

Monroe County Canal Restoration Program Update FKNMS WQPP Steering Committee March 7, 2022



Rhonda Haag
Monroe County

Greg Corning
Wood



Presentation Topics

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EPA Grant:

- Florida Keys Seaweed Barrier Technology Pilot Project
- Canal Restoration Program Public Outreach
- Florida Keys Sargassum Master Plan – Phase II
- Canal Water Quality Monitoring

Canal Restoration Work Plan

- **What?**
- **Why?**

Canal Restoration Projects (without assessments):

- Canal #28 Backfilling;
- Canal #25 Backfilling;
- Canal #90 Backfilling;
- Canal #291 Backfilling;
- Canal #259 Culvert;
- Canal # 84 Organic Muck Removal (OMR) and Backfilling;
- Canal #58 Injection Well; Canal #278 Injection Well
- Canal #475 Culvert

Canal Restoration Projects (with assessments):

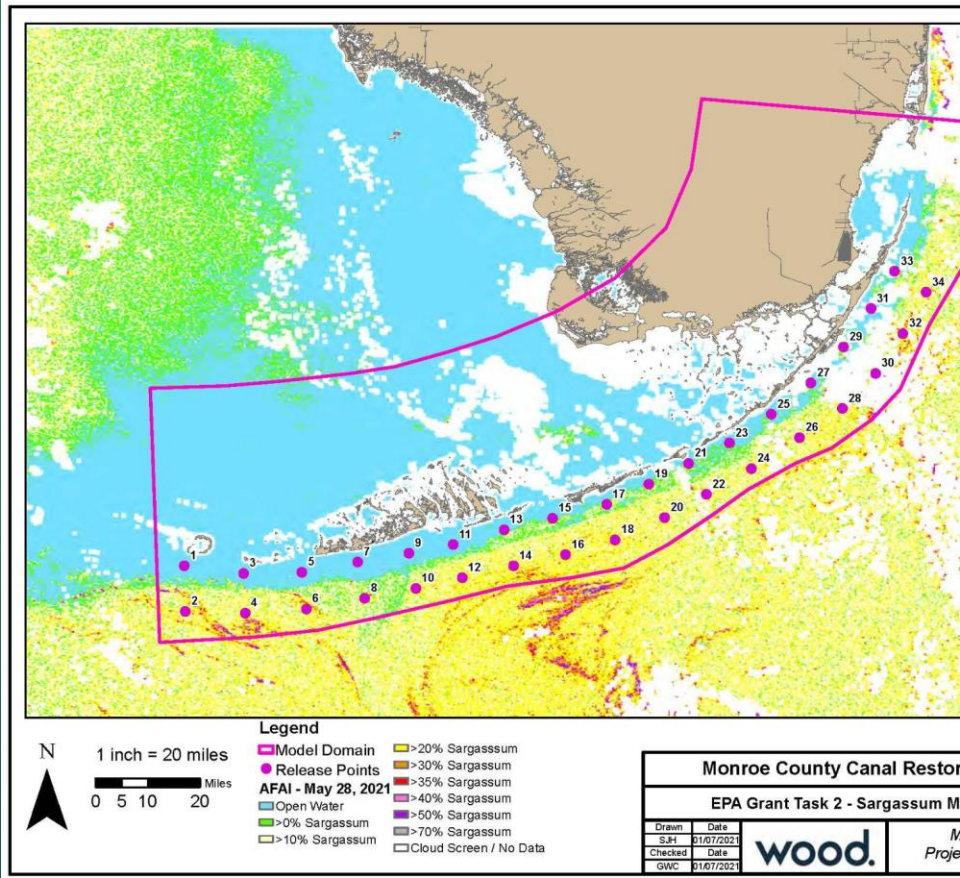
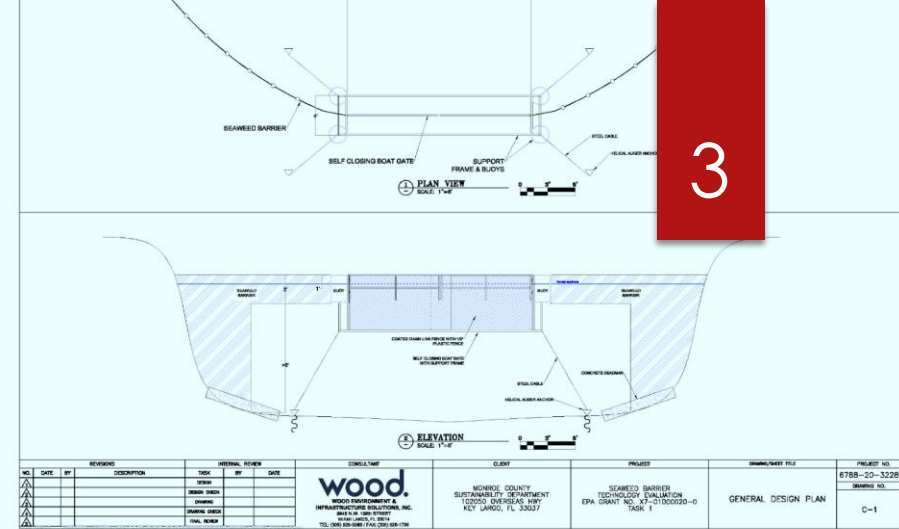
- Canal #105 Backfilling, Air Curtain, Culvert;
- Canal #255 OMR, Backfilling, and Air Curtain;
- Canal #295 OMR, Backfilling, and Air Curtain;
- Canal #297 OMR, Backfilling, and Air Curtain;
- Canal #300 OMR, Backfilling, and Air Curtain;
- Canal #315 OMR, Backfilling, and Air Curtain;
- Canal #474 Backfilling and Air Curtain;

What's Next?

