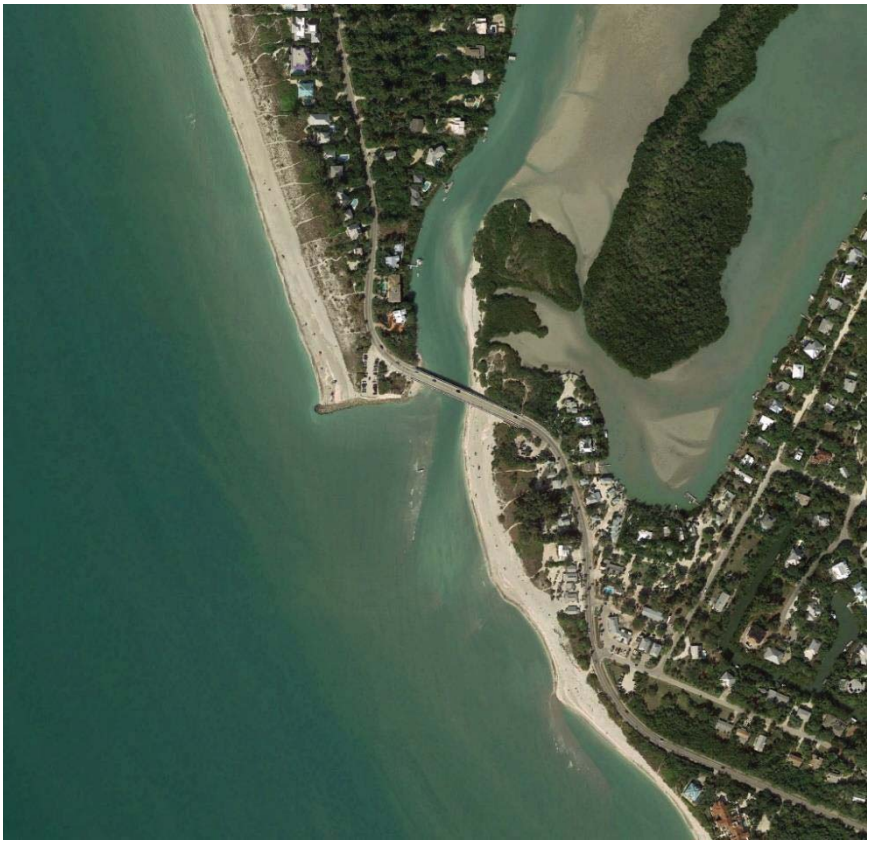
BLIND PASS MAINTENANCE DREDGING PROJECT

2017 POST-CONSTRUCTION REPORT



Prepared for:

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August 28, 2017
CEC File No. 16.180

Prepared by:

COASTAL ENGINEERING CONSULTANTS INC

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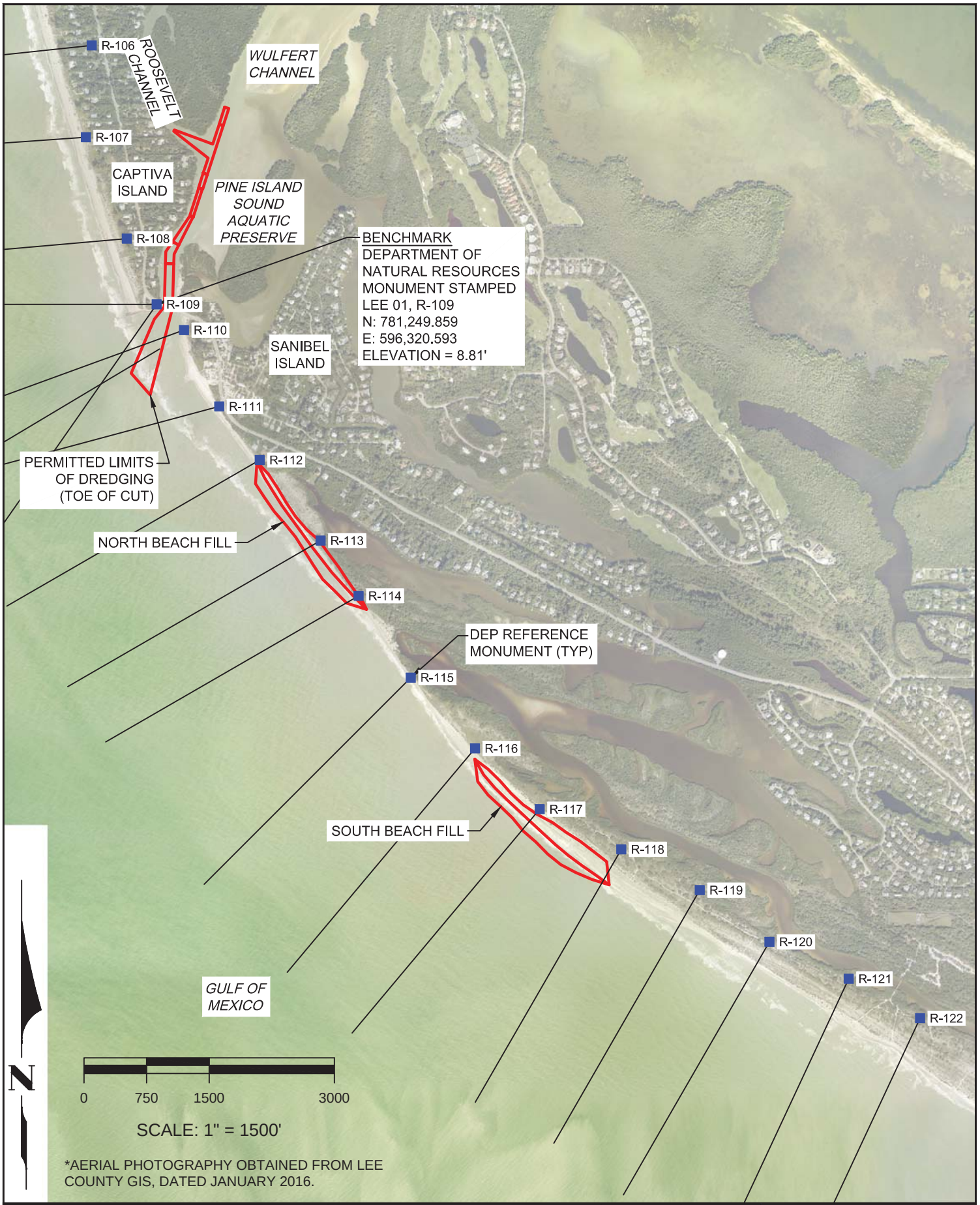
1 INTRODUCTION

Blind Pass was originally opened through hydraulic dredging during the 2009 restoration project. In June 2013, Lee County completed the first maintenance dredging of the pass. In June 2017, the second maintenance dredging of the pass was completed. This report summarizes the results of the 2017 dredging pre-construction and post-construction surveys noting that the post-construction survey also serves as a monitoring survey. The work was performed by Coastal Engineering Consultants (CEC).

An overall location map of the project area which includes R-monument survey lines is presented in Figure 1. Figure 2 presents a location map of Blind Pass and depicts ebb shoal and dredge template survey lines.

The dredge Contractor, Ferreira Construction Southern Division (Ferreira), began dredging and beach fill placement on March 11, 2017. Approximately 89,700 cubic yards were excavated from the permitted dredge template between Stations 0+00 to 35+16 within Wulfert Channel and between Stations 100+50 to 105+26 within Roosevelt Channel. Approximately 67,060 cubic yards were placed within the North Beach fill area between R-112 and R-114+200 and approximately 22,640 cubic yards were placed within the South Beach fill area between R-116 and R-118. The dredging was completed on June 3, 2017.

By comparing the pre-construction and post-construction surveys, CEC computed shoreline and volumetric changes along the project area's beach and volumetric changes within the permitted dredge template.



SHEET 1
FILE NO.: 16180-FIG 1

COASTAL ENGINEERING CONSULTANTS INC.
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CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE:
FIGURE 1
OVERALL PROJECT LOCATION MAP

DATE: 7/10/2017	SCALE: AS NOTED		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
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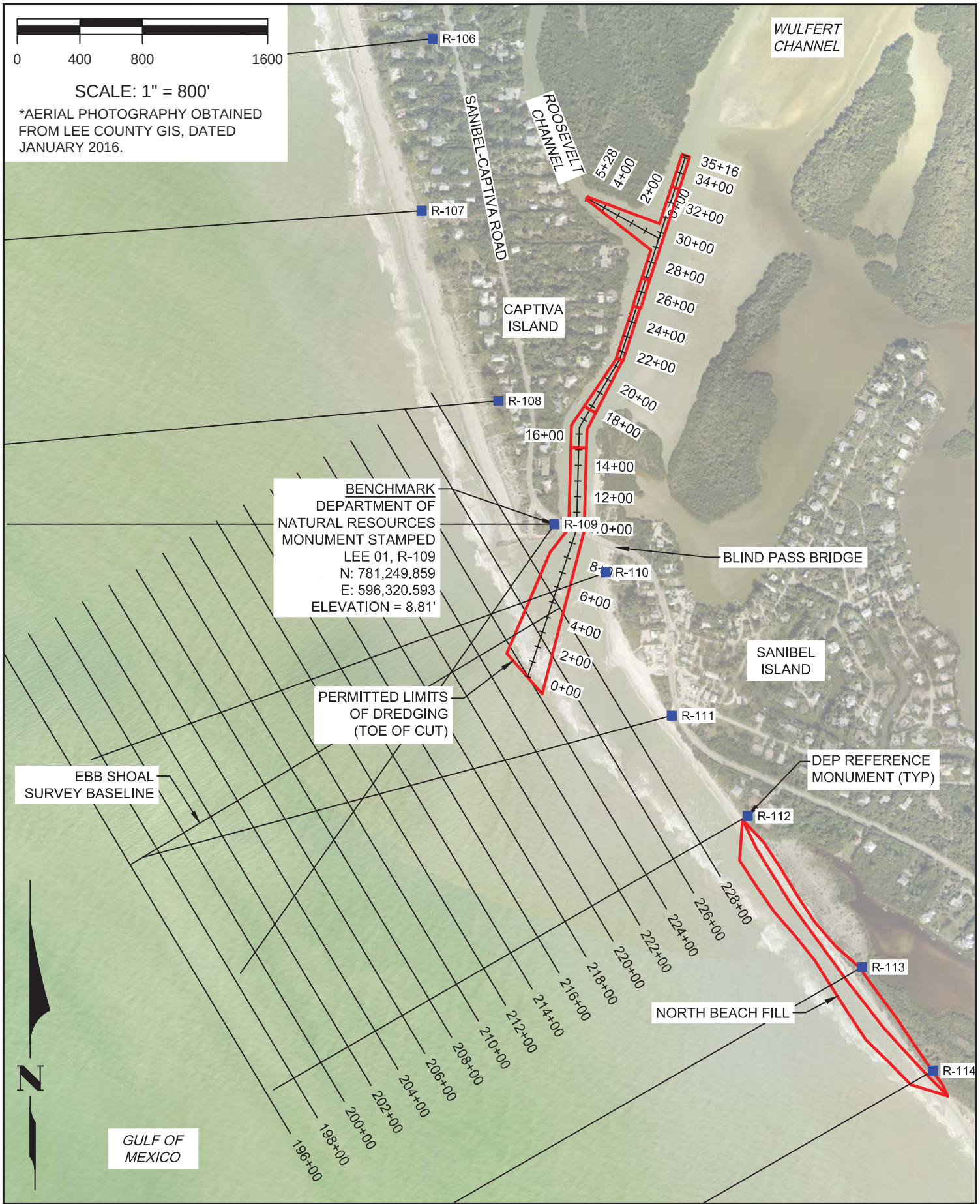

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CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE:
FIGURE 2
BLIND PASS LOCATION MAP

DATE: 7/10/2017	SCALE: AS NOTED		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-LOC MAP.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION

2 SCOPE OF WORK

The following Scope of Work was conducted to address the monitoring requirements of FDEP Permit No 0265943-003-JM.

Pass: Conduct pre- and post-construction surveys of the Blind Pass, Wulfert Channel and Roosevelt Channel as described herein. The surveys shall serve as the basis for payment, thus the survey lines shall be spaced at approximate 50-foot intervals seaward of the bridge and 50-foot intervals landward of the bridge, and points of inflection along the channel baseline. The budget includes one pre-construction survey of the entire channel, one post-construction survey of the channel segment seaward of the bridge, and one post-construction survey of the channel segment landward of the bridge. The work shall extend 1000 feet either side of the pass or to the MHW line, whichever is less. The landward extent of the survey shall be 600 feet inland past the work area. Data points shall be collected at a maximum spacing of 25 feet. The inlet shoreline position (MHW) shall be measured for the pre- and post-construction survey to provide a baseline for future analyses described in the reporting section. Compute the potential quantities of sand to be excavated from the channel based on the pre-construction channel survey.

Ebb Shoal Survey: Incorporate and utilize the August 2016 Physical Monitoring ebb shoal data, collected on-behalf of the County, as the pre-construction survey. Conduct a post-construction survey of the ebb shoal as described herein. The survey lines shall be spaced no greater than 200 feet apart, and shall be aligned parallel to the shoreline. The alignment spacing shall be sufficient to document the channel position and shoal formation. The work shall extend 1000 feet either side of the pass or to the Mean High Water (MHW) line, whichever is less. The seaward extent of the surveys shall be a minimum of 3,000 feet offshore. Data points shall be collected at a maximum spacing of 25 feet.

Beach Profiles: Incorporate and utilize the August 2016 Physical Monitoring beach profile data, collected on-behalf of the County, as the pre-construction monitoring survey. Conduct a post-construction survey of the beach profiles as described herein. Profile surveys of the active beach zone will be collected along the shoreline at each reference monument (R monument) from R-106, north of Blind Pass, to R-122, south of the fill area and will include half monuments from R-110.5 to R-118.5. Field verify control information utilized in the survey. The surveys shall be utilized to identify the shoreline position, average beach width and sediment transport rates in the vicinity of Blind Pass. The beach portion of the profile survey shall extend from a minimum of 150 feet landward of the monument or from the edge of a building or road, whichever is the most seaward, to a wading depth deep enough to provide a 50-foot overlap with the offshore portion of the profile survey where environmental conditions allow. Profile data points along the beach portion of the profile survey shall be collected at a maximum interval of 25 feet and at all breaks in grade. The offshore portion of the profile survey shall extend from as close to shore as safely possible to provide at least a 50-foot overlap with the beach portion of the profile survey where environmental conditions allow to length of at least 3,000 feet from the MHW line or an elevation of -30 feet NAVD, whichever is more landward. Profile data points along the offshore portion of the profile survey shall be collected at a maximum interval of 25 feet.

Sediment Analyses: Conduct post-construction sediment sampling and analyses in accordance with the DEP approved Sediment Quality Assurance / Quality Control Plan dated February 4, 2011, and as described herein. Post-construction samples shall be collected at each full and half R

monument in the fill area on approximate 500 foot intervals. Duplicate samples of a minimum of 1 U.S. pint (200 grams) shall be excavated from the bottom of a test hole 6 to 12 inches deep within the constructed berm. The location, date, and time shall be archived. Visually assess grain size, Munsell color, shell content, and silt content of the material by handling the fill material to ensure that it is predominantly sand, and further to note the physical characteristics. Note the existence of any layering or rocks within the test hole. One sample will be sent for laboratory analysis while the other sample will be archived and delivered to the County for storage. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument Profile Line designation, date sample was obtained, and "Berm."

All samples will be evaluated for visual attributes (Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D 6913 Particle Size Analysis of Soils, ASTM C 136 Sieve Analysis of Aggregates, and analyzed for carbonate content if applicable. The samples will be sieved using the following U.S. Standard Sieve Numbers: ¾", 3/8", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230. The testing shall be performed by an appropriately licensed and certified laboratory.

3 EQUIPMENT AND QA/QC PROCEDURES

3.1 Survey Report

The Survey Report is presented in Appendix 1.

3.2 Equipment

The following equipment was utilized for the survey work performed by CEC.

Upland: CEC employed two Trimble R10 Real Time Kinematic (RTK) Global Positioning Systems (GPS) with GLONASS capability for the upland surveys along with a Trimble R8 base receiver installed on an established control point. These systems are capable of delivering RTK positions with coordinate accuracy of ±10mm+2ppm. The standard 2-meter antenna rod allows for data collection seaward of the mean high water line up to 5 feet deep while protecting the equipment from the elements.

Offshore: The CEC survey vessel used for this work was a 20-foot fiberglass hull powered by an outboard. An Innerspace 456 single beam echo sounder was used with a side mounted transducer. The GPS antenna was mounted directly above the transducer. A Trimble R8 GLONASS RTK GPS receiver was integrated with the on-board computer system. The HYPACK 2016 software package was the hydrographic guidance program utilized.

3.3 QA/QC Procedures

CEC employs an advanced QA/QC program to ensure work performed by us meets the FDEP accuracy standards. CEC upland field crews utilize RTK systems for data collection. CEC also incorporates the necessary equipment on the survey vessel to collect bathymetric survey data "Real-Time". To meet the specification calling for an approximate 50-foot overlap in data between the boat and the upland crew, CEC implements the following procedure. Utilizing "Real-Time" data collection, the boat crew immediately accounts for the tide correction, as well as the draft,

and reports measured water depth in NAVD88 at each profile with the upland crew. This gives the upland crew, who simultaneously collects the upland and nearshore profile data, the necessary information to achieve the "overlap" specification.

Upland Data Collection: CEC mobilized one operator and GPS rover unit to collect survey data from the approximate mean high water line landward to the existing dune while an additional operator and unit collected data just landward of the mean high water seaward to wading depth or approximately –5 feet NAVD88. The recorded data was maintained within tolerances of ±3.00 feet horizontal and ±0.16 feet vertical. QA/QC procedures were maintained by both comparison of values with higher accuracy and by repeat measurement.

The Trimble base station was setup on a suitable control point for GPS observations, either a point with provided GPS coordinates or a point with coordinates derived from observations performed during monumentation. The point designation, record coordinates, ellipsoidal height, GEIOD model and antenna height are logged in the field book. At least one check shot was recorded for each RTK rover on a point with known coordinates and GPS observations were collected on known previously established survey control points throughout the day to ensure the integrity of the data.

An electronic list of R-monument coordinates and profile azimuths was loaded into the rover units and measurements were recorded along the azimuth line at intervals no greater than 25 feet or wherever geographical features dictated. The measurements were taken landward along the azimuth line to the location of the R-monument and a measurement was taken on the R-monument when possible. The extent of the vegetation line and prominent features such as seawalls were also noted in the data collection. The measurements were taken seaward along the azimuth line to a minimum depth of –5 feet NAVD88 or as far as conditions dictated, to maintain a minimum of 50 feet of overlap with the data being collected by the offshore survey crew. This data was then compiled and merged with the offshore data to produce the profile drawings.

Offshore Data Collection: All survey equipment was properly calibrated and operated in accordance with FDEP standards. Bar checks to calibrate the fathometer were performed periodically throughout the survey. Bathymetric survey data collection was conducted in calm seas. Maximum wave heights during the data collection period were less than 3 feet. The data was collected at intervals not exceeding 25 feet and at all grade breaks along the profile sufficient to accurately describe the bathymetry at the profile locations. The beach profile survey extended seaward to a minimum of 3,000 feet from MHW.

The vertical accuracy of the profile data meets or exceeds the GPS-derived heights (0.2 to 0.5 feet) standard. The horizontal positioning system accuracy of the data was within 2 feet and the off-line horizontal deviation was within 30 feet. Measure downs form a known point to the water's surface were taken periodically throughout the survey as a check for the tides measured by the RTK GPS as necessary.

Bathymetric survey data collection was performed as close in time as possible with the upland topographic survey data collection. This significantly increased efficiency by conducting the work with the same base station set-up. Safety was also increased by having both crews visible to each other at all times. Difference in time between the onshore and offshore data was no greater than 7 days for the pre-construction survey and no greater than 2 days for the post-construction survey.

3.4 Data Reduction and Deliverables

The data from the upland and offshore surveys were merged together using the HYPACK 2016 subroutines. The reduced data was converted to "xyz" and FDEP formats. The survey report is provided in Appendix 1. The "xyz" data file was imported into AutoCAD to generate beach profiles and channel cross sections to the specified scale. These profiles and cross sections are presented in Appendices 2 and 3, respectively.

4 PHYSICAL MONITORING

4.1 Survey Dates

CEC conducted the pre-construction survey of the Blind Pass channel on February 7, 2017. For the half R-monument beach profiles between R-110 and R-119 (e.g, R-110.5) the physical monitoring survey conducted by CEC on August 18, 2016 was utilized. The R-monument beach profiles surveyed by CB&I in June 2016 which included R-106 through R-122 were utilized. For the Blind Pass ebb shoal, the physical monitoring survey conducted by CEC on August 18, 2016 was utilized. The post-construction survey which included the beach profiles, Blind Pass channel, and ebb shoal was conducted by CEC on June 26-27, 2017.

4.2 Depth of Closure

Based on the Birkemeier depth of closure (DOC) formulation (Birkemeier, 1985), CEC estimated DOC near Blind Pass to be -13.3 feet NAVD88 (CEC, 2011). It is consistent with DOC values reported by others, e.g., Coastal Planning & Engineering (CPE) used DOC equal to -13.0 feet NAVD88 for their Captiva and Sanibel Islands Beach Renourishment Project (CPE, 2007).

4.3 Beach Profiles

Appendix 2 presents the beach profiles measured between R-106 and R-122 at each R-monument and also includes half R-monuments from R-110.5 to R-118.5 for the June (CB&I) and August (CEC) 2016 and June 2017 surveys.

Table 1 presents the 2016 and 2017 shoreline positions at Mean High Water (MHW = +0.28 feet NAVD88) along with the shoreline changes between the two surveys.

Table 1. Shoreline Positions and Changes at MHW between June/August 2016 Pre-Construction and June 2017 Post-Construction Surveys.

Mon	Pre-Con Position June/ August 2016 (ft)	Post-Con Position June 2017 (ft)	2016-2017 Shoreline Change (ft)	2016-2017 Average Shoreline Change (ft)	
R-106*	559.6	534.2	-25.4	-36.8	**Updrift of Blind Pass**
R-107*	179.3	171.1	-8.1		
R-108*	272.9	229.3	-43.6		
R-109*	357.7	287.8	-69.9		
Blind Pass					
R-110*	82.7	111.8	29.1	42.8	**Downdrift of Blind Pass**
R-110.5**	178.6	284.4	105.8		
R-111*	92.4	109.3	16.8		
R-111.5**	155.5	174.8	19.3		
R-112*	64.2	109.8	45.6	32.5	**North Beach Fill**
R-112.5**	432.3	444.0	11.7		
R-113*	94.0	132.1	38.0		
R-113.5**	2.2	75.7	73.5		
R-114*	44.8	38.7	-6.2		
R-114.5**	-7.7	-44.9	-37.2	-23.4	**Downdrift of North Beach Fill**
R-115*	12.4	-28.5	-41.0		
R-115.5**	65.6	73.6	8.0		
R-116*	120.4	128.3	7.9	11.6	**South Beach Fill**
R-116.5**	178.3	182.7	4.4		
R-117*	174.5	208.0	33.5		
R-117.5**	317.4	338.0	20.7		
R-118*	445.1	436.4	-8.7		
R-118.5**	514.5	505.8	-8.7	20.6	**Downdrift of South Beach Fill**
R-119*	543.9	564.5	20.6		
R-120*	413.9	446.3	32.4		
R-121*	479.4	523.3	43.9		
R-122*	516.7	531.5	14.7		

* surveyed in June 2016
** surveyed in August 2016

A summary of the shoreline changes based on the comparisons between the 2016 pre-construction and 2017 post-construction surveys at the R-monuments is presented below.

Updrift of Blind Pass: The beach segment north of Blind Pass, extending from R-106 to R-109, receded on average approximately 36.8 feet. The range of shoreline recession measured at MHW was from 8.1 feet at R-107 to 69.9 feet at R-109.

Downdrift of Blind Pass: The beach segment south of Blind Pass, extending from R-110 to R-112, advanced on average approximately 42.8 feet. The range of shoreline advancement measured at MHW was from 16.8 feet at R-111 to 105.8 feet of advancement at R-110.5.

North Beach Fill: This fill segment extended from R-112 to R-114+200 (Figure 1), within which approximately 67,060 cubic yards were placed. The segment's shoreline measured at MHW

advanced on average approximately 32.5 feet. The range of shoreline change was from 6.2 feet of recession at R-114 to 73.5 feet of advancement at R-113.5.

Downdrift of North Beach Fill: The beach segment extending from R-114+200 to R-116 receded on average approximately 23.4 feet. The range of shoreline change measured at MHW was from 41.0 feet of recession at R-115 to 8.0 feet of advancement at R-115.5.

South Beach Fill: This fill segment extended from R-116 to R-118 (Figure 1), within which approximately 22,640 cubic yards were placed. The segment's shoreline measured at MHW advanced on average approximately 11.6 feet. The range of shoreline change was from 8.7 feet of recession at R-118 to 33.5 feet of advancement at R-117.

Downdrift South Beach Fill: The beach segment extending from R-118 to R-122 advanced on average approximately 20.6 feet. The range of shoreline change measured at MHW was from 8.7 feet of recession at R-118.5 to 43.9 feet of advancement at R-121.

Figure 3 presents a schematic of the historic annual MHW shoreline positions relative to the 2012 dredging project pre-construction positions that serves as a baseline.

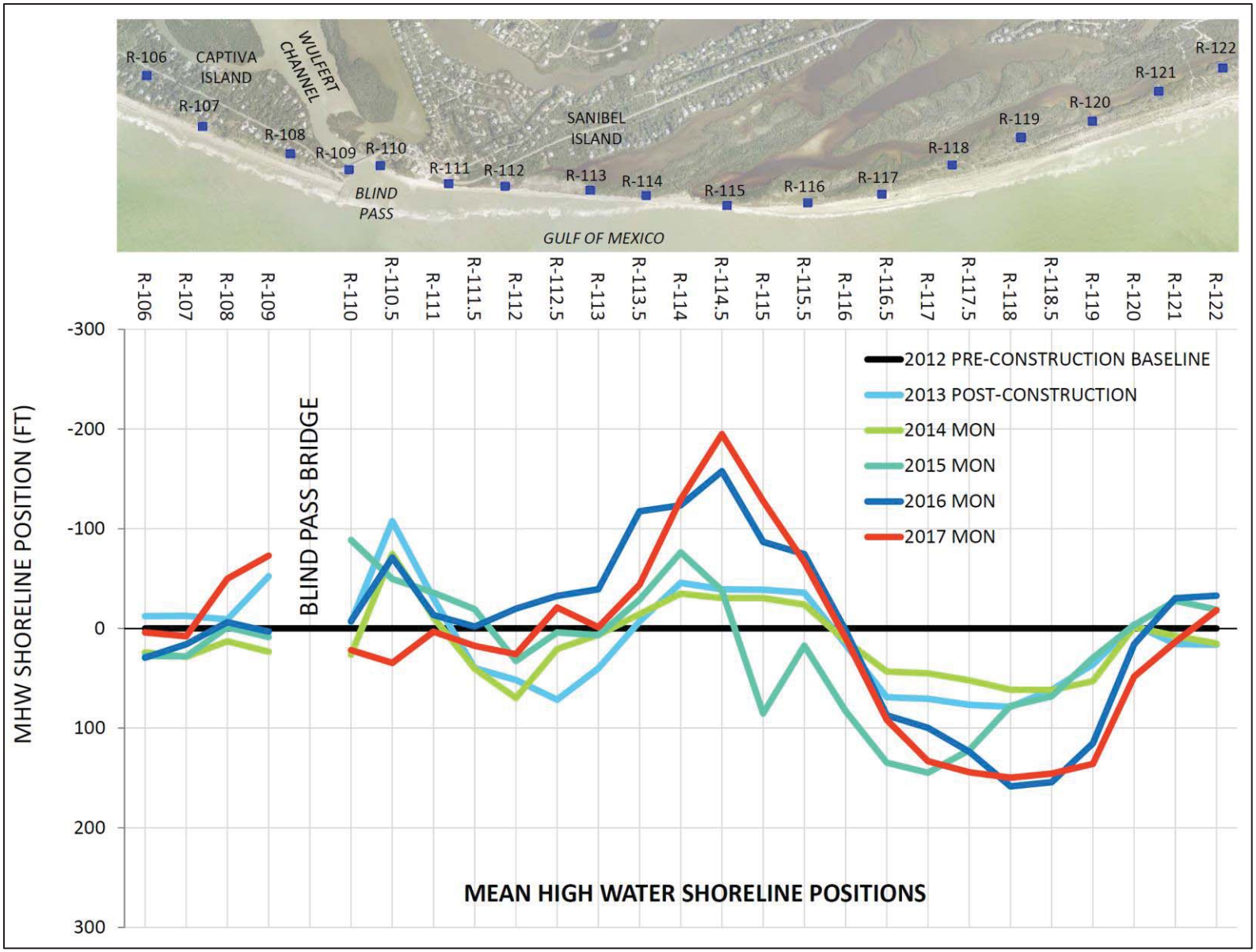


Figure 3. MHW Shoreline Positions Relative to 2012 Pre-Construction MHW Shoreline.

Tables 2 and 3 present volumetric changes to MHW and DOC, respectively, calculated from comparing the 2016 pre-construction and 2017 post-construction surveys. A summary of the volumetric changes to MHW and DOC is presented below.

Updrift of Blind Pass: The beach segment north of Blind Pass, extending from R-106 to R-109, lost approximately 4,150 cubic yards above MHW and lost approximately 56,580 cubic yards to DOC.

Downdrift of Blind Pass: The beach segment south of Blind Pass, extending from R-110 to R-112, gained approximately 18,580 cubic yards above MHW but lost approximately 29,630 cubic yards to DOC.

North Beach Fill: The fill segment extending from R-112 to R-114+200, within which approximately 67,060 cubic yards were placed, gained approximately 18,390 cubic yards above MHW and gained approximately 33,580 cubic yards to DOC noting that these volumes were calculated based on the R-monument surveys conducted in June/August 2016 and June 2017 while the volume of material placed, 67,060 cubic yards, was calculated based on the 100-foot station pre-construction and pay surveys conducted immediately before and after fill placement.

Downdrift of North Beach Fill: The beach segment extending from R-114+200 to R-116 lost approximately 3,490 cubic yards above MHW and lost approximately 21,900 cubic yards to DOC.

South Beach Fill: The fill segment extending from R-116 to R-118, within which approximately 22,640 cubic yards were placed, gained approximately 13,670 cubic yards above MHW and lost approximately 10,510 cubic yards to DOC noting that these volumes were calculated based on the R-monument surveys conducted in June/August 2016 and June 2017 while the volume of material placed, 22,640 cubic yards, was calculated based on the 100-foot station pre-construction and post-construction surveys conducted immediately before and after fill placement.

Downdrift of South Beach Fill: The beach segment extending from R-118 to R-122 gained approximately 36,270 cubic yards above MHW and lost approximately 26,710 cubic yards to DOC.

Figures 4 and 5 present histograms of the 2016-2017 volumetric changes to MHW and DOC, respectively.

Table 2. Volumetric Changes to MHW between June/August 2016 Pre-Construction and June 2017 Post-Construction Surveys.

Mon	Area (cy/ft)	Average Area (cy/ft)	Length (ft)	Volume (cy)	Total Volume (cy)	
R-106*	-3.2					
		-1.7	1,101	-1,925		
R-107*	-0.3					
		-1.7	1,310	-2,172	-4,149	**Updrift of Blind Pass**
R-108*	-3.1					
		-0.1	866	-51		
R-109*	2.9					
Blind Pass						
R-110*	5.8					
		15.3	525	8,032		
R-110.5**	24.8					
		14.3	482	6,884	18,582	**Downdrift of Blind Pass**
R-111*	3.8					
		3.5	411	1,438		
R-111.5**	3.2					
		5.6	401	2,229		
R-112*	7.9					
		5.3	731	3,897		
R-112.5**	2.7					
		5.7	658	3,728		
R-113*	8.6				18,393	**North Beach Fill**
		15.6	449	6,988		
R-113.5**	22.6					
		10.6	356	3,780		
R-114*	-1.3					
		-0.4	577	-217		
R-114.5**	0.6					
		-0.7	585	-419		
R-115*	-2.0				-3,486	**Downdrift of North Beach Fill**
		-2.9	573	-1,651		
R-115.5**	-3.8					
		-2.1	572	-1,198		
R-116*	-0.4					
		0.4	533	218		
R-116.5**	1.2					
		5.9	532	3,132		
R-117*	10.5				13,671	**South Beach Fill**
		11.4	531	6,069		
R-117.5**	12.3					
		7.5	567	4,251		
R-118*	2.7					
		4.1	529	2,182		
R-118.5**	5.6					
		7.3	531	3,891		
R-119*	9.1					
		11.3	1,040	11,701	36,274	**Downdrift of South Beach Fill**
R-120*	13.4					
		11.6	1,048	12,108		
R-121*	9.7					
		6.5	977	6,392		
R-122*	3.4					

* surveyed in June 2016

** surveyed in August 2016

Table 3. Volumetric Changes to DOC between June/August 2016 Pre-Construction and June 2017 Post-Construction Surveys.

Mon	Area (cy/ft)	Average Area (cy/ft)	Length (ft)	Volume (cy)	Total Volume (cy)	
R-106*	-10.8					
		-10.6	1,101	-11,633		
R-107*	-10.3					
		-17.4	1,310	-22,738	-56,583	**Updrift of Blind Pass**
R-108*	-24.4					
		-25.7	866	-22,212		
R-109*	-26.9					
Blind Pass						
R-110*	-80.5					
		-48.2	525	-25,296		
R-110.5**	-15.9					
		-16.5	482	-7,949	-29,634	**Downdrift of Blind Pass**
R-111*	-17.1					
		-4.7	411	-1,926		
R-111.5**	7.7					
		13.8	401	5,538		
R-112*	19.9					
		6.9	731	5,061		
R-112.5**	-6.0					
		11.1	658	7,321		
R-113*	28.3				33,578	**North Beach Fill**
		33.5	449	15,042		
R-113.5**	38.8					
		17.3	356	6,154		
R-114*	-4.2					
		-0.7	577	-428		
R-114.5**	2.7					
		-6.5	585	-3,808		
R-115*	-15.7				-21,896	**Downdrift of North Beach Fill**
		-13.8	573	-7,900		
R-115.5**	-11.8					
		-17.1	572	-9,759		
R-116*	-22.3					
		-15.3	533	-8,148		
R-116.5**	-8.3					
		-8.2	532	-4,375		
R-117*	-8.1				-10,511	**South Beach Fill**
		1.9	531	1,033		
R-117.5**	12.0					
		1.7	567	980		
R-118*	-8.6					
		-7.7	529	-4,060		
R-118.5**	-6.8					
		-6.8	531	-3,597		
R-119*	-6.8					
		-5.4	1,040	-5,598	-26,712	**Downdrift of South Beach Fill**
R-120*	-4.0					
		-4.9	1,048	-5,117		
R-121*	-5.8					
		-8.5	977	-8,340		
R-122*	-11.3					

* surveyed in June 2016

** surveyed in August 2016

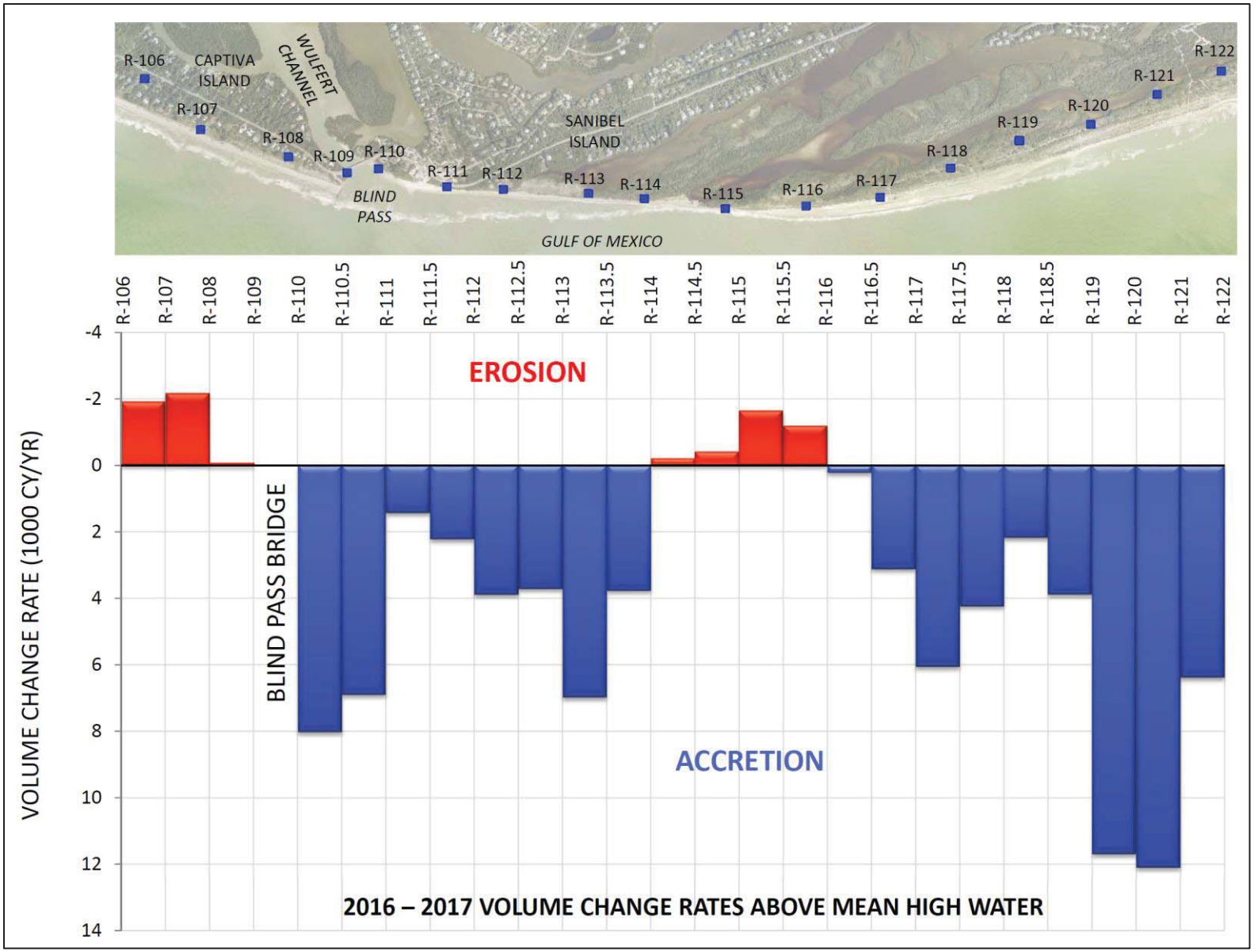


Figure 4. Histogram of Volumetric Changes to MHW between 2016 Pre-Construction and June 2017 Post-Construction Surveys.

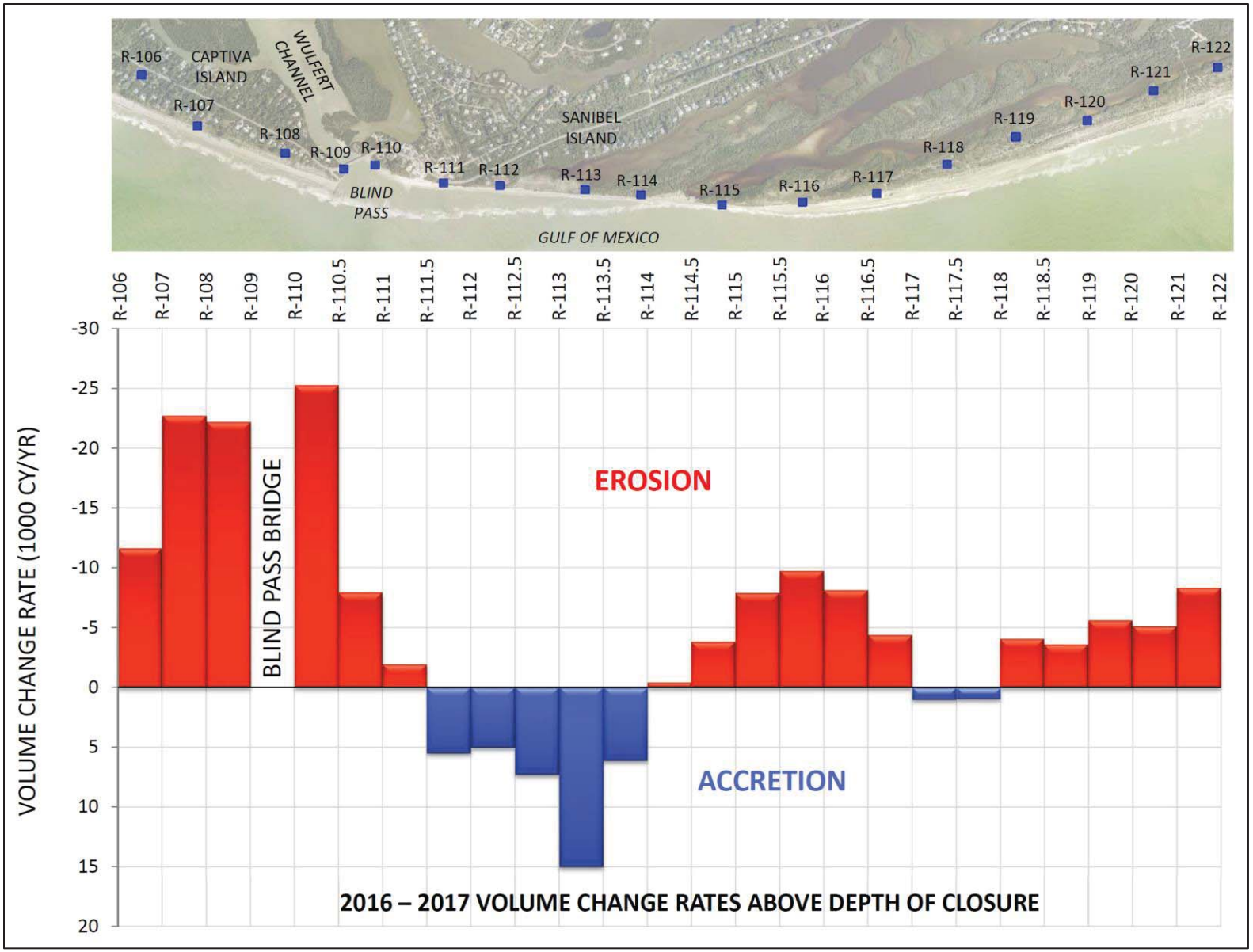


Figure 5. Histogram of Volumetric Changes to DOC between 2016 Pre-Construction and June 2017 Post-Construction Surveys.

