8699

Diag. Cht. No.6450-2.

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT
(HYDROGRAPHIC)

Type of Survey ....HYDROGRAPHIC.....

Field No. .....PA-16-1-61.....

Office No......H-8699.....

LOCALITY

State .....WASHINGTON.....

General Locality .....WHIDBEY ISLAND.....

Locality .SOUTHERN PARTS OF SARATOGA PASSAGE..

.....& PORT SUSAN.....

1961-62

CHIEF OF PARTY
H. D. Reed & F. X. Popper

LIBRARY & ARCHIVES

DATE .....4/12/63.....

☆U.S. GOV. PRINTING OFFICE: 1975—668-353

8699

40 18443 Applied at USP
40 18473
80 18423
80 18441
1580 18440
000 18400

H8699 has been applied to the largest scale 1843 - (See sign off this Report) it now has to be applied thru the Scales

SL

Form 537
(Ed. June 1946)

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-8699

Field No. PA-10-1-61

State WASHINGTON

General locality WHIDBEY ~~& CAMANO~~ ISLANDS

Locality SOUTHERN PORTIONS OF SARATOGA PASSAGE & PORT SUSAN

Scale 1:10,000 Date of survey May-Oct 1961 ~~Field Season~~

Instructions dated April 22, 1960, December 1, 1960

Vessels Ship PATTON and Launch CS-1191

Chief of party H.D. Reed, Jr.

Surveyed by H.D. Reed, Jr., C.B. Carter, Jr., J.L. Piter

Soundings taken by ~~echometer~~, graphic recorder, hand lead, ~~wire~~

Fathograms scaled by Personnel of Ship PATTON

Fathograms checked by Personnel of Ship PATTON

Protracted by

Soundings penciled by

Soundings in fathoms ~~feet meters~~ MLLW and are true depths

REMARKS: Survey about 85% complete. Report covers 1961 field work only. (See attached 1962 report.)

U. S. GOVERNMENT PRINTING OFFICE 16—66520-1

GM

DESCRIPTIVE REPORT

TO ACCOMPANY

HYDROGRAPHIC SURVEY H-8699 (Field No. PA-10-1-61)

Scale 1:10,000 1961 & 1962

Ship PATTON H.D. Reed, Jr., Comdg.
ship BOWIE F.X. Popper, Comdg

A. PROJECT:

This survey is a part of Project OPR-412. Original instructions were issued under date of April 22, 1960. Supplemental instructions are dated December 1, 1960. (See attached 1962 report.)

B. AREA SURVEYED:

This survey covers the south end of Saratoga Passage, between Camano and Whidbey Islands and the south end of Port Susan between Camano Island and the mainland. In Saratoga Passage the limits are: Elger Bay to the north; approximate longitude 122° 29.00' to the northwest and approximate latitude 48° 03.75' to the south. In Port Susan the limits extend from approximate latitude 48° 03.75' to the south to about 48° 07.5' to the north. Field work in 1961 was accomplished at intervals during the period May 19 - October 24. A satisfactory junction was made with Survey LJ-10-7-60 (H-8609) to the northwest.

C. SOUNDING VESSELS:

During the 1961 field season, the Ship PATTON and Launch CS-1191 operating from the ship were used as sounding vessels. Blue was used to identify the work of both vessels.

D. SOUNDING EQUIPMENT:

All soundings were obtained with Model 808 portable depth recorders calibrated for 800 fm./sec. Fathometer No. 74 was used on the Ship PATTON, No. S-110 was used on Launch CS-1191 except for part of one day when No. 51 was used.

Corrections to 1961 fathometer soundings are discussed in the special fathometer report, and are tabulated at the end of this report.

E. SMOOTH SHEET:

No smooth sheet projection has been constructed as of the time this report was written (November 1961). Since the survey was not completed during the 1961 field season, it is expected that the smooth plotting will be postponed until after the survey is finished. (See attached 1962 report.)

F. CONTROL:

Hydrography was controlled by three point sextant fixes on shore signals. Signals were located by photogrammetric methods, triangulation, or sextant cuts and fixes. Photo hydro control was transferred from the following manuscripts: T-11615, T-11616, T-11619, T-11620, T-11621, T-11622, T-11625, T-11626 and T-11627, T-11628. See review.

G. SHORELINE:

Shoreline originates with the photogrammetric compilations referred to in Section F, above. Shoreline and topographic details have been verified in the field by the Portland Photogrammetric Unit. A general check of the shoreline details in Saratoga Passage included in this survey was made by Ship PATTON personnel in 1961. A few minor changes which had taken place since the original field inspection was made were noted on the boat sheet and where applicable, sextant fixes were taken and recorded in the sounding volumes. No shoreline inspection was made by Ship PATTON personnel in Port Susan during the 1961 field season. See review.

H. CROSSLINES:

About 6 % of crosslines was run in the Saratoga Passage area of this survey. Satisfactory agreement was made with the regular system of sounding lines. Crosslines were run over the ship hydro in Port Susan, but remain to be completed on the launch hydro area and unfinished parts of the survey.

I. JUNCTIONS:

A satisfactory junction was made with a 1960-61 survey, (LJ-10-7-60) H-8609, to the northwest (See Section B, above). There are no junctions with surveys made prior to 1960. See review.

J-K. COMPARISON WITH PRIOR SURVEYS AND CHART:

H-1884 (1:20,000) 1888. Part of this survey covers the area in Saratoga Passage included on PA-10-1-61. A general comparison between the two surveys shows good agreement, considering the widely spaced soundings on H-1884 and the time interval between the two. Representative soundings transferred from H-1884 to PA-10-1-61 agree satisfactorily with the present survey, and indicate little change in configuration of the bottom.

H-~~1886~~ 1730 (1:20,000) 1886. Port Susan. There is satisfactory agreement between the two surveys for the area completed on PA-10-1-61 in 1961. In the deeper areas the soundings on H-1884 run from 1 to 3 fathoms deeper than the present survey. It is recommended that a final comparison with H-1884 be made after PA-10-1-61 is completed in 1962.