Continued Canal Master Planning

Canal Restoration Program 2020 / 2021 - EPA Grant Update

- Held public meeting on February 24th and hosting another meeting on March 24th to inform public about canal restoration program
- Completed Sargassum Master Plan Phase II DRAFT, including modeling of movement along with options for management and disposal
- Submitted permit applications for the Physical Weed gate, pending approval
- Completed WQ monitoring for dissolved oxygen for all canals within unincorporated Monroe County



What?

Canal Restoration Work Plan

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- 28-20.140 – Monroe County Comprehensive Plan
 - (d) Canal Restoration Implementation
- Florida Keys Area of Critical State Concern
- Provides framework and accountability for implementing canal restoration projects
- If lack of progress is determined, ROGOs get reduced by 20%.

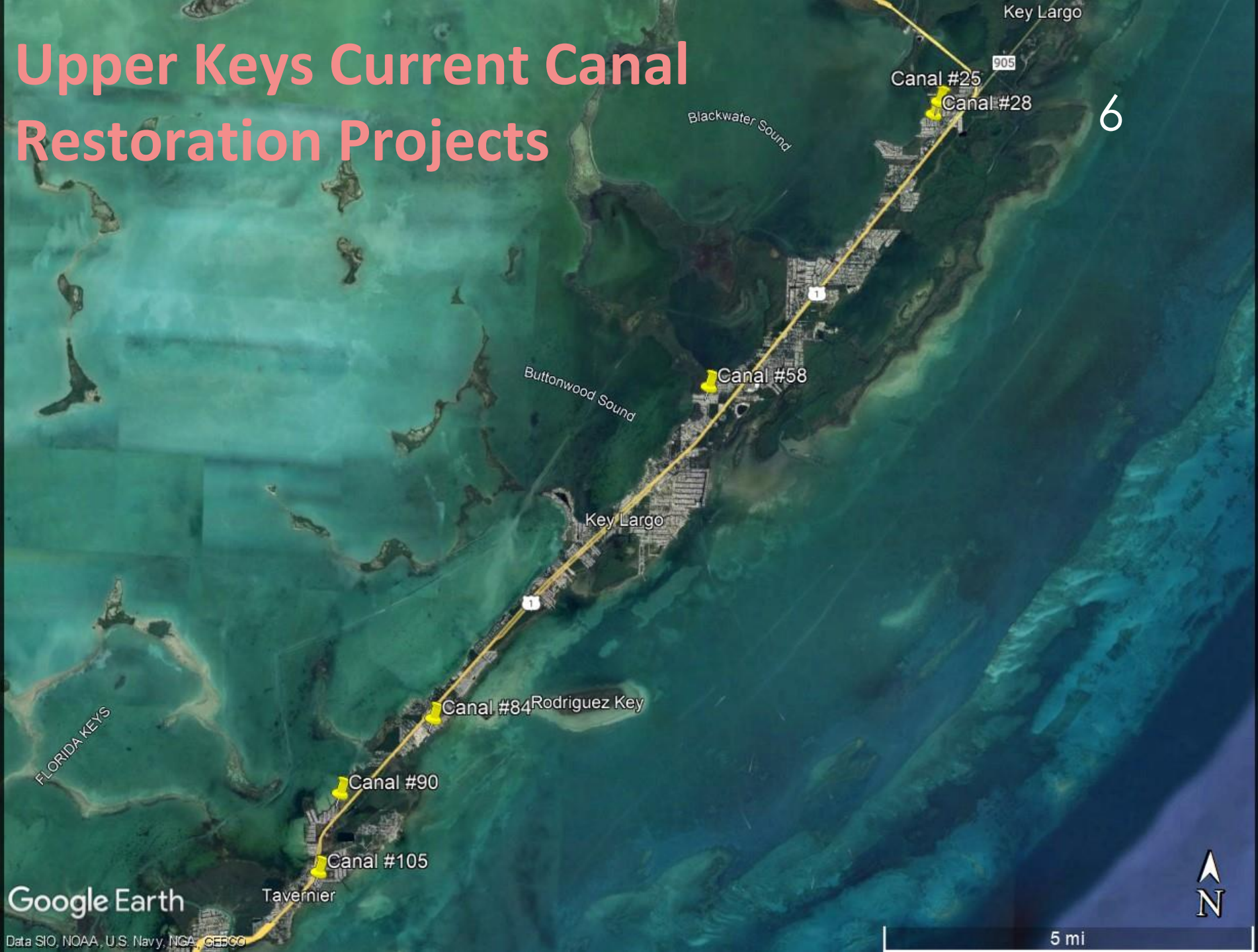


Why is Canal Restoration Needed?

- **96 canals throughout unincorporated Monroe County do not meet FDEP water quality standards**
- **Estimated at \$540 Million**
- **Seaweed Loading / Accumulation**
- **Lack of Flushing**
- **Deep (+40') with no oxygen / life**



Upper Keys Current Canal Restoration Projects



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Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

5 mi



Canal 105 Backfill, Culvert, Air Curtain

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- A. Restoration Cost - \$700,000
- B. Requires assessment for O&M associated with air curtain
- C. 15' too-deep canal with existing undersized culverts.
- D. Breakwater repairs grant design, permitting and procurement underway



Canals 25, 28, and 90 Backfill

- ▶ Canal 25 – 20,000 CY - \$1.3 Million
- ▶ Canal 28 – 40,000 CY - \$2.1 Million
- ▶ Canal 90 – 8,000 CY - \$800K
- ▶ Design, Permitting and Procurement underway



