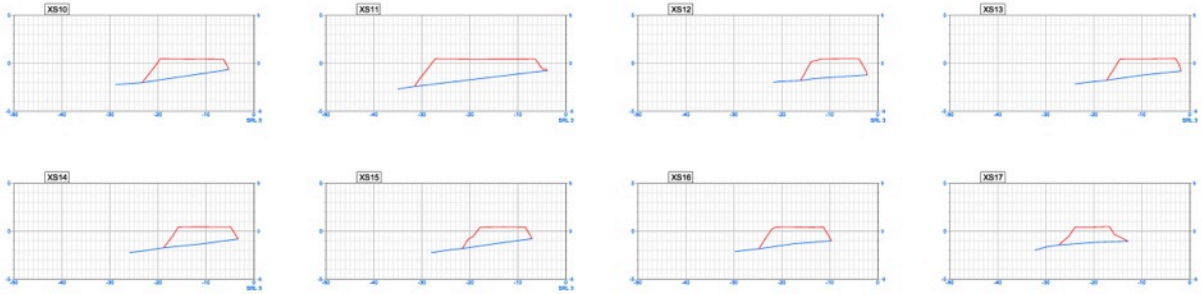


OYSTER REEF 3 AS-BUILT CROSS SECTIONS
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 5'



RED = ROCKS
BLUE = NATURAL GROUND

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SEE SHEET 1 OF 4 FOR LEGEND, NOTES, SIGNATURE AND SEAL

NOAA Mulberry
Design & Implementation Oyster Reef Creation
Record Survey

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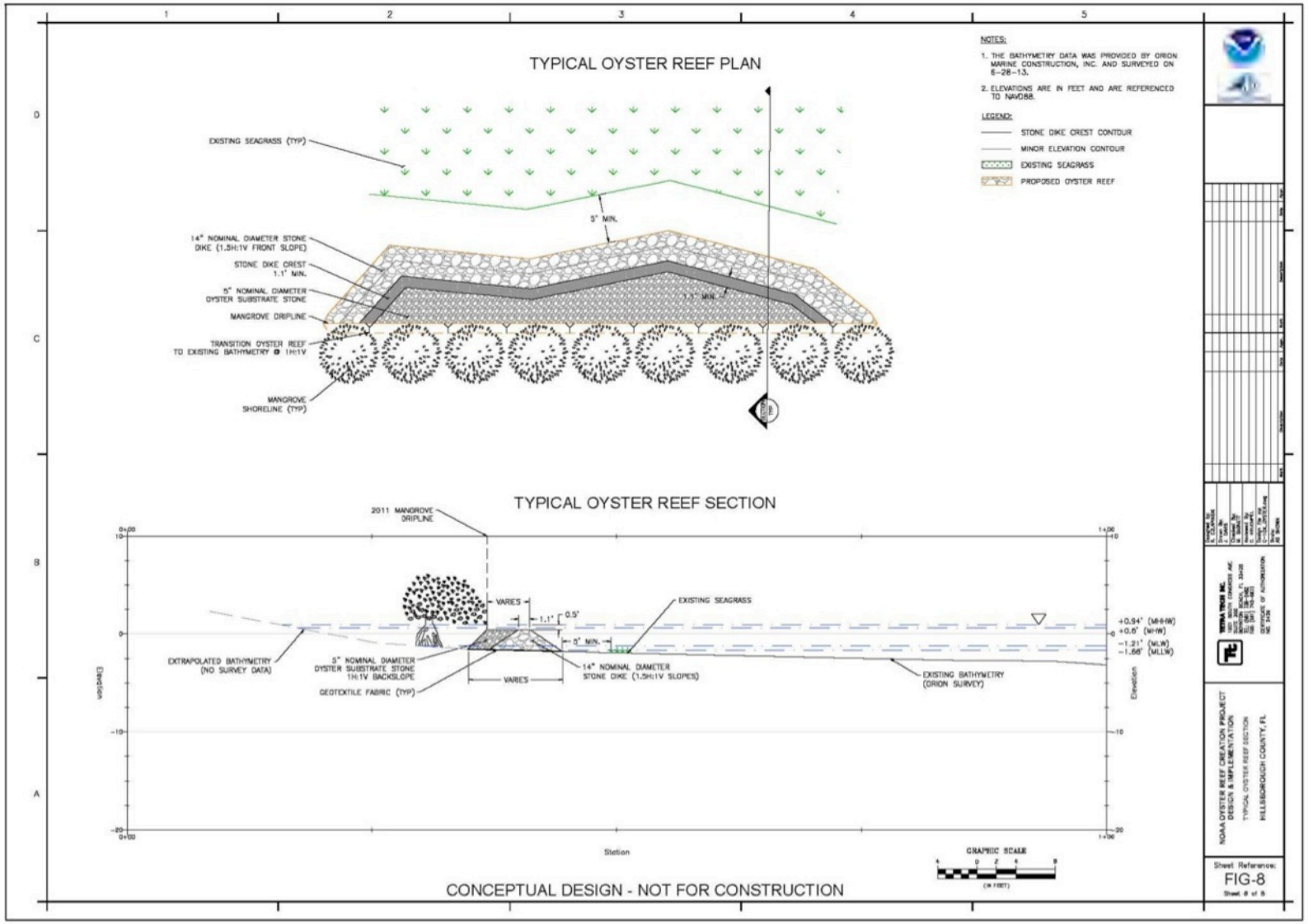
SHEET NO. 4 OF 4

Implemented Project Siting & Design



Installation Equipment

Reef Installation – In Progress

Reef Installation – Perimeter Rock

Reef Installation – Ditch Cobble Interior

Reef Installation in Progress

Created Reef

Migratory Bird Protection

- Approach: Port Tampa Bay “Site-specific Bird Protection Plan for Tampa Bay Spoil Islands 2D and 3D”.
- Maintained recommended 300 foot buffer distance from nesting American Oystercatchers during reef installation.
- No other nesting birds were at risk of being affected by the project.

Migratory Bird Protection

Migratory Bird Protection

Engineering & Installation Oversight

Inter-agency Site Inspection
June 25, 2015

Inter-agency Site Inspection

TETRA TECH

Inter-agency Site Inspection
June 25, 2015

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PORT TAMPA BAY™

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NOAA
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
FLORIDA

ENVIRONMENTAL PROTECTION COMMISSION
HILLSBOROUGH COUNTY

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Resource Designs, Inc.

Audubon FLORIDA

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FLORIDA DREDGE AND DOCK

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Questions?