Chart 6450 (1:80,000) Revised 9/5/60, is based on the above surveys. Agreement with PA-10-1-61 is satisfactory for the common area. No new dangers to navigation were found during the 1961 field work on PA-10-1-61.

See review.

L. ADEQUACY OF SURVEY:

For the area covered in Saratoga Passage, this survey is considered to be complete and adequate to supersede prior surveys for charting. Additional launch work remains to be done in the Port Susan area. (See Section P. below)

M. AIDS TO NAVIGATION:

There is one fixed aid to navigation in the area of this survey (East Point Light). This has previously been located by triangulation. No floating aids are located in the area. Landmarks for charts are being reported separately by the photogrammetric party.

N. STATISTICS:

1961

Hydrography:

	Number of Positions	Nautical miles of sounding line	Area in square nautical miles
Ship PATTON	925	222.2	10.92
Launch CS-1191	1377	148.8	6.94
Totals	2302	371.0	17.86

1 Tide Station (Off limits of survey.)
3 Serial Temperature and Salinity Observations
41 Bottom Samples

P. RECOMMENDATIONS:

The following field work in Port Susan is recommended to complete this survey: 1. Launch hydrography - East side - from Latitude 48° 04.0' northwestward to about 48° 07.4'. West side - from a junction with 1961 work at Latitude 48° 05.7'northwestward to about 48° 07.4'. 2. Bottom Samples throughout the area. 3. Inspection of shoreline details as required since original field inspection was made. (consult manuscripts)

See boat sheet for further details of unsurveyed area.

Q. REFERENCE TO REPORTS: *See continuation of Discriptive Report attached.*

1961 Fathometer Report - forwarded to Washington Office on *Nov. 20, 1961*

H.D. Reed Jr.
CDR, C&GS
Cmdg., Ship PATTON

November 16, 1961

✓ LIST OF SIGNALS

SURVEY PA-10-1-61, H-

ESTABLISHED 1961

PORT SUSAN

	Name	Origin		Name	Origin
	✓Add	T-11621		✓ Hem	T-11620
*	✓Ado	T-11621		✓ Ion	T-11620
	✓Ban	Vol IV (launch) P. 3 sextant cuts	*	Job	T-11620
				✓Kim	Vol III (ship) P.40
*	✓Bed	T-11621		✓ Lay	T-11620
	✓Big	T-11621		✓ Mar	T-11620
	✓Bon	T-11621	*	Ned	T-11627
	✓Car	T-11621	*	New	T-11616
	✓Cop	T-11622	*	Nil	T-11621
	✓ Cue	T-11627		✓ Pat	Vol III (ship) P. 41
	✓ Cut	T-11620	*	Pot	T-11621
	✓ Day	T-11621	*	Ram	T-11621
	✓ Don	T-11620	**	✓Shel	(Shelton 2, 1924)
*	✓Dun	T-11622		✓Sip	T-11621
	✓Ear	T-11622		✓Tap	~~T-11621~~ Vol XIII P.3
	✓Eva	T-11620	*	✓Use	T-11621
	✓Few	T-11622	*	Ute	T-11616
*	Fly	T-11620	*	✓Val	T-11621
	✓Fog	T-11620		✓ Vor	T-11616
*	✓Gas	T-11622		✓Was	T-11621
	✓Get	T-11620	*	Yam	T-11621

* Not used during 1961 field season

** Station mark reported tilted by photogrammetric party. Considered to be photo-hydro control.

(See attached 1962 report)

VELOCITY CORRECTIONS

Project OPR-412
1961
Sheets LJ-10-7-60 & PA-10-1-61

Correction	Dates, Area, and Depths April-May Saratoga Passage Holmes Harbor	June Saratoga Passage Holmes Harbor	August Saratoga Passage
0.0	0.0 to 8.5 fms	0.0 - 7.0	0.0 - 3.5
+ 0.1	8.6 - 20.5	7.1 - 16.0	3.6 - 12.0
+ 0.2	20.6 - 32.0	16.1 - 26.0	12.1 - 20.0
+ 0.3	32.1 - 44.0	26.1 - 37.0	20.1 - 28.0
+ 0.4	44.1 - 54.0	37.1 - 47.0	28.1 - 36.0
+ 0.5	54.1 - 64.0	47.1 - 57.0	36.1 - 44.0
+ 0.6	64.1 - 74.0	57.1 - 67.0	44.1 - 51.5
+ 0.7		67.1 - 77.0	51.6 - 59.0
+ 0.8		77.1 - 80.0	59.1 - 66.5
+ 0.9			66.6 - 74.0
+ 1.0			74.1 - 80.0

Correction	August Port Susan	September Saratoga Passage	October Port Susan
0.0	00 - 4.0	0.0 - 4.0	00 - 4.5
+ 0.1	4.1 - 13.0	4.1 - 10.0	4.6 - 11.0
+ 0.2	13.1 - 21.5	10.1 - 16.0	11.1 - 17.5
+ 0.3	21.6 - 30.5	16.1 - 22.5	17.6 - 23.5
+ 0.4	30.6 - 40.5	22.6 - 28.5	23.6 - 29.5
+ 0.5	40.6 - 49.0	28.6 - 34.5	29.6 - 35.5
+ 0.6	49.1 - 56.0	34.6 - 40.5	35.6 - 41.0
+ 0.7	56.1 - 63.0	40.6 - 46.5	41.1 - 47.5
+ 0.8	63.1 - 69.0	46.6 - 52.0	47.6 - 53.0
+ 0.9		52.1 - 57.5	53.1 - 58.5
+ 1.0		57.6 - 63.0	58.6 - 64.5
+ 1.1		63.1 - 68.0	64.6 - 70.0
+ 1.2		68.1 - 74.0	
+ 1.3		74.1 - 79.0	

