FE359

Diagram No. 6450-3

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey ..... Hydrographic

Field No. DA-5-1-91

Registery No. FE-359

LOCALITY

State ..... Washington

General Locality ..... Lake Washington

Sublocality ..... Pontiac Bay

.....

19 91

CHIEF OF PARTY
CAPT T.W. Richards

LIBRARY & ARCHIVES

DATE ..... February 10, 1992

☆U.S. GOV. PRINTING OFFICE: 1985—566-054

FE359

WC/L

CHTS

18447 L

18441

18440

18003 NC

NOAA FORM 77-28 (11-72) | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HYDROGRAPHIC TITLE SHEET

REGISTER NO. FE-359

FIELD NO. DA-5-1-91

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

State: Washington

General locality: Lake Washington

Locality: Pontiac Bay

Scale: 1:5,000 Date of survey: February 7-28, 1991

Instructions dated: February 5, 1991 Project No.: S-N933-DA

Vessel: Launches RA-3(2123), RA-5(2125), & RA-6(2126)

Chief of party: CAPT Thomas W. Richards

Surveyed by: LT Cole, LT Waddell, LT Glang, LTJG Simmons, LTJG Lemke, LTJG Ward, ENS Johnson

Soundings taken by echo sounder, hand lead, pole: DSF-6000 echo sounder, Dives (plastic tape)

Graphic record scaled by: RAINIER Personnel

Graphic record checked by: RAINIER Personnel

Verification by: E. Domingo Automated plot by: PHS Xynetics Plotter

Evaluation by: B.A. Olmstead

Soundings in Meters and Decimeters at Lake Washington Water Level Datum (Low Water of the Lake)

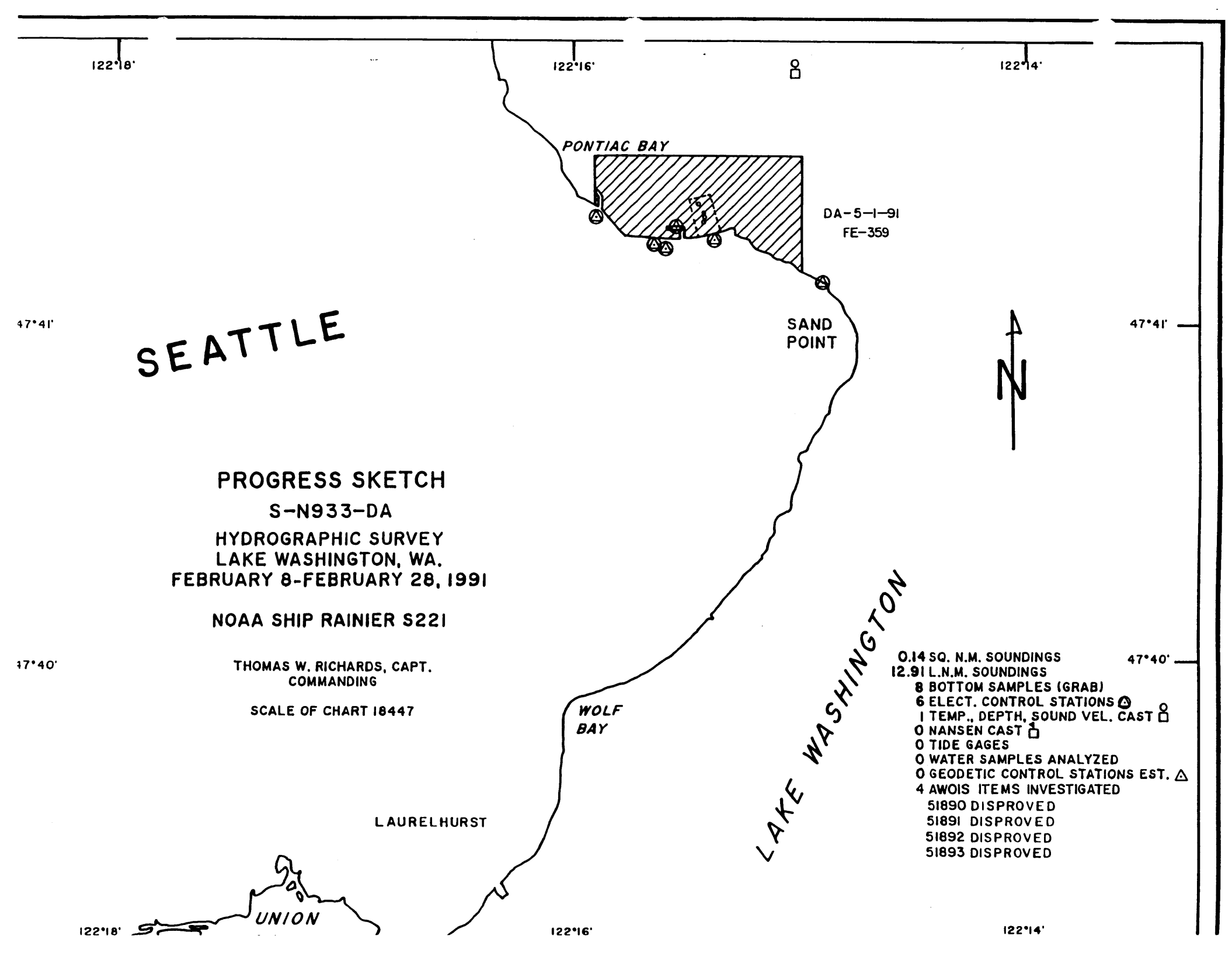
REMARKS: All times are in UTC. Revisions and marginal notes in black were generated during office processing. Some separates are filed with the hydrographic data, as a result page numbering may be interrupted or non-sequential.

