

**KILL DEVIL HILLS STATION INFORMATION****NOVEMBER 2017****DATUMS: NAD83/2011 & NAVD88**

<b>STATION</b>	<b>NORTHING</b>	<b>EASTING</b>	<b>ELEVATION</b>	<b>AZIMUTH</b>
199+93.01	854433.71	2980957.84	9.31	59.58
209+74.44	853579.14	2981440.37	8.82	60.53
219+99.94	852686.23	2981944.55	9.58	60.53
229+83.39	851830.15	2982428.55	8.16	60.52
240+41.84	850908.80	2982949.45	9.03	60.52
249+81.53	850076.05	2983384.80	8.64	61.90
260+17.44	849165.95	2983879.57	6.63	61.90
269+49.25	848341.66	2984314.02	6.77	62.20
279+80.81	847429.13	2984795.03	7.03	62.20
289+99.14	846547.02	2985305.30	6.28	62.20
299+92.48	845649.70	2985733.15	6.43	62.20
309+71.20	844785.81	2986193.06	5.56	61.97
320+05.37	843872.99	2986679.03	5.57	61.97
329+88.80	843003.79	2987138.95	5.68	62.10
340+20	842092.34	2987621.23	N/A	62.12
349+70	841269.59	2988097.3	N/A	62.12
359+83	840357.49	2988539.16	N/A	62.12
369+89	839485.48	2989042.4	N/A	62.12

**KITTY HAWK STATION INFORMATION****NOVEMBER 2017****DATUMS: NAD83/2011 & NAVD88**

<b>STATION</b>	<b>NORTHING</b>	<b>EASTING</b>	<b>ELEVATION</b>	<b>AZIMUTH</b>
0+00.00	871890.80	2971224.20	13.72	62.60
9+99.90	871003.30	2971685.80	9.51	62.60
-10+00	872720.97	2970653.00	100	62.60
-20+00	873607.16	2970189.67	100	62.60
20+02.68	870116.70	2972153.20	10.41	62.60
30+05.52	869230.00	2972621.70	9.78	62.20
40+23.88	868329.70	2973097.50	11.46	62.20
50+28.29	867441.70	2973566.70	11.17	62.20
60+50.00	866538.40	2974044.00	9.47	62.20
70+02.90	865695.80	2974489.10	9.25	62.20
80+15.19	864800.80	2974962.00	9.51	62.20
89+56.91	863968.20	2975401.90	9.55	62.20
99+99.71	863052.20	2975900.20	9.53	61.50
109+99.46	862189.90	2976406.10	9.84	59.60
119+99.14	861327.70	2976911.90	10.55	59.60
130+33.04	860436.00	2977435.10	10.3	59.60
138+27.64	859735.48	2977811.33	13.62	59.60
149+99.46	858740.05	2978430.26	9.68	59.60
159+99.55	857895.27	2978966.59	10.64	59.60
169+70.21	857040.44	2979427.66	8.91	59.60
179+87.62	856163.07	2979942.69	9.86	59.60
189+87.10	855301.16	2980448.64	9.45	59.60

<b>TOWN OF DUCK STATION INFORMATION</b>			
<b>NOVEMBER 2017</b>			
<b>DATUMS: NAD83/90 &amp; NAVD88</b>			
<b>STATION</b>	<b>NORTHING</b>	<b>EASTING</b>	<b>AZIMUTH</b>
PI-17	920098.86	2950657.32	70
PI-18	919175.36	2951025.99	70
D-01	918267.75	2951387.52	70
D-02	917384.44	2951733.76	70
D-03	916429.37	2952102.95	70
D-04	915495.29	2952464.03	70
D-05	914597.97	2952849.30	70
D-06	913696.93	2953224.38	70
D-07	912798.76	2953607.33	70
D-08	911897.95	2953983.04	70
D-09	910994.82	2954356.65	70
D-10	910066.74	2954759.12	70
D-11	909133.14	2955158.05	70
D-12	908412.53	2955461.41	70
D-13	907478.35	2955874.29	70
D-14	906578.33	2956252.15	70
D-15	905677.78	2956628.57	70
D-16	904767.65	2956978.72	70
D-17	903863.92	2957333.66	70
D-18	902886.47	2957718.79	70
D-19	902331.03	2957932.45	70
D-20	901760.74	2958139.73	70
D-21	900958.69	2958472.08	70
D-22	900228.83	2958754.03	70
D-23	899515.64	2958992.70	70
D-24	898739.78	2959267.16	70
D-25	897824.26	2959601.68	70
D-26	896902.26	2959928.60	70
D-27	895981.88	2960250.61	70
D-28	895072.97	2960604.07	70
D-29	894166.25	2960963.56	70
D-30	893257.57	2961317.69	70
D-31	892350.69	2961676.73	70
D-32	891379.42	2962078.13	70
D-33	890553.16	2962439.37	70
D-34	889616.07	2962839.65	70

