

4293 Add'l. Work and

4293a

Wire Drag

& 4293(1922-23)

Diag. Cht. No. 904-2

4293 Add'l. Work and

4293 Add'l. Work and

4293a Wire Drag

Form 504

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

....., Director

U. S. COAST AND GEODETIC SURVEY  
L. & A.

State: Porto Rico

Acc. No.

DESCRIPTIVE REPORT

~~Topographic~~ } Sheet No. 4293 Add'l. Wk.  
Hydrographic } and  
4293a

WIRE DRAG

LOCALITY

Vieques Sound

South and East of

Gulebra I.

1925 - 1927

CHIEF OF PARTY

G. C. Mattison

GOVERNMENT PRINTING OFFICE

APR 26 9 01 AM '27

16

DEPARTMENT OF COMMERCE  
COAST AND GEODETIC SURVEY.  
E. LESTER JONES, DIRECTOR.

PORTO RICO

CULEBRA ISLAND.

A DESCRIPTIVE REPORT  
to accompany

WIRE DRAW SHEET #4293. *Add. Work.*  
*and 4293a.*

1925-1927.

S.S. RANGER

G.C. MATTHEWSON,  
Chief of Party.

DESCRIPTIVE REPORT  
to accompany  
WIRE DRAG SHEET #4293.

CULEBRA ISLAND.

This work was done following as closely as possible the instructions of the Director dated May 28, 1925.

SURVEY METHODS:

In practically all the work the dragging was done using the MARINDIN and MITCHELL as guide and end launches respectively. For part of the work in Mosquito Bay and Great Harbor, the TENDER EDNA M. was used as an end launch. In dragging the channel in the vicinity of Black Can Buoy #5 and Red Nun Buoy #6 at the entrance to Great Harbor, a whale boat and a pulling dinghy were used to tow the drag.

Considerable difficulty was encountered in trying to drag to the effective depth required, especially in the vicinity of South Channel and Mosquito Bay. At times, when setting the drag to allow for a possible lift, there would be no lift, and the drag would ground on charted shoals. At other times when not allowing for lift in setting the drag, a drag test would show a lift and the area would not be dragged deep enough. The lift could not be kept uniform, due to the variable speed required in handling the launches in the narrow channels. Most of the drag lines, in these areas, were <sup>so</sup> short that the tender did not have time to take a test and change the setting of the drag to get the required depth before the end of the line.

Handling the launches MARINDIN and MITCHELL in these areas was another difficulty. Some of the limits of the areas to be dragged were very near to and followed closely the outline of the reefs, which in most cases are irregular in shape. In trying to follow these limits the launches would not always respond to the helm quickly enough to avoid grounding outside of the area to be dragged. Hence much time was lost clearing the drag and getting in position to make another attempt.

In a number of places, especially in Mosquito Bay, it was found that the limits around shoals could be covered most effectively by grounding the whole length of the drag against the shoal. The tender would then locate the bight of the drag. This method required a number of short lines and many groundings. It was almost always very difficult to clear the drag after thus grounding it; and several times ground wire and weights were lost. However, from experience, it seemed quite probable that it would require more time to try to follow the outline of the shoals and at the same time satisfactorily cover the limits required. In a few places where the drag limits were close to shoals, floats were anchored marking the shoal points, thus aiding the launches while running lines to avoid grounding the drag unnecessarily.

Short drags were necessary for most of the work on this sheet. In reversing the launches there was usually a heavy strain on these short drags, causing several partings. The end launch MITCHELL invariably had difficulty in reversing and parted it's towline a great many times, causing numerous delays. For this reason the Tender was used as an end launch on many short drags, especially in Mosquito Bay.

GENERAL REMARKS:

Attention is called to the following notes made while plotting the smooth sheet.

Position 41 E to 47 E--A drag of 16 feet effective depth grounded on a shoal about 400 meters WSW of signal WASH. No sounding was obtained. The drag grounded at position 42 E while dragging from the southward and at position 47 E while dragging from the northward. The full bight of the drag at each grounding marked the position of the shoal at a point where there is a 16 foot charted shoal. This shoal is covered by a drag of 13 feet effective depth. { Lat. 18° 19.50'  
Long. 65° 14.51'

At position 13 F, a 14 foot drag grounded on a 13½ foot sounding. This sounding is not covered; considered too close inshore. { Lat. 18° 18.96'  
Long. 65° 13.98'

At position 19 F, a 14 foot drag grounded between N and #1 buoy. No sounding was obtained; grounding close to visible coral shoal. Not considered important enough to spend more time covering the same. { Lat. 18° 18.78'  
Long. 65° 13.97'

Between positions 7 and 8 G, a 14 foot drag covered soundings of 13½ and 13¾ feet. The drag was exceptionally taut at position 7 and 8 G. Probably enough lift to allow drag to pass over the above soundings. { Drag 14 ft.  
off. depth  
retained.  
See TP, pg 3  
this DR.

Soundings of 29 and 28 feet was obtained at positions 19 and 38 H respectively. These soundings were not covered; considered as part of the shoal making out from Palada Cay. { Lat. 18° 20.11'  
Long. 65° 14.07'

A 31½ foot soundings found in the middle of Weather Channel was covered by a drag with an effective depth of only 27 feet. There was considerable difficulty in dragging this channel due to a strong current and heavy swells. { Lat. 18° 20.56'  
Long. 65° 14.98'

Position 39 K--A 28½ foot sounding was obtained and not covered. This sounding is between the required drag limits and the shore. Not considered important enough to spend more time covering the same.

N day while trying to drag the channel between the north end of Puerca Heads and the shoal to the northward, a shoal apparently in the middle of the eastern end of the channel was noted. A sounding of 8 feet was obtained on this shoal. No further attempt was made to drag this channel.

On N day while dragging from the northward to the southward in South Channel, a 32 foot drag hung and pulled over a shoal, on which a 26 foot sounding was obtained on J day. This shoal is evidently finger and branch coral and allowed the drag to slip over while dragging south. On different days, two drags of 32 feet each grounded on this shoal while dragging north. The 26 foot sounding obtained on J day was verified on P. day. A drag of 26 feet effective depth covered this shoal while dragging north.

