



TAYLOR ENGINEERING, INC.



# Deepening of the Intracoastal Waterway in Palm Beach County, Florida

June 2016



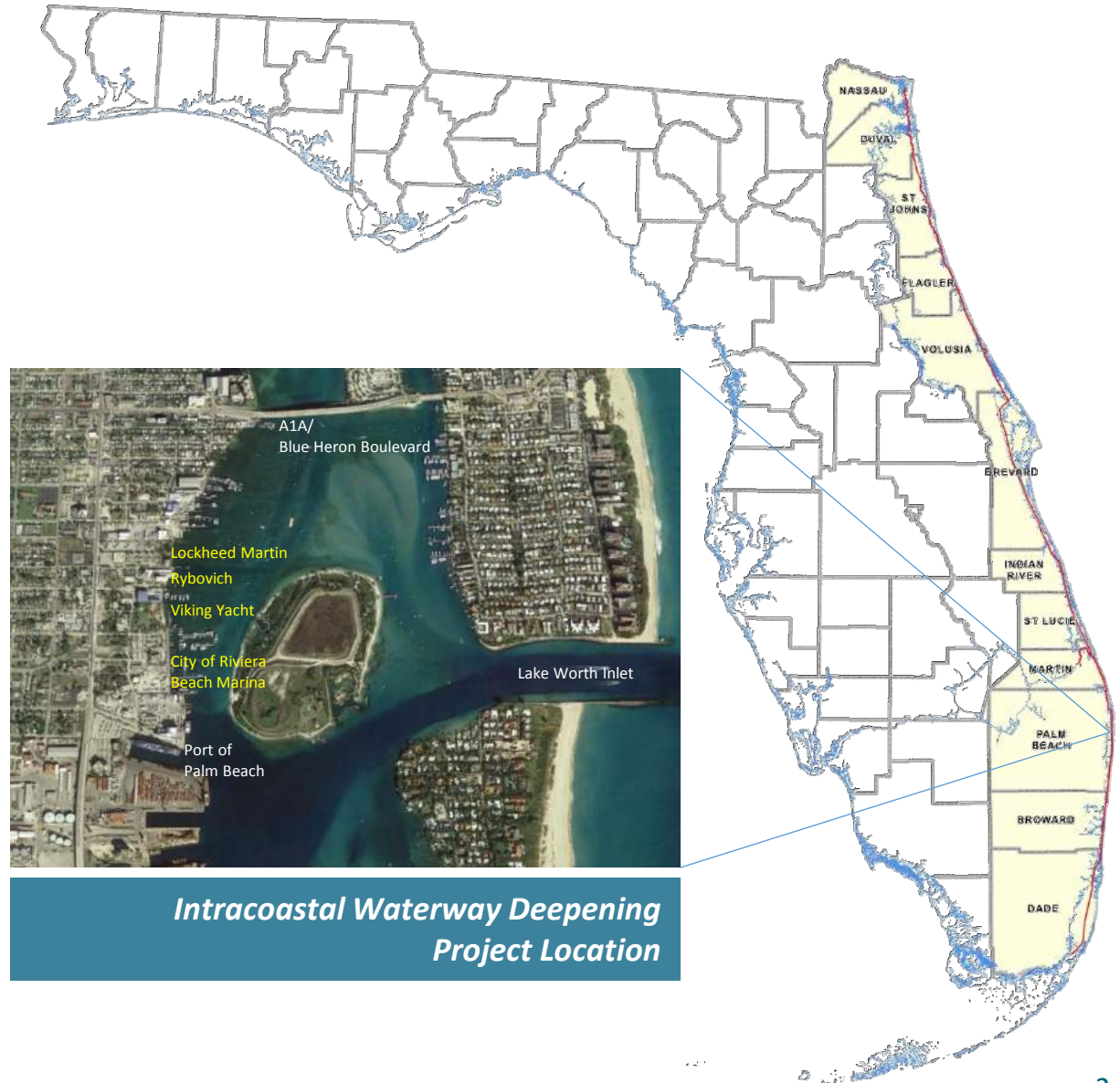
WODCON XXI

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Co-Authors: John Adams, P.E. and Yehya Siddiqui

