

9167

Diag. Cht. Nos. 6450-2 & 6460-2.

FORM C&GS-504

U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
COAST AND GEODETIC SURVEY

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. FA-5-1-70 Office No. H-9167

LOCALITY

State Washington

General locality Fuget Sound

Locality Elliott Bay

1970

CHIEF OF PARTY

J. B. Watkins, Jr & G. C. Saladin

LIBRARY & ARCHIVES

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18450 ✓
18445 ✓
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18441 ✓
18449 ✓

29167

Descriptive Report
to Accompany
Hydrographic Sheet FA-5-1-70 (H-9167)

Elliott Bay, Washington

Scale 1:5,000

NOAA Ship FAIRWEATHER (MSS 20)

CDR. Gerald C. Saladin, Comdg.

A. PROJECT

The survey was accomplished under OPR-412 project instructions dated 7 July 1970, change #1 dated 3 September 1970 and #2 dated 8 October 1970, and in compliance with Pacific Marine Center OPORDER.

B. AREA SURVEYED

The area surveyed includes Elliott Bay east of Long. 122°23.5' W. and it includes the West Waterway of the Duwamish Waterway. Junction is made with FA-5-3-70 (H-9169) in the waterways around Harbor Island, and with an April 1969 tagline survey around Piers 90 and 91.

The control was established from 31 August 1970 to 11 September 1970, with hydrography extending from 9 September through 10 November 1970.

C. SOUNDING VESSELS

Hydrography was done with the ship's launches, with the ship taking some of the bottom samples and two Nansen casts. Following are the applicable color codes and position numbers:

FAIRWEATHER	Violet	0001 - 0017
Launch FA-3	Green	2001 - 2703
Launch FA-4	Blue	4001 - 5793
Launch FA-5	Red	6001 - 6382
Launch FA-6	Brown	8001 - 8014

(2)

D. SOUNDING EQUIPMENT

Raytheon DE-723 fathometers, serial numbers 529, 561, 559, and 550, and a Ross 400A fathometer were used throughout the survey in depths extending to nearly 600 feet. Echo-sounding velocity corrections were determined from serial salinity and temperature measurements, and supplemented with bar-check results and initial corrections. An abstract of cumulative corrections is included. ✓

E. SMOOTH SHEET

The signal overlay was plotted by the Gerber Digital Plotter and verified by ship personnel. The position and sounding data were logged by ship personnel, with the final smooth sheet to be plotted electronically, and verified, by personnel at Pacific Marine Center. ✓

F. CONTROL

Visual control was used throughout the survey with signals at photo-located points (Incomplete Manuscripts T-13148, T-13149, T-13150, T-13151), inter-section stations, and one sextant-located point. ✓

G. SHORELINE

Shoreline was transferred directly to the boatsheet from Incomplete Manuscripts T-13148, T-13149, T-13150, and T-13151. Shoreline details were verified in the field using field matte prints and U.S. Army Corps of Engineers 1:12,000 scale photographs taken 9 September 1970. Delineation of low-water line was often not feasible due to steep slopes and shoreline obstructions.

Shoreline changes listed below are noted in red pencil on the boatsheet, and can be delineated using the Corps of Engineers photographs. (Numbers refer to specific photographs).

A new grain terminal pier at Lat. 47°37.4' N., Long. 122°22.1' W. has been built, with fill extending several hundred meters along the shore in both directions from the pier. (Photos S7026-48-11 and S7026-48-12). ✓

(3)

$\phi 47^{\circ} 36.17' \lambda 122^{\circ} 20.26'$
The ferry terminal at Pier 52 has been rebuilt, and ~~appears correctly on the chart.~~ (Photos S-7026-48-9, S-7026-48-10, and S-7026-48-11). Revise chart to agree with T-13149

A pier near Lat. $47^{\circ} 35.77' N.$, Long. $122^{\circ} 20.30' W.$ has been removed. (Photos S7026-48-9 and -10). The pier was carried forward as submerged ruins from T-12519. The fathogram indicates possible remnants in the area. There has been filling along the northeast corner of Harbor Island, and pier 17 has been extended. (Photos S7026-48-9 and S7026-48-10).

$\phi 47^{\circ} 35.25' \lambda 122^{\circ} 21.0'$
Most of the dolphins shown on the chart near Pier 16 are gone. Those that exist are associated with Pier 16, and another barge terminal immediately to the east. (Photos S7026-48-9 and S7026-48-10). ~~S7026-48-10~~ SECTION J

The western-most of the drydocks shown at the northwest corner of Harbor Island is gone, as is the pier that lay on the west side of that drydock. (Photos S7026-48-9 and S7026-48-10). The pier should be charted as subm ruins.

A small pier exists at Lat. $47^{\circ} 35.15' N.$, Long. $122^{\circ} 21.99' W.$, and, in the same area, previously charted dolphins are gone, with several new dolphins present. The dolphins all have sextant positions.

Only one dolphin now exists near Lat. $47^{\circ} 35.1' N.$, Long. $122^{\circ} 22.1' W.$, and it is located by sextant fix. ~~S7026-48-10~~ SECTION J

The area around Long. $122^{\circ} 22.2' W.$ on the southern tip of the bay now has a barge terminal and land-fill. The area west of the barge loading-ramp is foul with piling. Piling and dolphins in the area have sextant-located positions. (Photos S7026-48-9 and S7026-48-10). Additional dolphins shown on T-12519 are not discredited by the present survey. Therefore, they were carried forward as submerged dolphins to supplement the present survey.

The hull of the PRINCESS ELAINE has been permanently moored near Lat. $47^{\circ} 37.24' N.$, Long. $122^{\circ} 22.53' W.$ and serves as a restaurant. (Photos S7026-48-9 and -10).

The floating-log "breakwater" on the north side of the small-boat marina at Lat. $47^{\circ} 37.39' N.$, Long. $122^{\circ} 22.67' W.$ has been outlined by sextant-located positions. In the small cove just northwest of the marina there has been some filling. (Photos S7026-48-9 and S7026-48-10).

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The floating dock near Lat. 47°35.5' N., Long. 122°22.8' W. is gone, but the pilings that anchored it remain. (Photos S7026-48-9 and -10).

There is ongoing filling near Lat. 47°35.6' N., Long. 122°22.8' W. (Photos S7026-48-9 and -10).

H. CROSSLINES

Crosslines, comprising approximately fifteen percent of the regular system of sounding lines, were in agreement at intersections throughout the sheet.

I. JUNCTIONS

Junction with contemporary survey FA-5-3-70 (H-9169) was complete and adequate.

J. COMPARISON WITH PRIOR SURVEY

Comparison is made with prior surveys H-5844, H-5845, H-5846, scale 1:5,000, 1935, with U.S. Army Corps of Engineers survey E 126.2-15, scale 1:2,400, and with applicable Pre-Survey Review items.

Bottom characteristics are generally the same except in areas of new fill along the shore. Fairly consistent discrepancies with the present survey are noted, but draft and velocity corrections will bring the depths into good agreement.