<b>TOWN OF SOUTHERN SHORES STATION INFORMATION</b>			
<b>NOVEMBER 2017</b>			
<b>DATUMS: NAD83/90 &amp; NAVD88</b>			
<b>STATION</b>	<b>NORTHING</b>	<b>EASTING</b>	<b>AZIMUTH</b>
-187+14	888697.70	2963230.40	70.00
-177+13	887775.80	2963619.00	70.00
-170+56	887172.90	2963880.50	66.60
-163+99	886569.90	2964142.00	66.60
-157+41	885966.90	2964403.50	66.60
-150	885364.00	2964665.00	65.31
-140	884444.00	2965116.00	65.31
-130	883452.00	2965239.00	65.31
-120	882604.00	2965920.00	65.31
-110	881697.00	2966366.00	62.57
-100	880778.00	2966790.00	62.57
-90	879895.00	2967110.00	62.57
-80	878988.00	2967533.00	62.57
-70	878106.00	2967951.00	62.57
-60+00	877175.00	2968381.00	62.57
-50+00	876228.00	2968838.00	62.57
-40+00	875440.00	2969249.00	62.57
-30+00	874496.08	2969731.60	62.57
-20+00	873607.16	2970189.67	62.57
-10+00	872720.97	2970653.00	62.57



*2017 Dare County, NC Post Construction and Monitoring Beach Profile Survey Report:  
Town of Duck, Town of Southern Shores, Town of Kitty Hawk, and Town of Kill Devil Hills*

<b>CONTROL MONUMENT USED BY APTIM FOR 2017 DARE COUNTY ANNUAL MONITORING TOPOGRAPHIC AND HYDROGRAPHIC SURVEY REPORT NOVEMBER 2017</b>	
<b>DATUMS: NAD83/2011- NAVD1988</b>	
<b>Designation</b>	ARCH
<b>Stamping</b>	ARCH 2005
<b>Northing</b>	854412.25
<b>Easting</b>	2979783.79
<b>Horizontal Root Mean Square Error</b>	0.123
<b>Elevation</b>	11.64
<b>Vertical Root Mean Square Error</b>	0.004
<b>Description</b>	Located about 3.2 miles NW of Kill Devil Hills and 4.1 miles SSW of Southern Shores. On US 158 Bypass , 2.4 miles west from the main entrance to The Wright Brothers Memorial to Arch Street, in the northwest quadrant. 57.2 ft. West-Southwest of the centerline of US 158 Southbound Lanes. The Disk is a commemorative of the Wright Brothers first flight NGS, NCGS, NOAA, and NPS agency inscriptions.



Monument: L230



Location Verification: L230

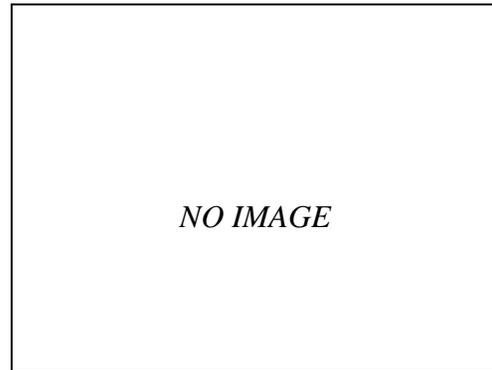
<b>Mean of Inverse Shots - Published Versus APTIM Found</b>				
Monument	No. of Shots	$\Delta N$	$\Delta E$	$\Delta Z$
ARCH	16	-0.01	-0.01	-0.06