Figures 6 and 7 present contour maps based on the pre-construction and post-construction survey data, respectively. The figures depict the limits of dredging and fill placement. The pre-construction survey data was a combination of the June 2016 (beach R-monument lines), August 2016 (beach half R-monument and Blind Pass ebb shoal lines), and February 2017 (Blind Pass channel lines). The Blind Pass channel data were used to derive its limits. The 2016 ebb shoal survey data within these limits were first excluded and then merged with the 2017 channel survey data. Using the channel and ebb shoal merged data, data limits were updated and used to eliminate the 2016 beach (R-monument and half R-monument) survey data which were within the limits. The remainder of the 2016 beach data was merged with previously merged channel and ebb shoal data.

Figure 8 presents a morphology change map depicting changes in elevations that occurred between the two surveys.

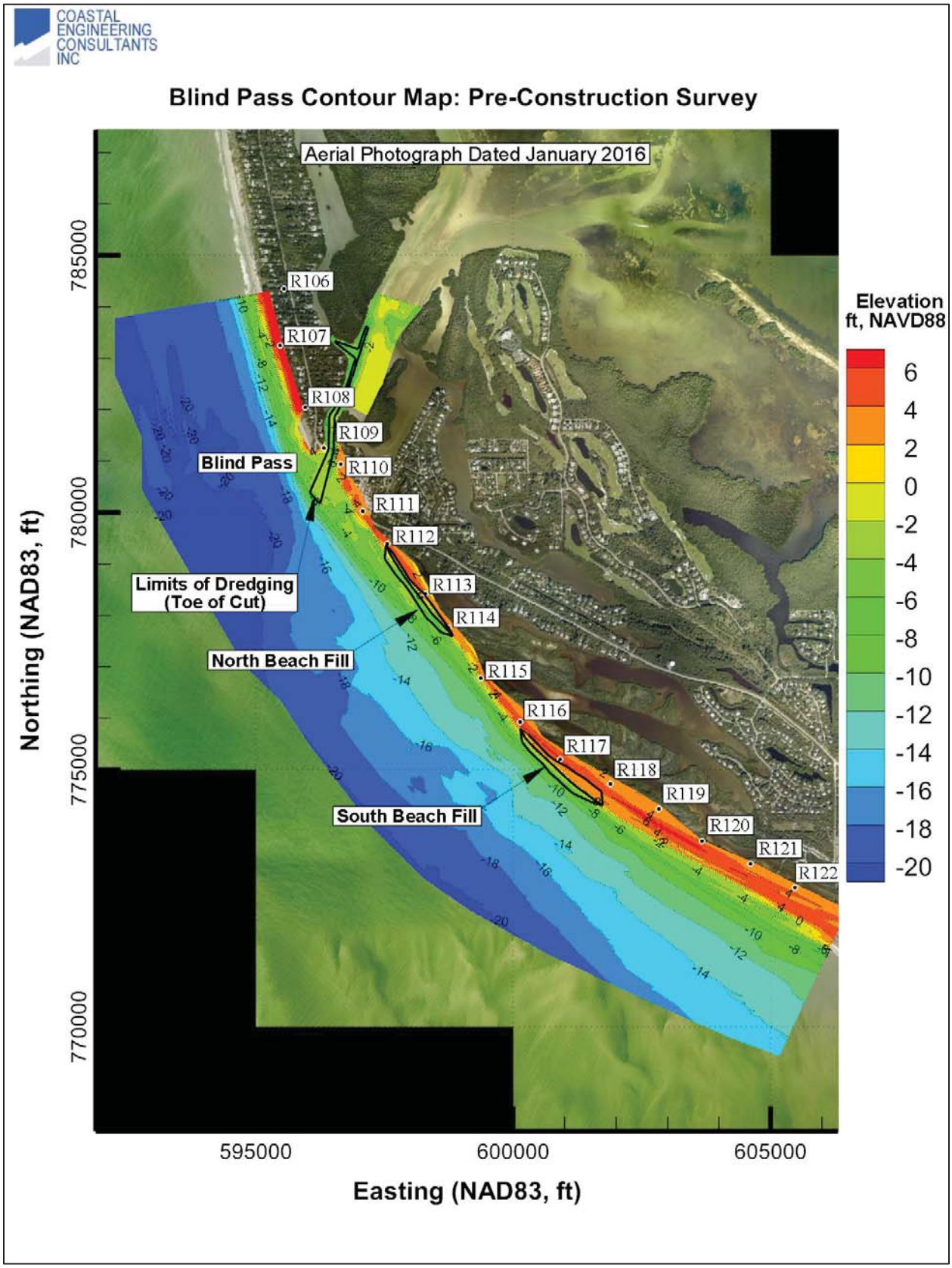


Figure 6. Pre-construction Survey Contour Map.

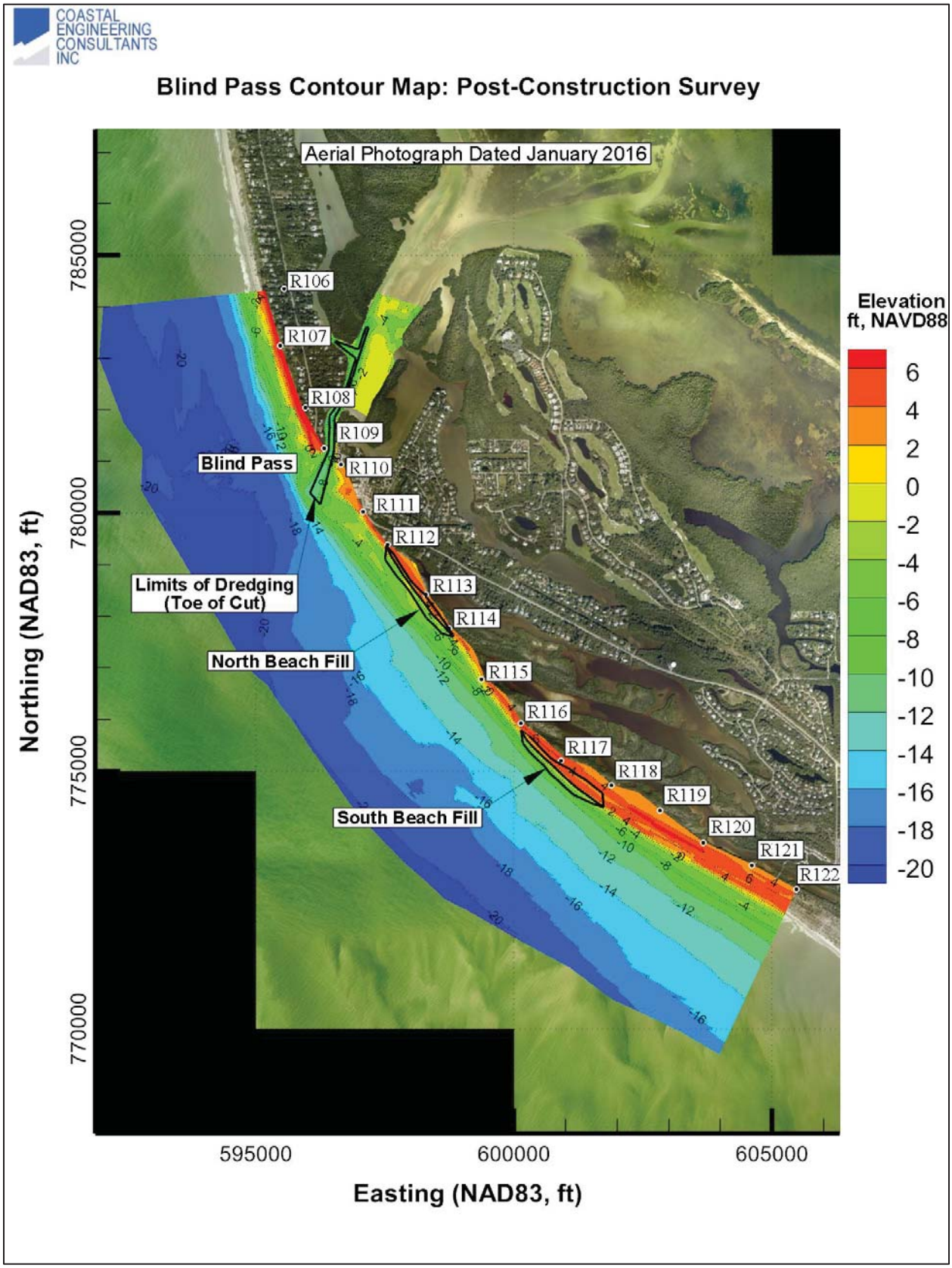


Figure 7. Post-construction Survey Contour Map.

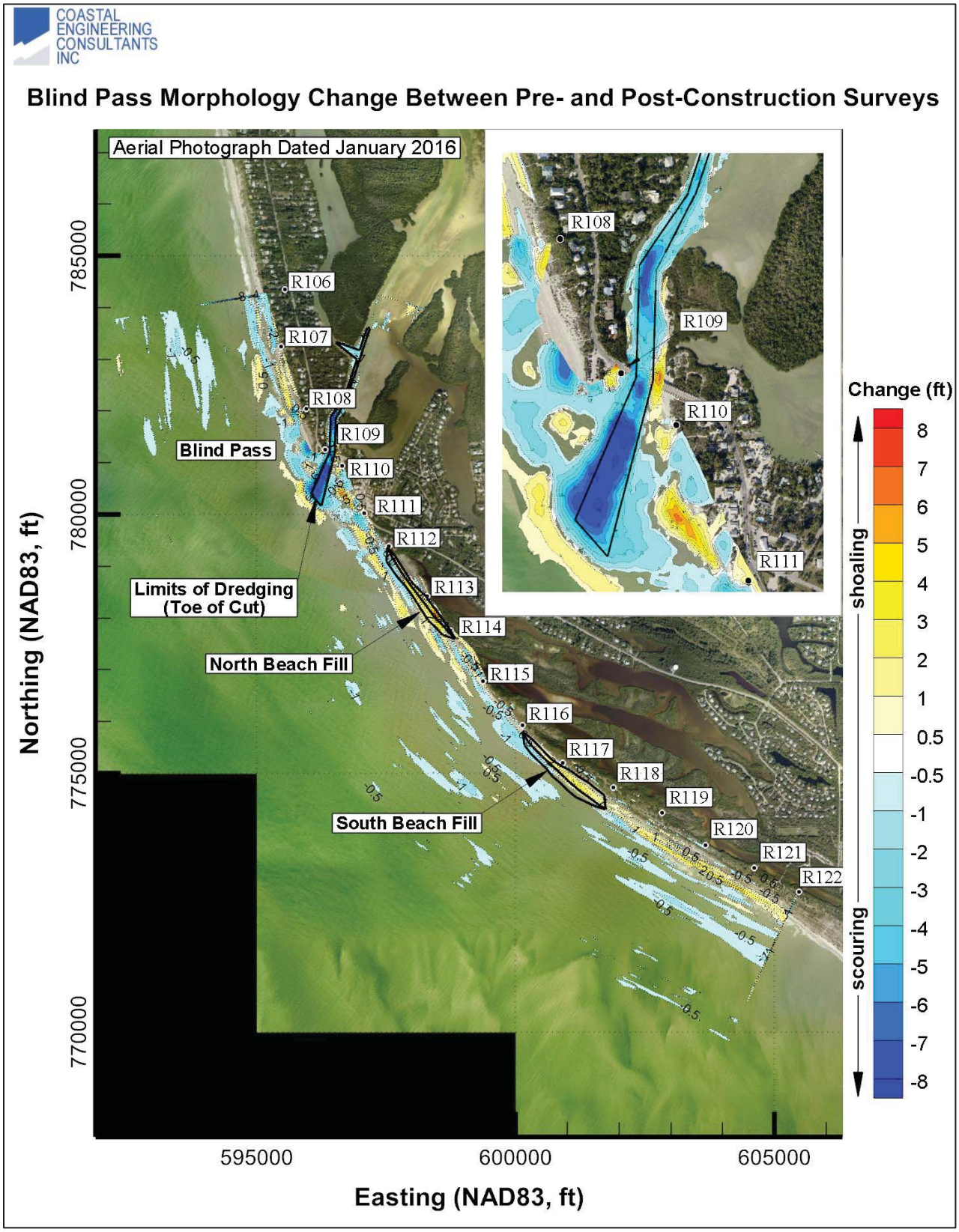


Figure 8. Morphologic Changes between Pre-construction and Pre-construction Surveys.

4.4 Ebb Shoal

Appendix 3 presents the ebb shoal cross sections, 200-foot increment Stations 196+00 through 228+00 depicted in Figure 2. The ebb shoal was surveyed in August 2016 (pre-construction survey) and June 2017 (post-construction survey), noting that the dredge template's seaward end is located along Station 224+00. The survey data comparison indicates no changes seaward of Station 220+00. Station 222+00 indicates that the ebb shoal grew in elevation by as much as 2 feet. Further landward, along Stations 226+00 and 228+00, the sections show material that was removed from the dredge template. Station 228+00 also indicates ebb shoal growth toward the beach on the south side of the pass between R-110 and R-111 which can also be seen in Figure 5.

4.5 Blind Pass

Appendix 3 presents the Blind Pass cross sections surveyed in February 2017 (pre-construction survey) and June 2017 (post-construction survey). The dredge template and stations are depicted in Figure 2. It should be noted that the bridge precludes accurate surveying of Station 10+00 due to its orientation, instead two offset stations were surveyed, Stations 9+50 and 10+50, to monitor changes near the bridge.

Table 4 presents the volume change within the channel which was calculated from comparing the February 2017 pre-construction and June 2017 post-construction surveys. The total volume change within the dredge template including the 1-foot tolerance was computed to be approximately -77,780 cubic yards utilizing the 200-foot station survey lines with the addition of Stations 9+50 and 10+50 due to the presence of the bridge. It should be noted that the volume of material excavated from the template, 89,700 cubic yards, was calculated based on the 50-foot station pre-construction and pay surveys.

Figure 9 presents a histogram of the volumetric changes within the dredge template between the 2017 pre- and post-construction surveys.

Table 4. Volume Change within Dredge Template between February 2017 Pre-Construction and June 2017 Post-Construction Surveys.

Station	Area (cy/ft)	Average Area (cy/ft)	Length (ft)	Volume (cy)
Wulfert Channel				
0+00	-32.4			
		-54.7	200	-10,937
2+00	-77			
		-72.4	200	-14,474
4+00	-67.8			
		-63.5	200	-12,709
6+00	-59.3			
		-43.4	200	-8,684
8+00	-27.5			
		-26.3	150	-3,949
9+50	-25.1			
		-18.8	100	-1,878

Station	Area (cy/ft)	Average Area (cy/ft)	Length (ft)	Volume (cy)
10+50	-12.4			
		-14.2	150	-2,133
12+00	-16			
		-19.9	200	-3,972
14+00	-23.7			
		-23.9	200	-4,782
16+00	-24.1			
		-20.6	200	-4,120
18+00	-17.1			
		-13.8	200	-2,760
20+00	-10.5			
		-10.6	200	-2,113
22+00	-10.6			
		-5.9	200	-1,173
24+00	-1.1			
		-1.1	200	-220
26+00	-1.1			
		-1.4	200	-286
28+00	-1.8			
		-1.9	200	-374
30+00	-2			
		-1.9	200	-387
32+00	-1.9			
		-1.9	200	-373
34+00	-1.8			
		-1.4	100	-139
35+00	-1			
Roosevelt Channel				
101+00	-12.3			
		-10.8	100	-1,077
102+00	-9.2			
		-5.6	200	-1,123
104+00	-2			
		-1.2	100	-118
105+00	-0.3			
Total				**-77,781**

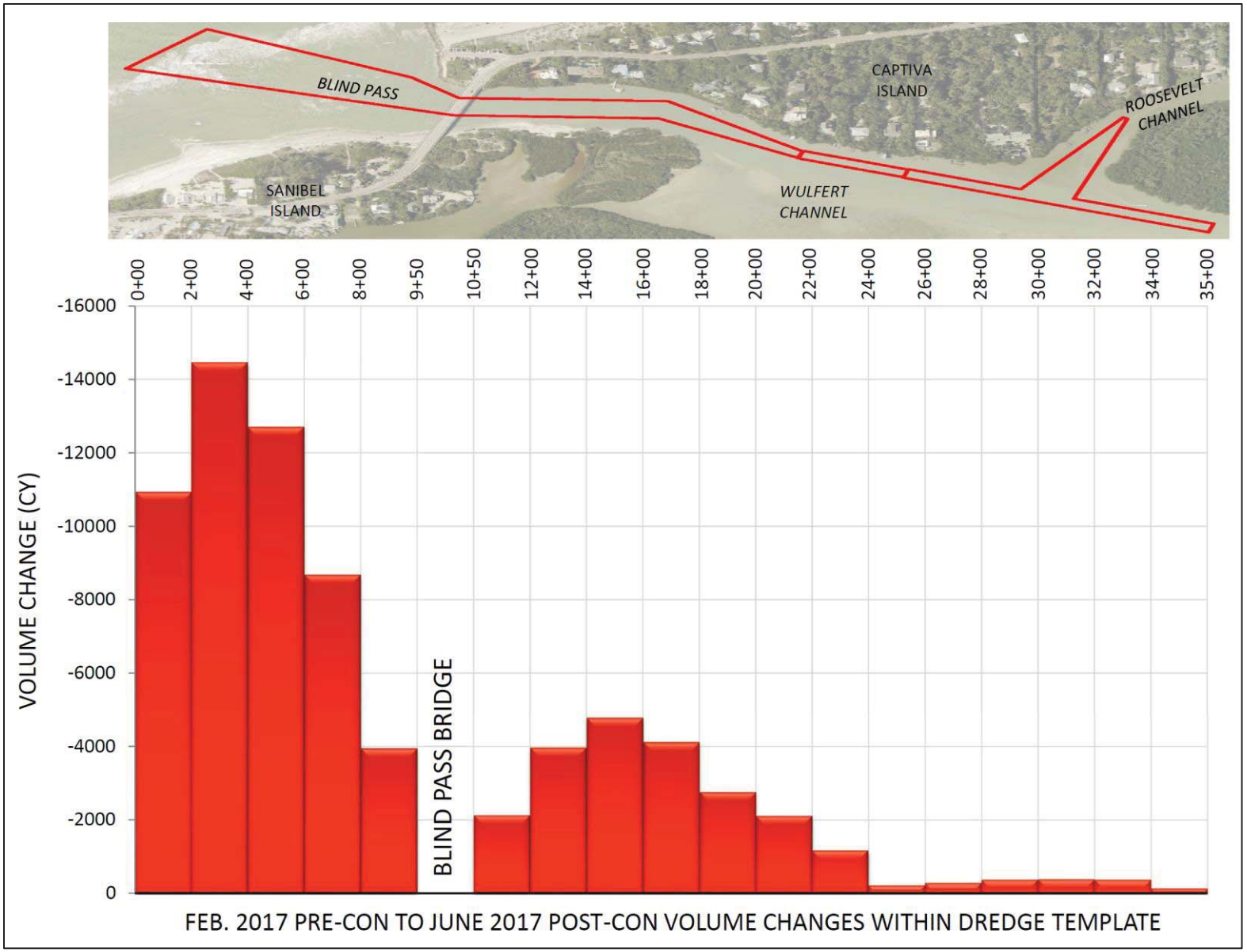


Figure 9. Histogram of Volumetric Changes within Dredge Template between 2017 Pre- and Post-Construction Surveys.

Based on the June 2017 survey, the total volume remaining within the Blind Pass dredge template was approximately 24,770 cubic yards (Table 5), of which approximately 13,080 cubic yards were within the design cut and 11,690 cubic yards were within the overdredge tolerance.

Table 5. Volume Remaining within Dredge Template after June 2017 Survey.

Station	Area (cy/ft)	Average Area (cy/ft)	Length (ft)	Volume (cy)
Wulfert Channel				
0+00	9.6			
		9.0	200	1,791
2+00	8.3			
		9.3	200	1,857
4+00	10.3			
		9.3	200	1,857
6+00	8.3			
		18.6	200	3,714
8+00	28.9			
		17.3	150	2,590
9+50	5.7			
		7.7	100	768
10+50	9.7			
		8.5	150	1,280
12+00	7.4			
		8.5	200	1,699
14+00	9.6			
		10.0	200	2,001
16+00	10.4			
		8.0	200	1,607
18+00	5.7			
		5.4	200	1,073
20+00	5.1			
		3.9	200	784
22+00	2.8			
		2.9	200	579
24+00	3.0			
		2.3	200	453
26+00	1.5			
		1.3	200	251
28+00	1.0			
		1.8	200	356
30+00	2.6			
		3.1	200	618
32+00	3.6			
		2.2	200	445
34+00	0.8			
		0.5	100	46
35+00	0.1			
Roosevelt Channel				
101+00	6.4			
		4.1	100	407
102+00	1.7			
		2.1	200	417
104+00	2.4			
		1.7	100	174
105+00	1.0			
Total				**24,766**

5 SEDIMENTS

A grain size analysis was performed on sediment samples collected on June 21, 2017. The samples were collected in accordance with the projects Sediment Quality Assurance / Quality Control plan. The samples were collected at each full and half R-monument in the fill area (R-112 to R-114+200 and R-116 to R-118). The samples were excavated from depths of 6 to 12 inches below the surface in the newly constructed berm. The average mean grain size of the sediment samples collected was 0.59 mm. The average gravel content of the sediment grab samples was 4.9% and the average silt content (finer than the #230 sieve) was 0.72%. The samples of the post-construction grain size analysis are presented in Appendix 4 and the summary of the analysis is presented in Table 6. Based on the results of the post-construction sampling, the sediment placed on the beach is consistent with the Sediment Quality Assurance / Quality Control plan.

Table 6. Summary of Post-Construction Sediment Grain Size Sampling Analysis.

Location	Sample No.	gINT Granularmetrics						USC	Carbonates	Organics	Munsell Color	
		Size Class (wt%)				Descriptive Statistics					Wet	
		Gravel	Sand	<#200	<#230	Mean (mm)	Verbal				Verbal	Value
R-112	1-2	0.34	98.9	0.76	0.75	0.35	M	SP	35.10%	0.80%	Gray	10YR-6/1
R-112+487	2-2	7.39	91.73	0.88	0.77	0.60	C	SW	58.40%	1.10%	Gray	10YR-6/1
R112+800	3-2	7.42	91.67	0.91	0.90	0.60	C	SW	47.60%	1.20%	Gray	10YR-6/1
R113	4-2	4.07	95.03	0.9	0.85	0.46	M	SW	48.10%	0.90%	Gray	10YR-6/1
R113+406	5-2	4.45	94.58	0.97	0.94	0.44	M	SW	32.00%	0.90%	Gray	10YR-6/1
R114	6-2	5.08	93.84	1.08	1.06	0.49	M	SW	48.50%	1.00%	Gray	10YR-6/1
R114+190	7-2	3.02	96.09	0.89	0.88	0.51	C	SW	53.60%	1.00%	Gray	10YR-6/1
R116	8-2	5.31	93.9	0.79	0.78	0.95	C	SW	77.30%	1.40%	Gray	10YR-6/1
R116+500	9-2	1.79	97.91	0.3	0.28	0.40	M	SW	40.60%	1.10%	Gray	10YR-6/1
R117	10-2	1.44	98.26	0.3	0.28	0.40	M	SW	40.40%	1.00%	Gray	10YR-6/1
R-117+380	11-2	8.08	91.48	0.44	0.40	0.87	C	SW	67.00%	1.50%	Gray	10YR-6/1
R117+800	12-2	12.58	86.89	0.53	0.50	1.06	VC	SW	79.90%	1.10%	Gray	10YR-6/1
R118	13-2	2.53	96.51	0.96	0.95	0.51	C	SW	64.50%	1.50%	Gray	10YR-6/1
Average		4.88	94.37	0.75	0.72	0.59						

6 CONCLUSION

This report describes the pre-construction and post-construction physical monitoring results of Lee County's Blind Pass restoration project completed in June 2017. The information presented herein provides the necessary data for both Lee County and FDEP to regularly observe and assess, with quantitative measurements, the performance of the project, any adverse effects which have occurred, and the need for any adjustments, modifications, or mitigative response to the project. The monitoring process also provides the County and FDEP information necessary to plan, design, and optimize subsequent follow-up projects, potentially reducing the need for and costs of unnecessary work, as well as potentially reducing any environmental impacts that may have occurred or be expected.

The data used in the analysis included surveys conducted by CB&I in June 2016 (used as pre-construction), and by CEC in August 2016 (used as pre-construction), February 2017 (used as pre-construction), and June 2017 (used as post-construction and monitoring).

Based on the February 2017 pre-construction and June 2017 post-construction surveys, the total volume change within the dredge template including the 1-foot tolerance was approximately 77,780 cubic yards, noting that the volume of material excavated from the template was approximately 89,700 cubic yards.

As of June 2017, the total volume remaining within the Blind Pass dredge template was approximately 24,770 cubic yards.

Based on the shoreline change analysis conducted by comparing MHW positions between the June/August 2016 and June 2017 surveys at the R-monuments:

- beach segment north of Blind Pass, extending from R-106 to R-109, receded on average approximately 36.8 feet;
- beach segment south of Blind Pass, extending from R-110 to R-112, advanced on average approximately 42.8 feet;
- North Beach Fill segment extending from R-112 to R-114+200 advanced on average approximately 32.5 feet;
- beach segment downdrift on North Beach Fill extending from R-114+200 to R-116 receded on average approximately 23.4 feet;
- South Beach Fill segment extending from R-116 to R-118 advanced on average approximately 11.6 feet; and
- beach segment downdrift on South Beach Fill extending from R-118 to R-122 advanced on average approximately 20.6 feet.

Based on the beach volumetric change analysis conducted by comparing volume changes above MHW and to DOC between the June/August 2016 and June 2017 surveys at the R-monuments:

- beach segment north of Blind Pass, extending from R-106 to R-109, lost approximately 4,150 cubic yards above MHW and lost approximately 56,580 cubic yards to DOC;

- beach segment south of Blind Pass, extending from R-110 to R-112, gained approximately 18,580 cubic yards above MHW but lost approximately 29,630 cubic yards to DOC;
- North Beach Fill segment extending from R-112 to R-114+ gained approximately 18,390 cubic yards above MHW and gained approximately 33,580 cubic yards to DOC;
- beach segment downdrift on North Beach Fill extending from just south of R-114+200 to R-116 lost approximately 3,490 cubic yards above MHW and lost approximately 21,900 cubic yards to DOC;
- South Beach Fill segment extending from R-116 to R-118 gained approximately 13,670 cubic yards above MHW and lost approximately 10,510 cubic yards to DOC; and
- beach segment downdrift on South Beach Fill extending from R-118 to R-122 gained approximately 36,270 cubic yards above MHW and lost approximately 26,710 cubic yards to DOC.

Based on the monitoring, there were no documented adverse impacts to the natural resources or coastal system within the project area as a result of construction.

7 REFERENCES

Birkemeier, W.A. 1985. Field Data on Seaward Limit of Profile Change, *Journal of Waterway, Port, Coastal and Ocean Engineering*, vol. 111, number 3, pp. 598-602.

Coastal Engineering Consultants (CEC). 2011. Lee County Blind Pass Restoration Project 1-Year Monitoring Report, March 2010.

Coastal Planning & Engineering (CPE). 2007. Captiva and Sanibel Islands; Beach Renourishment Project; 1 Year Post-Construction Engineering Monitoring Report. May 2007.

I:\2016\16180 Blind Pass Dredge Design and Permit Services\Reports\ 16180_Monitoring_Report - 2017-08-23 - DRAFT.docx

APPENDIX 1

SURVEY REPORT

COASTAL ENGINEERING CONSULTANTS INC
A CECI GROUP COMPANY

CECI Group Services
Civil Engineering
Planning Services
Survey & Mapping
Coastal Engineering
Environmental Services
Website: www.coastalengineering.com

BLIND PASS, SANIBEL-CAPTIVA LEE COUNTY, FLORIDA
2017 POST-CONSTRUCTION SURVEY REPORT

All Surveys were conducted utilizing multiple Trimble Real Time Kinematic (RTK) Global Positioning Systems (GPS). The Pre-Construction Surveys were performed on August 10 and August 18, 2016, and February 7 and February 13, 2017. The Post Construction / Monitoring Survey was conducted on June 26 and 27, 2017. All GPS control during this survey was referenced from previously established Florida Department of Environmental Protection (FDEP) Bureau of Beaches and Coastal Systems (BBCS) and meets or exceeds Geospatial Positioning Accuracy Standards, Range VIII.

All "R monument" and intermediate beach profiles were collected on the State Plane Coordinate System Grid, Florida West Zone and survey data was collected along FDEP established grid bearings as outlined in the project Scope of Work. The horizontal and vertical datums were North American Datum (NAD) of 1983/1990 Adjustment and North American Vertical Datum (NAVD) of 1988, Geoid 2012A, respectively.

All survey control was established as part of the upland topographic survey control work, and conducted in accordance with the FDEP Monitoring Standards for Beach Erosion Control Projects. These surveys meet the requirements set forth in Chapter 5J-17 (F.A.C.) Florida Administrative Code.

The following National Geodetic Survey Benchmarks were used during this Survey:

FLDEP TIDAL 872 5383B PID No. DL8722, Elevation: 5.18 feet NAVD 1988
FLDEP TIDAL 872 5383A PID No. DL8724, Elevation: 9.41 feet NAVD 1988

Equipment

Upland: CEC employed two Trimble R10 Real Time Kinematic (RTK) Global Positioning Systems (GPS) with GLONASS capability for the upland surveys along with a Trimble R8 base receiver installed on an established control point. These systems are capable of delivering RTK positions with coordinate accuracy of ±10mm+2ppm. The standard 2-meter antenna rod allows for data collection seaward of the mean high water line up to 5 feet deep while protecting the equipment from the elements.

Offshore: The CEC survey vessel used for this work was a 20-foot fiberglass hull powered by an outboard. An Innerspace 456 single beam echo sounder was used with a side mounted transducer. The GPS antenna was mounted directly above the transducer. A Trimble R8

GLONASS RTK GPS receiver was integrated with the on-board computer system. The HYPACK 2016 software package was the hydrographic guidance program utilized.

QA/QC Procedures

CEC employs an advanced QA/QC program to ensure our work meets the FDEP accuracy standards. CEC upland field crews utilize RTK systems for data collection. CEC also incorporates the necessary equipment on the survey vessel to collect bathymetric survey data "Real-Time". To meet the specification calling for an approximate 50-foot overlap in data between the boat and the upland crew, CEC implements the following procedure. Utilizing "Real-Time" data collection, the boat crew immediately accounts for the tide correction and reports measured water depth in NAVD88 at each profile with the upland crew. This gives the upland crew, who simultaneously collects the upland and near shore profile data, the necessary information to achieve the "overlap" specification.

Upland Data Collection: CEC mobilized one operator and GPS rover unit to collect survey data from the approximate mean high water line landward to the existing dune while an additional operator and unit collected data just landward of the mean high water seaward to wading depth or approximately –5 feet NAVD88. The recorded data was maintained within tolerances of ±3.00 feet horizontal and ±0.16 feet vertical. QA/QC procedures were maintained by both comparison of values with higher accuracy and by repeat measurement.

The Trimble base station was setup on a suitable control point for GPS observations, either a point with provided GPS coordinates or a point with coordinates derived from observations performed during monumentation. The point designation, record coordinates, ellipsoidal height, GEIOD model and antenna height are logged in the field book. At least one check shot was recorded for each RTK rover on a point with known coordinates and GPS observations were collected on known previously established survey control points throughout the day to ensure the integrity of the data.

An electronic list of R-monument coordinates and profile azimuths was loaded into the rover units and measurements were recorded along the azimuth line at intervals no greater than 25 feet or wherever geographical features dictated. The measurements were taken landward along the azimuth line to the location of the R-monument and a measurement was taken on the R-monument when possible. The extent of the vegetation line and prominent features such as seawalls were also noted in the data collection. The measurements were taken seaward along the azimuth line to a minimum depth of –5 feet NAVD88 or as far as conditions dictated, to maintain a minimum of 50 feet of overlap with the data being collected by the offshore survey crew. This data was then compiled and merged with the offshore data to produce the profile drawings.

Offshore Data Collection: All survey equipment was properly calibrated and operated in accordance with FDEP standards. Bar checks to calibrate the fathometer were performed periodically throughout the survey. Bathymetric survey data collection was conducted in calm seas. Maximum wave heights during the data collection period were less than 3 feet. The data was collected at intervals not exceeding 25 feet and at all grade breaks along the profile

sufficient to accurately describe the bathymetry at the profile locations. The beach profile survey extended seaward to a minimum of 3,000 feet from MHW.

The vertical accuracy of the profile data meets or exceeds the GPS-derived heights (0.2 to 0.5 feet) standard. The horizontal positioning system accuracy of the data was within 2 feet and the off-line horizontal deviation was within 30 feet. Measure downs form a known point to the water's surface were taken periodically throughout the survey as a check for the tides measured by the RTK GPS as necessary.

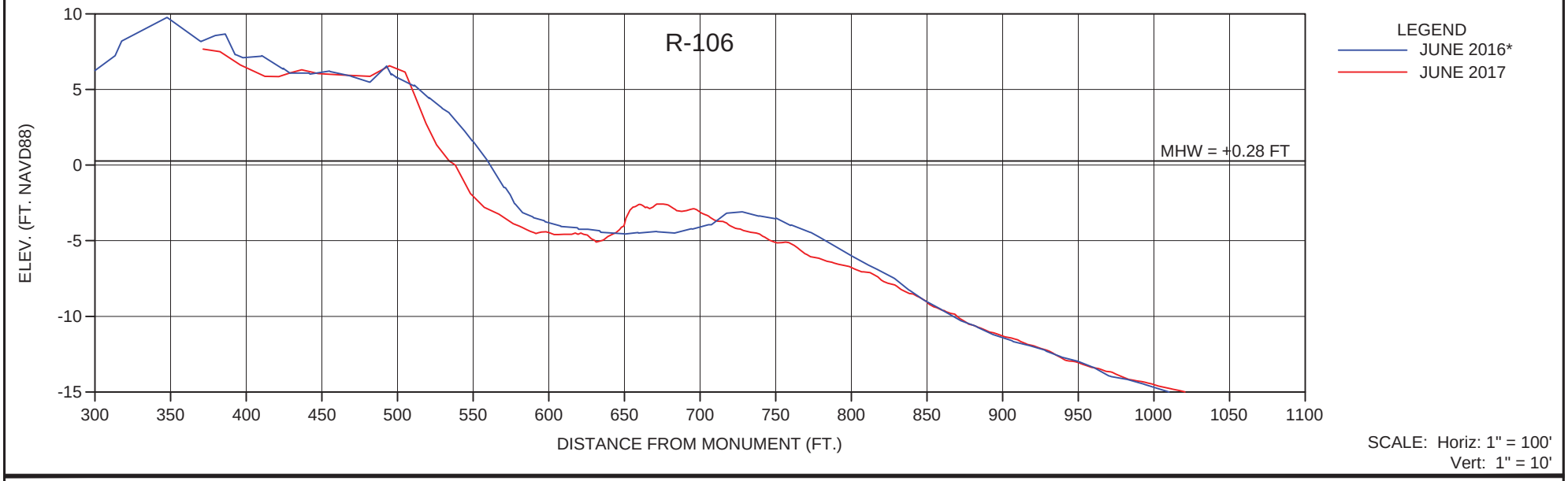
Bathymetric survey data collection was performed as close in time as possible with the upland topographic survey data collection. This significantly increased efficiency by conducting the work with the same base station set-up. Safety was also increased by having both crews visible to each other at all times.