See TP 6, pg. 8  
this Resc. Rpt.

Lat. 18° 17.30'  
Long. 65° 15.48'

Lat. 18° 17.60'  
Long. 65° 14.62'

Between positions 20 and 21 P a 15 foot drag covered a 13 $\frac{3}{4}$  foot sounding and then hung up, on a 13 $\frac{1}{2}$  foot sounding. This 13 $\frac{3}{4}$  foot sounding was obtained and verified by a check sounding on G day.

See TP 6, pg. 2 &c  
TP 10, pg. 7.  
15 ft. drag depth  
retained. Drag  
ended at 13 ft.  
sdgs.

DISCREPANCIES FOUND BETWEEN CHART AND DRAG WORK:

A 15 foot sounding is shown on the chart about 225 meters west of Grouper Shoal. A sounding of 19 feet was the least depth found at the same point as the charted 15 foot sounding. A sounding of 18 feet was found 49 meters N $\frac{1}{2}$ W of the 19 foot sounding. The position of these soundings are given later in this report under list of shoals. In determining the least depth on this shoal two drags of 19 feet each passed over them, one from the northward and one from the southward. While dragging from south to north the 19 foot drag caught (apparently on the 18 foot sounding) but pulled over. A third drag of 19 feet effective depth, towed very slowly and with a large bight, grounded on the 19 foot sounding while dragging north and did not slip over. The 18 foot sounding mentioned above was not found by grounding on it with the drag, but it was obtained by the Tender while the drag party was working in this vicinity.

5-25-48  
15 ft. dis-  
proved &  
was subse-  
quently re-  
moved from  
chart.

The chart shows a least depth of 13 feet on Middle Ground between Culebra and Culebrita Island. The least depth found while dragging was 14 $\frac{1}{4}$  feet. This sounding was covered by drags of 14 feet effective depth, once from the northward and once from the southward.

Retain  
13-ft.  
sdgs.

DRAG WORK NOT SHOWN ON THE SMOOTH SHEET:

The drag strip from 15 A to 20 A was not transferred to the smooth sheet. These positions were plotted on the tracing but this drag strip does not cover any area that is not covered by a drag of the same or deeper effective depth. This drag strip was left off the smooth sheet to avoid confusion.

LIST OF SHOALS:

The following is a list of shoals to which attention is called. A list of the most important shoals have already been forwarded to the office and are again given here. Some of the unimportant soundings are not mentioned in this list.

A depth of 24 feet was found 585 meters 68° true from Pt. Colorado, in Lat. 18 17'--1610 meters, Long. 65 16'--1184 meters.

A depth of 24 feet was found 580 meters, 73° true from Pt. Colorado, in Lat. 18 17'--1560 meters, Long. 65 16'--1173 meters.

A depth of 24 feet was found 582 meters, 79° true from Pt. Colorado, in Lat. 18 17'--1503 meters, Long. 65 16' 1153 meters.

A depth of 28 feet was found 609 meters, 84° true from Pt. Colorado, in Lat. 18 17'--1456 meters, Long. 65 16'--1119 meters.

A depth of 28 feet was found 596 meters 91° true from "A" Beacon on Pt. Colorado, in Lat. 18 17'--1379 meters, Long. 65 16'--1124 meters.

A depth of 23 feet was found 860 meters 92° true from "A" Beacon on P. Colorado, in Lat. 18 17'--1367 meters, Long. 65 16'--1052 meters.

Another depth of 23 feet was found 690 meters, 93° true from Pt. Colorado, in Lat. 18 17'--1360 meters, Long. 65 16'--1034 meters.

A depth of 19 feet was found 646 meters 96° true from "A" Beacon on Pt. Colorado in Lat. 18 17'--1321 meters, Long. 65 16'--1081 meters.

A shoal about 70 meters in extent running NW and SE was found near black can buoy #5. At the NW end of this shoal a depth of 17 feet was found 955 meters 119° true from "A" Beacon on Pt. Colorado in Lat. 18 17'--934 meters, Long. 65 16'--885 meters. At the SW end of this shoal a depth of 18 feet was found 986 meters 119° true from "A" Beacon on Pt. Colorado in Lat. 18 17'--921 meters, Long. 65 16'--863 meters. A depth of 24 feet, marking the NE end of this shoal was found 978 meters, 118° true from "A" Beacon on Pt. Colorado, in Lat. 18 17'--943 meters Long. 65 16'--853 meters.

A depth of 18 feet was found on branch coral 1219 meters 134° true from "A" Beacon on Pt. Colorado in Lat. 18 17'--547 meters, Long. 65 16'--841 meters. The chart shows a sounding of 17 feet about 10 meters NNE of this sounding. A depth of 19 feet was found 49 meters 173° from this 18 foot sounding. This 19 foot sounding plots the same as a 15 foot sounding shown on the chart. Another depth of 19 feet was found between the 18 and 19 foot soundings mentioned above. A drag of 19 feet effective depth passed over these soundings; once from the south to north and once from north to south. In passing over the shoal running north the 19 foot drag caught (apparently on the 18 foot sounding) but pulled off again. A third drag of 19 feet effective depth, with a large bight and towed very slowly, hung up on the 19 foot sounding, coming up to it from the southward

S-25-48  
1761 5ft. sdgs  
disproved &  
subsequently  
removed from  
chart.

Effective depths  
of drags which  
issued over 18ft.  
14g. changed from  
18ft. to 16ft.