✓LIST OF SIGNALS

SURVEY PA-10-1-61, H-

ESTABLISHED 1961

SARATOGA PASSAGE

	Name	Origin
	Ace	T-11625
	Ann	T-11619
	Ark	(East Point Light, 1944)
	Bat	T-11615
	Box	T-11619
	Cab	T-11619
	Caw	T-11619
	Doc	T-11619
	Egg	T-11620
	End	T-11619
	Far	T-11615
	For	Vol 3 P. 56 ~~Transferred from Shel-2, PM~~
	Gap	Vol II launch, P. 25 (sextant cuts)
	Got	T-11619
	Gum	T-11615
	Gus	T-11620
*	Hat	T-11620
	Hid	T-11620
*	Hun	T-11619
*	Irk	Vol V (ship) P. 4 (sextant cuts)
	Joy	T-11626
	Jug	T-11619
	Leo	T-11620
	Log	T-11619
	Low	T-11619
	Max	T-11619
	Nat	T-11620
	Pat	T-11619
*	Put	T-11620 from
	Ree	Transferred ↘ LJ-10-7-60
	Rim	T-11620
	Ski	T-11619
	Sly	T-11620
	Sue	T-11620
	Tub	T-11619
	Tug	T-11620
	Van	T-11619
	Vex	T-11619
	Wax	T-11619
	Wee	T-11620

* Not used during 1961 field season (See attached 1962 report.)

LEAD LINE COMPARISONS

(Ship hydro only)

Date	Lead Line	Fathometer	Corr. fms.
May 16	18.0 (mean of 5)	17.5 (mean of 5)	+ 0.5
June 20	19.3 (mean of 6)	19.0 (mean of 6)	+ 0.3
		Mean	+ 0.4

This correction used for May, 1961 ship hydrography.

Aug 8	19.6 (mean of 6)	19.1 (mean of 6)	+ 0.5
Aug 24	14.1 (mean of 6)	13.5 (mean of 6)	+ 0.6
		Mean	+ 0.6

This correction used for August 1961 ship hydrography.

Note: Velocity corrections were applied to fathometer soundings in making the above computations.

BAR CHECK CORRECTIONS

(Launch hydro only)

A bar check correction of + 0.2 fathom was used throughout the season. This was derived by meaning the daily bar checks. None of the daily values varied from the mean by more than 0.1 fathom.

PHASE CORRECTIONS

Project OPR-412, PA-10-1-61
Ship Hydrography, Fathometer #714

Date	Day Letter	Corr. (fms.) A	Corr. (fms.) B	Mean Value used
May 19	A	0.0	+ 1.4	
"	"	0.0	+ 1.7	+ 1.5
May 20	B	0.0	+ 1.2	
"	"	0.0	+ 1.2	+ 1.2
May 22	C	0.0	+ 1.3	
"	"	0.0	+ 1.3	+ 1.3
Note: Phasing head changed after work on May 19				
Aug 18	D	0.0	+ 0.6	
Aug 19	E	0.0	+ 0.5	
Aug 21	F	0.0	+ 0.6	
Aug 22	H	0.0	+ 0.7	
	Correction to all August Ship Hydrography -			+ 0.6

Sheets LJ-10-7-60 & PA-10-1-61
Launch Hydrography Fathometer S-110

June 6	m	0.0	- 0.2	
June 7	n	0.0	0.0	
June 19	r	0.0	(+ 0.4) R (doubtful)	
Aug 8	b	0.0	+ 0.1	
Aug 21	e	0.0	- 0.1	
Aug 22	f	0.0	- 0.1	
Sept 23	h	0.0	0.0	
				0.0

Fathometer #51

Oct 18	n	0.0	0.0	0.0

INDEX (Initial) CORRECTIONS

Sheet LJ-10-7-60
Launch CS-1191

Day letter	Positions (inclusive)	Correction (fms)
l	2-8	+ 0.3
l	9-12	+ 0.2
l	25-28	+ 0.2
l	29-33	+ 0.2
l	54-59	+ 0.2
l	97-100	+ 0.2
l	101-108	+ 0.2
l	117 + 2 sdgs-124	+ 0.2
l	125 + 2 sdgs-146	+ 0.2
m	20 + 1 sdg-21 + 2 sdgs	- 0.2
p	57-59 + 3 sdgs	- 0.2
r	161-161 + 3 sdgs	- 0.4
r	162-174	- 0.2
s	17-20	- 0.2
s	69-81	- 0.2

Corrections negligible for Sheet PA-10-1-61, (launch and ship) and Sheet PA-20-1-61.

APPROVAL SHEET

SURVEY PA-10-1-61, H-

The records for the 1961 field work on this survey are approved. All 1961 work was supervised by me and the records were examined daily in the field.

Additional field work as outlined in the descriptive report will be required to complete this survey. It is recommended that plotting the smooth sheet be delayed until after the additional work is finished.

(See attached 1962 report.)

H.D. Reed Jr.
CDR, C&GS,
Cmdg., Ship PATTON

TIDE NOTE

SURVEY PA-10-1-61, H-

A portable automatic tide gage was established at Tulalip, Tulalip Bay, Washington and operated during the course of the 1961 hydrography. This gage should be re-established in 1962 to control the hydrography required to complete the survey. Position: Latitude 48° 03.8' Longitude 122° 17.5'

Height of the plane of reference (MLLW) on the tide staff in 1961 was 3.4 ft.

No corrections for differences in time or height were applied to the observed tides in 1961.