AWOIS & SURF Check 3/25/92 mcR

K.W.W.

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

U.S. GOVERNMENT PRINTING OFFICE: 1986 - 652-007/41215


122°18'
122°16'
122°14'
PONTIAC BAY
DA-5-I-91
FE-359
47°41'
SEATTLE
SAND
POINT
N
PROGRESS SKETCH
S-N933-DA
HYDROGRAPHIC SURVEY
LAKE WASHINGTON, WA.
FEBRUARY 8-FEBRUARY 28, 1991
NOAA SHIP RAINIER S221
47°40'
THOMAS W. RICHARDS, CAPT.
COMMANDING
SCALE OF CHART 18447
WOLF
BAY
LAKE WASHINGTON
0.14 SQ. N.M. SOUNDINGS
12.91 L.N.M. SOUNDINGS
8 BOTTOM SAMPLES (GRAB)
6 ELECT. CONTROL STATIONS
1 TEMP., DEPTH, SOUND VEL. CAST
0 NANSEN CAST
0 TIDE GAGES
0 WATER SAMPLES ANALYZED
0 GEODETIC CONTROL STATIONS EST.
4 AWOIS ITEMS INVESTIGATED
51890 DISPROVED
51891 DISPROVED
51892 DISPROVED
51893 DISPROVED
LAURELHURST
UNION

Descriptive Report to Accompany Field Examination FE-359

Field Number DA-5-1-91
Scale 1:5,000
February 1991

NOAA Ships RAINIER/DAVIDSON
Chief of Party: Captain Thomas W. Richards/Commander David H. Peterson

A. PROJECT ✓

This field examination was completed in Seattle, Washington, as specified by Project Instructions S-N933-DA dated February 5, 1991 and Change 1 dated February 19, 1991.

This survey will provide contemporary hydrographic data for updating existing nautical charts detailing the Lake Washington area adjacent to NOAA's Sand Point Facility as well as the positions and/or existence of AWOIS items in the vicinity. In addition, this survey provided hydrographic training for NOAAS RAINIER and DAVIDSON personnel.

B. AREA SURVEYED – See Eval Report, Section 1

The survey is located in Lake Washington near Seattle, Washington, in the vicinity of NOAA's Sand Point Facility pier and its approaches. The survey is bounded on the south side by the shoreline. The survey limits extend north from the northeast corner of the Sand Point Navy pier to 47°41'30"N, then east along that parallel to 47°41'30"N, 122°15'00"W (NAD83). Data acquisition was conducted from February 7 to February 28, 1991 (DN 038 to 059).* Velocity cast was taken on DN 038. No hydrography was conducted until DN 039.

C. SURVEY VESSELS ✓

Data were acquired by the automated survey launches noted below:

Vessel	Vesno.	Operation
RA-3	2123 (launch used for training only)	Bottom Drag (Not included with the survey data)
RA-5	2125	Hydrography Bottom Samples SEACAT Cast Dive Operations (AWOIS 51891, 51893; Pos's 5216, 5218, 5176)
RA-6	2126	Hydrography (Positions 6000-6002) Bottom Drag Dive Operations (Positions 6003, 6005)

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

Data acquisition and processing were accomplished with Hewlett-Packard (HP) 340M workstations and the following HDAPS programs:

Program Name	Version	Date Installed
SURVEY	5.00	02-07-91
POSTSUR	5.00	02-07-91
PLOTALL	1.80	02-07-91
POINT	1.30	02-07-91
BACKUP	2.00	02-07-91
CONVERT	2.37	02-07-91
PRINTOUT	2.24	02-07-91
DIAGNOSTIC	2.70	02-07-91
INVERSE	1.22	02-07-91
INSTALL	2.00	02-07-91
BASELINE	1.03	02-07-91
QUICK	1.04	02-07-91
LISTAWOIS	1.20	02-07-91
LOADNEW	1.26	02-07-91
REJECT	1.00	02-07-91
CARTO	1.10	02-07-91
Vers	NA	02-07-91
BACKOLD	1.03	02-07-91
NEWCONT	1.01	02-07-91
DISC_UTIL	1.00	02-07-91
MB	0.00	02-07-91
HJ	0.00	02-07-91
AUTOST	1.00	02-07-91
GLOBAL	1.01	02-07-91
MAKEFIX	1.00	02-07-91
BIGABST	1.01	02-07-91
REAPPLY	1.01	02-07-91
PREDICT	1.00	02-07-91
READPROJS	1.04	02-07-91
SOFTCHECK	1.00	02-07-91

Velocity corrections were determined using:

Program Name	Version	Version Date
Velocity	1.11	3-09-90

E. SONAR EQUIPMENT ✓

Not applicable.

F. SOUNDING EQUIPMENT ✓

The survey launches were equipped with the Raytheon DSF-6000N echo sounders shown below. The echo sounders were operated in the HIGH + LOW (HIGH DIGITIZED) function, using manual gain controls on both high and low frequencies to obtain the best analog trace. Soundings were recorded in meters and tenths of meters. Six-meter bar checks were conducted and recorded daily using both the LOW and the HIGH + LOW (HIGH DIGITIZED) functions. The echo sounders were operated in accordance with the Provisional Instructions "Raytheon DSF-6000N Echo-Sounder Operating and Processing Instructions", dated July 5, 1983, and the Field Procedures Manual for Hydrographic Surveying (FPM).