A depth of 22 feet was found 1363 meters  $134^{\circ}$  true from Pt. Colarada, in Lat.  $18^{\circ} 17'$ --445 meters, Long.  $65^{\circ} 16'$ --75~~4~~ meters. ✓

A 12 foot sounding was found 1147 meters  $93^{\circ}$  true from "A" Beacon on Pt. Colarada, in Lat.  $18^{\circ} 17'$ --1330 meters, Long.  $65^{\circ} 16'$ --582 meters. ✓

An 8 foot sounding was found 1223 meters  $94^{\circ}$  true from "A" Beacon on Pt. Colarada in Lat.  $18^{\circ} 17'$ --1311 meters, Long.  $65^{\circ} 16'$ --508 meters. ✓

A 19 foot sounding was found 1264 meters  $108^{\circ}$  true from "A" Beacon on Pt. Colarada in Lat.  $18^{\circ} 17'$ --1015 meters Long.  $65^{\circ} 16'$ --500 meters. ✓

Several 26 foot drags were grounded up against the north and east side of Snapper Shoal, and soundings were obtained along the bight of the drag. The position of only the 6 and 18 foot soundings (mentioned below) are given in this list. ✓

An 18 foot sounding was found at the NE end of Snapper Shoal 1534 meters  $100^{\circ}$  true from "A" Beacon on Pt. Colarada in Lat.  $18^{\circ} 17'$ --1122 meters, Long  $65^{\circ} 16'$ --219 meters. ✓

A 6 foot sounding was found on Snapper Shoal 1500 meters  $105^{\circ}$  true from "A" Beacon on Pt. Colarada in Lat.  $18^{\circ} 17'$ --1021 meters, Long.  $65^{\circ} 16'$ --273 meters. ✓

A 27 foot sounding was found 1655 meters  $97^{\circ}$  true from "A" Beacon on Pt. Colarada in Lat.  $18^{\circ} 17'$ --1304 meters, Long.  $65^{\circ} 16'$ --82 meters. ✓  
Another depth of 27 feet was found 8 meters East true from the above 27 foot sounding. (p.s. 7a - not plotted).

19  
A 18 foot sounding was found 1710 meters  $104^{\circ}$  from "A" Beacon on Pt. Colarada in Lat.  $18^{\circ} 17'$ --1000 meters, Long.  $65^{\circ} 16'$ --58 meters. ✓

A depth of 24 feet was found 1750 meters  $103^{\circ}$  true from Pt. Colarada, in Lat.  $18^{\circ} 17'$ --1004 meters, Long.  $65^{\circ} 16'$ --22 meters. ✓

A depth of 25 feet was found 1710 meters  $103^{\circ}$  true from Pt. Colarada, in Lat.  $18^{\circ} 17'$ --1024 meters Long.  $65^{\circ} 16'$ --59 meters. ✓

A depth of 27 feet was found 1636 meters  $106^{\circ}$  true from Pt. Colarada in Lat.  $18^{\circ} 17'$ --946 meters, Long.  $65^{\circ} 16'$ --152 meters ✓

A depth of 26 feet was found 1632 meters  $111^{\circ}$  true from Pt. Colarada in Lat.  $18^{\circ} 17'$ --830 meters, Long.  $65^{\circ} 16'$ --207 meters. ✓

A depth of 26 feet was found 1814 meters  $111^{\circ}$  true from Pt. Colarada in Lat.  $18^{\circ} 17'$ --794 meters, Long.  $65^{\circ} 16'$ --27 meters. ✓

A 24 foot sounding was found 1820 meters  $110^{\circ}$  true from "A" Beacon on Pt. Colorado in Lat.  $18^{\circ} 17' - 772$  meters, Long.  $65^{\circ} 16' - 11$  meters.

A 24 foot sounding was found 1870 meters  $111^{\circ}$  true from "A" Beacon on Pt. Colorado in Lat.  $18^{\circ} 17' - 734$  meters, Long.  $65^{\circ} 16' - 22$  meters  
15 1735

A depth of 29 feet was found 166 meters  $301^{\circ}$  true from point where shoreline of NW end of NE Cay crosses meridian  $65^{\circ} 16'$ , in Lat.  $18^{\circ} 20' - 1272$  meters, Long.  $65^{\circ} 16' - 122$  meters

A depth of 28 feet was found 478 meters  $310^{\circ}$  true from north end of Pajarita Cay, in Lat.  $18^{\circ} 20' - 1026$  meters, Long.  $65^{\circ} 14' - 1754$  meters/ A depth of 29 feet was found 110 meters  $344^{\circ}$  true from the 28 foot sounding.

A depth of 30 feet was found 470 meters  $312^{\circ}$  true from north west end of Palada Cay, in Lat.  $18^{\circ} 20' - 1321$  meters, Long.  $65^{\circ} 14' - 425$  meters.

A depth of 29 feet was found 419 meters  $204^{\circ}$  true from northwest end of Palada Cays, in Lat.  $18^{\circ} 20' - 624$  meters, Long.  $65^{\circ} 14' - 225$  meters. Depths of 29 feet and 33 feet were found 31 meters  $163^{\circ}$  true and 111 meters  $156^{\circ}$  true respectively from the above 29 foot sounding.

A depth of 28 feet was found 410 meters  $223^{\circ}$  true from southeast point of Palada Cays, in Lat.  $18^{\circ} 20' - 360$  meters, Long.  $65^{\circ} 15' - 1697$  meters A depth of 29 feet was found 82 meters  $56^{\circ}$  true from the 28 foot sounding and a depth of 31 feet was found 40 meters  $333^{\circ}$  true from the 28 foot sounding.

A depth of 31 feet was found 666 meters  $229^{\circ}$  true from southeast point of Palada Cays, in Lat.  $18^{\circ} 20' - 174$  meters Long.  $65^{\circ} 14' - 110$  meters.

A depth of 33 feet was found 563 meters  $212^{\circ}$  true from the southeast point of Palada Cays in Lat.  $18^{\circ} 20' - 162$  meters Long.  $65^{\circ} 13' - 1718$  meters.

A depth of 33 feet was found 747 meters  $213^{\circ}$  true from the southeast point of Palada Cays in Lat.  $18^{\circ} 20' - 29$  meters Long.  $65^{\circ} 14' - 50$  meters.

A depth of 29 feet was found 836 meters  $215^{\circ}$  true from southeast point of Palada Cays in Lat.  $18^{\circ} 19' - 1836$  meters Long.  $65^{\circ} 14' - 128$  meters.

A depth of 18 feet was found 1556 meters  $344^{\circ}$  true from Culebrita Island Lighthouse, in Lat.  $65^{\circ} 19' - 1390$  meters, Long.  $65^{\circ} 13' - 1612$  meters.

A depth of 19 feet was found 1734 meters  $334^{\circ}$  true from Culebrita Island Lighthouse in Lat.  $18^{\circ} 19' - 1452$  meters Long.  $65^{\circ} 14' - 193$  meters. Another depth of 19 feet was found 40 meters  $14^{\circ}$  true from this 19 foot sounding.



