

# TIME- AND COST-EFFICIENT POST-HURRICANE EMERGENCY SAND SEARCH FOR MEXICO BEACH

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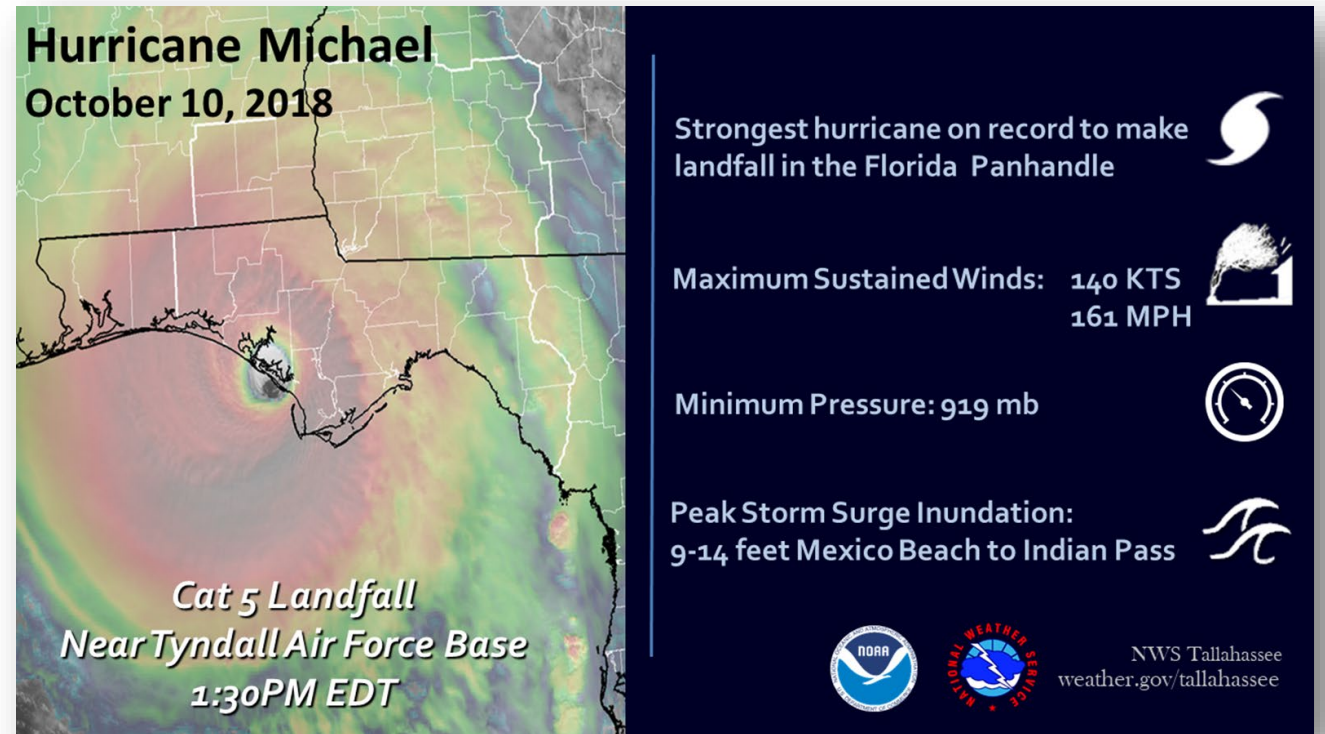
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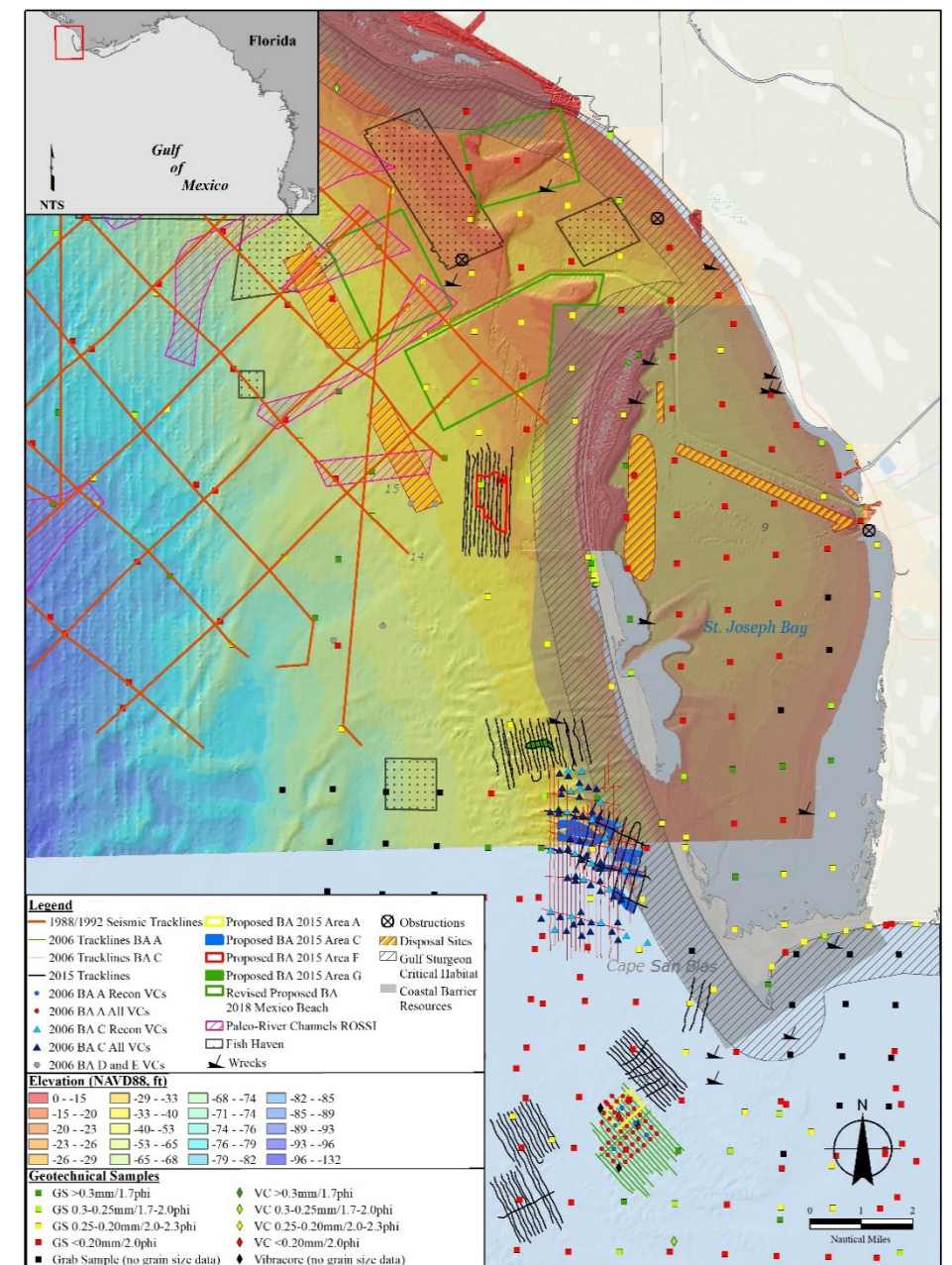
# SCOPE OF WORK

- ▶ Identify potential offshore sand sources for use in nourishment of Mexico Beach.
- ▶ Critically eroded beach area R-132 and R-138
  - > 77,000 cy net sediment transport
  - > Hurricane Michael (October 2018)
    - Expedite offshore sand search
    - Full scale beach restoration
- ▶ 2 Phase Sand Search Approach
  - > Refine study area/resources
    - Phase 1: Desktop study and Jet Probes
    - Phase 2: Geophysical and Geotechnical Survey