COASTAL ENGINEERING CONSULTANTS, INC.
FLORIDA BUSINESS AUTHORIZATION NO. LB 2464

Richard J. Ewing, P.S.M.
Professional Surveyor and Mapper
Florida Certificate No. 5295
NOT VALID WITHOUT THE SIGNATURE AND
THE ORIGINAL RAISED SEAL OF A FLORIDA
LICENSED SURVEYOR AND MAPPER
CEC FILE NO. 16.213
DATE OF SIGNATURE: 8.29.17

APPENDIX 2

BEACH PROFILES



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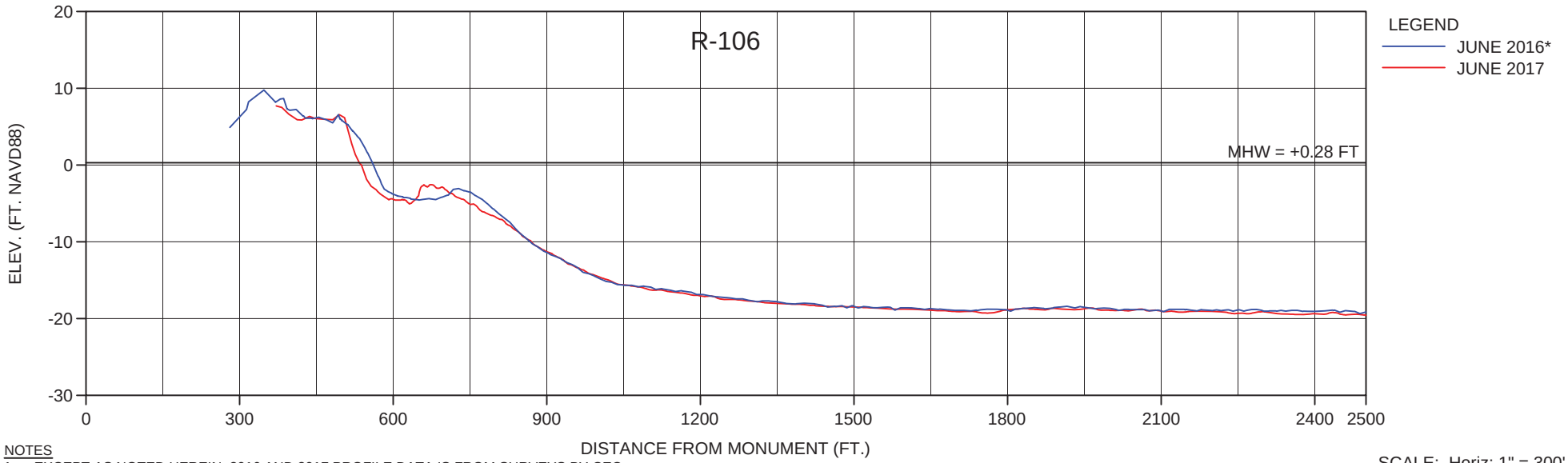

SCALE: Horiz: 1" = 300'
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NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-106 SHEET 1

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CLIENT: LEE COUNTY

TITLE: R-106 MONITORING SURVEY

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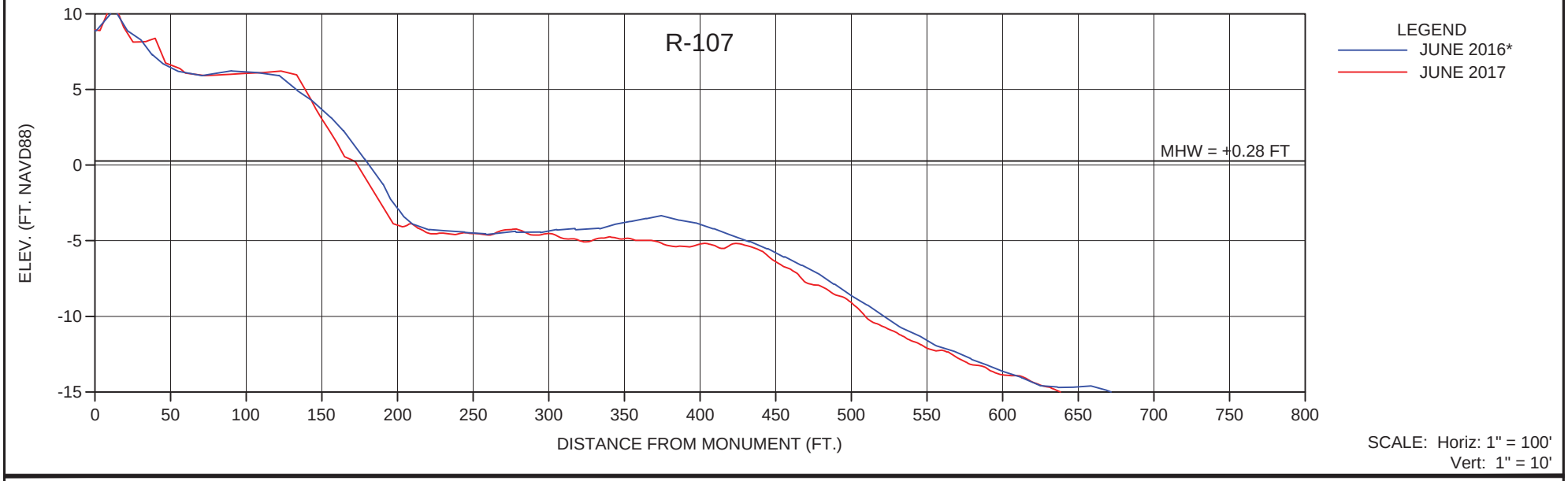

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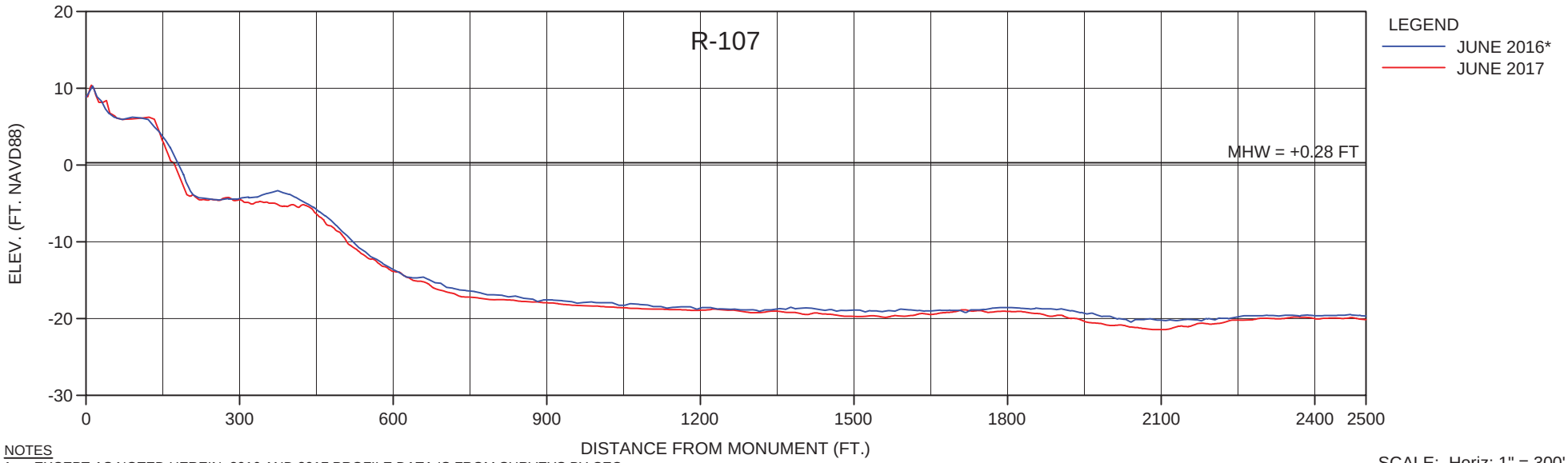

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NOTES
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TITLE: R-107 MONITORING SURVEY

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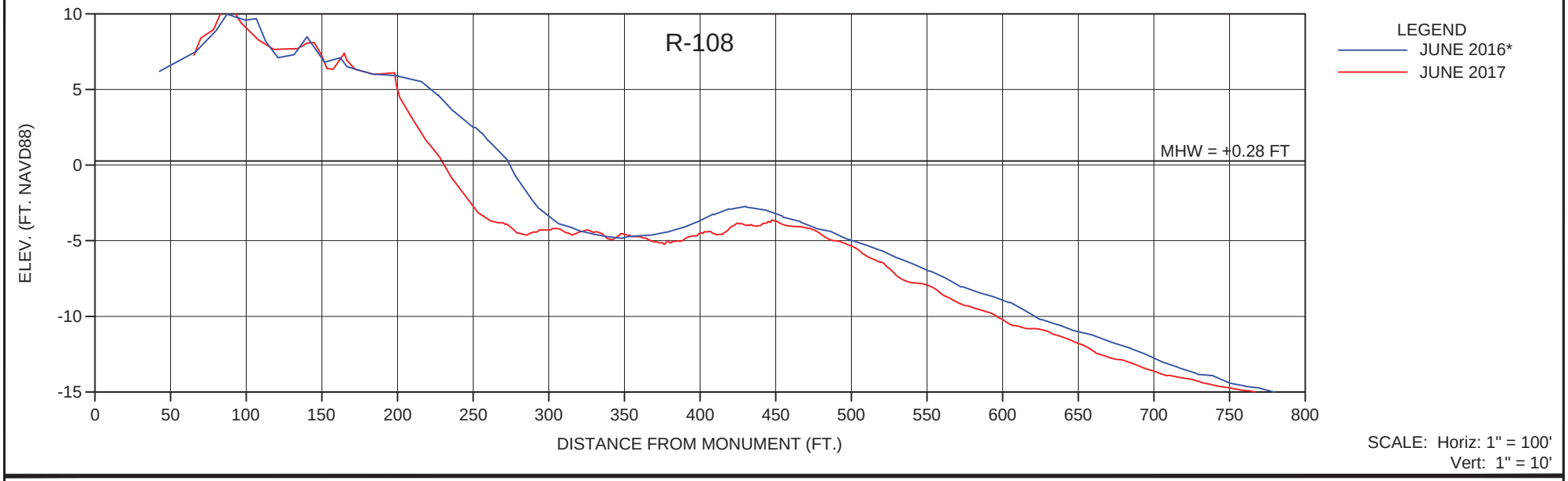

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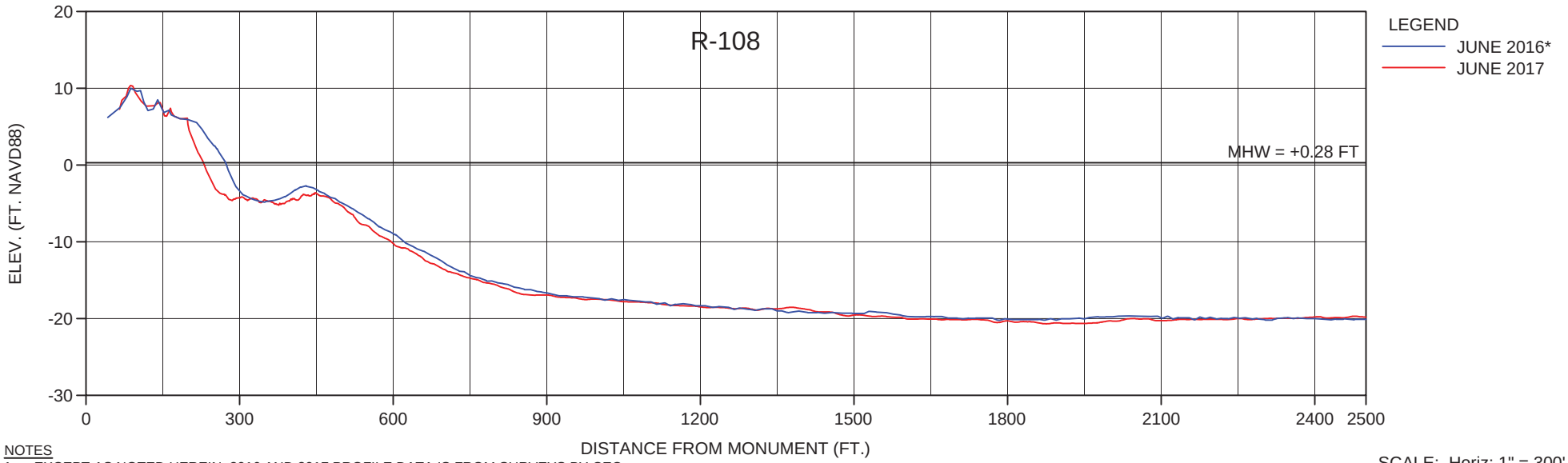

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2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-108 SHEET 3

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TITLE: R-108 MONITORING SURVEY

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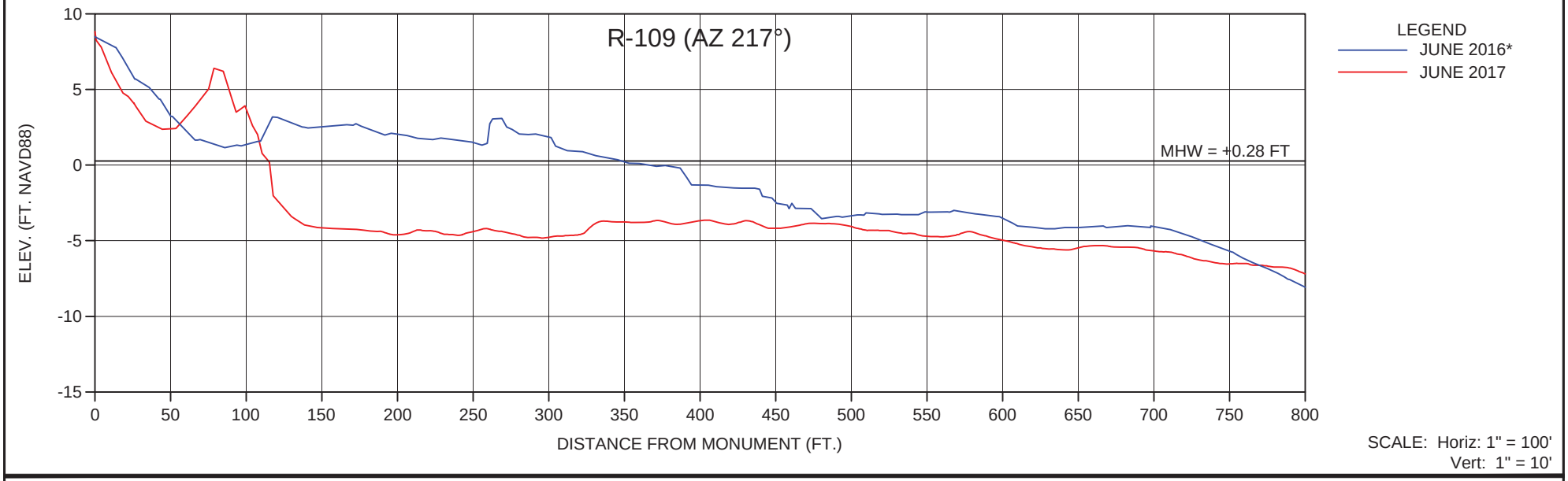
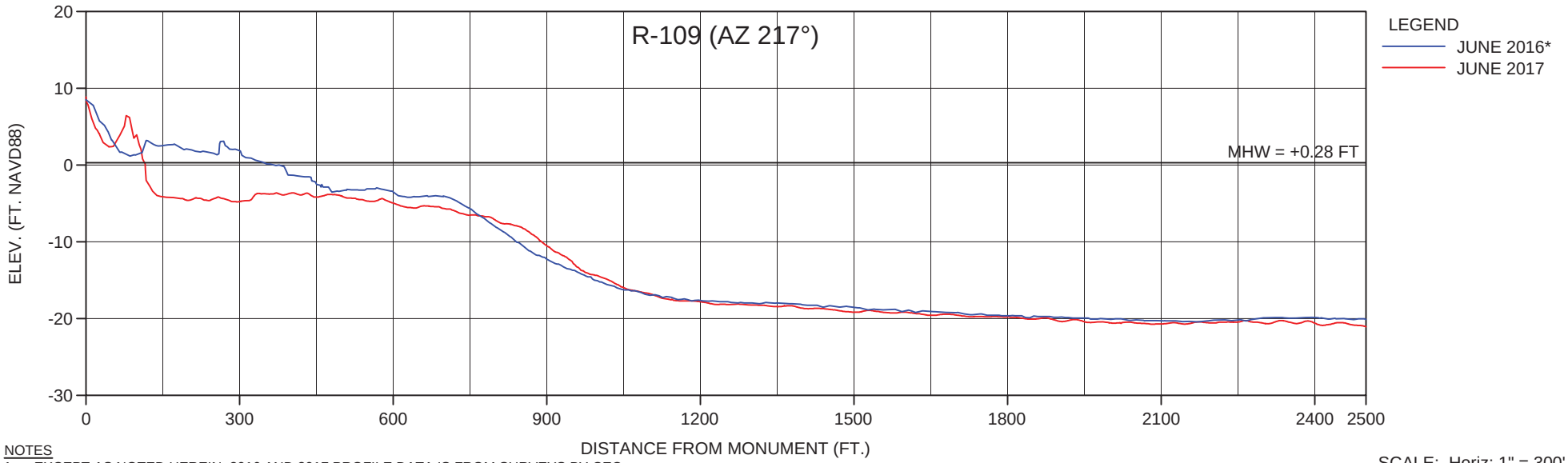
NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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SHEET 5
FILE NO.: 16180-R-109

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CLIENT: LEE COUNTY

TITLE: R-109 MONITORING SURVEY

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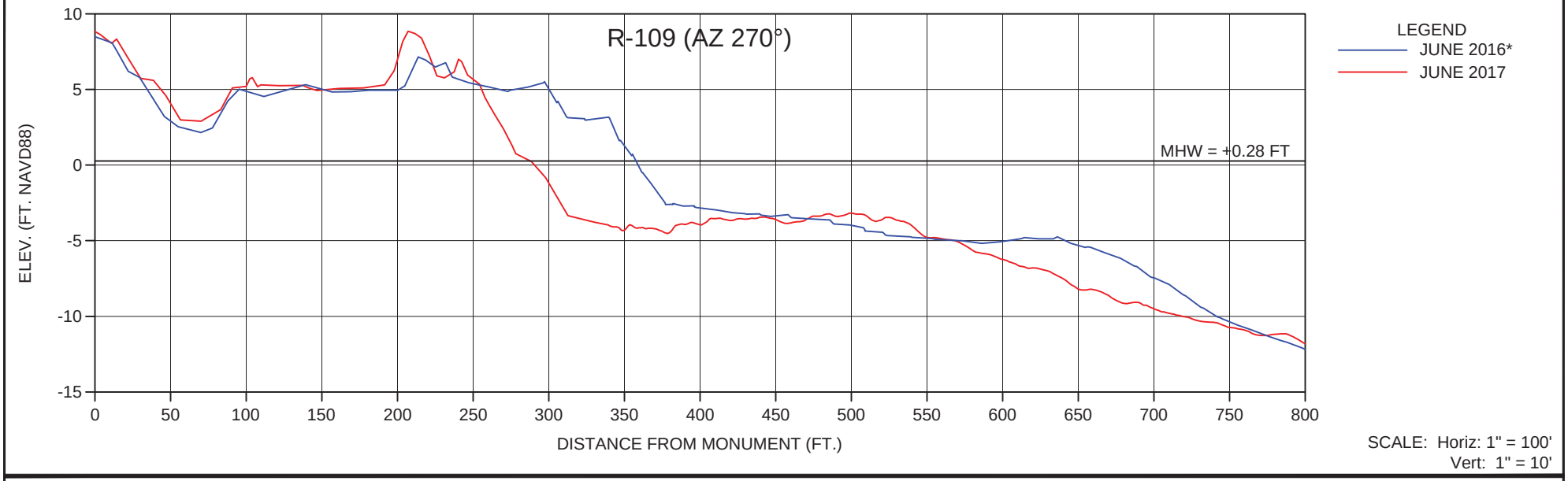
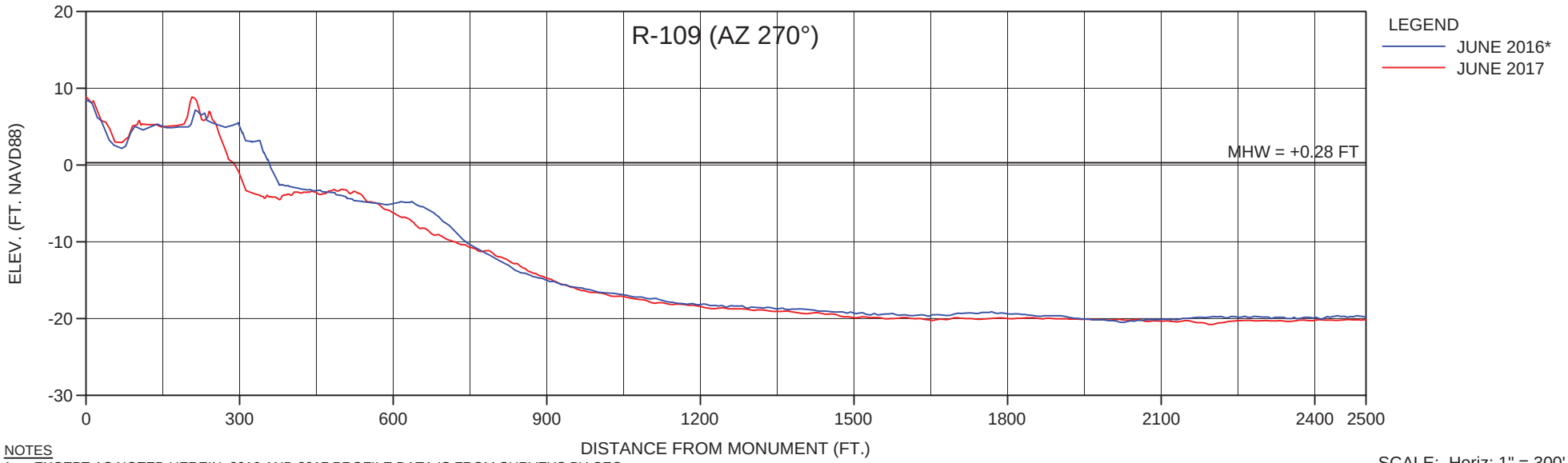
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
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2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-109 SHEET 4

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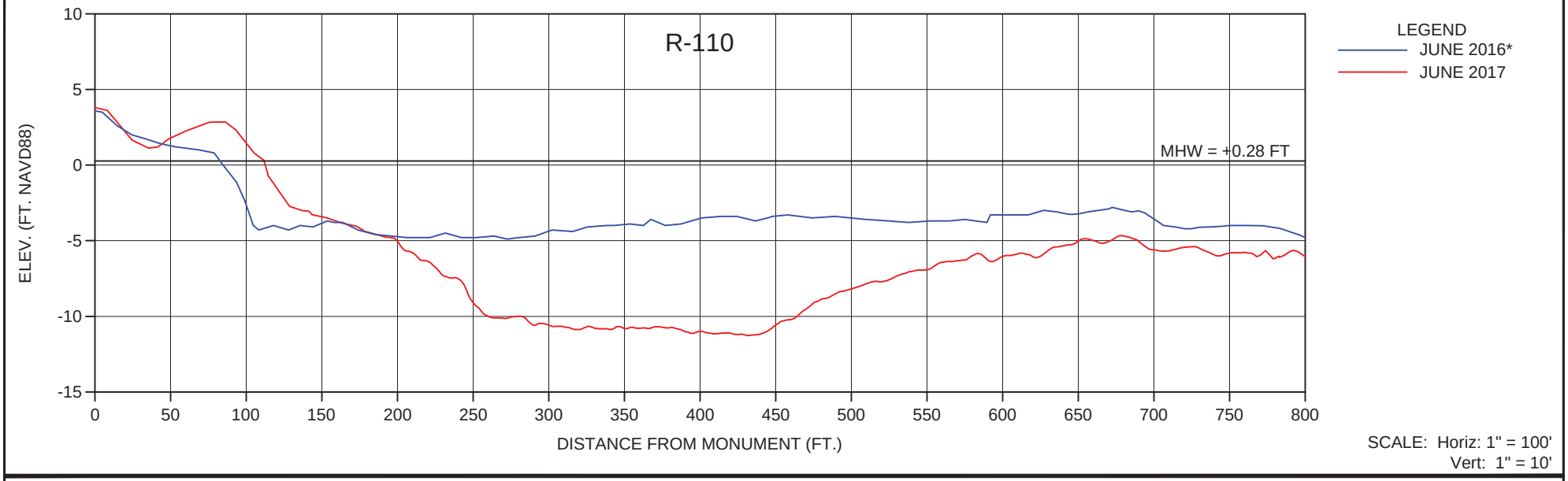
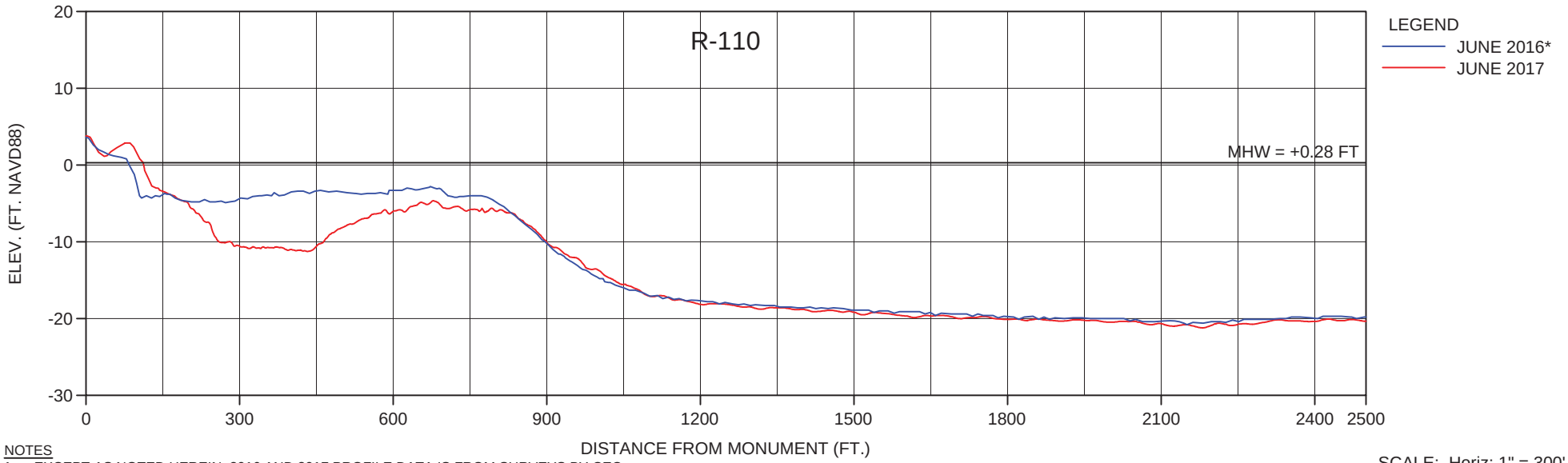
TITLE: R-109 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-110 SHEET 6

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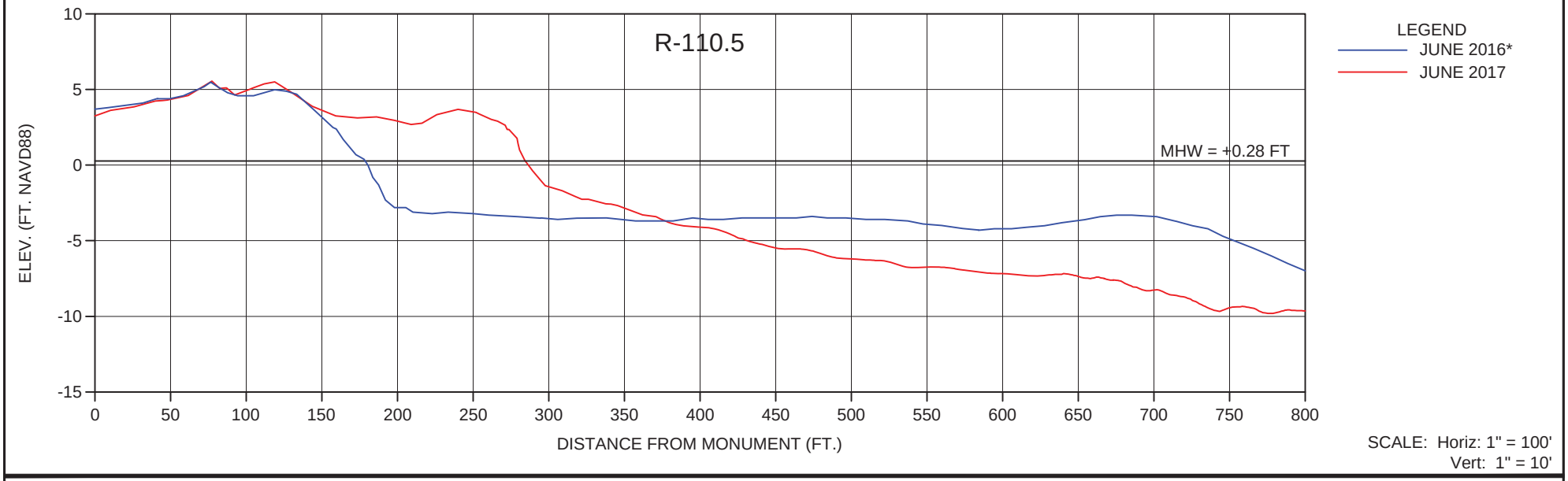
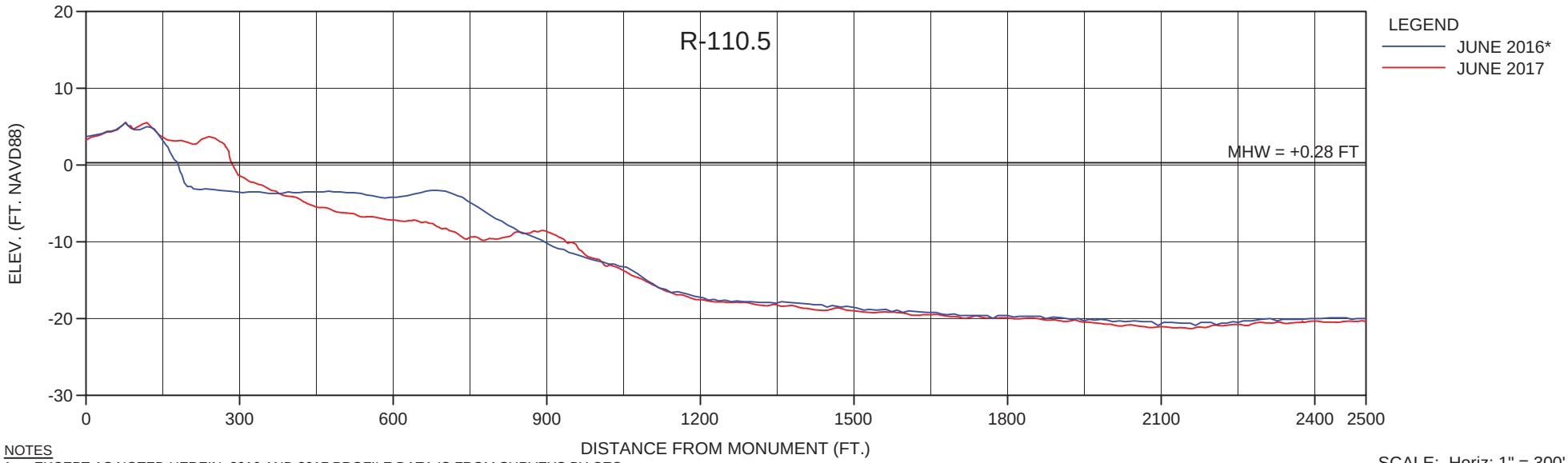
TITLE: R-110 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-10.5
SHEET 7

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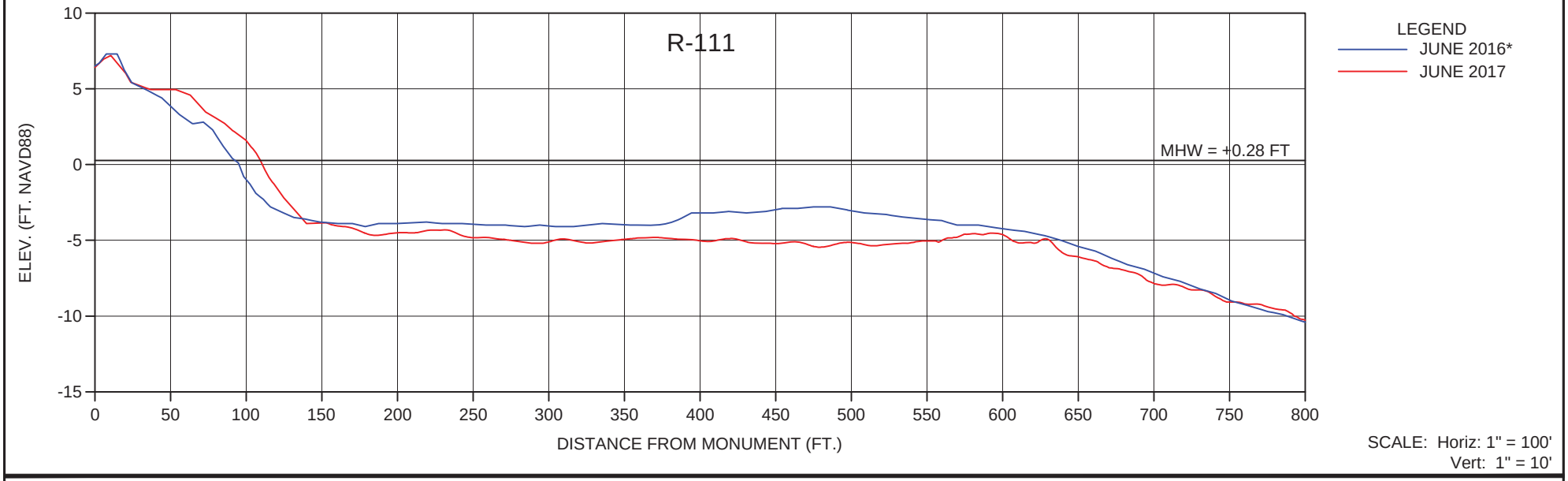
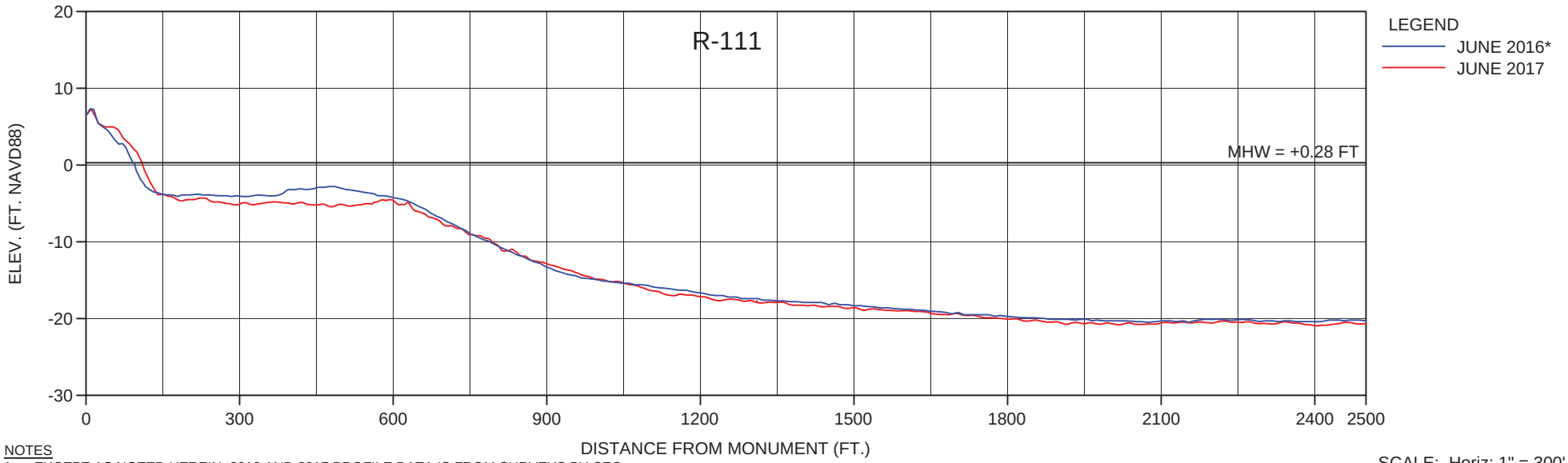
DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-111
SHEET 8

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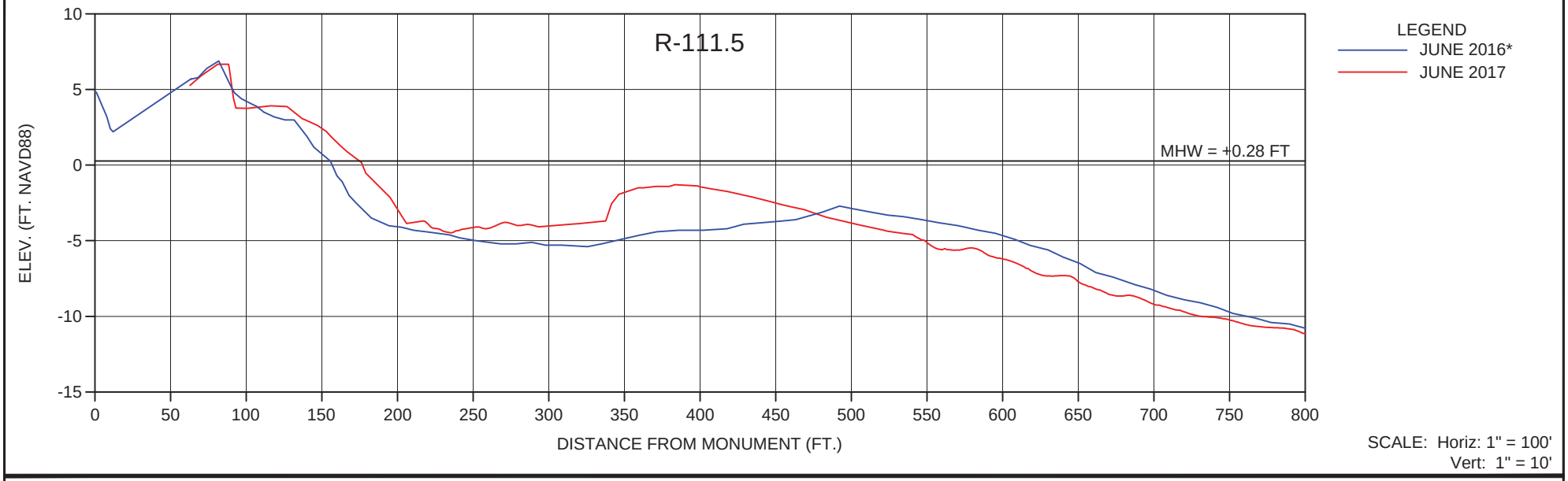
ACAD NO.	16180-2017 Mon-RMON.dwg
REF. NO.	16.180

NO.	DATE	BY	REVISION DESCRIPTION



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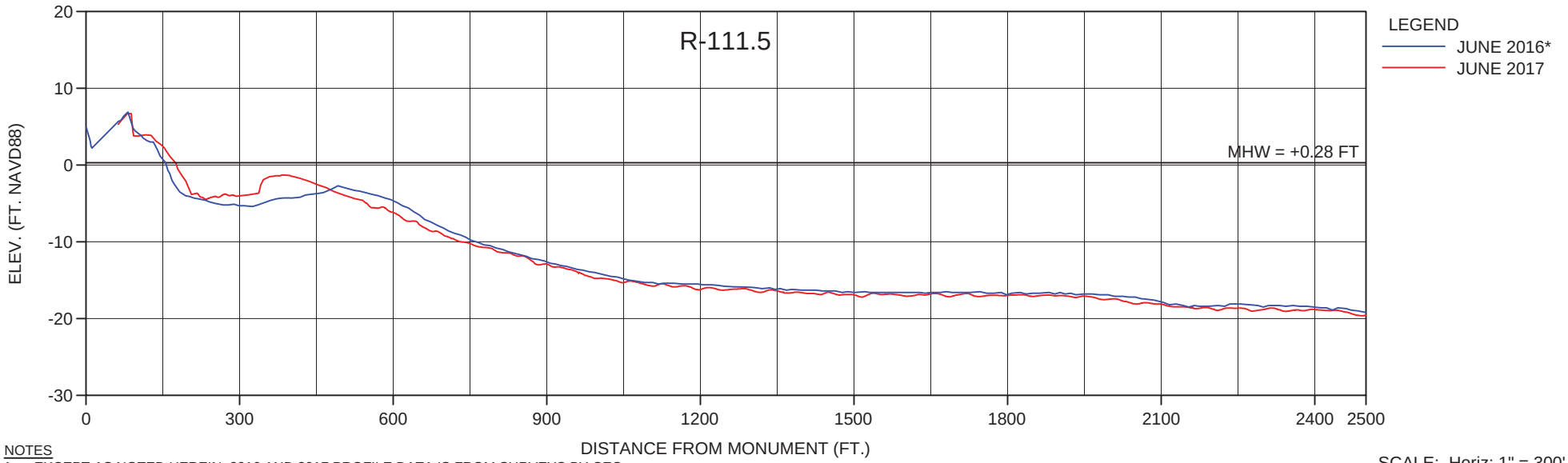
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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SHEET 9
FILE NO.: 16180-R-111.5

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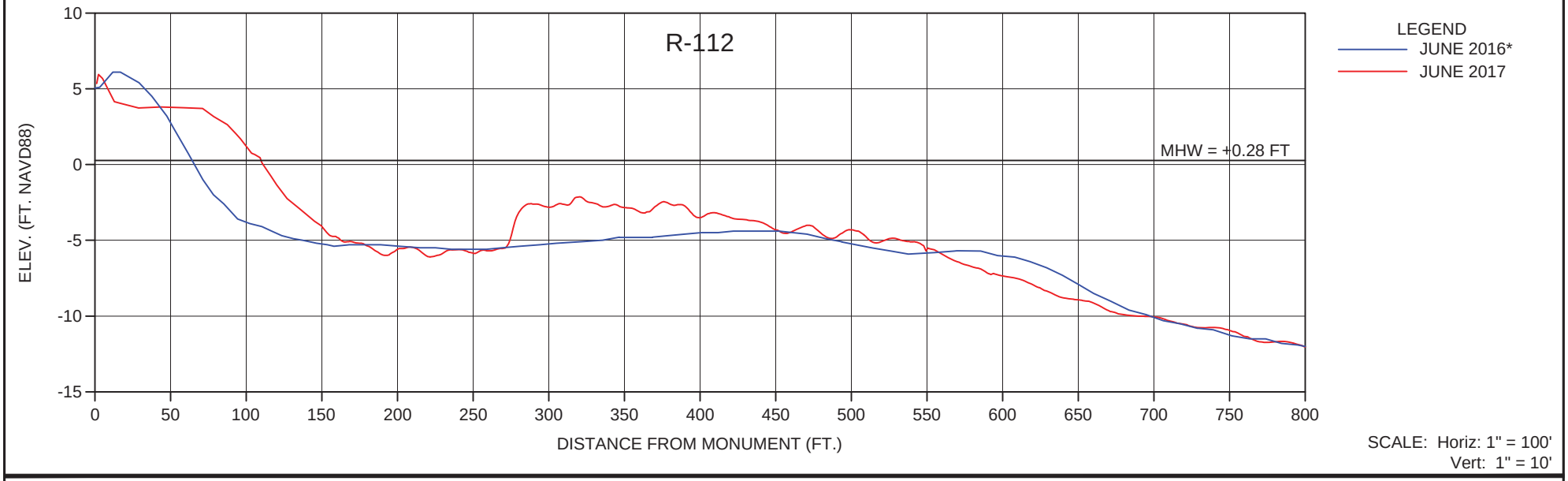
DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



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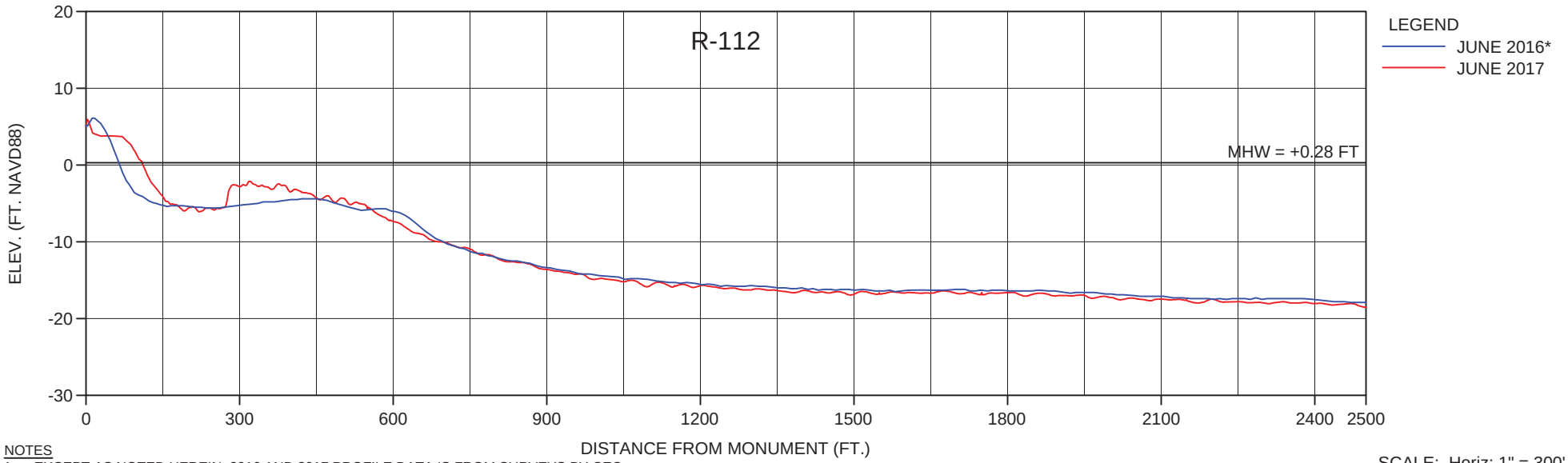

SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-112
SHEET 10

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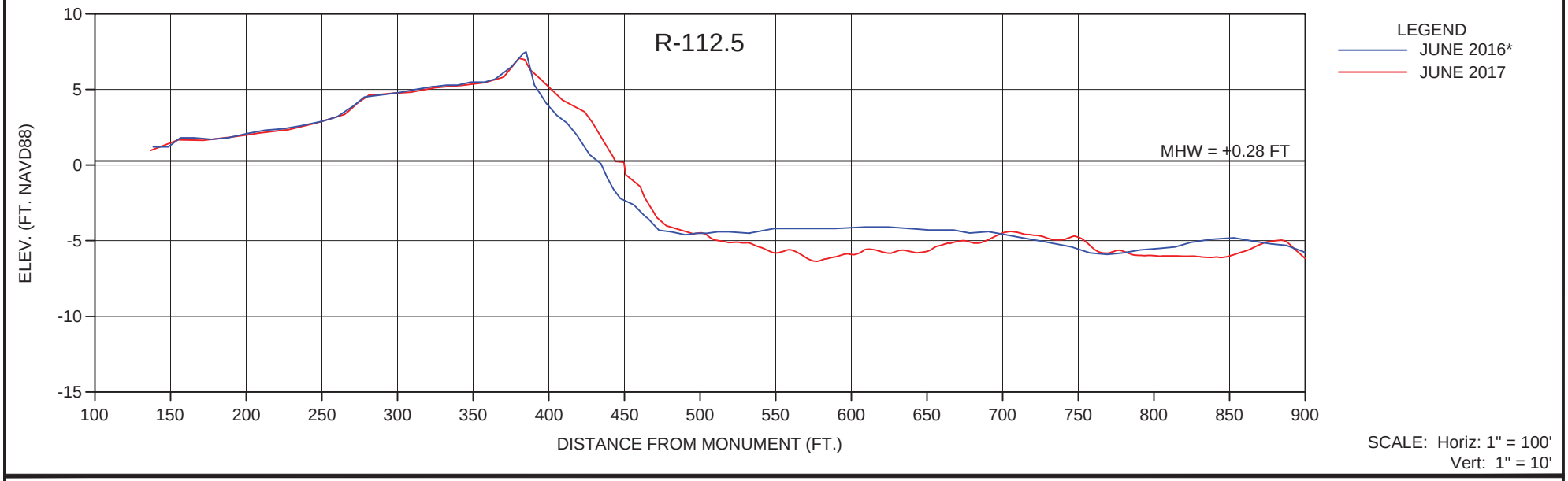
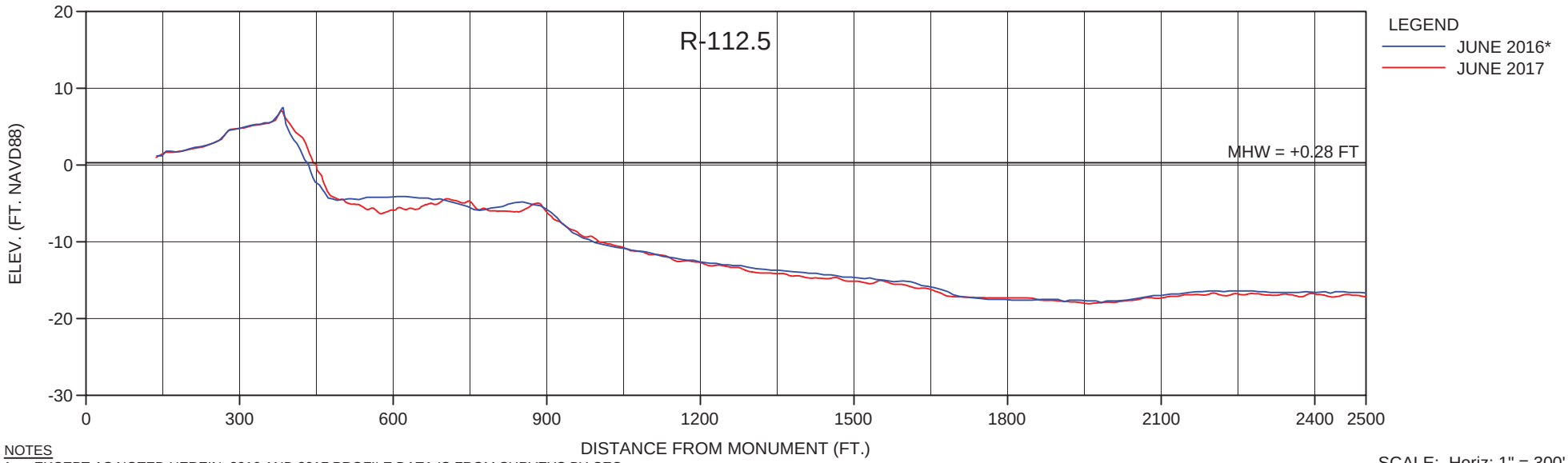
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-112.5 SHEET 11

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DATE:	7/10/2017
SCALE:	AS SHOWN
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CHECKED:	MTP
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SEC.	
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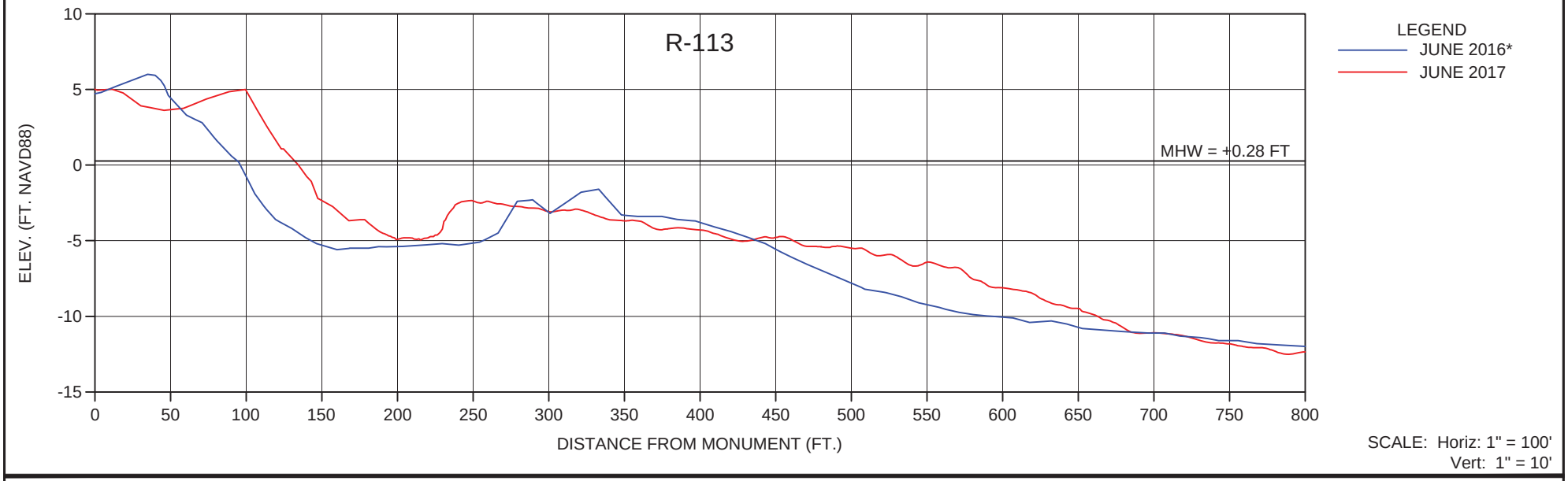
ACAD NO.	16180-2017 Mon-RMON.dwg
REF. NO.	16.180

NO.	DATE	BY	REVISION DESCRIPTION



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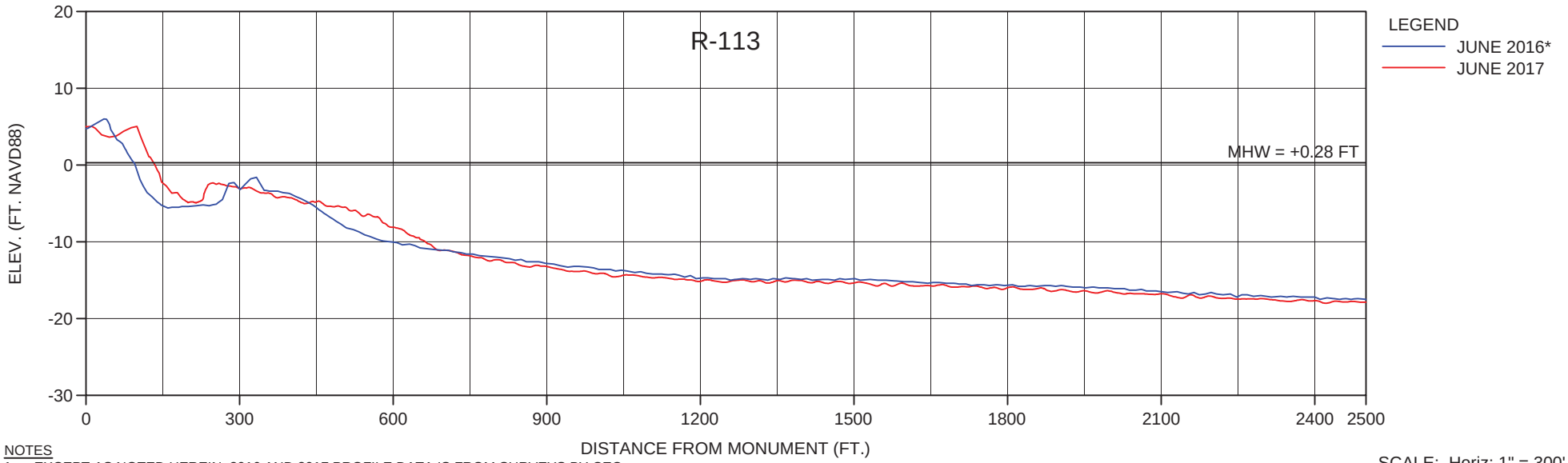
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-IT3 SHEET 12

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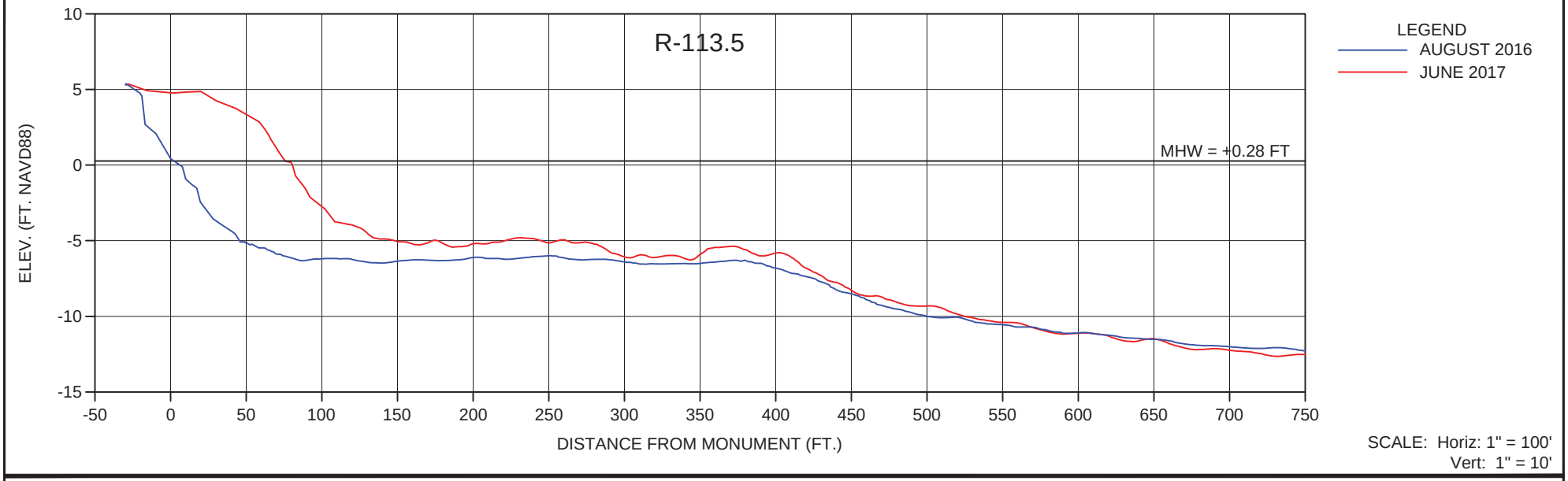
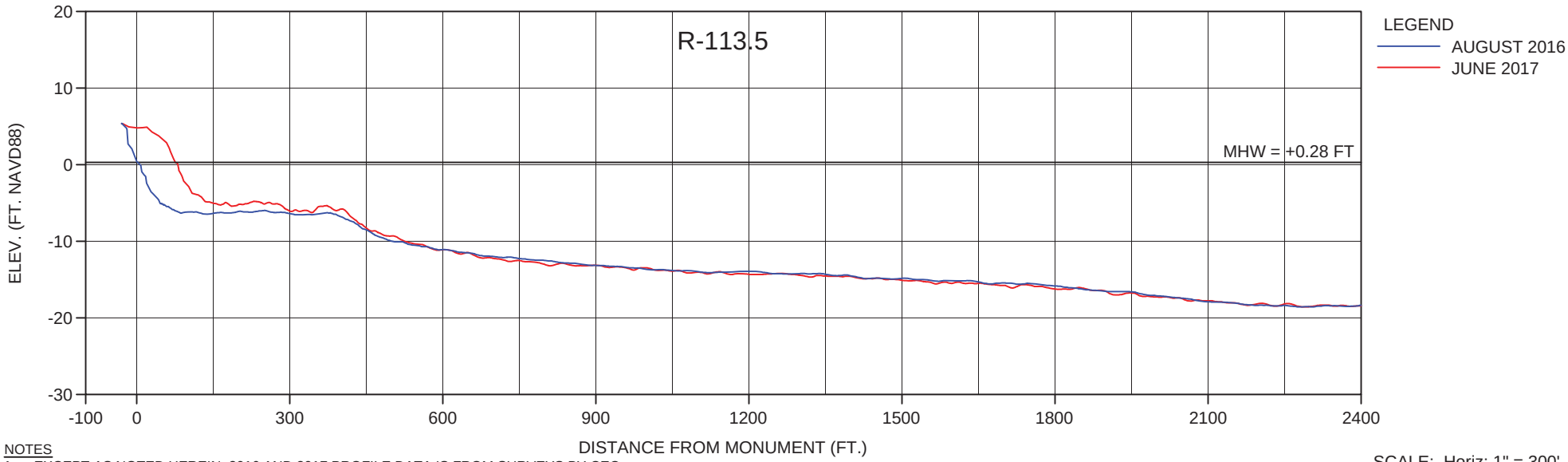
TITLE: R-113 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
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FILE NO.: 16180-R-113.5
SHEET 13

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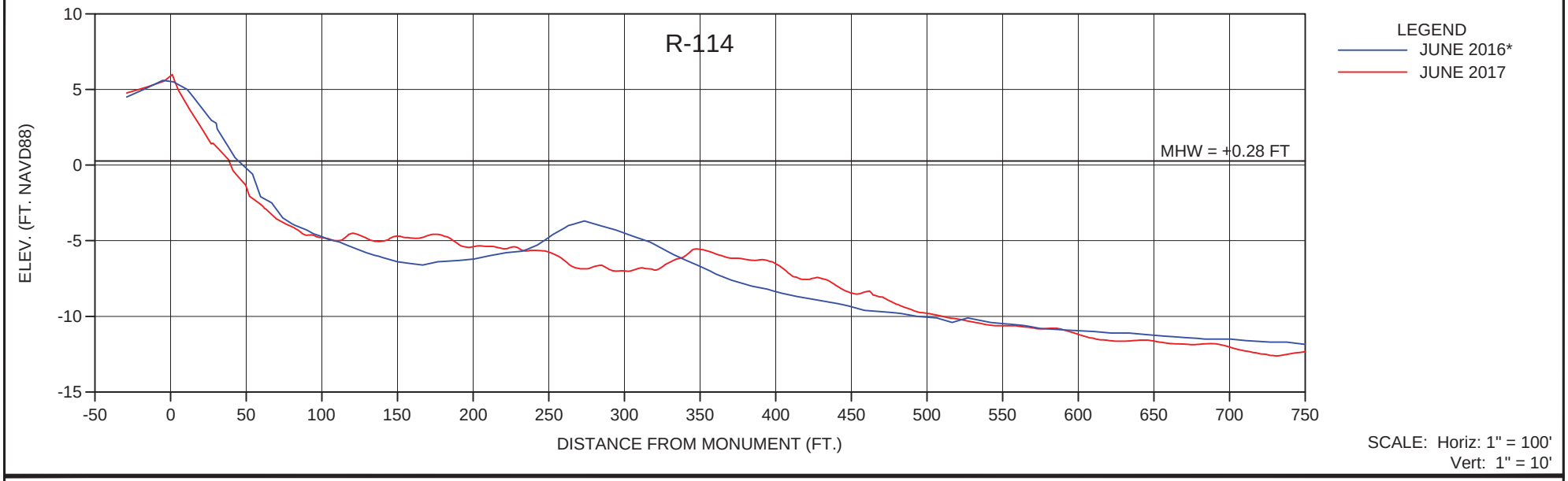
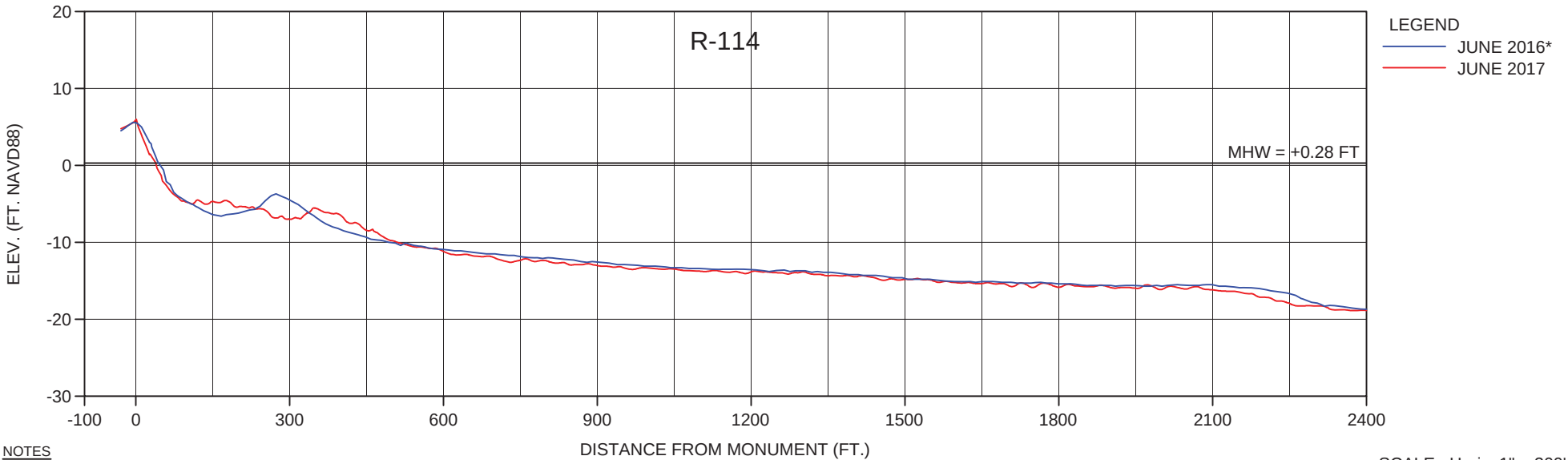
TITLE: R-113.5 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-114
SHEET 14

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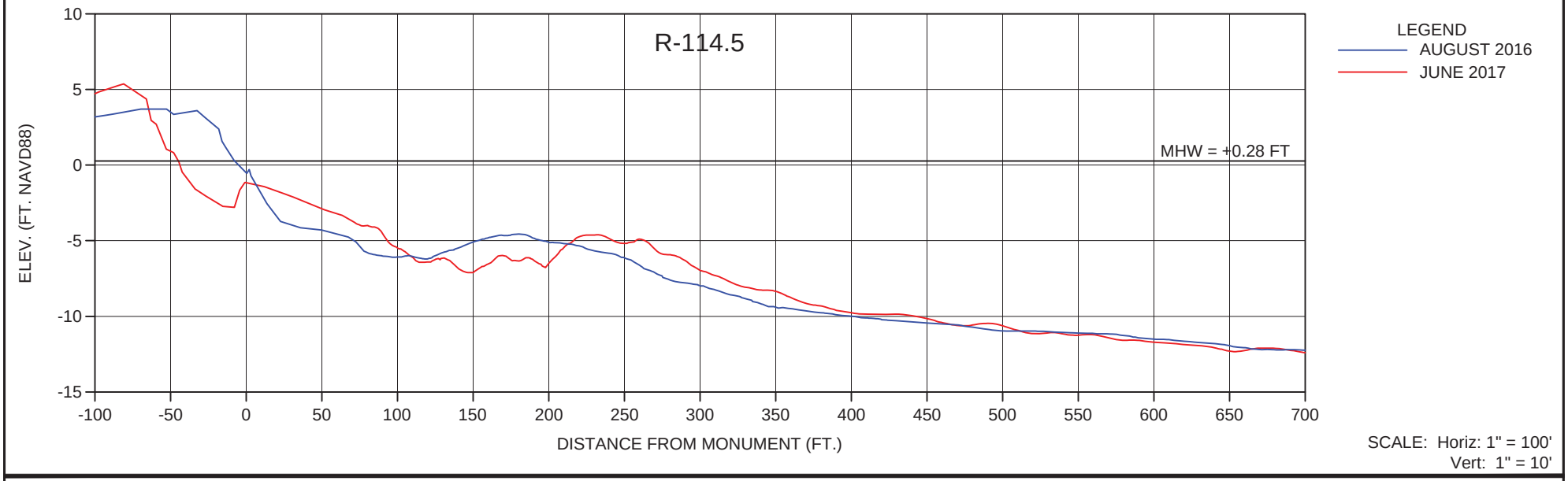
TITLE: R-114 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
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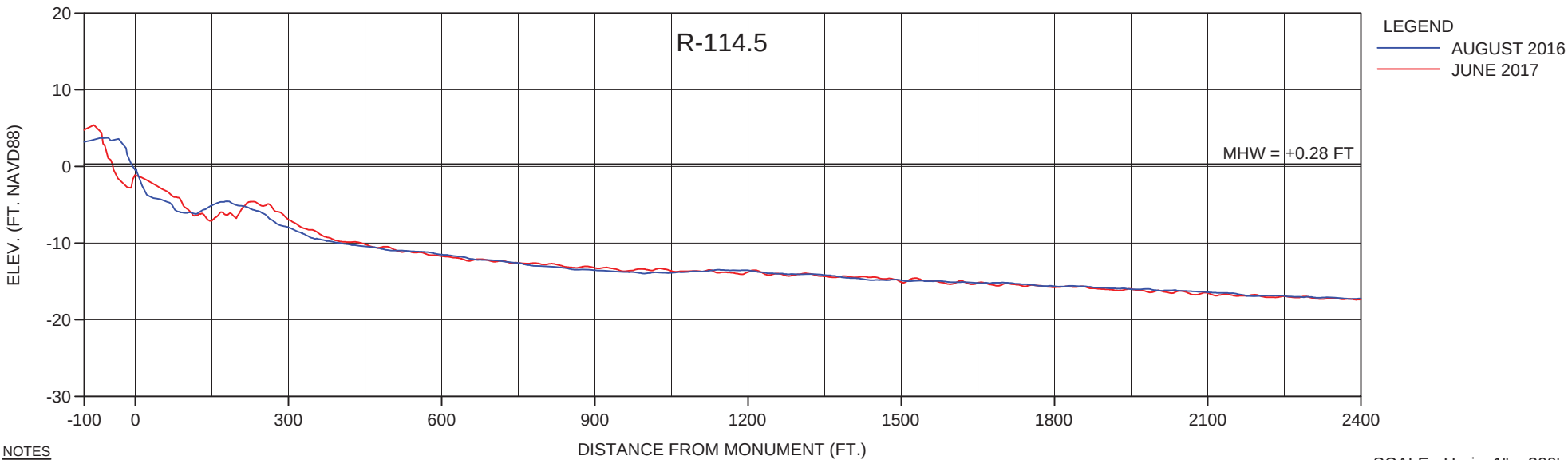

SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
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FILE NO.: 16180-R-114.5 SHEET 15

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DATE: 7/10/2017	SCALE: AS SHOWN		
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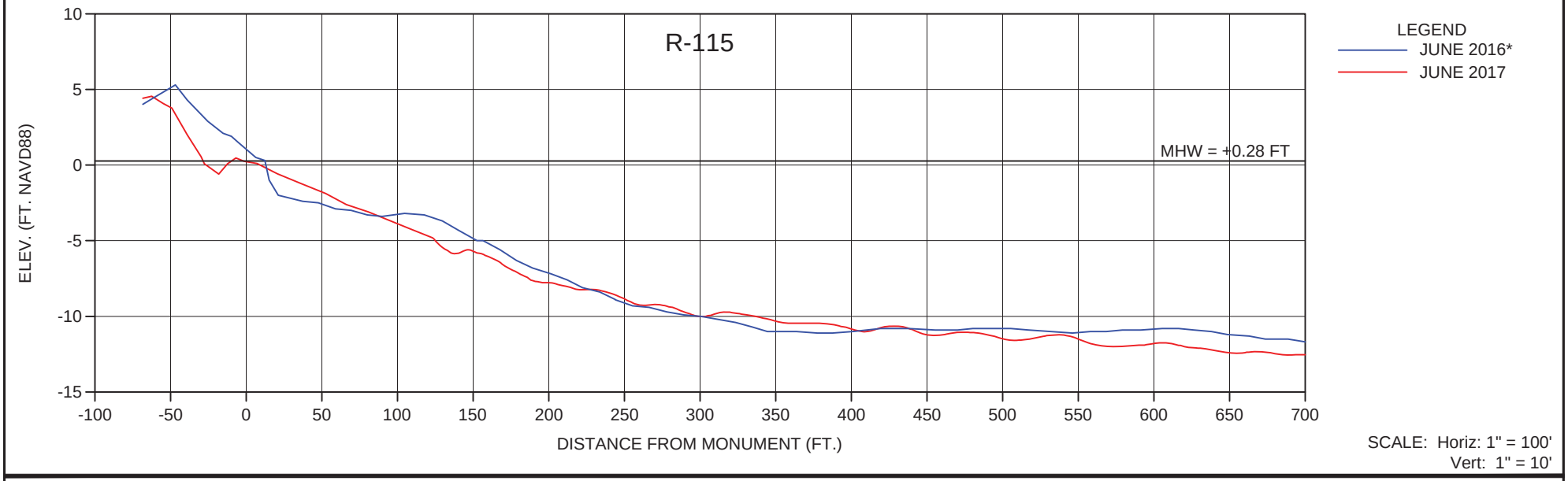
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



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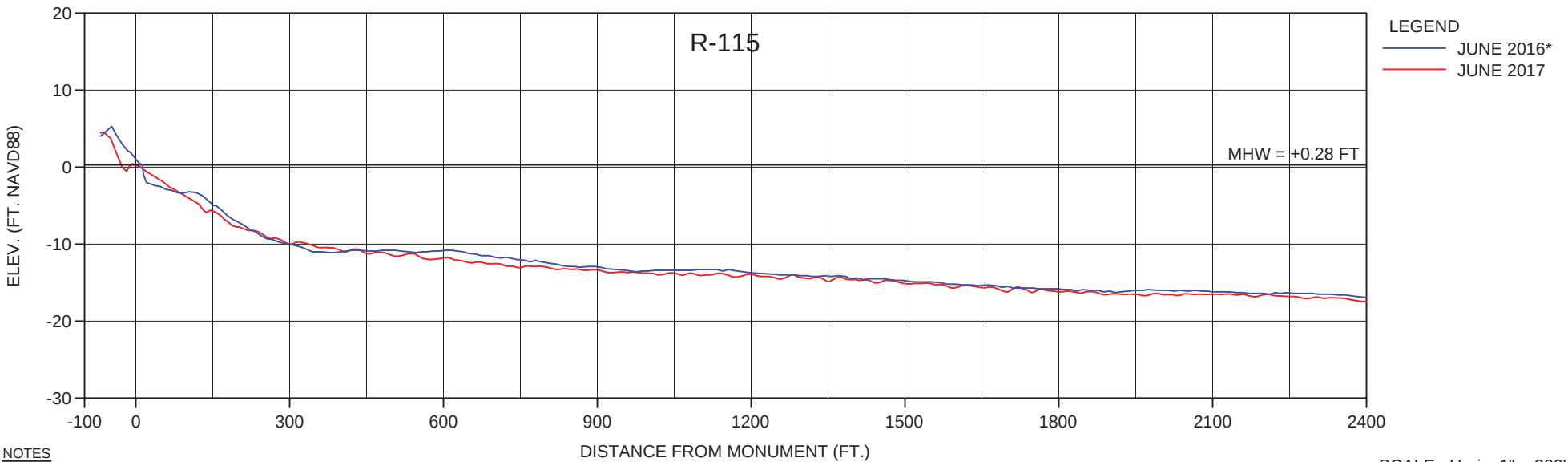
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
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FILE NO.: 16180-R-115 SHEET 16

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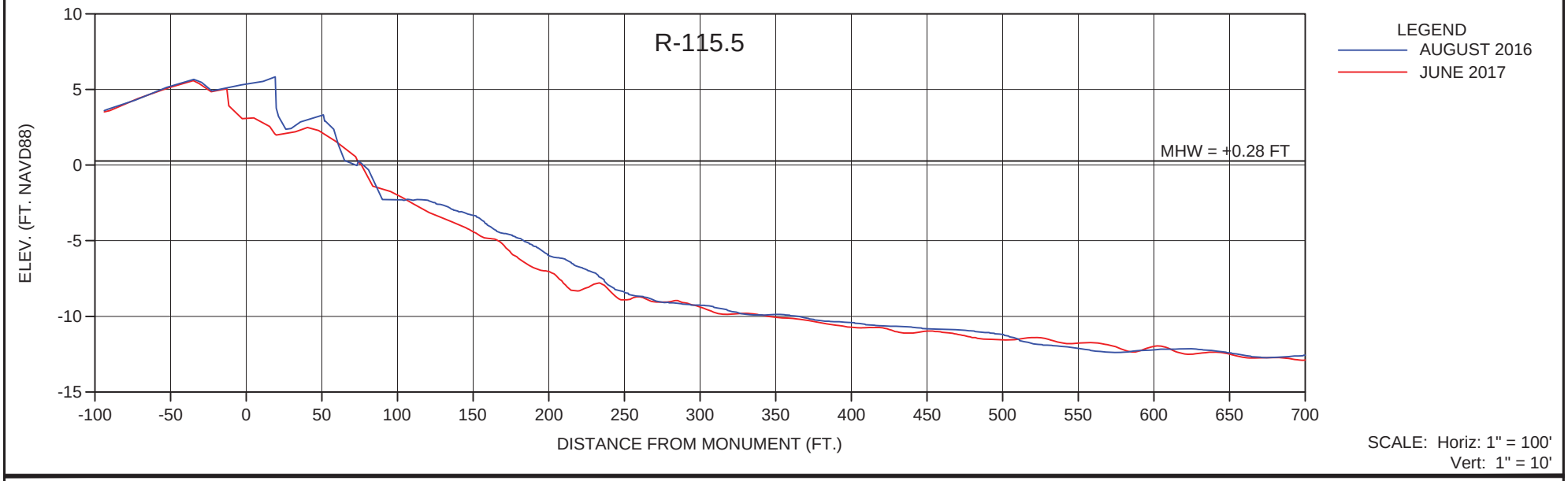
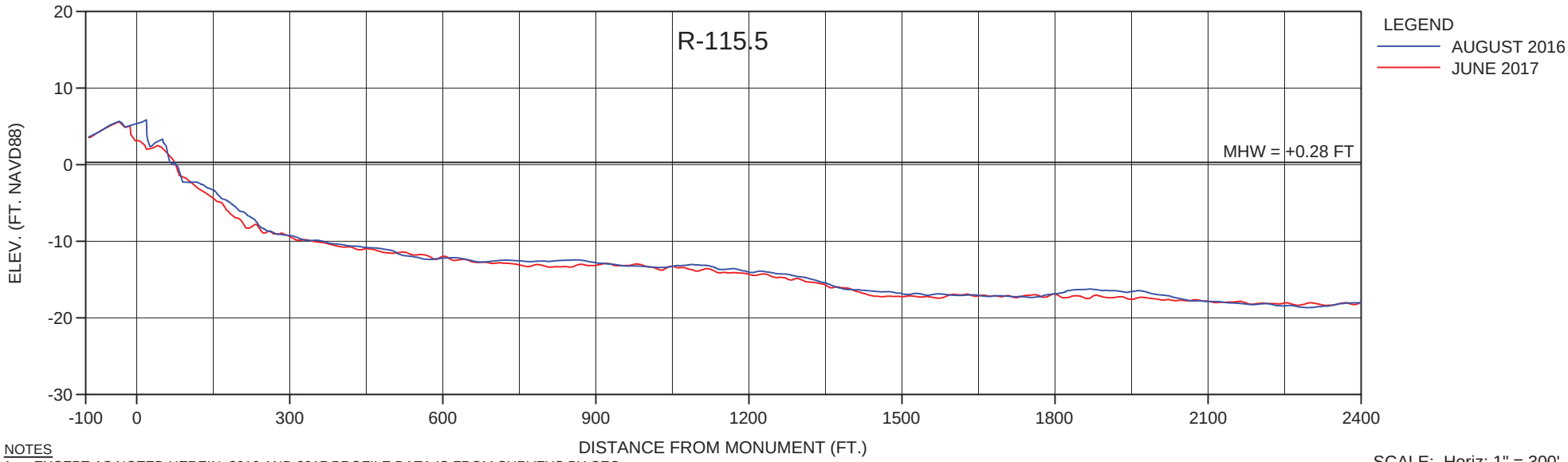
TITLE: R-115 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-115.5 SHEET 17

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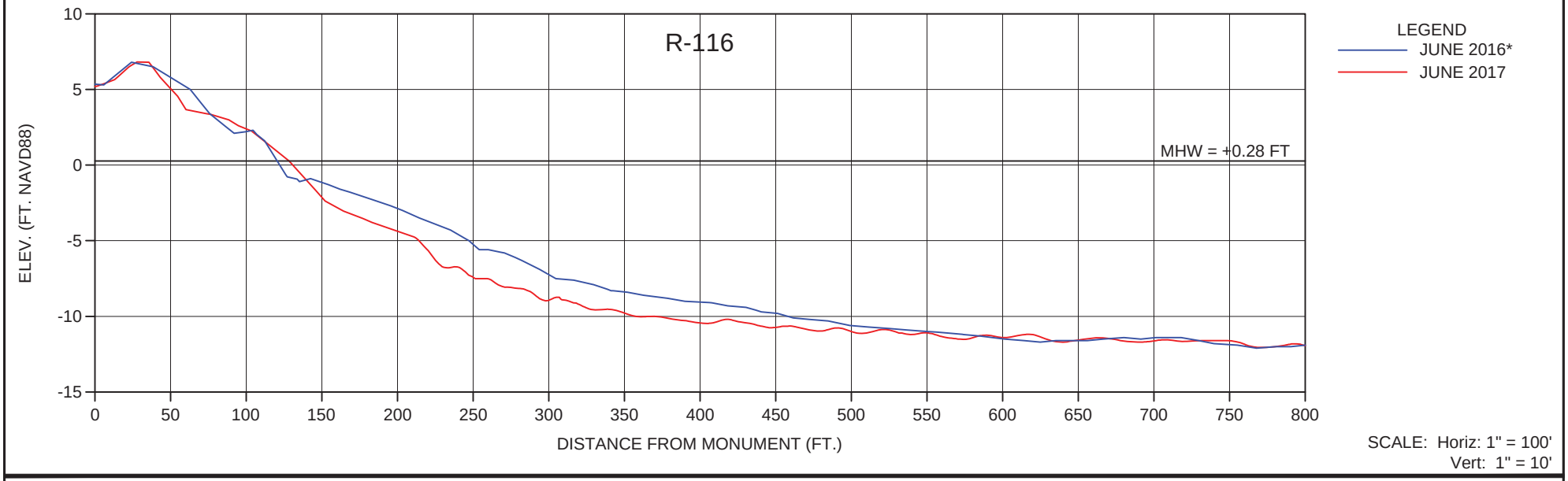
CLIENT: LEE COUNTY

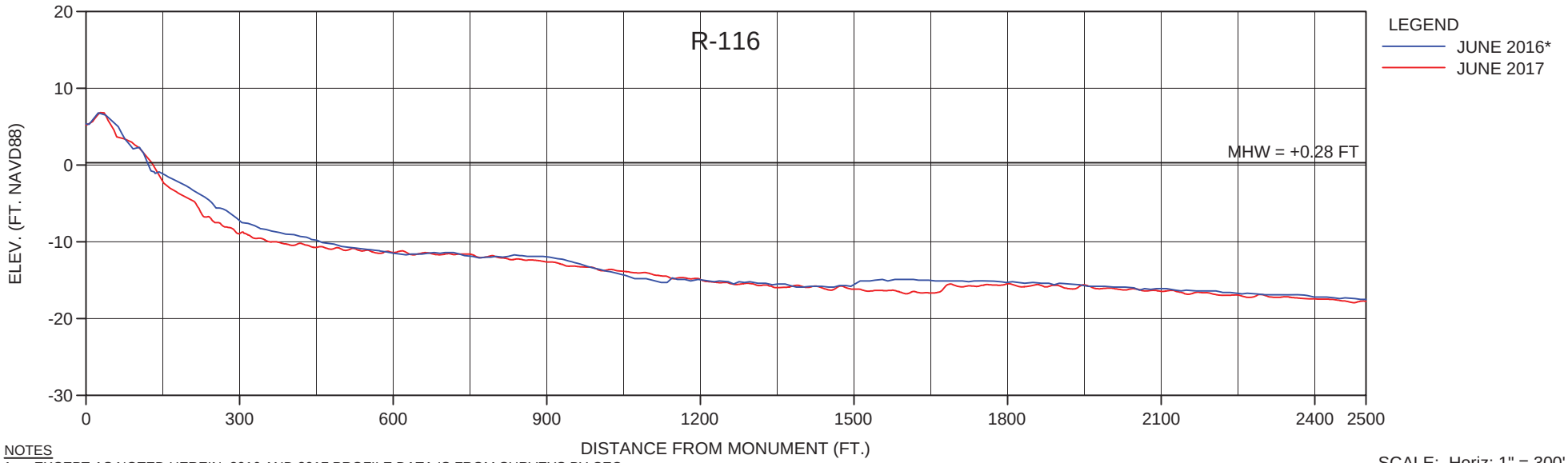
TITLE: R-115.5 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-116 SHEET 18

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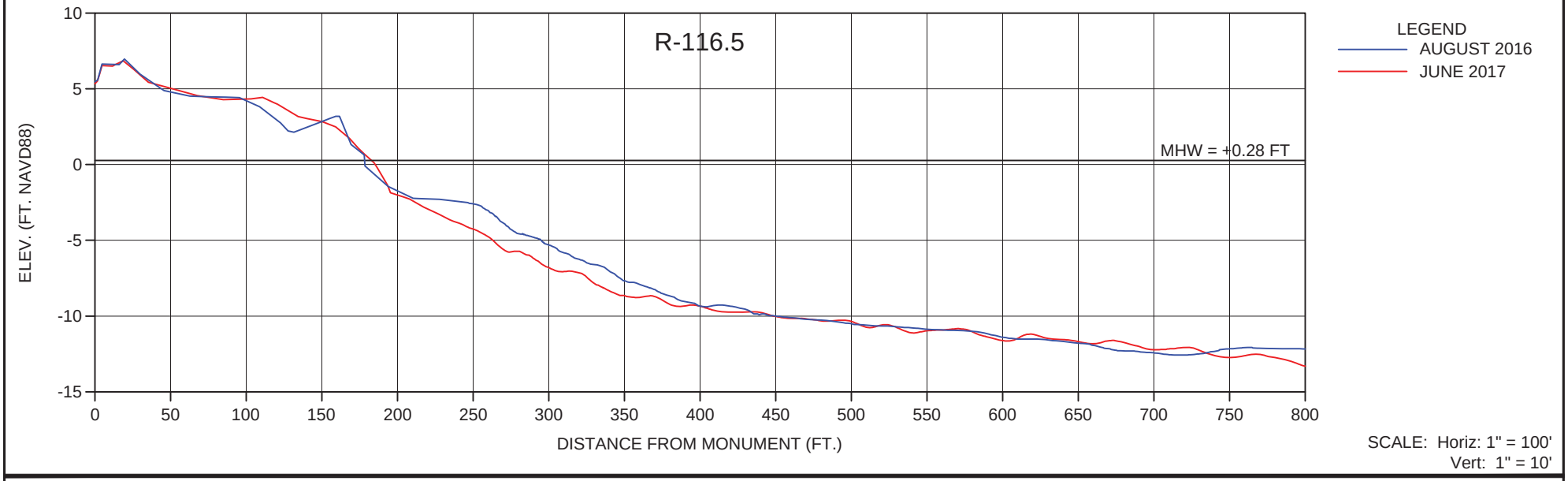
CLIENT: LEE COUNTY