<b>CONTROL MONUMENT USED BY APTIM FOR 2017 DARE COUNTY ANNUAL MONITORING TOPOGRAPHIC AND HYDROGRAPHIC SURVEY REPORT FEBRUARY 2017</b>	
<b>DATUMS: NAD83/2011 - NAVD1988</b>	
<b>Designation</b>	C255
<b>Stamping</b>	C255 1981
<b>Northing</b>	900856.11
<b>Easting</b>	2958600.06
<b>Horizontal Root Mean Square Error</b>	0.106
<b>Elevation</b>	16.89
<b>Vertical Root Mean Square Error</b>	0.014
<b>Description</b>	A National Geodetic Survey pin inside a protective casing with lid approximately 3 inches below ground and located between the two steps on the West side of the Army Corp of Engineer's Field Research Facility (1261 Duck Road), approximately 355 feet East of the main parking lot gate, 15 feet South of the Northerly steps, 15 feet North of the Southerly steps, and 2.7 feet West of the flag pole.



Monument: C255



Location Verification: C255

<b>Mean of Inverse Shots - Published Versus APTIM Found</b>				
Monument	No. of Shots	$\Delta N$	$\Delta E$	$\Delta Z$
C255	28	0.01	0.06	-0.01

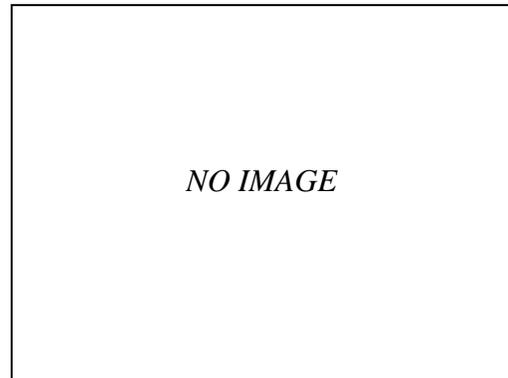


2017 Dare County, NC Post Construction and Monitoring Beach Profile Survey Report:  
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DATUMS: NAD83/2011 - NAVD1988	
<b>Designation</b>	CAFFEY
<b>Stamping</b>	CAFFEY 1935
<b>Northing</b>	915308.87
<b>Easting</b>	2952084.11
<b>Horizontal Root Mean Square Error</b>	0.254
<b>Elevation</b>	1.99
<b>Vertical Root Mean Square Error</b>	0.051
<b>Description</b>	A U.S. Coast & Geodetic Survey disk in concrete located in thick vegetation approximately 140 feet West of Duck Road and 40 feet South of a parking lot for 1566 Duck Road



Monument: CAFFEY



Location Verification: CAFFEY

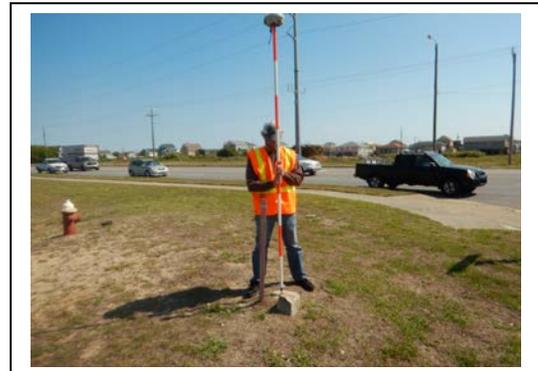
Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	$\Delta N$	$\Delta E$	$\Delta Z$
CAFFEY	19	-0.01	0.01	0.05



<b>CONTROL MONUMENT USED BY APTIM FOR 2017 DARE COUNTY ANNUAL MONITORING TOPOGRAPHIC AND HYDROGRAPHIC SURVEY REPORT NOVEMBER 2017</b>	
<b>DATUMS: NAD83/2011- NAVD1988</b>	
<b>Designation</b>	KITTY
<b>Stamping</b>	KITTY 1962
<b>Northing</b>	849159.56
<b>Easting</b>	298928.60
<b>Horizontal Root Mean Square Error</b>	0.147
<b>Elevation</b>	9.17
<b>Vertical Root Mean Square Error</b>	0.036
<b>Description</b>	Located about 0.65 miles east of the post office in kitty hawk. A Standard disk set in a 12x12 inch concrete monument and tamped Kitty 1962 is 12 feet east-southeast of the intersection. The mark is flush with ground.



