

8349

Diag. Cht. Nos. 1208-2 and 1209-3.

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. GI-1156 Office No. H-8349

LOCALITY

State Massachusetts

General locality Cape Cod

Locality East Side of Monomoy Island

19~~56~~ 56

CHIEF OF PARTY

R. A. Marshall

LIBRARY & ARCHIVES

DATE April 22, 1958

8349

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC TITLE SHEET

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

REGISTER No. H-8349

Field No. Gi-1156

State MASSACHUSETTS

General locality CAPE COD

Locality EAST SIDE OF MONOMOY ISLAND

Scale 1:10,000 Date of survey 12 Sept. to 8 Nov. 1956

Instructions dated 24 May 1954; 14 Jan. 1955; 27 Feb & 27 Dec. 1955

Vessel GILBERT

Chief of party ROBERT A. MARSHALL

Surveyed by N. E. TAYLOR; M. B. MILLER; J. S. BAKER

Soundings taken by ~~XXXXXX~~, graphic recorder, hand lead, ~~xxx~~ Pole

Fathograms scaled by SHIP PERSONNEL

Fathograms checked by NORFOLK DISTRICT OFFICE

Protracted by W. W. FEAZEL

Soundings penciled by W. W. FEAZEL

Soundings in ~~XXXXXX~~ feet at MLW ~~XXXXXX~~ and are true depths

REMARKS:

302

D E S C R I P T I V E R E P O R T

to accompany

HYDROGRAPHIC SURVEY NO. H — 8349

(Field No: GI-1156)

Vicinity of

EAST SIDE OF MONOMOY ISLAND-NAUSET BEACH, MASS.

USC&GS Ship G I L B E R T ,

Cdr. Robert A. Marshall, Comdg.

Scale: 1:10,000

Surveyed by: N. E. Taylor, LtCdr, C&GS,
M. B. Miller, Ensign, C&GS,
J. S. Baker, Ensign, C&GS.

A. PROJECT

Work covered by this report was accomplished on Project 13690 under instructions dated 24 May 1954, ref. 22-rct S-2-PARKER, issued to C.O., PARKER; supplemental instructions dated 14 January 1955, ref. 22-SRO S-2-GI, modified 27 February 1955, ref. 22/MEK S-2-GI; supplemental instructions dated 27 December 1955, ref. 22/MEK S-2-GI.

B. SURVEY LIMITS AND DATES

The area covered by this survey lies east of Monomoy Island in the Southern portion, and between the mainland and Nauset Beach and east of Nauset Beach in the Northern portion. The area is bounded approximately by latitude 41°-41' and 41°-35', and longitude 69°53'30" and the shoreline. To complete this survey two boat sheets were used, GI-1156 by LAUNCH CS-180, and GI-1156a by LAUNCH CS-175. This survey junctions with the following contemporary surveys: H-8348 to the North, H-8350⁽¹⁹⁵⁶⁾ to the East, and H-8171⁽¹⁹⁵⁴⁻⁵⁶⁾ to the South.

Field work commenced on 12 September 1956 and was completed on 8 November 1956.

The progress of the field work was delayed to an unusually severe extent due to three factors, i.e. the weather, the poor condition of the equipment used resulting in frequent breakdowns, and the excessive travel time from the base of operations to the working grounds.

There were an exceptional number of days during which no hydrography could be accomplished due to heavy seas and winds ranging between 20 and 35 miles per hour.

In view of the fact that LAUNCH CS-180 had to be refueled daily, it was necessary to operate from a shore base. The Ship GILBERT was moored at Woods Hole, Mass., the only harbor in the area which had facilities capable of accommodating a Government vessel of this size. LAUNCH CS-180 was moored at Wychmere Harbor, Harwichport, Mass., the closest available mooring to the working grounds. Because of this situation, it was necessary to truck the crew of 180 from Woods Hole to Harwichport and back, daily. This daily round trip consumed approximately 2½ to 3 hours. In addition, it took approximately 1 to 1½ hours Harwichport to the working grounds, and again 1 to 1½ hours from the working grounds to Harwichport, via LAUNCH CS-180.

During this period, the party experienced fathometer vibrator failures and Shoran failures. New vibrators had to be ordered from Washington, as they could not be procured in the field. A delay in delivery of these units necessitated the laying up of the party for several days. Several minor Shoran failures occurred which were repaired in the field. The Onan generators used to provide power to the Shoran in the launch and for Station GAMM, experienced many major failures requiring complete rebuilding of these units. Two new Onans were ordered from the Washington Office, and these also were inoperative when received and had to be rebuilt before they could be used. The motor generator set which supplied power to the Shoran equipment at Station CHAT, failed, and had to be rebuilt by an electrical concern in Hyannis, Mass. No spare set was available, and three days were lost due to this failure.

C. VESSELS AND EQUIPMENT

LAUNCH CS-180 with EDO Fathometer 213 and Shoran equipment Serial 653, was used for this survey except in the area bounded by lat. 41°40' and 41°38' and between the mainland and Nauset Beach and Monomoy Island and long. 69°56'30". This area was surveyed by LAUNCH CS-175 with 808 fathometer 161 SPX, using visual control, on a separate boat sheet GI-1156a.

C. VESSELS AND EQUIPMENT (continued)

LAUNCH CS-180 was operated from the Ship GILBERT, which was moored in Woods Hole. LAUNCH CS-180 was moored in Wychmere Harbor, and the personnel operating it were transported from Woods Hole to Wychmere Harbor daily, by truck. ✓

LAUNCH CS-175 was operated by a shore party based at Ryders Cove, where a mooring was established for this launch.

D. TIDE AND CURRENT STATIONS

Tide information was obtained from the Boston tide gage, with an 0.8 range ratio and a $\frac{1}{2}$ hour time differential, and the Chatham tide gage. For additional information, see Tide Note attached to this report. ✓

No current stations were observed by the hydrographic party.

