

5401

5401

5401

Form 504  
Ed. June, 1928

**DEPARTMENT OF COMMERCE**  
U. S. COAST AND GEODETIC SURVEY  
R. S. Patton, Director

State: Massachusetts

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**DESCRIPTIVE REPORT**

~~Topographic~~ } Sheet No. 2      5401  
Hydrographic }

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LOCALITY

Cape Cod.

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Wellfleet Harbor.

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19<sup>33</sup>

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CHIEF OF PARTY

K. T. Adams.

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY

HYDROGRAPHIC  
~~TOPOGRAPHIC~~ TITLE SHEET

The finished ~~Topographic~~ <sup>Hydrographic</sup> Sheet is to be accompanied by the following title sheet, filled in as completely as possible, when the sheet is forwarded to the Office.

Field Number 2

U. S. Coast and Geodetic Survey.

5401

Register No. ....

State Massachusetts . . . . .

General locality Cape Cod . . . . .

Locality Wellfleet Harbor . . . . .

Chief of party K. T. Adams . . . . .

Surveyed by E. A. Dally and E. S. Averell . . . . .

Date of survey July 1, 1933 to November 8, 1933 . . . . .

Scale 1 : 20,000 . . . . .

~~Depths~~ <sup>Depths</sup> in feet ~~above~~ <sup>below</sup> Mean Low Water . . . . .

Depth Curve  
~~Contour~~ interval . . . . . feet. 6, 12, 18, 24, 30, 36, 60.

Plotted by E. S. Averell Soundings penciled by E. S. Averell  
~~Checked by~~ E. S. Averell ~~Rechecked by~~ E. S. Averell

Records accompanying sheet (check those forwarded): ~~Photographs~~

Descriptive report, Horizontal angle books, Field computations,  
Data used in reduction of soundings

Data from other sources affecting sheet . . . . .

Remarks: Tidal Data submitted separately but includes:  
Tide Curves at Wellfleet  
Tide Curves at Provincetown.

U. S. COAST & GEODETIC SURVEY  
LIBRARY AND ARCHIVES

FEB 23 1934

Acc. No. \_\_\_\_\_

DESCRIPTIVE REPORT

TO ACCOMPANY HYDROGRAPHIC SHEET NUMBER 2

WELLFLEET HARBOR AND BILLINGSGATE SHOAL, CAPE COD, MASS. 1833

PROJECT H. T. 145

K. T. ADAMS  
CHIEF OF PARTY

DESCRIPTIVE REPORT

TO ACCOMPANY HYDROGRAPHIC SHEET NUMBER 2.

WELLFLEET HARBOR AND BILLINGSGATE SHOAL, CAPE COD, MASS. 1933

PROJECT H. T. 145

AUTHORITY:- The authority for the hydrographic work embraced by this sheet is included in the "Orders and Instructions, Project H. T. 145, Paragraph 5 and 6, to the Inspector, Coast and Geodetic Survey, Boston, Mass.

SURVEY METHODS:- A Coast Guard Picket Boat No. 2337 was furnished to carry on the work, and carried a crew of seven men rated as follows:

- 1 man in charge who read right angle and plotted
- 1 left angle man
- 1 recorder
- 1 coxswain
- 1 engineer
- 2 leadsmen

Lieutenant E. A. Deily had direct charge of the boat until August 10, 1933 when Mr. E. S. Averall was placed in charge.

The hydrography was executed by the conventional U. S. Coast and Geodetic Survey methods using the hand line only. Signals were located by triangulation or topography. Only one signal, BUOY, was located by sextant fix for use as a hydrographic signal. This was located at ebb tide so that its position during use would not change.

OFFICE WORK:- During the plotting of the smooth sheet a jump in the sounding lines occurred when the signals ROK and DED were used. ROK had been located by sextant cuts and these did not check the location as determined by the topographic party. On examining the topographic sheet a small hole was found on the edge of the circle surrounding the location of the signal DED.

To check the position of these two signals a party went to Wellfleet and took intersections to these with a theodolite. Their location is given in the computations attached to this report. They should not be classed as triangulation stations however.

The new position of ROK checked that of the topographic party, while the new one of DED checked the position of the hole on the edge of the circle, showing that the wrong point had been taken for the signal.

Where lines were spaced so close that all soundings taken could not be plotted, the shallower ones were chosen.

Tide Reducers for Wellfleet Harbor were obtained by the use of a Portable Automatic Tide Gage located in Wellfleet Harbor; Lat, 41°-55.4' N. Long. 70°-02.2' W. Position numbers and letters for this area are in red ink.

Tide Reducers for the area outside the harbor were taken from a

Portable Automatic Gage located on the town pier at Provincetown. Position numbers and letters for this area are in blue ink.