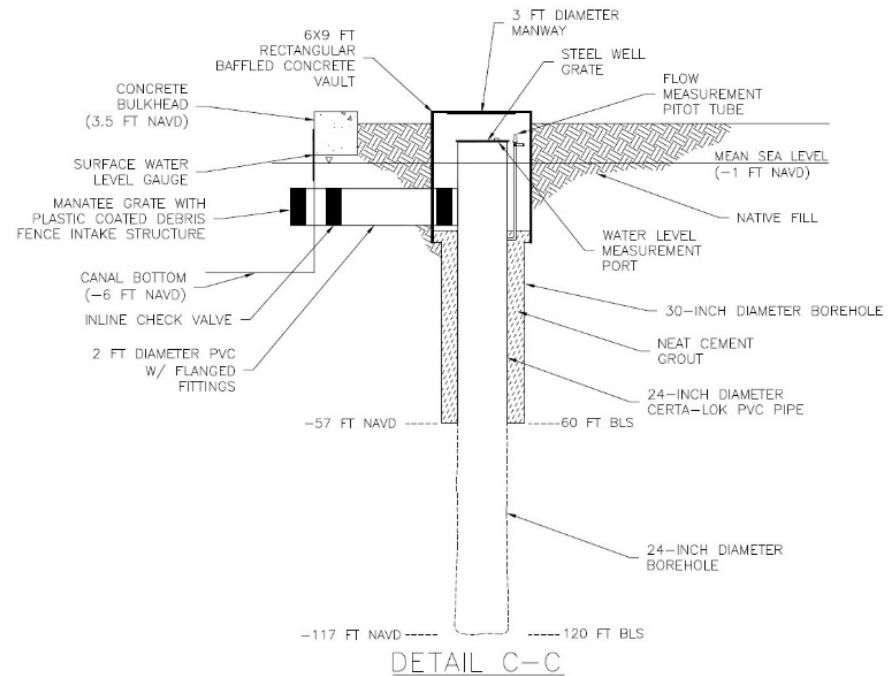
Canal 84 Organic Muck Removal, Backfill, and Air Curtain

- ▶ Restoration Cost - \$1.2 Million
- ▶ Construction underway for muck removal and backfilling
- ▶ Breakwater repairs grant design, permitting and procurement underway



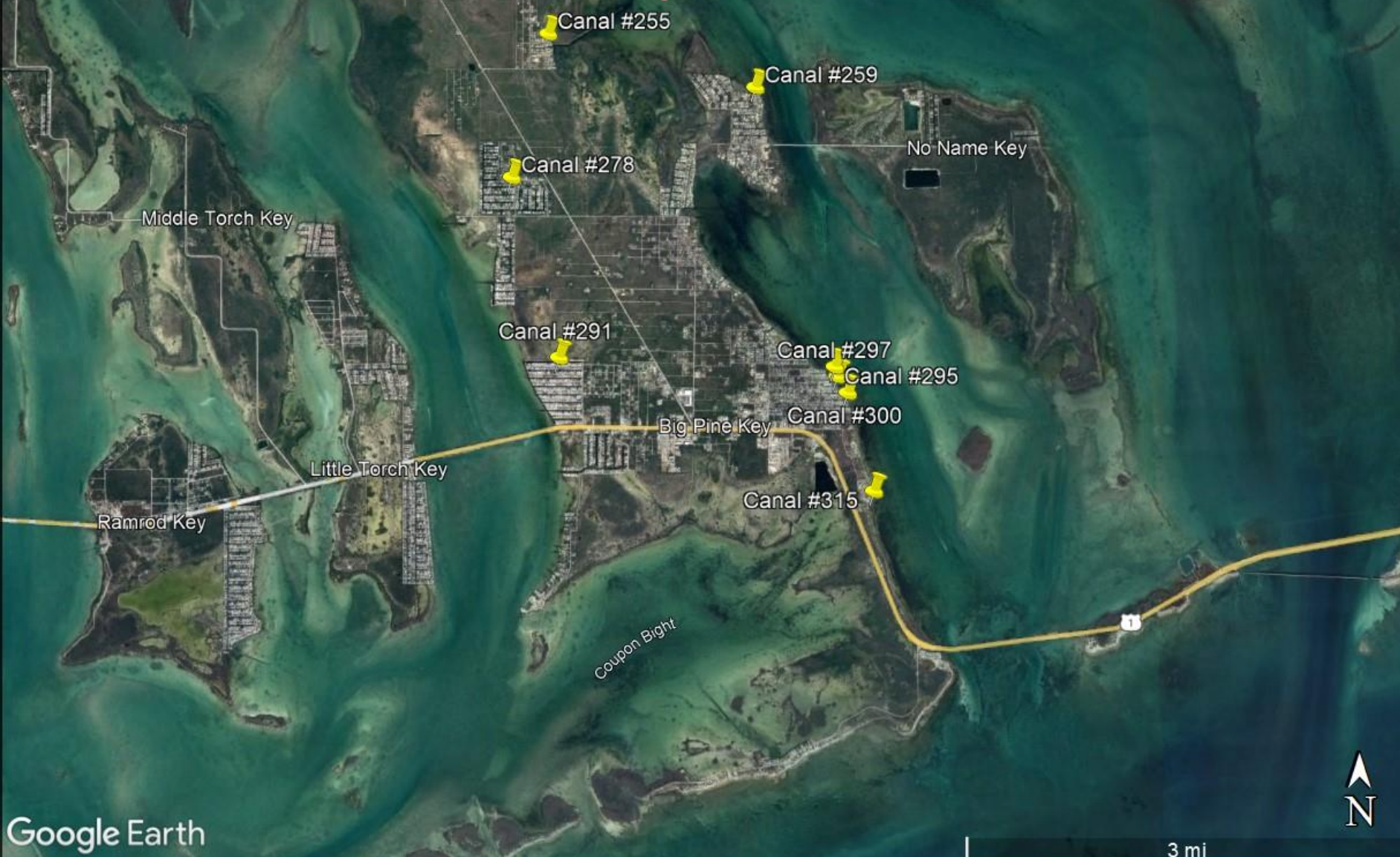
Canal 58 Injection Well

- ▶ **Restoration Cost - \$200,000**
- ▶ **Estimated maximum injection rate of 4,200 gallons per minute**