# PRESENTATION OUTLINE

1. Objectives
2. Benefits
3. Permitting
4. Design
5. Construction
6. Summary
7. Questions





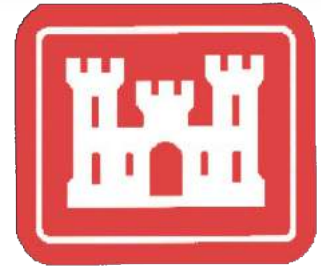
# OBJECTIVES

- **Deepen the Intracoastal Waterway from -10 ft MLW to -17 ft MLW**
- **Support local industries**
  - Allow larger vessels
  - Provide safe navigation and access to service facilities
- **Stimulate local economy**



# BENEFITS

- **USACE Detailed Project Report, 2001**
    - Section 107 Small Navigation Project
    - Recommended -15 ft MLW + 2 ft allowable overdredge over 5.2 miles
    - Recreational benefit not recognized
  - **FIND Economic\* Analysis Report, 2011**
    - \$725,000/year (180 ft LOA)
    - \$7.3 million/year (240 ft LOA)
    - \$18.4 million/year (280 ft LOA)
- \*Average Annual Increase in Net Income



*Riviera Beach*  
FLORIDA

**RYBOVICH**  
YACHTING INTEGRITY THROUGH REFIT

# PERMITTING – Strategy & Schedule

- **Strategy**

- Avoidance & minimization
- Existing upland DMMA
- Advance mitigation area
- Support from local, state, and federal officials

- **Schedule**

- Application: June 2012
- DOA Section 408: April 2013
- FDEP: January 2014
- DOA: November 2014





# DESIGN – Dredge Template & DMMA

- **Dredge**

- Cut length = 3,500 ft
- Channel width = 100 ft
- Volume = ±101,000 cy
- Template = -15 ft MLW + 2 ft allowable overdredge

- **DMMA**

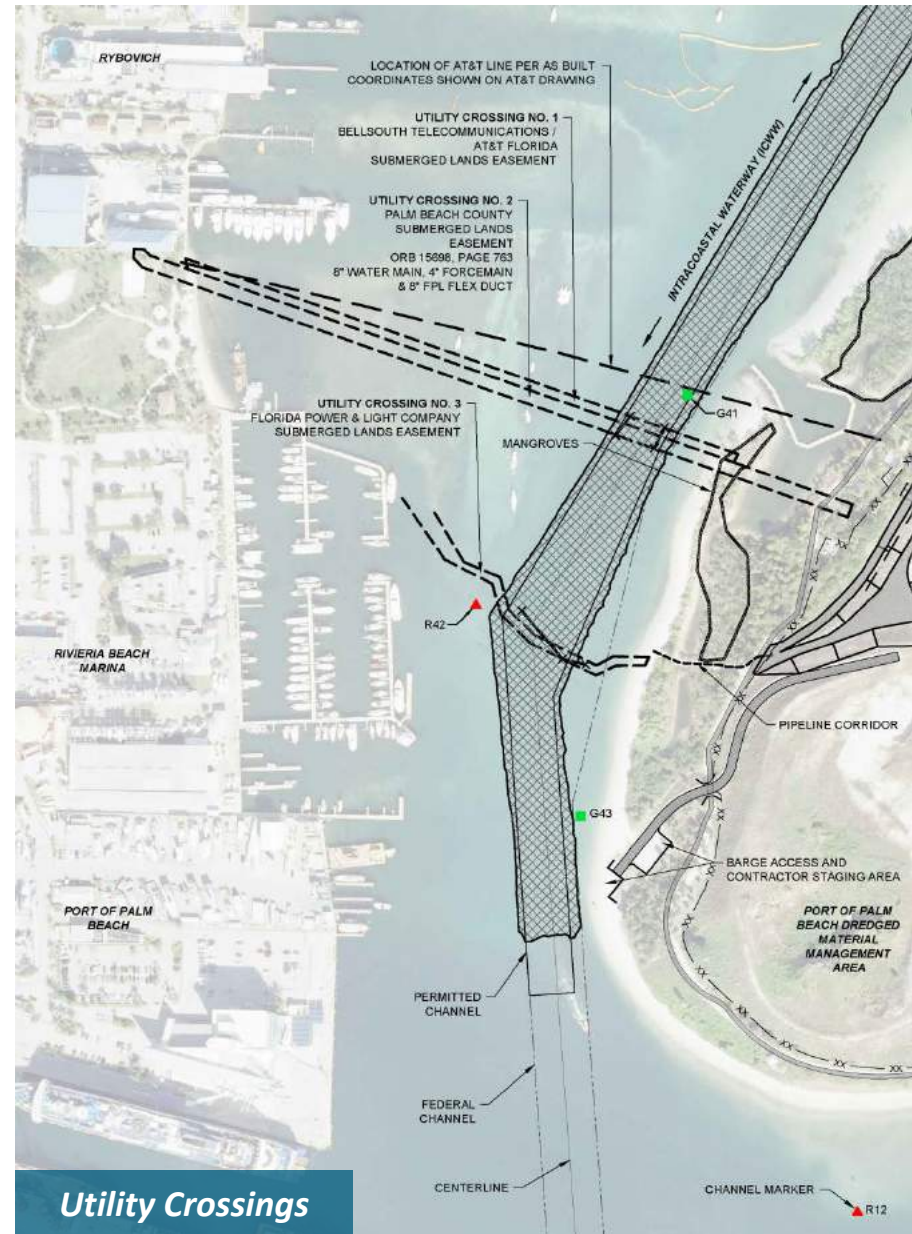
- FIND-owned upland confined disposal area
- Capacity = 289,000 cy