A depth of 20 feet was found 660 meters 55° true from western point of Ladrone Cay in Lat 18 19' 00" 1551 meters, 65 14' 40" 400 meters.

A depth of 21 feet was found 574 meters 42° true from western point of Ladrone Cay in Lat. 18 19' 15" 1590 meters Long. 65 14' 54" 549 meters.

A depth of 21 feet was found 643 meters 48° true from western point of Ladrone Cay in Lat. 18 19' 30" 1596 meters, Long. 65 14' 47" 473 meters.

A depth of 23 feet was found 720 meters 52° true from western point of Ladrone Cay in Lat. 18 19' 45" 1599 meters Long. 65 14' 37" 379 meters.

A depth of 32 feet was found 440 meters 15° true from the western point of Ladrone Cay in Lat. 18 19' 15" 1597 meters, Long. 65 14' 35" 835 meters.

Attention is again called to the 28 foot sounding obtained by the party in 1923 (apparently 1 w day) in Lat. 18° 19' 16" - Long. 65° 14' 41".

A depth of 14 feet was found 1172 meters 275° true from Galebrita Island Lighthouse in Lat. 18 18' 15" 1841 meters Long. 65 14' 59" 595 meters. This 14 foot sounding and the 13 foot sounding (60 meters NNW of it) shown on the chart were covered by a drag of 14 feet effective depth.

Retain 13ft. sdg. 1M2. 5-25-48

A depth of 17 feet was found 1140 meters 259° true from Galebrita Island Lighthouse in Lat. 18 18' 15" 1511 meters Long 65 14' 54" 544 meters. A depth of 19 feet was found 66 meters 263° true from this 17 foot sounding. This 19 foot sounding plots on a charted sounding of 17 feet and was covered by a drag of 19 feet effective depth.

5-25-48 17ft disproved & subsequently removed from chart. (M2.)

(p. 44)  
A depth of 32 feet was found 1056 meters 96° true from eastern end of Viento Point in Lat. 18 17' 15" 1215 meters Long 65 14' 15" 1206 meters. A depth of 39 feet was found 61 meters 344° true from the 32 foot sounding.

39 ft (pos. 14 ft) not plotted. Less at pos. 4 ft (32 ft.)

A depth of 13 feet was found 1277 meters 101° true from eastern end of Viento Point, in Lat. 18 17' 15" 1103 meters Long. 65 14' 10" 1080 meters. Another 13 foot sounding was found 53 meters 156° true from the above 13 foot sounding.

See TP6, Pg. 2 & TP2, Pg. 3 This Des. Rpt.

A depth of 13 feet was found 1170 meters 105° true from eastern end of Point Viento in Lat. 18 17' 15" 1008 meters Long. 65 14' 12" 1220 meters.

A depth of 15 feet was found 1445 meters 104° true from eastern end of Point Viento in Lat. 18 17' 15" 977 meters Long. 65 14' 10" 940 meters.

A depth of 8 feet was found 1108 meters, 116° true from eastern end of Viento Point in Lat. 18 17' 15" 848 meters Long. 65 14' 13" 1350 meters.

A depth of 26 feet was found 797 meters  $128^{\circ}$  true from eastern end of Viento Point in Lat  $18^{\circ} 17'$ --846 meters Long  $65^{\circ} 14'$ --1704 meters.

A depth of 21 feet was found 1087 meters,  $142^{\circ}$  true from eastern end of Viento Point, in Lat.  $18^{\circ} 17'$ --452 meters Long.  $65^{\circ} 14'$  1682 meters.

A depth of 26 feet was found 1366 meters  $145^{\circ}$  true from eastern end of Viento Point in Lat.  $18^{\circ} 17'$ --202 meters Long  $65^{\circ} 14'$ --1570 meters.

Three soundings of 12 feet were found on a coral ridge running north and south. The position of these soundings with distances and directions from the southernmost end of Vaca Point (known as Breeze Pt) are as follows: One at 269 meters  $207^{\circ}$  true; one at 305 meters  $208^{\circ}$  true and one at 316 meters  $200^{\circ}$  true. Position of second 12 foot sounding mentioned is about the middle of the ridge, Lat.  $18^{\circ} 17'$ --624 meters. Long.  $65^{\circ} 15'$ --1435 meters. This is a separate ridge from Shrimp Shoal, as the end of a 15 foot drag went between the two.

A depth of 26 feet was found 581 meters  $126^{\circ}$  true from the ~~xxx~~ southernmost end of Point Vaca or Breeze Point, in Lat.  $18^{\circ} 17'$ --546 meters Long.  $65^{\circ} 15'$ --827 meters. A drag of 32 feet effective depth passed over the charted 30 foot sounding, 180 meters NE of the 26 foot sounding. *and 9/50 over the 26 ft. sdg. [Effective depth (strip 6-11N) reduced to from 32 to 30 ft. to position of 26 ft. sdg. and remainder of strip was rejected. 5-25-48 LAH Z.]*

A depth of 37 feet was found 850 meters  $161^{\circ}$  true from the southernmost end of Point Vaca or Breeze Point in Lat  $18^{\circ} 17'$ --98 meters Long.  $65^{\circ} 15'$ --1015 meters.

A depth of 12 feet was found 1302 meters  $174^{\circ}$  true from the southernmost end of Point Vaca or Breeze Point in Lat.  $18^{\circ} 16'$ --1450 meters Long.  $65^{\circ} 15'$ --1156 meters.

A depth of 26 feet was found 1484 meters  $180^{\circ}$  true from the southernmost end of Point Vaca or Breeze Point in Lat.  $18^{\circ} 16'$ --1252 meters Long  $65^{\circ} 15'$ --1288 meters. A depth of 33 feet was found 39 meters  $358^{\circ}$  true from the 26 foot sounding.

PLOTTING:

Due to the discrepancy in the location of the signals in Great Harbor at the time of the original work (1923), new signals were located by triangulation for this survey. Great Harbor was redragged and it was considered advisable to make a separate sheet on which to plot the work of Great Harbor and Mosquito Bay.