E. SMOOTH SHEET

Smooth sheet is to be constructed and plotted by the Norfolk Processing Office. ✓✓

F. CONTROL STATIONS

This survey, with the exception of the hydrography accomplished on boat sheet GI-1156a and "r" day on boat sheet GI-1156, was Shoran controlled from two stations. One station was located on Chatham lighthouse, its position given as Chatham South Lighthouse, 1880, with the G.P. on page 135 of Accession Nos. of Computation G3656. The other station was located on Point Gammon, its position being obtained by computing an inverse azimuth from Bishops & Clerks Lighthouse, 1887, 1943 (page 144 of Accession G3692) to Point Gammon Lighthouse, 1934 (page 145 of Accession G3692), and then projecting this azimuth northward from Point Gammon a measured distance. Both of these stations were used in 1954, and the station on Point Gammon was established in 1954. ✓

Control for the aluminum Shoran test plate, used for calibration of the Shoran equipment, was obtained from Cape Cod Triangulation G.P.'s, Topo Station Card T5738, and Chart Letter No. 257, Ship HILGARD, 22 July 1949.

Locations of the Shoran stations are as follows:

CHAT - Lat. $41^{\circ} 40' 16.672''$; Long. $69^{\circ} 57' 01.571''$ ✓

GAMM - Lat. $41^{\circ} 36' 37.85''$; Long. $70^{\circ} 16' 01.89''$ ✓

The hydrography accomplished on sheet GI-1156a and on "r" day, sheet GI-1156, was visual controlled, using signals erected on the beach. Control stations and hydrographic signals were furnished by and obtained from topographic sheets T11203 ph 116 and T11208, and reports furnished by personnel completing these sheets should be referred to. Copies of these reports can not be found aboard this vessel. ✓

Recovery and building of signals was necessary at many stations, and it was necessary to establish or relocate seven signals, as noted in the sounding volumes. ✓

A number of signals were also established or recovered along Monomoy Island, for use in obtaining Shoran comparisons. These Shoran comparisons were not plotted by the field party because the distortion in the boat sheet compromised the accuracy of these plots. ✓

G. SHORELINE AND TOPOGRAPHY*advance prints of*

Shoreline and Topography was furnished by topographic sheets T11203 (1955) ph 116 and T11208 (1952-54) and reports furnished by personnel completing these sheets should be referred to.

It is noted that the shoreline of Nauset Beach as shown by the topographic sheets, is inaccurate. The beach line as it presently exists was walked, using sextant cuts to ~~exact~~ ^{refer to first advance prints} signals to fix positions, by the hydrographic party.

H. SOUNDINGS

All soundings were recorded in feet, on an EDO 255, Ser. No. 213, and 808, Ser. No. 161 depth recorder.

No unusual methods, equipment, or corrections were applied.

I. CONTROL OF HYDROGRAPHY

The two Shoran stations given in section "F" of this report, CHAT and GAMM, were used for the major part of the horizontal control of the hydrographic positions, except that the sounding lines on sheet GI-1156a and on "r" day, sheet GI-1156 were controlled by 3-point sextant fixes on beach signals, which were plotted on the boat sheet with a celluloid 3-arm protractor.

With Shoran control, the Shoran arc from CHAT was followed, and the distance along the arc was obtained from station GAMM. Positions approaching the baseline extension of CHAT-GAMM were difficult to obtain, and due to approaching this base line, the sounding positions at the north edge of the sheet are believed less accurate. Most of these positions had to be plotted on the basis of arc and time on the boat sheet.

Where visual hydrography was accomplished, sounding lines were controlled by 3-point sextant fixes on beach signals, which were plotted on the boat sheet with a celluloid 3-arm protractor.

J. ADEQUACY OF SURVEY

The survey encompassed on sheets GI-1156 and GI-1156a is considered quite adequate to supersede prior surveys of the area for charting purposes.

The offshore ^{portion} ~~position~~ of the survey is complete, the 30-foot curve being drawn with no difficulty. The southern portion of the survey along Monomoy Island is also complete, with the 6 and 12 foot depth curves being easily drawn. That portion of the survey accomplished on sheet GI-1156a, i.e. Pleasant Bay and Chatham Bar, is complete with the exception of a number of splits which should be run to complete the area over Chatham Bar between Lat. 41° 38' 45" and extending into the portion of this area covered on GI-1156 to Lat. 41° 37' 20", and between Long. 69° 56' 30" on the East and the shoreline on the West.

The portion of this survey which lies along Nauset Beach for a distance of about 1/3 mile from the beach, was not surveyed at all. The area begins to shoal appreciably from that point and heavy breakers run from there into the beach, making survey operations extremely hazardous.

The Nauset Beach area and the area around Chatham Bar which requires splitting, are both extremely hazardous areas in which to work. Any work in these areas should be done only at high water on a very flat day. During the 1956 field season, few such days were available.

J. ADEQUACY OF SURVEY (continued)

LAUNCH CS-180 twice touched bottom, and LAUNCH CS-175 broached to, tossing two men overboard, during the operations around Chatham Bar.

Bottom samples should be taken over the area. It was observed that the bottom in the area of the survey consisted primarily of hard sand, but actual bottom samples were not recorded.

A number of shoal spots shown on Chart 1209 were not disclosed, and additional work should be accomplished on these to either prove or disprove their existence. These spots are discussed in sections L and M of this report.

K. CROSSLINES

Crosslines total about 10% for this survey, and crossings are adequate.

L. and M. COMPARISONS WITH PRIOR SURVEYS AND WITH CHARTS

Previous surveys in this area were encompassed on Chart 1209, and comparison will be made on Chart 1209 corrected through 17 March 1956.

Depth curves and soundings from this survey are in general agreement with the chart.