Monument: KITTY



Location Verification: KITTY

<b>Mean of Inverse Shots – OPUS Solution Versus APTIM Found</b>				
Monument	No. of Shots	$\Delta N$	$\Delta E$	$\Delta Z$
KITTY	18	0.01	0.01	-0.03



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<b>DATUMS: NAD83/2011 - NAVD1988</b>	
<b>Designation</b>	TIDAL C
<b>Stamping</b>	865 1370 1977
<b>Northing</b>	900621.51
<b>Easting</b>	2957662.02
<b>Horizontal Root Mean Square Error</b>	0.147
<b>Elevation</b>	18.46
<b>Vertical Root Mean Square Error</b>	0.036
<b>Description</b>	A National Ocean Survey disk protected by an open pipe approximately 6 inches above ground and located on the Army Corp of Engineer's Field Research Facility property (1261 Duck Road) approximately 600 feet East of Duck Road, 300 feet West of the gazebo, and 100 feet North of the access road.



Monument: Tidal C



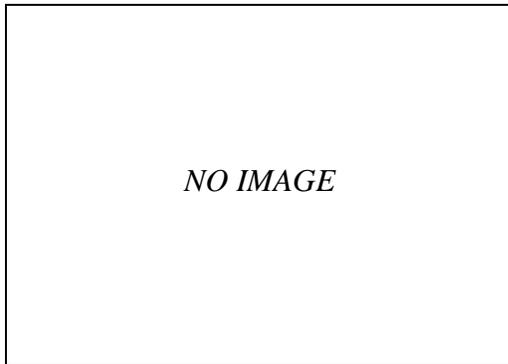
Location Verification: Tidal C

<b>Mean of Inverse Shots – OPUS Solution Versus APTIM Found</b>				
Monument	No. of Shots	$\Delta N$	$\Delta E$	$\Delta Z$
TIDAL C	12	0.01	-0.01	0.00

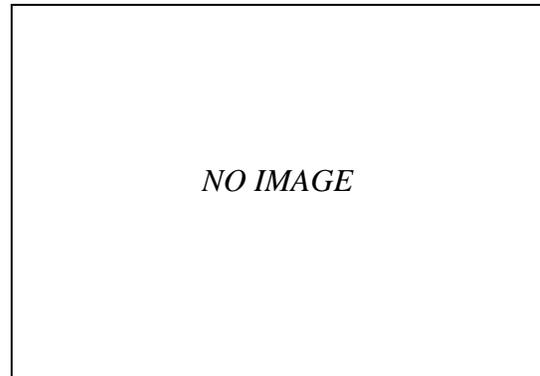


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DATUMS: NAD83/2011 - NAVD1988	
<b>Designation</b>	TIDAL D
<b>Stamping</b>	1370 D 1979
<b>Northing</b>	900450.64
<b>Easting</b>	2957190.64
<b>Horizontal Root Mean Square Error</b>	2.051
<b>Elevation</b>	18.46
<b>Vertical Root Mean Square Error</b>	0.078
<b>Description</b>	Attached to the top of a stainless steel rod driven into the ground and inside a 4-inch PVC pipe that projects 0.6 meters above ground, the disk is recessed 0.3 meters below the top of the pipe. Used as a vertical check only.



Monument: TIDAL D



Location Verification: TIDAL D

Mean of Inverse Shots – OPUS Solution Versus APTIM Found				
Monument	No. of Shots	$\Delta N$	$\Delta E$	$\Delta Z$
TIDAL D	4	1.82	-0.94	-0.07