Pre-Survey Review Items:

PSR #1

A search made west of Pier 91 revealed two ~~snags~~ but no deadheads. Positions of the ~~snags~~ were deadheads were determined, and one corresponds well to the westernmost of the two charted snags. The snags should be ^{retained on the chart,} charted, and the deadheads ~~deleted.~~ ^{should be charted.} *concur*

*charted source:
H-5846(1935)*

The depths and bottom configuration extending south of Pier 69 and west of Pier 64 correspond well to the chart and should be retained and supplemented by the new survey.

source: H-5846(1935)

H-9169 completely supersedes hydro in this area.

Source:

Bp 69597(1966)

The depth on the chart of 32 feet near the southwest corner of Pier 42 is verified by the present survey and should be retained. Disregard. The referenced sounding does not appear on the 6th Ed. of chart 6442 (Feb. 2, 1974); having been removed on the basis of undetermined authority other than the present survey. Therefore, it requires no further consideration.

Source:

CL 915(1966)

The 21-foot sounding charted near the southwest corner of Pier 39 is not ^{verified or disproved} borne out by the present survey and supplementary tagline and should be deleted.

Remain as charted.

Source:

Bp 69611(1964-65)

The charted 19-foot depth between Pier 39 and Pier 37 is supported by soundings of the present survey and should be retained on the chart. Disregard:

Already removed from chart by Bp 81331(1971)

PSR #3

Source:

BP 45944 (1949)

The "35 foot reported" depth at the north end of Harbor Island is verified and should be charted as delineated by the present survey.

Now Reported Depth from CL-519(1973) should be retained

The area off Pier 16 appears to have undergone some dredging and should be charted as shown by the present survey. Dolphins shown on the chart are mostly gone, with a few located off the two barge-loading ramps. The new dolphins should be charted as they appear on the Corps of Engineers photos.

CONCUR

Charted from H-5844(1934-35)

Piers subject to mooring changes in log located

Piling and dolphins near Lat. 47°35.2' N., Long. 122°21.9' W., are no longer as shown on the chart and should be shown as indicated by positions on the present survey.

CONCUR

Charted Source:

H-5844(1934-35)

Only one dolphin exists in the area of Lat. 47°35.1' N., Long. 122°22.1' W. and should be charted in lieu of ~~place of~~ the two now shown on the chart. CONCUR

PSR #4

The area shown as "10 ft. rep." at Lat. 47°35.0' N., Long. 122°21.1' W. has been filled. A position on the corner of the fill area, and the Corps of Engineers photographs, outline the required shoreline revision for charting.

Source:

H-5844(1934-35)

The sounding of 39 feet near Lat. 47°35.1' N., Long. 122°22.3' W. agrees well with depths in the area on the present survey and should be retained on the chart. Chart present survey depths.

CONCUR

PSR #2

Two mooring buoys exist at Lat. 47°35.31' N., Long. 122°22.8' W. and at Lat. 47°35.43' N., Long. 122°22.1' W., are located by sextant-fix, and should be charted.

CONCUR

(6)

A breakwater of floating logs fastened between dolphins protects a small boat marina near Lat. 47°35.35' N., Long. 122°22.7' W. Positions were taken on the dolphins, and the structure should be charted as shown on the ~~beatsheet~~. ^{smooth sheet} *concur*

source:

T-12519(1964-66)

Pier ruins at Lat. 47°35.55' N., Long. 122°22.80' W. still remain and should be retained on chart. *concur*

K. COMPARISON WITH THE CHART

Comparison is made with Chart 6442, 4th Edition, 13 December 1969, scale 1:10,000. General bottom characteristics are as shown on the chart. Seeming discrepancies in depth are largely resolved with the application of appropriate draft and velocity corrections. The several changes in the shoreline and shoreline structures are listed in Sections G and J of this report.

L. ADEQUACY OF THE SURVEY

The survey is considered complete and adequate for charting. If further delineation of depths around major piers is desired, detailed surveys by the Port of Seattle might prove useful.

M. AIDS TO NAVIGATION

Major aids to navigation are as shown on the chart. Two black can buoys mark the limit of the dredged channel west of Pier 91. An aerobeacon rises atop a downtown building. There are three lights on the north end of Harbor Island, with the eastern- and western-most marking entrances to the East and West Waterways. The public boat-launching ramp on the east side of Duwamish Head is marked on its north side by a light. A light marks the outer extent of the shoal area north of Duwamish Head. The Colman Ferry Terminal is marked with two lights, and a fog signal light. The fog signal light is mis-located on the chart, and its correct position is given on the accompanying Form 567. In addition, numerous sporadically maintained minor lights marking the outer limits of piers and atop terminal dolphins exist throughout the bay, and are tabulated below. Positions were determined by sextant fix or photogrammetrically.

<u>DESCRIPTION</u>	<u>LAT. - N.</u> (° ' m)	<u>LONG. - W.</u> (° ' m)	<u>MAINTAINED BY:</u>
Fixed red light on SW corner of Pier 91	47 37 1100	122 22 1176	U. S. Navy
Fixed red light on SE corner of Pier 91	47 37 1100	122 22 1072	U. S. Navy
Fixed red light atop pole on NW part of Pier 71	47 36 1839	122 21 0613	Union Oil Co.
Fixed red light atop pole on S end of Pier 71	47 36 1800	122 21 0574	Union Oil Co.
Fixed red light on NW building corner on Pier 70	47 36 1674	122 21 0440	Privately maintained
Fixed red light on SW building corner on Pier 70	47 36 1638	122 21 0397	Privately maintained
Fixed red light on NW building corner on Pier 69	47 36 1600	122 21 0332	American Can Co.
Fixed white light on center building corner on Pier 69	47 36 1567	122 21 0336	American Can Co.
Fixed red light on SW building corner on Pier 69	47 36 1537	122 21 0291	American Can Co.
Fixed red light on NW building corner on Pier 66	47 36 1339	122 21 0002	Port of Seattle
Fixed red light - NW of 3 - in center of building on Pier 66	47 36 1256	122 20 1163	Port of Seattle
Fixed amber light - center of 3 - in center of building on Pier 66	47 36 1255	122 20 1162	Port of Seattle
Fixed red light - SE of 3 - in center of building on Pier 66	47 36 1254	122 20 1161	Port of Seattle
Fixed red light on SW building corner on Pier 66	47 36 1185	122 20 1081	Port of Seattle
Fixed red light on SW building corner on Pier 64	47 36 1056	122 20 0938	Port of Seattle