COMPARISON WITH PREVIOUS SURVEYS:- Billingsgate Island has changed its shape considerably and an island at high tide has been made of the spit to the north of it. A channel is apparently being formed between these two.

*See letter 736-1934  
for results of examination  
of Sand Rock by E. A. Daily  
in 1934.  
Rock removed from chart.*

A rock marked "Sand Rock", Lat.  $41^{\circ}-51'8''$  Long.  $70^{\circ}-02'4''$  shown on chart 340, was searched for but not found. However, it should be retained on the chart as it was not definitely proved that it is not as shown. More time should be spent in looking for this rock in next seasons work.

A number of small groups of rocks not shown on the chart were located West of Lieutenants Island, at the entrance to Herring River, and to the East of Great Beach Hill.

A new rock was located 0.7 miles <sup>South</sup> West of Lieutenant Island in Lat.  $41^{\circ}-53'3''$  Long.  $70^{\circ}-02'2''$ . This is a flat jagged rock about 15 feet in diameter baring 1 foot at Low Water. Soundings on lines near it show 4 feet of water. The rock was not discovered till late in the season. As the launch could not get near it at the time due to the low tide, the rock was located from a skiff and no soundings were taken. The hydrographer could find no local name for this rock.

Chart 340 shows a name, "Bay Rocks" at approximately Lat.  $41^{\circ}-54'0''$  Long.  $70^{\circ}-03'5''$  but there is no rock symbol on the chart. Neither could any rock be found near this location. It would be advisable to remove this name from the new chart.

CHANNEL:- The outer end of the channel to Wellfleet Harbor is not fully developed. Depths in the channel North East of Billingsgate Island vary from 12 to 33 feet.

Chart 340 shows a 6 foot dredged channel in 1817. The depth varies to 8 feet but the wharf to which it leads cannot be reached at low tide, as the North End of this channel has filled in.

There are many oyster beds in the inner harbor, marked by 12 to 15 foot saplings. These serve roughly to determine the channel at the northern end of the Harbor. They cannot be relied on to serve as accurate markings, as some of them are several feet from the edge of this narrow channel.

GEOGRAPHIC NAMES:- Local Geographic names were not checked by the hydrographer.

STATISTICS:-	N	No. Positions	No. Soundings	Miles of Line
Inside Wellfleet Harbor		1787	8753	265.4
Outside Wellfleet Harbor		844	4564	148.3
Total		2631	13317	413.7

Approved by: *K.T. Adams*  
K. T. Adams  
Chief of Party

Submitted by: *Edw. S. Averell*  
E. S. Averell  
Surveyor

COMPUTATION OF TRIANGLES

State: Mass.

11-9121

Acc. No.

NO.	STATION	OBSERVED ANGLE	CORR'N	SPHER'L ANGLE	SPHER'L EXCESS	PLANE ANGLE AND DISTANCE	LOGARITHM
2-3	Great Beach Hill - Blackfish						3.579 9311.
1	Ded	(68 17 )				37.6	0.031 9411.
2	Great Beach Hill	78-38-23.1					9.991 4068.
3	Blackfish	33 03 59.3					9.736 8837.
1-3	Ded - Blackfish						3.603 2790.
1-2	- Great Beach Hill						3.348 7559.
2-3	Great Beach Hill - Blackfish						3.579 9311.
1	Rock	(124 53 )				46.1	0.086 0851.
2	Great Beach Hill	10-00-30.6					9.240 0355.
3	Blackfish	45 05 43.3					9.850 2066.
1-3	Rock - Blackfish						2.906 0517.
1-2	- Great Beach Hill						3.516 2228.
2-3	Great Beach Hill - Blackfish						3.579 9311.
1	Tan	(72 23 )				32.6	0.020 8385.
2	Great Beach Hill	97 30-52.1					9.996 2541.
3	Blackfish	10 05 35.3					9.243 6551.
1-3	Tan - Blackfish						3.597 0237.
1-2	- Great Beach Hill						2.844 4247.
2-3	obs. $\angle$ s at Great Beach Hill						
1	Rock	41-00-15.5 - 30-59-44.9 = 10-00-30.6					
2	Ded	109-38-08.0 - " = 78-38-23.1					
3	Tan	128-30-37.0 - " = 97-30-52.1					
1-3	obs. $\angle$ s at Blackfish						
1-2	Rock	208-21-38.4 subtract from 253-27-21.7 = 45-05-43.3					
	Ded	220-23-22.4 " " " = 33-03-59.3					
	Tan	243 21-46.4 " " " = 10-05-35.3					

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Inverse  
POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

$\alpha$	2	to 3				$\alpha$	3	to 2			
$2^d \angle$		&	+			$3^d \angle$		&	-		
$\alpha$	2	to 1	282	35	19.0	$\alpha$	3	to 1			
$\Delta\alpha$				+1	47.5	$\Delta\alpha$					
			180	00	00.0				180	00	00.0
$\alpha'$	1	to 2	102	37	065	$\alpha'$	1	to 3			