Raytheon DSF-6000N Echo Sounder ✓

Vesno.	Serial No.	DN
2125	B048N ✓	038-046
2126	A114N ✓	058-059

The echo sounder was continuously monitored during data acquisition. All sounding data were scanned at least two times, not only to ensure all significant peaks were inserted, but also to verify the digitized depths.

G. CORRECTIONS TO ECHO SOUNDINGS ✓

Corrections to echo soundings were determined for velocity of sound through water, static draft, and settlement and squat. Sounding correctors apply to both narrow and wide beams of the DSF-6000N echo sounder. Supporting data and computations for all corrections to echo soundings are included in the separates* supplementing this report.

Sound Velocity ✓

Correctors for the velocity of sound through water were determined from the cast listed below:

Cast No.	Deepest Depth (m)	DN	Geographic Position
1	41.9	038	47°41'45"N, 122°15'00"W

Sound velocity correctors were acquired with a SEACAT SBE Profiler S/N 281, which was calibrated at the Northwest Regional Calibration Center in Bellevue, WA, on June 28, 1990.

Velocity correctors were computed using the PC program Velocity in accordance with Hydrographic Survey Guideline (HSG) #69. A printout of Velocity Table No. 1 used in the HDAPS Post Survey program is included with the separates* accompanying the survey data.

Static Draft ✓

For each launch, the distance from the transducer face to the gunwhale was measured with a large metal square. The static draft measurement was then determined by dropping a leadline from the gunwhale to the water and subtracting this distance from the distance measured with the square. The measurement from the gunwhale to the waterline was conducted with the fuel tanks averaging 3/4 full and three people aboard. A transducer depth of 0.6 meters was determined on February 13, 1991, in fresh water. This transducer depth agrees with the launch historical records. Concur

Settlement and Squat ✓

Settlement and squat correctors were determined for Vesno. 2125 in Lake Washington, WA on February 6, 1991 and for Vesno. 2126 on February 27, 1991.

* Separates are Filed in the Survey cahier.

The tests were conducted over a hard bottom in depths exceeding seven times each vessel's draft. Both sea and wind were calm. Observations were made through a Zeiss Ni2 leveling instrument (S/N 103453) to a rod held vertically on deck, directly over the transducer. Correctors were computed in accordance with Hydrographic Manual 4.9.4.2.

The following is a summary of all Offset Tables used on this survey and their applicable period:

Vesno.	Offset Table No.	Period used on line (DN)
2125	5	039-046
2126	61	058-059

Copies of these offset tables are included with the separates* supplementing this report.

Heave ✓

Not applicable.

Pneumatic Depth Gage ✓

Not applicable.

Bar Check Lines ✓

Bar check lines were calibrated by RAINIER personnel during January, 1991 at PMC. Calibration forms are included with the separates* supplementing this report.

Tide Correctors ✓

Tidal zoning and correctors were not applicable.

The Hiram M. Chittenden Locks water level gauge is a permanent installation, maintained by the Army Corp of Engineers, located at the northeast end of the locks. The locks project office was contacted prior to beginning each day's field operations to ensure the gauge was operating properly. Historical data for the water level gauge and the lake datum relationship to NGVD were provided by Mr. Peter Brooks, Army Corp of Engineers, Seattle District, office of operation. This information, along with an explanation of the lake datum's derivation are included in the appendicies* to this report.

The leveling records have been forwarded to N/OMA1212 in accordance with HSG 50 and FPM 4.3. Concur

H. CONTROL STATIONS

Geographic positions for all control stations are based on the North American Datum of 1983 (NAD83) and the Geodetic Reference System 1980 Ellipsoid. A listing of the geodetic stations used to control this survey is included in the appendicies.

Positions for all existing stations are available from N/CG2333. All existing stations were recovered in accordance with methods stated in Section 5.2.4 of the Field Procedures

* Separates are filed in the survey cabier.

Manual. New stations were positioned via traverse methods to meet Third-Order, Class I standards. Further information can be found in the Horizontal Control Report performed by the January 1991 Horizontal Control Training Class, Pacific Hydrographic Section (PHS), Gary Fredrick, party chief. A copy of the report is included in the appendicies.

I. HYDROGRAPHIC POSITION CONTROL

Soundings, bottom samples, and detached positions were located using the Motorola Mini-Ranger Falcon 484 microwave positioning system in multiple-range mode.

Accuracy requirements stated in FPM 3.1.3.1 were generally met. When maximum residuals exceeded the specified limits, OIC's deselected the station(s) with the highest residual. On occasion, ECR's and maximum residuals persistently exceeded the specified limits. This data was generally rejected and re-run with different control.

Hydrography collected close inshore often occurred with one or more LOP's blocked, resulting in high ECR's and/or maximum residuals. In these cases, OIC's generally annotated the raw master printout. If the data plotted on track and sounding intervals appeared correct, the data was retained.* Some hydrography was acquired with only two LOP's because stations were blocked or deselected. In these cases, only ECR values were monitored to assure data acquisition requirements, as stated in FPM 3.1.3.1, were met.
* Reference Section 4, Eval Report concerning positions plotting in error.
All baseline calibrations were conducted in accordance with FPM 3.1.2.1 and 3.1.3.2. From February 4 to February 6, 1991 (DN 035-DN 037), calibrations were conducted over a measured range of 1058.0 meters from MAGNUSON BASELINE 0 to MAGNUSON BASELINE 1058 at the Magnuson Park Calibration line. Calibration data and the baseline description are included with the survey data separates.**

System checks for multiple LOP hydrography were conducted in accordance with FPM 3.1.3.3.