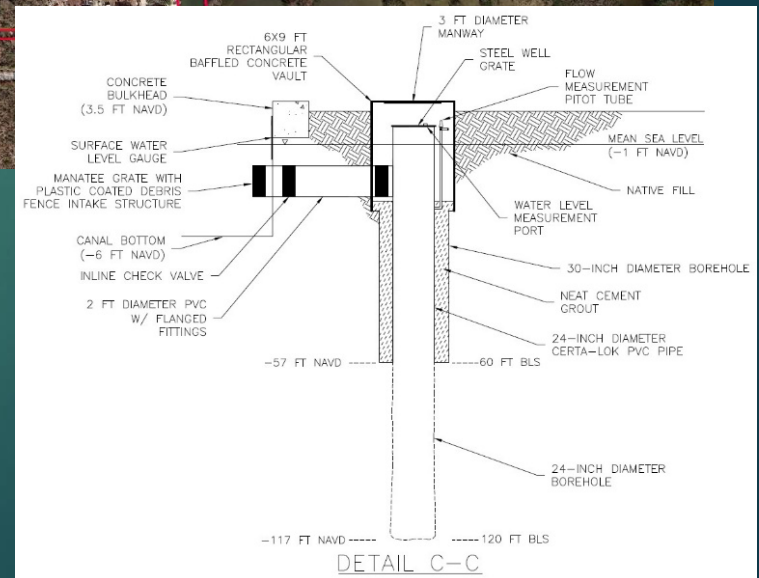
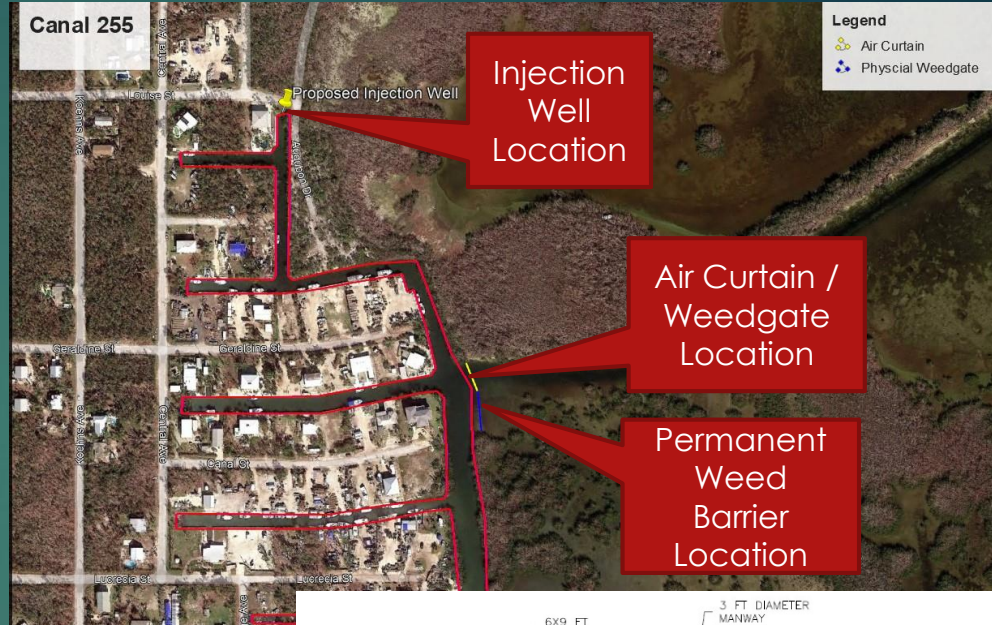
Lower Keys (Big Pine Key) Current Canal Restoration Projects

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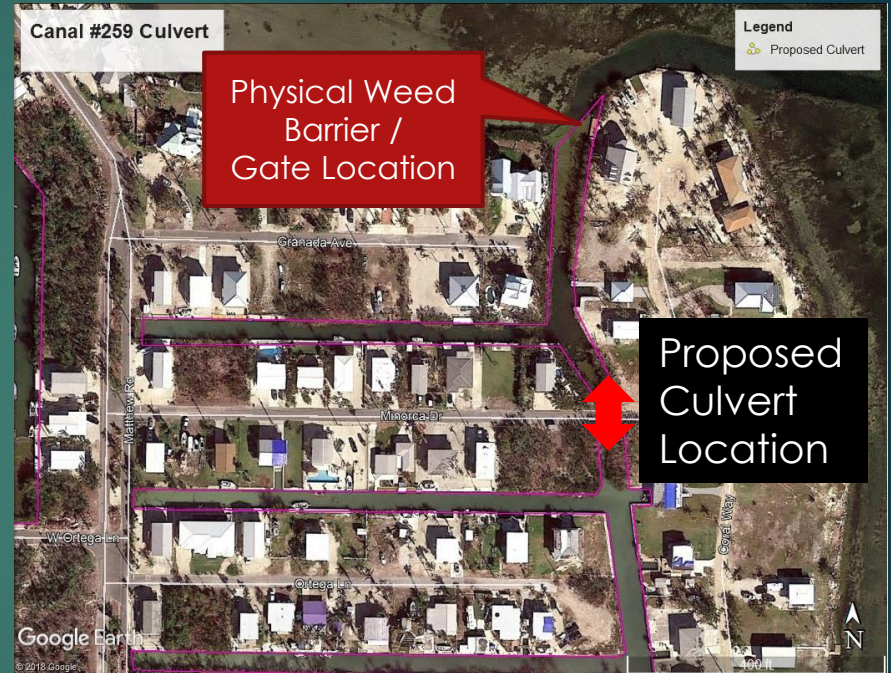
Canal 255 Injection Well / Air Curtain / potential dredging / organic capping