FIRST ANGLE OF TRIANGLE

$\phi$	41	54	16.282	2 Great Beach Hill	$\lambda$	70	04	09.127	$\phi$			3	$\lambda$		
$\Delta\phi$		-	26.884		$\Delta\lambda$		-2	40.938	$\Delta\phi$				$\Delta\lambda$		
$\phi'$	41	53	49.398	1 Blackfish	$\lambda'$	70	01	28.189	$\phi'$			1	$\lambda'$		

Logarithms		Values in seconds		Logarithms		Values in seconds		Logarithms		Values in seconds		Logarithms		Values in seconds	
$s$	2.9182866			$\frac{1}{2}(\phi+\phi')$	41-54-02.84			$s$				$\frac{1}{2}(\phi+\phi')$			
$+$ Cos $\alpha$					Logarithms	Values in seconds		Cos $\alpha$					Logarithms	Values in seconds	
B	8.5107062			$s$	3.5693632			B				$s$			
h	1.4289928	1st term	+26.858	Sin $\alpha$					h		1st term	"			
$s^2$	7.13873			A'	8.5090701			$s^2$				A'			
Sin $^2\alpha$						Sec $\phi'$	0.1282253			Sin $^2\alpha$				Sec $\phi'$	
C	1.35730			$\Delta\lambda$	2.2066586	-160.938		C				$\Delta\lambda$			
	8.49603	2d term	+ 0.031	Sin $\frac{1}{2}(\phi+\phi')$	9.8246743					2d term	+	Sin $\frac{1}{2}(\phi+\phi')$			
$h^2$				$-\Delta\alpha$	1.0313329	+107.488		$h^2$				$-\Delta\alpha$			
D	2.3906			$S \sin \alpha$ 3.5693632 $S \cos \alpha$ 2.9182866 $\tan \alpha$ 0.6510766 282-35-19.0				D							
		3d term	+ —							3d term	+				
		$-\Delta\phi$	+26.884	$\sin \alpha$	9.9894321					$-\Delta\phi$					

S 3.5799311

Comp KTA  
✓ KTA  
copy F.S.P.

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

° ' "					° ' "												
$\alpha$	2		to 3	282 35 19.0	$\alpha$	3		to 2	102 37 06.5								
2 <sup>d</sup> $\angle$			&	+ 97 30 52.1	3 <sup>d</sup> $\angle$			&	- 10 05 35.3								
$\alpha$	2		to 1	20 06 11.1	$\alpha$	3		to 1	92 31 31.2								
$\Delta\alpha$					$\Delta\alpha$												
				180 00 00.0					180 00 00.0								
$\alpha'$	1		to 2		$\alpha'$	1		to 3									
FIRST ANGLE OF TRIANGLE					° ' "												
$\phi$	41	54	16.282	2 Great Beach Hill	$\lambda$	70	04	09.127	$\phi$	41	53	49.398	3 Blackfish	$\lambda$	70	01	28.189
$\Delta\phi$		-	21.273		$\Delta\lambda$		+	10.421	$\Delta\phi$		+	5.611		$\Delta\lambda$		+	2 51.359
$\phi'$	41	53	55.009	1 Tan	$\lambda'$	70	04	19.548	$\phi'$	41	53	55.009	1 Tan	$\lambda'$	70	04	19.548
Logarithms		Values in seconds		° ' "		° ' "		Logarithms		Values in seconds		° ' "					
s	2.844 4247	<del>1697.0</del> 1697.0 154.0		450.6 932.4		s	3.597 0237										
Cos $\alpha$	9.972 7006			Logarithms		Cos $\alpha$	8.644 0555					Logarithms					
B	8.510 7062			s	2.844 4247	B	8.510 7068					s	3.597 0237				
h	1.327 8315	1st term	21.273	Sin $\alpha$	9.536 1925	h	0.751 7860	1st term	- 5.647	Sin $\alpha^+$	9.999 5780						
s <sup>2</sup>	5.688 85			A'	8.509 0700	s <sup>2</sup>	7.194 05			A'	8.509 0700						
Sin <sup>2</sup> $\alpha$	9.072 38			Sec $\phi'$	0.128 2358	Sin <sup>2</sup> $\alpha$	9.999 16			Sec $\phi'$	0.128 2358						
C	1.357 30			$\Delta\lambda$	1.017 9230	C	1.357 18			$\Delta\lambda$	2.233 9075	171.359					
	6.118 53	2d term	+ —	Sin $\frac{1}{2}(\phi+\phi')$			8.550 39	2d term	+ .036	Sin $\frac{1}{2}(\phi+\phi')$							
h <sup>2</sup>	—			- $\Delta\alpha$		h <sup>2</sup>	—			- $\Delta\alpha$							
D	2.390 6					D	2.390 5										
	—	3d term	+ —				—	3d term	+ —								
		- $\Delta\phi$	21.273					- $\Delta\phi$	- 5.611								



POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

$\alpha$	2	to 3	282	35	19.0
$2^d \angle$		&	+ 78	38	23.1
$\alpha$	2	to 1	1	13	42.1
$\Delta\alpha$					
			180	00	00.0
$\alpha'$	1	to 2			

$\alpha$	3	to 2	102	37	06.5
$3^d \angle$		&	- 33	03	59.3
$\alpha$	3	to 1	69	33	07.2
$\Delta\alpha$					
			180	00	00.0
$\alpha'$	1	to 3			

FIRST ANGLE OF TRIANGLE

$\phi$	41	54	16.282	2	Great Bend Hill	$\lambda$	70	04	09.127
$\Delta\phi$		- 1	12.337			$\Delta\lambda$		+	2.076
$\phi'$	41	53	03.945	1	Red	$\lambda'$	70	04	11.203

$\phi$	41	53	49.398	3	Blackfish	$\lambda$	70	01	28.189
$\Delta\phi$			- 45.453			$\Delta\lambda$		+	2 43.014
$\phi'$	41	53	03.945	1	Red	$\lambda'$	70	04	11.203

$s$	Logarithms	3.348 7559	Values in seconds	121.7 1729.3	$\frac{1}{2}(\phi+\phi')$	1125.1	Logarithms	3.348 7559	Values in seconds	258.3
$\cos \alpha$	9.999 9002				$\sin \alpha$	8.331 1702				
$B$	8.510 7062				$A'$	8.509 0705				
$h$	1.859 3623	1st term	72.337		$\sec \phi'$	0.128 1396				
$s^2$	6.697 51				$\Delta\lambda$	0.317 1362			2.076	
$\sin^2 \alpha$	6.				$\sin \frac{1}{2}(\phi+\phi')$					
$C$	1.357 30	2d term	+ —		$-\Delta\alpha$					
$h^2$										
$D$	2.390 6	3d term	+ —							
		$-\Delta\phi$	72.337							

$s$	Logarithms	3.603 2790	Values in seconds		$\frac{1}{2}(\phi+\phi')$		Logarithms	3.603 2790	Values in seconds	
$\cos \alpha$	9.543 2697				$\sin \alpha$	9.971 7348				
$B$	8.510 7068				$A'$	8.509 0705				
$h$	1.657 2555	1st term	45.421		$\sec \phi'$	0.128 1396				
$s^2$	7.206 56				$\Delta\lambda$	2.212 2239			163.014	
$\sin^2 \alpha$	9.943 47				$\sin \frac{1}{2}(\phi+\phi')$					
$C$	1.357 18	2d term	+ .032		$-\Delta\alpha$					
$h^2$										
$D$	2.390 5	3d term	+ —							
		$-\Delta\phi$	45.453							

POSITION COMPUTATION, THIRD-ORDER TRIANGULATION

$\alpha$	2	to 3	282	35	19.0	$\alpha$	3	to 2	102	37	06.5
$2^d \angle$		&	+ 10	00	30.6	$3^d \angle$		&	- 45	05	43.3
$\alpha$	2	to 1	292	35	49.6	$\alpha$	3	to 1	57	31	23.2
$\Delta\alpha$						$\Delta\alpha$					
			180	00	00.0				180	00	00.0
$\alpha'$	1	to 2				$\alpha'$	1	to 3			

FIRST ANGLE OF TRIANGLE

$\phi$	41	54	16.282	2 Great Beach Hill	$\lambda$	70	04	09.127	$\phi$	41	53	49.398	3 Blackfish	$\lambda$	70	01	28.189
$\Delta\phi$			- 40.904		$\Delta\lambda$		- 2	11.462	$\Delta\phi$			- 14.019		$\Delta\lambda$		+	29.476
$\phi'$	41	53	35.378	1 Rok	$\lambda'$	70	01	57.665	$\phi'$	41	53	35.379	1 Rok	$\lambda'$	70	01	57.665

Logarithms		Values in seconds		Logarithms		Values in seconds		Logarithms		Values in seconds	
$s$	3.516 2228	1091.4	759.6	$s$	3.516 2228	1329.2	53.8	$s$	2.906 0517		
$\text{Cos } \alpha$	9.584 6025			$\text{Cos } \alpha$	9.729 9414			$\text{Cos } \alpha$	9.729 9414		
$B$	8.510 7062			$B$	8.510 7068			$B$	8.510 7068		
$h$	1.611 5415	1st term	40.883	$h$	1.146 6999	1st term	14.018	$h$	1.146 6999	1st term	14.018
$s^2$	7.032 45			$s^2$	5.812 10			$s^2$	5.812 10		
$\text{Sin}^2 \alpha$	9.930 62			$\text{Sin}^2 \alpha$	9.852 28			$\text{Sin}^2 \alpha$	9.852 28		
$C$	1.357 30			$C$	1.357 18			$C$	1.357 18		
	8.320 37	2d term	+ .021		7.021 56	2d term	+ .001		7.021 56	2d term	+ .001
$h^2$	—			$h^2$	—			$h^2$	—		
$D$	2.390 6			$D$	2.390 5			$D$	2.390 5		
	—	3d term	+ —		—				—	3d term	+ —
		$-\Delta\phi$	40.904							$-\Delta\phi$	14.019