<u>DESCRIPTION</u>	<u>LAT. - N.</u> (° ' m)	<u>LONG. - W.</u> (° ' m)	<u>MAINTAINED BY:</u>
Fixed red light on NW building corner on Pier 63	47 36 1005	122 20 0880	Puget Sound Freight Lines
Fixed red light on SW building corner on Pier 63	47 36 0982	122 20 0858	Puget Sound Freight Lines
Fixed red light on SW building corner on Pier 62	47 36 0950	122 20 0807	Puget Sound Freight Lines
Fixed red light on NW building corner on Pier 61	47 36 0929	122 20 0727	Port of Seattle
Fixed red light on SW building corner of Pier 60	47 36 0883	122 20 0709	Port of Seattle
Fixed red light on NW building corner on Pier 59	47 36 0854	122 20 0714	Pier 59 Dock Corp.
Fixed red light on SW building corner on Pier 59	47 36 0830	122 20 0684	Pier 59 Dock Corp.
Fixed red light on NW corner of Pier 56	47 36 0642	122 20 0573	Seattle Marine Aquarium
Fixed red light near SW corner of Pier 56	47 36 0605	122 20 0559	Seattle Marine Aquarium
Fixed red light on NW building corner on Pier 55	47 36 0560	122 20 0438	Fisheries Supply Co.
Fixed red light on SW building corner on Pier 55	47 36 0535	122 20 0437	Fisheries Supply Co.
Fixed red light on NW building corner on Pier 54	47 36 0500	122 20 0442	Washington Fish & Oyster Co.
Fixed red light on SW building corner on Pier 54	47 36 0450	122 20 0415	Washington Fish & Oyster Co.
Fixed white light on end of bulkhead at Pier 53	47 36 0395	122 20 0434	Colman Ferry Dock
Fixed white forward range (lower) on Pier 53	47 36 0381	122 20 0377	Colman Ferry Dock
Fixed white rear range light (higher) on Pier 53	47 36 0381	122 20 0373	Colman Ferry Dock

<u>DESCRIPTION</u>	<u>LAT. - N.</u> (° ' m)	<u>LONG. - W.</u> (° ' m)	<u>MAINTAINED BY:</u>
Fixed red forward range light (lower) on N slip at Pier 52	47 36 0336	122 20 0393	Colman Ferry Dock
Fixed red rear range light (higher) on N slip at Pier 52	47 36 0336	122 20 0389	Colman Ferry Dock
Fixed red forward range light (lower) on S slip at Pier 52	47 36 0296	122 20 0393	Colman Ferry Dock
Fixed red rear range light (higher) on S slip at Pier 52	47 36 0296	122 20 0393	Colman Ferry Dock
Fixed red light on NW building corner on Pier 48	47 36 0044	122 20 0375	Port of Seattle
Fixed red light on SW building corner on Pier 48	47 35 1851	122 20 0374	Port of Seattle
Fixed red light on NW corner of Pier 46	47 35 1761	122 20 0414	Port of Seattle
Fixed red light on SW corner of Pier 46	47 35 1542	122 20 0413	Port of Seattle
Fixed red light atop dolphin off the end of Pier 43	47 35 1478	122 20 0375	Washington Tug & Barge
Fixed red light on NW building corner on Pier 42	47 35 1304	122 20 0513	Port of Seattle
Fixed red light on SW building corner on Pier 42	47 35 1206	122 20 0514	Port of Seattle
Fixed red light on NW corner of Pier 39	47 35 1106	122 20 0554	Port of Seattle
Fixed red light on SW corner of Pier 39	47 35 1033	122 20 0573	Port of Seattle
Fixed red light on NW corner of Pier 37	47 35 0907	122 20 0618	Port of Seattle
Fixed red light on SW corner of Pier 37	47 35 0834	122 20 0622	Port of Seattle

<u>DESCRIPTION</u>	<u>LAT. - N.</u> (° ' m)	<u>LONG. - W.</u> (° ' m)	<u>MAINTAINED BY:</u>
Fixed red light on NW corner of Pier 36	47 35 0762	122 20 0623	Port of Seattle
Fixed red light atop pole near SW corner of Pier 36	47 35 0726	122 20 0629	Port of Seattle
Fixed red light atop dolphin at NW corner of Pier 17	47 35 0764	122 20 1159	Puget Sound Tug & Barge
Fixed red light atop dolphin off Pier 16	47 35 0587	122 20 1252	Privately maintained
Fixed red light atop dolphin off Pier 16	47 35 0572	122 21 0040	Privately maintained
Fixed red light on NE corner of Pier 15	47 35 0620	122 21 0136	Mobil Oil Company
Fixed red light on NW corner of Pier 15	47 35 0620	122 21 0149	Mobil Oil Company
Fixed green light on N end of Pier 11	47 34 1845	122 21 0532	Atlantic Richfield Co.
Fixed red light atop pole on N end of Pier 5	47 34 1652	122 21 0791	Port of Seattle
Fixed red light atop dolphin off NE pier corner	47 35 0360	122 21 0783	Lockheed Shipbuilding and Construction Co.
Fixed red light on NW pier corner	47 35 0356	122 21 0795	Lockheed Shipbuilding and Construction Co.
Fixed green light atop pole on NE pier corner	47 35 0231	122 22 0039	Wycoff Co.
Fixed red light on post on NW pier corner	47 35 0211	122 22 0077	Wycoff Co.
Fixed white light atop pole on barge terminal E dolphin	47 35 0087	122 22 0176	Alaska Hydro Train
Fixed red light atop pole on barge terminal N dolphin	47 35 0102	122 22 0238	Alaska Hydro Train

<u>DESCRIPTION</u>	<u>LAT. - N.</u> (° ' m)	<u>LONG. - W.</u> (° ' m)	<u>MAINTAINED BY:</u>
Fixed red light atop pole on barge terminal W dolphin	47 35 0062	122 22 0248	Alaska Hydro Train
Fixed red light on SE building corner on pier	47 35 0187	122 22 0446	Van Vetter Company
Fixed red light on NW part of building on pier	47 35 0255	122 22 0506	Van Vetter Company
Fixed red light atop dolphin at small boat marina	47 35 0694	122 22 0759	Lloyds' Marina

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N. STATISTICS

	<u>Ship</u>	<u>FA-3</u>	<u>FA-4</u>	<u>FA-5</u>	<u>FA-6</u>	
Positions	17	703	1793	382	14	= 2909
Sounding line (n.m.)	0.0	57.7	169.5	31.7	1.5	
Bottom samples	15	0	35	0	0	50
Leadline soundings	0	0	0	0	0	
Oceanographic stations	2	0	0	0	0	
Magnetic stations	0	0	0	0	0	

Total area surveyed: 4.3 square nautical miles

O. MISCELLANEOUS

None.

P. RECOMMENDATIONS

None.

Q. REFERENCES TO REPORTS

1. Season's Report, NOAA Ship FAIRWEATHER, 1970.
(To be forwarded).
2. Field Edit Report, OPR-412, NOAA Ship FAIRWEATHER,
1970. (To be forwarded).
3. Fathometer Report, OPR-412, NOAA Ship FAIRWEATHER,
1970. (To be forwarded).
4. Coast Pilot Report, OPR-412, NOAA Ship FAIRWEATHER,
1970. (To be forwarded).
5. Evaluation of Ross Fathometer, OPR-412, NOAA Ship
FAIRWEATHER, 1970. (To be forwarded).

Respectfully submitted,

James C. Bishop, Jr.