* Separates are filed in the survey cahier.

J. SHORELINE – See Eval Report, section 2.

Shoreline verification was conducted in accordance with FPM 7.1 and the project instructions. Shoreline support data for Lake Washington were provided as a copy of the NOS chart 18447, 23rd edition, September 30, 1989, 1:25,000 scale (NAD 83), referred to in the Project Instructions.

A 1:5,000-scale enlargement of NOS chart 18447 was used to transfer shoreline detail to the final field sheets.

Shoreline verification and disprovals are addressed in Section M of this report and as follows. Shoreline changes* were noted adjacent to the Navy pier, south to MONUMENT 26 USN, 1945 and east of PIER, 1987 to 47°41'15.0"N 122°15'15.0"W (NAD83). These changes are noted in red, dashed lines on the final field sheet.* Two specific areas of revised shoreline have been delineated on the smooth sheet in red dashed lines without supporting positional information as portrayed from the final field sheet.

K. CROSSLINES ✓

A total of 1.1 nautical miles of crosslines were run perpendicular to mainscheme lines, representing 11.4% of the mainscheme hydrography; this percentage doesn't reflect additional 25 meter splits run during AWOIS investigations. Crossline soundings agree to within one meter with mainscheme soundings in all areas.

** Separates are Filed in the Survey Cahier.

~~additional 25 meter splits run during AWOIS investigations. Crossline soundings agree to within one meter with mainscheme soundings in all areas.~~ Reference previous paragraph.

L. JUNCTIONS - See Eval Report, section 5

Not applicable.

M. COMPARISON WITH PRIOR SURVEYS - See Eval Report, section 6

This survey was compared to the following prior survey:

H-9742 (1:10,000; 1978):

Dredging operations and local construction in 1980 aided in altering the shoreline from its 1978 position. During this period, soundings were also changed from the H-9742 values.

Soundings agree to within two meters where dredging wasn't a factor. Differences in Water Level Datums and Velocity correctors between prior and present surveys account for approximately one meter.

N. COMPARISON WITH THE CHART - See Eval Report, section 7

This survey was compared to NOS Chart 18447, 23rd Edition, September 30, 1989, 1:25,000 (NAD83). A 1:5,000-scale enlargement of H-9742 was used to clarify AWOIS positions.

AWOIS Items - See Eval Report, section 7 for further discussion of AWOIS item 51893.

Four AWOIS items originating from H-9742 lie in the survey limits and are discussed below. The charted positions were converted from NAD27 to NAD83 using NADCON version 1.01. All AWOIS items originate from miscellaneous sources.

1. AWOIS #51890 is a submerged ~~ruin~~ obstruction charted at 47°41'10.60"N, 122°15'00.64"W (NAD83). A visual inspection of the area (DN 044, Vesno. 2125) revealed the remnants of an old pier face. The pilings start at Pos. No. 5101* and run northwest in a straight line for 10 meters. A D.P. was taken on the southeastern most pile which was awash. The northwestern most pile was 0.5 meter below the surface. Position 5101 is a pile awash. There was no detached position taken on the northwestern most pile.

Recommendation: Retain the submerged ruin charted at 47°41'~~10.60~~10.57"N, 122°~~15'00.64~~14'59.87"W (NAD83), and label as "submerged". Do not concur. Chart pier ruins as shown on the smooth sheet.

2. AWOIS #51891 is a submerged pile charted at 47°41'19.20"N, 122°15'25.20"W (NAD83). Diver investigations performed three, 30-meter radius circle searches (DN 044, Vesno. 2125). D.P.s 5176, 5216, and 5217 were taken to mark the centers of the search patterns. No pile or other obstruction was found on the flat, silty bottom.

Recommendation: Delete the submerged pile charted at 47°41'19.20"N, 122°15'25.20"W (NAD83). Concur

3. AWOIS #51892 is a submerged runway* charted with dashed lines extending 700 feet seaward from shore and 200 feet in both directions from an axis running from the position 47°41'20.00"N, 122°15'25.00"W (NAD83). The diver investigations from AWOIS #51891 and #51893 revealed no runway or obstructions within a 30-meter radius circle search around the stated position on a flat, silty bottom. An echo sounding search was

* Feature originates from a Department of Navy, "General Development Plan" extending the runway 700 feet north into the lake.

also conducted with 25-meter line spacing, extending over 50 meters past the limits given in the item history, again revealing no runway or other obstruction.

Recommendation: Delete the dash lines ~~delineating~~ delineating the charted runway centered at 47°41'20.00"N, 122°15'25.00"W (NAD83). Concur

4. AWOIS #51893 is one submerged pile and three abandoned runway approach lights* charted at 47°41'20.05"N, 122°15'25.15"W (NAD83). A diver investigation (DN 044, Vesno. 2125) revealed no pile, lights, or other obstruction within a 30-meter radius circle search around the stated position on a flat, silty bottom. D.P. 5218 was used to center the search radius.* Subsequently shown as submerged piles after US Power Squadron revealed no visible structures in 1980.

Recommendation: Delete the piles charted at 47°41'20.05"N, 122°15'25.15"W (NAD83). Subm centrally Do not concur Reference Eval Report, Section 7. Chart this area as shown on the present survey.

Dangers to Navigation

While performing bottom drag operations, an obstruction was discovered. A diver investigation (DN 059, Vesno. 212~~5~~8) revealed a submerged runway light and its associated debris. The hydrographer believes when the runway lights from AWOIS #51893 were removed, they were taken to deeper water and disposed of. A copy of the Danger to Navigation Report* is included in the appendicies. * Subsequently retracted on April 8, 1991. Bottom drag operations conducted by either launch 2123 or 2126 hung on an obstruction approximately 60 meters NE of the most offshore charted submerged dolphin. Dives were conducted at positions 6003 and 6005.