Form 250  
Ed. July, 1928

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

R. S. Patten, Director.

State: Mass.

OBSERVATIONS  
OF  
HORIZONTAL ANGLES

LOCALITY

Cape Cod  
Welfleet

INSTRUMENT

Heyde #303

Jan 10

1934

CHIEF OF PARTY

K. T. Adams

1 Vols.

Vol. 1

U. S. COAST & GEODETIC SURVEY  
LIBRARY AND ARCHIVES

FEB 28 1934

Acc. No. \_\_\_\_\_

5401

See note  
page 9

# HORIZONTAL

STATION: Up STATE: Mass.

OBSERVER: Scaled Angles.

OBJECTS OBSERVED		TIME	TEL. D	REP'S	ANGLE
		h. m.	OR R		o /
<i>at Up</i>					
Con to Gin	62°-20				
Con to Rok	71°-02				
" - Bill	138°-50				
" - Ded	139°-49				
" - Nor	144°-30				
" - Fire	30°-24				
<i>at Ham</i>					
Con " Fire	33°-30				
" - Rok	240° -				
" - Ded	253°-24				
" - Nor	263°-50				
" - Gin	286°-54				
<i>at Ham</i>					
Fire to <sup>Rok</sup> <del>Ded</del>	Counter-clockwise	27°-10			
" " Gin	43°-18				
" " Nor	54°-44				
" " Ded	59°-45				

Do not write in this margin

### ANGLES

ISLAND OR  
COUNTY:

Great Beach

DATE:

INSTRUMENT:

A "	B "	MEAN OF VERNIERS	ANGLE MEAN D AND R ° ' "	REMARKS
<i>Do not write in this margin</i>				
<i>See note page 9</i>				

HORIZONTAL

STATION: *Great Beach Hill 1933* STATE: *Mass.*

OBSERVER: *Edw. S. Averell*

OBJECTS OBSERVED	TIME h. m.	TEL. D OR R	REP'S	ANGLE ° ' "	
<del>ROK</del>				<del>41 00</del>	
FIRE to ROK		D		41 00	
FIRE to <sup>to B.H.</sup> DED		D		109 38	
<del>FIRE to <sup>to B.H.</sup>DED</del> Fire		D		0 00	
ROK DED		R		41 00 109 38 360 00	

Do not write in this margin

### ANGLES

~~ISLAND OR~~  
 COUNTY: Barnstable

DATE: Jan. 10 '34

INSTRUMENT: Heyde # 303

		MEAN OF VERNIERS		ANGLE MEAN D AND R			REMARKS
A	B			°	'	"	
<del>17</del>							
12							
27							
07							
00"							
43"							
28'							
48'							

Do not write in this margin

HORIZONTAL

STATION: Great Beach Hill 1933 STATE: Mass.

OBSERVER: Edw. S. Averell

OBJECTS OBSERVED	TIME h. m.	TEL. D OR R	REF'S	ANGLE ° ' "	
FIRE - ROK		D		41 00	
Bill				108 41	
Ded				109 38	
Tan				128 30	
FIRE				360 00	
FIRE - ROK		R		41 01	
BILL				108 42	
DED				109 38	
TAN				128 31	
FIRE				360 00	

Do not write in this margin



# ANGLES

~~ISLAND OF~~

COUNTY: Barnstable.

DATE: Jan 10 '34

INSTRUMENT: Heyde #303

	A	B	MEAN OF VERNIERS	ANGLE MEAN D AND B			REMARKS
	"	"		°	'	"	
Do not write in this margin	00						
	08						
	23						
	18						
	42						
	40						
	03						
	12						
	38			37	42		
	12						
00							

*Copied  
See page 6*

HORIZONTAL

STATION: *Blackfish 1933* STATE: *Mass*

OBSERVER: *Edw. S. Averell*

OBJECTS OBSERVED	TIME h. m.	TEL. D OR R	REP'S	ANGLE ° ' "
<i>FARE - Bill                      RoK                      Ded                      tan                      FIRE</i>		<i>D</i>		<i>203 48                      208 21                      220 23                      243 22                      360 00</i>
<i>FARE - Bill                      RoK                      Ded                      tan                      FIRE</i>		<i>R</i>		<i>203 48                      208 22                      220 24                      243 22                      360 00</i>
<i>Bill                      RoK                      Ded                      tan                      FIRE</i>		<i>R</i>		<i>203 47                      208 22                      220 23                      243 22                      360 00</i>