James C. Bishop, Jr.
LTJG, NOAA

LIST OF SIGNALS ON H-9167 (FA-5-1-70)

<u>Name used in Hydrographic Survey</u>	<u>Latitude (° ' m)</u>	<u>Longitude (° ' m)</u>	<u>Origin of Station</u>
020	47 35 0188	122 22 0446	T-13151
021	47 34 1747	122 22 0397	"
022	47 35 0187	122 22 0015	"
023	47 34 1845	122 22 0091	"
030	47 35 0404	122 21 0880	"
031	47 35 0032	122 21 0757	"
032	47 34 1729	122 21 0873	SEATTLE RADIO STATION KJR, TOWER, 1936
050	47 34 1493	122 21 0767	T-13151
051	47 34 1346	122 21 0811	"
060	47 34 0777	122 21 0678	"
061	47 34 0714	122 21 0404	"
070	47 34 0990	122 21 0537	"
071	47 34 1142	122 21 0536	"
090	47 34 1392	122 21 0539	"
110	47 34 1701	122 21 0534	"
120	47 35 0187	122 21 0536	"
130	47 35 05 30 ²⁹	122 21 0531	WEST WATERWAY LIGHT, 1963-70
132	47 35 1717	122 23 0246	DUWAMISH HEAD LIGHT, 1962-70
133	47 35 1373	122 23 0212	T-13150
134	47 35 1141	122 22 1112	"
135	47 35 0678	122 22 0913	"

LIST OF SIGNALS ON H-9167 (FA-5-1-70)
(continued)

<u>Name used in Hydrographic Survey</u>	<u>Latitude (° ' m)</u>	<u>Longitude (° ' m)</u>	<u>Origin of Station</u>
136	47 35 0387	122 22 0622	T-13150
137	47 37 1265	122 22 0479	T-13149
138	47 37 0980	122 21 1243	"
139	47 37 0446	122 20 1106	SEATTLE WORLD'S FAIR, SPACE NEEDLE, 1962-70
140	47 36 1182	122 20 0326	^{SEATTLE} NORTHWESTERN INSUR- ANCE CO., BEACON, 1955-68
150	47 35 0622	122 21 0136	T-13151
160	47 35 0499	122 21 0014	"
190	47 35 0026	122 20 0861	"
191	47 34 1661	122 20 0887	"
192	47 35 0775	122 20 0903	HYDROGRAPHIC (Sextant located)
193	47 35 0256	122 20 1167	KOL RADIO TOWER, 1934-70
201	47 34 1374	122 20 0884	T-13151
220	47 34 0993	122 20 0883	"
230	47 34 0769	122 20 0816	"
240	47 34 0787	122 20 0687	"
241	47 34 0794	122 20 0414	"
250	47 34 1054	122 20 0619	"
251	47 34 0848	122 20 0414	"
260	47 34 1301	122 20 0634	"
290	47 34 1674	122 20 0616	"

LIST OF SIGNALS ON H-9167 (FA-5-1-70)
(continued)

<u>Name used in Hydrographic Survey</u>	<u>Latitude (° ' m)</u>	<u>Longitude (° ' m)</u>	<u>Origin of Station</u>
301	47 35 0039	122 20 0627	T-13151
350	47 35 0553	122 20 0484	ALBER'S TANK, 1934-70
360	47 35 0727	122 20 0604	T-13151
370	47 35 0885	122 20 0614	"
390	47 35 1058	122 20 0565	"
420	47 35 1204	122 20 0514	"
460	47 35 1566	122 20 0377	"
501	47 36 0178	122 20 0396	T-13149
540	47 36 0479	122 20 0425	"
550	47 36 0550	122 20 0436	"
560	47 36 0600	122 20 0556	"
561	47 36 0623	122 20 0531	"
630	47 36 0976	122 20 0860	"
660	47 36 1344	122 21 0015	"
661	47 36 1277	122 20 1099	BELL STREET DOCK, TANK, 1929-70
680	47 36 1468	122 21 0112	T-13149
681	47 36 1418	122 21 0123	"
690	47 36 1565	122 21 0341	"
691	47 36 1525	122 21 0120	"
701	47 36 1675	122 21 0440	"
702	47 36 1685	122 21 0303	"
710	47 36 1838	122 21 0552	"

LIST OF SIGNALS ON H-9167 (FA-5-1-70)
(continued)

Name used in Hydrographic Survey	Latitude (° ' m)	Longitude (° ' m)	Origin of Station
711	47 36 1842	122 21 0463	T-13149
897	47 37 1099	122 22 0869	T-13148
905	47 35 1698	122 19 0913	KING STREET STATION, TOWER, 1934-70
906	47 36 0236	122 19 10 ⁵⁰ 39	SMITH BUILDING ^{FLAGPOLE,} 1921 ¹⁴⁻⁷⁰
907	47 36 0872	122 20 0069	NORTHERN LIFE ^{TOWER,} BUIL- DING, CENTER FLAG- POLE, 1929-70
908	47 37 1836	122 21 03 ⁴⁰ 99	^{SEATTLE TV STATION} KIRO, TV TOWER, 1958
909	47 37 1708	122 23 0652	SEATTLE, MAGNOLIA BLUFF, FLAGPOLE, NEAR Δ 1958 ALDER HIGH, 1934 r 1968
910	47 37 1715	122 23 0311	T-13148
911	47 37 1631	122 23 0447	"
913	47 37 1094	122 22 1184	"
914	47 37 1490	122 22 1179	"
916	47 35 1242	122 23 0350	T-13150
917	47 35 1051	122 23 0520	"
918	47 35 0658	122 23 0783	"

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NOAA Ship FAIRWEATHER

MSS 20

CDR. Gerald C. Saladin, Commanding

VELOCITY CORRECTIONS
Elliott Bay 1970

Corrections to be applied to the following sheet numbers:

FA-5-1-70
FA-5-2-70
FA-5-3-70

Applicable Depths (feet)	Corrections (feet)
0 - 30	+0.5
30 - 60	+1.0
60 - 90	+1.5
90 - 120	+2.0
120 - 150	+2.4
150 - 180	+3.0
180 - 210	+3.4
210 - 240	+3.9
240 - 270	+4.4
270 - 300	+4.9
300 - 330	+5.3
330 - 360	+5.8
360 - 390	+6.3
390 - 420	+6.8
420 - 450	+7.3
450 - 480	+7.8
480 - 500	+8.3
500 - 582	+8.8

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NOAA Ship FAIRWEATHER

MSS 20

CDR. Gerald C. Saladin, Commanding

ECHO CORRECTIONS (Bar Check)
Elliott Bay - 1970

Correction to be applied to the following sheet number:

FA-5-1-70

Launch Number	Date	Correction (feet)
FA-4	9-18	+2.6
	9-23	+2.5
	9-24	+2.4
	9-28	+2.5
	9-29	+2.6
	9-30	+2.6
	10-01	+2.3
	10-05	+2.6
	10-06	+2.6
	10-08	+2.6
	10-09	+2.7
	10-15	(+2.6)
	10-16	(+2.6)
	10-19	+2.6
	10-20	+2.7
	10-21	+2.6
	10-22	+2.5
	10-23	+2.6
	10-26	+2.6
	10-27	+2.6
	10-28	+2.6
	10-29	+2.7
	11-03	(+2.6)
	11-05	+2.6
	11-06	+2.7
	11-09	(+2.7)
	11-10	(+2.7)

Note: Corrections in parentheses () are estimated for days when bar checks were not taken.