- A. Restoration Cost - \$600,000
- B. Long dead-end canal system with no flushing
- C. Requires assessment for O&M associated with air curtain



Canal #259 Culvert and Physical Weedgate

- A. **Funded by the RESTORE grant**
- B. **Replace undersized existing culvert under Minorca Drive in Big Pine Key.**
- C. **Design and permitting completed for culvert**
- D. **Procurement underway, opening bids this week.**
- E. **Estimated Restoration Cost - \$500K**



Canals 295, 297, 300 and 315 Organic Muck Removal, Backfilling, and Air Curtain

- ▶ Canal 295 Restoration Cost - \$1.1 Million
- ▶ Canal 297 Restoration Cost - \$1.4 Million
- ▶ Canal 300 Restoration Cost - \$1.5 Million
- ▶ Canal 315 Restoration Cost - \$2.4 Million
- ▶ Requires assessment for O&M associated with air curtain



Lower Keys (Geiger Key) Current Canal Restoration Projects



Canal 474 Backfilling / Capping, Air Curtain

- ▶ Restoration Cost - \$300K
- ▶ Requires assessment for O&M associated with air curtain



Canal 475 Culvert

- ▶ Restoration Cost - \$850K
- ▶ Design & Permitting completed
- ▶ Procurement underway



What's Next?

▶ **Starting construction on the following canal projects this summer:**

- ▶ **Canal #475 Geiger Key – Culvert**
- ▶ **Canal #259 Big Pine Key – Culvert / Physical Weed gate**
- ▶ **Canal #28 Key Largo – Backfill**
- ▶ **Canal #25 Key Largo – Backfill**
- ▶ **Canal #90 Key Largo – Backfill**

▶ **Design and permitting currently underway:**

- ▶ **Canal #58 Key Largo – Injection Well**
- ▶ **Canal #278 Big Pine Key – Injection Well**
- ▶ **Canal #291 Big Pine Key - Backfill**

Continued Canal Master Planning

▶ **Continue to pursue EPA / FDEP WQ Grant funds for planning efforts for:**

▶ Water quality monitoring pre and post construction

- a) Technology Evaluations (Canal and Sargassum Prevention)
- b) Canal operation and maintenance plan for Hurricane Preparedness
- c) Evaluate canals with multiple technologies with a phased approach for restoration
- d) Evaluate grouping like projects (potentially not following rank order) to get more bang for the buck when soliciting them for construction.
- e) Living document that will be updated as more information such as WQ data and alternative technology(s) are evaluated.

▶ **Continue to work through the ranked list of 96 canals, reaching out to residents to set up public meetings to discuss potential assessments for O&M**

Thank You!
Rhonda Haag





Islamorada
Canal Restoration Project Update
FKNMS WQPP
Steering Committee Meeting
March 7, 2022

Peter Frezza
Environmental Resources Manager
Islamorada, Village of Islands

Canal Restoration Ranking Summary

- ❑ 63 canals throughout Village of Islamorada
- ❑ Technologies:
 - ❑ Organic Removal
 - ❑ Backfilling
 - ❑ Weed gate
 - ❑ Injection Well
 - ❑ Culvert
- ❑ Total restoration price tag estimated at \$320 Million

wood.

**VILLAGE OF ISLAMORADA
UPDATED CANAL WATER QUALITY
IMPROVEMENT PROJECT RANKING EVALUATION**

PREPARED FOR:

ISLAMORADA, VILLAGE OF ISLANDS
86800 OVERSEAS HIGHWAY
ISLAMORADA, FL 33036

PREPARED BY:

WOOD ENVIRONMENT AND INFRASTRUCTURE SOLUTIONS, INC.
16250 NW 59th Avenue, Suite 206
Miami Lakes, Florida 33014

Wood Project No. 6783-20-3265

July 2021



Canal Restoration Ranking List

Canal Ranking	Canal Name	Island Name	2021 Total Score	Recommended Technology	Conceptual Restoration Cost
1	147 LOWER MATECUMBE KEY	LOWER MATECUMBE KEY	116	Weedgate, Organic Removal, and Backfilling	\$2,268,836
2	132 PLANTATION KEY	PLANTATION KEY	115	Injection Well and Backfilling	\$2,000,000
3	114 PLANTATION KEY	PLANTATION KEY	102	Backfill and Injection Well	\$879,573
4	115 PLANTATION KEY	PLANTATION KEY	98	Backfill	\$1,545,042
5	152 LOWER MATECUMBE KEY	LOWER MATECUMBE KEY	95	Culvert	\$408,196
6	116 PLANTATION KEY	PLANTATION KEY	92	Backfill	\$652,536
7	151 LOWER MATECUMBE KEY	LOWER MATECUMBE KEY	89	Culvert	\$267,377
8	145 LOWER MATECUMBE KEY	LOWER MATECUMBE KEY	87	Organic Removal and Backfill	\$4,964,804
9	148 LOWER MATECUMBE KEY	LOWER MATECUMBE KEY	84	Organic Removal and Backfill	\$3,780,653
10	143 UPPER MATECUMBE	UPPER MATECUMBE	80	Backfill	\$1,714,500
11	111 PLANTATION KEY	PLANTATION KEY	78	Weedgate, Organic Removal, Backfill and Culvert	\$7,727,180
12	157 LOWER MATECUMBE KEY	LOWER MATECUMBE KEY	76	Weedgate, Organic Removal, Backfilling, and Culvert	\$26,949,533
13	137 PLANTATION KEY	PLANTATION KEY	72	Organic Removal and Backfill	\$4,582,913
14	119 PLANTATION KEY	PLANTATION KEY	71	Backfill	\$570,551
15	109 PLANTATION KEY	PLANTATION KEY	69	Weedgate, Organic Removal, Backfill and Culvert	\$11,727,408
16	107 PLANTATION KEY	PLANTATION KEY	68	Weedgate, Organic Removal, Backfill and Culvert	\$24,945,292
17	121 PLANTATION KEY	PLANTATION KEY	68	Backfill	\$2,009,561 ²⁴