There are practically no soundings on the portion of the chart that covers the inshore portion of sheet GI-1156 along Monomoy Island and Nauset Beach, and up into Pleasant Bay. Comparison of this area with prior surveys H-1726 and H-1727 shows that the depths are in fairly good agreement in the area covered by H-1727, but survey H-1726 is obsolete. This survey indicates that the area presently called Nauset Beach was covered with water at that time.

The following list of shoals and wrecks were noted on Chart 1209. No indications of any of these spots were discovered during the course of the survey, and additional work should be accomplished to either prove or disprove their existence.

8 FT. - Lat. 41°36'36"; Long. 69°56'29"	} Wreck-Lat. 41°40'06"; Long. 69°55'00" " " 41°38'11"; " 69°54'51"
19 " - " 41°39'07"; " 69°55'37"	
18 " - " 41°35'52"; " 69°56'36"	

N. DANGERS AND SHOALS

No new dangers or shoals or bare rocks were discovered and all were found as charted, except as noted in L and M above. The most important hazard to navigation in this area is Chatham Bar, which was sounded during this survey. The area around Chatham Bar is subject to continual shifting. See Section O of this report.

O. COAST PILOT INFORMATION

The primary channel in the area of this survey is over Chatham Bar, from the Atlantic Ocean into Pleasant Bay. This channel has a controlling depth of 6 feet on boat sheet 1156a. Entrance over Chatham Bar should not be attempted without an experienced pilot with knowledge of local conditions because of this dangerous bar, shoal water, changing and twisting channels and the uncertainty of bar conditions.

The area of this survey is used at this time almost entirely by local sport or commercial fishermen.

Contact was made with Mr. Harold Claflin, the Chatham Harbormaster, who is in charge of locally maintained buoys from Chatham Bar to the Chatham Fish Pier. He stated that these buoys are constantly being changed to agree with

See Review

(adequately discredited by present survey Review)

O. COAST PILOT INFORMATION (continued)

changed channels in the above area. Mr. Claflin stated also that the conditions on Chatham Bar are very unpredictable, and change from relatively easy to cross to impossible, and vice versa.

There are no protected coves or anchorages on the outside coast of Nauset Beach or Monomoy Island. Small craft in the area can be afforded protection from the weather only by going up into Pleasant Bay.

P. AIDS TO NAVIGATION

Lighted buoy (FIG) "1" Gong, Lat. $41^{\circ}37'50''$, Long. $69^{\circ}56'38''$ is maintained by the Coast Guard to mark the entrance to Chatham Bar Channel.

Several buoys dot the area marking the channel, but are subject to frequent and unannounced changes by local people, as the channel shifts.

No bridges or overhead ~~or submerged~~ lines or cables are located in the area of this survey. (*short submerged cable in Chatham Hbr., lat. $41^{\circ}39.9'$ long. $69^{\circ}57.25'$ not authorized for charting*)

Q. and R. LANDMARKS AND GEOGRAPHIC NAMES

Landmarks and geographic names were submitted by the photogrammetric party and no investigation was made by the hydrographic party.

S. to Y. No remarks under headings.

Z. TABULATION OF APPLICABLE DATA

Statistics, Tide Note, Fathometer Frequency Corrections, Velocity Correction Abstract, and Shore Corrections, are included as separate parts of this report.

Respectfully submitted,

Marvin B. Miller
Marvin B. Miller,
Ensign, C&GS.

APPROVED AND FORWARDED:

Charles A. Schoene
Charles A. Schoene,
Commander, C&GS,
Commanding Ship GILBERT.

NORFOLK PROCESSING OFFICE
 LIST OF SIGNALS
 H-8349

TRIANGULATION STATIONS ✓

AGE STAGE HARBOR LIGHT, 1954
 CUP CUPOLA, 1954 (C.G. STA. NO. 42, 1920-31)
 DAY STAGE HARBOR DAY BEACON, 1954 (STAGE HBR. L.H., 1880-1931)
 GRASSY GRASSY, 1954
 HAM HAMMONDS, 1954
 HIP HIGH POINT OF SHIPWRECK, 1954
 INWARD INWARD, 1954
 MAN CHATHAM, ROMAN CATHOLIC CHURCH, 1920
 MAT CHATHAM, C.G. STA. SIGNAL MAST, 1934
 MET CHATHAM, METHODIST CHURCH, 1920-34
 OUT CHATHAM, SOUTH L.H., 1880-1931
 TEL TELEPHONE, 1954

TOPOGRAPHIC STATIONS

God Pol

SOURCE T-11196

SOURCE T-11203

Ace Bag Dog Eat Pat Quo Sky

SOURCE T-11208

524 cards were not available during verification of this sheet. Information not available as to whether these stations are described D.S.K.

Tim

HYDROGRAPHIC STATIONS

Arm Vol. 12, pg. 34 & 61 ✓
 Vol. 10, pg. 4 ✓
 Bag Vol. 12, pg. 34 ✓
 Dad Vol. 12, pg. 6 ✓
 Eye Vol. 10, pg. 4 ✓
 Lew Vol. 12, pg. 34 ✓
 Mil Vol. 12, pg. 61 ✓
 Nor Vol. 12, pg. 9 ✓
 Row Vol. 12, pg. 6 ✓
 Tay Vol. 12, pg. 33 ✓
 Try Vol. 12, pg. 61 ✓

NORFOLK PROCESSING OFFICE
FLOATING AIDS TO NAVIGATION
H-8349

<u>BUOY</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>	<u>DEPTH</u>	<u>POS. NO.</u>	<u>DATE</u>
✓ Chatham Bar Lighted Buoy 1	41-37.83	69-56.60	27'	9e	10/29/56
✓ Chatham Bar Gong Buoy	41-37.85	69-56.58	27'	10e	10/29/56
✓ Chatham Bar Lighted Buoy 3	41-37.79	69-57.30	17'	8e	10/29/56
✓ Chatham Bar Lighted Buoy 5	41-37.90	69-57.76	15'	7e	10/29/56
✓ Chatham Bar Lighted Buoy 6	41-38.63	69-57.64	14'	36b	10/22/56
✓ Chatham Bar Buoy 8	41-39.11	69-57.63	10'	40b	10/22/56
✓ Old Harbor Buoy 9	41-39.85	69-56.80	12'	32c	10/24/56