Do not write in this margin

ANGLES

~~Location~~ COUNTY: Barnstable DATE: Jan 10 '34.  
 INSTRUMENT: Heyda #303

	A "	B "	MEAN OF VERNIERS	ANGLE MEAN D AND R ° ' "	REMARKS
	23			No	No Reverse on this set of Ds.
	40				
	38				
	08				
	12				
Do not write in this margin	58				
	13				
	04				
	34				
	30				
	57				
	03				
	45				
	06				
	45				

*copied  
see page 7*

HORIZONTAL

STATION: *Blackfish 1933* STATE: *Mass*

OBSERVER: *Edw. S. Averell*

OBJECTS OBSERVED	TIME h. m.	TEL. D OR R	REF'S	ANGLE ° ' "	
<i>Fire - Bill</i>		<i>D</i>		<i>203 48</i>	
<i>RoK</i>				<i>208 22</i>	
<i>Ded</i>				<i>220 23</i>	
<i>Tan</i>				<i>243 21</i>	
<i>Fire</i>				<i>360 00</i>	
<i>Fire - Bill</i>		<i>R</i>		<i>203 47</i>	
<i>RoK</i>				<i>208 21</i>	
<i>Ded</i>				<i>220 23</i>	
<i>TAN</i>				<i>243 21</i>	
<i>Fire</i>				<i>00 00</i>	

Do not write in this margin

ANGLES

~~TOWN~~  
 COUNTY: Barnstable      DATE: Jan 10 39  
 INSTRUMENT: Heyde      # 303

	A	B	MEAN OF VERNIERS	ANGLE MEAN D AND R			REMARKS
	"	"		o	'	"	
	03						
	02						
	25						
	43						
	12						
Do not write in this margin	43						
	20						
	20						
	47						
	00						

*Copied  
 See page 6*

HORIZONTAL

STATION: *Great Beach Hill 1933* STATE: *Mass*  
 OBSERVER: *E. S. Averell*

OBJECTS OBSERVED	TIME	TEL. D OR R	REP'S	ANGLE	
	h. m.			°	'
<i>wellfleet</i> Fire Tower		D		00	00
		R		00	00
<del>Rock</del> Rock		D		41	<del>00</del>
		R		41	01
Bill		D		108	41
		R		108	42
Red		D		109	38
		R		109	38
Tan		D		128	30
		R		128	31
<i>wellfleet</i> Fire Tower		D		360	00
		R		360	00

Do not write in this margin

ANGLES

ISLAND OR COUNTY: Barnstable DATE: 7/10/34  
INSTRUMENT: Heyde #303

	A	B	MEAN OF VERNIERS	ANGLE MEAN D AND R			REMARKS
	"	"		o	'	"	
	00		00-20.0				
	40						
	08		00-35.5	41-00-15.5			
	03						
Do not write in this margin	23		41-47.5	108-41-27.5			
	12						
	18		38-28.0	109-38-08.0			✓
	38						
	42		30-57.0	128-30-37.0			
	12						
	40		00-20.0				
	00						
							copied & comp. K.T.A.

HORIZONTAL

STATION: *Blackfish 1933* STATE: *Mass*

OBSERVER: *E. S. Averell*

OBJECTS OBSERVED	TIME	TEL. D OR R	REP'S	ANGLE	
	h..m.			°	'
<i>weelflut. Fire Tower</i>		D		00	00
		R		00	00
<i>Bill</i>		D		203	48
		R		203	47
<i>Rok</i>		D		208	22
		R		208	22
<i>Red</i>		D		220	24
		R		220	23
<i>Tau</i>		D		243	22
		R		243	22
<i>weelflut Fire Tower</i>		D		360	00
		R		360	00

Do not write in this margin



ANGLES

ISLAND OR COUNTY: Barnstable

DATE: 1/10/34

INSTRUMENT: Hyde #303

	A	B	MEAN OF VERNIERS	ANGLE MEAN D AND R	REMARKS	
	"	"		° ' "		
	00		00 15.0			
	30					
	58		48 27.5	203 48 - 01.3		
	57					
Do not write in this margin	13		22 08.0	208 21 41.8		
	03					
	04		23 54.5	220 23 28.3		
	45					
	34		22 20.0	243 21 53.8		
	06					
	30		00 37.5			
	45					
						copied + computed KTA.