# PHASE 1: DESKTOP STUDY

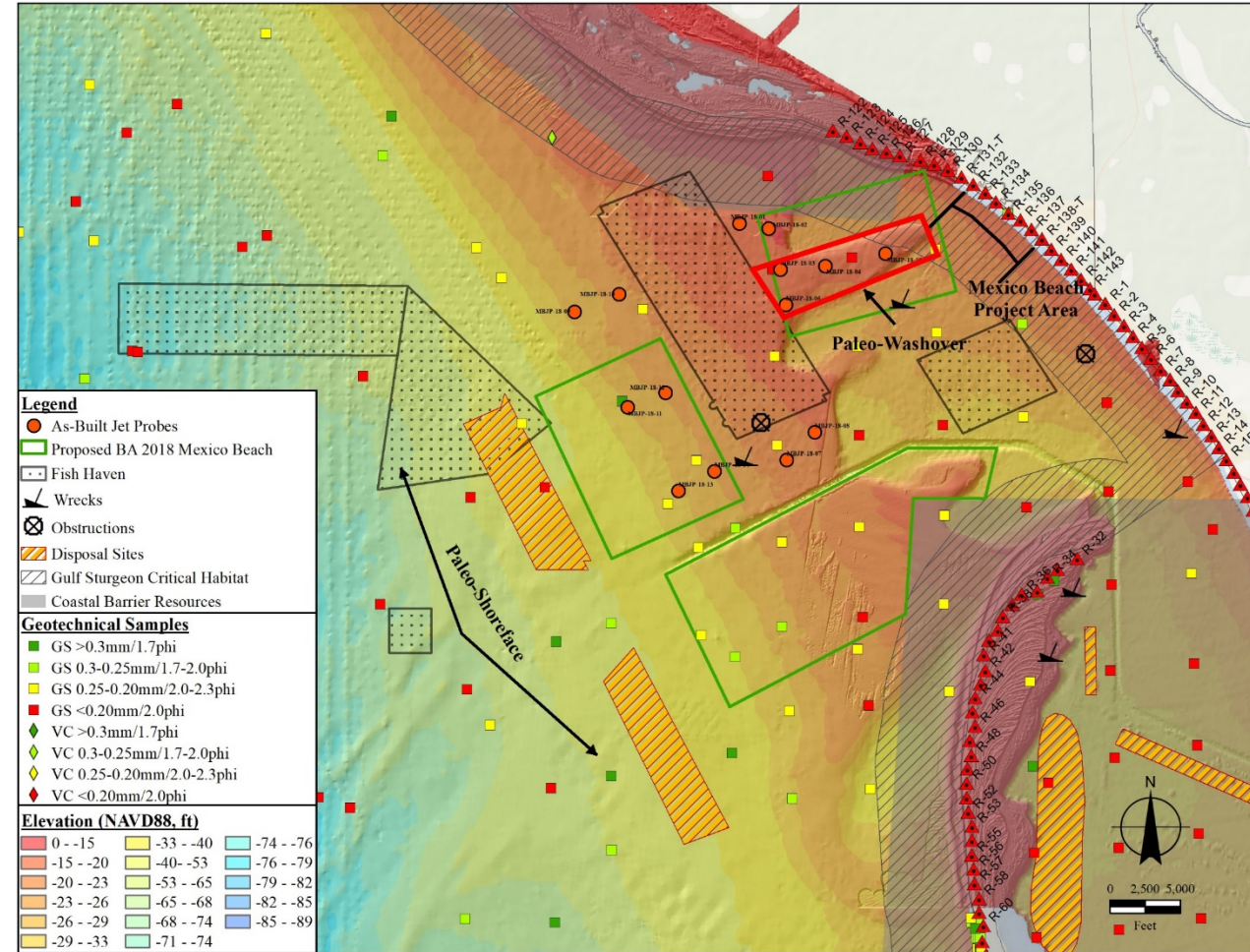
- ▶ Dewberry and MRD Associates, Inc. Feasibility Study (April 1, 2017)
- ▶ FDEP ROSSI Database
  - Vibracores, Grab Samples, Historical Seismic Tracklines, and Paleo-River Channels
- ▶ Buffered Avoidance Areas
  - Disposal Sites
  - Coastal Barrier Resources
  - Gulf Sturgeon Critical Habitat
  - Fish Havens
  - Obstructions/Wrecks
- ▶ 3 potential sand sources





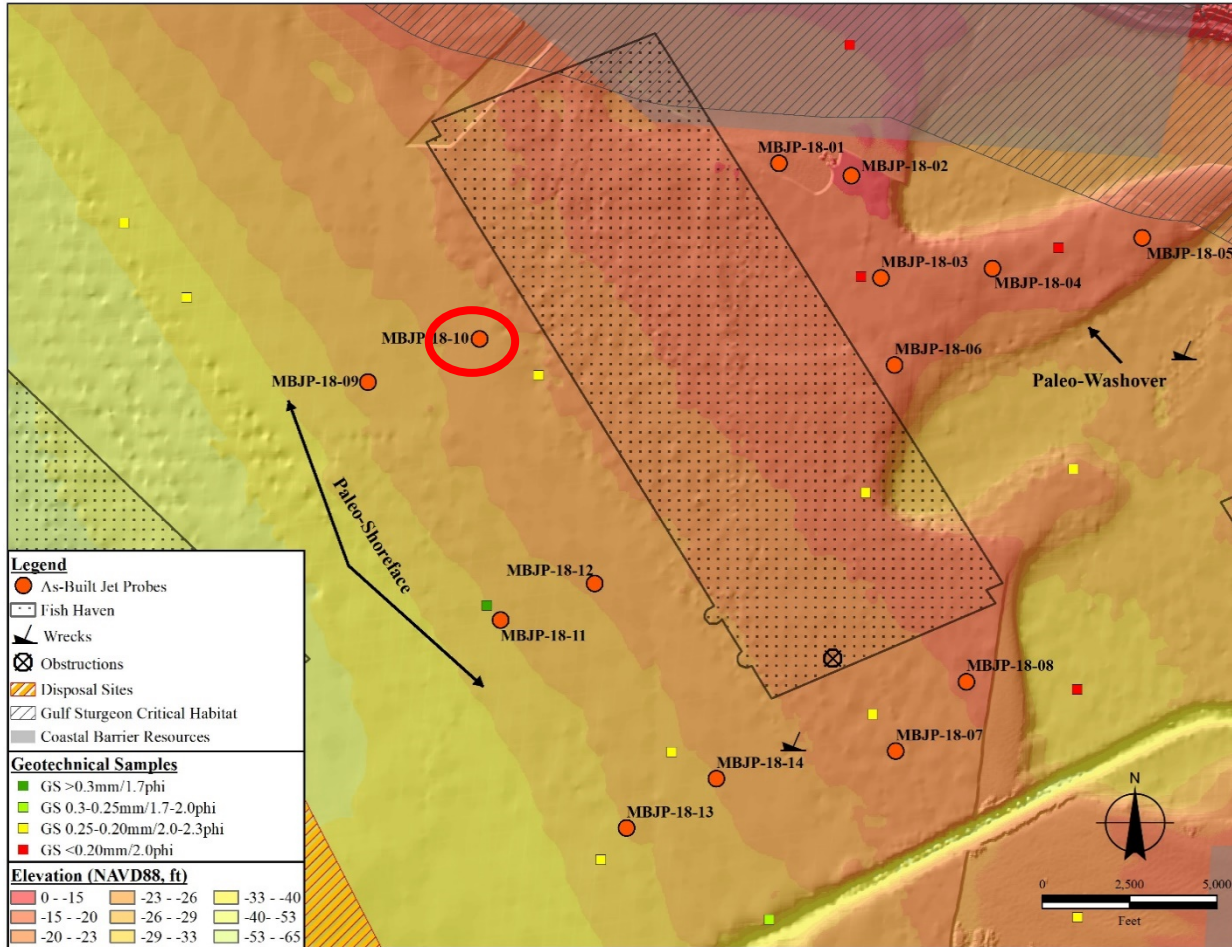
# PHASE 1: JET PROBES

- ▶ December 17 and 18, 2018
- ▶ Distributed 14 jet probes between the 2 potential sand deposits
  - > Sub-surface sediment type
    - Surface (0ft)
    - Mid depth (10ft)
    - Bottom of hole (20ft)
  - > General grain size (target ( $\leq 0.20$  mm/2.3 phi to  $\geq 0.30$  mm/1.7 phi))
  - > Sand layer thickness (volume)
  - > Sampled Paleo-Shoreface and Paleo-Washover areas
  - > Visual description of sub-surface material and seafloor