Comparison of Soundings

A comparison between the survey and the 1:5,000-scale enlargement of NOS chart 18447 shows agreement within one* meter. * Dredging operations associated with NOAA's Staging Pier reflect an increase of depths up to seven meters upon removal of bottom material. Reference, Section M, Comparison with Prior Surveys.

O. ADEQUACY OF SURVEY

This survey is adequate to supersede prior survey H-9742 for charting in the common area. H-9742 is not the source of charted information. As such, FE-359 is adequate to supersede prior survey H-2608 and H-9742 for charting in the common area.

P. AIDS TO NAVIGATION - See Eval Report, section 4 and section 7

There are no floating aids to navigation within the limits of this survey. Concur

There are two charted, non-floating, privately maintained aids to navigation which lie in limits of this survey. These lights are located on the northwest and northeast corner of the NOAA Sand Point pier and were positioned to Third Order, Class I specifications in 1983. PHS's field positions were compared to the charted positions. Comparisons are shown below:

Charted (Scale from chart 18447) (NAD 83)	Survey (1983 Survey positions) (NAD83)
Northwest Corner Light	
47°41'17.20"N, 122°15'~~25~~35.10"W	47°41'17.~~16~~119"N, 122°15'~~31.34~~34.994"W
Northeast Corner Light	
47°41'17.20"N, 122°15'29.10"W	47°41'17.~~12~~164"N, 122°15'~~34.99~~31.343"W

There are no bridges, overhead cables, or overhead pipelines within the limits of this survey. Concur

A comparison of the two Fixed aids charted and survey positions showed good agreement. NOAA Form 76-40 with revised positional information supplements this report.

Q. STATISTICS ✓

Vessel:	2125	2126	Total
# of Pos	~~240~~ 200	~~46~~ 40	~~286~~ 240
NM of Hydro	9.6	2.2	11.8
Days of Prod.	6.0	1.2	7.2

NM^2 Hydrography	0.14	Velocity Casts	1
Detached Positions	13	Tide Stations	0
Bottom Samples	9	Current/Magnetic Stations	0

R. MISCELLANEOUS ✓

No currents were observed within this survey's limits.

Bottom samples were not submitted to the Smithsonian Institution.

S. RECOMMENDATIONS ✓

None.

T. REFERRAL TO REPORTS ✓

The following supplemental reports contain additional information relevant to this survey:

Title	Date Sent to N/CG245
Coast Pilot Report	March, 1991
User Evaluation Report	March, 1991

Respectfully Submitted,

Steven A. Lemke
Lieutenant (j.g.), NOAA

Approved and Forwarded,

Thomas W. Richards
Captain, NOAA
Commanding Officer

NAD 83

HORIZONTAL CONTROL TRAINING CLASS 1991

LIST OF GEOGRAPHIC POSITIONS

	STATION NAME	GPN CODE K	LATITUDE DEG MN SEC	LONGITUDE DEG MN SEC	G-NBR
5	AVIATION 2 1982	9	47 41 8.44227	122 14 56.80417	
30	AVIATION 2 1982 RM 7				
35	AVIATION 2 1982 RM 8				
22	BERTH HAVEN	9	47 41 12.22711	122 15 12.14789	
12	DIVE	5	47 41 14.16438	122 15 36.06442	
34	DIVE MINIRANGER	5	47 41 14.18466	122 15 36.03357	
23	MAGGIE	9	47 41 1.18206	122 15 23.62466	
6	MAGNUSON ECC	9	47 40 56.72787	122 15 1.83338	
18	MAGNUSON 2	9	47 40 56.16712	122 14 56.56960	
16	MONUMENT 26 USN 1945	9	47 41 20.39726	122 15 52.96262	
11	NOAA FLAGPOLE	9	47 41 11.08114	122 15 25.91359	
19	NORIX	9	47 41 14.38615	122 15 14.34507	
14	PIER	9	47 41 17.14223	122 15 32.84645	
27	PIER NE OUTSIDE CORNER	5	47 41 17.18813	122 15 31.25251	
31	PIER NW INSIDE CORNER	5	47 41 16.69652	122 15 31.93254	
33	PIER NW OUTSIDE CORNER	5	47 41 17.14121	122 15 35.01871	
28	PIER SE OUTSIDE CORNER	5	47 41 15.26610	122 15 31.28169	
29	PIER SW INSIDE CORNER	5	47 41 15.24244	122 15 31.90827	
32	PIER SW OUTSIDE CORNER	5	47 41 16.68420	122 15 35.00779	
21	PMEL MAGNETIC STATION	9	47 41 13.28681	122 15 15.73096	
	PMEL WIND SHEAR TOWER	9	47 41 7.27735	122 15 3.35958	
	REFLECTION	9	47 41 10.22961	122 15 5.99788	
13	RUNWAY	9	47 41 6.59159	122 15 31.58192	
17	SAINT EDWARDS SEMINARY TANK	9	47 43 42.42621	122 15 7.54670	
20	SAND POINT	9	47 41 7.99336	122 15 34.08762	
1	SAND POINT BASELINE 0	9	47 40 26.19629	122 15 6.20990	
4	SAND POINT BASELINE 1058	9	47 40 59.72714	122 15 16.63852	
2	SAND POINT BASELINE 150	9	47 40 30.94885	122 15 7.68730	
3	SAND POINT BASELINE 430	9	47 40 39.82290	122 15 10.44327	
26	SOUND	9	47 41 2.46748	122 15 4.42063	
15	TIDAL	9	47 41 14.66904	122 15 38.59072	
10	VIEWPOINT	9	47 41 16.86041	122 15 22.05443	
7	WASC NO 1	5	47 41 11.69149	122 15 25.91344	
8	WASC NO 3	5	47 41 9.79293	122 15 19.28423	
9	WASC NO 4	5	47 41 7.87886	122 15 13.78187	

NOAA FORM 76-40
(8-74)

Replaces C&GS Form 567.