(5)

NOAA Ship FAIRWEATHER

MSS 20

CDR. Gerald C. Saladin, Commanding

ECHO CORRECTIONS (Bar Check)
Elliott Bay - 1970

Correction to be applied to the following sheet number:

FA-5-1-70

Launch Number	Date	Correction (feet)
FA-3	9-09	(+1.3)
	9-10	(+1.3)
	9-11	(+1.3)
	9-15	+1.3
	9-16	(+1.3)
	9-18	(+1.3)
	10-13	(+1.3)
	10-14	(+1.3)
FA-5	9-23	+1.0
	9-24	+1.1
	9-25	+1.4
	9-28	+1.3
	9-29	+1.5
	9-30	+1.7
	10-02	+1.4
FA-6	10-19	(+1.6)

Note: Corrections in parentheses () are estimated for days when bar checks were not taken.

127

(8)

NOAA Ship FAIRWEATHER

MSS 20

CDR. Gerald C. Saladin, Commanding

INITIAL CHECK CORRECTIONS
Elliott Bay - 1970

Corrections to be applied to the following sheet number:

FA-5-1-70

Date	Time From - To	Corrections (ft)
Launch FA-3		
9-09-70	1425:00 - 1433:15	+0.4
9-10-70	1413:30 - 1443:15	-0.1
9-11-70	0904:00 - 0913:45	-0.1
9-18-70	1351:00 - 1404:00	-0.1
10-14-70	1259:00 - 1431:15	-0.1
Launch FA-5		
9-28-70	1126:30 - 1131:30	-0.1

Note: All times referenced to 105° W.

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

~~TO BE CHANGED~~
~~TO BE REVISED~~
~~TO BE DELETED~~ } STRIKE OUT TWO

January 18, 1971

I recommend that the following objects which ~~have~~ (have not) been inspected from seaward to determine their value as landmarks be charted on ~~charts~~ ~~from~~ the charts indicated.
The positions given have been checked after listing by ENS. D. B. McLean

CDR Ronald C. Saladin
Chief of Party

STATE	Washington	CHARTING NAME	DESCRIPTION	SIGNAL NAME	POSITION		DATUM	METHOD OF LOCATION AND SURVEY No.	DATE OF LOCATION	HARBOR CHART	INSHORE CHART	OFFSHORE CHART	CHARTS AFFECTED
					LATITUDE * ° ' "	LONGITUDE * ° ' "							
-		COLMAN FERRY TERMINAL	FOG LIGHT	OLD POSITION	47 36	10.17 D.M. METERS 314	122 20	21.17 D.P. METERS 442	1927	N.A.			6442, 6446
-		COLMAN FERRY TERMINAL	FOG LIGHT	NEW POSITION	47 36	10.32 D.M. METERS 319	122 20	19.14 D.P. METERS 400	1927	N.A.	Sextant Fix 1970	XX	6442, 6446, 6450
-		FL W. - on 1 sec, off 2	FOG LIGHT										
-		sec, on 4 sec, off 10 sec											
-		FL W. - on 1 sec, off 2											
-		sec, on 4 sec, off 10 sec											

This form shall be prepared in accordance with Hydrographic Manual, Publication 20.2, Sec. 1-55, 2-39, 6-36, 7-18 to 22 inclusive, and Fig. 79. Positions of charted landmarks and nonfloating aids to navigation, if redetermined, shall be reported on this form. Revisions shall show both the old and new positions. The data should be considered for the charts of the area and not by individual field survey sheets. Information under each column heading should be given.
* TABULATE SECONDS AND METERS
USCGM-DC 16234-P 61

OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

VESSEL	SERIAL NO.	DATE	PROJ. NO.		YEAR	DEPTH (Fathoms) FEET	WEIGHT OF SAM- PLER	AP- PROX. FRAN- TION	LENGTH OF CORE	COLOR OF SEDI- MENT	FIELD DESCRIPTION	REMARKS (Unusual conditions, cohesiveness, denting, cutters, strat. pos., type of bottom, relief, etc., slope, plain, disposition, etc.)	CHECKED BY	DATE CHECKED
			1270	1270										
FAUCONBERG	5706	9-Nov-70	47°35.28'	122°21.7'	1970	60					gnls S+M		ERS ERK	13-NOV-70
	5707		47°35.45'	122°21.7'	1970	64					gnls S+M			
	5708		47°35.7'	122°21.7'	1970	204					gnls S+M			
	5709		47°35.5'	122°21.95'	195	195					gnls S+FG			
	5710		47°35.30'	122°21.95'	150	150					gnls MS			
	5711		47°35.20'	122°22.18'	130	130					gnls M			
	5712		47°35.39'	122°22.18'	226	226					gnls MG			
	5715		47°35.26'	122°22.38'	125	125					gnls S			
	5716		47°35.88'	122°22.30'	17	17					gnls S			
	5717		47°36.5'	122°22.0'	522	522					gnls MG			
	5718		47°36.4'	122°21.3'	275	275					gnls M			
	5719		47°36.18'	122°22.4'	268	268					gnls M			
	5720		47°36.20'	122°22.38'	430	430					gnls M+S			
	5721		47°37.2'	122°21.85'	76	76					gnls MS			
	5722		47°37.25'	122°22.10'	125	125					gnls MS			
	5725		47°37.43'	122°22.25'	80	80					gnls M			
	5724		47°37.22'	122°22.28'	208	208					gnls M &			

Use more than one line per sample if necessary.

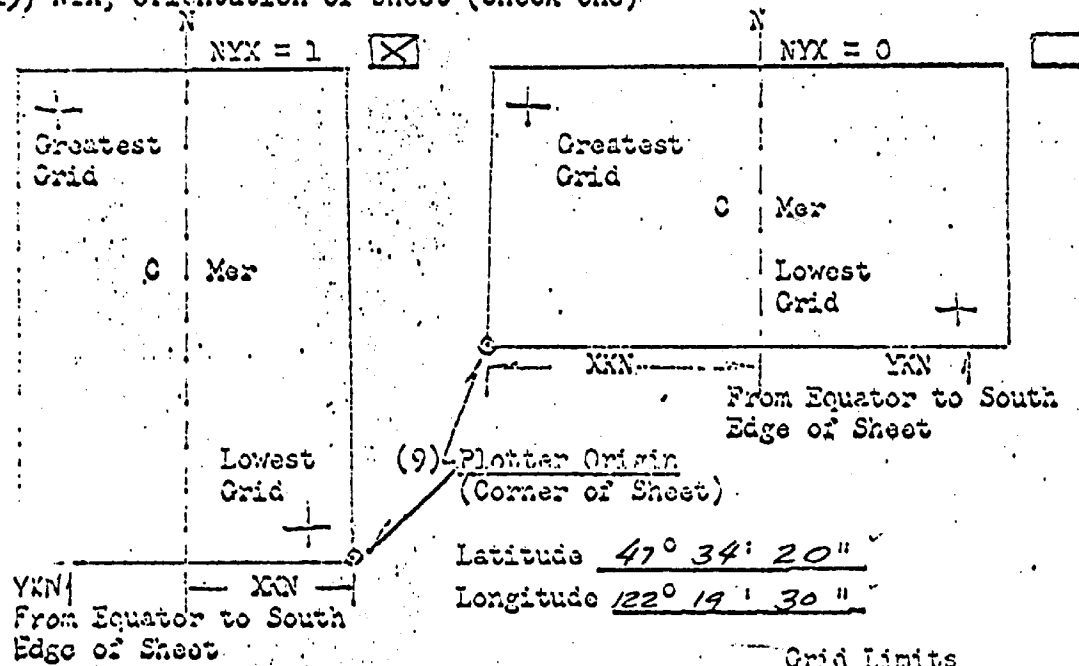
OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