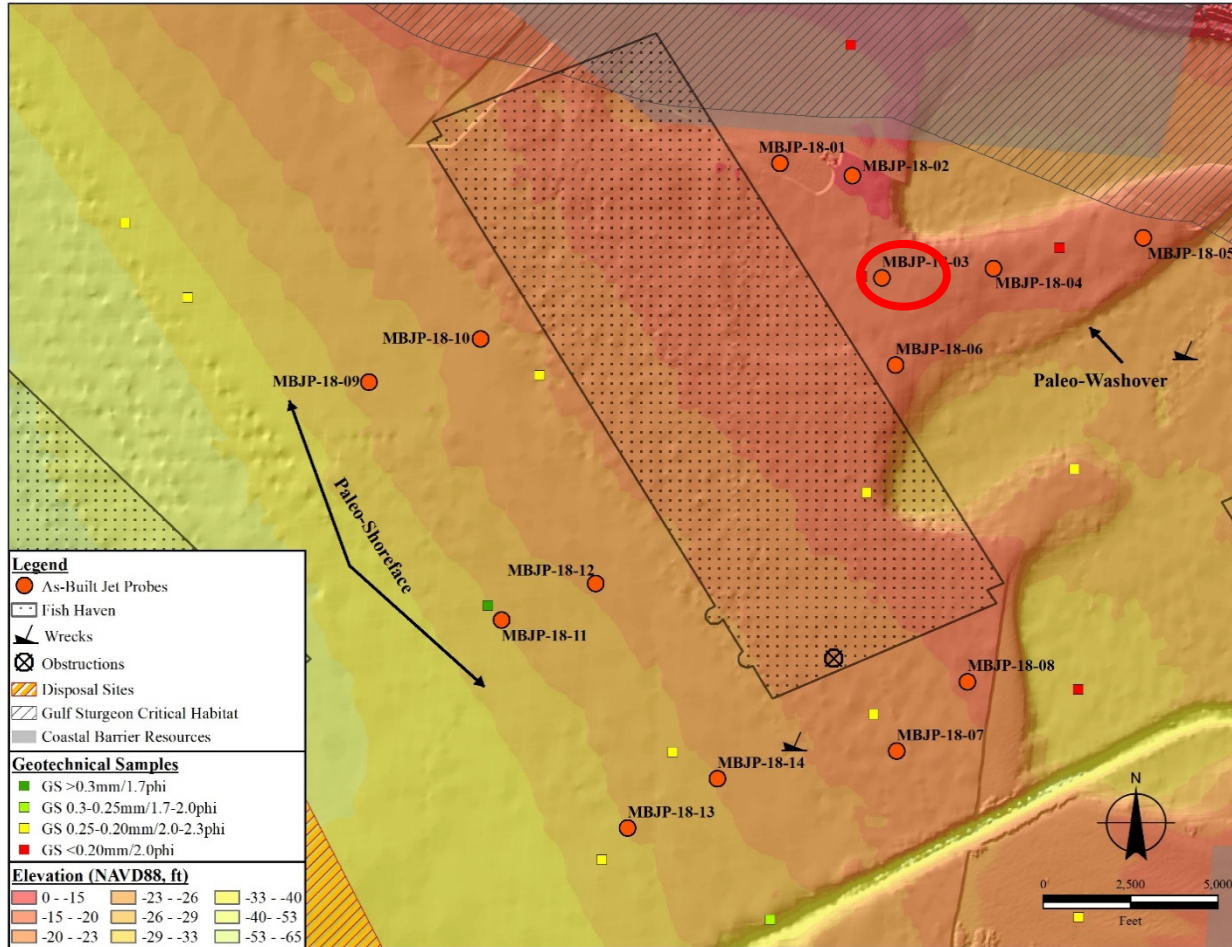
# PHASE 1: JET PROBES



JET PROBE LOG		DIVISION		INSTALLATION		SHEET 1 OF 1 SHEETS					
1. PROJECT Mexico Beach Sand Search Bay County, Florida						9. SIZE OF PROBE 1.5 In.					
2. JET PROBE DESIGNATION MBJP-18-10						10. COORDINATE SYSTEM/DATUM Florida State Plane North		HORIZONTAL NAD 1983		VERTICAL NAVD88	
3. DRILLING AGENCY APTIM				LOCATION COORDINATES (ft) X = 1,653,188 Y = 337,468		11. MANUFACTURER'S DESIGNATION OF PROBE APTIM Jet Probe					
4. NAME OF DRILLER Franky Stankiewicz				CONTRACTOR FILE NO.		12. TOTAL SAMPLES 4		DISTURBED		UNDISTURBED (UD)	
5. DIRECTION OF JET PROBE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED				DEG. FROM VERTICAL		BEARING		13. TOTAL NUMBER BOXES			
6. THICKNESS OF OVERBURDEN				7. DEPTH DRILLED INTO ROCK		14. ELEVATION GROUND WATER		15. DATE OF JET PROBE 12-18-18 13:05			
8. TOTAL DEPTH OF JET PROBE 20.0 Ft.				16. ELEVATION TOP OF JET PROBE -27.0 Ft.		17. TOTAL RECOVERY FOR JET PROBE 20 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR Franky Stankiewicz			
ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS					
-27.0	0.0				Anchor	Sample #Anchor, Depth = 0.0' Mean (mm): 0.31, Phi Sorting: 1.47 Fines (230): 23.07% (SC)					
-29.0	2.0		SAND, fine grained, some clay, with shell, very dark greenish gray (5GY-3/1), (SC).		1	Sample #1, Depth = 0.5' Mean (mm): 0.28, Phi Sorting: 1.11 Fines (230): 1.28% (SW)					
			SAND, fine grained, some shell, light yellowish brown (2.5Y-6/3), (SW).		2	Sample #2, Depth = 10.0' Mean (mm): 1.33, Phi Sorting: 2.99 Fines (230): 4.83% (SW-SC)					
			SHELL, trace silty clay, peat and wood fragments within clay from 3.0' to 11.0', dark gray (5Y-4/1), (SW-SC).								
-39.0	12.0		Sandy SHELL.								
-43.0	16.0										
-47.0	20.0		SAND, medium grained, gray (5Y-5/1), (SW).		3	Sample #3, Depth = 20.0' Mean (mm): 0.55, Phi Sorting: 2.09 Fines (230): 1.19% (SW)					
			End of Jet Probe								