HORIZONTAL

STATION: *Blackfish 1933* STATE: *Mass*

OBSERVER: *E.S. A. Orill*

OBJECTS OBSERVED	TIME h. m.	TEL. D OR R	REP'S	ANGLE ° ' "	
<i>wellfleet Fire Tower</i>		D		00 00	
		R		00 60	
<i>Bill</i>		D		203 48	
		R		47	
<i>Rob</i>		D		268 22	
		R		21	
<i>Red</i>		D		220 23	
		R		23	
<i>Tan</i>		D		243 21	
		R		24	
<i>wellfleet Fire Tower</i>		D		360 00	
		R		00	

Do not write in this margin

ANGLES

ISLAND OR COUNTY:

Barnstable

DATE: 1/10/34

INSTRUMENT:

Heyde #303

	A "	B "	MEAN OF VERNIERS	ANGLE MEAN D AND R ° ' "	REMARKS
	00		00 06.0		
	12				
	03		47-53.0	203-47-47.0	47.0 } 203 47 54.2 61.3 }
	43				
	02		21 41.0	208 21 35.0	35.0 } 208 21 38.4 41.8 }
	20				
	25		23 22.5	220 23 16.5	16.5 } 220 23 22.4 28.3 }
	20				
	43		21 45.0	243-21-39.0	39.0 } 243 21 46.4 53.8 }
	47				
	12		00 06.0		
	00				

Do not write in this margin

copied + comp. K.T.A.

# HORIZONTAL

STATION: \_\_\_\_\_ STATE: \_\_\_\_\_

OBSERVER: \_\_\_\_\_

OBJECTS OBSERVED	TIME h. m.	TEL. D OR R	REF'S	ANGLE ° ' "	
<p>The observations in this volume were taken to verify the positions of topographic signals Ded, Rok and Tan after certain discrepancies had been discovered while plotting the smooth sheet.</p> <p>The positions computed should <u>not</u> be used as triangulation but should be used in plotting these three signals on the smooth sheet.</p>					
<p>K. T. Adams</p>					

Do not write in this margin

# ANGLES

ISLAND OR  
COUNTY:

DATE:

INSTRUMENT:

	A	B	MEAN OF VERNIEES	ANGLE MEAN D AND R ° ' "	REMARKS
Do not write in this margin					Wellfleet Fire Tower
				$251-35-34.1$ (from triang)	$209-08-44.8$ (from triang)
				$282-35-19.0$	Blackfish
				$102-37-06.5$ (from course)	Great Beach Hill
				$282-35-19.0$	
				$251-35-34.1$	
	< at Great Beach Hill			$30-59-44.9$	
				$209-08-44.8$	
				$102-37-06.5$	
	< at Blackfish			$106-32-38.3$	
			$360$		
			$253-28-21.7$		









80-113

October 22, 1934.

To: The Director,  
U.S.Coast and Geodetic Survey.

From: Lieutenant Earle A. Deily,  
U. S. Coast and Geodetic Survey,  
Barnstable, Massachusetts.

Subject: INVESTIGATION, SAND ROCK, Charts 1208, 340.

As requested in your letter of August 24, 1934, 22-MC, 1990 (28) a special search was made for the sunken rock called Sand Rock which is charted in the approximate Latitude 41 51.8, Longitude 70 02.4.

A thorough search was made for this rock on August 14, 1934 from a dory which was rowed slowly over this area. The hydrographer reported a low tide, smooth sea, and a visibility thru the water so that the bottom could be seen. Approximately three quarters of an hour was spent in the search and no depths less than 11 feet secured. There were no further shoal indications and no rock was seen.

The hydrography in this area, positions 123 bf to 151 bf, was plotted on Sheet H-C, Project H.T.145, which is being submitted this season. Further discussion of this search is made in the descriptive report accompanying that sheet.

Sand Rock should be removed from the charts concerned.

Earle A. Deily  
Lieutenant, U.S.C.&G.Survey.

March 22, 1933.

Division of Hydrography and Topography:

✓ Division of Charts:

Tide Reducers are approved in  
11 volumes of sounding records for

HYDROGRAPHIC SHEET 5401

Locality Wellfleet Harbor, Cape Cod Bay, Massachusetts

Chief of Party: K. T. Adams in 1933

Plane of reference is mean low water, reading

4.0ft. on tide staff at Provincetown

15.8ft. below B. M. 6

2.3 ft. on tide staff at Wellfleet

25.5 ft. below B.M. 1 (1933)

Height on mean high water above plane of reference is 9.1 feet at

Provincetown and 10.0 feet at Wellfleet.

Condition of records satisfactory except as noted below:

*Atty* *Hammann*  
Chief, Division of Tides and Currents

April 13, 1934

Section of Tidal Records.  
Report on Hydrographic Sheet # 5401.  
Wetfleet Harbor  
Cape Cod  
Massachusetts.

Chief of Party - K. T. Adams.  
Surveyed by - E. A. Daily & E. S. Averell  
Protracted by - Information not available  
Sounding penciled by  
Verified and inked by H. W. Murray & W. R. Mullen.