Form 537
(Ed. June 1946)

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- 8699

Field No. PA- 10-1-61

State WASHINGTON

General locality WHIDBEY ~~& CAMANO~~ ISLANDS

Locality SOUTHERN PARTS OF SARATOGA PASSAGE & PORT SUSAN

Scale 1:10,000 Date of survey May - Oct. 1961 & 1962 ~~Field Seasons~~

Instructions dated April 22, 1960, December 1, 1960 and February 13, 1962

Vessel Ship Patton and Launch CS 1191, Ship Bowie & Launch 95

Chief of party H.D. Reed & F.X. Popper

Surveyed by H.D. Reed, F.X. Popper, C.B. Carter, J.L.Piter, L.S. Brown

Soundings taken by fathometer, graphic recorder, hand lead, ~~wire~~

Fathograms scaled by Personnel of Ships Patton and Bowie

Fathograms checked by " " " " " "

Protracted by A.W. Cecil

Soundings penciled by C.W. Mathisson and A.W. Cecil

Soundings in fathoms ~~feet at MLW~~ MLLW and are true depths

REMARKS:

U. S. GOVERNMENT PRINTING OFFICE 777032

DESCRIPTIVE REPORT
TO ACCOMPANY

Hydrographic Survey H-8699	Field No. PA 10-1-61
Scale 1:10,000	1961 and 1962
Ship Patton Ship Bowie	H.D. Reed Comdg. F.X. Popper Comdg.

A. PROJECT

This survey is a part of Project OPR 412 with original instructions issued April 22, 1960, supplemental instructions December 1, 1960 and February 13, 1962.

B. AREA SURVEYED

The area included the southern end of Port Susan from the mainland on the east to Camano Island on the west. In Saratoga Passage, the eastern boundry was Camano Island and the western, Whidbey Island. The area lay between parallels 48° 03' 30" and 48° 07' 30". In 1961 the Patton accomplished most of the survey between May 19 and October 24.

The area surveyed by the Bowie in 1962 consisted of inshore hydrography in Port Susan. On the mainland the area extended an average of 0.3 of a mile off shore and from latitude 48° 03' 30" to 48° 07' 30". On the eastern shore of Camano Island the hydrography extended from lattitude 48° 05' 30" to 48° 07' 15" and about 0.4 miles off shore. The Bowie accomplished the remaining portion of the survey between September 14 and October 16 1962.

This survey junctioned with survey LJ 10-7-60 to the northwest. (H-8609)

C. SOUNDING VESSELS

In 1961 the vessels used were the Ship Patton and Launch CS-1191. In 1962 the Ship Bowie and Launch 95 were employed. Blue was used to identify the Patton's work and violet the Bowie's.

D. SOUNDING EQUIPMENT

Model 808 portable depth recorders calibrated for 800 fathoms/second were used in both 1961 and 1962. Fathometer no. 74 was used by the Patton and no. S-110 by Launch CS-1191 except for one day when no. 51 was used.

In 1962 the Bowie used fathometer no. 57-25 and Launch 95 used no. 57-28 on September 14, 17, and 18 and on September 19, no. 57-24. Fathometer corrections are shown at the end of this report.

E. SMOOTH SHEET

The projection was machine ruled by the Washington Office and mailed to the Ship Bowie where the plotting was done. All positions were protracted on the smooth sheet with the exception of 5 positions which were transfered from the boat sheet as they were not 3 point sextant fixes. These were 157h 158h, 159h, 162h and 163h along the western shore of Camano Island.

On the night of February 4, 1963, rain leaked through the plotting room overhead and dampened part of the smooth sheet.* The northern and southern boundaries of the wetted portion are lattitudes 48° 07.5' and 48° 05.5' respectively. The eastern boundary is 122° 20.5' and the western, 122° 23.0'. All of the Bowie's "d" day in this area was plotted after the wetting and the Patton's hydrography before.* See para. F.

F. CONTROL

All of the hydrography was visually controlled. Signals were located by photogrammetric methods, triangulation and sextant cuts. Photo-hydro control was transferred from manuscripts T-11615, T-11616, T-11619, T-11620, T-11621, T-11622, T-11625, T-11627, and T-11626, and T-11628. It was noted that signal Gap was misplotted by about 15 meters on the boat sheet.

See Review.

G. SHORELINE

Shoreline originated with the photogrammetric compilations referred to in section F above. Shoreline and topographic details have been verified in the field by the Portland Photogrammetric Unit. A check of shoreline details in Saratoga Passage was made by the Patton's personnel in 1961. A few minor changes were noted on the boat sheet and where applicable, sextant fixes were taken and recorded in the sounding volumes. No shoreline inspection was made by the Patton in 1961 in Port Susan. The personnel of the Bowie inspected the Port Susan shoreline in 1962 and found no changes.

see review.

H. CROSSLINES

7% of the total hydrography was crosslines. Agreement was good in all cases except in the previously mentioned wetted area. Here the crosslines are 3 to 5 fathoms shoaler at several crossings.* It is suspected that distortion occured between the plotting of the crosslines and regular sounding lines.

* Distortion was found to be negligible and crossings were brought into agreement on final reduced soundings during verification. See section 3. of review.

I. JUNCTIONS

A satisfactory junction was made with survey LJ-10-7-60 (H-8609) to the northwest. The Bowie's portion of the survey junctioned well with the Patton's.

See review.

J-K. COMPARISON WITH PRIOR SURVEYS AND CHART

H-1884, 1:20,000, 1888
This survey covers the portion of survey PA 10-1-61 in Saratoga Passage. At depths of 60 fathoms or more the smooth sheet showed depths 1 to 2 fathoms greater than the prior survey. At depths approximating 30 fathoms the agreement was one fathom or less.

H-1730, 1:20,000, 1886, Port Susan
Agreement in all cases was quite good, there being less than 1 fathom difference between the smooth sheet and prior survey.

Chart 6450, 1:80,000, revised 9/5/60
Agreement with PA- 10-1-61 was satisfactory in both Saratoga Passage and Port Susan. No new dangers to navigation were found in either 1961 or 1962.

See review.

L. ADEQUACY OF SURVEY

The survey is considered to be complete and sufficiently accurate to supersede prior surveys. See review.

M. AIDS TO NAVIGATION

There is one fixed aid to navigation (East Point Light) which has been located by triangulation. No floating aids to navigation are located in this area. See review.