TITLE: R-116 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



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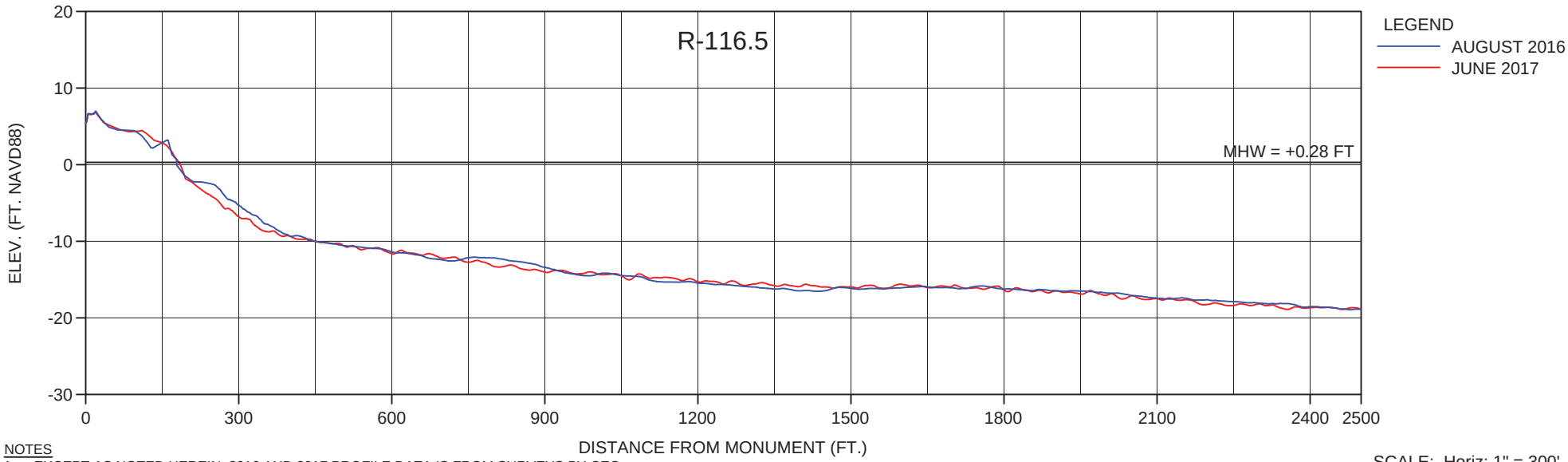

SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-116.5 SHEET 19

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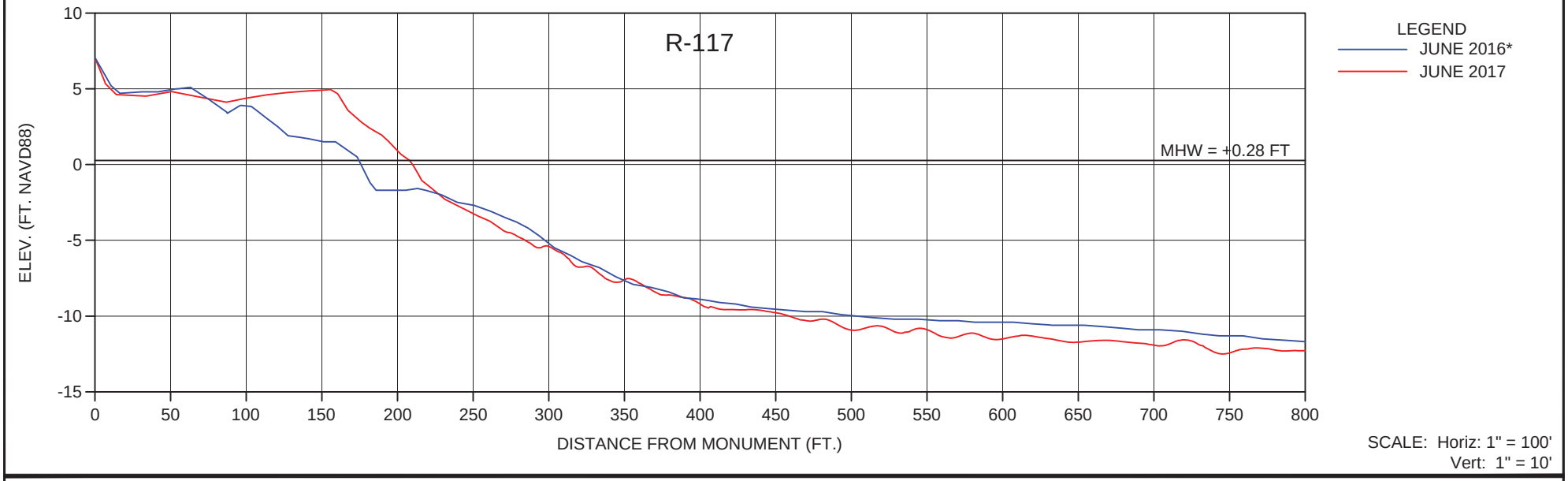
TITLE: R-116.5 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



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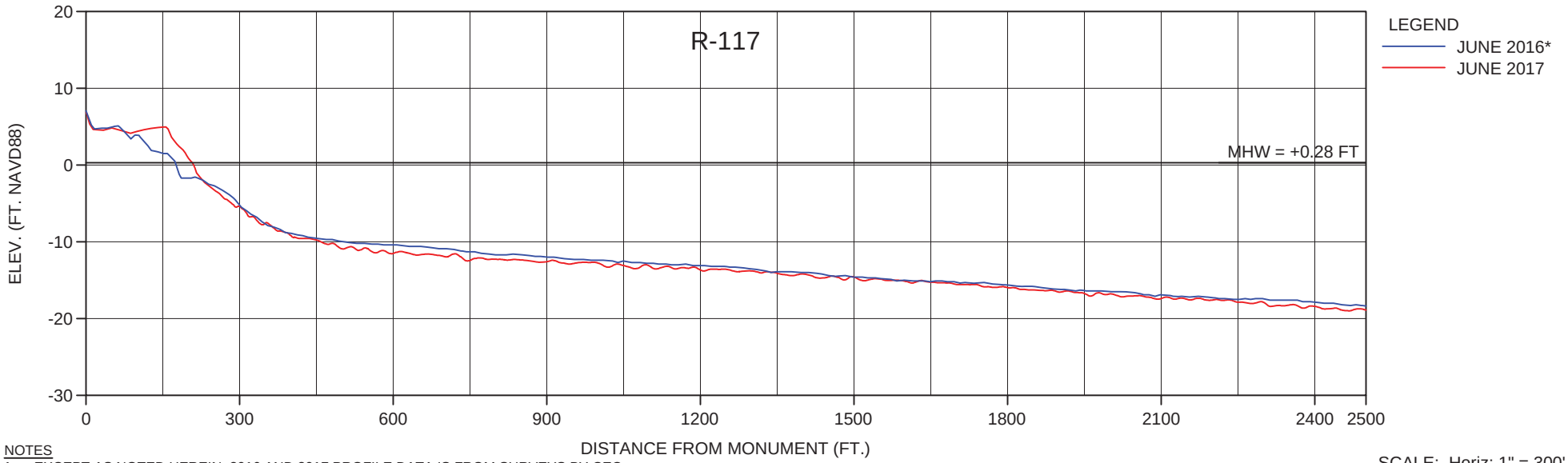

SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-117
SHEET 20

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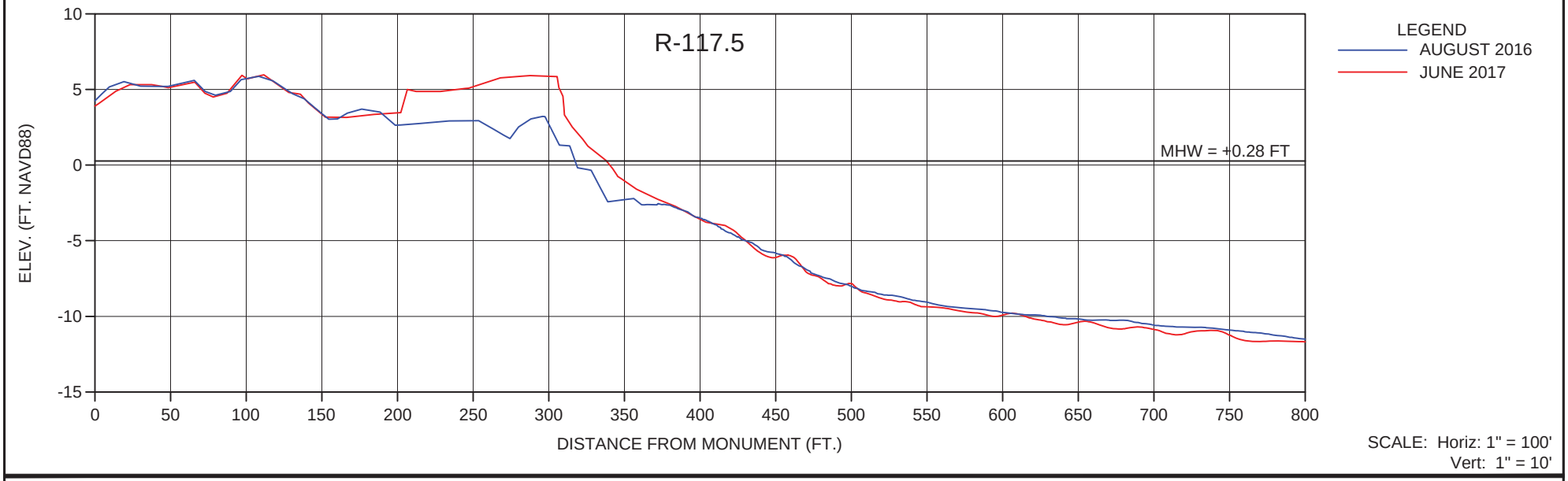
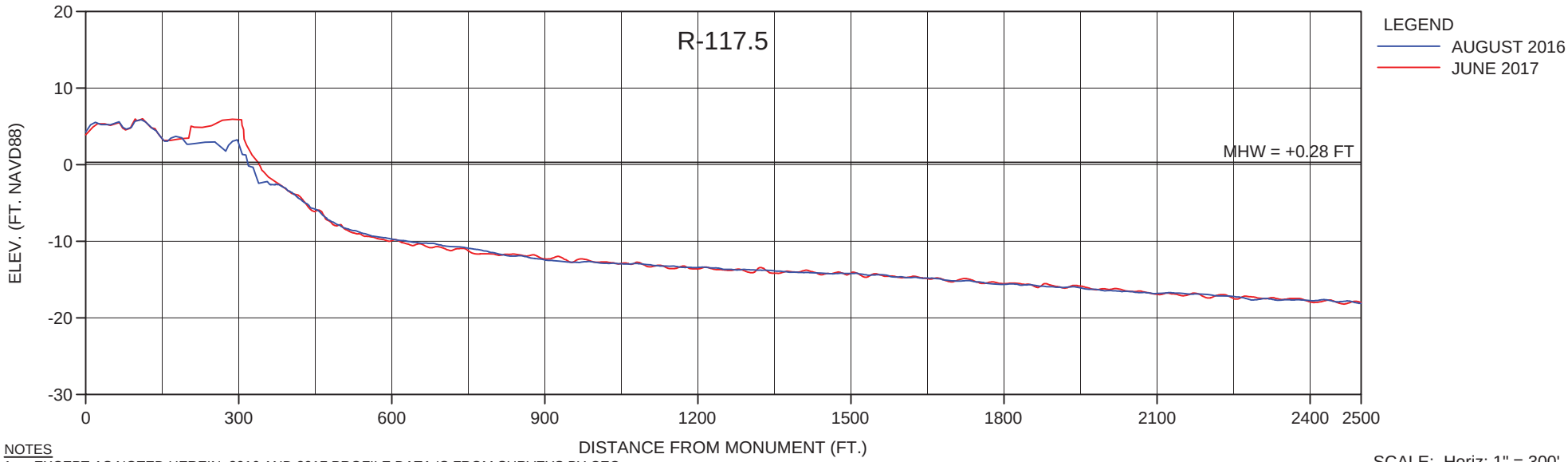
TITLE: R-117 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-117.5
SHEET 21

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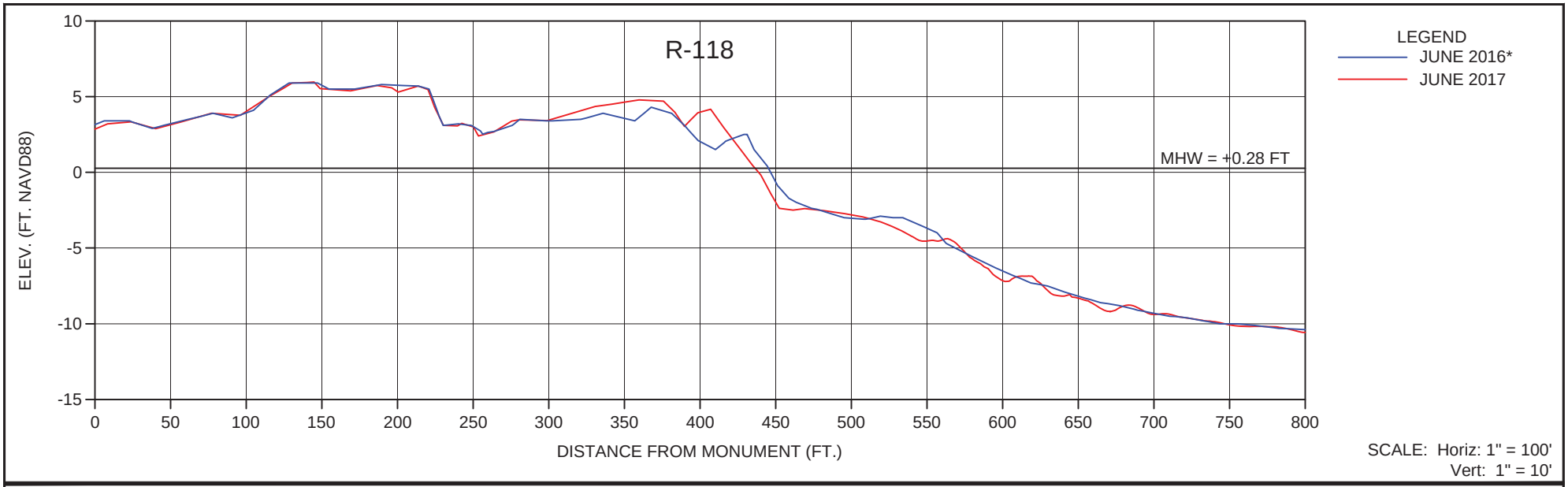
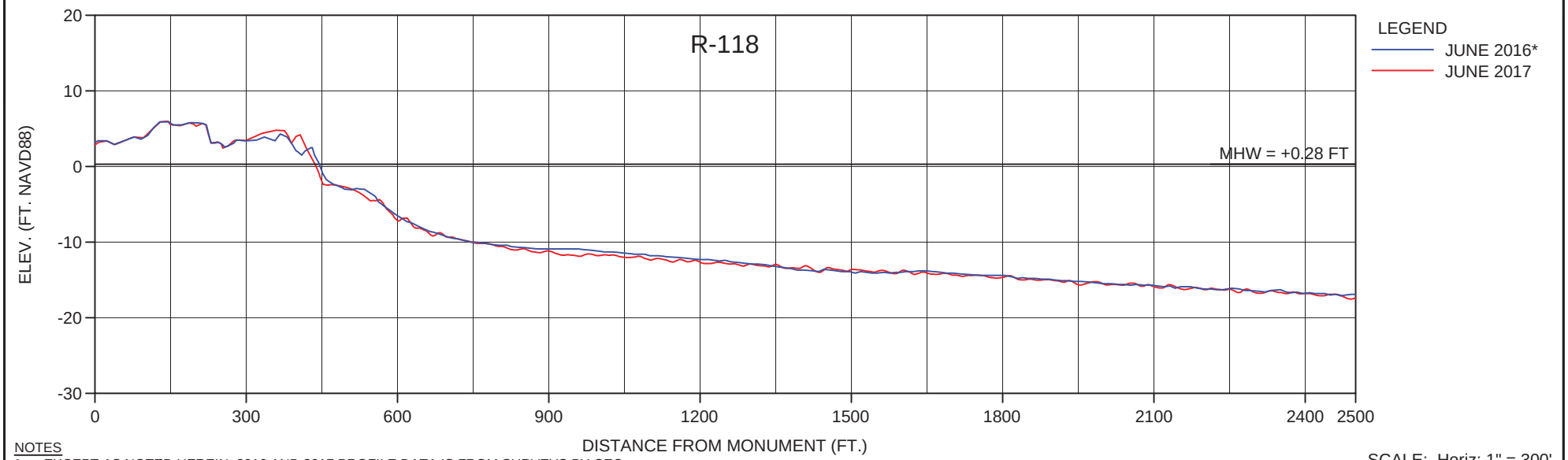
TITLE: R-117.5 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-118 SHEET 22

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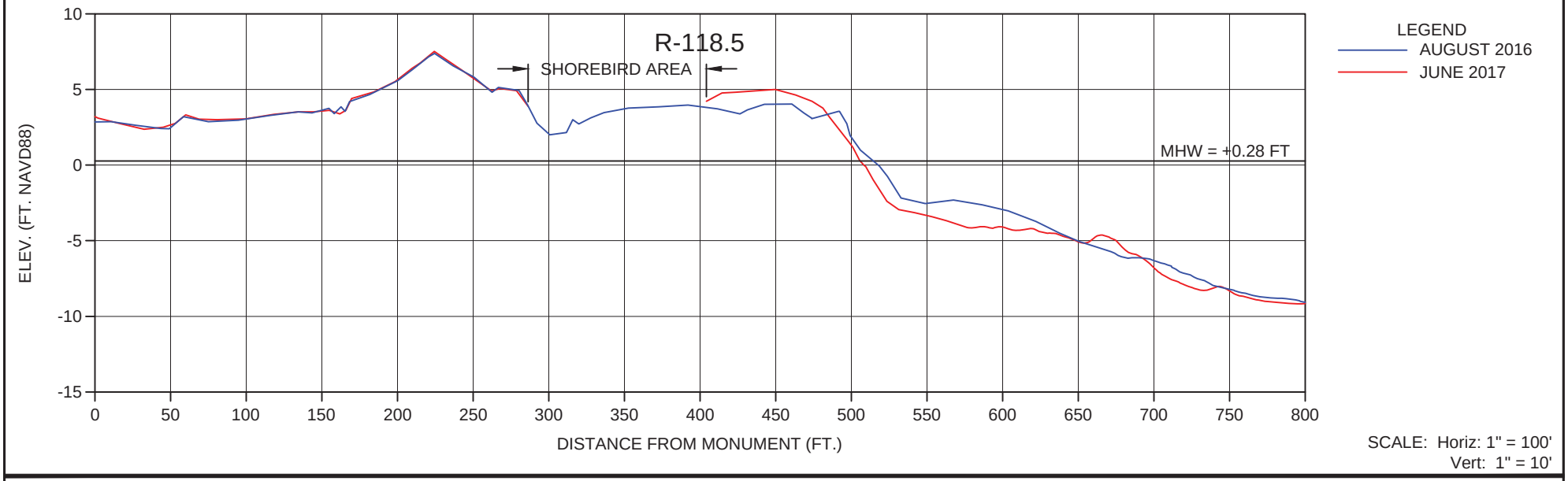
TITLE: R-118 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
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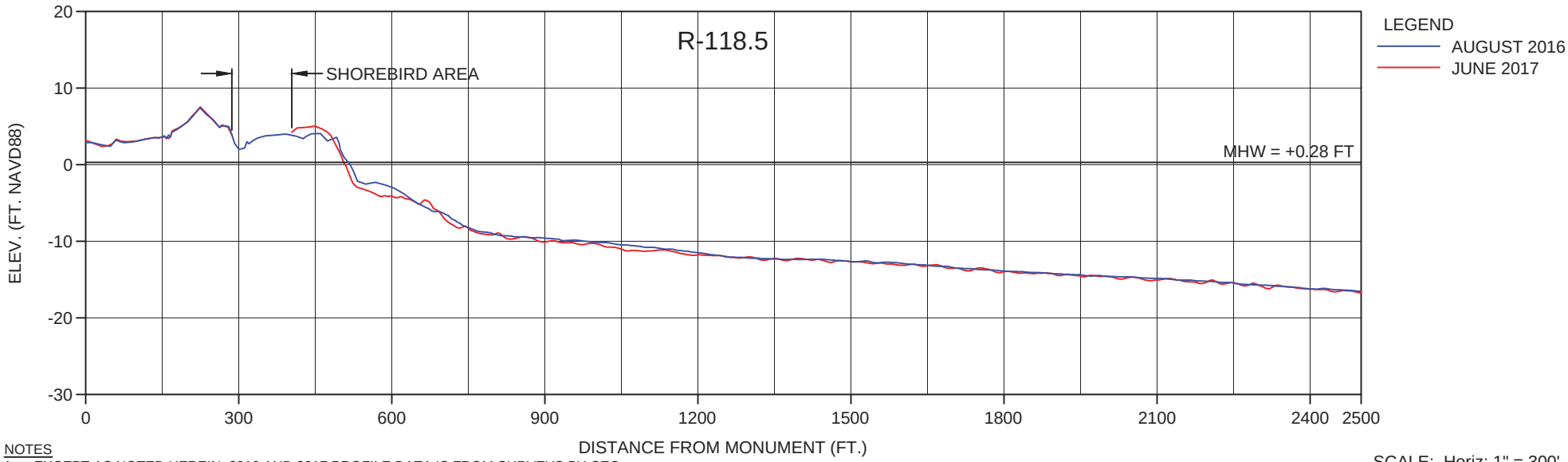

SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-118.5
SHEET 23

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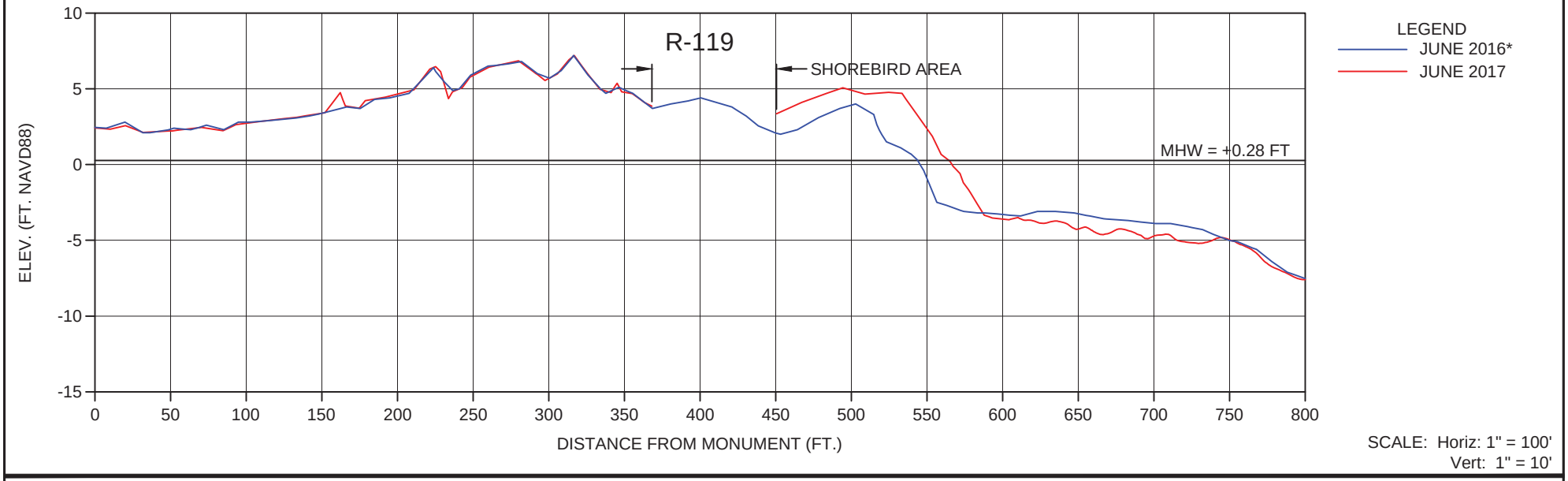
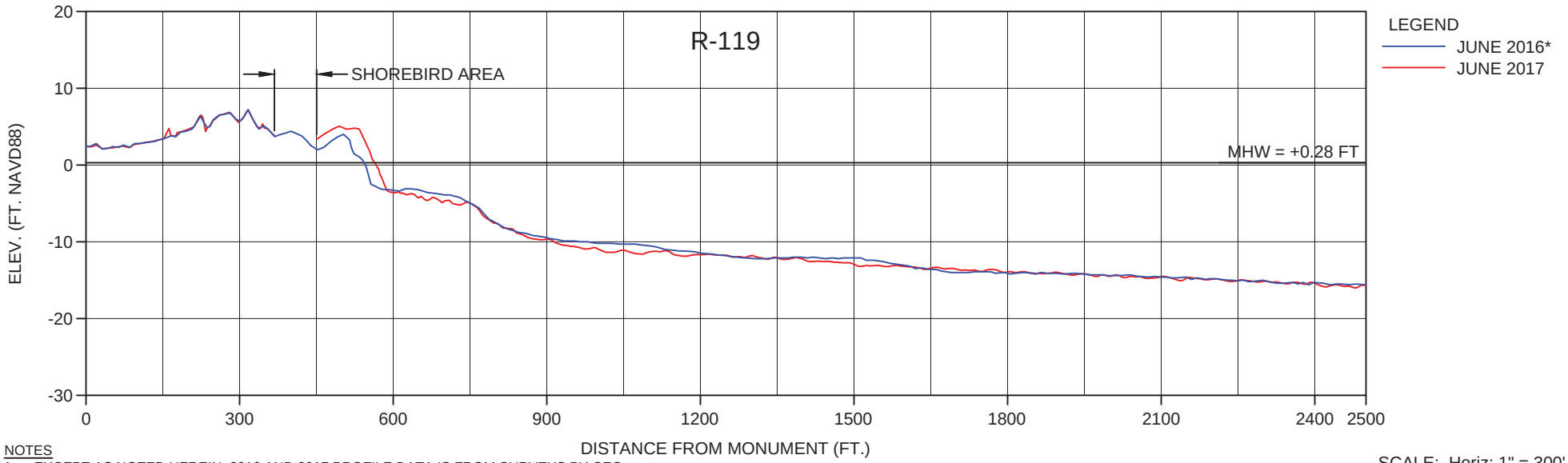
TITLE: R-118.5 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-119
SHEET 24

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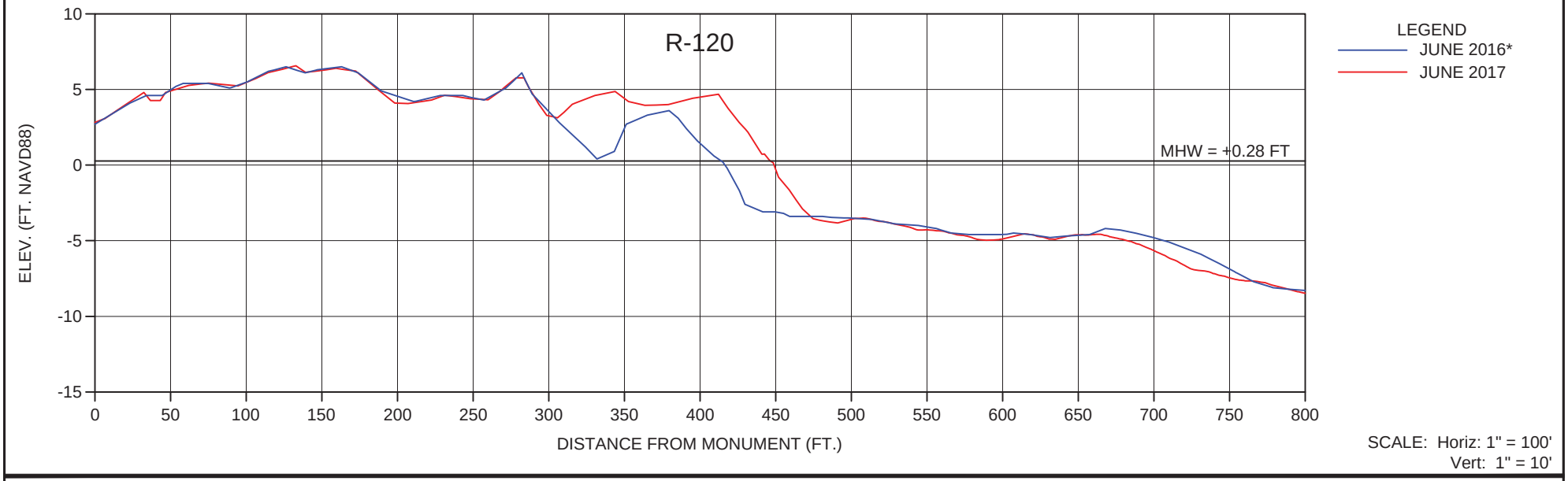
CLIENT: LEE COUNTY

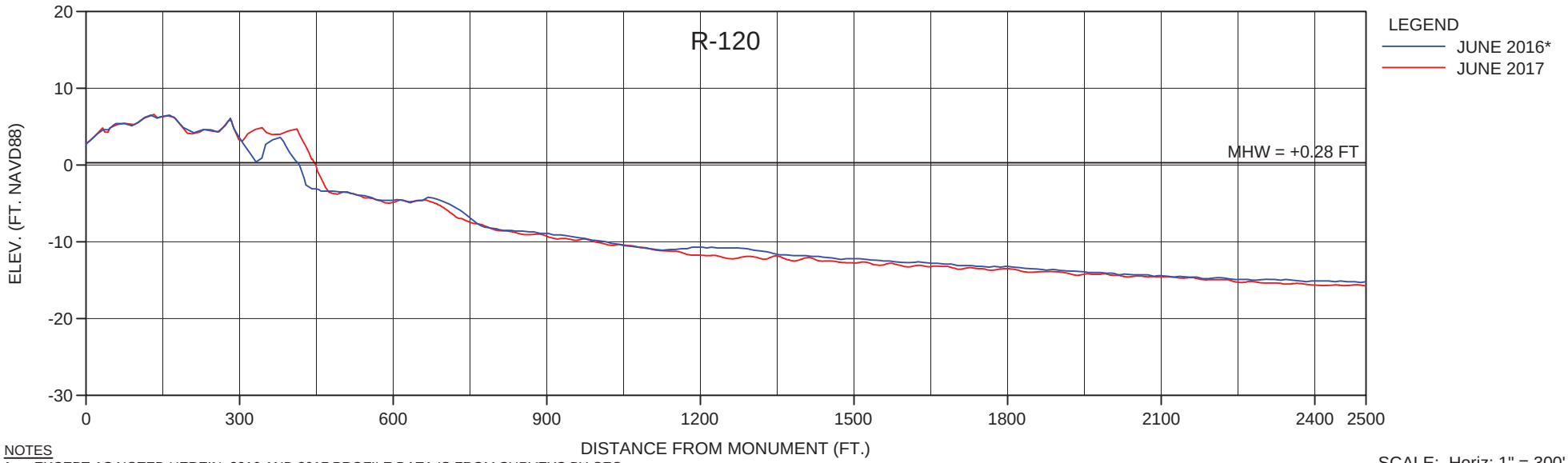
TITLE: R-119 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
2. PROFILE DATA FOR SPECIFIC R-LINES PROVIDED BY CB&I.

FILE NO.: 16180-R-120
SHEET 25

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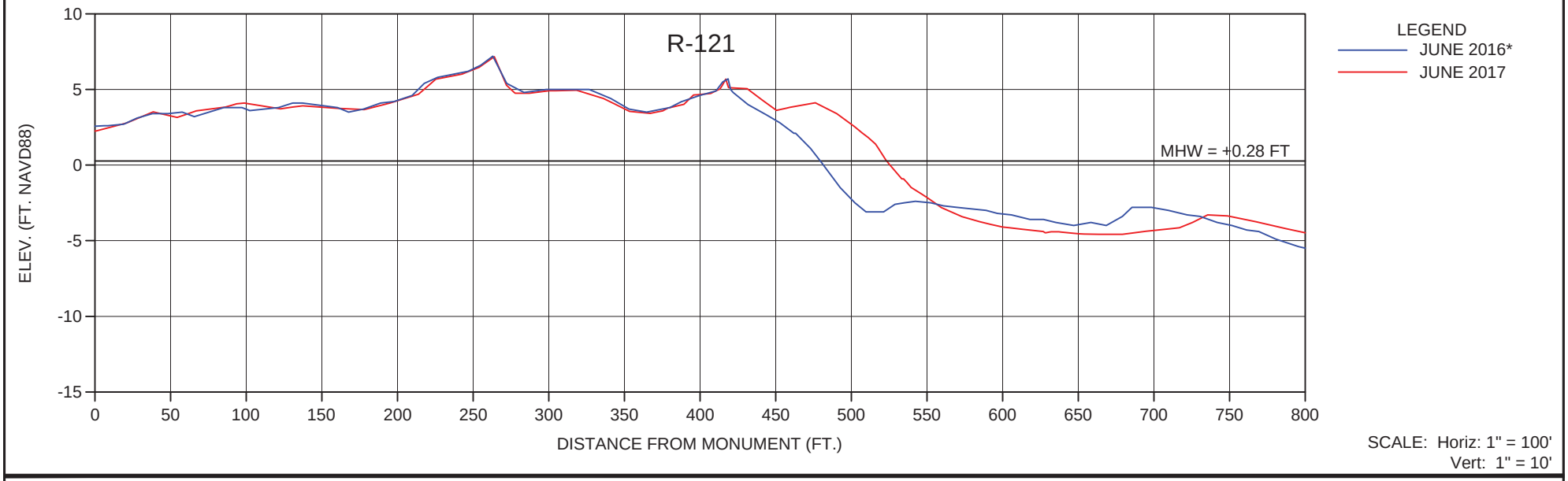
CLIENT: LEE COUNTY

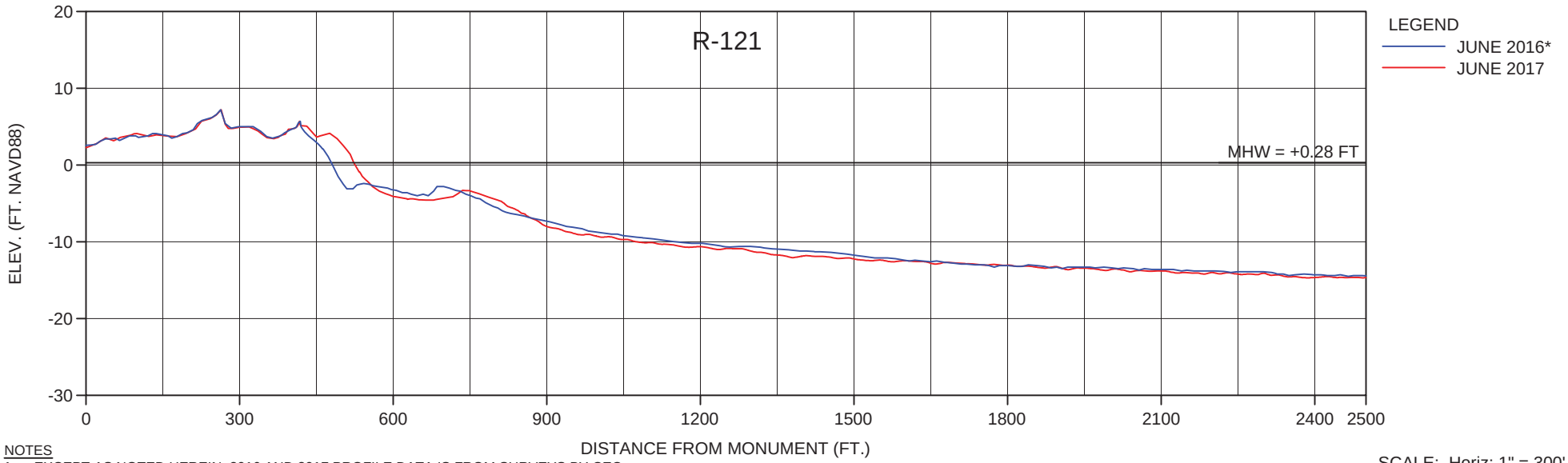
TITLE: R-120 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-121
SHEET 26

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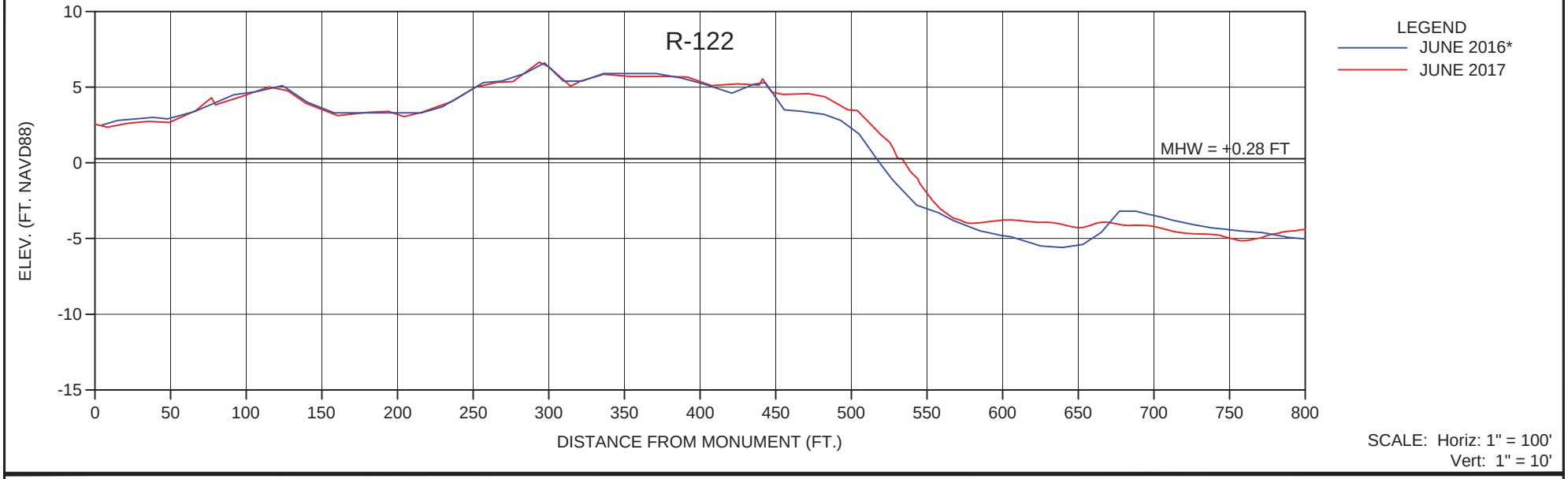
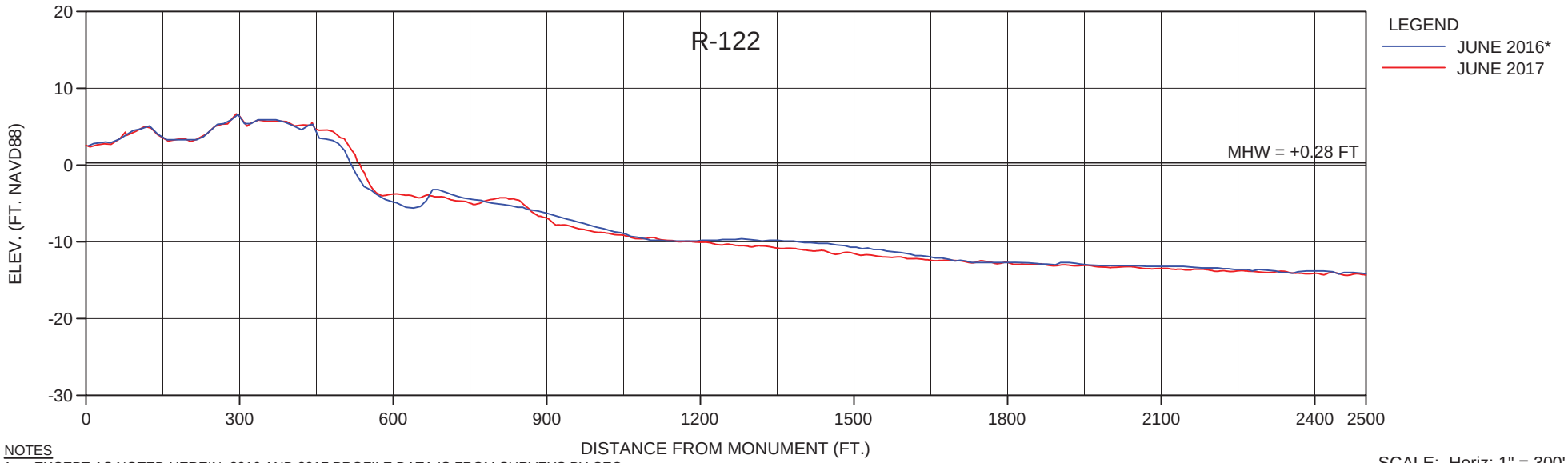
TITLE: R-121 MONITORING SURVEY

DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

NO.	DATE	BY	REVISION DESCRIPTION



SCALE: Horiz: 1" = 100'
Vert: 1" = 10'



SCALE: Horiz: 1" = 300'
Vert: 1" = 20'

NOTES
1. EXCEPT AS NOTED HEREIN, 2016 AND 2017 PROFILE DATA IS FROM SURVEYS BY CEC.
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FILE NO.: 16180-R-122
SHEET 27

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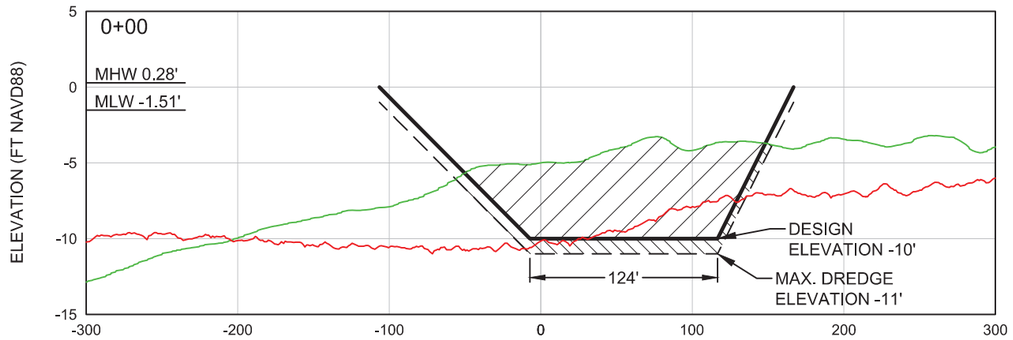
TITLE: R-122 MONITORING SURVEY

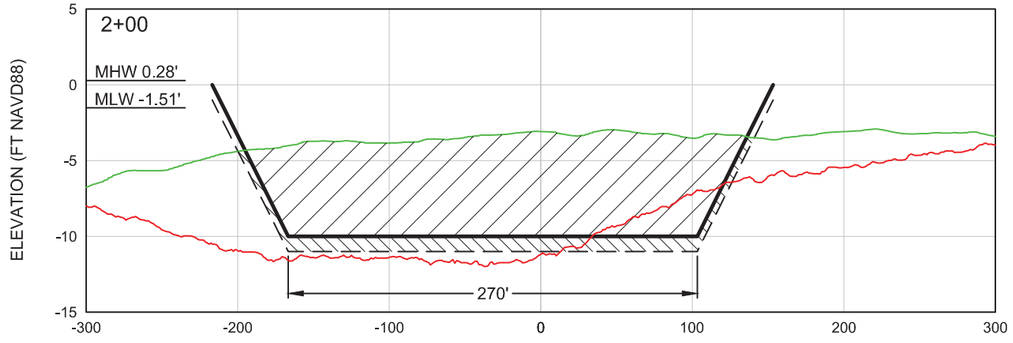
DATE: 7/10/2017	SCALE: AS SHOWN		
DRAWN: SDB	F.B.		
CHECKED: MTP	PG.		
SEC.	TWP.	RNG.	
ACAD NO. 16180-2017 Mon-RMON.dwg			
REF. NO. 16.180			

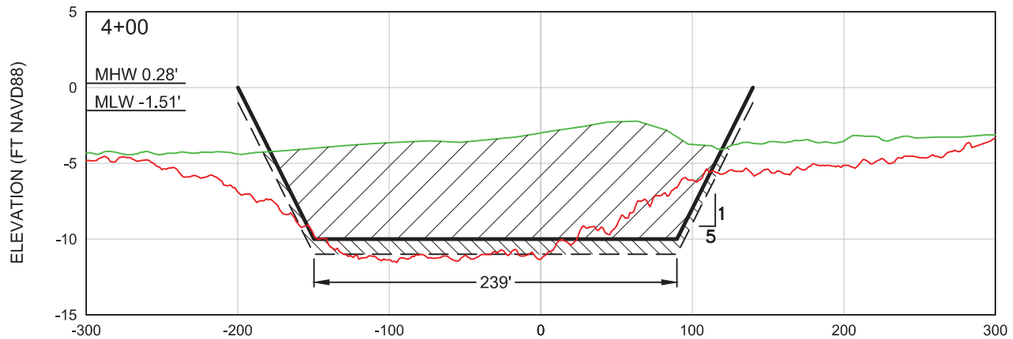
NO.	DATE	BY	REVISION DESCRIPTION

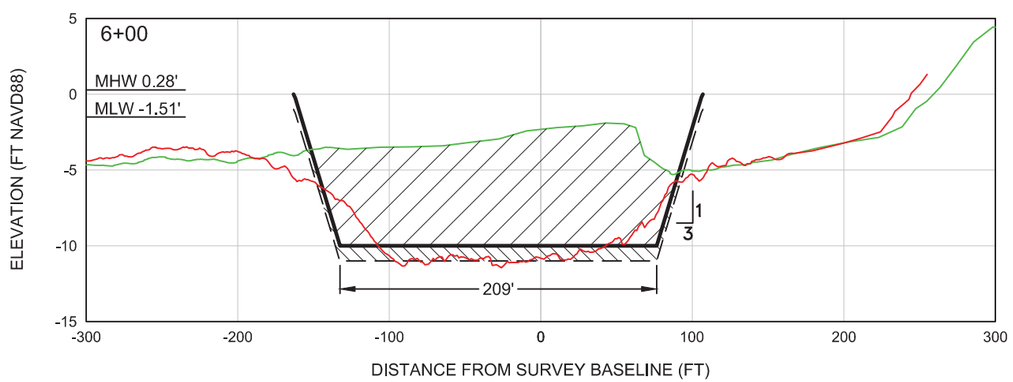
APPENDIX 3

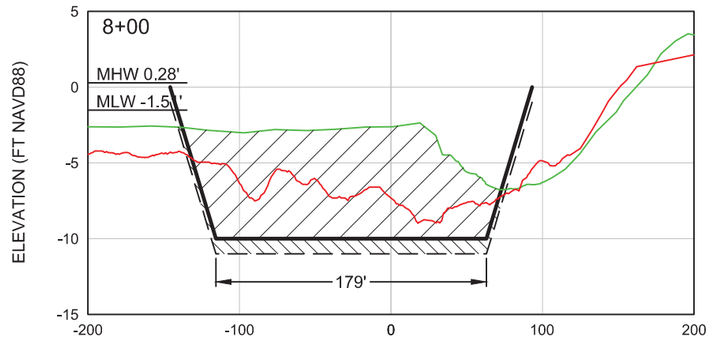
BLIND PASS AND EBB SHOAL CROSS SECTIONS

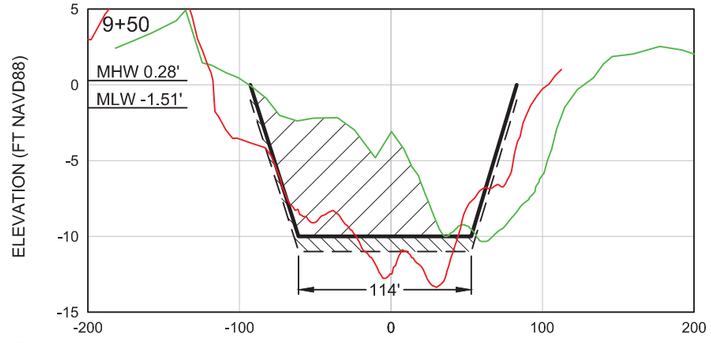


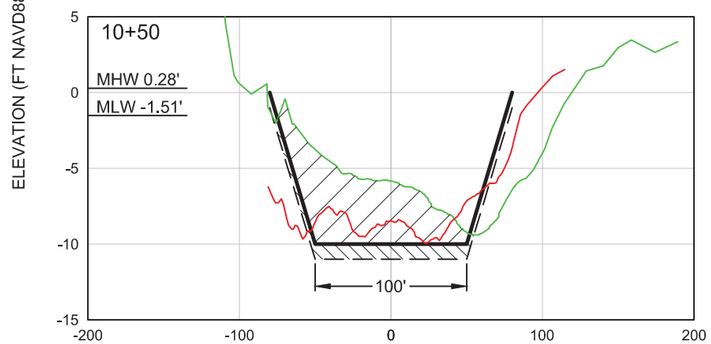


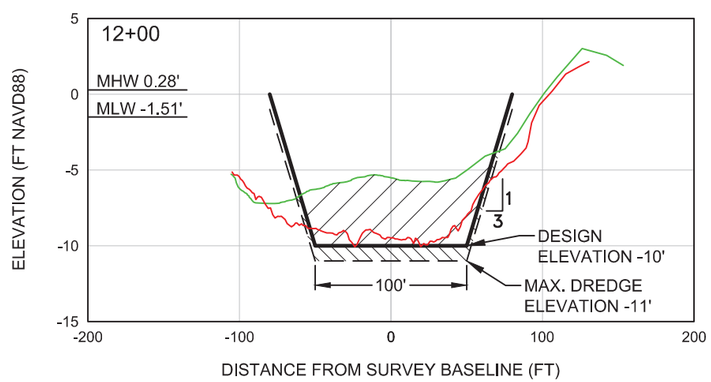












LEGEND:

= FEB. 2017 PRE-CON SURVEY

= JUNE 2017 POST-CON SURVEY

= DESIGN DREDGE AREA

= OVERDREDGE AREA

SCALE:

H: 1" = 100'
V: 1" = 10'

NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017
SCALE: AS NOTED
DRAWN: SDB
F.B.
CHECKED: MTP
PG.
SEC.
TWP.
RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE: BLIND PASS RESTORATION
CROSS SECTIONS
STA. 0+00 TO 12+00

COASTAL ENGINEERING CONSULTANTS, INC.
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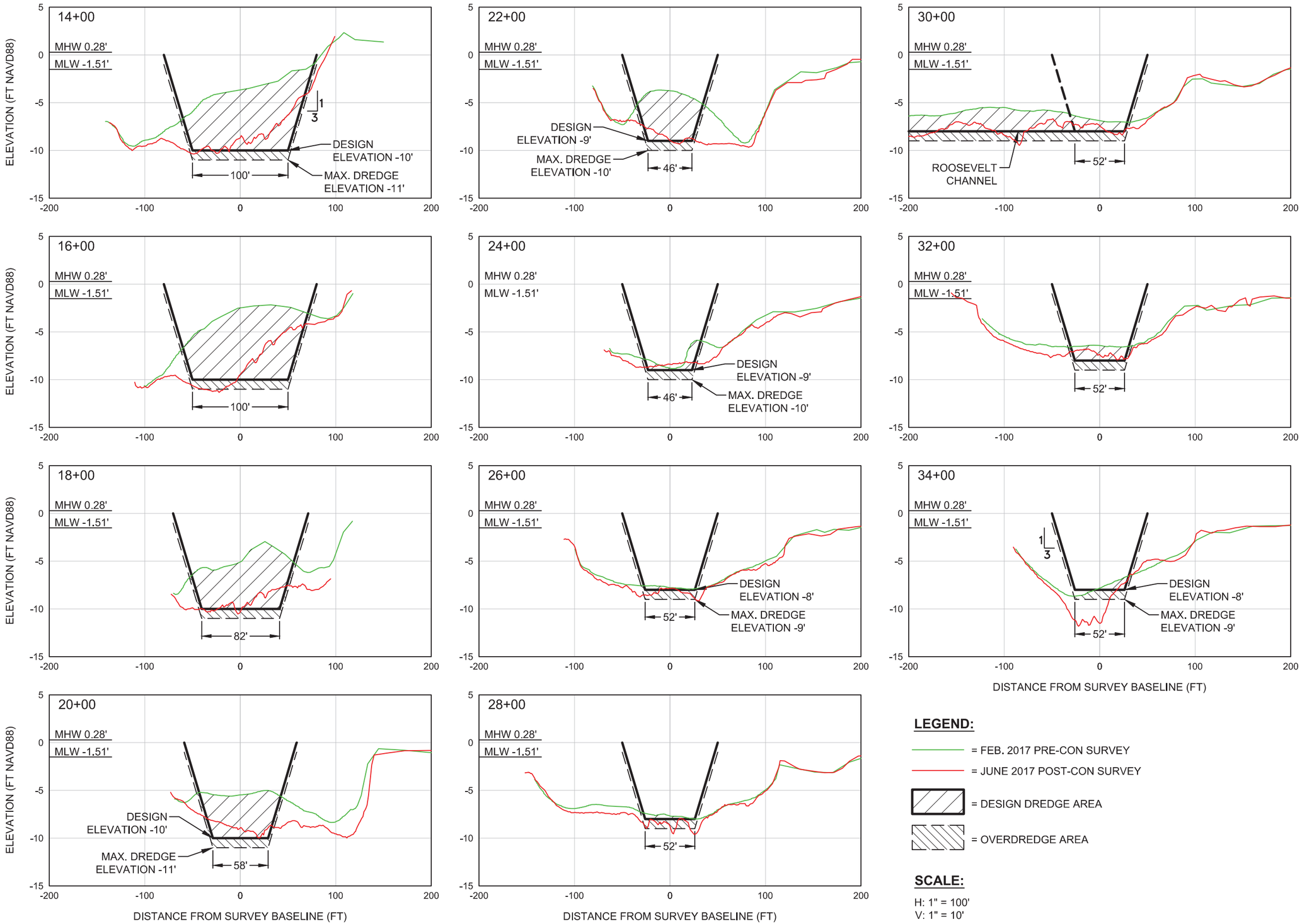
FAX: (239)643-1143
www.coastalengineering.com
E-Mail: info@cecifl.com
COASTAL & MARINE ENGINEERING
ENVIRONMENTAL & GEOLOGICAL SERVICES
LAND & MARINE SURVEY AND MAPPING

SHEET 1
FILE NO.: 16180-XS-1



LEGEND:

= FEB. 2017 PRE-CON SURVEY

= JUNE 2017 POST-CON SURVEY

= DESIGN DREDGE AREA

= OVERDREDGE AREA

SCALE:

H: 1" = 100'
V: 1" = 10'

NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017 SCALE: AS NOTED
DRAWN: SDB F.B.
CHECKED: MTP PG.
SEC. TWP. RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE: BLIND PASS RESTORATION
CROSS SECTIONS
STA. 14+00 TO 34+00

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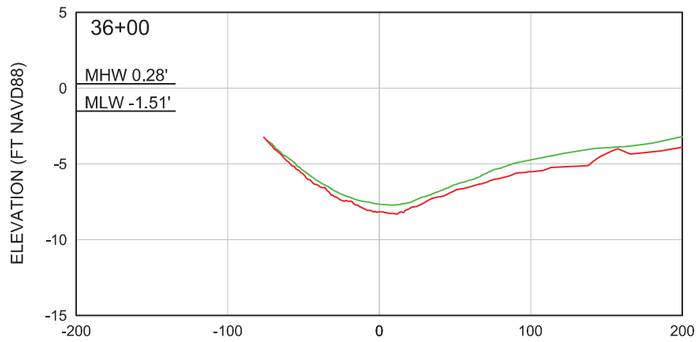
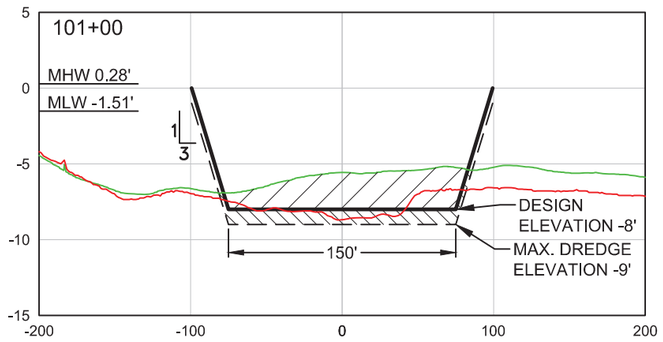
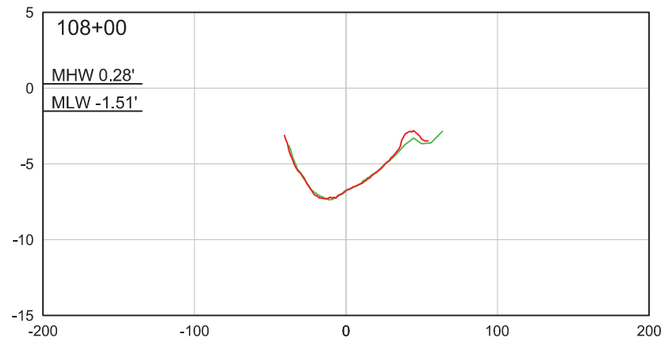
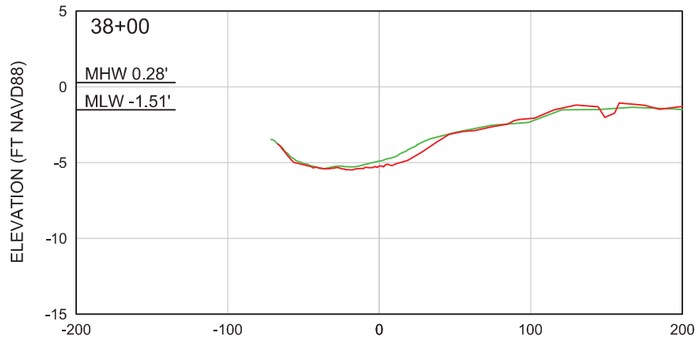
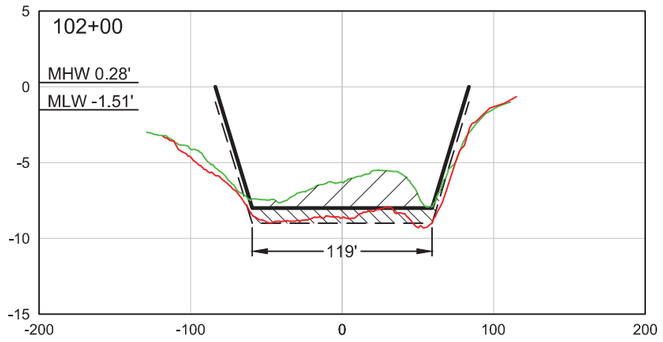
SHEET 2
FILE NO.: 16180-XS-2

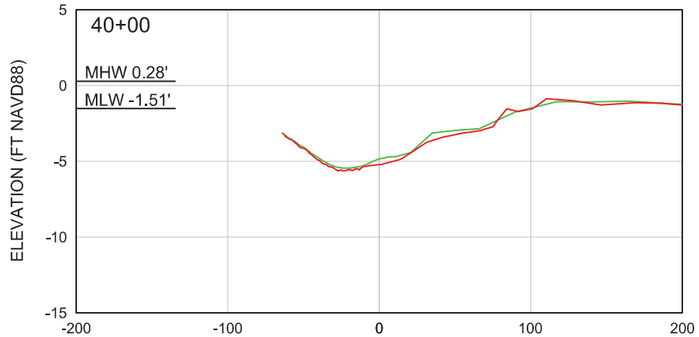


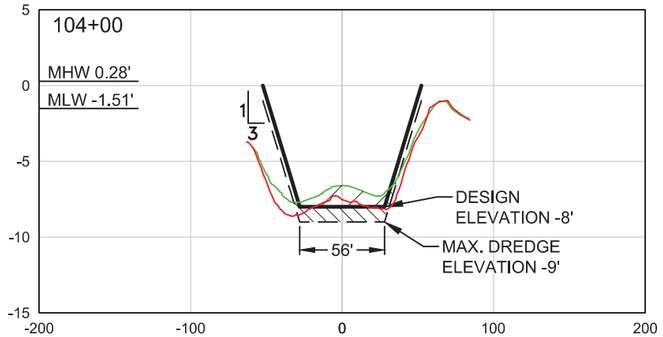


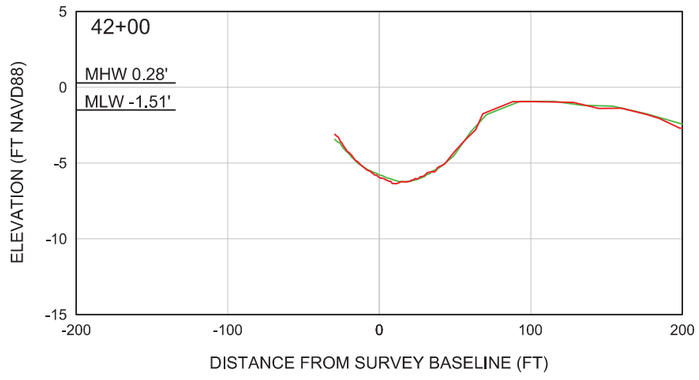


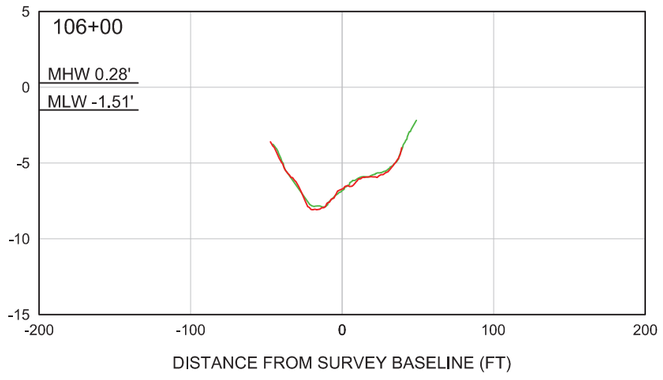












LEGEND:

= FEB. 2017 PRE-CON SURVEY

= JUNE 2017 POST-CON SURVEY

= DESIGN DREDGE AREA

= OVERDREDGE AREA

SCALE:

H: 1" = 100'
V: 1" = 10'

NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017 SCALE: AS NOTED
DRAWN: SDB F.B.
CHECKED: MTP PG.
SEC. TWP. RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE: BLIND PASS RESTORATION
CROSS SECTIONS STA 36+00 TO 42+00
ROOSEVELT STA 101+00 TO 108+00

COASTAL ENGINEERING CONSULTANTS, INC.
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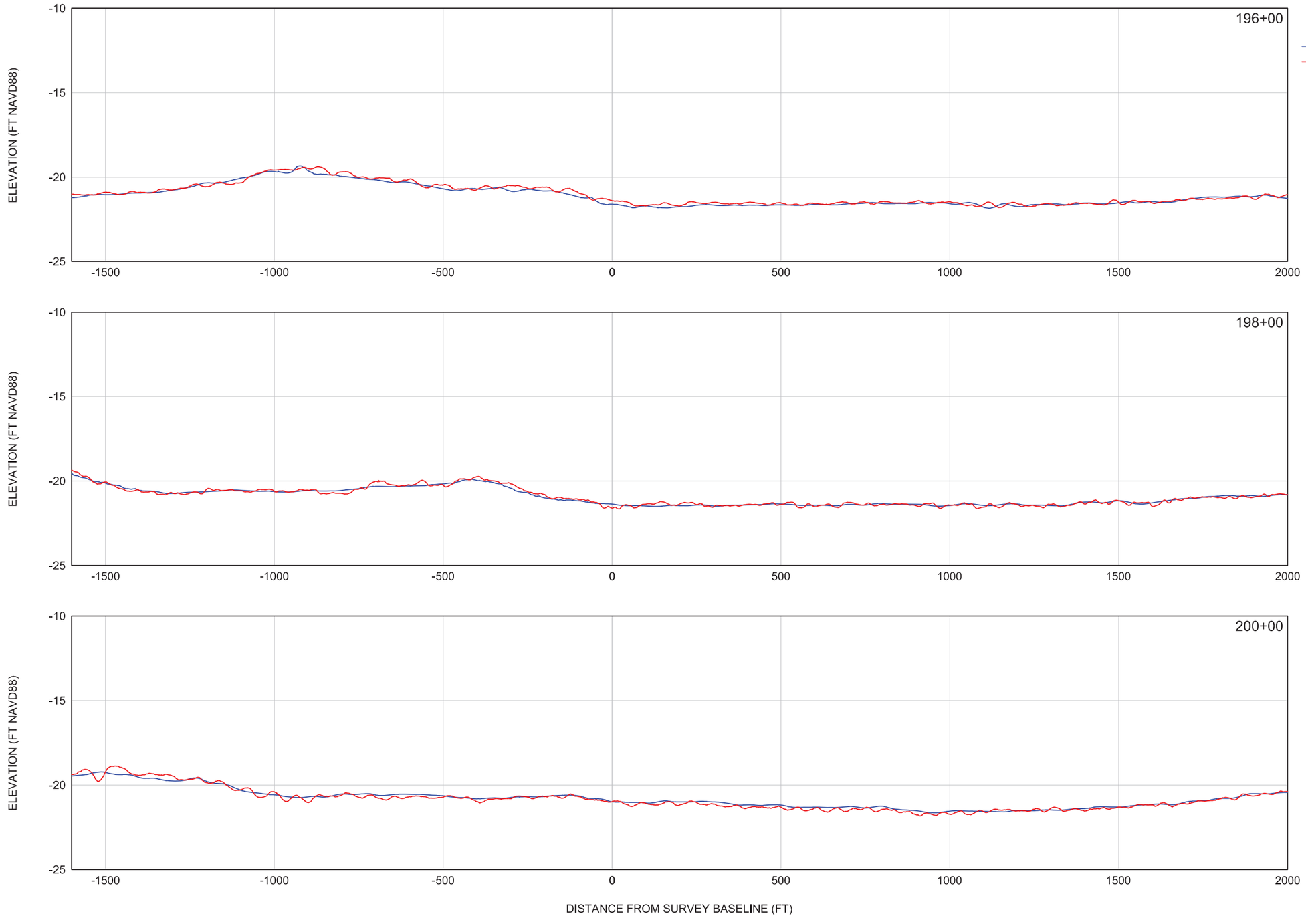
ENVIRONMENTAL & GEOLOGICAL SERVICES
LAND & MARINE SURVEY AND MAPPING
PHONE: (239)643-2324
FAX: (239)643-1143
www.coastalengineering.com
E-Mail: info@cecifl.com

SHEET 3
FILE NO.: 16180-XS-3



NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017
SCALE: AS NOTED
DRAWN: SDB
F.B.
CHECKED: MTP
PG.
SEC.
TWP.
RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE:
BLIND PASS RESTORATION
CROSS SECTIONS
EBB SHOAL: STA 196+00 TO 200+00

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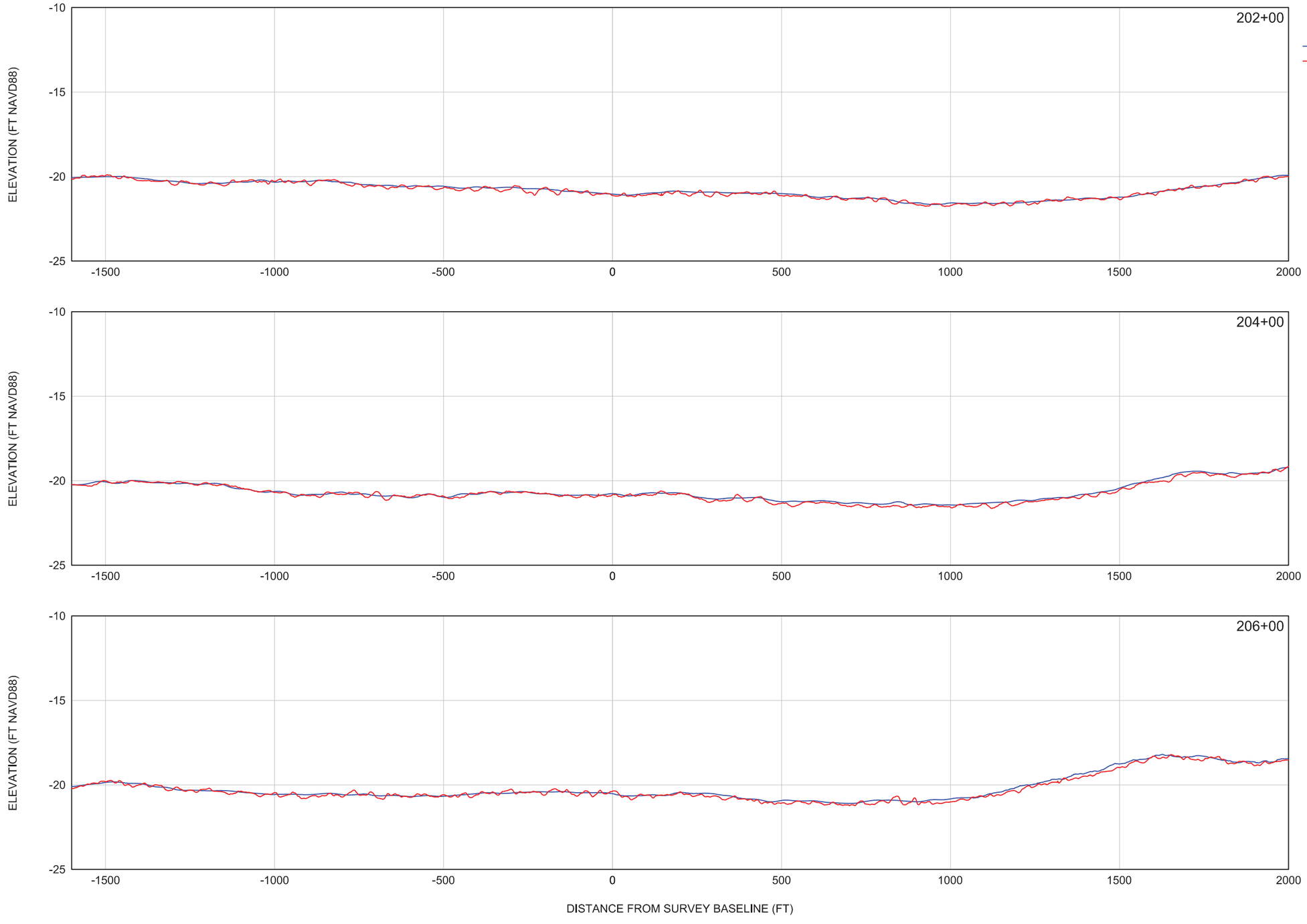
SHEET 4
FILE NO.: 16180-XS-4



NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017
SCALE: AS NOTED
DRAWN: SDB
F.B.
CHECKED: MTP
PG.
SEC.
TWP.
RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE:
BLIND PASS RESTORATION
CROSS SECTIONS
EBB SHOAL: STA 202+00 TO 206+00

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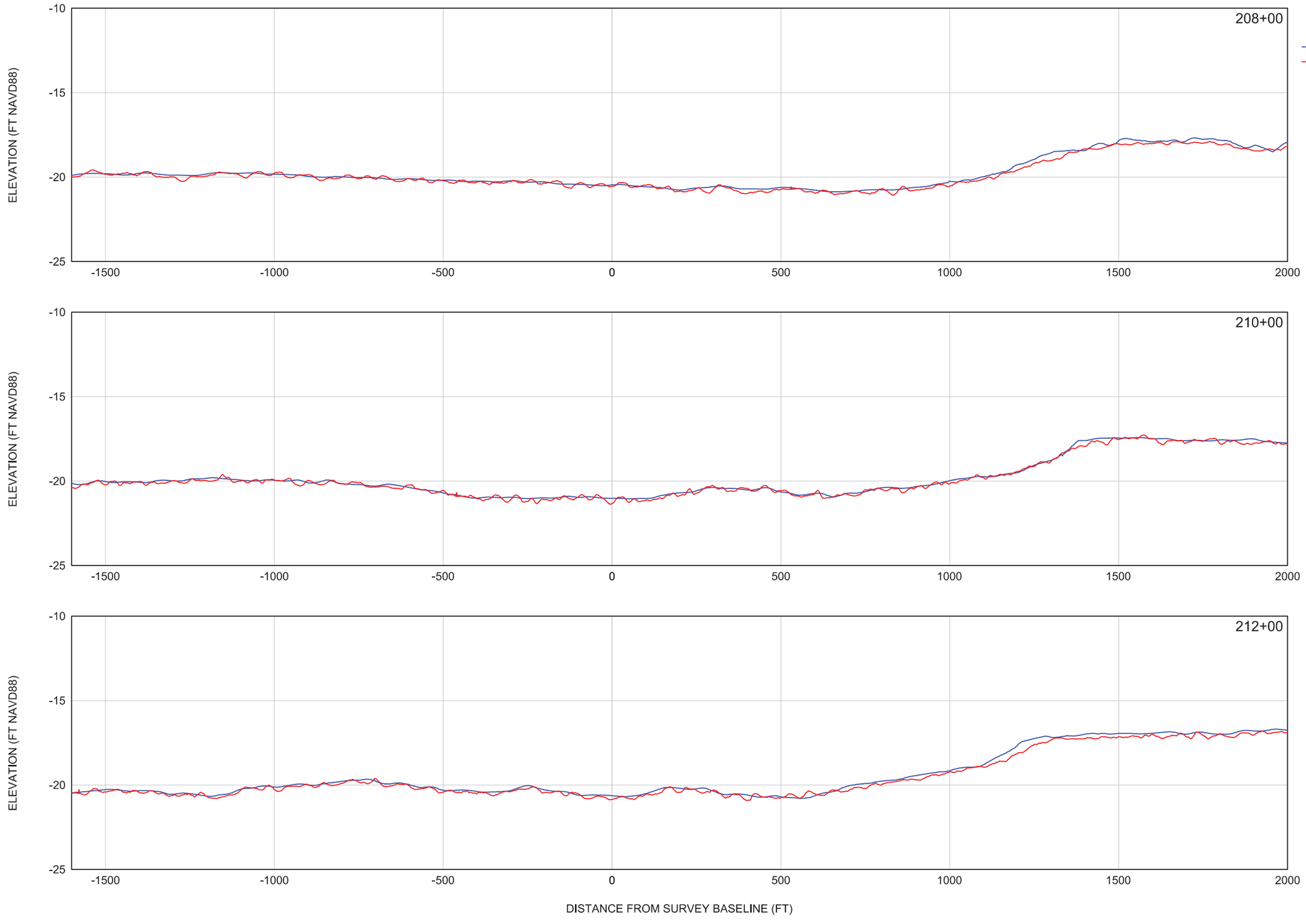
SHEET 5
FILE NO.: 16180-XS-5



NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017
SCALE: AS NOTED
DRAWN: SDB
F.B.
CHECKED: MTP
PG.
SEC.
TWP.
RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE:
BLIND PASS RESTORATION
CROSS SECTIONS
EBB SHOAL: STA 208+00 TO 212+00

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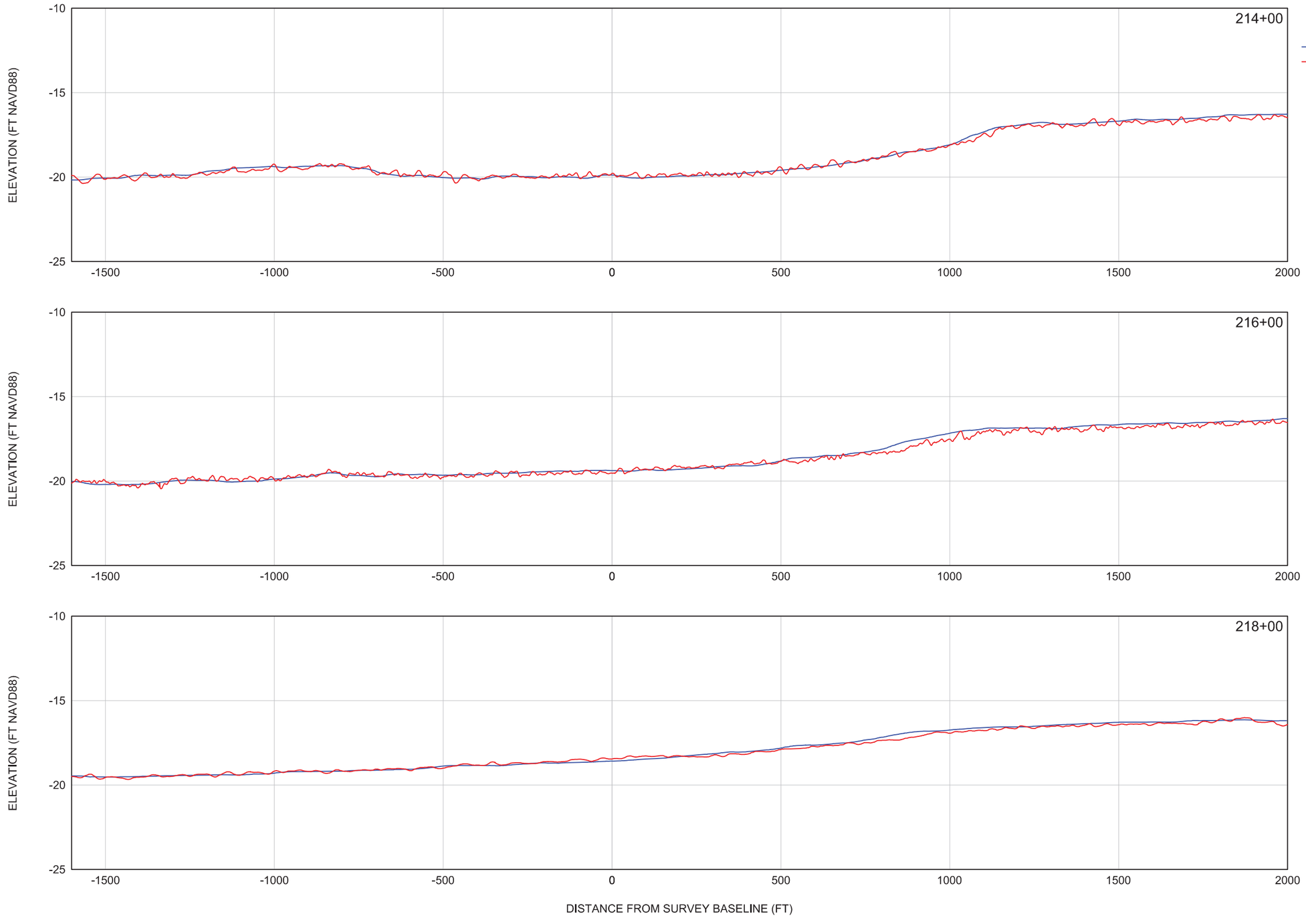
SHEET 6
FILE NO.: 16180-XS-6



NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017
SCALE: AS NOTED
DRAWN: SDB
F.B.
CHECKED: MTP
PG.
SEC.
TWP.
RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE:
BLIND PASS RESTORATION
CROSS SECTIONS
EBB SHOAL: STA 214+00 TO 218+00

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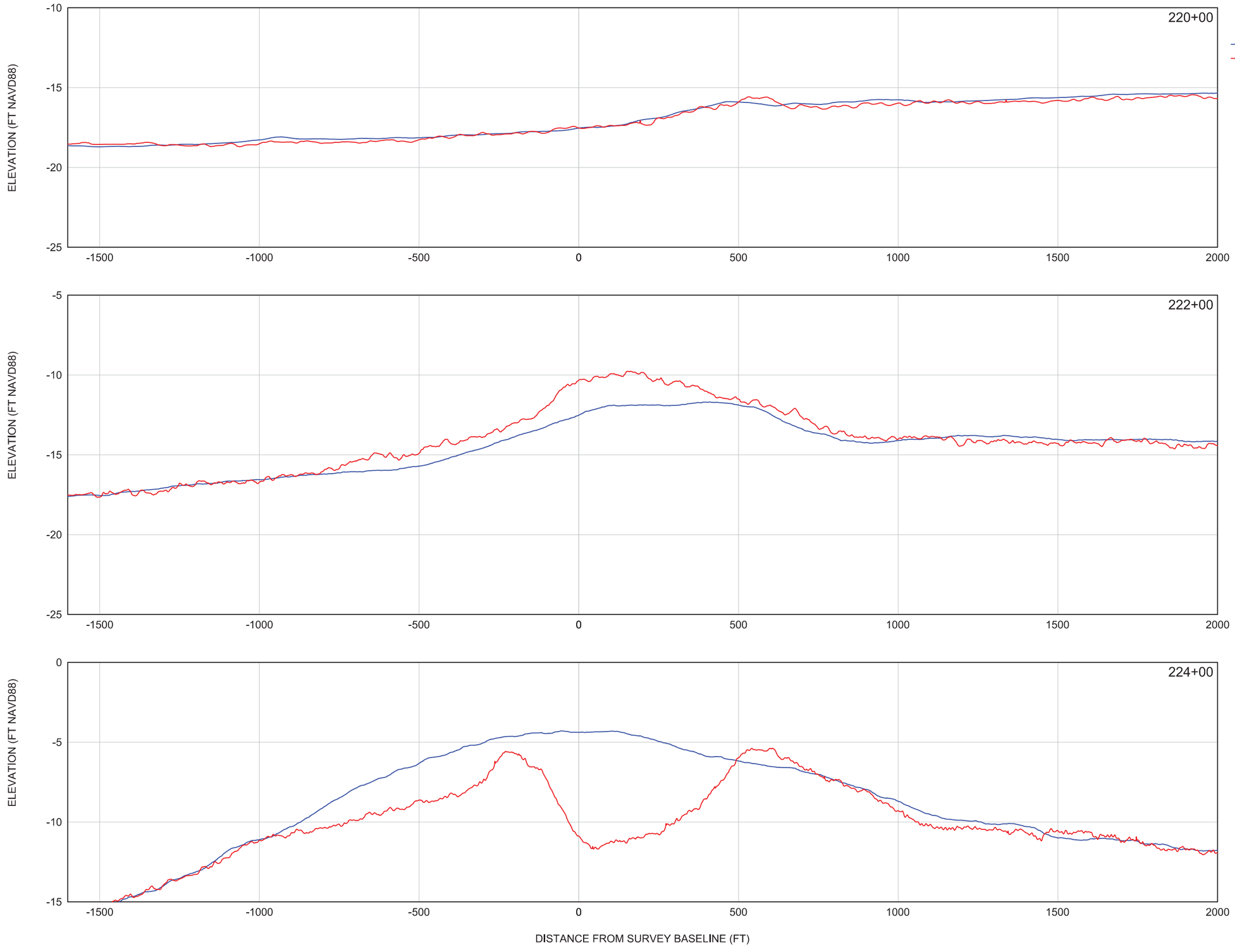
SHEET 7
FILE NO.: 16180-XS-7



LEGEND:

= AUGUST 2016

= JUNE 2017

SCALE:

H: 1" = 300'

V: 1" = 6'

NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017 SCALE: AS NOTED
DRAWN: SDB F.B.
CHECKED: MTP PG.
SEC. TWP. RNG.
ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg
REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE: BLIND PASS RESTORATION
CROSS SECTIONS
EBB SHOAL: STA 220+00 TO 224+00

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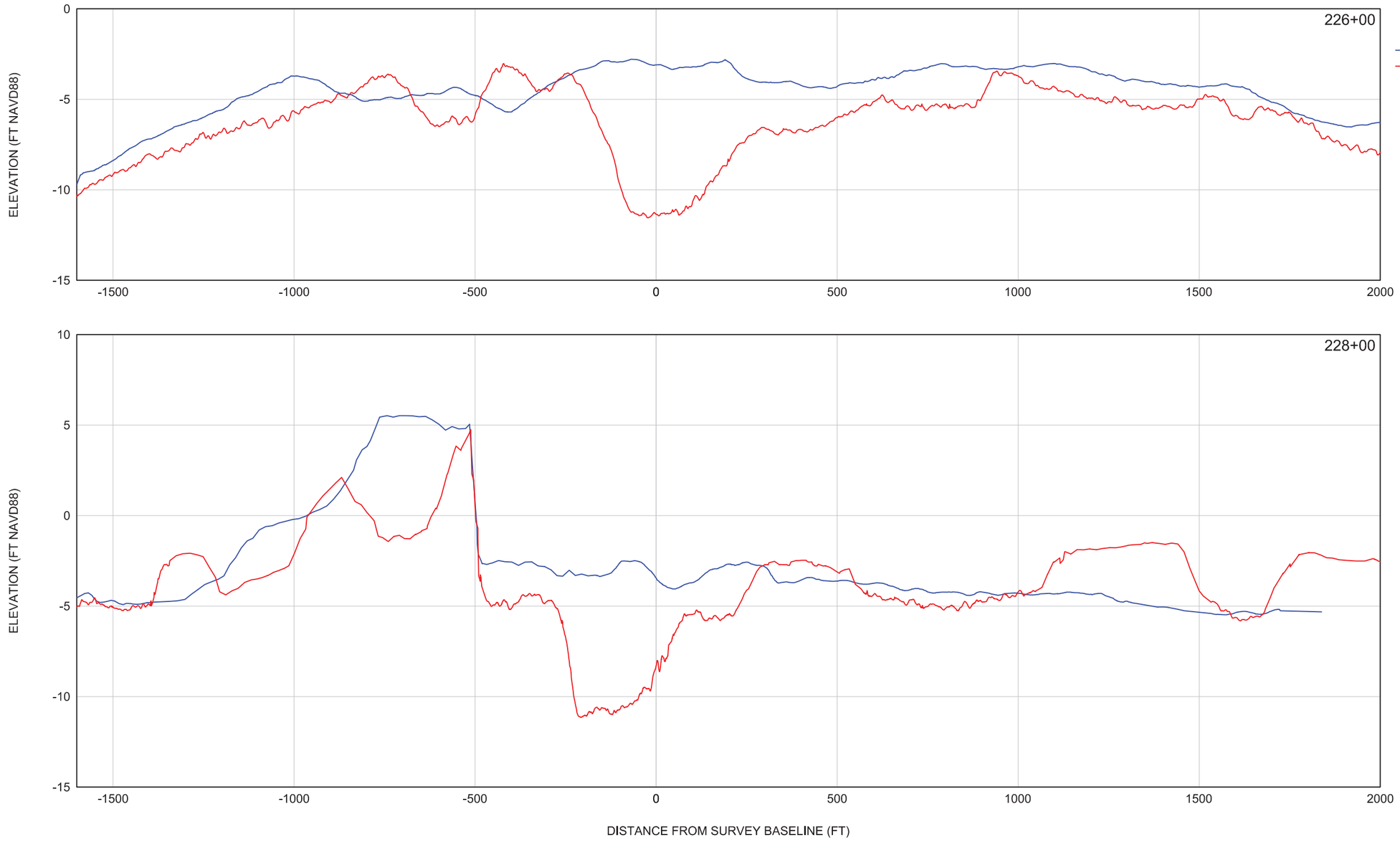
SHEET 8

FILE NO.: 16180-XS-8



LEGEND:

= AUGUST 2016

= JUNE 2017

SCALE:

H: 1" = 300'

V: 1" = 6'

NO.	DATE	BY	REVISION DESCRIPTION

DATE: 7/10/2017 SCALE: AS NOTED

DRAWN: SDB F.B.