Most of this work was plotted on the original sheet #4293 on the scale 1:20,000 . A sub-sheet on a scale of 1:10,000 was made to include East Channel, Mosquito Bay and Great Harbor. The following is a list of the work plotted on 4293 and of the work plotted on the sub-sheet.

Plotted on #4293 (1:20,000)

1 "A" day thru 7 "S" day  
1 "V" day thru 17 "V" day  
All of "X" day  
38 "AA" day to the end of "CC" day

Plotted on sub-sheet (1:10,000) H 4293 a

8 "S" day thru "S" day  
18 "V" day thru "W" day  
1 "Y" day thru 37 "AA" day.

GENERAL DESCRIPTION OF COAST:

There is nothing to be added to the general description of the coast as given in the present Coast Pilot.

CURRENTS:

The tidal currents as noted in the Coast Pilot were verified during the progress of this survey.

LANDMARKS AND PROMINENT FEATURES:

There is but one addition to the "Prominent Features" as noted in the present Coast Pilot. There is a high white beacon established by the Navy on the highest part of the hill at the south end of Luis Pena Cay.

CHANNELS:

The channels are fully described in the Coast Pilot. But attention is called to the following soundings found.

In South Channel a least depth of 26 feet was found in mid channel. The position of this sounding is given under List of Shoals.

In Weather Channel a least depth of 31 feet was found in mid channel.

CHANNELS (Con't)

The least depth found on shoal areas in West~~ern~~ Channel was 18 feet. The chart shows a least depth of 15 feet.

5-25-48.  
15-ft. disproved  
& subsequently  
removed from  
chart. (M.Z.)

Attention is called to the 23 foot sounding close to the east side of the channel at the entrance to Great Harbor.

ANCHORAGES:

Anchorage are adequately described in the Coast Pilot.

Respectfully submitted.

*Henry E. Finnegan*  
Henry E. Finnegan,  
Jr. H&G. Engineer.

STATISTICS

W.D. SHEET # 4293.

*****							
Date	Let.	Vol.	Drag Length.	Positions.	Miles Stat.	Soundings.	
Dec. 30, 1925	A	1	2400 1600	41	2.5	5	
Jan. 5, 1926	B	1	1600 22 00 1400	56	3.2	4	
Jan. 6, 1926	C	1	1200 1000	63	5.2	8	
Jan. 12, 1926	D	1	4500	34	4.2	3	
Jan. 13, 1926	E	1	4500 1800 1500 1400	47	6.0	5	
Jan. 15, 1926	F	1	2100	19	1.00	1	
Jan. 26, 1926	G	2	2000 1200	49	4.2	7	
Jan. 28, 1926	H	2	3000 1400	35	2.5	9	
Jan. 29, 1926	J	2	1400	13	0.6	1	
Feb. 10, 1926	K	2	1400	51	3.9	3	
Feb. 11, 1926	L	2	2100 1800	42	3.2	15	
Feb. 12, 1926	M	2	1800	28	2.3	17	
Feb. 15, 1926	N	2	1000 1400	22	1.0	6	
Feb. 16, 1926	P	2&3	1000	77	5.4	14	
Feb. 17, 1926	Q	3	2100 1000 1400	43	3.5	11	
Feb. 18, 1926	R	3	1400 1200	45	2.0	17	
Feb. 19, 1926	S	3	1200 800	22	1.5	6	
Feb. 23, 1926	T	3	400	34	1.5	11	
Feb. 24, 1926	U	3	400	44	1.25	20	
Feb. 25, 1926	V	3&4	1600 600 400	58	2.8	2	
Feb. 26, 1926	W	4	700	50	1.7	3	
Mar. 1, 1926	X	4	1200	15	1.3	1	
Mar. 2, 1926	Y	4	300 1000	50	2.2	7	
Mar. 3, 1926	Z	4	1000 500	72	3.2	7	
Mar. 4, 1926	AA	4	1200 1000 1800	43	4.0	10	

STATISTICS  
W.D. SHEET # 4293. (con't)

\*\*\*\*\*

	Date	Let.	Vol	Drag Length	Positions	Miles Stat.	Soundings
Mar.	5,1926	BB	4	1000	9	0.25	2
Mar.	1,1927	CC	5	1200	5	0.25	7
Totals-----					1067	70.65	202

Total area dragged      11.5 Square miles Stat.  
New area dragged        6.8        "        "        "

Plane of reference.

Plane tide staff at Culebrita Island.  
Plane of reference M.T.L. -0.5 =1.3 on staff.  
Lowest tide observed        1.1 on staff  
Highest tide observed        3.5 on staff

Portable Automatic Tide Gauge at Great Harbor.  
Plane of reference M.T.L. -0.5 =2.1 on staff.  
Lowest tide observed        2.1 on staff  
Highest tide observed        3.5 on staff.

. ADDITIONAL SIGNALS USED ON SHEET #4293.

TRIANGULATION

Name	Lat.	Meters	Long.	Meters	Remarks.
Surf	18 20	672.7	65 18	1123.1	Established 1900
Negra*	18 18	792.3	65 14	1475.4	" "
Ridge*	18 19	1202.7	65 16	250.7	Gable of house-1925
Pajarito Cay) *	18 20	691.1	65 14	1303.7	Established-1925
Shark*	18 20	1502.5	65 14	529.7	" "
Palada Cay*	18 20	723.7	65 13	1495.7	" "
Cape Passage *	18 19	703.4	65 13	603.8	" "
Davy Cay <sub>3</sub> *	18 19	1132.6	65 14	809.9	" "
Bor *	18 18	740.6	65 15	884.9	" "
Battle Cay*	18 18	167.6	65 15	283.1	" 1900
Whale-Rock*	18 20	1773.9	65 14	410.4	Peak of rock-1925
Blue*	18 18	1563.3	65 15	1522.9	<del>Ex</del> Gable of house-1925
Red *	18 18	1095.7	65 15	1244.0	" " " "
House*	18 18	747.3	65 15	962.1	" " " "
Grey*	18 17	1633.5	65 15	1487.8	" " Barn 1926
Beach*	18 18	344.0	65 16	1393.5	" " house "
Lite*	18 18	550.0	65 16	1292.2	" " " "
Rote*	18 18	925.4	65 18	398.2	" " " "
Hut*	18 18	574.3	65 18	291.9	" " " "
Cot*	18 18	254.9	65 18	127.1	" " " "

Note:

Signals marked \* recoverable.