VESSEL	SERIAL NO.	DATE	SAMPLE POSITION		DEPTH feet	WEIGHT OF SAMPLER	AP- PROX. PEN- TRA- TION	LENGTH OF CORE	COLOR OF SEDI- MENT	FIELD DESCRIPTION	REMARKS <small>(Unusual conditions, cohesiveness, denting, cutter, size, no., type of bottom relief, i.e., slope, plain, disposition, etc.)</small>	DATE CHECKED
			LATITUDE	LONGITUDE								
FAIRWEATHER LAUNCH #4												
	5573	3 NOV 70	122° 21.3'	97° 35.9'						gn dm S.M		
	5574		122° 21.1'	97° 35.4'						gn dm S.M		
	5575		122° 20.8'	97° 35.6'						gn dm S.M		
	5576		122° 20.8'	97° 35.4'						gn dm S.M		
	5577		122° 21.1'	97° 35.6'						gn dm S.M		
	5578		122° 21.3'	97° 35.6'						gn dm S.M		
	5579		122° 21.3'	97° 35.8'						gn dm S.M		
	5580		122° 20.8'	97° 35.8'						gn dm M.S.G		
	5581		122° 21.1'	97° 35.8'						gn S.G		

Use more than one line per sample if necessary.

20100

- (1) Proj. OF 412 (4) Requested by JBW FAIRWEATHER
- (2) H No. _____ (5) Ship or Office _____
- (3) Field No. G (6) Date Required ASAP (8/31/72)
- (7) Visual Ft. (0) or Fathoms (1) (8) Electronic (fill out form 113)
- (10) XKN (SP 5) Distance from C Mer to East Edge (NYX = 1) 2821.635 ✓
or West Edge (NYX = 0). ~~3448.665~~ Meters
- (11) YKN (SP 241) Distance from Equator to South Edge of Sheet. 5270645.780 Meters
- (12) Central Meridian 122° 28' 45" "
- (13) Survey Scale 1: 5000
- (14) Size of Sheet (Check one) 36x60 42x60
- (15) NYX, Orientation of sheet (Check one)



- Grid Limits
- (16) Greatest Latitude 47° 38' 15" " (Projection Line Interval Page 4 Hydro Y-axis) 15" "
- (17) Lowest Latitude 47° 34' 30" "
- (18) Difference 0 3' 45" "
- (20) 15 YKN
- (21) Greatest Longitude 122° 24' 45" "
- (22) Lowest Longitude 122° 19' 45" " (24) 15" "
- (23) Difference 0 5' 00" " (25) 20 XKN

TRANSMITTAL SHEET

H-9167

FA-5-1-70

The field work and examination of records was accomplished under the supervision of this command. The boatsheet was inspected daily for completeness and no additional work is considered necessary.



Gerald C. Saladin
CDR., NOAA
Commanding Officer
NOAA Ship FAIRWEATHER

APPROVAL SHEET

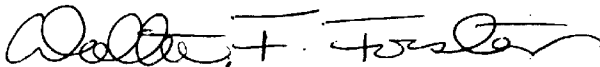
The smooth sheet has been inspected, is complete, and meets the requirements of the General Instructions for automated surveys and the Hydrographic Manual. (Note: All exceptions are listed in the Verifier's Report)

Examined and approved,



James S. Green
Supervisory Cartographic Technician

Approved and forwarded,



Walter F. Forster, LCDR, NOAA
Chief, Processing Division
Pacific Marine Center

TIDE NOTE FOR OPR - 412

ELLIOTT BAY-DUWAMISH RIVER-PUGET SOUND, WASHINGTON, 1970

All tide correctors for this project were based on readings from the Seattle Standard Tide Gage at Elliott Bay. Hourly heights were supplied by Chief, Tides and Currents Branch (C 331), Rockville, and were data-logged by FAIRWEATHER personnel.

TIDE NOTE FOR HYDROGRAPHIC SHEET

Nov. 28, 1972

Pacific Marine Center
Nautical Chart Division:

Plane of reference approved in
~~volumes of sounding records~~ for *hourly heights*

HYDROGRAPHIC SHEET *H 9167, 9168, 9169*

Locality: *Elliott Bay, Washington*

~~Chief of Party:~~ *Year: 1970*

Plane of reference is *mean lower low water = 7.6 feet on*
hourly heights sheet

Tide Station Used (Form C&GS-681): *Seattle, Washington*

Height of Mean High Water above Plane of Reference is as follows: *10.4 feet*

Remarks

P. S. H. Row

GEOGRAPHIC NAMES

Survey No. H-9167

Name on Survey	On Chart No.		On previous survey No.		On U. S. Quadrant Maps		From local information		On local Maps		P. O. Guide or Ma.		Rand McNally At.		U. S. Light List	
	A	B	C	D	E	F	G	H	K							
/ DUWAMISH HEAD																1
/ EAST WATERWAY																2
/ ELLIOTT BAY																3
/ HARBOR ISLAND																4
/ SEATTLE																5
/ SMITH COVE																6
/ WEST WATERWAY																7
																8
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																27

Approved by
 Chas E. Hamilton
 Staff Geographer
 14 Feb. 1974

HYDROGRAPHIC SURVEY STATISTICS
HYDROGRAPHIC SURVEY NO. H-9167

RECORDS ACCOMPANYING SURVEY: To be completed when survey is registered.

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET & PNO		1	BOAT SHEETS		1	
DESCRIPTIVE REPORT		1	OVERLAYS		3	
DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES						1
CAHIERS	1					
VOLUMES	15					
Dredge Boxes Box Raw			2x			
T-SHEET PRINTS (List)						
SPECIAL REPORTS (List)						

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS			
	PRE-VERIFICATION	VERIFICATION	REVIEW	TOTALS
POSITIONS ON SHEET				2917
POSITIONS CHECKED		2886	—	
POSITIONS REVISED		119	—	
DEPTH SOUNDINGS REVISED		225	17	
DEPTH SOUNDINGS ERRONEOUSLY SPACED		----	—	
SIGNALS ERRONEOUSLY PLOTTED OR TRANSFERRED		----	—	
	TIME (MANHOURS)			
TOPOGRAPHIC DETAILS		177	102	
JUNCTIONS		1	30	
VERIFICATION OF SOUNDINGS FROM GRAPHIC RECORDS		324	30	
SPECIAL ADJUSTMENTS		8	20	
ALL OTHER WORK		136	53	
TOTALS		646	235	
PRE-VERIFICATION BY	BEGINNING DATE		ENDING DATE	
VERIFICATION BY Nicholas Lestenkof	12 July 1972		15 October 1973	
REVIEW BY Dennis J. Hill	29 July 1974		10-30-75 9 Sept 74	

Inspection: R.W. Wellman 112 hrs 2/10/74 2018 U.S. G.P.O. 1972-769-562/439 REG.#6
6-26-74

REGISTRY NO. _____

The Computer and Excess Sounding Cards for this survey have not been corrected to reflect the changes made to the Computer Card and Excess Card Printouts at this time of the review.