# PHASE 1: JET PROBES



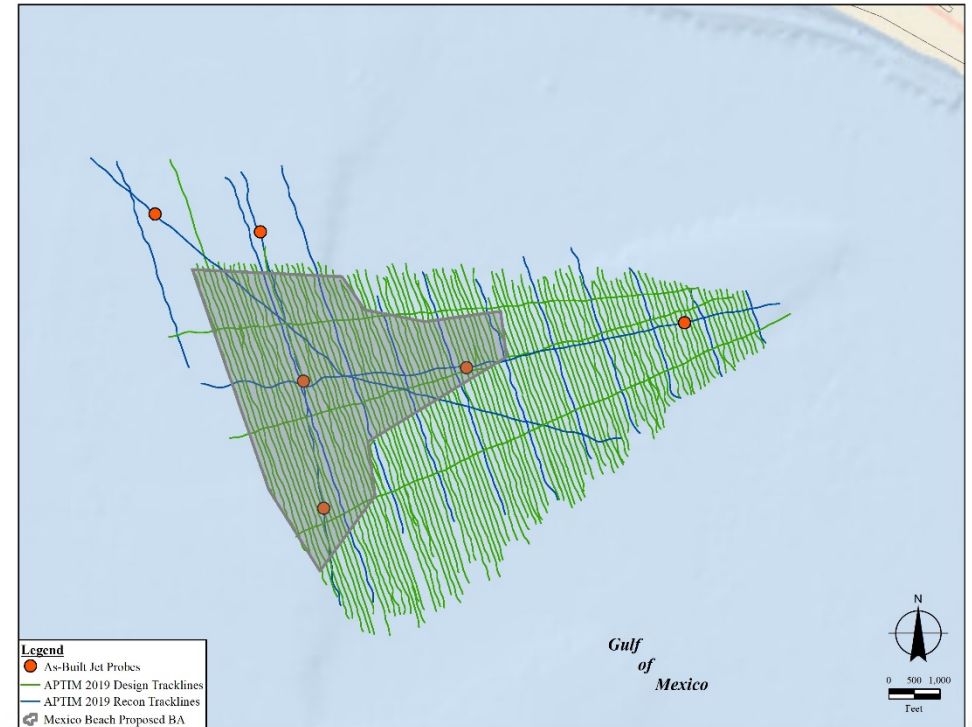
JET PROBE LOG		DIVISION		INSTALLATION		SHEET 1 OF 1 SHEETS	
<b>1. PROJECT</b> Mexico Beach Sand Search Bay County, Florida						<b>9. SIZE OF PROBE</b> 1.5 In.	
<b>2. JET PROBE DESIGNATION</b> MBJP-18-03		<b>LOCATION COORDINATES (ft)</b> X = 1,664,657 Y = 339,209		<b>10. COORDINATE SYSTEM/DATUM</b> Florida State Plane North		<b>HORIZONTAL</b> NAD 1983 <b>VERTICAL</b> NAVD88	
<b>3. DRILLING AGENCY</b> APTIM		<b>CONTRACTOR FILE NO.</b>		<b>11. MANUFACTURER'S DESIGNATION OF PROBE</b> APTIM Jet Probe			
<b>4. NAME OF DRILLER</b> Franky Stankiewicz				<b>12. TOTAL SAMPLES</b>		<b>DISTURBED</b> 3 <b>UNDISTURBED (UD)</b>	
<b>5. DIRECTION OF JET PROBE</b> <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED				<b>DEG. FROM VERTICAL</b>		<b>BEARING</b>	
<b>6. THICKNESS OF OVERBURDEN</b>				<b>13. TOTAL NUMBER BOXES</b>			
<b>7. DEPTH DRILLED INTO ROCK</b>				<b>14. ELEVATION GROUND WATER</b>			
<b>8. TOTAL DEPTH OF JET PROBE</b> 20.0 Ft.				<b>15. DATE OF JET PROBE</b>		<b>STARTED</b> 12-17-18 14:22 <b>COMPLETED</b> 12-17-18 14:56	
<b>16. ELEVATION TOP OF JET PROBE</b> -18.2 Ft.				<b>17. TOTAL RECOVERY FOR JET PROBE</b> 20 Ft.			
<b>18. SIGNATURE AND TITLE OF INSPECTOR</b> Franky Stankiewicz							
ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS	
-18.2	0.0				1	Sample #1, Depth = 0.0' Mean (mm): 0.23, Phi Sorting: 0.56 Fines (230): 1.12% (SP)	
			SAND, fine grained, light gray (2.5Y-7/1), (SP).		2	Sample #2, Depth = 10.0' Mean (mm): 0.25, Phi Sorting: 0.52 Fines (230): 1.16% (SP)	
-30.2	12.0						
-31.2	13.0		Shelly SAND.				
			SAND.				
-34.2	16.0						
-35.2	17.0		Shelly SAND.				
			SAND, fine grained, light gray (5Y-7/1), (SP).		3	Sample #3, Depth = 20.0' Mean (mm): 0.26, Phi Sorting: 0.73 Fines (230): 1.22% (SP)	
-38.2	20.0						
			End of Jet Probe				





# PHASE 2: GEOPHYSICAL SURVEY

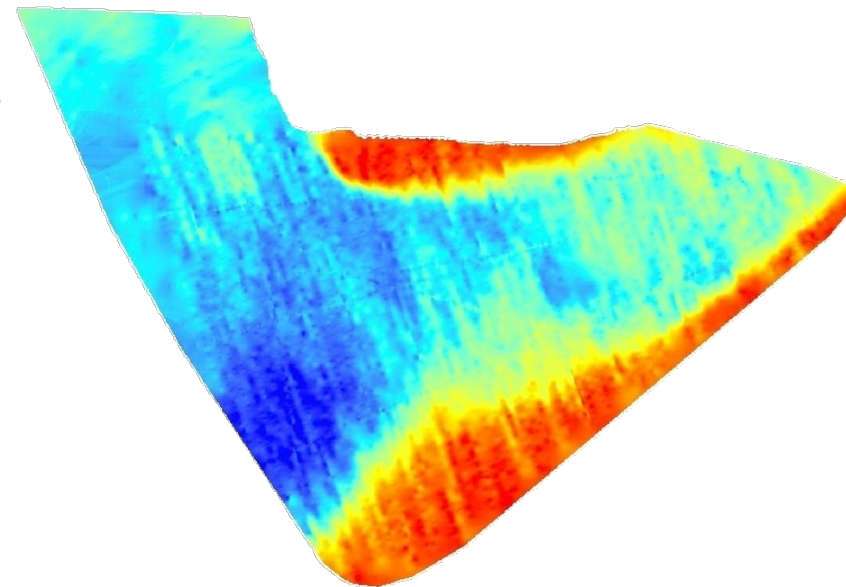
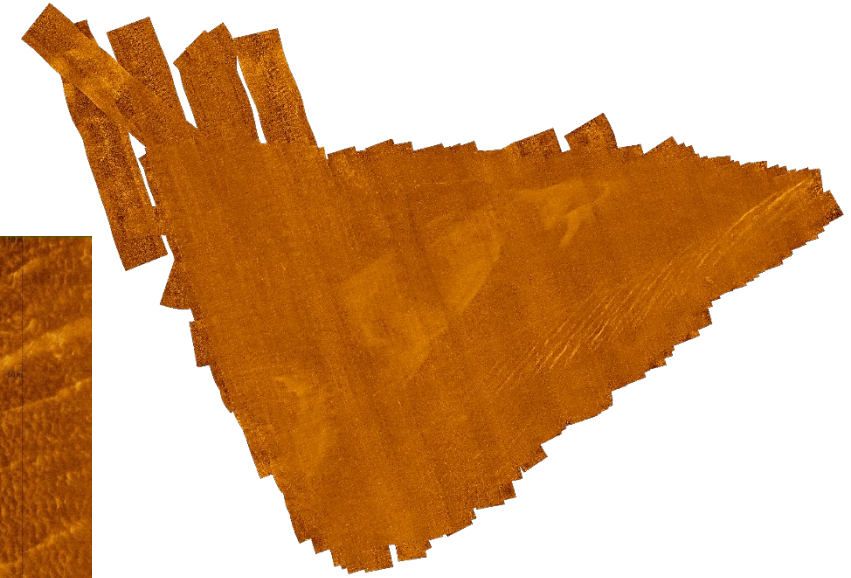
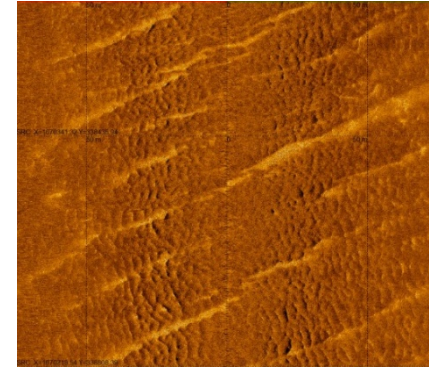
- ▶ Geophysical Survey (May 6 - 9, 2019)
  - > 93.7 nm of data
    - 13.5 nm Reconnaissance Geophysical Survey
    - 80.2 nm Design/Cultural Resource Geophysical Survey (30 m (98 ft) line spacing)
  - > Delineate the base of the paleo-shoreline feature
- ▶ Data review and archeological cultural resource review
  - > Buffer magnetic anomalies
  - > Vibracore survey plan development