TRIANGULATION SIGNALS CON'T.

\*\*\*\*\*

Name	Lat.	Meters	Long.	Meters	Remarks.
A Beacon *	18 17	1384.7	65 16	1725.1	Front Range-1926
Gov.*	18 18	1165.2	65 16	1750.5	Flag pole-1926
Navy*	18 17	1717.5	65 19	1550.7	Navy Beacon 1926
Post*	18 17	993.0	65 15	1523.7	WW Rocks-1926
Whit	18 17	1338.0	65 15	1491.9	WW rock-1926
Pile	18 18	873.2	65 17	46.7	Dolphin 1926
C Beacon*	18 18	1027.5	65 17	478.7	Front Range-1926
D Beacon*	18 19	42.1	65 17	1135.3	Rear Range-1926
Try	18 18	153.1	65 17	697.9	Tripod signal-1926
Slope	18 17	806.1	65 16	1551.6	Tripod signal.

Note:

Signals marked \*, recoverable

TOPOGRAPHIC SIGNAL Sheet #4293

-----

Scrub*	18 20	550.0	65 17	762.0	Established 1900
--------	-------	-------	-------	-------	------------------



LIST OF HYDROGRAPHIC SIGNALS  
WIRE DRAG SHEET #4293.

Name	Lat.	Meters	Long.	Meters	Remarks.
Pave	18 20	77	65 16	1196	WW on Rock Ledge, Pavement Pt.
Mit	18 20	1130	65 15	1740	WW Pile of stones, Seria Pt., N.E. Cay.
Gap	18 20	1250	65 15	1095	WW Rock ledge, N.E. CAY
Nec	18 20	1188	65 15	710	WW Sharp Rock Pt., N.E. CAY
Ent	18 18	611	65 14	1477	WW. Boulder, Pt. Negra
Cloth	18 18	714	65 15	30	Banner in mangroves. Mangrove Har.
Trunk	18 18	1070	65 15	197	Tree trunk, Mangrove, Har.
Note	18 17	1773	65 14	1748	Banner in tree, Agua Cay.
Ade	18 17	1691	65 14	1760	WW. Rock ledge, Agua Cay,
Wind <sub>2</sub>	18 17	1349	65 15	627	Tripod signal on pile of rocks, Viento Point.
Breeze,*	18 17	892	65 15	1300	WW on Pyramid shaped rock, Breeze Point.
Brown	18 17	1739	65 15	1700	WW. on Rock, Mosquito Bay.
Bank	18 17	1677	65 16	422	" " " " "
Port	18 17	1665	65 16	1077	" " ", Pt. Carenero
"B" Beacon					
*	18 17	1699	65 17	600	Rear Range Beacon, W. of Aloe Point.

Note:  
Signals marked \*, recoverable

September 22, 1927.

*T. J. A.*

(11)

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in  
11 volumes of sounding records for

HYDROGRAPHIC SHEET **4293 add'l.**

Locality: **CULEBRA ISLAND, PORTO RICO.**

Chief of Party: **G. C. Mattison, 1925-1927.**

Plane of reference is **M. L. W.**  
**1.3** ft. on tide staff at **Culebrita Island**  
**2.2 ft** ~~do~~ **Great Harbor**

Condition of records satisfactory except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
6. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

*E. W. Rude*

Chief, Division of Tides and Currents.

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WIRE (PART)  
HYDROGRAPHIC TITLE SHEET

*Prepared in the Office*

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. 5

REGISTER NO. **4293a**

State Porto Rico

General locality Vieques Sound

Locality Great Harbor and Mosquito Bay

Scale 10,000 Date of survey Feb.~Mar., 1926

Vessel Ranger

Chief of Party G. C. Mattison

Surveyed by C. K. Green, H. E. Finnegan

Protracted by H. E. F.

Soundings penciled by \_\_\_\_\_

Soundings in ~~fathoms~~ <sup>feet</sup>

Plane of reference M.T.L. - 0.5 feet

Subdivision of wire dragged areas by \_\_\_\_\_

Inked by \_\_\_\_\_

Verified by \_\_\_\_\_

Instructions dated May 28, 1925

Remarks: The work is included in the 11 volumes  
filed 4293 Add'l. Work and 4293a

REG. NO. **4293a**

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

~~XXXXXXXXXXXXXXXXXXXX~~  
~~XXXXXXXXXXXXXXXXXXXX~~ **WIRE DRAG** TITLE SHEET

4293

The finished Hydrographic Sheet is to be accompanied by the following title sheet, filled in as completely as possible, when the sheet is forwarded to the Office.

U. S. Coast and Geodetic Survey.

Register No. **4293** Add'l Work (on orig sheet)

State . . . . . **PORTO RICO.** . . . . .

General locality . **VIEQUES SOUND** . . . . .

Locality . . . . . **South and East of  
CULEBRA ISLAND** . . . . .

Chief of party . . . **G.C. MATTISON** . . . . .

Surveyed by . . **C.K. GREEN--H.E. FINNEGAN** . . . . .

Date of survey . . **December 1925--March, 1927** . . . . .

Scale **1:20,000 and 1:10,000** . . . . .

Soundings in . . . . . **Feet** . . . . .

Plane of reference . . . **M.T.L. -0.5 ft.** . . . . .

Extracted by **HEF** . . . . . Soundings in pencil by **HEF** . . . . .

Inked by . . **HEF** . . . . . Verified by . . . . .

Records accompanying sheet (check those forwarded):

Des. report, . . . . . Tide books, . . . . . Marigrams,  <sup>2</sup> Boat sheets,

<sup>2</sup> Sounding books,  <sup>9</sup> Wire-drag books, . . . . . Photographs.

Data from other sources affecting sheet . . . . .