Islamorada canals

Air curtains/weed barriers

Plantation Key

Boat Basin 7

Boat Basin 8

Canal 132 (permitting)

Canal 137

Upper Matecumbe Key

Boat Basin

Lower Matecumbe Key

Canal 145

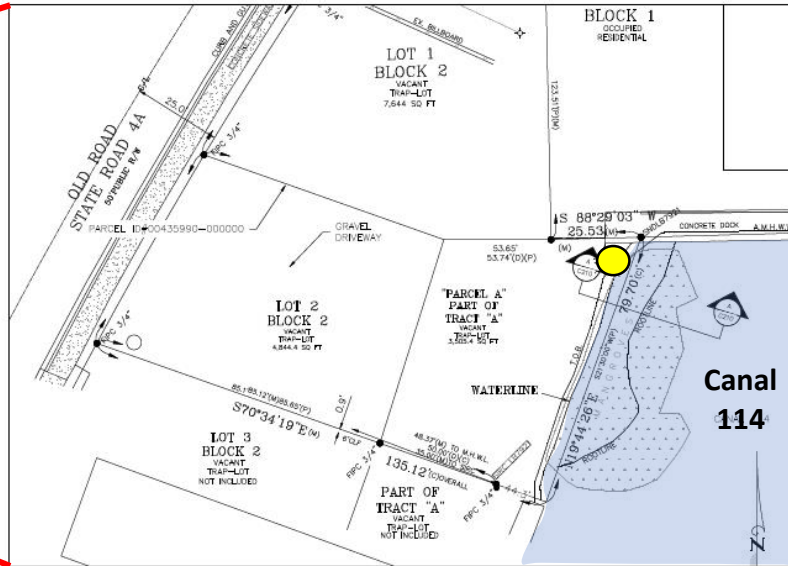
Canal 148



Injection Well – Canal 114 - Plantation Key



OVERALL SITE LAYOUT
0 100 200



EXISTING SITE LAYOUT
0 10 20
LEGEND
MONROE COUNTY PARCELS, 2010

wood.
ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, INC.
5845 NW 15TH STREET
MIAMI LAKES, FL 33014
TEL: (305) 826-5588

ENGINEER OF RECORD
STEPHEN HANKS
FL #E 92253

PROJECT:
CANAL #114 PLANTATION KEY
GRAVITY INJECTION WELL
FINAL DESIGN

APPLICANT:

WOOD PROJECT No:
6783-19-3137

REVISIONS				
NO.	DATE	BY	APPROV.	E.

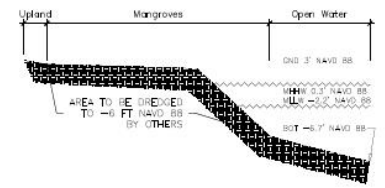
ENGINEER BY: S.H./DWC
DRAWN BY: DMC
CHECKED BY: S.H.
APPROVED BY: JH
DATE: 07/21/2021