CHECKED: MTP PG.

SEC. TWP. RNG.

ACAD NO. 16180-2017 Mon-PASS-XSECT.dwg

REF. NO. 16.180

CLIENT: LEE COUNTY BOARD OF COMMISSIONERS

TITLE: BLIND PASS RESTORATION
CROSS SECTIONS
EBB SHOAL: STA 226+00 TO 228+00

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SHEET 9

FILE NO.: 16180-XS-9

APPENDIX 4

POST-CONSTRUCTION GRAIN SIZE ANALYSIS SAMPLES

AMERICAN VIBRACORE
SERVICES

Presented to Coastal Engineering Consultants Inc.

COASTAL ENGINEERING CONSULTANTS INC.

Blind Pass Maintenance Dredging 2017

CEC Project No. 16.180

1215 Wallace Drive, Delray Beach, FL 33444 561-372-0500 americanvibracore.com

AMERICAN VIBRACORE
SERVICES

Organic Content Testing

Project Name: Blind Pass Maintenance Dredging 2017		
AVS Project Number: 17-0145		
Client Name: Coastal Engineering Consultants		
Tested By: Dave May		
Test Dates: 7/03/2017		
Test Method: C- Ash Content By Ignition at 440°C ± 22°C		
Sample Number/Location		**Percent Organic**
1-2	R-112	0.8
2-2	R-112+487	1.10
3-2	R-112+800	1.20
4-2	R-113	0.90
5-2	R-113+406	0.90
6-2	R-114	1.00
7-2	R-114+190	1.00
8-2	R-116	1.40
9-2	R-116+500	1.10
10-2	R-117	1.00
11-2	R-117+380	1.50
12-2	R-117+800	1.10
13-2	R-118	1.50

Blind Pass Maintenance Dredging 2017

Location	Sample No.	gINT Granularmetrics						USC	Carbonates	Organics	Munsell Color	
		Size Class (wt%)				Descriptive					Wet	
		Gravel	Sand	<#200	<#230	Mean (mm)	Verbal				Verbal	Value
R-112	1-2 13919	0.34	98.9	0.76	0.75	0.35	M	SP	35.10%	0.80%	Gray	10YR-6/1
R-112+487	2-2 13920	7.39	91.73	0.88	0.77	0.60	C	SW	58.40%	1.10%	Gray	10YR-6/1
R112+800	3-2 13921	7.42	91.67	0.91	0.90	0.60	C	SW	47.60%	1.20%	Gray	10YR-6/1
R113	4-2 13922	4.07	95.03	0.9	0.85	0.46	M	SW	48.10%	0.90%	Gray	10YR-6/1
R113+406	5-2 13923	4.45	94.58	0.97	0.94	0.44	M	SW	32.00%	0.90%	Gray	10YR-6/1
R114	6-2 13924	5.08	93.84	1.08	1.06	0.49	M	SW	48.50%	1.00%	Gray	10YR-6/1
R114+190	7-2 13925	3.02	96.09	0.89	0.88	0.51	C	SW	53.60%	1.00%	Gray	10YR-6/1
R116	8-2 13926	5.31	93.9	0.79	0.78	0.95	C	SW	77.30%	1.40%	Gray	10YR-6/1
R116+500	9-2 13927	1.79	97.91	0.3	0.28	0.40	M	SW	40.60%	1.10%	Gray	10YR-6/1
R117	10-2 13928	1.44	98.26	0.3	0.28	0.40	M	SW	40.40%	1.00%	Gray	10YR-6/1
R-117+380	11-2 13929	8.08	91.48	0.44	0.40	0.87	C	SW	67.00%	1.50%	Gray	10YR-6/1
R117+800	12-2 13930	12.58	86.89	0.53	0.50	1.06	VC	SW	79.90%	1.10%	Gray	10YR-6/1
R118	13-2 13931	2.53	96.51	0.96	0.95	0.51	C	SW	64.50%	1.50%	Gray	10YR-6/1

Granularmetric Report

Depths and elevations based on measured values

AMERICAN VIBRACORE
SERVICES
American Vibracores Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444
ph 561-372-0500
fax 561-372-0501

Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13919
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SP	Wet - 10YR-6/1	Sample 1-2 / R-112 Visual Shell 25%

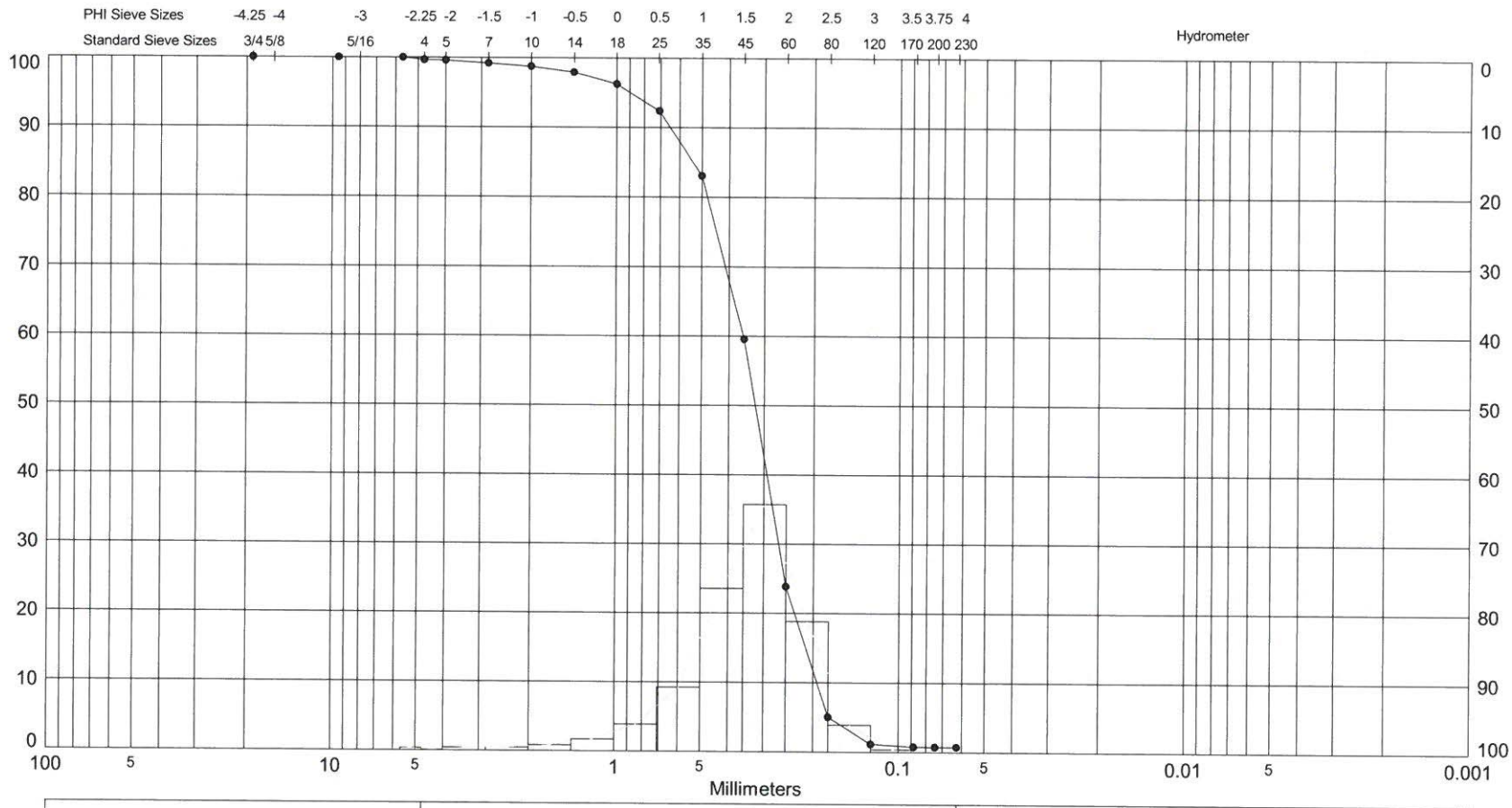
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
326.66	324.21	0.01	0.00	#200 - 0.76 #230 - 0.75	0.80	35.10	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
4	-2.25	4.76	1.10	0.34	1.10	0.34
5	-2.00	4.00	0.20	0.06	1.30	0.40
7	-1.50	2.83	1.31	0.40	2.61	0.80
10	-1.00	2.00	1.44	0.44	4.05	1.24
14	-0.50	1.41	2.79	0.85	6.84	2.09
18	0.00	1.00	5.54	1.70	12.38	3.79
25	0.50	0.71	12.60	3.86	24.98	7.65
35	1.00	0.50	30.28	9.27	55.26	16.92
45	1.50	0.35	76.88	23.54	132.14	40.45
60	2.00	0.25	116.69	35.72	248.83	76.17
80	2.50	0.18	61.41	18.80	310.24	94.97
120	3.00	0.13	12.66	3.88	322.90	98.85
170	3.50	0.09	1.20	0.37	324.10	99.22
200	3.75	0.07	0.07	0.02	324.17	99.24
230	4.00	0.06	0.03	0.01	324.20	99.25

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.50	2.21	1.98	1.63	1.17	0.95	0.16

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	1.52	0.35	0.75	-1.46	7.38

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13919	—●—		SP	#200 - 0.76 #230 - 0.75	0.80	35.10	0.32	0.35	-1.46	7.38	0.75

Comments: Sample 1-2 / R-112 Visual Shell 25%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

AMERICAN VIBRACORE SERVICES

American Vibracore Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

Project Name: Blind Pass Maintenance Dredging 2017

Sample Name: 13920

Analysis Date: 07-03-17

Analyzed By: DM

AMERICAN VIBRACORE SERVICES

American Vibracores Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444
ph 561-372-0500
fax 561-372-0501

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 2-2 / R-112+487 Visual Shell 25%

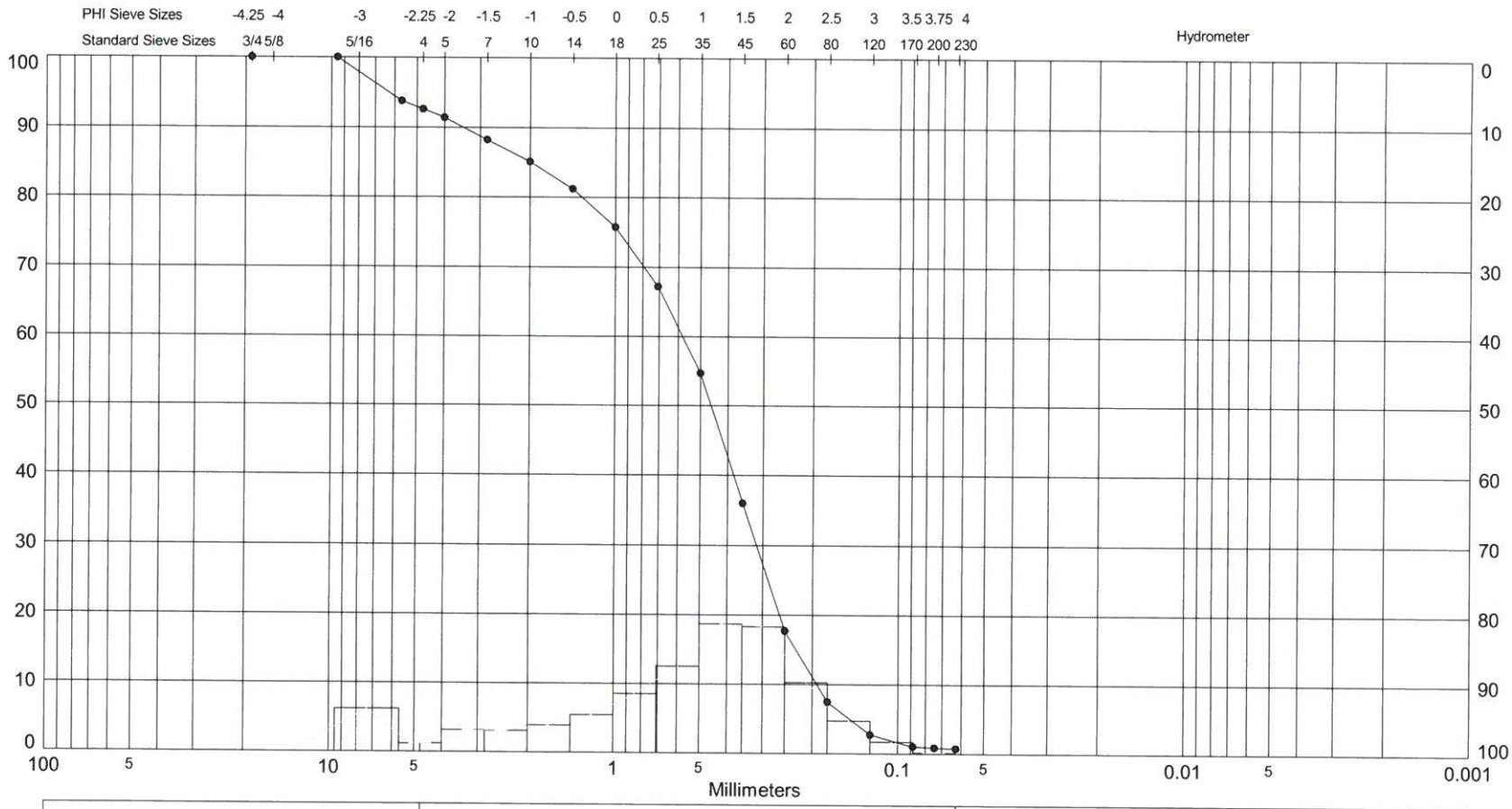
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
303.83	301.50	0.01	0.00	#200 - 0.88 #230 - 0.77	1.10	58.40	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	18.87	6.21	18.87	6.21
4	-2.25	4.76	3.59	1.18	22.46	7.39
5	-2.00	4.00	3.67	1.21	26.13	8.60
7	-1.50	2.83	9.65	3.18	35.78	11.78
10	-1.00	2.00	9.42	3.10	45.20	14.88
14	-0.50	1.41	11.89	3.91	57.09	18.79
18	0.00	1.00	16.55	5.45	73.64	24.24
25	0.50	0.71	25.93	8.53	99.57	32.77
35	1.00	0.50	38.16	12.56	137.73	45.33
45	1.50	0.35	56.71	18.67	194.44	64.00
60	2.00	0.25	55.54	18.28	249.98	82.28
80	2.50	0.18	31.09	10.23	281.07	92.51
120	3.00	0.13	14.45	4.76	295.52	97.26
170	3.50	0.09	5.11	1.68	300.63	98.95
200	3.75	0.07	0.54	0.18	301.17	99.12
230	4.00	0.06	0.32	0.11	301.49	99.23

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.76	2.08	1.80	1.13	0.04	-0.86	-2.84

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.73	0.60	1.52	-0.9	3.15

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13920	—●—		SW	#200 - 0.88 #230 - 0.77	1.10	58.40	0.46	0.60	-0.9	3.15	1.52

Comments: Sample 2-2 / R-112+487 Visual Shell 25%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

AMERICAN VIBRACORE SERVICES

American Vibracore Services, Inc.
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Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

Project Name: Blind Pass Maintenance Dredging 2017

Sample Name: 13921

Analysis Date: 07-03-17

Analyzed By: DM

AMERICAN VIBRACORE SERVICES

American Vibracores Services, Inc.
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Delray Beach, FL 33444
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fax 561-372-0501

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 3-2 / R-112+800 Visual Shell 35%

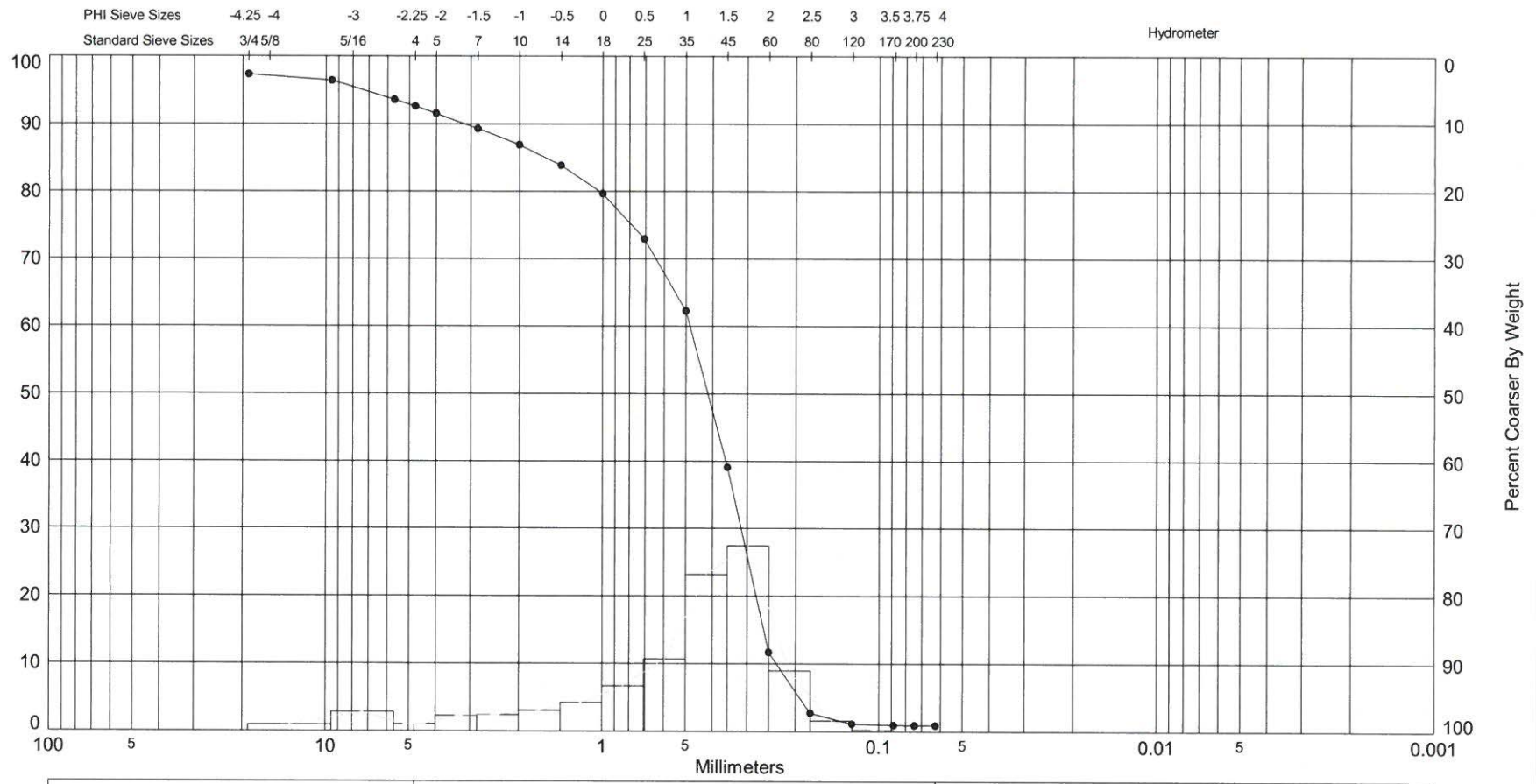
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
346.54	343.44	0.02	0.00	#200 - 0.91 #230 - 0.90	1.20	47.60	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		2.68	9.27	2.68
3/8"	-3.25	9.51	3.22	0.93	12.49	3.60
3.5	-2.50	5.66	9.78	2.82	22.27	6.43
4	-2.25	4.76	3.43	0.99	25.70	7.42
5	-2.00	4.00	3.69	1.06	29.39	8.48
7	-1.50	2.83	7.76	2.24	37.15	10.72
10	-1.00	2.00	8.20	2.37	45.35	13.09
14	-0.50	1.41	10.55	3.04	55.90	16.13
18	0.00	1.00	14.59	4.21	70.49	20.34
25	0.50	0.71	23.27	6.71	93.76	27.06
35	1.00	0.50	37.04	10.69	130.80	37.74
45	1.50	0.35	80.28	23.17	211.08	60.91
60	2.00	0.25	94.98	27.41	306.06	88.32
80	2.50	0.18	31.09	8.97	337.15	97.29
120	3.00	0.13	5.46	1.58	342.61	98.87
170	3.50	0.09	0.68	0.20	343.29	99.06
200	3.75	0.07	0.11	0.03	343.40	99.09
230	4.00	0.06	0.02	0.01	343.42	99.10

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.37	1.92	1.76	1.26	0.35	-0.52	-2.88

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.73	0.60	1.32	-1.14	4.26

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/15/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13921	—●—		SW	#200 - 0.91 #230 - 0.90	1.20	47.60	0.42	0.60	-1.14	4.26	1.32

Comments: Sample 3-2 / R-112+800 Visual Shell 35%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

AMERICAN VIBRACORE SERVICES

American Vibracores Services, Inc.
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Delray Beach, FL 33444
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fax 561-372-0501

SIEVE ANALYSIS_BLIND PASS MAINTENANCE DREDGING 2017.GPJ_FL DEP.ROSS.GDT_8/15/17

Granularmetric Report

Depths and elevations based on measured values

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Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13922
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 4-2 / R-113 Visual Shell 35%

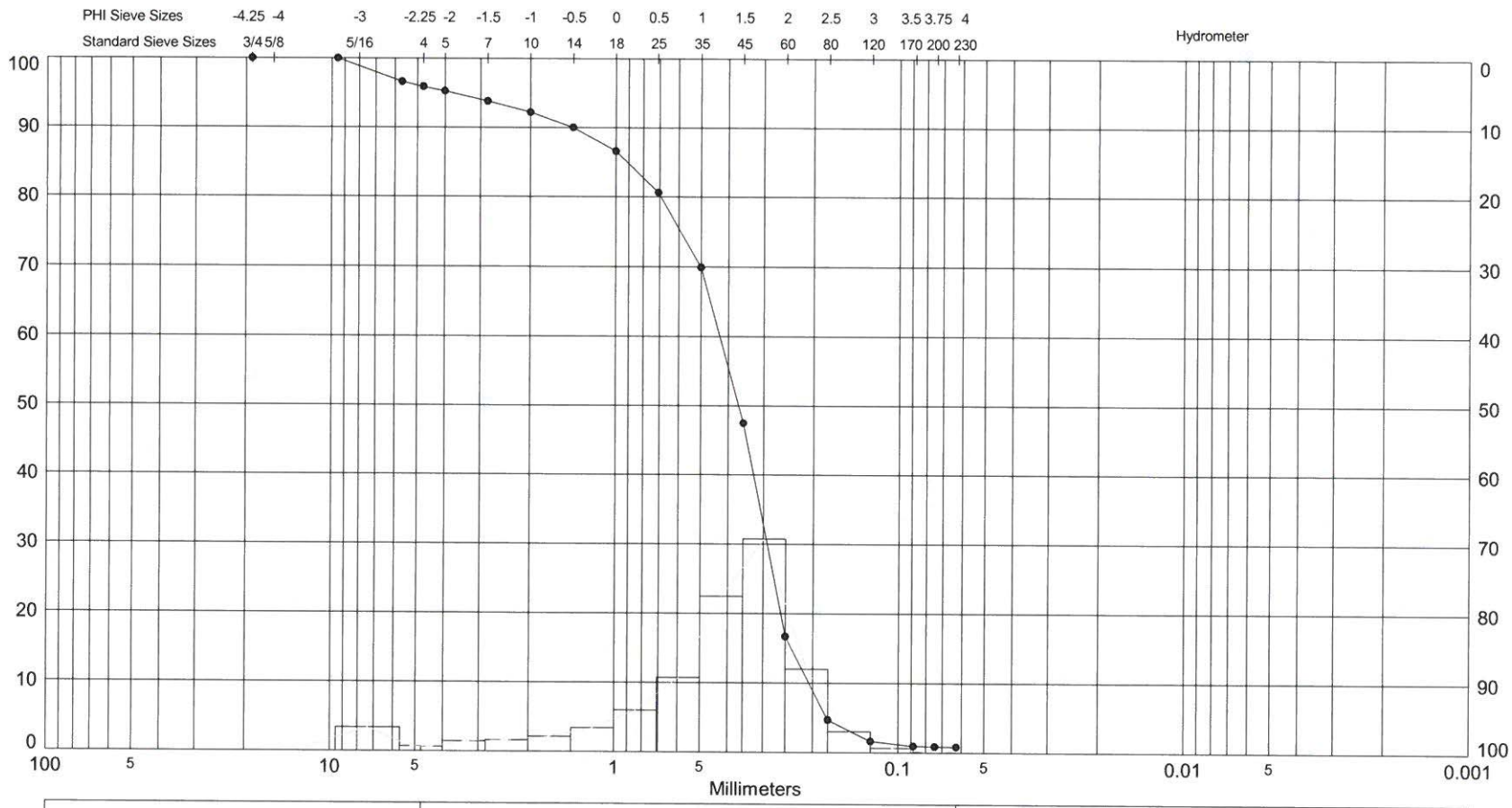
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
352.48	349.52	0.02	0.00	#200 - 0.90 #230 - 0.85	0.90	48.10	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	11.89	3.37	11.89	3.37
4	-2.25	4.76	2.44	0.69	14.33	4.07
5	-2.00	4.00	2.28	0.65	16.61	4.71
7	-1.50	2.83	5.16	1.46	21.77	6.18
10	-1.00	2.00	5.73	1.63	27.50	7.80
14	-0.50	1.41	7.68	2.18	35.18	9.98
18	0.00	1.00	12.02	3.41	47.20	13.39
25	0.50	0.71	21.09	5.98	68.29	19.37
35	1.00	0.50	37.70	10.70	105.99	30.07
45	1.50	0.35	79.20	22.47	185.19	52.54
60	2.00	0.25	108.46	30.77	293.65	83.31
80	2.50	0.18	42.35	12.01	336.00	95.32
120	3.00	0.13	10.68	3.03	346.68	98.35
170	3.50	0.09	2.38	0.68	349.06	99.03
200	3.75	0.07	0.24	0.07	349.30	99.10
230	4.00	0.06	0.20	0.06	349.50	99.15

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.49	2.03	1.86	1.44	0.76	0.22	-1.90

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	1.11	0.46	1.23	-1.61	5.61

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13922	—●—		SW	#200 - 0.90 #230 - 0.85	0.90	48.10	0.37	0.46	-1.61	5.61	1.23

Comments: Sample 4-2 / R-113 Visual Shell 35%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

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1215 Wallace Drive
Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

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SERVICES
American Vibracores Services, Inc.
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Delray Beach, FL 33444
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Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13923
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 5-2 / R-113+406 Visual Shell 30%

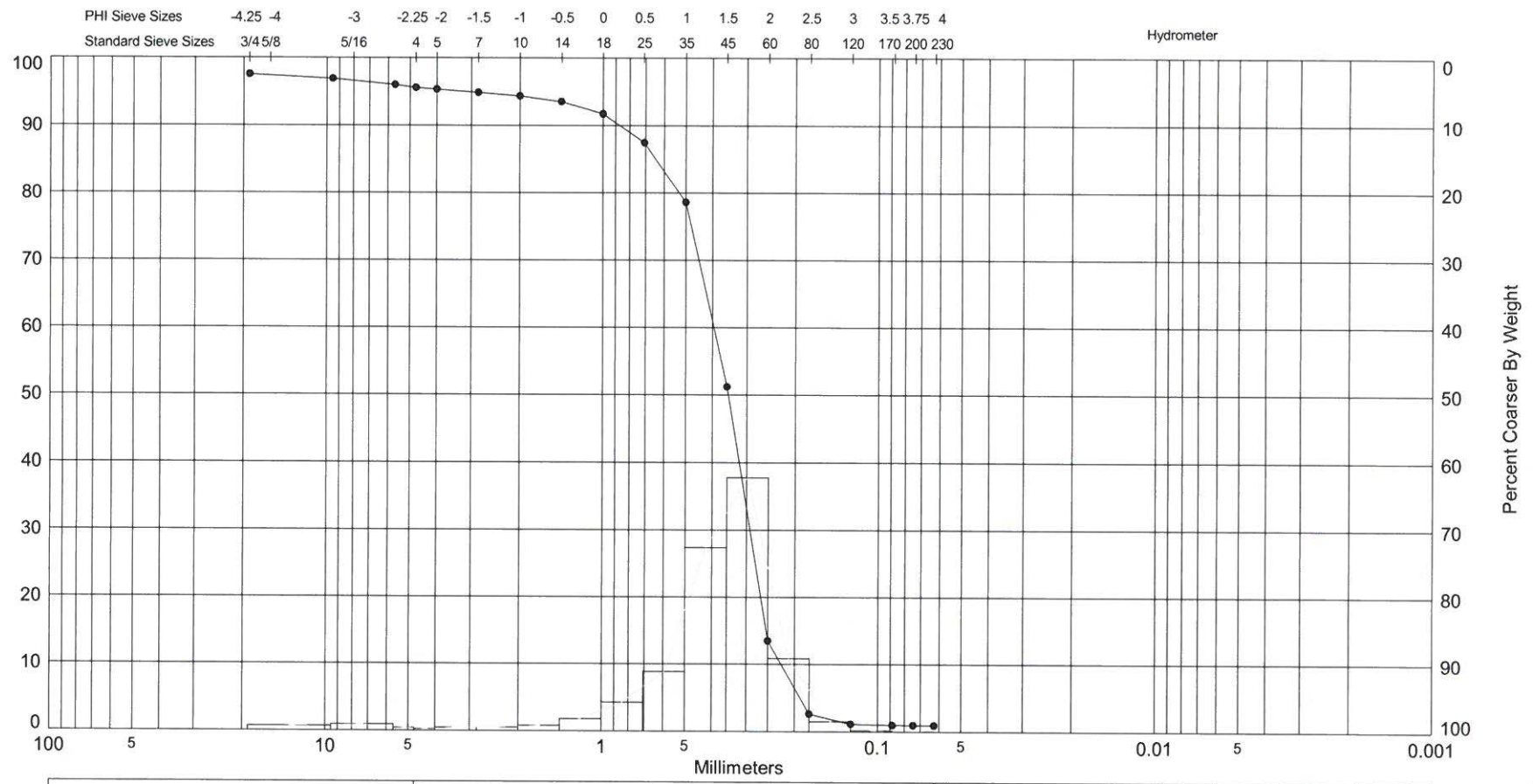
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
372.75	369.25	0.00	0.00	#200 - 0.97 #230 - 0.94	0.90	32.00	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		2.48	9.26	2.48
3/8"	-3.25	9.51	2.40	0.64	11.66	3.13
3.5	-2.50	5.66	3.37	0.90	15.03	4.03
4	-2.25	4.76	1.57	0.42	16.60	4.45
5	-2.00	4.00	0.90	0.24	17.50	4.69
7	-1.50	2.83	1.72	0.46	19.22	5.16
10	-1.00	2.00	1.93	0.52	21.15	5.67
14	-0.50	1.41	2.99	0.80	24.14	6.48
18	0.00	1.00	6.68	1.79	30.82	8.27
25	0.50	0.71	15.91	4.27	46.73	12.54
35	1.00	0.50	32.96	8.84	79.69	21.38
45	1.50	0.35	102.20	27.42	181.89	48.80
60	2.00	0.25	140.75	37.76	322.64	86.56
80	2.50	0.18	40.35	10.82	362.99	97.38
120	3.00	0.13	5.53	1.48	368.52	98.87
170	3.50	0.09	0.56	0.15	369.08	99.02
200	3.75	0.07	0.06	0.02	369.14	99.03
230	4.00	0.06	0.11	0.03	369.25	99.06

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.39	1.97	1.85	1.52	1.07	0.70	-1.67

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.17	0.44	0.94	-2.08	10.76

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/15/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13923	—●—		SW	#200 - 0.97 #230 - 0.94	0.90	32.00	0.35	0.44	-2.08	10.76	0.94

Comments: Sample 5-2 / R-113+406 Visual Shell 30%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

AMERICAN VIBRACORE SERVICES

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SIEVE ANALYSIS_BLIND PASS MAINTENANCE DREDGING 2017.GPJ_FL DEP.ROSS.GDT_8/15/17

Granularmetric Report

Depths and elevations based on measured values

Project Name: Blind Pass Maintenance Dredging 2017

Sample Name: 13924

Analysis Date: 07-03-17

Analyzed By: DM

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1215 Wallace Drive
Delray Beach, FL 33444
ph 561-372-0500
fax 561-372-0501

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 6-2 / R-114 Visual Shell 35%

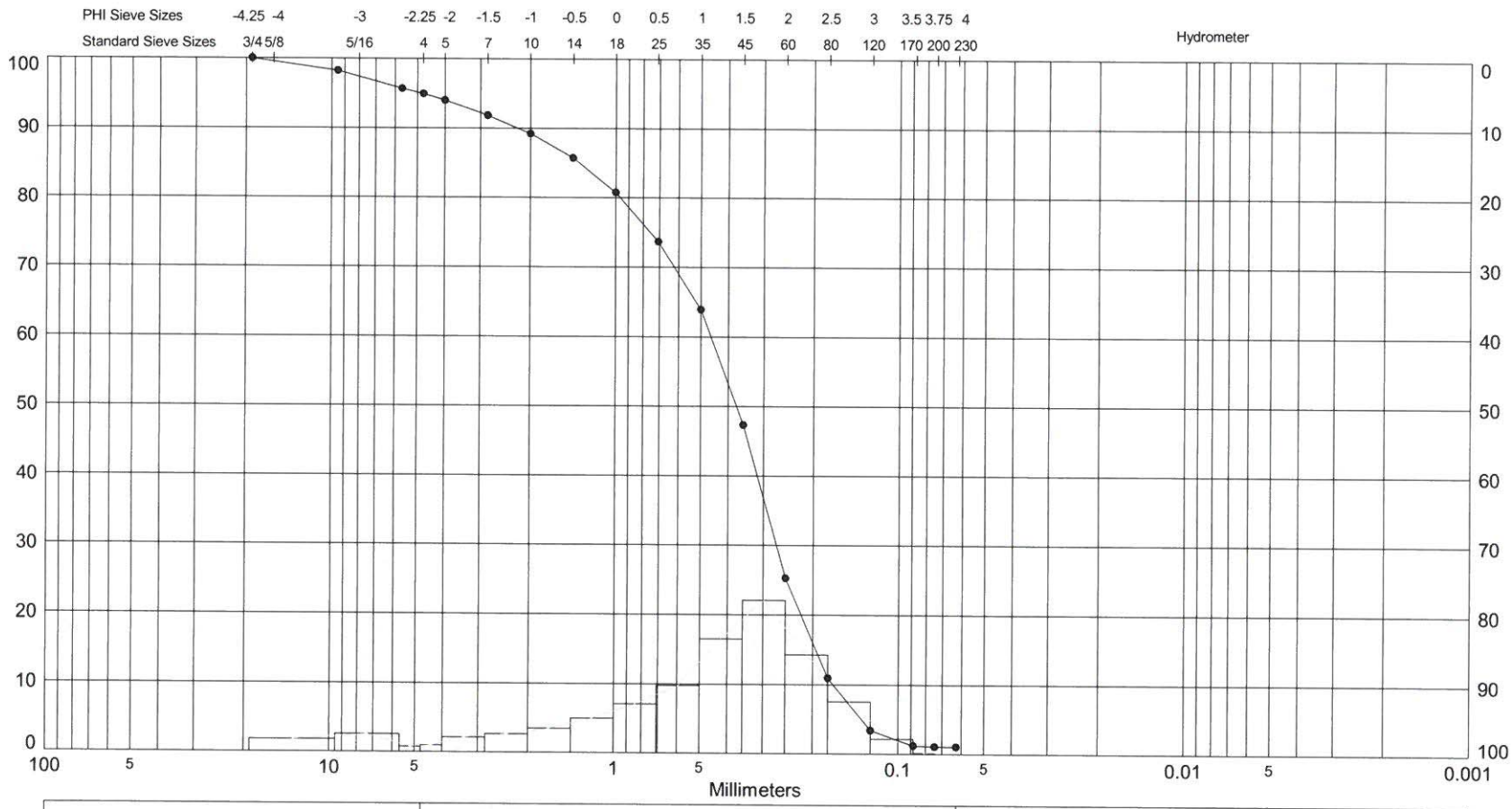
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
290.49	287.44	0.04	0.00	#200 - 1.08 #230 - 1.06	1.00	48.50	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	5.16	1.78	5.16	1.78
3.5	-2.50	5.66	7.42	2.55	12.58	4.33
4	-2.25	4.76	2.19	0.75	14.77	5.08
5	-2.00	4.00	2.73	0.94	17.50	6.02
7	-1.50	2.83	6.20	2.13	23.70	8.16
10	-1.00	2.00	7.68	2.64	31.38	10.80
14	-0.50	1.41	10.03	3.45	41.41	14.26
18	0.00	1.00	14.44	4.97	55.85	19.23
25	0.50	0.71	20.54	7.07	76.39	26.30
35	1.00	0.50	28.44	9.79	104.83	36.09
45	1.50	0.35	48.11	16.56	152.94	52.65
60	2.00	0.25	64.20	22.10	217.14	74.75
80	2.50	0.18	41.51	14.29	258.65	89.04
120	3.00	0.13	21.95	7.56	280.60	96.60
170	3.50	0.09	6.35	2.19	286.95	98.78
200	3.75	0.07	0.39	0.13	287.34	98.92
230	4.00	0.06	0.06	0.02	287.40	98.94