When the cards have been updated to reflect the final results of the survey, the following shall be completed:

CARDS CORRECTED

DATE _____ TIME REQUIRED _____ INITIALS _____

REMARKS:

REGISTRY NO. H-9167

The magnetic tape containing the data for this survey has not been corrected to reflect the changes made during evaluation and review.

When the magnetic tape has been updated to reflect the final results of the survey, the following shall be completed:

MAGNETIC TAPE CORRECTED

DATE _____ TIME REQUIRED _____ INITIALS _____

REMARKS:

OFFICE OF MARINE SURVEYS AND MAPS
HYDROGRAPHIC SURVEYS DIVISION
MODIFIED HYDROGRAPHIC SURVEY REVIEW

REGISTRY NO. H-9167

FIELD NO. FA-5-1-70

Washington, Puget Sound, Elliott Bay

SURVEYED: September 9 - November 10, 1970

SCALE: 1:5,000

PROJECT NO.: OPR-412

SOUNDINGS: DE-723 Depth Recorder
Ross 400A Depth Recorder

CONTROL: Sextant Fixes on
Shore Signals

Chief of Party	J. B. Watkins, Jr., and G. C. Saladin
Surveyed by	J. E. Thomasson D. B. McLean J. C. Bishop B. L. Keck W. D. Neff A. F. Divis
Automated Plot by	Gerber Digital Plotter (PMC)
Verified by	N. Lestenkof
Reviewed by	D. Hill
	Date: October 30, 1975
Cursory inspection made--survey processing considered complete	K. W. Wellman June 26, 1979

1. Control and Shoreline

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

The shoreline originates with reviewed topographic manuscripts T-13148 through T-13151, which were compiled from 1966 photographs, field edited in 1970, and revised in 1975 from 1970 Corps of Engineers aerial photographs. The topographic manuscripts are described in their respective Descriptive Reports as inadequate because of notable omissions by the field editor and many shoreline changes which were apparent on the 1970 photographs but were not shown on the reviewed topographic manuscripts. Accordingly, several items not disproved by the present survey, which are shown on prior topographic manuscript T-12519 (1963-64), were appropriately carried forward to supplement the present survey. The mean high

water line and topographic features are shown on the present survey for guidance purposes only. Revisions shown in red originate with the hydrographer. The official sources of topography are the latest topographic manuscripts referenced above except as superseded by present survey information shown in red on the smooth sheet.

2. Hydrography

- a. Depths at crossings are in good agreement.
- b. The usual depth curves are adequately delineated. A few brown supplemental curves were added to emphasize isolated shoal features.
- c. The development of the bottom configuration and the investigation of least depths are considered adequate.

3. Condition of Survey

The survey records, automated plotting, and the Descriptive Report are adequate and conform to the requirements of the Hydrographic Manual and the Instruction Manual - Automated Hydrographic Surveys with the exception that some control stations were not adequately described.

4. Junctions

The junction with H-9169 (1970) on the south is discussed in the review of that survey and requires no further consideration. Present depths are in general harmony with charted depths on the west where no contemporary surveys junction the present survey.

5. Comparison with Prior Surveys

H-5709	(1934-35)	1:20,000
H-5844	(1934-35)	1: 5,000
H-5845	(1935)	1: 5,000
H-5846	(1935)	1: 5,000
H-7076	(1945-46)	1: 1,200

These prior surveys cover the area of the present survey. A comparison between the present and prior surveys reveals a variable pattern of depth differences. Such depth differences range from areas of good agreement to scattered depth differences of as much as \pm 21 feet. The southern portion of the West Waterway has deepened by as much as 20 feet. Significant changes in topographic features are also noted, e.g., accretion of as much as approximately 450 meters in the northern portion of the present

survey area where extensive filling has been done. The noted depth and topographic differences are attributed to a combination of natural and cultural factors.

The piles and shoal strip charted in latitude $47^{\circ}35.27'$, longitude $122^{\circ}21.07'$ are shown on H-5846 as a portion of a shoal area. A comparison with the present survey reveals that the area has apparently been dredged. The area should be charted in accordance with the present survey.

Several significant items not considered disproved have been appropriately carried forward to supplement the present survey. With these additions, the present survey is adequate to supersede the prior surveys within the common area.

6. Comparison with Chart 6442, 6th Edition, February 2, 1974

a. Hydrography

The charted hydrography originates with the previously discussed prior surveys, which require no further consideration, with Corps of Engineers surveys and miscellaneous sources supplemented by the partial application of depths from the boat sheet of the present survey. Only minor differences are noted between the present survey and charted depths.

Various items indicated on Bp-89466 (1975) originate with miscellaneous sources subsequent to the date of the present survey. They are not verified or disproved by the present survey information and should be retained on the chart. In addition, charted soundings as well as secondary pier structures not shown on the present survey and which fall in the unsurveyed areas in proximity to piers 89-91 originate with miscellaneous contemporary and subsequent sources. Such features are not discredited by the present survey and should be retained as charted. (Reference Bp-89466 (1975).)

Attention is directed to the following:

(1) A drydock charted in the vicinity of latitude $47^{\circ}35.19'$, longitude $122^{\circ}21.69'$ should be relocated as shown on the present survey.

(2) A visible wreck shown on the present survey in the vicinity of latitude $47^{\circ}36.14'$, longitude $122^{\circ}20.20'$ was removed subsequent to the present survey per Chart Letter 1144 (1973). It should not be charted.

(3) The pier ruins formerly charted as extending from pier 43 in the vicinity of latitude $47^{\circ}35.77'$, longitude $122^{\circ}20.25'$ were carried

forward to supplement the present survey from T-12519 (1963-64). They were deleted from the chart subsequent to the date of the present survey on the authority of Chart Letter 1615 "D" (1971). Accordingly, the ruins should not be charted.

(4) The 24 charted in latitude $47^{\circ}35.32'$, longitude $122^{\circ}21.02'$ originates with the boat sheet of the present survey. It should be superseded by the smooth sheet depth of 27 feet.

(5) The following items are neither proved nor disproved by the present survey and should be revised as indicated:

(a) The pile charted in the vicinity of latitude $47^{\circ}36.06'$, longitude $122^{\circ}20.16'$ originates with Chart Letter 1225 (1964). It should be charted as a submerged pile.

(b) The two dolphins and submerged feature charted in the vicinity of latitude $47^{\circ}36.31'$, longitude $122^{\circ}20.42'$ originate with air photo revision Bp-98549 (1966). The dolphins should be revised to submerged dolphins on the chart.