SHEET TITLE:
EXISTING SITE PLAN

SHEET NUMBER: REV #
C210
SHEET 2 OF 5 SHEETS



GRAVEL DRIVE TO THE CANAL HEADWALL LOCATED IN THE BACK (EAST SIDE) OF THE PROPERTY

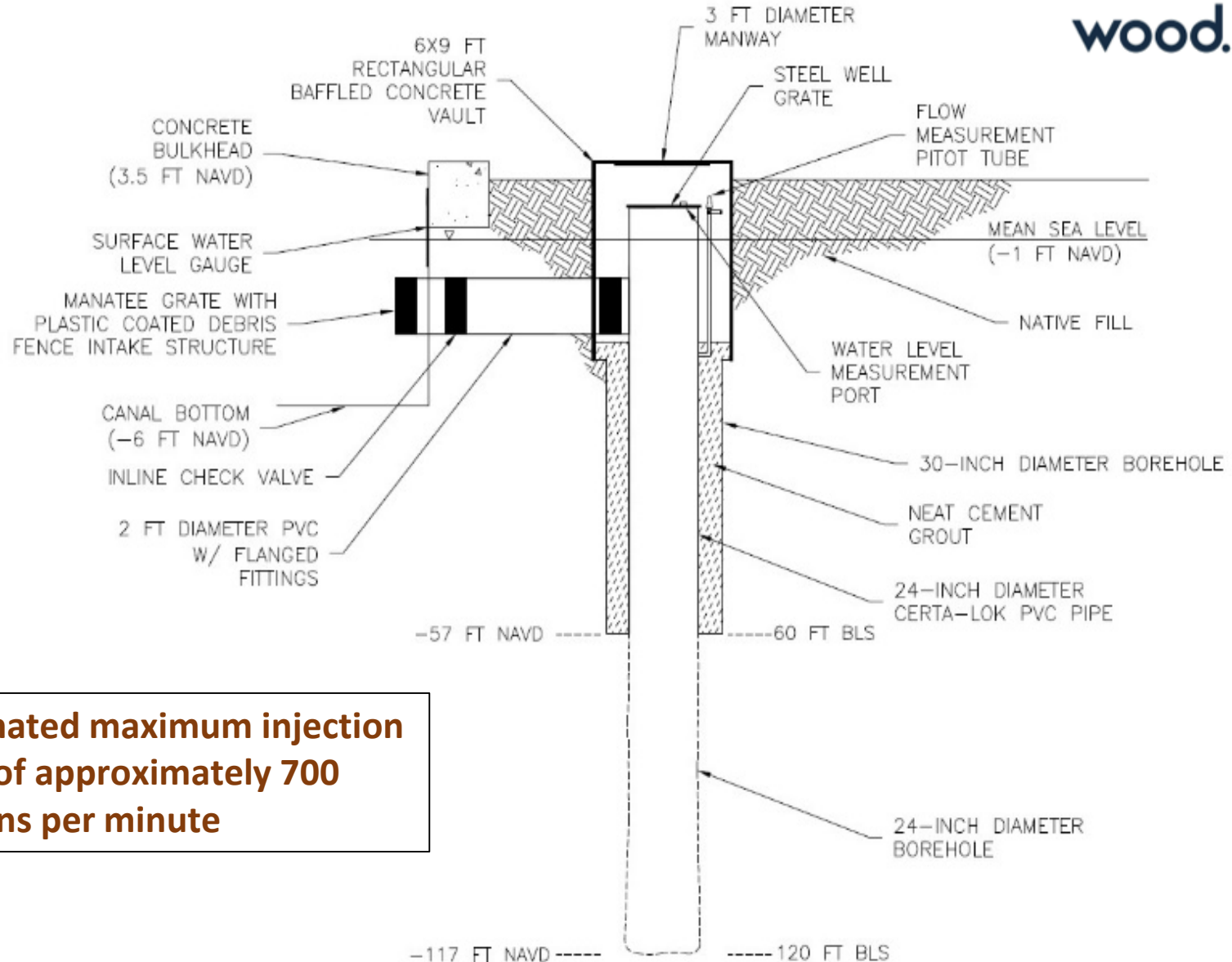


DETAIL A-A
0 5 10

- NOTES:
- 1) THE ELEVATIONS ARE BASED ON THE MAY 28, 2020 SURVEY COMPLETED UNDER MIAMI ENGINEERING SERVICES.
 - 2) THE TIDE LEVELS ARE BASED ON NOAA STATION ID 8723769 IN PLANTATION KEY, FLORIDA.

Injection Well – Canal 114 - Plantation Key

wood.



Estimated maximum injection rate of approximately 700 gallons per minute

DETAIL C-C

Lower Matecumbe Culvert(s) Project

Canals 150, 151, 152, 153, 155, and 157

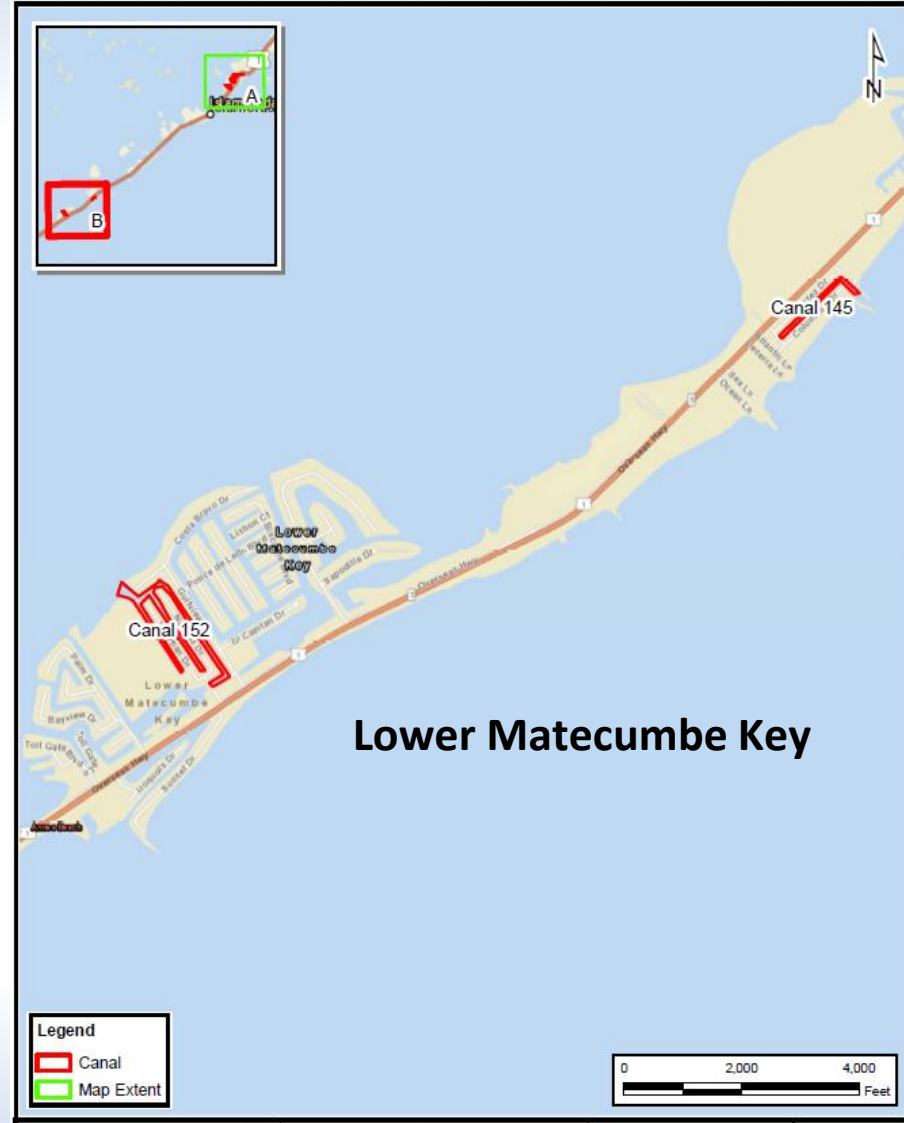


Canal 116 Backfill - North Plantation Key



Monitoring

- Semi-annual Water Quality and Benthic monitoring in 5 canals
- Bi-monthly dissolved oxygen monitoring in all 63 canals