# DESIGN - Utilities

## • Utilities

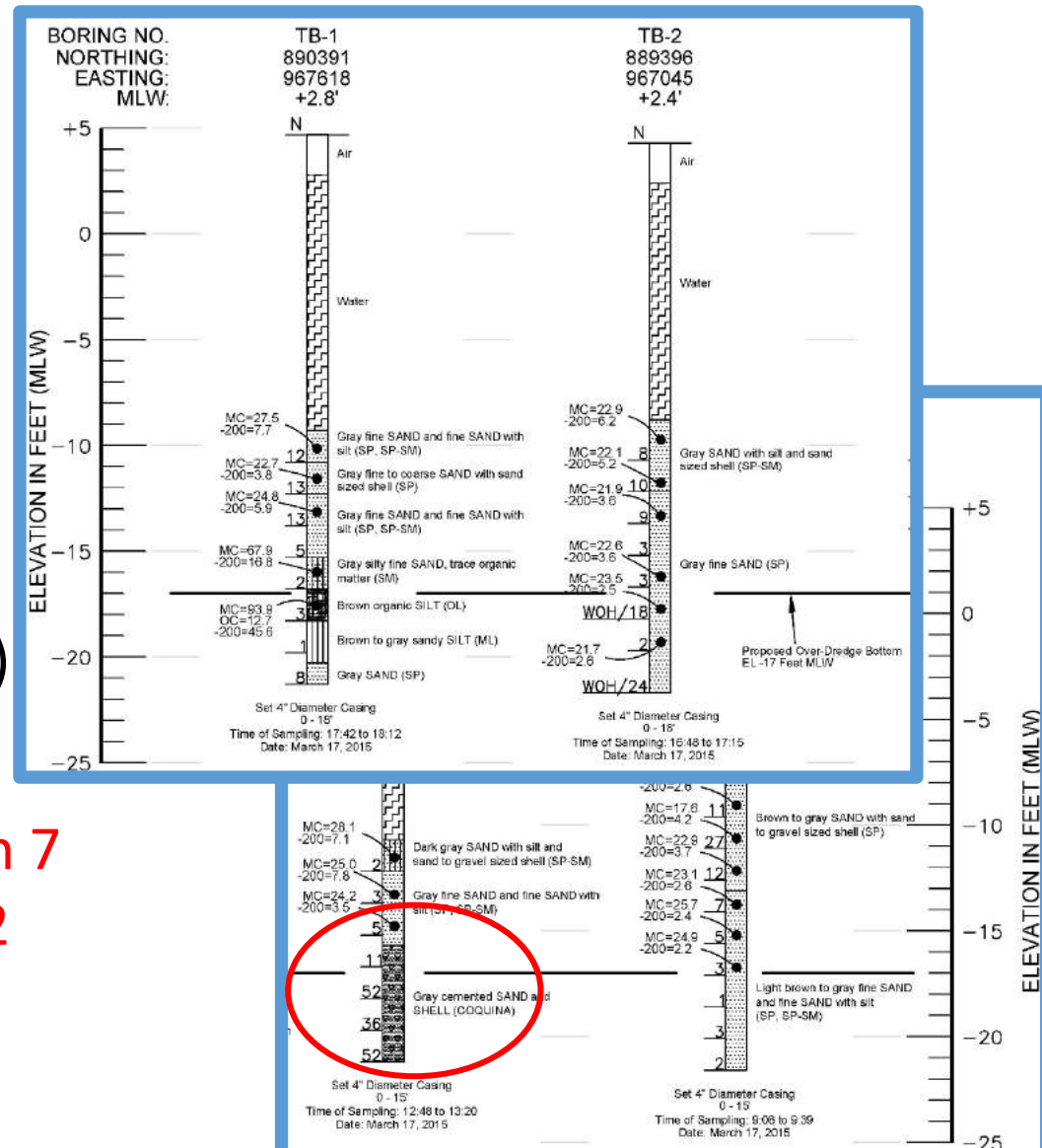
- Crossing No. 1
  - ▣ BellSouth/AT&T
- Crossing No. 2
  - ▣ Palm Beach County/FP&L
- Crossing No. 3
  - ▣ FP&L (abandoned)
- All three crossings below project depth