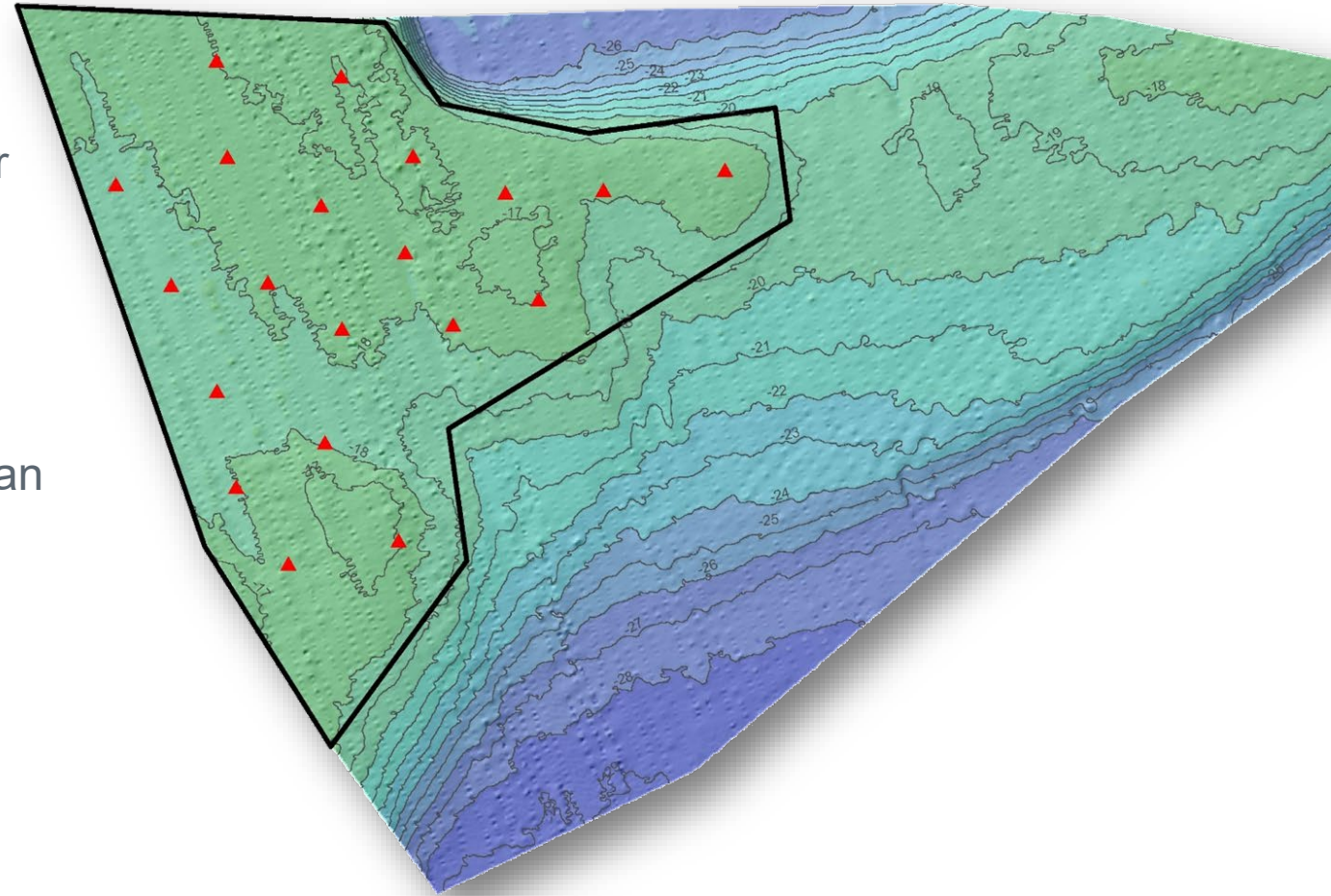
# PHASE 2: GEOPHYSICAL SURVEY

- ▶ Seismic Sub-bottom
  - > Digitization of sand shoals, paleochannels, geohazards
  - > Sand thickness (isopach)
- ▶ Sidescan sonar
  - > Delineation of surface features, types, characteristics and surface hazards/debris
- ▶ Magnetometer
  - > Identify magnetic anomalies
- ▶ Single Beam
  - > Bathymetric surface



# PHASE 2: GEOPHYSICAL SURVEY

- ▶ June 18th and June 23rd, 2019,
  - > 20 vibracores (up to 1,000 ft spacing over potential borrow area)
  - > Athena Technologies Inc.
- ▶ Native beach sampling R-130, R-134, R-138, and R-142
  - > Top of Dune, Toe of Dune, Mid-berm, Mean High Water (MHW), Mean Low Water (MLW), -4, -8, -12, -16 and -20 ft NAVD.

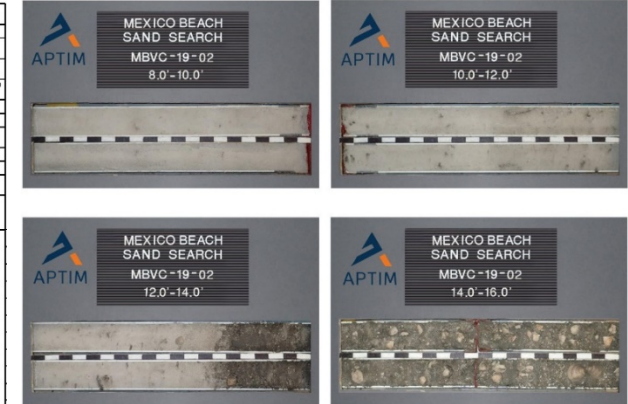




# PHASE 2: GEOTECHNICAL SURVEY

- ▶ Vibracores were split, photographed, logged and sampled
  - > Layer thickness, color, texture, composition and grain size (clay, silt, sand, gravel, shells)
- ▶ Entered into gINT
  - > Mean, median grain size, sorting, silt/clay content (moment method)
- ▶ Vibracores color coded based on grain size (Facies)
  - > Plotted on seismic sub-bottom data
    - Red – >5% fines, high clay, silt, shell
    - Yellow – fine grained sand, <5% silt, >10% shell fragments
    - Green – sand, <5% silt; trace shell hash, fragments, whole shells.