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY
- [X] HYDROGRAPHIC PARTY
- [ ] GEODETIC PARTY
- [ ] PHOTO FIELD PARTY
- [ ] COMPILATION ACTIVITY
- [ ] FINAL REVIEWER
- [ ] QUALITY CONTROL & REVIEW GRP.
- [ ] COAST PILOT BRANCH

(See reverse for responsible personnel)

- [ ] TO BE CHARTED
- [X] TO BE REVISED
- [ ] TO BE DELETED

REPORTING UNIT (Field Party, Ship or Office)	STATE	LOCALITY	DATE
NOAA Ship RAINIER	WASHINGTON	LAKE WASHINGTON	3/11/91

The following objects HAVE [X] HAVE NOT [ ] been inspected from seaward to determine their value as landmarks.

OPR PROJECT NO.	JOB NUMBER	SURVEY NUMBER	DATUM
S-N933-DA	N/A	FE-359 DA-5-1-91	NAD 83

CHARTING NAME	DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses)	POSITION LATITUDE ° ′	POSITION LATITUDE ″ D.M. ~~Metres~~	POSITION LONGITUDE ° ′	POSITION LONGITUDE ″ D.D. ~~Metres~~	METHOD AND DATE OF LOCATION (See instructions on reverse side) OFFICE	METHOD AND DATE OF LOCATION FIELD	CHARTS AFFECTED
F R Lt Priv maintd	LAKE WASHINGTON NOAA PIER E LT	47°41'	17.164 ✓	122°15'	31.343 ✓		V-2-6-L 11/2/83	18447
F R Lt Priv maintd	LAKE WASHINGTON NOAA PIER W LT	47°41'	17.119 ✓	122°15'	34.994 ✓		V-2-6-L 11/2/83	18447

RESPONSIBLE PERSONNEL

TYPE OF ACTION	NAME	ORIGINATOR
OBJECTS INSPECTED FROM SEAWARD	CAPT. Thomas W. Richards	☐ PHOTO FIELD PARTY ☒ HYDROGRAPHIC PARTY ☐ GEODETIC PARTY ☐ OTHER *(Specify)*
POSITIONS DETERMINED AND/OR VERIFIED		FIELD ACTIVITY REPRESENTATIVE
		OFFICE ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		☐ REVIEWER ☐ QUALITY CONTROL AND REVIEW GROUP REPRESENTATIVE

INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'

(Consult Photogrammetric Instructions No. 64,

OFFICE

I. OFFICE IDENTIFIED AND LOCATED OBJECTS

Enter the number and date (including month, day, and year) of the photograph used to identify and locate the object.

EXAMPLE: 75E(C)6042
8-12-75

FIELD

I. NEW POSITION DETERMINED OR VERIFIED

Enter the applicable data by symbols as follows:

F - Field	P - Photogrammetric
L - Located	Vis - Visually
V - Verified	
1 - Triangulation	5 - Field identified
2 - Traverse	6 - Theodolite
3 - Intersection	7 - Planetable
4 - Resection	8 - Sextant

A. Field positions* require entry of method of location and date of field work.

EXAMPLE: F-2-6-L
8-12-75

*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.

FIELD (Cont'd)

B. Photogrammetric field positions** require entry of method of location or verification, date of field work and number of the photograph used to locate or identify the object.

EXAMPLE: P-8-V
8-12-75
74L(C)2982

II. TRIANGULATION STATION RECOVERED

When a landmark or aid which is also a triangulation station is recovered, enter 'Triang. Rec.' with date of recovery.

EXAMPLE: Triang. Rec.
8-12-75

III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH

Enter 'V-Vis.' and date.

EXAMPLE: V-Vis.
8-12-75

**PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.

☆ U.S.GPO:1975-0-665-080/1155

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
Seattle, Washington 98115-0070

NOAA Ship RAINIER S331
1801 Fairview Ave. East
Seattle, Washington 98102-3767

11 March 1991

Commander
Thirteenth Coast Guard District
Federal Building
915 Second Avenue
Seattle, WA. 98174-1067

Dear Sir:

Attached is information regarding a danger to navigation which I recommend for inclusion in the Local Notice to Mariners for the Thirteenth Coast Guard District. A copy of the chart showing the area in which the danger exists is also attached.

Sincerely,

Thomas W. Richards
Captain, NOAA
Commanding Officer

Enclosures

cc: N/CG221
PMC

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: FE-359
Survey Title: State: Washington
Locality: Lake Washington
Project Number: S-N933-DA, NOAA Ship RAINIER

The following item was discovered during data acquisition of hydrographic survey FE-359.