PRIVATE AIDS

✓ Can Buoy	41-40.27	69-56.60	-	31c	10/24/56
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STATISTICS FOR HYDROGRAPHIC SURVEY H-8349 (1956)

SHEET GI-1156:

<u>Date</u> 1956	<u>Day</u> <u>Letter</u>	<u>Volume</u>	<u>Positions</u>	<u>Nautical Miles</u> <u>of Sounding</u>
Sept. 12	a	1	118	42.5
19	b	2	114	41.6
21	c	3	109	41.0
24	d	4	99	35.1
25	e	5	110	38.0
Oct. 2	f	6	75	20.5
3	g	6	29	8.0
4	h	6	7	0.8
5	j	7	44	14.8
10	k	7	15	4.2
11	l	7	41	14.6
16	m	8	39	12.2
22	n	9	42	14.4
29	p	9 & 10	82	27.9
30	q	10	62	14.4
Nov. 8	r	11	44	5.5

SHEET GI-1156a:

Oct. 19	a	12	62	7.7
22	b	12	104	9.3
24	c	12	32	
26	d	12 & 13	93	10.3
29	e	213	151	15.5
30	f	314	75	9.1
Nov. 6	g	314	44	3.9
7	h	314	4	0.3
			1595	391.6

Area is 14.5 sq. mi.

**NORFOLK PROCESSING OFFICE
TIDE REVISIONS**

OFFSHORE AREAS OF PROJECT 13690, ENTRANCE TO NANTUCKET SOUND

When the original tide zone diagram was received from the Field Party it was apparent that in off-shore areas, 3 foot tide jumps would occur in depths as little as 8 feet when changing from one zone to another. A request to the Division of Tides for a review of the diagram resulted in a new lay-out, the limits of which are given on the copy of their letter included in this report.

These new limits cover parts of three seasons work and numerous hours of processing work would have been required to draft new curves of the hourly heights and enter new corrections in the sounding volumes.

Since there was no change in the time differences on the Boston page, a series of arithmetical corrections were compiled to correct the differences in the ratios of H.W. heights. These corrections were applied directly to the original tide reducers already entered in the volumes by the Field Party.

This method has probably resulted in some very slight inaccuracies in the break points, however, they are certainly negligible as the tides are entered to the nearest two-tenths foot. Also, comparisons with actual tide curves show the ratios are correct at all stages of the tide when these corrections are applied.

The following is a summary of the corrections applied to the original tide entries to correct the Ratio of High Water Heights:

RATIO OF 0.6 to 0.4 on BOSTON

From Lat. 41-31 to Lat. 41-32

0.0 to 0.2	- 0.0
" 0.6	-0.2
" 1.2	-0.4
" 1.4	-0.6
" 1.8	-0.8
" 2.2	-1.0
" 2.8	-1.2
" 3.0	-1.4
" 3.4	-1.6
" 3.8	-1.8
" 4.4	-2.0
" 4.6	-2.2
" 5.2	-2.4
" 5.4	-2.6
" 5.8	-2.8
" 6.0	-3.0
" 6.6	-3.2
" 7.0	-3.4
" 7.4	-3.6
" 7.6	-3.8
" 8.0	-4.0

(continued)

(continuation)

RATIO OF 0.8 TO 0.7 ON BOSTON

From Lat. 41-39 to Lat. 41-42

0.0 to 0.8	0.0
" 2.4	-0.2
" 4.0	-0.4
" 5.4	-0.6
" 7.0	-0.8
" 8.4	-1.0

RATIO OF 0.8 TO 0.6 ON BOSTON

From Lat. 41-32 to Lat. 41-39

0.0 to 0.4	0.0
" 1.0	-0.2
" 2.0	-0.4
" 2.8	-0.6
" 3.6	-0.8
" 4.4	-1.0
" 5.0	-1.2
" 6.0	-1.4
" 6.6	-1.6
" 7.6	-1.8
" 8.4	-2.0

RATIO OF 0.5 TO 0.4 ON BOSTON

From 41-23 to Lat. 41-31

0.0 to 0.4	0.0
" 1.4	-0.2
" 2.4	-0.4
" 3.4	-0.6
" 4.4	-0.8
" 5.4	-1.0

Respectfully submitted,

Hugh L. Proffitt
Cartographer.



130 YEARS OF SERVICE
1907 - 1957

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
WASHINGTON 25

IN REPLY ADDRESS THE DIRECTOR
COAST AND GEODETIC SURVEY
AND NOT THE NUMBER OF THIS LETTER

AND REFER TO NO.
36-45-267

13 February 1958

To: Norfolk District Office
Coast and Geodetic Survey
102 West Olney Road
Norfolk 10, Virginia

Subject: Tide Zones, Project OS-369

Listed below are tide zones referred to Boston that should be used along the outer coast for the above project. This zoning supersedes that which was previously furnished you.

Lat. 41° 42' to Lat. 41° 39'
Time Difference = + $\frac{1}{2}$ Hr.
Ratio of High Water Heights = 0.7

Lat. 41° 39' to Lat. 41° 32'
Time Difference = + $\frac{1}{2}$ Hr.
Ratio of High Water Heights = 0.6

Lat. 41° 32' to Lat. 41° 23'
Time Difference = + $\frac{1}{2}$ Hr.
Ratio of High Water Heights = 0.4

Lat. 41° 23' to Lat. 41° 19'
Time Difference = 0 Hr.
Ratio of High Water Heights = 0.2

use of this survey

Enclosed are the hourly heights referred to mean low water at Boston.