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.89	2.32	2.01	1.42	0.41	-0.32	-2.28

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.02	0.49	1.49	-1.24	4.31

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13924	—●—		SW	#200 - 1.08 #230 - 1.06	1.00	48.50	0.37	0.49	-1.24	4.31	1.49

Comments: Sample 6-2 / R-114 Visual Shell 35%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

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Granularmetric Report

Depths and elevations based on measured values

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Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13925
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 7-2 / R-114+190 Visual Shell 40%

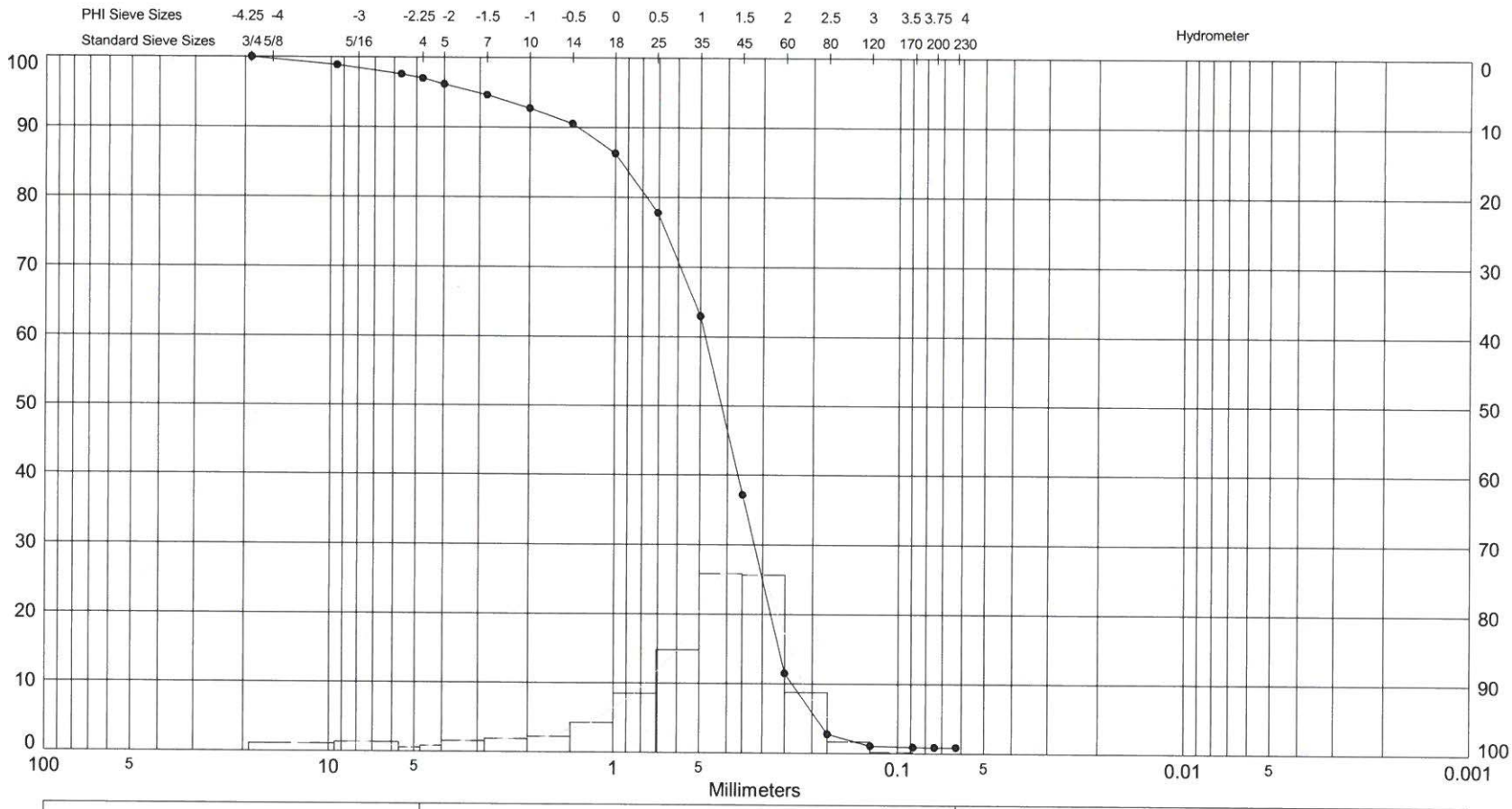
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
271.51	269.12	0.00	0.00	#200 - 0.89 #230 - 0.88	1.00	53.60	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	3.00	1.10	3.00	1.10
3.5	-2.50	5.66	3.56	1.31	6.56	2.42
4	-2.25	4.76	1.65	0.61	8.21	3.02
5	-2.00	4.00	2.27	0.84	10.48	3.86
7	-1.50	2.83	4.16	1.53	14.64	5.39
10	-1.00	2.00	5.12	1.89	19.76	7.28
14	-0.50	1.41	5.96	2.20	25.72	9.47
18	0.00	1.00	11.51	4.24	37.23	13.71
25	0.50	0.71	23.07	8.50	60.30	22.21
35	1.00	0.50	40.25	14.82	100.55	37.03
45	1.50	0.35	70.14	25.83	170.69	62.87
60	2.00	0.25	69.65	25.65	240.34	88.52
80	2.50	0.18	23.75	8.75	264.09	97.27
120	3.00	0.13	4.48	1.65	268.57	98.92
170	3.50	0.09	0.47	0.17	269.04	99.09
200	3.75	0.07	0.04	0.01	269.08	99.11
230	4.00	0.06	0.04	0.01	269.12	99.12

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.37	1.91	1.74	1.25	0.59	0.13	-1.63

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.97	0.51	1.17	-1.7	6.5

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13925	—●—		SW	#200 - 0.89 #230 - 0.88	1.00	53.60	0.42	0.51	-1.7	6.5	1.17

Comments: Sample 7-2 / R-114+190 Visual Shell 40%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

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1215 Wallace Drive
Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

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SERVICES
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fax 561-372-0501

Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13926
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 8-2 / R-116 Visual Shell 50%

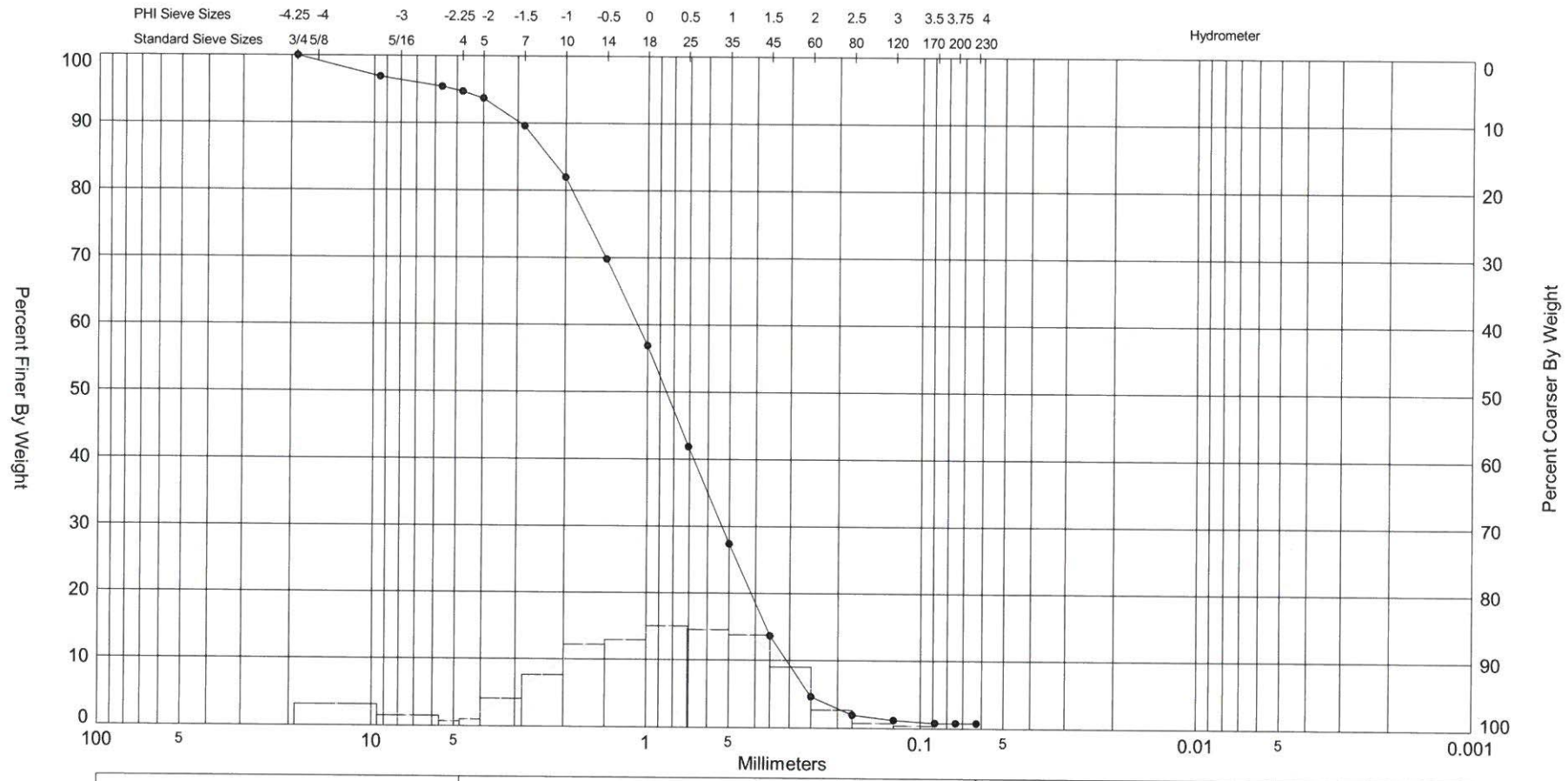
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
189.32	187.86	0.01	0.00	#200 - 0.79 #230 - 0.78	1.40	77.30	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	5.90	3.12	5.90	3.12
3.5	-2.50	5.66	2.81	1.48	8.71	4.60
4	-2.25	4.76	1.34	0.71	10.05	5.31
5	-2.00	4.00	1.92	1.01	11.97	6.32
7	-1.50	2.83	7.75	4.09	19.72	10.42
10	-1.00	2.00	14.44	7.63	34.16	18.04
14	-0.50	1.41	23.04	12.17	57.20	30.21
18	0.00	1.00	24.43	12.90	81.63	43.12
25	0.50	0.71	28.42	15.01	110.05	58.13
35	1.00	0.50	27.44	14.49	137.49	72.62
45	1.50	0.35	26.02	13.74	163.51	86.37
60	2.00	0.25	17.07	9.02	180.58	95.38
80	2.50	0.18	5.04	2.66	185.62	98.05
120	3.00	0.13	1.43	0.76	187.05	98.80
170	3.50	0.09	0.74	0.39	187.79	99.19
200	3.75	0.07	0.04	0.02	187.83	99.21
230	4.00	0.06	0.02	0.01	187.85	99.22

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
1.98	1.41	1.09	0.23	-0.71	-1.13	-2.36

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.08	0.95	1.34	-0.68	3.61

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13926	—●—		SW	#200 - 0.79 #230 - 0.78	1.40	77.30	0.85	0.95	-0.68	3.61	1.34

Comments: Sample 8-2 / R-116 Visual Shell 50%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

AMERICAN VIBRACORE SERVICES

American Vibracore Services, Inc.
1215 Wallace Drive
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Granularmetric Report

Depths and elevations based on measured values

Project Name: Blind Pass Maintenance Dredging 2017

Sample Name: 13927

Analysis Date: 07-03-17

Analyzed By: DM

AMERICAN VIBRACORE SERVICES

American Vibracores Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444
ph 561-372-0500
fax 561-372-0501

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 9-2 / R-116+500 Visual Shell 35%

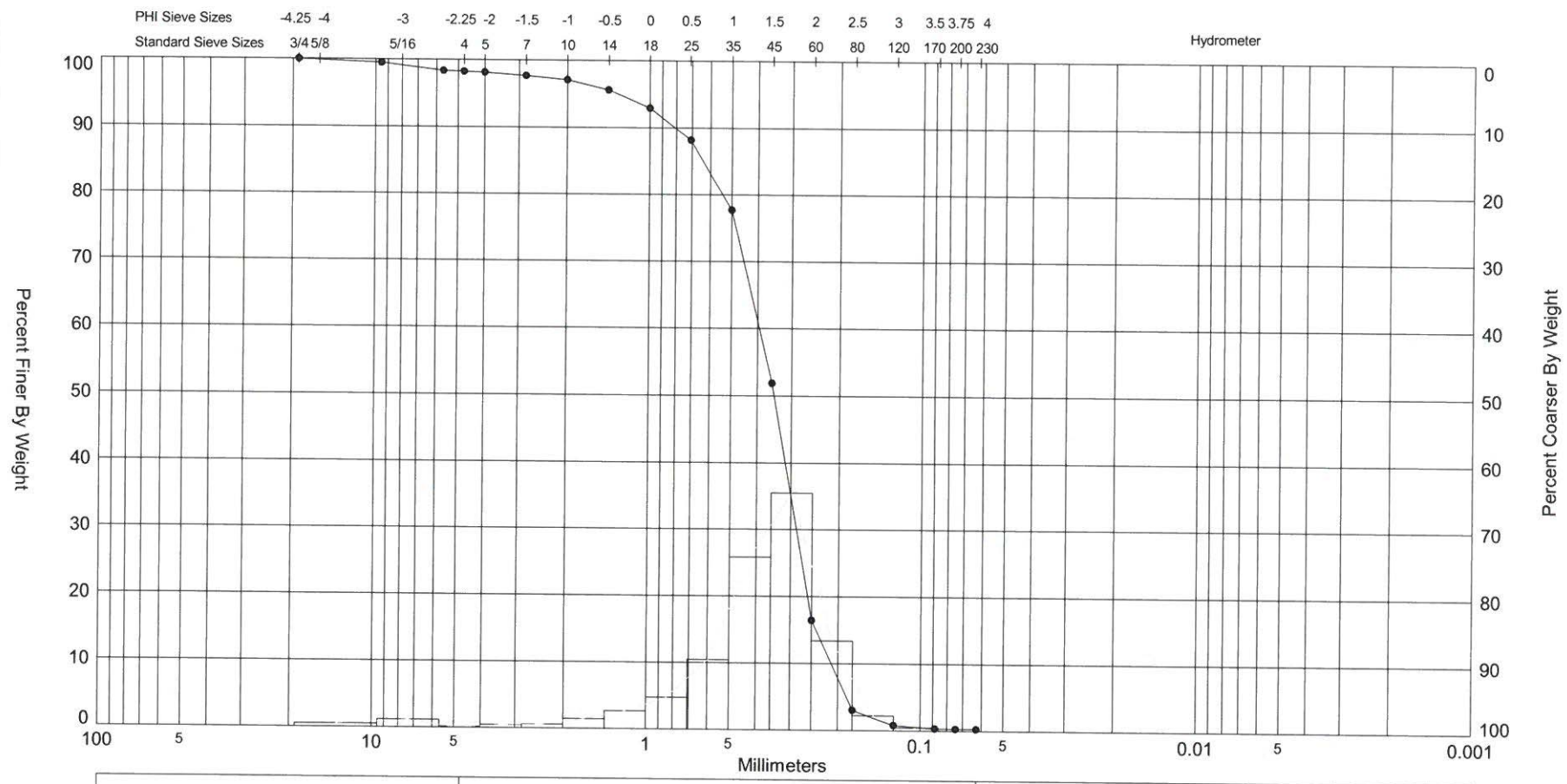
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
275.96	275.18	0.00	0.00	#200 - 0.30 #230 - 0.28	1.10	40.60	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	1.44	0.52	1.44	0.52
3.5	-2.50	5.66	3.20	1.16	4.64	1.68
4	-2.25	4.76	0.29	0.11	4.93	1.79
5	-2.00	4.00	0.31	0.11	5.24	1.90
7	-1.50	2.83	1.31	0.47	6.55	2.37
10	-1.00	2.00	1.65	0.60	8.20	2.97
14	-0.50	1.41	4.02	1.46	12.22	4.43
18	0.00	1.00	7.38	2.67	19.60	7.10
25	0.50	0.71	13.08	4.74	32.68	11.84
35	1.00	0.50	28.81	10.44	61.49	22.28
45	1.50	0.35	71.27	25.83	132.76	48.11
60	2.00	0.25	97.84	35.45	230.60	83.56
80	2.50	0.18	36.94	13.39	267.54	96.95
120	3.00	0.13	6.18	2.24	273.72	99.19
170	3.50	0.09	1.28	0.46	275.00	99.65
200	3.75	0.07	0.13	0.05	275.13	99.70
230	4.00	0.06	0.05	0.02	275.18	99.72

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.43	2.02	1.88	1.53	1.05	0.70	-0.39

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	1.33	0.40	0.96	-2.23	10.6

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13927	—●—		SW	#200 - 0.30 #230 - 0.28	1.10	40.60	0.35	0.40	-2.23	10.6	0.96

Comments: Sample 9-2 / R-116+500 Visual Shell 35%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

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American Vibracore Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

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SERVICES
American Vibracores Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444
ph 561-372-0500
fax 561-372-0501

Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13928
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 10-2 / R-117 Visual Shell 30%

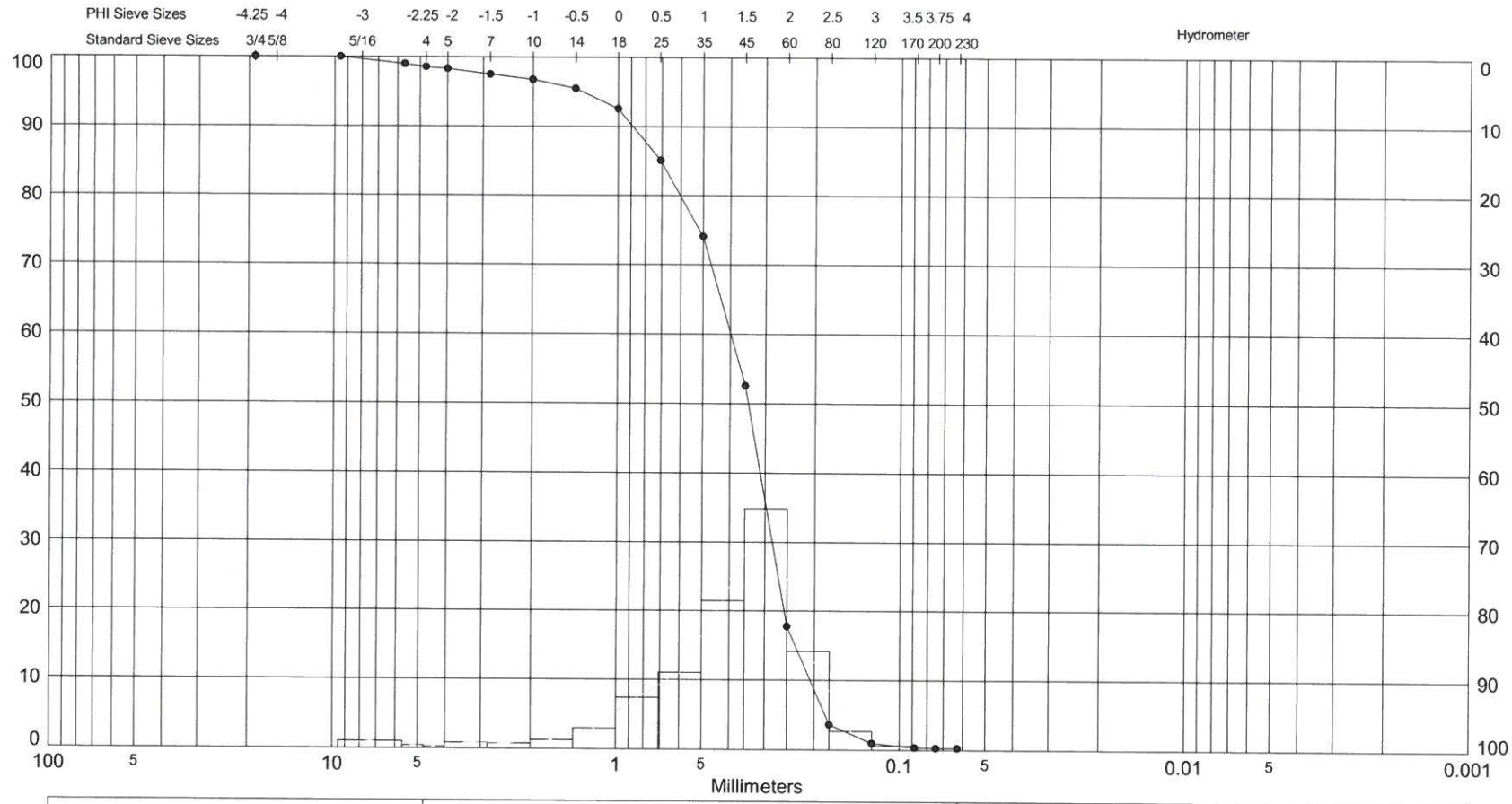
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
262.84	262.10	0.00	0.00	#200 - 0.30 #230 - 0.28	1.00	40.40	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	2.67	1.02	2.67	1.02
4	-2.25	4.76	1.12	0.43	3.79	1.44
5	-2.00	4.00	0.64	0.24	4.43	1.69
7	-1.50	2.83	2.16	0.82	6.59	2.51
10	-1.00	2.00	2.01	0.76	8.60	3.27
14	-0.50	1.41	3.29	1.25	11.89	4.52
18	0.00	1.00	7.71	2.93	19.60	7.46
25	0.50	0.71	19.53	7.43	39.13	14.89
35	1.00	0.50	28.97	11.02	68.10	25.91
45	1.50	0.35	56.44	21.47	124.54	47.38
60	2.00	0.25	91.61	34.85	216.15	82.24
80	2.50	0.18	37.20	14.15	253.35	96.39
120	3.00	0.13	7.03	2.67	260.38	99.06
170	3.50	0.09	1.51	0.57	261.89	99.64
200	3.75	0.07	0.16	0.06	262.05	99.70
230	4.00	0.06	0.05	0.02	262.10	99.72

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.45	2.06	1.90	1.54	0.96	0.55	-0.42

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	1.31	0.40	0.95	-1.7	7.42

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13928	—●—		SW	#200 - 0.30 #230 - 0.28	1.00	40.40	0.34	0.40	-1.7	7.42	0.95

Comments: Sample 10-2 / R-117 Visual Shell 30%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

AMERICAN VIBRACORE SERVICES

American Vibracore Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

AMERICAN VIBRACORE
SERVICES
American Vibracores Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444
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Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13929
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 11-2 / R-117+380 Visual Shell 30%

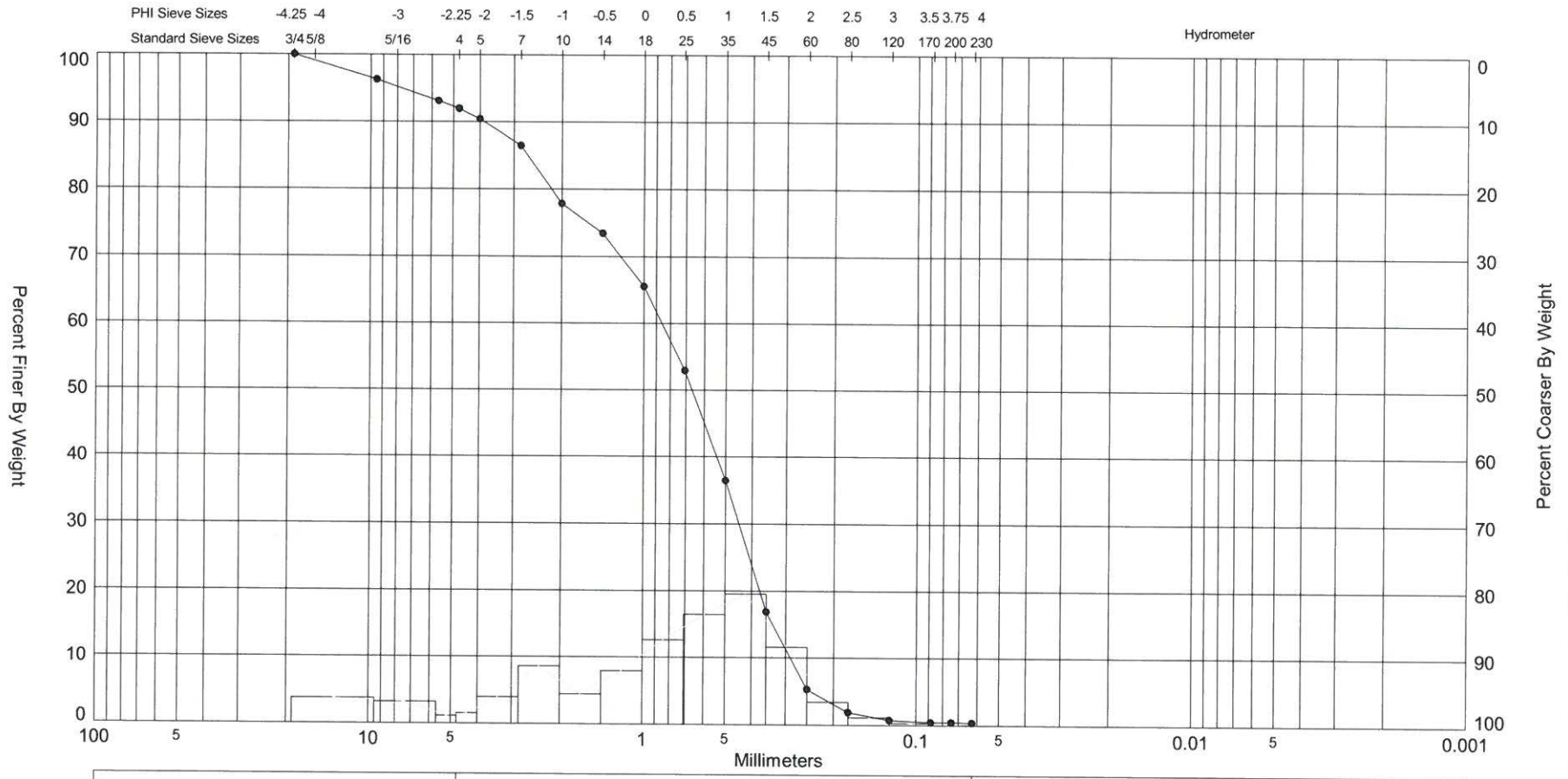
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
233.37	232.43	0.00	0.00	#200 - 0.44 #230 - 0.40	1.50	67.00	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	8.77	3.76	8.77	3.76
3.5	-2.50	5.66	7.45	3.19	16.22	6.95
4	-2.25	4.76	2.63	1.13	18.85	8.08
5	-2.00	4.00	3.54	1.52	22.39	9.59
7	-1.50	2.83	9.21	3.95	31.60	13.54
10	-1.00	2.00	20.05	8.59	51.65	22.13
14	-0.50	1.41	10.35	4.44	62.00	26.57
18	0.00	1.00	18.45	7.91	80.45	34.47
25	0.50	0.71	29.49	12.64	109.94	47.11
35	1.00	0.50	38.44	16.47	148.38	63.58
45	1.50	0.35	45.59	19.54	193.97	83.12
60	2.00	0.25	27.01	11.57	220.98	94.69
80	2.50	0.18	8.00	3.43	228.98	98.12
120	3.00	0.13	2.62	1.12	231.60	99.24
170	3.50	0.09	0.70	0.30	232.30	99.54
200	3.75	0.07	0.04	0.02	232.34	99.56
230	4.00	0.06	0.09	0.04	232.43	99.60

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.05	1.54	1.29	0.59	-0.68	-1.36	-2.96

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.2	0.87	1.5	-0.89	3.27

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13929	—●—		SW	#200 - 0.44 #230 - 0.40	1.50	67.00	0.66	0.87	-0.89	3.27	1.5

Comments: Sample 11-2 / R-117+380 Visual Shell 30%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

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American Vibracore Services, Inc.
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Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

AMERICAN VIBRACORE
SERVICES
American Vibracores Services, Inc.
1215 Wallace Drive
Delray Beach, FL 33444
ph 561-372-0500
fax 561-372-0501

Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13930
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 12-2 / R-117+800 Visual Shell 50%

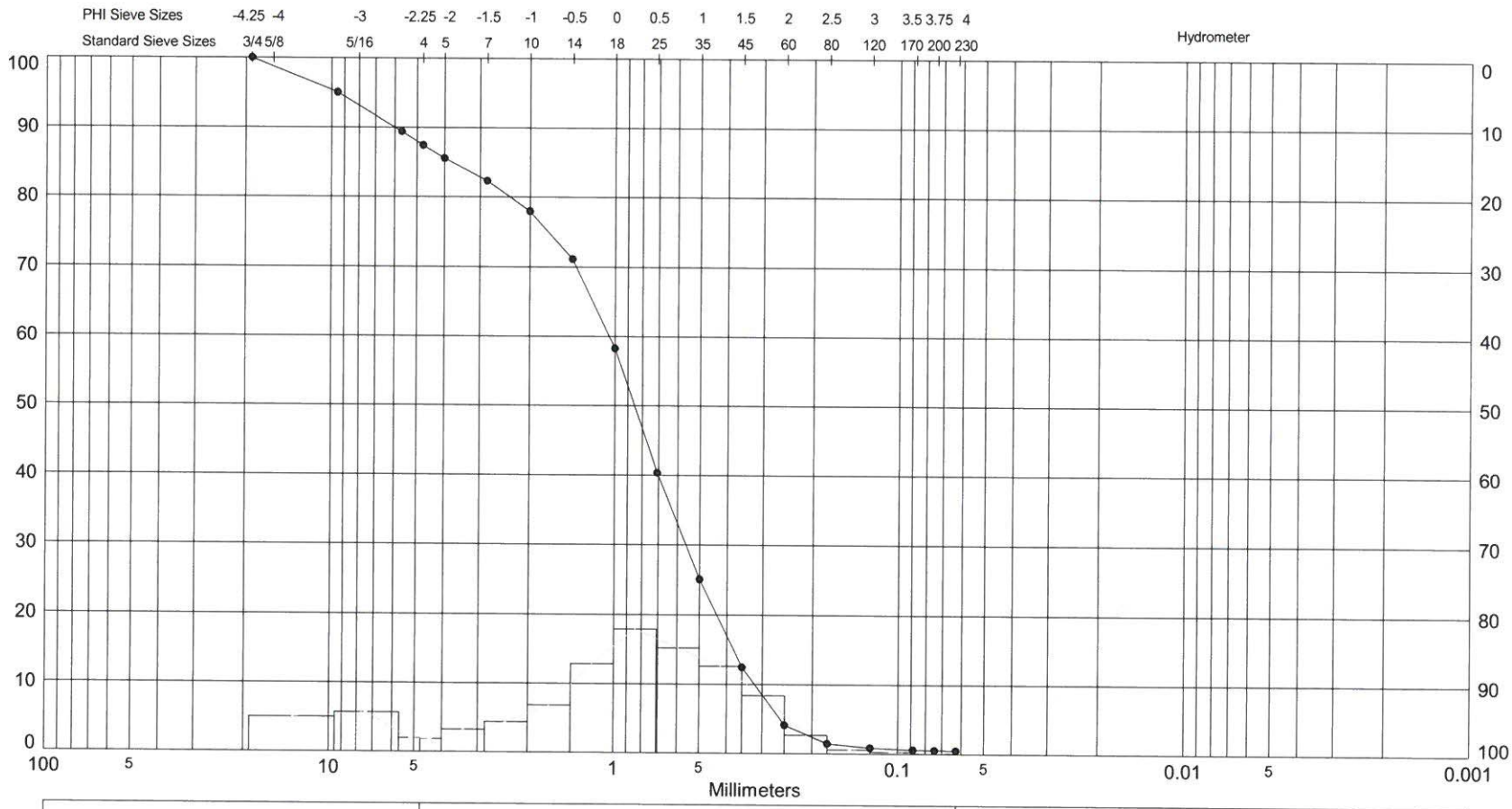
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
220.16	219.06	0.01	0.00	#200 - 0.53 #230 - 0.50	1.10	79.90	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	10.94	4.97	10.94	4.97
3.5	-2.50	5.66	12.43	5.65	23.37	10.62
4	-2.25	4.76	4.32	1.96	27.69	12.58
5	-2.00	4.00	4.08	1.85	31.77	14.43
7	-1.50	2.83	7.13	3.24	38.90	17.67
10	-1.00	2.00	9.61	4.37	48.51	22.03
14	-0.50	1.41	15.08	6.85	63.59	28.88
18	0.00	1.00	28.30	12.85	91.89	41.74
25	0.50	0.71	39.44	17.91	131.33	59.65
35	1.00	0.50	33.58	15.25	164.91	74.90
45	1.50	0.35	27.78	12.62	192.69	87.52
60	2.00	0.25	18.43	8.37	211.12	95.89
80	2.50	0.18	5.84	2.65	216.96	98.55
120	3.00	0.13	1.28	0.58	218.24	99.13
170	3.50	0.09	0.60	0.27	218.84	99.40
200	3.75	0.07	0.16	0.07	219.00	99.47
230	4.00	0.06	0.05	0.02	219.05	99.50

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
1.95	1.36	1.00	0.23	-0.78	-1.76	-3.25

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	-0.08	1.06	1.53	-0.79	3.05

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13930	—●—		SW	#200 - 0.53 #230 - 0.50	1.10	79.90	0.85	1.1	-0.79	3.05	1.53

Comments: Sample 12-2 / R-117+800 Visual Shell 50%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

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Delray Beach, FL 33444

Granularmetric Report

Depths and elevations based on measured values

AMERICAN VIBRACORE
SERVICES
American Vibracores Services, Inc.
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Project Name: Blind Pass Maintenance Dredging 2017
Sample Name: 13931
Analysis Date: 07-03-17
Analyzed By: DM

Latitude:	Longitude:	Coordinate System:	Elevation (ft):

USCS:	Munsell:	Comments:
SW	Wet - 10YR-6/1	Sample 13-2 / R-118 Visual Shell 40%

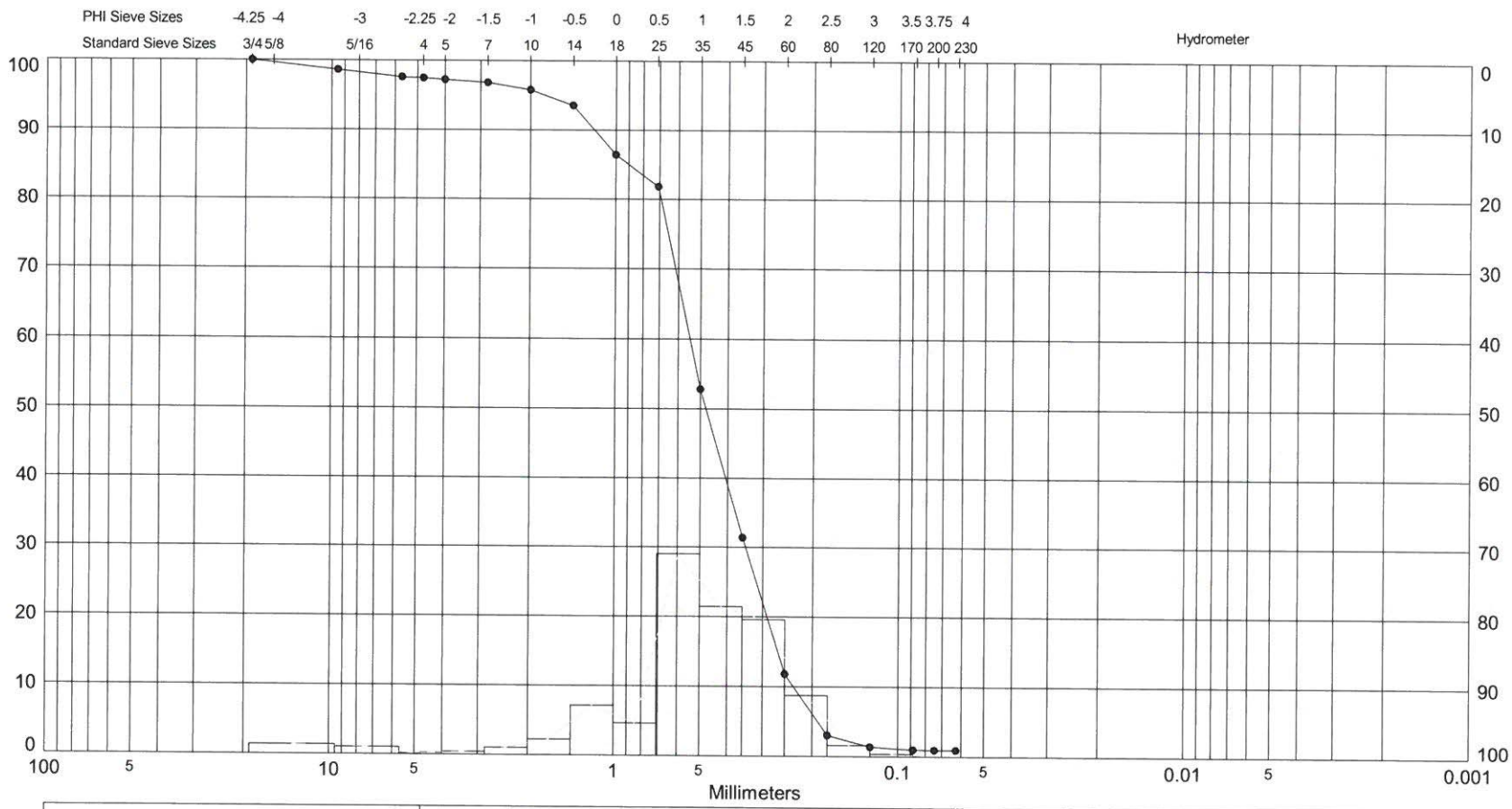
Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
209.15	207.17	0.00	0.00	#200 - 0.96 #230 - 0.95	1.50	64.50	

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
3/4"	-4.25	19.03		0.00	0.00	0.00
3/8"	-3.25	9.51	2.87	1.37	2.87	1.37
3.5	-2.50	5.66	2.15	1.03	5.02	2.40
4	-2.25	4.76	0.28	0.13	5.30	2.53
5	-2.00	4.00	0.50	0.24	5.80	2.77
7	-1.50	2.83	0.82	0.39	6.62	3.17
10	-1.00	2.00	2.16	1.03	8.78	4.20
14	-0.50	1.41	4.69	2.24	13.47	6.44
18	0.00	1.00	14.90	7.12	28.37	13.56
25	0.50	0.71	9.63	4.60	38.00	18.17
35	1.00	0.50	60.70	29.02	98.70	47.19
45	1.50	0.35	44.86	21.45	143.56	68.64
60	2.00	0.25	40.93	19.57	184.49	88.21
80	2.50	0.18	18.32	8.76	202.81	96.97
120	3.00	0.13	3.42	1.64	206.23	98.60
170	3.50	0.09	0.79	0.38	207.02	98.98
200	3.75	0.07	0.12	0.06	207.14	99.04
230	4.00	0.06	0.03	0.01	207.17	99.05

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.39	1.89	1.66	1.07	0.62	0.26	-0.82

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.96	0.51	1.07	-1.75	8.22

GRANULARMETRIC REPORT BLIND PASS MAINTENANCE DREDGING 2017.GPJ FL DEP ROSS.GDT 8/11/17



Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
13931	—●—		SW	#200 - 0.96 #230 - 0.95	1.50	64.50	0.48	0.51	-1.75	8.22	1.07

Comments: Sample 13-2 / R-118 Visual Shell 40%

Depths and elevations based on measured values

Sample Information	
Project Name:	Blind Pass Maintenance Dredging 2017
Analysis Date:	07-03-17
Analyzed By:	DM
Latitude:	
Longitude:	
Horizontal System:	
Vertical System:	

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