The soundings within the channel lines and the critical areas ~~was~~ as well as the protracting were checked by H. W. Murray. Mr. Murray has no particular comment to make on the sheet. The note in the descriptive report regarding signals "Det" and "Rot" has been observed and positions taken from these stations checked and changed where it was deemed necessary.

The records conform to the requirements of the Hydrographic Manual and the sheet was protracted and penciled in an excellent manner.

The curves are complete within the area of the sheet.

H-5400 which adjoins this sheet in  $41^{\circ}56'$  to  $41^{\circ}58'$  and Long  $70^{\circ}05'$  to  $70^{\circ}06'$  has not been completed, therefore the overlap has not been put on this sheet.

Respectfully submitted  
W. R. Mullen.

SECTION OF FIELD RECORDS  
Review of Hydrographic Sheet No. 5401  
Wellfleet Harbor, Cape Cod, Mass.  
Surveyed in 1933  
Hand lead soundings.

The authority for this work is included in the Orders and Instructions, Project H. T. 145, Par. 5 and 6, to the Inspector, C. & G. Survey, Boston, Mass. (Dated April 29, 1933).

Chief of party - K. T. Adams.  
Surveyed by - E. A. Dilly, E. S. Averell.  
Protracted by - E. S. Averell.  
Soundings penciled by - E. S. Averell.  
Verified and inked by - H. W. Murray, W. L. Muller.

1. The records conform to the requirements of the Hydrographic Manual.
2. The character and extent of the survey satisfy the specific instructions except that the instructions called for a scale of 1/10,000. The field party was afterward authorized by the Chief of Field Work to use a scale of 1/20,000.
3. The sounding lines generally cross very well and adjacent lines show good agreement. One poor crossing occurs in Lat. 41°53'.6, Long. 70°-02'.8. Both lines were found to have been correctly plotted and neither line could be changed. The discrepancy is probably partly due to the steep slope at this point.
4. The information is sufficient for completely drawing the usual depth curves.
5. There is quite a large overlap in the vicinity of Lat. 41°57' at the junction with H. 5400. The junction appears satisfactory except that the soundings near the 18 foot curve do not agree very well, however this junction will be more definitely reported in the review of H. 5400 when that sheet is completed. This is the only junction with contemporary work.
6. Comparison with previous surveys:

The survey of 1849 and 50, H. 249, and the survey of 1912, H. 3418, are the only previous hydrographic surveys in this area. Both surveys agree with the new work only in a general way. A number of changes were noted. In so far as the soundings and depth curves, the previous work will be superseded by the recent survey, H. 5401, which will now become the basic survey for this area. Sand Rock, although not found will be retained on the charts until definitely disproved. (*Sand Rock disproved - Letter 736-1934*)

7. Chart change.

The name Bay Rock appears on Chart 340 in approximate Lat. 41°54'.7, Long. 70°03' but no rock symbol is shown. The name was originally taken from the topographic survey of 1848, T. 259, which also shows no definite rock symbol except some dots a little heavier than the usual symbol for

sanding. The field party searched this area but could find no rock near this location. This name should be removed from Chart 340. It is not shown on Chart 1208.

8. The cartographer should take note of the fact that Lumpfish Rock, Lobster Rock and Chamel Rock, shown on H. 249 were removed in 1872, according to the Army Engineers. (See tracing filed with H. 249).

9. The ground in this area has been well covered and shoal development is sufficient. No additional hydrography is needed but a further search ~~shall~~<sup>should</sup> be made for the sunken rock called Sand Rock, which is charted in approximate Lat. 41°51'.87, Long. 70°02'.4. The rock is well located in the records of H. 249 (pos. lu) and has a least depth of 6.6 feet over it. A search was made for it, but weather conditions were poor and the rock was not found. The field party do not believe this rock has been disproved and recommend that more time be spent in looking for it next season.

Accomplished &  
Disproved  
See Letter  
80-EMS  
Oct 22 - 1934  
from  
E.A. Deily

This rock should be examined at low tide and a recommendation made as to whether or not it should be charted.

Rock disproved. See review of H-5543 par 6a and chart letter No. 736 (1934) R.L.J.

10. Reviewed by - R. L. Johnston.

*K.T. Adams*

K. T. Adams,  
Chief, Section of Field Records.

Examined and approved:

*L.O. Lobbut*

Chief, Division of Charts.

\* *F.S. Borden*

Chief, Section of Field Work.

*G. Wade*

Chief, Division of H. & T.

\* Field party of Lt. Deily instructed to make examination recommended in par. 9 above. Letter to Deily Aug. 24, 1934.  
J.B.B.

Applied to new chart 581 5/12/35 H.E. MacSwan

21 Jan 24, 1936  
EAS