K. G. Crosby
K. G. Crosby, Chief
Tides and Currents Division

Enclosures:

TIDE NOTE, SHEET H-8349 (1956)

Tide reducers for boatsheet GI-1156a from the northern limit to the limit of $41^{\circ} 39.0'$ on the south, were derived from the tide gage established at Chatham Fish Pier. The location of this gage was Lat. $41^{\circ} 41.3'$, Long. $69^{\circ} 57.0'$. MLW on staff: 3.0 feet.

Tide reducers for the area south of $41^{\circ} 39'$ on 1156a, and for all of boatsheet GI-1156, were furnished by the Washington Office. These tides were based on Boston, with a range of 0.8 and a time differential of $+\frac{1}{2}$ hour on Boston.

at

It is noted that at the break points of these two tidal areas there is a difference in tide of as much as 3 feet between the tides based on Chatham and those based on Boston. It is assumed that the Washington Office was aware of this difference when the tide ~~gages~~ zones were assigned, and that these differences in tide reducers will be resolved during smooth plotting of this sheet.

*See "Norfolk Processing Office
Tide Revisions" for corrections.*

FATHOMETER FREQUENCY CORRECTIONS

The EDO fathometer used in this survey was calibrated for a velocity of sound of 800 fms/sec. at a motor frequency of 60 cps. In order to provide a true depth, a correction to the soundings must be entered whenever the frequency varies by 1/2 cps or more.

The following is a list of the corrections used, in feet.

<u>Frequency Variation</u>	<u>Depth Range</u>	<u>Correction</u>	✓
+ 0.5 cps	0 - 13	± 0.0	
	13 - 38	0.2	
	38 - 63	0.4	
	63 - 88	0.6	
+ 1.0 cps	0 - 6	± 0.0	
	6 - 18	0.2	
	18 - 30	0.4	
	30 - 41.5	0.6	
	41.5 - 53	0.8	
	53 - 65	1.0	
+ 1.5 cps	65 - 77	1.2	
	0 - 4	± 0.0	
	4 - 12	0.2	
	12 - 20	0.4	
	20 - 27.5	0.6	
	27.5 - 35.5	0.8	
	35.5 - 43.5	1.0	
	43.5 - 52.	1.2	
	52 - 60	1.4	
	60 - 68	1.6	
+ 2.0 cps	68 - 75.5	1.8	
	75.5 - 83.5	2.0	
	83.5 - 91.5	2.2	
	91.5 - 99.5	2.4	
	0 - 3	± 0.0	
	3 - 9	0.2	
	9 - 15	0.4	
	15 - 21	0.6	
	21 - 27	0.8	
	27 - 33.5	1.0	
33.5 - 39.5	1.2		
39.5 - 45.5	1.4		
45.5 - 51.5	1.6		
51.5 - 57.5	1.8		
57.5 - 63.5	2.0		
63.5 - 70	2.2		
70 - 76	2.4		

VELOCITY CORRECTIONS

The velocity and instrument corrections were obtained by bar checks. Temperature and salinity observations were not taken during the course of this survey in the area covered by the survey. These corrections were not entered into the sounding record books, in accordance with verbal instructions of the Norfolk Processing Office. Corrections in feet:

SHEET 1156

12 Sept. to 21 Sept. ✓

0	to 1	0.0
1	3	+ 0.2
3	6	+ 0.4
6	15	+ 0.6
15	21.5	+ 0.8
21.5	24.5	+ 1.0
24.5	27.5	+ 1.2
27.5	30	+ 1.4
30	32	+ 1.6
32	34.5	+ 1.8
34.5	37.5	+ 2.0
37.5	40	+ 2.2

24 Sept. to 10 Oct.

0	to 4	0.0
4	13.5	+ 0.2
13.5	24	0.0
24	30	+ 0.2
30	37	+ 0.4
37	44	+ 0.6
44	53	+ 0.8
53	60	+ 1.0

11 Oct. to 30 Oct.

0	to 12	0.0
12	17	+ 0.2
17	24	+ 0.4
24	32	+ 0.6
32	39	+ 0.8
39	43.5	+ 1.0
43.5	48	+ 1.2
48	60	+ 1.4

8 November

0	to 3	0.0
3	7	- 0.2
7	12.5	0.0
12.5	15	- 0.2

SHEET 1156a ✓

19 Oct. to Oct. 22

0	to 7	0.0
7	11	+ 0.2
11	15	+ 0.4

26 Oct. to 29 Oct.

0	to 13	0.0
13	15	- 0.2

30 October

0	to 1	0.0
1	2.5	- 0.2
2.5	4	- 0.4
4	6	- 0.6
6	7.5	- 0.4
7.5	9	- 0.2
9	12	0.0
12	15	+ 0.2

6 Nov. to 7 Nov.

0	to 3	0.0
3	7	- 0.2
7	12.5	0.0
12.5	15	- 0.2

SHORAN CORRECTIONS

Corrections to the Shoran readings were obtained from a comparison of the zero checks taken daily during this survey with the zero check settings when the Shoran set was calibrated by visual fixes. These differences were either added to or subtracted from the calibration correction as required.

FINAL SHORAN CORRECTIONS:

<u>Date</u> 1956	<u>Day</u> <u>Letter</u>	<u>Correction</u> <u>to C H A T</u>	<u>Correction</u> <u>to G A M M</u>
Sept. 12	a	- 0.006	- 0.006
19	b	+ 0.003	- 0.003
21	c	+ 0.001	- 0.004
24	d	- 0.002	- 0.007
25	e	- 0.004	- 0.007
Oct. 2	f	- 0.003	- 0.010
3	g	- 0.001	- 0.010
4	h	+ 0.002	- 0.013
5	j	- 0.001	- 0.012
10	k	0.000	- 0.009
11	l	+ 0.001	- 0.008
16	m	+ 0.004	- 0.012
22	n	+ 0.006	- 0.013
29	p	+ 0.002	- 0.015
30	q	- 0.006	- 0.014

NORFOLK PROCESSING OFFICE
ADDENDUM
To Accompany

HYDROGRAPHIC SURVEY H-8349 (Field No. G1-1156)

GENERAL

With the exception of the omissions listed under paragraph "J", this appears to be an excellent basic field survey.