# DESIGN - Geotechnical

## • Geotechnical

- 1996 Scientific Environmental Applications (2)
- 2015 Dunkelberger Engineering & Testing
  - ❑ March 2015 (4)
  - ❑ November 2015 (10)
- Total: 16 SPT Borings
  - ❑ Coquina identified in 7 borings between -12 and -18 ft MLW





# CONSTRUCTION - Strategy

- **Strategy**

- Mechanical/hydraulic dredge option
- Opportunity for additional local area dredging work
- Local area coordination:
  - ❑ Palm Beach County Parks
  - ❑ Port of Palm Beach
- Contractor:
  - ❑ Cavache, Inc.
  - ❑ Hydraulic dredge: 16-inch Ellicott 1170 cutter



# CONSTRUCTION – Schedule & Budget

- **Schedule**

- Advertisement: Summer 2015
- Complete: Spring 2016
- Contract Length: 150 days from NTP (Actual = 149 days)

- **Budget**

- Estimated budget: \$1.9M
- Original contract: \$1.2M
- Final contract : \$2.0M





# CONSTRUCTION - Challenges

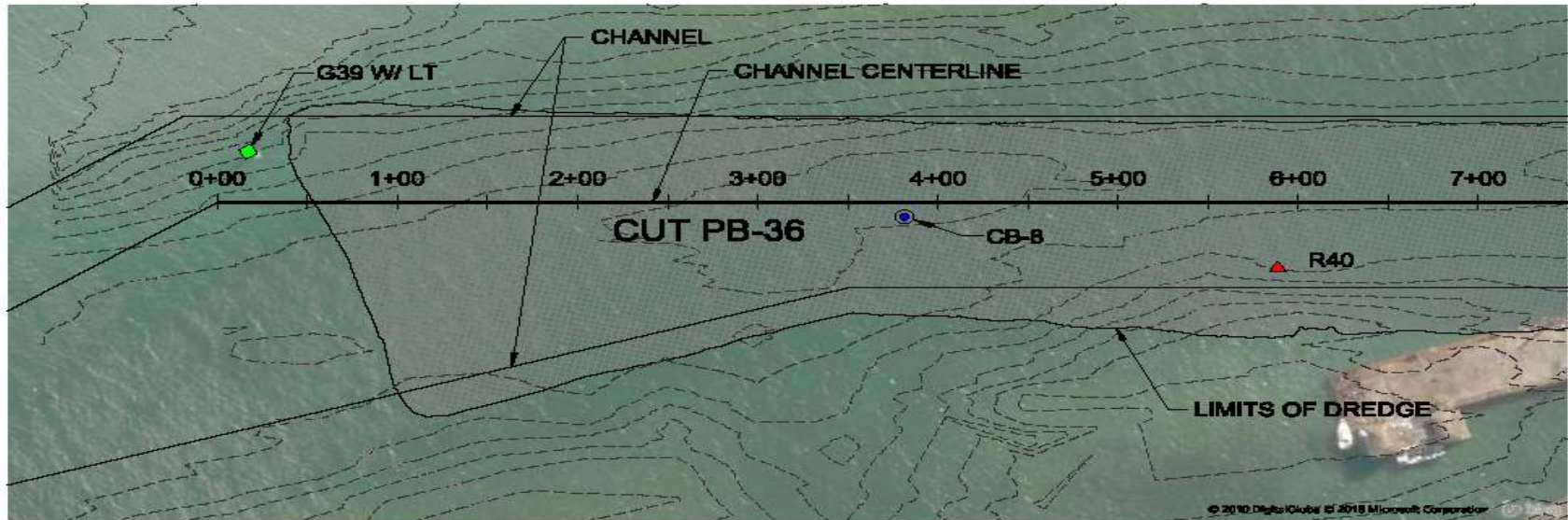
- Challenge No. 1: Harder Material



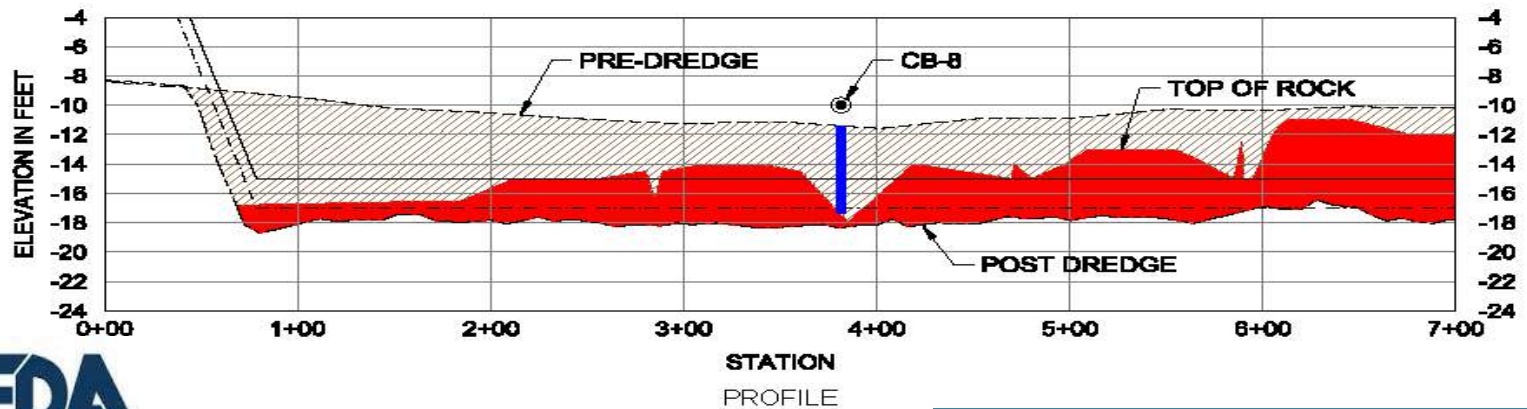


# CONSTRUCTION - Challenges

- Challenge No. 1: Harder Material



PLAN



PROFILE

# CONSTRUCTION - Challenges

- Challenge No. 1: Harder Material

CAVACHE Inc. Material Log

Date: 12-14-2015

CUT / STATION	START TIME	MATERIAL ELEVATION START	STOP TIME	MATERIAL ELEVATION STOP	WESTSIDE OF CENTERLINE MATERIAL	EAST SIDE OF CENTERLINE MATERIAL	COMMENTS
PB 36 26+07	7:30 AM	-14.5 Rock	11:00 AM	-17 Rock	Up + down Rock w/sand	Up + down Rock w/sand	Change cutter teeth