DRILLING LOG		Boring Designation MBVC-19-02		SHEET 1 OF 1 SHEETS	
1. PROJECT Mexico Beach Sand Search Bay County, Florida		2. BORING DESIGNATION MBVC-19-02		3. DRILLING AGENCY Aptima Technologies, Inc.	
4. NAME OF DRILLER Patma McCallan		5. DIRECTION OF BORING VERTICAL		6. THICKNESS OF OVERBURDEN 0.0 FT	
7. TOTAL DEPTH OF BORING 22.0 FT		8. SIZE AND TYPE OF BIT 2.0 in.		9. COORDINATE SYSTEM/STATION Florida State Plane North NAD 83	
10. MANUFACTURER'S DESIGNATION OF DRILL Electric		11. TOTAL SAMPLES 4		12. TOTAL NUMBER CORE BOARDS	
13. ELEVATION GRINDING WATER		14. DATE BORING 06-18-19 07:43		15. ELEVATION TOP OF BORING 16.7 FT	
16. SIGNATURE AND TITLE OF INSPECTOR Kristina McCoy, P.E.		17. TOTAL RECOVERY FOR BORING 75.8 FT		18. SIGNATURE AND TITLE OF INSPECTOR Kristina McCoy, P.E.	
ELEV. (FT)	DEPTH (FT)	LOG	CLASSIFICATION OF MATERIALS Depth and elevations based on measured values	NO. OF SAMPLES	REMARKS
-18.7	0.0				
-17.4	0.7		SAND, fine grained, quartz, trace shell hash, trace silt, 0.5% shell fragments @ 0.6", color mottled light gray (10Y-7/2) and gray (10Y-6/2) (SP)	1	Sample #1, Depth = 2.1' Mean (D50): 0.25, Phi Sorting: 1.14 Fines (D30): 1.17% (SP)
-20.2	3.5		SAND, fine grained, quartz, trace shell hash, trace silt, trace whole shell, shell fragments up to 1.25", whole shells up to 0.75", and pebbles up to 0.25", 2.0% some shell hash overall @ 0.6", light gray (10Y-6/2) (SP)	2	Sample #2, Depth = 4.5' Mean (D50): 0.25, Phi Sorting: 0.60 Fines (D30): 0.63% (SP)
-22.1	5.4		SAND, fine grained, quartz, trace shell hash, trace silt, trace whole shell, shell fragments up to 0.75", 2% shell hash overall @ 0.6", light gray (10Y-6/2) (SP)	3	Sample #3, Depth = 8.1' Mean (D50): 0.25, Phi Sorting: 0.37 Fines (D30): 1.71% (SP)
-27.5	11.1		SAND, fine grained, quartz, trace shell hash, trace silt, and pebbles up to 0.25", 0.75% whole shell @ 1.1", light greenish gray (10Y-7/1) (SP)	4	Sample #4, Depth = 12.2' Mean (D50): 0.22, Phi Sorting: 0.42 Fines (D30): 1.20% (SP)
-30.2	13.8		SAND, fine grained, quartz, some shell hash, trace silt, trace shell fragments, trace whole shell, shells up to 0.75", (1.0% shell) whole shell @ 14.2", dark greenish gray (10Y-6/1) (SP)	VS	VS
-31.5	14.9		SAND, fine grained, quartz, some shell hash, trace silt, trace whole shell, trace coral, shell components, shell hash, shell fragments, whole shells up to 1.5", coral up to 0.25" x 0.25", greenish gray (10Y-6/1) (SP)		
-33.7	17.0		SAND, fine to medium grained, quartz, some shell hash, trace shell hash, trace silt, fragments up to 1.0", some shell hash from 16.8' to 17.2', (0.5% shell) wood fragments @ 17.7' & 18.1', (0.5% shell) wood fragments @ 18.0', dark gray (10Y-5/1) (SP)		
-38.3	19.8		SAND, fine to medium grained, quartz, some shell hash, trace shell hash, trace silt, fragments up to 1.0", some shell hash from 16.8' to 17.2', (0.5% shell) wood fragments @ 17.7' & 18.1', (0.5% shell) wood fragments @ 18.0', dark gray (10Y-5/1) (SP)		
-38.9	20.4		SAND, fine to medium grained, quartz, some shell hash, trace shell hash, trace silt, fragments up to 1.0", some shell hash from 16.8' to 17.2', (0.5% shell) wood fragments @ 17.7' & 18.1', (0.5% shell) wood fragments @ 18.0', dark gray (10Y-5/1) (SP)		
			End of Boring		

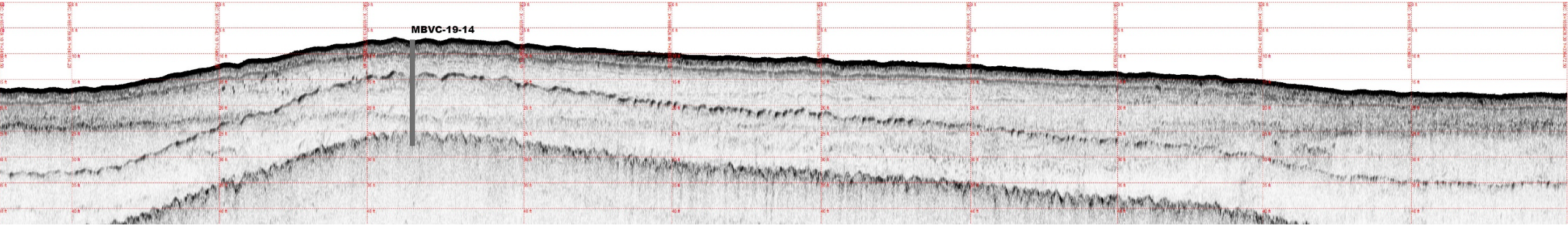
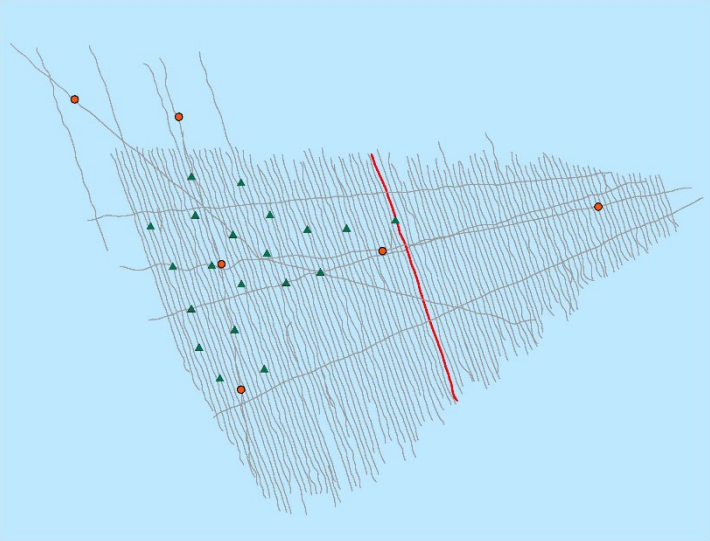


Sieve Number	Size (phi)	Size (mm)	Wentworth Scale	
3/4	-4.25	19.00	Pebble	Gravel
5/8	-4.00	16.00		
7/16	-3.50	11.20		
5/16	-3.00	8.00		
3 1/2	-2.50	5.60	Sand	
4	-2.25	4.75		
5	-2.00	4.00		
7	-1.50	2.80		
10	-1.00	2.00		
14	-0.50	1.40		
18	0.00	1.00		
25	0.50	0.71		
35	1.00	0.50	Sand	
45	1.50	0.36		
60	2.00	0.25		
80	2.50	0.18		
120	3.00	0.13		
170	3.50	0.09	Sand	
200	3.75	0.08		
230	4.00	0.06		