N. STATISTICS

Hydrography:

Vessel	no. of positions	nautical miles of sounding line	square n. miles of hydrography
Patton	925	222.2	10.92
Launch CS1191	1377	148.8	6.94
Launch 95	841	70.9	1.92
Bowie	60	6.0	0.20
totals	3203	447.9	19.98

1 tide station
4 temperature and salinity observations (1 by the Bowie)
60 bottom samples (19 by the Bowie)

P. RECOMMENDATIONS

It is recommended that the positions plotted in the wetted area mentioned in section E or those plotted using signals in this area, be checked to determine whether an intolerable amount of distortion has occured because of the wetting. Lack of time prevents Bowie personnel from thoroughly investigating this area. Projection checked and found to be in satisfactory condition.

Q. REFERENCE TO REPORTS

1961 Fathometer Report - fowarded to Washington office Nov. 20, 1961.
Preliminary descriptive report - forwarded with this report April 4, 1963.

Alfred W. Cecil

Alfred W. Cecil
ENS USC&GS

April 4, 1963

TIDE NOTE

A portable automatic tide gage was established at Tulalip Bay, Washington and operated during the 1961 season. This gage was reestablished in 1962 and operated during the time the Bowie surveyed.

The gage's position is as follows; latitude 48° 03.8', longitude 122° 17.5'.

Height of the plane of reference (MLLW) on the tide staff in both 1961 and 1962 was 3.4 feet.

✓ LIST OF SIGNALS

PORT SUSAN

Name	Origin	Name	Origin
✓Add	T-11621	✓Ham	T-11620
✓Ado*	T-11621	✓Ion	T-11620
✓Ban	Sext. cuts Volume X	Job**	T-11620
		✓Kim	Vol. III IV p 40
✓Bed*	T-11621	✓Lay	T-11620
✓Big	T-11621	✓Mar	T-11620
✓Bon	T-11621	Ned**	T-11620
✓Cam	T-11620	New**	T-11616
✓Car	T-11621	Nil**	T-11621
✓Cop	T-11622	✓Pat	Vol. III IV p 41
✓Cry	Sext. cuts Vol XIII p 4	✓Par	Vol. XI p 37
		Pot**	T-11621
✓Cue	T-11627	Ram**	T-11621
✓Cut	T-11620	✓Shel ***	
✓Day	T-11621	✓Sip	T-11621
✓Don	T-11620	✓Tap	~~T-11621~~ Vol. XIII P. 3
✓Dun*	T-11622	✓Use**	T-11621
✓Ear	T-11622	Ute**	T-11616
✓Eva	T-11620	✓Val*	T-11621
✓Fat	T-11621	✓Vor	T-11616
✓Few	T-11622	✓Was	T-11621
Fly**	T-11620	Yam**	T-11621
✓Fog	T-11620	✓Zag	T-11621
✓Gas*	T-11622		
✓Get	T-11620		
✓Bus	T*11621		

* Not used in 1961
** Not used in 1961 or 1962
*** Shelton 2 1924, assumed to be photo-hydro control as station mark was found disturbed by photogrammetric party.

LIST OF SIGNALS

SARATOGA PASSAGE

Name	Origin	Name	Origin
Ace	T-11625	Joy	T-11626
Ann	T-11619	Jug	T-11619
Ark	East Point Light, 1944	Leo	T-11620
Bat	T-11615	Log	T-11619
Box	T-11619	Low	T-11619
Cab	T-11619	Max	T-11619
Caw	T-11619	Nat	T-11620
Doc	T-11619	Pat	T-11619
Egg	T-11620	Put*	T-11620
End	T-11619	Ree	Transferred from LJ-10-7-60 (H-8609)
Far	T-11615		
For	Vol. III p. 56	Rim	T-11620
Gap	Vol. II-p. 25	Ski	T-11619
Got	T-11619	Sly	T-11620
Gum	T-11615	Sue	T-11620
Gus	T-11620	Tub	T-11619
Hat *	T-11620	Tug	T-11620
Hid *	T-11620	Van	T-11619
Hun *	T-11619	Vex	T-11619
Irk*	Vol. VII p. 4	Wax	T-11619
		Wee	T-11620

* Not used during 1961 (none of these signals were used in 1962)

✓ VELOCITY CORRECTIONS

Saratoga Passage 1961

Correction	April-May	June	August	September
0.0	0.0-8.5	0.0-7.0	0.0-3.5	0.0-4.0
0.1	8.6-20.5	7.1-16.0	3.6-12.0	4.1-10.0
0.2	20.6-32.0	16.1-26.0	12.1-20.0	10.1-16.0
0.3	32.1-44.0	26.1-37.0	20.1-28.0	16.1-22.5
0.4	44.1-54.0	37.1-47.0	28.1-36.0	22.6-28.5
0.5	54.1-64.0	47.1-57.0	36.1-44.0	28.6-34.5
0.6	64.1-74.0	57.1-67.0	44.1-51.5	34.6-40.5
0.7		67.1-77.0	51.6-59.0	40.6-46.5
0.8		77.1-80.0	59.1-66.5	46.6-52.0
0.9			66.6-74.0	52.1-57.5
1.0			74.1-80.0	57.6-63.0
1.1				63.1-68.0
1.2				68.1-74.0
1.3				74.1-79.0

Port Susan 1961 & 1962

	August 1961	October 1961	September 1962
0.0	0.0-4.0	0.0-4.5	0.0-9.5
0.1	4.1-13.0	4.6-11.0	
0.2	13.1-21.5	11.1-17.5	9.6-21.6
0.3	21.6-30.5	17.6-23.5	
0.4	30.6-40.5	23.6-29.5	21.8-36.0
0.5	40.6-49.0	29.6-35.5	
0.6	49.1-56.0	35.6-41.0	36.1-48.7
0.7	56.1-63.0	41.1-47.5	
0.8	63.1-69.0	47.6-53.0	48.8-60.0
0.9		53.1-58.5	
1.0		58.6-64.5	60.1-71.0
1.1		64.6-70.0	

All corrections are positive and in fathoms. All depths are in fathoms.