(c) The three piles charted in the vicinity of latitude $47^{\circ}34.92'$, longitude $122^{\circ}21.62'$ originate with Bp-98549 (1966). They should be charted as submerged piles.

Except as noted above and in sections G and J of the Descriptive Report, the present survey is adequate to supersede the charted hydrography within the common area.

b. Controlling Depths

The only charted controlling depth note (vicinity of latitude $47^{\circ}35.30'$, longitude $122^{\circ}21.10'$) originates with Chart Letter 1519 (1973) subsequent to the date of the present survey and supersedes the present survey information.

c. Aids to Navigation

Several unofficial, privately maintained aids to navigation have not been charted; however, those charted are in substantial agreement with the positions shown on the present survey and adequately mark the intended features except that the light at latitude $47^{\circ}36.16'$, longitude $122^{\circ}20.35'$ was charted erroneously and should be located as shown on the present survey.

8. Compliance with Instructions

This survey adequately complies with the project instructions.

9. Additional Field Work

This survey is considered to be an adequate basic survey and no additional field work is recommended. However, during future work in the area, the existence of all items carried forward from prior surveys should be verified or disproved.

Examined and Approved:

R. H. Carstens
Acting Chief
Hydrographic Surveys Division

J. C. [Signature]
for Associate Director
Office of Marine Surveys
and Maps

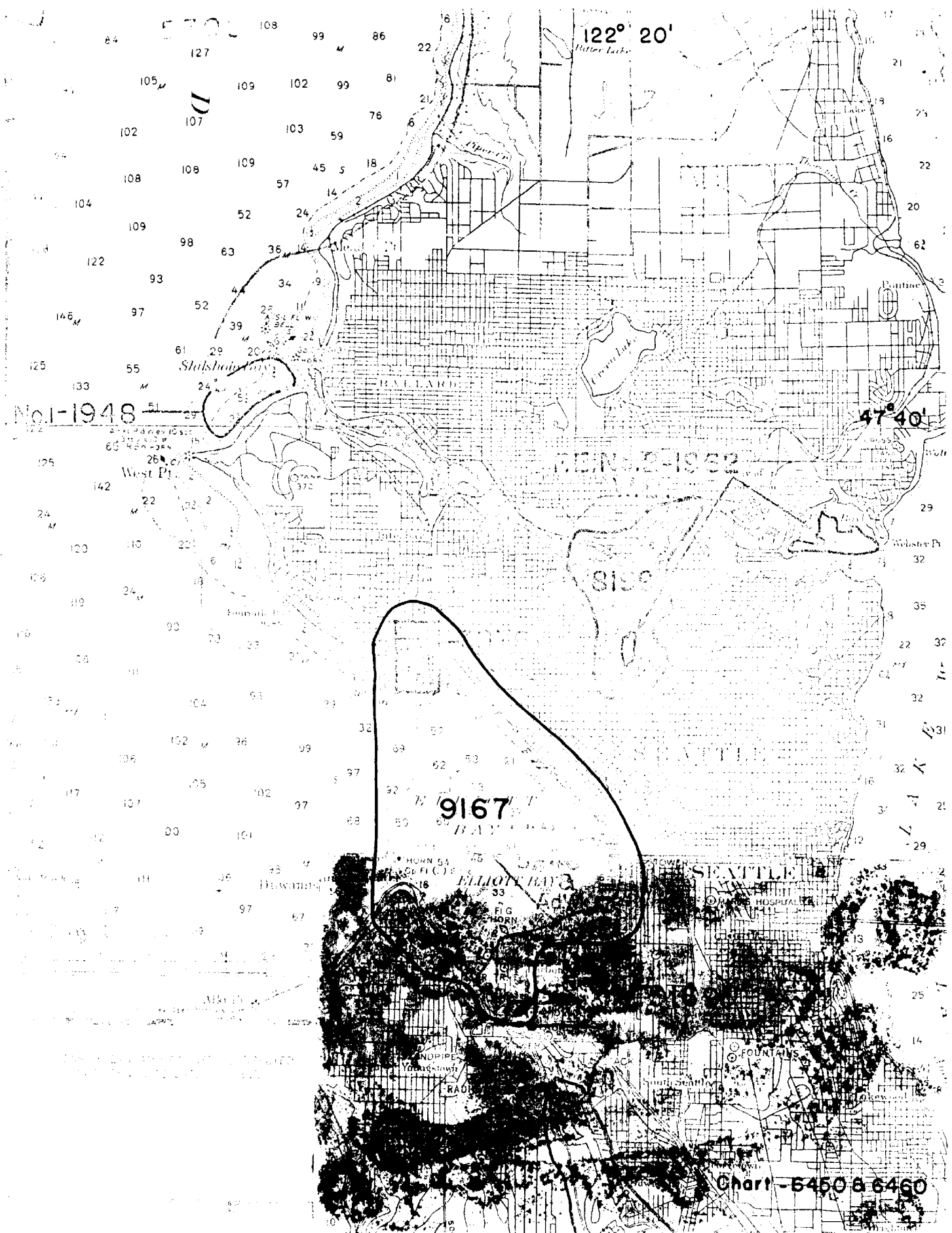
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9167

INSTRUCTIONS

- A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
 2. In "Remarks" column cross out words that do not apply.
 3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
6442	2-1-74	W. CHANDLER	Full Part Before After Verification ^{Before} Review Inspection Signed Via Drawing No.
^{A.B.} 18530	10-23-74	Ray Spence	Full Part Before After Verification ^{Before} Review Inspection Signed Via Drawing No.
6442	4/15/75	J Green	Full Part Before After Verification ^{Before} Review Inspection Signed Via Drawing No.
6446	10/12/75	P. Shuman	Full Part Before After Verification ^{Before} Review Inspection Signed Via Drawing No. Applied thru 6442 X Drawing
6450	12-3-75	B Hamilton	Full Part Before After Verification ^{Before} Review Inspection Signed Via Drawing No. Applied thru 6446
6401	6/18/76	A Cortis	Full Part Before After Verification ^{Before} Review Inspection Signed Via Drawing No. Appd thru 185-50 "A"
18450 (6442)	10/26/79	D.C. Larson 10-30-79AR	Full Part Before After Verification Review Inspection Signed Via Drawing No. 9
18445 (185)	10/26/79	D.C. Larson FA B 10-30-79AR	Full Part Before After Verification Review Inspection Signed Via Drawing No. 16
18440		G. Jemel 4-25-80BAS	Full Part- Before After Verification Review Inspection Signed Via Drawing No.
18441	7/80	Cortis 8-7-80-AR	Full Part Before After Verification Review Inspection Signed Via Drawing No. 49 (thru CT 18450)
18449	8/80	Cortis 8-7-80-KC1	FULL: after VER, REV, INSP. Dwg # 22 (thru CT 18450)
18474	1-84	D.C. Hopkins	Full After VER, Rev, INSP Dwg #1 Thru chart 18449, Applied Depth Carves thru Survey



122° 20'

47° 40'

No. 1-1948

NOV. 24-1952

9167

Chart - 6450 & 6460