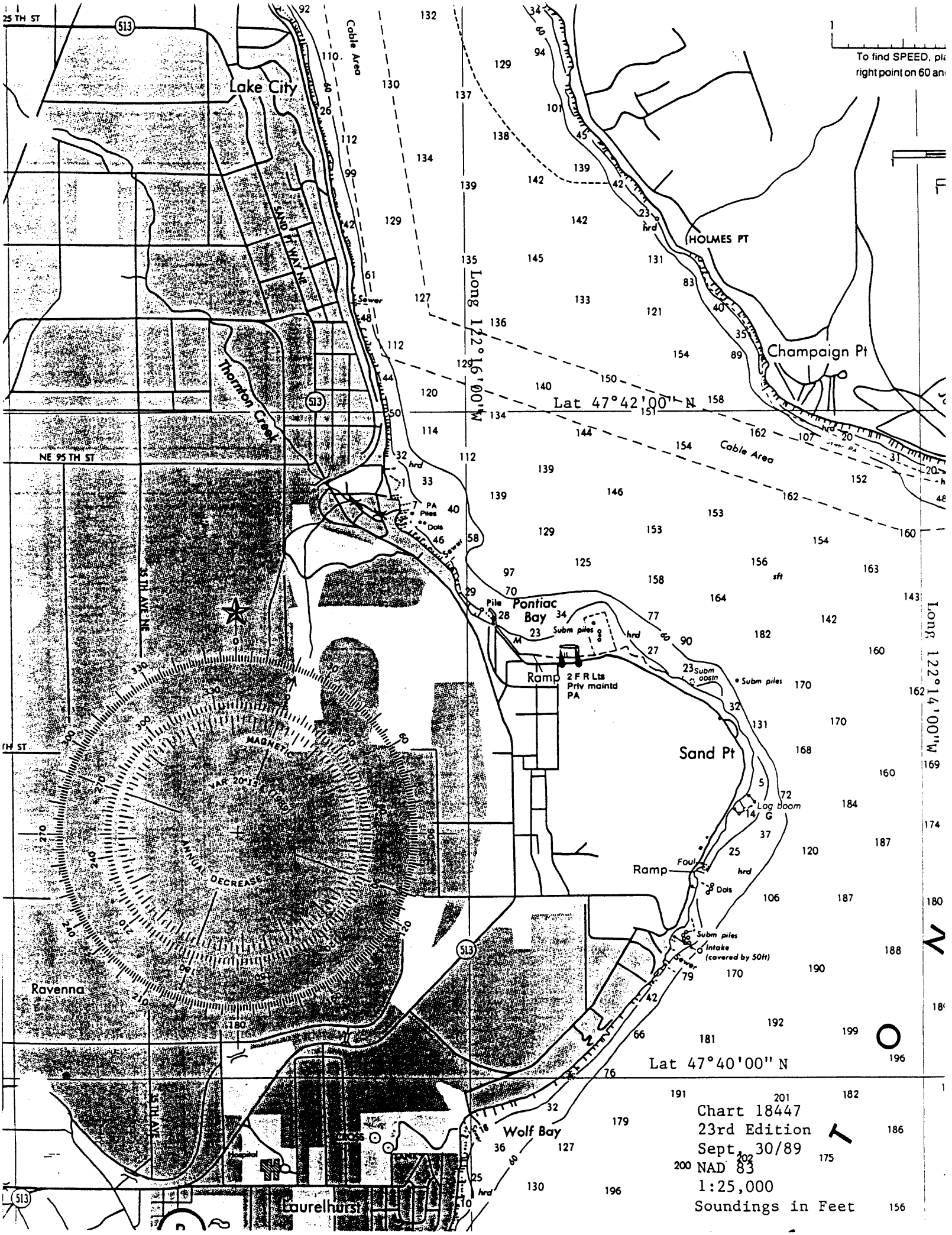
Object discovered: One obstruction corrected to Low Water of the Lake that could be hazardous to surface towed equipment.

Affected nautical chart:

CHART NUMBER	EDITION NO.	EDITION DATE	REPORTED DEPTH	CHARTED HORIZ DATUM	GEOGRAPHIC POSTION LATITUDE(N)	GEOGRAPHIC POSTION LONGITUDE(W)
18447	23rd	9/30/89	53.0 Ft.*	NAD 83	47/41/22.95	122/15/23.08

* Position 6003, DN 59, 15.9 meters excessed.

Questions concerning this report should be directed to the Pacific Hydrographic Section at (206) 526-6853.


Lake City
Cable Area
SAND PT WAY NE
Thornton Creek
NE 95TH ST
35TH AVE NE
Long 122°16'00"W
Lat 47°42'00" N
HOLMES PT
Champaign Pt
Cable Area
Pontiac Bay
Ramp
2 F R Lts
Priv maintd
PA
Sand Pt
Log boom
Ramp
Foul
Subm piles
Intake
(covered by 50ft)
Sewer
MAGNETIC
VAR 20°15' E (2000)
ANNUAL DECREASE
Ravenna
Wolf Bay
Lat 47°40'00" N
Long 122°14'00"W
Chart 18447
23rd Edition
Sept 30/89
NAD 83
1:25,000
Soundings in Feet

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
Seattle, Washington 98115-0070

NOAA, NOS, N/CG245
Pacific Hydrographic Section
BIN C15700, Bldg. 3
Seattle, Washington 98115-0070

28 March 1991

Commander
Thirteenth Coast Guard District
Federal Building
915 Second Avenue
Seattle, WA. 98174-1067

Dear Sir:

Attached is information regarding a danger to navigation which I recommend for inclusion in the Local Notice to Mariners for the Thirteenth Coast Guard District. This information was recovered during office review and found to be 18 meters west of a danger reported by NOAA Ship RAINIER on 11 March 1991. A copy of the chart showing the area in which the danger exists is also attached.