PHASE CORRECTIONS

Fathometer #74 (Ship Patton)

Date	Day Letter	Corr. fms. A scale	Bscale	Mean Value used
5/19/61	A	0.0	1.4	
5/19/61	A	0.0	1.7	1.5
5/20/61	B	0.0	1.2	
5/20/61	B	0.0	1.2	1.2
5/22/61	C	0.0	1.3	
5/22/61	C	0.0	1.3	1.3
Phasing head was changed after May 19 1961				
8/18/61	D	0.0	0.6	
8/19/61	E	0.0	0.5	
8/21/61	F	0.0	0.6	
8/22/61	H	0.0	0.7	0.6

Fathometer # S-110 (Launch CS-1191)

6/6/61	m	0.0	-0.2	
6/7/61	n	0.0	0.0	
6/19/61	r	0.0	00.4	(rejected)
8/8/61	b	0.0	0.1	
8/21/61	e	0.0	-0.1	
8/22/61	f	0.0	-0.1	
9/23/61	h	0.0	0.0	0.0

Fathometer # 51

10/18/61	n	0.0	0.0	0.0

Final values only are given for the following fathometers used by the Bowie in 1962.

Fathometer #57-24

Scale	Corr. fms
A	0.0
B	-0.8
C	-2.7
D	-2.8
E	-2.6

Fathometer # 57-28

Scale	Corr. fms
A	0.0
B	-0.6

Fathometer # 57-25

Scale	Corr. fms
A	0.0
B	-0.4

BAR CHECK CORRECTIONS

A bar check correction of 0.2 fathoms was used throughout the 1961 season. None of the daily values varied from this mean by more than 0.1 fathoms.

The 1962 corrections are as follows.

Fathometer	Date	Day	Corr. fms
57-28	9/14/62	a	0.2
57-28	9/17/62	b	0.2
57-28	9/18/62	c	0.2
57-24	9/19/62	d	0.3

✓ APPROVAL SHEET
FOR

Hydrographic Survey H-8699 Field No. PA 10-1-61

The 1961 field work and records were examined daily in the field by CDR H.D. Reed (Cmdg..Ship Patton). The 1962 fieldswork and records were examined by CDR. F.X. Popper (Cmdg. Ship Bowie). Most smooth plotting was done under the direction of LT. L.S. Brown (Cmdg. Ship Bowie).

This survey is believed tombe,complete and adequate; however the distortion caused by the smooth sheet getting wet should be investigated. The urgency of preparing for the coming field season prevented a thorough study of the seriousness or possible corrections for the distorted area. The completed smooth sheet was not examined by a senior officer or experianced hydrographer. See review.

John O. Boyer

John O. Boyer
CDR. C&GS
Cmdg. Ship Bowie

RH C

FORM C&GS-712
(4-62)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

TIDE NOTE FOR HYDROGRAPHIC SHEET

May 2, 1963

Nautical Chart Division: R. H. Carstens

Plane of reference approved in
14 volumes of sounding records for

HYDROGRAPHIC SHEET 8699

Locality Saratoga Passage, Washington

Chief of Party: F. X. Popper 1961-62

Plane of reference is mean lower low water

3.8 ft. on tide staff at Greenbank, Washington

13.9 ft. below B. M. 1 (1960)

3.4 ft. on tide staff at Tulalip Bay, Washington

40.3 ft. below Bench Mark 3 (1935)

Height of mean high water above plane of reference is 10.4.

Condition of records satisfactory except as noted below:

J. M. Symons
Chief, Tides and Currents Branch

USCOMM-DC 16543-P62

FORM 197
(3-16-55)

GEOGRAPHIC NAMES

Survey No. H-8699

Name on Survey	A On Chart No. 6450 & 6448	B On previous survey No. T-11620	C On U.S. quadrangle Maps	D From local information	E On local Maps	F P.O. Guide or Map	G Rand McNally Atlas	H U.S. Light List	K BGN	
Camano Head	x								x	1
Camano Island	x								x	2
East Point	x								x	3
Elger Bay	x								x	4
Kayak Point	x									5
Lowell Point	x									6
Port Susan	x									7
Saratoga Passage	x									8
Whidbey Island	x									9
Pebble Beach		x	x							10
Hermosa Point	x									11
Cornell		x								12
Saratoga	x									13
Mabana	x									14
Spee-Bi-Dah										15
Tulalip Shores										16
Tulare Beach										17
Sunny Shores										18
McKees Beach										19
Sunny Shore Acres										20
Tyee Beach										21
Camp Diana										22
Bells Beach										23
Trillicum Beach										24
										25
										26
										27

Geographic Names Section
2 May 1963

Approved
C. E. Harrington
Staff Geographer
10 Sept. 1976

Form 946

Hydrographic Surveys (Chart Division)

HYDROGRAPHIC SURVEY NO. 8699

Records accompanying survey: Smooth sheets 1;

boat sheets 1; sounding vols. 14; wire drag vols. ;

Descriptive Reports 2; graphic recorder envelopes 4;

special reports, etc.

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

Number of positions on sheet		3203	
Number of positions checked		120	16
Number of positions revised		23	8
Number of soundings revised (refers to depth only)		73	30
Number of soundings erroneously spaced		15	6
Number of signals erroneously plotted or transferred			-
Topographic details	Time	5	40
Junctions	Time	6	24
Verification of soundings from graphic record	Time	30	40
Special adjustments	Time		8

Verification by Oscar Chapman James Schad Total time 294 21 hr train 63 prod Date 4/27/70 22 Mar 71

Reviewed by P. R. Sanchi Time 221 Date 21 June 1973

Inspected by S. Baumgardner Sept 9, 1976 40 hrs

Cartens 10 hr 3/17/77

294 221 63 378

US COMM C&GS DC

H-8699

Information for Future Presurvey Reviews

The bottom in this area is very stable.