TIDES

See the NORFOLK PROCESSING OFFICE TIDE REVISION REPORT.

SOUNDINGS

All fathograms were check scanned and the soundings reduced with templates by the Norfolk Processing Office.

Sounding agreement at crossings is good considering the many fathometer failures, the irregular and changeable character of the bottom, and the constant wave action.

One major discrepancy occurs at Lat. 41-37.7' and Long. 69-57.1', between positions 49 & 50f (blue). It is believed to be caused by either position displacement, or changes brought about by wave action. *Steep slope, minor position displacement - crossing acceptable.*

SHORELINE

Shoreline changes on "s" day, beginning N.E. of station Sky, are believed to be a delineation of the approximate M.H.W. line. The Hydrographer states that measurement were made to the "waters edge" or to the "shoreline". In order to help clarify this situation, elevations above M.L.W. have been placed alongside each position. Station Pol was plotted on a temporary dog ear for plotting positions on this day.

The high-water-line in the vicinity of stations Ace and Pat was omitted on the smooth sheet as indicated changes were not furnished by the Hydrographer. *Shoreline from T-11203*

Norfolk, Va.
15 April 1958

Respectfully submitted,

Hugh L. Proffitt
Hugh L. Proffitt
Cartographer.

GEOGRAPHIC NAMES

Survey No. H-8349

Name on Survey	Source									
	A	B	C	D	E	F	G	H	K	
<u>Massachusetts</u>			(for title)						BGN	1
<u>Cape Cod</u>			" "							2
<u>Monomoy Island</u>									BGN	3
<u>Nauset Beach</u>									"	4
<u>Chatham</u>			(tide station)							5
										6
										7
										8
										9
										10
										11
										12
										13
										14
										15
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										17
										18
										19
										20
										21
										22
										23
										24
										25
										26
										27

Names approved June 10, 1958
L. Heck

TIDE NOTE FOR HYDROGRAPHIC SHEET

Chart Division: R. H. Carstens

29 May 1958

Plane of reference approved in
14 volumes of sounding records for

HYDROGRAPHIC SHEET 8349

Locality Nantucket Sound Approach, Massachusetts

Chief of Party: R. A. Marshall in 1956

Plane of reference is mean low water, reading
3.0 ft. on tide staff at Chatham
13.7 ft. below B.M. 1 (1952)

Height of mean high water above plane of reference is 3.9 feet.

NOTE: Height of mean high water above plane of reference for the area referred to the Boston tide gage is 6.2 feet.

Condition of records satisfactory except as noted below:


Signature

Chief, Tides Branch

Hydrographic Surveys (Chart Division)

HYDROGRAPHIC SURVEY NO. 8349...

Records accompanying survey:

Boat sheets ~~1 (2 Parts)~~ sounding vols. 14...; wire drag vols.; bomb vols.; graphic recorder rolls 11. Envelopes special reports, etc. 1. Smooth sheet and 1. Descriptive report,

The following statistics will be submitted with the cartographer's report on the sheet:

	Kennon	Gearhart
Number of positions on sheet	1621	
Number of positions checked	260	
Number of positions revised	11	
Number of soundings revised (refers to depth only)	24	
Number of soundings erroneously spaced	155	
Number of signals erroneously plotted or transferred	0	
Topographic details	Time 5 hrs	16
Junctions	Time 4 hrs	16
Verification of soundings from graphic record	Time 5 hrs	
Verification by <i>J.E. Gearhart</i> DAVID J. KENNON	46 hrs Total time 246 hrs	Date 10-3-58
Reviewed by <i>J.E. Gearhart</i>	Time 62	Date 10/10/58

DIVISION OF CHARTS

Review Section - Nautical Chart Branch

Review of Hydrographic Survey

Registry No. H-8349

Massachusetts - Cape Cod - East Side of
Monomoy Island

Field No. GI-1156

Surveyed - Sept.-Nov. 1956

Scale 1:10,000

Project No. 13690

Soundings:

Depth recorder (EDO 255; 808)

Control:

Shoran
Sextant angles on
shore signals

Chief of Party - R. A. Marshall
Surveyed by - N. E. Taylor, M. B. Miller, J. S. Baker
Protracted by - W. W. Feazel (Norfolk P. O.)
Soundings plotted by - W. W. Feazel
Verified and inked by - D. J. Kennon, J. E. Gearhart
Reviewed by - L. V. Evans III 12/18/58
Inspected by - R. H. Carstens

1. Shoreline and Control

The sources of shoreline and control are given in the Descriptive Report. The position of the high-water line at Wauset Beach in 1956 was determined by the hydrographer and is shown in red.

2. Sounding Line Crossings

Depths at crossings are in adequate agreement to confirm the over-all accuracy of the survey.

3. Depth Curves and Bottom Configuration

The usual depth curves are adequately defined except for the incomplete and unsurveyed areas discussed in Section J of the Descriptive Report.

The area of Chatham Harbor, Chatham Bar and close to Monomoy Island has a bottom of bars and channels forming a broken, confused pattern subject to continued, extensive changes. The offshore bottom is characterized by many lumps, low ridges, holes and troughs, also

also subject to considerable shifting, superimposed on a gentle, broadly undulating slope.

4. Junctions with Contemporary Surveys

The junction to the east with H-8350 (1956) is discussed in the review of that survey. A satisfactory junction was effected with H-8348 (1956) to the north in Chatham Harbor. The junction to the south with H-8171 (1954-56) will be considered in the review of that survey.

There are no adjoining, contemporary surveys in the outside water to the north. Present depths along the outer, north limits of this survey which are the project limits, are in general harmony with charted hydrography.