# LINE 254 – MBVC-2019-VC14



# MBVC-2019-VC14

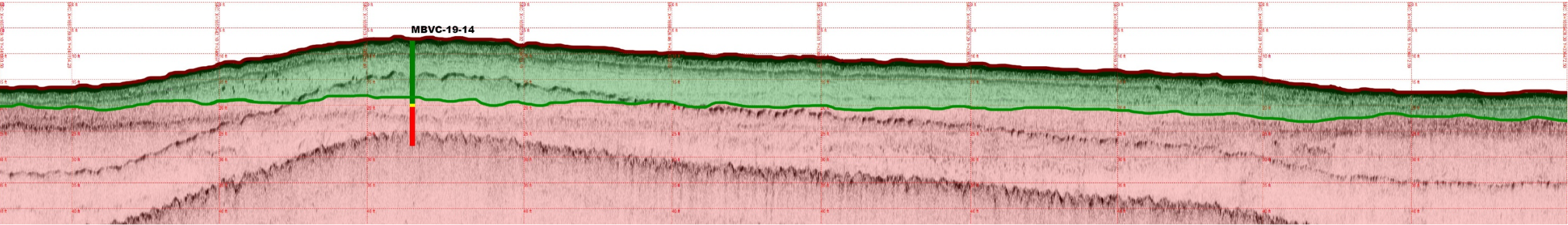
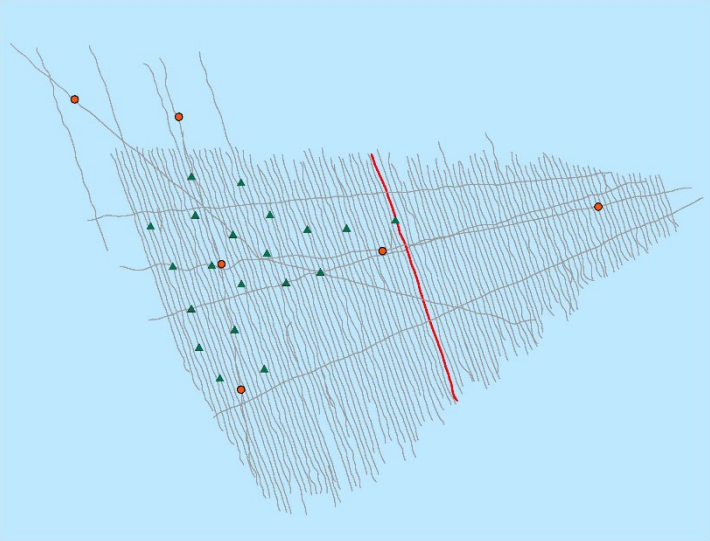


DRILLING LOG		DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS		
1. PROJECT Mexico Beach Sand Search Bay County, Florida		APTIM		9. SIZE AND TYPE OF BIT 2.0 in.		
2. BORING DESIGNATION MBVC-19-14		LOCATION COORDINATES (N) X = 1,668,115 Y = 340,089		10. COORDINATE SYSTEM/DATUM Florida State Plane North HORIZONTAL NAD 1983 VERTICAL NAVD 88		
3. DRILLING AGENCY Athena Technologies, Inc.		CONTRACTOR FILE NO.		11. MANUFACTURER'S DESIGNATION OF DRILL Electric <input type="checkbox"/> AUTO HAMMER <input type="checkbox"/> MANUAL HAMMER		
4. NAME OF DRILLER Palmer McClellan				12. TOTAL SAMPLES 5 DISTURBED UNDISTURBED (UD)		
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED		DEC. FROM VERTICAL		13. TOTAL NUMBER CORE BOXES		
6. THICKNESS OF OVERBURDEN 0.0 Ft.		BEARING		14. ELEVATION GROUND WATER		
7. DEPTH DRILLED INTO ROCK 0.0 Ft.				15. DATE BORING STARTED 06-23-19 08:45 COMPLETED 06-23-19 08:52		
8. TOTAL DEPTH OF BORING 21.0 Ft.				16. ELEVATION TOP OF BORING -16.9 Ft.		
				17. TOTAL RECOVERY FOR BORING 20.6 Ft.		
				18. SIGNATURE AND TITLE OF INSPECTOR Kristina McCoy, P.G.		
ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	SOIL SAMPLE NO.	REMARKS
-16.9	0.0					
-17.5	0.6		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, shell fragments up to 0.5", light gray (2.5Y-7/2), (SW).		1	Sample #1, Depth = 0.3' Mean (mm): 0.33, Phi Sorting: 1.38 Fines (230): 0.60% (SW)
-20.1	3.2		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, trace whole shell, silty pockets up to 0.25", shells up to 1.0", (1.0"x1.5") shell fragment @ 2.2', light gray (2.5Y-7/1), (SW).		2	Sample #2, Depth = 1.9' Mean (mm): 0.30, Phi Sorting: 1.36 Fines (230): 0.81% (SW)
-28.0	11.1		SAND, fine grained, quartz, trace shell fragments, trace shell hash, trace silt, silty pockets up to 0.75", shell fragments up to (0.75"x1.0"), 2 (1.0") whole shells @ 4.8', 1.25" whole shell @ 7.3', (0.5"x0.75") whole shell @ 9.9', light greenish gray (10Y-8/1), (SP).		3	Sample #3, Depth = 7.1' Mean (mm): 0.22, Phi Sorting: 0.35 Fines (230): 0.68% (SP)
-29.3	12.4		SAND, fine grained, quartz, trace shell hash, trace silt, silty pockets up to (0.25"x0.5"), (0.25"x0.5") shell fragment @ 12.0', greenish gray (10Y-6/1), (SP).		4	Sample #4, Depth = 11.7' Mean (mm): 0.22, Phi Sorting: 0.33 Fines (230): 0.84% (SP)
-29.9	13.0		SAND, fine grained, quartz, trace clay, trace shell fragments, trace shell hash, shell fragments up to (0.25"x0.5"), dark greenish gray (10Y-4/1), (SP-SC).		5	Sample #5, Depth = 12.7' Mean (mm): 0.23, Phi Sorting: 0.56 Fines (230): 8.45% (SP-SC)
-33.2	16.3		Shelly SAND, fine to medium grained, quartz, trace clay, shell fragments up to 1.5", whole shells up to (1.5"x2.0"), 0.25" wood fragment @ 14.0', dark greenish gray (10Y-4/1), (GW-GC).		VS VC08#7	
-34.8	17.9		SAND, fine to medium grained, quartz, some clay, little shell hash, trace shell fragments & whole shells up to 0.75", dark greenish gray (10Y-4/1), (SC).			
-36.6	19.7		Shelly SAND, fine to medium grained, quartz, some clay, shell components: shell hash, shell fragments up to 2.0" & whole shells up to 1.25", dark greenish gray (10Y-4/1), (GC).			
-37.5	20.6		Silty SAND, fine grained, quartz, trace shell hash, color mottled light brownish gray (10YR-6/2) and, very dark gray (N-3/0), (SM).			
-37.9	21.0		No Recovery.			
End of Boring						