Station	Volume Sand to 15 ft. (CY)		Volume Rock to 15 ft. (CY)		Volume Sand b/w 15 - 17 ft. (CY)		Volume Rock b/w 15 - 17 ft. (CY)		Sand and Rock Volume Total (CY)_PAYMENT APP		Pre-Construction Survey by Station (CY)			Delta
	Survey	Taylor	Survey	Taylor	Survey	Taylor	Survey	Taylor	Survey	Taylor	Above 15	15 - 17	Total	
20+50	324.40	324.34	95.40	95.37	39.60	39.60	207.40	207.41	666.80	666.72			-	-
21+00	587.30	588.20	190.70	190.74	70.50	70.59	414.80	414.91	1,263.30	1,264.44	778.10	485.40	1,263.50	0.02%
21+50	607.20	608.99	95.40	95.37	143.50	48.83	295.90	390.18	1,142.00	1,143.37	707.90	472.70	1,180.60	3.27%
22+00	678.70	641.38	-	41.04	234.40	51.18	180.90	383.93	1,094.00	1,117.53	685.70	469.30	1,155.00	5.28%
22+50	670.00	631.97	-	41.04	162.40	76.38	288.70	397.45	1,121.10	1,146.84	671.50	475.30	1,146.80	2.24%
23+00	696.50	696.20	-	-	86.50	180.68	392.60	300.61	1,175.60	1,177.49	696.50	482.40	1,178.90	0.28%
23+50	390.30	592.26	297.40	95.37	50.60	165.08	425.90	311.72	1,164.20	1,164.43	687.80	476.60	1,164.40	0.02%
24+00	364.40	566.61	297.40	95.37	46.90	69.38	428.60	407.63	1,137.30	1,138.99	661.70	478.20	1,139.90	0.23%
24+50	581.00	583.84	-	-	78.80	78.75	411.00	412.23	1,070.80	1,074.82	580.70	495.20	1,075.90	0.47%
25+00	591.00	590.18	-	-	72.60	73.23	428.60	428.22	1,092.20	1,091.63	590.70	515.90	1,106.60	1.30%
25+50	741.90	680.16	-	58.17	194.80	68.00	308.40	437.34	1,245.10	1,243.67	741.80	544.10	1,285.90	3.17%
26+00	761.60	703.62	61.40	119.62	192.70	65.02	351.10	480.33	1,366.80	1,368.59	823.20	573.70	1,396.90	2.15%
26+50	742.60	676.19	126.10	192.33	59.50	54.80	527.80	529.88	1,456.00	1,453.20	869.00	600.00	1,469.00	0.88%
27+00	713.00	690.47	202.20	221.88	43.20	47.32	552.40	553.15	1,510.80	1,512.82	915.30	625.00	1,540.30	1.92%
27+50	633.80	747.91	355.60	235.03	45.60	56.64	584.10	577.75	1,619.10	1,617.33	989.50	665.80	1,655.30	2.19%
28+00	535.10	758.47	524.80	294.61	33.20	44.92	616.50	605.53	1,709.60	1,703.53	1,062.30	694.00	1,756.30	2.66%
28+50	406.30	557.83	625.90	478.64	12.30	21.90	643.70	637.44	1,688.20	1,695.81	1,041.00	717.70	1,758.70	4.01%
28+79	263.10	-	375.10	-	9.90	-	383.80	-	1,031.90	-	647.00	438.50	1,085.50	4.94%
	10,288.20	10,638.62	3,247.40	2,254.58	1,577.00	1,212.30	7,442.20	7,475.71	22,554.80	21,581.21	13,149.70	9,209.80	22,359.50	



# CONSTRUCTION - Challenges

- Challenge No. 2: Vegetation Impact





# CONSTRUCTION - Challenges

- Challenge No. 2: Vegetation Impact



*DMMA West*



*DMMA East*

# SUMMARY

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- **Objective**

- Deepen ICWW to support local industry



- **Benefits**

- Between \$725,000 (180 LOA) and \$18.4 M (280 ft LOA) average annual increase in net income for \$2M investment

- **Permitting**

- Advance mitigation area key for shortened timeframe

- **Design**

- Lessons learned on limitations of geotechnical data
- \*Next phase: Seismic reflection data collection

- **Construction**

- Good working relationship with contractor is key



# SUMMARY



*Project Success*



WODCON XXI





**TAYLOR ENGINEERING, INC.**  
*Delivering Leading-Edge Solutions*

[www.taylorengineering.com](http://www.taylorengineering.com)



# ***THANK YOU***

# ***Questions?***

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