Position Index		Bottom Change Index	Use Index	Resurvey Cycle
Lat.	Long.			
480	1223	2	2	50 years
480	1222	2	5	50 years

OFFICE OF MARINE SURVEYS AND MAPS

MARINE SURVEYS DIVISION

HYDROGRAPHIC SURVEY REVIEW

REGISTRY NO. H-8699 FIELD NO. PA-10-1-61

Washington, Whidbey Island, Southern Parts of Saratoga Passage and Port Susan

SURVEYED: May 19 - October 24, 1961;
September 14 - October 16, 1962

SCALE: 1:10,000 PROJECT NO.: OPR-412

SOUNDINGS: 808 Depth Recorder
Hand Lead CONTROL: Sextant Fixes on Shore Signals

Chief of Party ..... H. D. Reed, Jr.
..... F. X. Popper
Surveyed by ..... C. B. Carter, Jr.
..... J. L. Piter
..... L. S. Brown
Protracted by ..... A. W. Cecil
Soundings Plotted by ..... C. W. Mathisson, A. W. Cecil
Verified and Inked by ..... O. Chapman, J. Schad
Reviewed by ..... R. Sanocki
Date: June 21, 1973
Inspected by ..... S. Baumgardner

1. Description of the Area

This survey is located northwesterly of Everett, Washington, in the southern areas of Port Susan and Saratoga Passage. The area in Saratoga Passage extends from Pebble Beach northerly to Lowell Point. The area in Port Susan extends from Hermosa Point northerly to Cornell.

The bottom slopes steeply from the low water line to 50 fathoms and then gradually to maximum depths of more than 65 fathoms in Port Susan and to more than 75 fathoms in Saratoga Passage. The passages are relatively flat.

The low water areas along the shoreline are stone and boulder strewn. The bottom consists of mud, clay, sand, and broken shells.

2. Control and Shoreline

The origin of the control is adequately described in part F of the Descriptive Report.

The shoreline originates with reviewed photogrammetric manuscripts: T-11615 (1960), T-11616 (1959-1960), T-11619 (1960), T-11620 (1960), T-11621 (1959-1960), T-11622 (1959-1960), T-11625 (1960), T-11626 (1960), T-11627 (1960), and T-11628 (1959-1960).

3. Hydrography

A. Depths at crossings are in good agreement.

B. The usual depth curves are adequately delineated.

C. The development of the bottom configuration and investigation of least depths are considered adequate.

4. Condition of Survey

The field plotting, sounding records, and the Descriptive Report are adequate and conform to the requirements of the Hydrographic Manual except:

A. Fifteen of 30 days work in the sounding volumes were not signed by either the Chief of Party or the Officer in Charge.

B. A separate report on fixed aids to navigation (Form 567) was not prepared as required by the Hydrographic Manual.

5. Junctions

Adequate junctions were effected with H-8609 (1960-1961) on the northwest in Saratoga Passage and with H-8700 (1962) on the north in Port Susan. A partial butt junction was effected with H-8753 (1963) in an inshore area on the south where present depths are superseded by H-8753.

6. Comparison with Prior Surveys

A. H-405 (1853) 1:211,798

The reconnaissance nature of this prior smaller scale survey provides soundings of little comparative value. The present survey is adequate to supersede the prior survey in common areas.

B. H-1728 (1886) 1:20,000
H-1730 (1886) 1:20,000
H-1884 (1888) 1:20,000

These surveys cover the area common to the present survey. Prior and present depths are substantially in agreement. Minor differences in areas inshore can be attributed to surveying methods.

C. A submerged rock located in latitude 48°03.74'N, longitude 122°17.84'W, originating with H-1728 (1886) and not investigated by the present survey, has been carried forward. The submerged rock is charted as a rock awash and should be charted in accordance with the present survey.

With the addition noted, the present survey is adequate to supersede these prior surveys within the common area.

7. Comparison with Chart 6448, 10th Edition, March 25, 1972
6450, 20th Edition, October 14, 1972

A. Hydrography

The charted hydrography originates with the previously discussed prior surveys which require no further consideration, supplemented by partial application of the boat sheet and unverified smooth sheet of the present survey and other sources.

Attention is directed to the following:

(1) The pier charted in latitude 48°04.62', longitude 122°28.06' from 1965 air photography (Bp-98414) is subsequent to the present survey and should be retained on the chart.

(2) The pier charted in latitude 48°06.27', longitude 122°23.99' from 1965 air photography (Bp-67327) is subsequent to the present survey and should be retained on the chart.

With the exception of the above items (1) and (2), the present survey is adequate to supersede the charted information.

B. Aids to Navigation

The aid to navigation located on the present survey is in substantial agreement with the chart and adequately marks the features intended.

8. Compliance with Instructions

The survey adequately complies with the project instructions.

9. Additional Field Work

This survey is considered to be a very good basic survey and no additional work is recommended.

Examined and Approved:

Chief
Marine Surveys Division

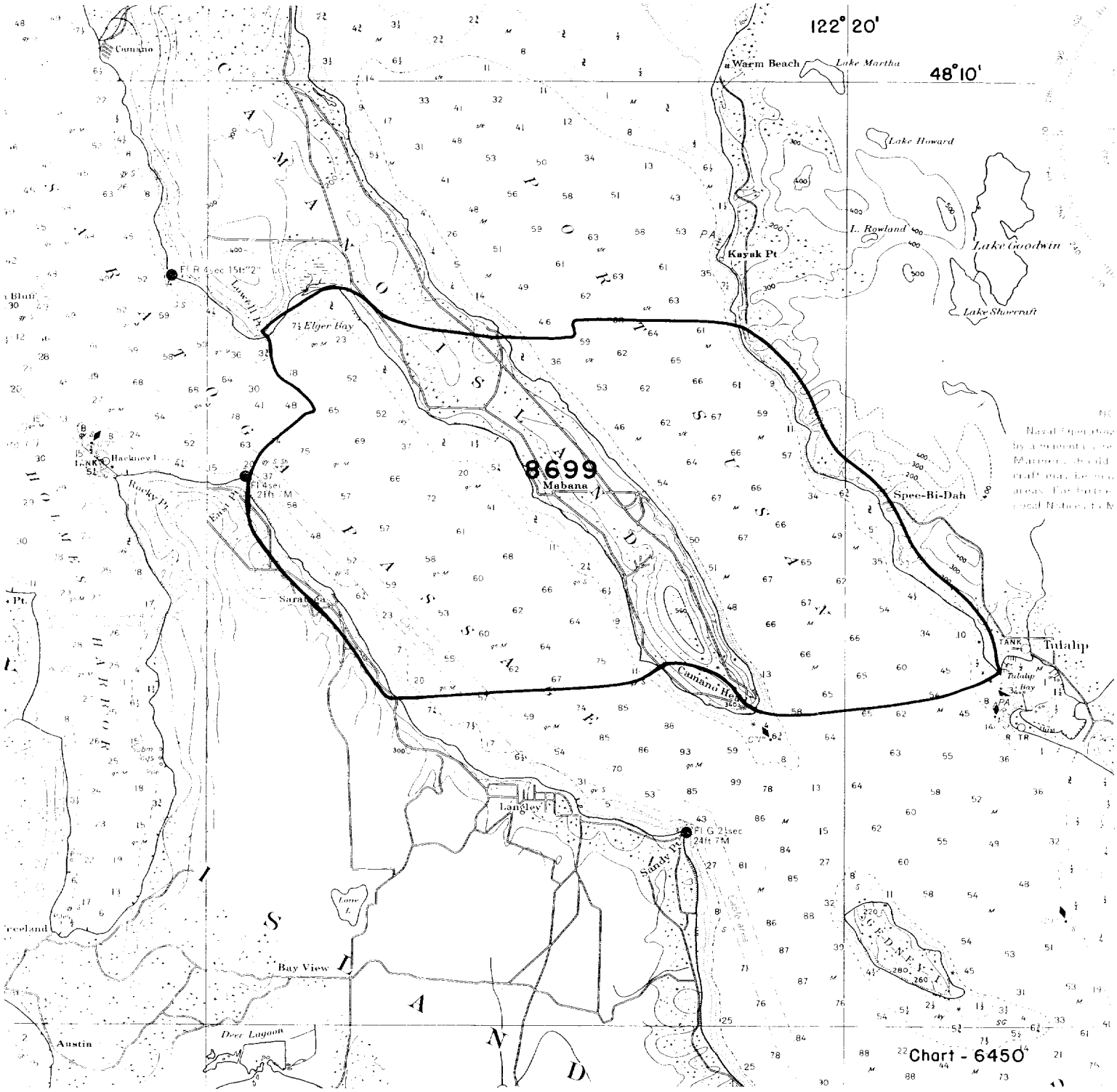
for Associate Director
Office of Marine Surveys
and Maps

8699

DATE	DAY	NUMBER POSITION	NUMBER VOLUME	SOUNDING	NAUTICAL MILES TO & FROM	MISC.	CRO. LINES	NUMBER BOT. SAMP.
14 Sept. '62	a	172	I	15.7	1.7	3.2	-	-
17 Sept. '62	b	149	I & II	15.3	7.5	1.6		
18 Sept. '62	c	257	III	27.1	4.5	3.3		
19 Sept.	d	242	II & IV	24.0	4.0	4.5		
16 Oct.	B	66		6.4	3.0	1.5		6

Discrepancies were found in crossings of launch work done by the PATTON in 1961 and by the BOWIE's launch in 1962 between latitudes 48°-04' & 48°-05' N, and longitudes 122°-19' & 122°-20' W in the vicinity of the 20, 30 and 40 fathom curves. Lines were rerun in this area by the ship BOWIE. Soundings agreed with the launch work done by the BOWIE as shown on the accompanying overlay. Some of the PATTON's work was replotted & some of the plotted positions moved inshore while some did not. However, a number of fixes in this area were rejected by the PATTON's launch which were described in their sounding volumes as "questionable." Also the fixes used by the PATTON's launch were relatively far away, and a small discrepancy in a signal location would result in a large movement of a fix position. Because of this it is recommended that the work done by the PATTON's launch in this area be rejected.

A. J. Brown


122° 20'
48° 10'
Camano
Warm Beach
Lake Martha
Lake Howard
L. Rowland
Lake Goodwin
Lake Shoecraft
Kayak Pt
Lowell Pt
Elger Bay
Hackney I
Rocky Pt
East Pt
Saratoga Pass
8699
Mabana
Spee-Bi-Dah
Camano Head
Tulalip
Tulalip Bay
Langley
Sandy Pt
Bay View
Austin
Deer Lagoon
Chart - 6450

8700 OK

16491 NO

NAUTICAL CHARTS BRANCH

SURVEY NO. H-8699

Record of Application to Charts

DATE	CHART	CARTOGRAPHER	REMARKS
4/24/63	6450	J.E. Pettibone	Part applied No critical corrs. Before ~~After~~ Verification and Review moved one sdg.
4/13/64	6401	G.R. Johnson	Before ~~After~~ Verification and Review Partly App'd Examined in part thru cht 6450, drg #31
			Before ~~After~~ Verification and Review
11/9/64	6448	JA McGann	Before ~~After~~ Verification and Review Examined only.
11-17-70	184-SC	R.S. House (ASN)	Before ~~After~~ Verification and Review thru Ch 6450
7/12/74	18443 6448	Ray Spence	~~Before~~ After ~~Verification and~~ Review Before Inspection (10)
4/4/75	6450	J Green	~~Before~~ After ~~Verification~~ and Review "
4/4/75	18440 6401	J Green	~~Before~~ After Verification and Review "
5/21/75	18423 184-SC	J Green	FULL ~~Before~~ After Verification and Review "
$10,000 5-4-77	18444 6450	Hamilton	thru 6450 Full application ~~Before~~ After Verification and Review & inspection
$40,000 3/26/93	18443	Charles James	Full ~~Before~~ after Verification and Review & inspection Appl'd DRAWING #20

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.