# LINE 254 – MBVC-2019-VC14

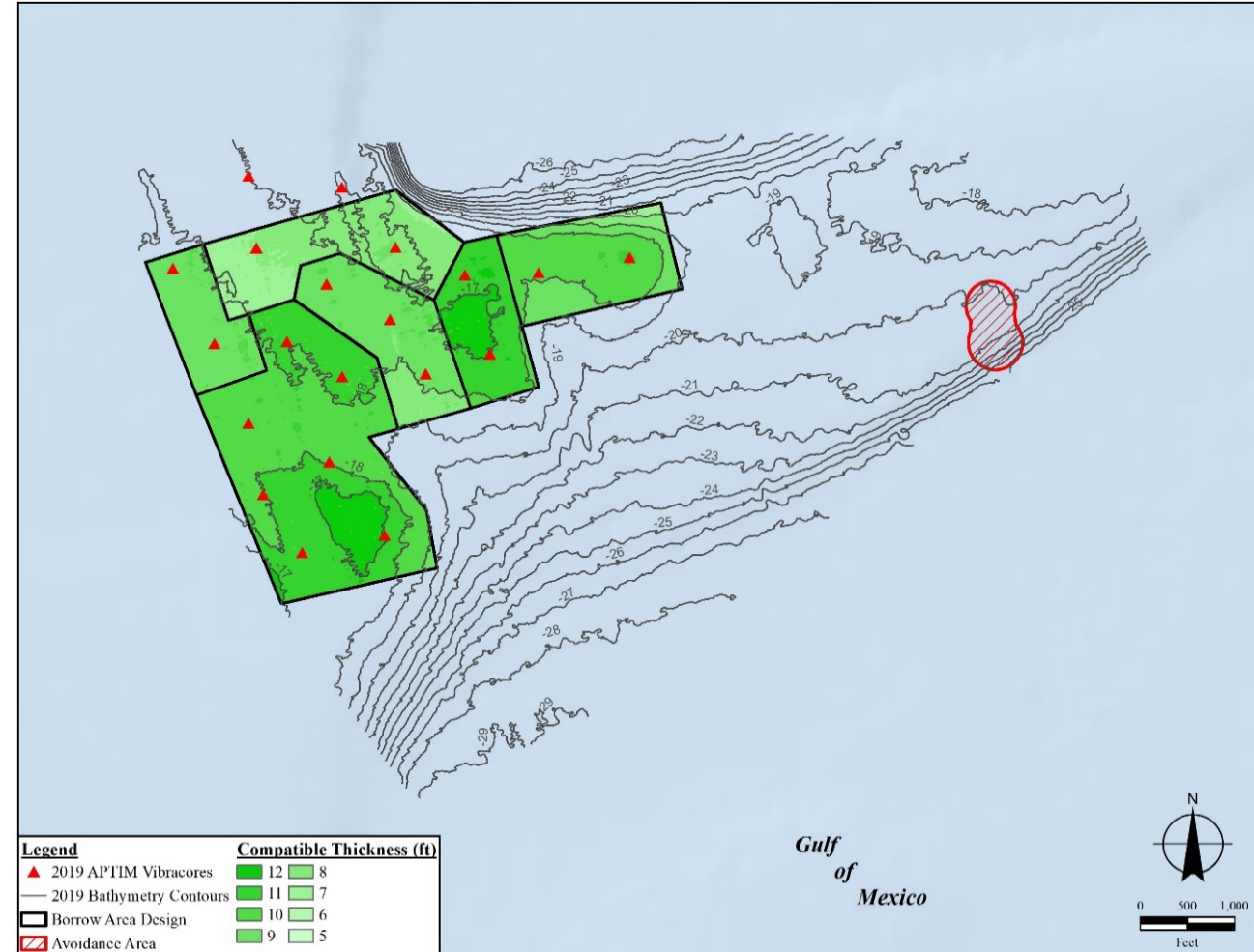




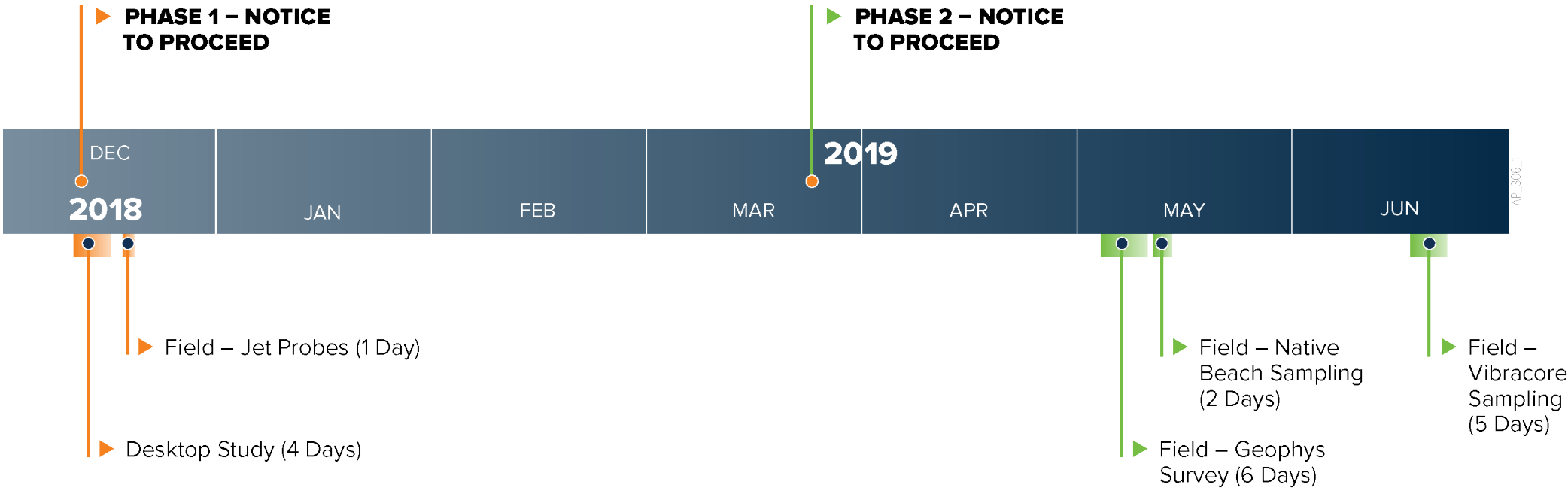
# BORROW AREA DESIGN

- ▶ 12,500 ft. southwest of FDEP monument R-129.
- ▶ Buffered for potential cultural resource
- ▶ 6 cut elevations (-24.5 ft. to -28.0 ft.)
- ▶ Volume: 4,270,000 cy
- ▶ Modeling of dredging on waves/flows  
(Morjana Signorin, Session F at 2:55 pm)

Borrow Area	Carbonate Content <sup>1</sup>	Mean Grain Size		Sorting	Fines	Average Wet Munsell Color Value <sup>4</sup>
	(%)	(mm)	(phi)	(phi)	(%)	
Mexico Beach Borrow Area	2.00	0.25	1.99	0.84	0.89	8
Mexico Beach (R-130 to R-142)	1.53	0.25	2.02	0.69	9.68	6

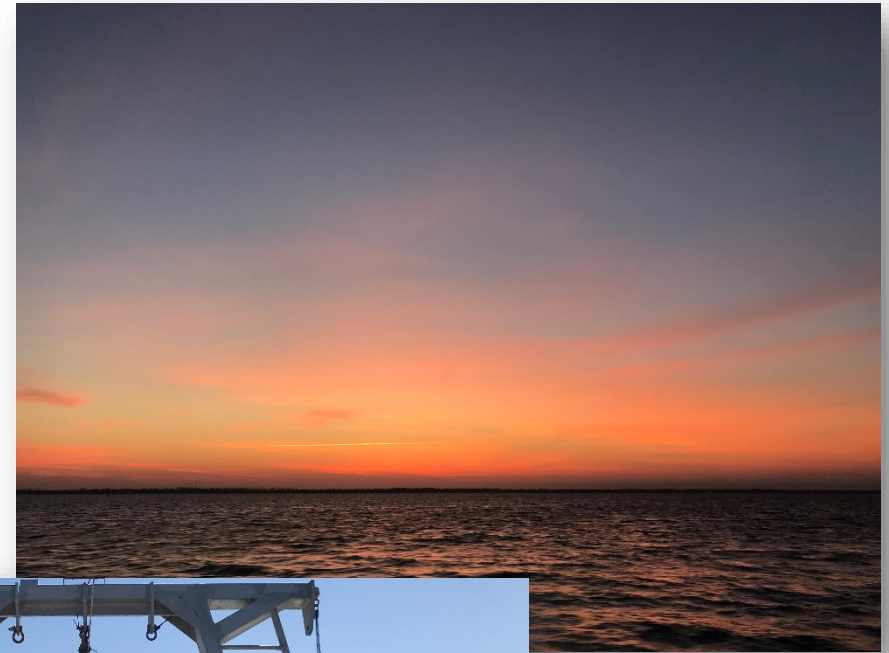


# PROJECT TIMELINE



# PROJECT CONCLUSION

- ▶ Two phase project approach
- ▶ Cost and time efficiency
  - > Select potential areas from Desktop study
  - > Jet probes to quickly narrow down project area
    - Sediment deposits/properties
  - > Geophysical/geotechnical data collection
    - Combined operations where able
    - Delineate sand deposit
  - > Borrow area design
    - Composite statistics





# QUESTIONS

**Beau Suthard, PG**

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**Expect the Extraordinary.**