Remarks: \*These volumes include the work for 4293a and are filed - 4293 Add'l. Work and 4293a

DIVISION OF CHARTS

REVIEW SECTION - NAUTICAL CHART BRANCH

REVIEW OF HYDROGRAPHIC SURVEY

Add. Wk. 1926  
REGISTRY NO. H-4293 W.D.  
H-4293a (1926)

Porto Rico, Vieques Sound, South & East of Culebra Islands  
Surveyed in February - March 1926 Scale 1:20,000 & 1:10,000  
Instructions dated May 28, 1925

Soundings:

Control:

Handlead

Sextant fixes on shore signals

Chief of Party - G. C. Mattison  
Surveyed by - C. K. Green and H. E. Finnegan  
Protracted by - H. E. Finnegan  
Soundings plotted by - H. E. Finnegan  
Verified and inked by - I. M. Zeskind and R. L. Johnson  
Reviewed by - I. M. Zeskind, May 25, 1948  
Inspected by - R. H. Carstens

1. In recompiling charts of this area it was noted that the Additional Work of 1926 had not been verified or reviewed. This informal review is, therefore, now being made.
2. The Additional Work covers a split, an insufficient overlap, the redragging of areas to greater depths and new work in Great Harbor and to the north, west and east of N. E. Cay.
3. The control consists of signals of the original survey supplemented by additional triangulation, hydrographic and topographic stations.
4. Comparisons were made between the Wire Drag Additional Work and the following hydrographic surveys. No conflicts between soundings and effective wire drag depths were found.

H-2468 (1900)	Scale 1:5,000
H-2469 (1900)	Scale 1:10,000
H-2472 (1900)	Scale 1:5,000
H-2490 (1900)	Scale 1:40,000
H-2492 (1900)	Scale 1:10,000

5. A comparison of the Additional Work was made with charts Nos. 914 (print date 6/30/47) and 904 (print date 3/8/48), and it was found that the effective depths are in harmony with the charted soundings, except as follows:
  - a. The 6-ft. sounding charted at latitude  $18^{\circ} 17.58'$  and longitude  $65^{\circ} 14.40'$  originates with British Admiralty Chart No. 2677, and is shown on H-2468 (1900). This sounding was covered by 2 drag strips each of which had 14-ft. effective depths. The sounding is considered disproved and should be removed from the charts.
  - b. The 18-ft. sounding charted at latitude  $18^{\circ} 19.75'$ , longitude  $65^{\circ} 13.90'$  originates with the present survey and is charted 37 meters southeast of its correct position.
  - c. The 17-ft. sounding charted at latitude  $18^{\circ} 19.87'$ , longitude  $65^{\circ} 14.72'$  originates with the present survey and is charted 40 meters south of its correct position.

# NAUTICAL CHARTS BRANCH

SURVEY NO. H-4293

## Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
29 Mar 49	904	Nichols	<del>Before</del> After Verification and Review <i>add. wk.</i>
5 Apr 49	{ 913 915 }	Nichols	<del>Before</del> After Verification and Review
5 Apr 49		{ 914 }	Nichols
1-18-57	904		P.H. de Lawder
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review
			Before After Verification and Review

M. 168-1

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

4293  
4293

4293  
4293

4293

4293

Form 504		U. S. COAST AND GEODETIC SURVEY	
DEPARTMENT OF COMMERCE		L. & A.	
U. S. COAST AND GEODETIC SURVEY		Acc. No.	
State: PORTO RICO			
11-5613			
DESCRIPTIVE REPORT.			
HYD		Sheet No. 4293	
VYD			
LOCALITY:			
Vieques Sound			
192			
1922-23			
CHIEF OF PARTY:			
F. B. T. Siems			



DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

WASHINGTON

December 3, 1924.

SECTION OF FIELD RECORDS

Report on Wire Drag Sheet No. 4293

Coasts of Culebra and Vieques Islands.

Surveyed in 1922 - 23.

Instructions dated July 7, 1921.

Chief of Party, F. B. T. Siems.

Surveyed by R. R. Moore.

Protracted and inked by A. P. Ratti.

Verified and Area and Depth Sheet by W. F. Malnate.

1. The records conform to the requirements of the General Instructions.
2. The methods and character of operations fulfill the requirements of the General Instructions.
3. There were no specific written instructions covering the area comprised by this sheet, but it is understood that a copy of chart 904 was sent to the field with limits of work desired indicated thereon.

As to the depth and extent of dragging the following remarks are in point:

a. In Lee Chammel between Culebra Island and Culebrita Island the drag should have been set deeper; particularly is this true of the 10 ft. strip. It is true that there is a 13 ft. spot on the Middle Ground which is close by, yet there is an extensive area south of the Middle Ground with depths ranging from 30 to 80 ft. that is used as an anchorage by the Navy Destroyers. The mean draft of these destroyers ranges at present from 8' 4" to 9' 4", so that an effective depth of 10 ft. can hardly be considered as adequate. Furthermore the drag should have been extended to the 3 fathom curve wherever possible. This is a general requirement. Navy Anchorage Chart "C" for this locality shows extensive areas, on the east side of Lee Channel and South Channel, that are used for anchorages that have not been dragged.

b. The drag should have been carried closer to Point Negra to insure safety to boats swinging in to Mangrove Harbor.

c. Mangrove Harbor is an anchorage used by Navy Destroyers. Although the entrance is narrow yet it would seem from an inspection of the chart that a small drag could have been taken in.

d. In South Channel the drag should have been carried closer to the 3 fathom curve to give as large an effective width to this channel as possible. The area between buoys C-1 and C-5 was not dragged. Also the area close to and to the west and south of buoy N-0. This is important, as the entrance range from the southeast into Great Harbor passes through these areas.

e. The area between buoys C-3 and N-2 through which the outer entrance range to Great Harbor passes was not dragged. An adequate depth of drag should be carried into this outer harbor and as close to the inner harbor as practicable. An attempt should be made to insure safe navigation at least on the entering ranges.

f. Mosquito Bay should be dragged as it affords good protection with the wind from the northeast.

g. On the western side of West Channel from Point Soldado to buoy C-5, the drag should be carried closer to the 3 fathom curve.

h. The area surrounding Point Soldado should have been dragged deeper than 31 ft. as this area is used as an anchorage by battleships. The junction with the adjoining sheet in this locality is not sufficient as a large area west of Pt. Soldado was not dragged.