5. Comparison with Prior Surveys

BP 17784 (1784)	H-2101 (1891) 1:20,000
H-293 (1851) 1:10,000	H-2224 (1895) 1:20,000
H-387 (1853) 1:30,000	H-2426 (1899) 1:20,000
H-570 (1856) 1:40,000	H-2597 (1902) 1:20,000
H-1284 (1875) 1:10,000	H-2603 (1902) 1:10,000
H-1726 (1886) 1:10,000	H-3031 (1909) 1:40,000
H-1727 (1886) 1:10,000	H-5141 (1931) 1:20,000

A study of the successive surveys shows the area of this survey to be extremely unstable. The zone along-shore and the barrier beach (Nauset Beach) are particularly subject to cycles of extensive erosion and accretion from the action of wave-generated currents and violent storms. Drastic changes not only in the channels and bars but also in the major features of Nauset Beach and Monomoy Island have occurred.

For example, prior to the 1851-53 surveys, Nauset Beach had been breached in the vicinity of lat. $41^{\circ}42'$. By 1931 that part of the former Nauset Beach south of the breach had disappeared, having migrated southward and westward, accreting along the mainland and forming the present Monomoy Island. Meanwhile, Nauset Beach was rebuilding through accretion from the material of the littoral drift constantly carried southward by the currents. By the time of the present survey, the former north side of the breach had grown southward almost 4 statute miles, probably approaching a form similar to conditions before breaching.

The size and complexity of changes are such that an analysis is beyond the scope of this review. A detailed study may be found in the Army report, "Chatham, Mass., Beach Erosion Control Study" (House Document No. 167, 85th Congress, 1st Session). It is apparent that in such a flexible area the hydrographic changes will quickly make any survey obsolescent.

Offshore, although there is general agreement in the basic pattern of depth curves, a similar shifting bottom is considered primarily responsible for the many differences in localized depths between the present and prior surveys. The following examples are typical of the prior depths discredited by the present hydrography:

<u>Prior Depth</u> (feet)	<u>Source</u>	<u>Lat.</u>	<u>Long.</u>	<u>Present Depth</u> (feet)
8	H-1727	41°36.6'	69°57.5'	22-24
19 (charted)	H-570	41°39.1'	69°55.6'	31
18 "	H-2224	41°35.85'	69°56.6'	25
48 "	H-570	41°41.04'	69°54.4'	62
34 "	H-570	41°39.1'	69°55.0'	41
55 "	H-570	41°39.04'	69°53.73'	47-50
30 "	H-570	41°37.37'	69°54.85'	41
30 "	H-2224	41°36.78'	69°54.26'	37-39
27 "	"	41°36.43'	69°54.58'	32
22 "	"	41°35.9'	69°54.76'	26-28
22 "	H-2426	41°35.75'	69°55.2'	27
21 "	H-2101	41°35.7'	69°57.25'	29
22 "	H-2224	41°36.45'	69°56.4'	28-30

With the addition of a number of bottom characteristics carried forward, the present survey supersedes the prior surveys within their common areas.

6. Comparison with Chart 250 (print of 2/17/58)
Chart 1208 (print of 10/27/58)

A. Hydrography

The offshore hydrography originates mainly with the prior surveys, supplemented by soundings from the boat sheets of the present survey (through Bp. 55027, 55029). The inshore area is almost entirely charted from the boat sheets of this survey. The smooth sheet soundings differ from the boat sheet soundings in many cases by 1 to 3 ft., largely because of revisions in tide reducers.

It is recommended that the wrecks in lat. $41^{\circ}40.1'$ long. $69^{\circ}55.0'$ and lat. $41^{\circ}38.2'$ long. $69^{\circ}54.8'$ mentioned in item L-M of the Descriptive Report be retained as charted until proved or disproved. Otherwise the present survey supersedes the charted hydrography within the limits covered.

B. Aids to Navigation

The survey position of Chatham Bar Lighted Buoy "1" is in substantial agreement with its charted position and adequately marks the feature intended. The Chatham Harbor buoys are not charted. Survey positions for Chatham Buoy "2" and Bearse Shoal North End Buoy "2" were not obtained.

7. Condition of Survey

- A. The field records are complete.
- B. The selection and spacing of soundings in congested areas was revised by the verifier to depict bottom relief more clearly. Otherwise the smooth plotting was satisfactory.
- C. Recompilation of the shoreline from more recent photographs necessitated considerable revision in the high-water line.

8. Compliance with Project Instructions

This survey adequately complies with the instructions except for the incompletely surveyed areas noted in item 9 and the lack of bottom characteristics.

9. Additional Field Work Recommended

As noted in the Descriptive Report item J. shoals and breakers along Nauset Beach prevented sounding in the inshore area and the development of the bar across the channel to Chatham is incomplete. Inasmuch as depths in the channel are continually changing additional splits in this area are not warranted. In other surveyed areas the present development is adequate and no additional hydrography is recommended.

H-8349 (1956)-5

The submerged wrecks charted in lat. $41^{\circ}40.1'$ long. $69^{\circ}55.0'$ and lat. $41^{\circ}38.2'$ long. $69^{\circ}54.8'$ were not investigated on the present survey and should be covered by wire drag during wire drag wreck investigation along the coast. *Remove from Chits. See Chart Letter No. 445 (1960)*

L.S.S. 8/9/60.