<p>E Sciences, Incorporated FL Engineering Lic. #8691 200 E Dania Beach Blvd Suite 105 Dania Beach, FL 33004 www.esciencesinc.com Phone: 954-484-9500 Fax: 954-484-5148</p>	<p>Water Quality and Benthic Vegetation Monitoring</p> <p>Islamorada, Village of Islands, Florida</p>	<p>FIGURE</p> <p>Location Map</p>	<p>1A</p>
		<p>SCALE: 1" = 2,000'</p> <p>DATE: 4/6/2021</p>	
<p>PROJECT NUMBER: 7-0505-001</p>			

<p>E Sciences, Incorporated FL Engineering Lic. #8691 200 E Dania Beach Blvd Suite 105 Dania Beach, FL 33004 www.esciencesinc.com Phone: 954-484-9500 Fax: 954-484-5148</p>	<p>Water Quality and Benthic Vegetation Monitoring</p> <p>Islamorada, Village of Islands, Florida</p>	<p>FIGURE</p> <p>Location Map</p>	<p>1B</p>
		<p>SCALE: 1" = 2,000'</p> <p>DATE: 4/6/2021</p>	
<p>PROJECT NUMBER: 7-0505-001</p>			

**CITY OF MARATHON
CANAL RESTORATION PROJECT UPDATES
FKNMS WQPP STEERING COMMITTEE MEETING
MARCH 7, 2022**



**George Garrett
City Manager
City of Marathon**

CANAL RESTORATION RANKING SUMMARY

1. 54 canals throughout City of Marathon Technologies:

- Organic Removal
- Backfilling
- Air Curtain
- Injection Well
- Culvert

2. Total restoration price tag estimated at \$120 Million

March 16, 2018



TECHNICAL MEMORANDUM

Prepared For: CITY OF MARATHON, FL

Prepared By: Amec Foster Wheeler Environment & Infrastructure, Inc.

Subject: Task 1 Deliverable – Canal Selection Process

Project: Selection of Canal Restoration Projects for Water Quality Improvement within the City of Marathon

I. Background

The ranking and selection of canals for the improvement of water quality within the City of Marathon will allow stakeholders to make decisions based on the applicability, feasibility, potential for success, and cost effectiveness of potential restoration technologies. This was a similar process that has previously been implemented by Monroe County for the Canal Management Master Plan (CMMP). Amec Foster Wheeler used information obtained during the development of various phases of the Monroe County CMMP and Geographical Information System (GIS) Canal Inventory database to score and rank the canals. Phase II of the CMMP which, occurred from 2012 and 2013 involved an evaluation of all 502 Keys canals in the GIS canal inventory database based on available water quality data and other quantitative and qualitative information. This information has since been updated based on additional water quality data collected during Phase IIIA of the CMMP and the updated Florida Department of Environmental Protection (FDEP) rule regarding dissolved oxygen (DO). DO concentration and relevant biological indicators were used to develop the following canal water quality classification system:

Table 1. Water Quality Ranking

DO Conditions	Biological Conditions	Water Quality Ranking
> 4.0 mg/L	Positive	Good
> 4.0 mg/L	Negative	Fair
3.0 – 4.0 mg/L	Positive	Fair
3.0 – 4.0 mg/L	Negative	Poor
< 3.0 mg/L	N/A	Poor

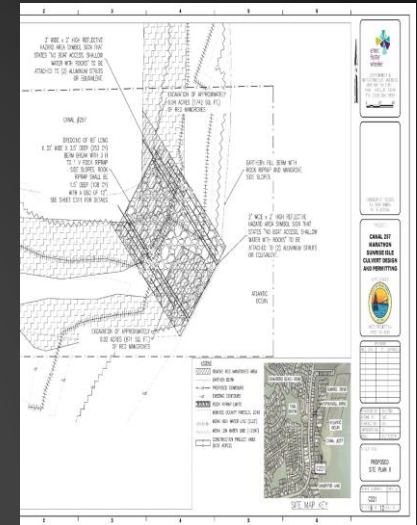
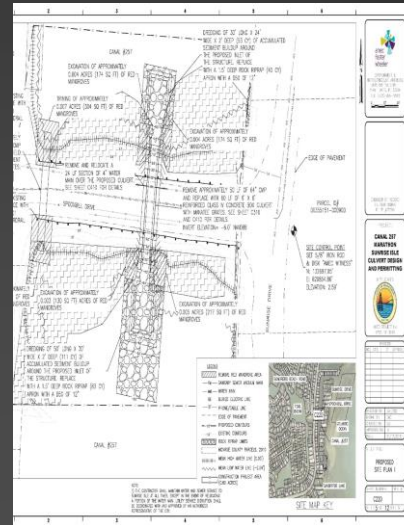
Subsequent to the start of Phase II of the CMMP, the FDEP water quality criteria for DO was modified from the 4 mg/L (at any location at any time) threshold to percent saturation as follows:

1. The daily average DO percent saturation shall not be below 42 percent;
2. The weekly average DO percent saturation shall not be below 51 percent; and
3. The monthly average DO percent saturation shall not be below 56 percent.

In 2017, water quality data for each of the canals ranked as either poor or fair was updated following the collection of additional data during the performance of Phase IIIA of the CMMP. In order to comply with the updated FDEP standard, in 2017, one time grab samples were collected along a vertical profile from the center of the canal. The readings were averaged and corrected for Time of Day. If the average was below 42 percent, the canal was recorded as being out of compliance.

CANAL #257 CULVERT AND BERM BREAK

1. Existing culvert replaced with 6' x 6' box culvert to increase tidal flushing
2. 65' x 30' berm break to increase tidal flushing
3. Completed in 2020 funded partially by FDEP WQ Grant



CANAL 257 – AIR CURTAIN / PHYSICAL WEED GATE

1. Private Public Partnership
2. Design & Permitting underway
3. Anticipate Construction to start Summer 2022
4. Restoration estimated at \$200K



Thank you!