i. In Great Harbor the smooth sheet as sent in by field party showed several areas dragged to moderate depths as passing over extremely shoal areas, noticeably so around Pirata Cay and Verde Cay. The plotting was done in accordance with the records. In reviewing the work the records were closely analyzed and all doubtful positions were rejected, the result being a close agreement with the charted soundings. However, there still remain two areas both dragged to 29 ft. which cannot be reconciled with the charted depths. The first is the area just west of Pt. Carenero where the drag passed

over several 26 ft. soundings. As these soundings occur in about the middle of the drag an error in location of the end buoys could not have any material effect upon this condition. The logical inference would seem to be that either the shoal soundings no longer exist here or else the drag failed to function. The second area is in the bight between Aloe Spit and Point Colorado. The drag passed over several shoaler soundings near the western shore of the bight. It is to be noted that the smooth plotting does not agree with the boat sheet plotting on account of the difference in the positions of the signals. And right here it might be mentioned that the control for the survey of this harbor is none too good. There were too many doubtful elements. For example,

△ Tree was located by two angles without a check, one angle being about 6° and the other about 16°. Then for the location of the other signals used it appears that the charted position of rear range beacon "C" was accepted as correct and the signals occupied in turn and cuts taken, but in no case was a signal located from three well established stations. In all cases the location depends on an assumption that some other signal is correctly located. In an area where the position of the boat is distant from the signals any small discrepancies in the location of the signals is negligible, but where the work is close to the objects a discrepancy in the signals may make an appreciable difference in the plotted position of the drag.

j. The area south of Crespos Heads Shoal should have been dragged deeper than 27 ft. The same is true of the area north of Grampus Shoals. In order to clear an existing shoal care should be taken not to extend the shoal drag too far beyond the shoal sounding.

4. The least water was found on all shoals discovered except the 39 ft. sounding (grounding depth) in latitude 18°16 3/4', longitude 65°15'.
5. The overlaps within the sheet are generally sufficient. The junction with the adjacent sheets will be taken up when these sheets are verified and reviewed.
6. There are one or two splits that should be cleared up, if work is done ~~here again~~. These are shown on the A. and D. sheet. Further dragging should be done to cover the places mentioned in paragraph 3.
7. The field plotting was completed to the extent prescribed in the General Instructions.
8. The verifier had to correct the sheet to allow for the one-fortieth rule, which was entirely disregarded in the plotting. Corrections also had to be made to about 4 days work owing to poor plotting.
9. Rating of work (
  - (a. Character and scope of drag operations - fair.
  - (b. Field drafting - fair
10. Reviewed by A. L. Shalowitz, Nov., 1924.

COPY TO FIELD RECORDS

Nov. 19, 1923.

Division of Hydrography and Topography:

Division of Charts:

Tide reducers are approved in ~~1~~ and  
3 volumes of sounding records for  
" " " wire drag " for  
HYDROGRAPHIC SHEET 4293

Locality: Vieques Id., Porto Rico

Chief of Party: F. B. T. Sigs, in 1922-23  
Plane of reference is mean low water, reading  
3.5 ft. on tide staff at Great Harbor - Culebra Id.  
1.7 " " " " Culebrita Lighthouse  
5.0 " " " " " Fajardo

For reduction of soundings, condition of records satisfactory  
except as checked below:

1. Locality and sublocality of survey omitted.
2. Month and day of month omitted.
3. Time meridian not given at beginning of day's work.
4. Time (whether A.M. or P.M.) not given at beginning of day's work.
5. Soundings (whether in feet or fathoms) not clearly shown in record.
6. Leadline correction entered in wrong column.
7. Field reductions entered in "Office" column.
8. Location of tide gauge not given at beginning of each day's work.
9. Leadline corrections not clearly stated.
10. Kind of sounding tube used not stated.
11. Sounding tube No. entered in column of "Soundings" instead of "Remarks".
12. Legibility of record could be improved.
13. Remarks.

*F. B. T. Sigs*  
Chief, Division of Tides and Currents.

Report on Verification of  
Wire Drag Sheet #4293

Chief of Party F. B. T. Steins  
Surveyed by R. R. Hoove  
Plotted and Inked by A. D. Patti  
Verified by H. F. Galante

1. The records and the plan of development conform to the requirements of the General Instructions.
2. In general, the plotting and subdivision of drag strips is good, with the following exceptions:  
The fortyth rule was disregarded throughout the whole sheet.  
The positions of N-bouy of the drag was poorly plotted on the following days - 1, 2, 0 and 0 day.
3. The sheet was clean and legible and the changes made in the office were only due to the two afore mentioned reasons (i.e. rule of forty and poor plotting of four days.)
4. On several occasions when drag grounded a position of grounding and sounding in that position were not taken.

A grounding of 30 feet was obtain on T-day which was of a lesser depth than any sounding previously shown on that shoal.

At 34R the records showed that the drag set at 19 feet was "aground on Bouy #5" but was not sufficiently clear to warrant a change in the sounding at that position, not knowing for certain whether "drag bouy #5" or "navigation bouy #5" was the position of grounding. Due to the absence of a sounding it was taken for granted that it was aground at a navigation bouy.

In all cases of grounding the least depth was shown as found by a sounding or the effective drag depth.

William F. Hume

DEPARTMENT OF COMMERCE

U. S. Coast and Geodetic Survey

HYDROGRAPHIC TITLE SHEET.

U. S. Coast and Geodetic Survey  
Register NO. - 4293 (Field Number 5)

State: Porto Rico.

General Locality: Vieques Sound  
Southeast Coast of Northeast Coast  
Locality: Culebra Island and ~~part~~ part of Vieques Island.

Chief of Party: R. B. F. Siems

Surveyed by: R. R. Moore.

Date of Survey: 1922-1923.  
Scale 10,000 + 20,000  
Soundings in.....feet

Plane of Reference: M. L. W.

Protracted by A. R. Ratti. Soundings in pencil A.P.R.

Inked by..... verified by.....

Records accompanying Sheet. (Check those forwarded)

Des. Report. ....Tide Books, .....Marigrams, ...2..Boat Sheets  
..1...Sounding Records, ..3...Wire Drag Books, ....1...Drag Depth Tracing.

R. L. Johnston