Examined and Approved:

Max G. Ricketts

Max G. Ricketts
Chief, Nautical Chart Branch

Ernest B. Lewey

Ernest B. Lewey
Chief, Division of Charts

Lorin F. Woodcock

Lorin F. Woodcock
Chief, Hydrographic Branch

Samuel B. Grenell

Samuel B. Grenell
Chief, Division of Coastal Surveys

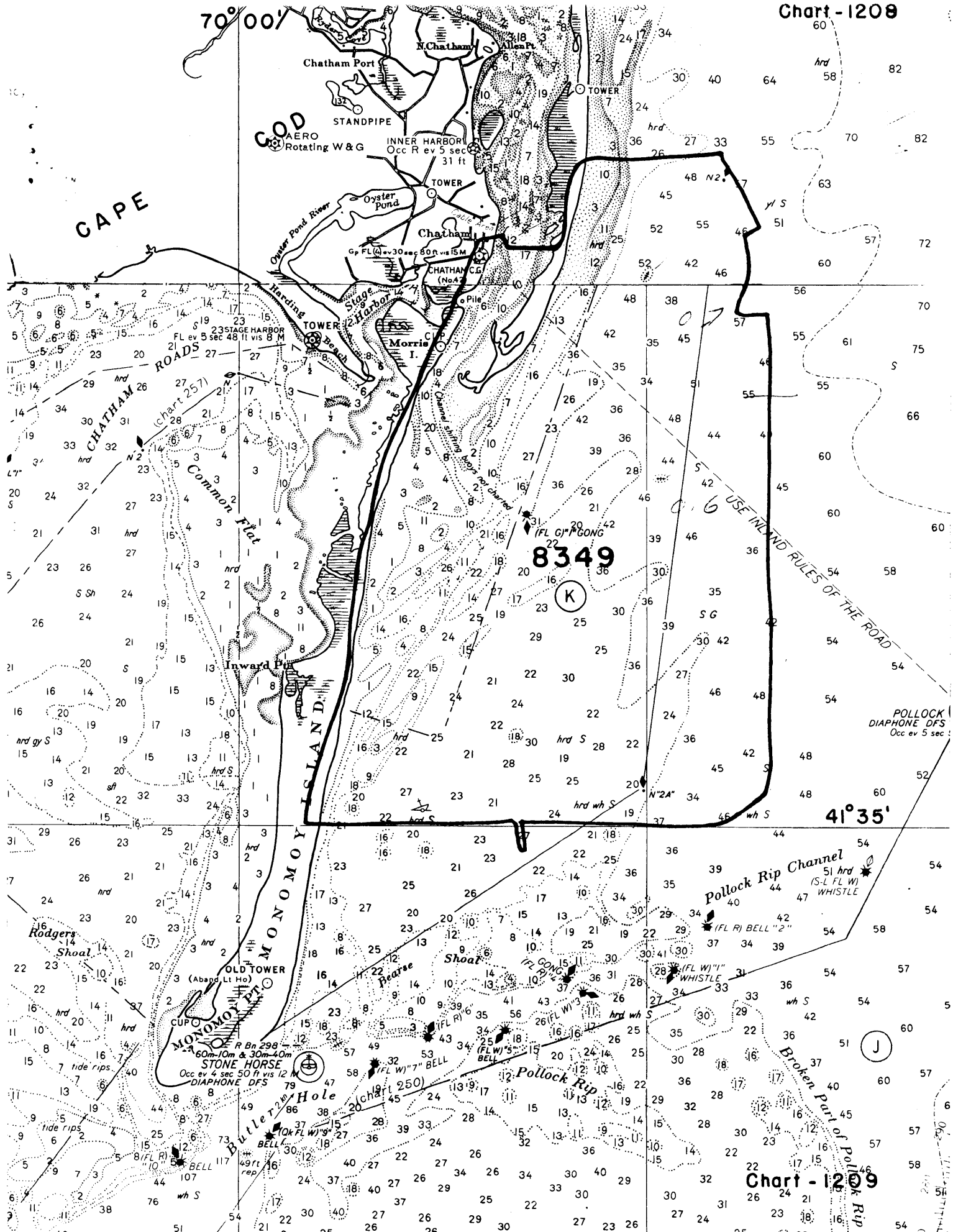
Note: 4/8/59

Instructions will be written for wire dragging the two wrecks, listed at top of page, during 1959 season

S. B. Grenell

70°00'

CAPE



8349

41°35'

USE INLAND RULES OF THE ROAD

POLLOCK DIAPHONE DFS Occ ev 5 sec

Pollock Rip Channel 51 hrd (S-L FL W) WHISTLE

STONE HORSE Occ ev 4 sec 50 ft vis 12 M DIAPHONE DFS

Rogers Shoal

(FL W) 7" BELL

(FL R) BELL "2"

OLD TOWER (Aband LI Ho)

(FL W) "1" WHISTLE

tide rips

(FL W) 5" BELL

(FL W) "3" WHISTLE

tide rips

(FL W) 9" BELL

(FL W) "4" WHISTLE

tide rips

(FL W) 11" BELL

(FL W) "5" WHISTLE

tide rips

(FL W) 13" BELL

(FL W) "6" WHISTLE

tide rips

(FL W) 15" BELL

(FL W) "7" WHISTLE

tide rips

(FL W) 17" BELL

(FL W) "8" WHISTLE

NAUTICAL CHARTS BRANCH

SURVEY NO. H-8349

Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
1-13-59	70	R. E. ELKINS	Examined after review. Consider completely applied Before After Verification and Review Examined thru the examination on chart 1208 dig 20. no revisions.
2/24/59	1209	H.C. Anderson	Before After Verification and Review Complete application thru new chart #270 B direct
2/24/59	250	H.C. Anderson	Before After Verification and Review Full Application thru #270 in its coverage.
Oct. 1958	270	L.A.M.	Before After Verification and Review Ver. after review 3-16-59 EMA
5/11/59	1107	J.H. EATON	Before After Verification and Review Fully applied thru chart 1209
5/14/59	71	JHEATON	Before After Verification and Review Thru Chart 1107
5/14/59	1000	JHEATON	Before After Verification and Review Thru Chart 71
7-9-59	1208	R. H. DeFauder	Before After Verification and Review. Area covered by chart 1209 applied thru that chart. Before After Verification and Review
			Before After Verification and Review

M-2168-1

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.