Sincerely,

Pam Chelgren-Koterba
Commander, NOAA
Chief, Pacific Hydrographic Section

Enclosures

cc: N/CG221

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: FE-359
Survey Title: State: Washington
Locality: Lake Washington
Project Number: S-N933-DA, NOAA Ship RAINIER

The following item was discovered during data acquisition of hydrographic survey FE-359.

Object discovered: One obstruction corrected to Low Water of the Lake that could be hazardous to surface towed equipment.

Affected nautical chart:

CHART NUMBER	EDITION NO.	DATE	REPORTED DEPTH	CHARTED HORIZ DATUM	GEOGRAPHIC POSTION LATITUDE(N)	LONGITUDE(W)
18447	23rd	9/30/89	46.9 Ft*	NAD 83	47/41/22.87	122/15/23.92

*Position 6005, DN 59, 14.2 meters Submerged obstruction.

Questions concerning this report should be directed to the Pacific Hydrographic Section at (206) 526-6853.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
Seattle, Washington 98115-0070

NOAA, NOS, N/CG245
Pacific Hydrographic Section
BIN C15700, Bldg. 3
Seattle, Washington 98115-0070

8 April 1991

Commander
Thirteenth Coast Guard District
Federal Building
915 Second Avenue
Seattle, WA. 98174-1067

Dear Sir:

I wish to retract the dangers to navigation reported to you by NOAA Ship RAINIER on 11 March 1991 and the Pacific Hydrographic Section on 28 March 1991. Attached is information concerning these dangers' reported depths and positions. Though these reported dangers are shoaler than their surrounding surveyed area, further office review has found them within the 30 foot charted contour. A revision to chart 18447 is scheduled for 1991 and will reflect changes noted during hydrographic survey FE-359.

Sincerely,

Pamela Chelgren-Koterba
Commander, NOAA
Chief, Pacific Hydrographic Section

Enclosures

cc: N/CG221

REPORTED DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: FE-359
Survey Title: State: Washington
Locality: Lake Washington
Project Number: S-N933-DA, NOAA Ship RAINIER

The following items should be retracted from the dangers to navigation reported.

Affected nautical chart: 18447

CHART NUMBER	EDITION NO.	DATE	REPORTED DEPTH	CHARTED HORIZ DATUM	GEOGRAPHIC POSTION LATITUDE(N)	LONGITUDE(W)	
18447	23rd	9/30/89	53.0 Ft.	NAD 83	47/41/22.95 ✓	122/15/23.08 ✓	Pos# 6003
18447	23rd	9/30/89	46.9 FT	NAD 83	47/41/22.87 ✓	122/15/23.92 ✓	Pos# 6005

Questions concerning this report should be directed to the Pacific Hydrographic Section at (206) 526-6853.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
Seattle, Washington 98115-0070

NOAA, NOS, N/CG245
Pacific Hydrographic Section
BIN C15700, Bldg. 3
Seattle, Washington 98115-0070

28 March 1991

Commander
Thirteenth Coast Guard District
Federal Building
915 Second Avenue
Seattle, WA. 98174-1067

Dear Sir:

Attached is information regarding the position of Light List number 18290 "NOAA PIER CLEARANCE LIGHTS" on page 188 of the U.S. Coast Guard Light List, Volume VI, 1990 Edition. This information was recovered during office review and I recommend that it be included in the Local Notice to Mariners for the Thirteenth Coast Guard District. Copies of the chart showing the area in which the danger exists along with NOAA Form 76-40 describing each light's character and position are also attached. Should there be any questions please contact Lieutenant James E. Waddell, Jr. at (206) 526-6854.

Sincerely,

For Pam Chelgren-Koterba
Commander, NOAA
Chief, Pacific Hydrographic Section

Enclosures

cc: N/CG22

FEBRUARY 1991
COAST PILOT REPORT
LAKE WASHINGTON, WASHINGTON

In February of 1991 personnel from NOAA Ship's RAINIER and DAVIDSON conducted Coast Pilot observations in Lake Washington's Pontiac Bay in conjuction with hydrographic survey operations assigned under Project Instructions S-N933-DA. As a result of these surveys and discussion with local authorities, the following changes to the Coast Pilot (Volume 7, 25th Ed., 1989) are recommended. Daily water level readings were obtained from the Corps of Engineers' lake level gauge at the Hiram M. Chittenden Locks, Seattle, Washington. Survey depths were corrected to low water of the lakes. Chart 18447, 23rd Ed., Sept. 30/89 was used for comparison purposes.

1. Page 300.-Line 10/R; read: "...Point on the W shore of the lake 2.3 miles NE of Union Bay.

The National Oceanic and Atmospheric Administration's pier, ajoining the NW portion of their property, is for the use of their own vessels. It has a 262-foot face, and in 1991, the corrected depths were 30 feet along both its outside and inside edges."

Respectfully Submitted,

James E. Waddell, Jr.
Lieutenant, NOAA

Approved and Forwarded,

Thomas W. Richards
Captain, NOAA
Commanding Officer

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
Seattle, Washington 98115-0070

NOAA Ship RAINIER
1801 Fairview Avenue East
Seattle, Washington
98102

11 March 1991

MEMORANDUM FOR: LCDR. Maureen Kenny, NOAA
Chief, Operations Section

FROM: CAPT. Thomas W. Richards, NOAA
Commanding Officer, NOAA Ship RAINIER

SUBJECT: User Evaluation for survey S-N933-DA

The Pacific Hydrographic Section was not cognizant of any desired changes to the existing chart. They have suggested that the User Evaluation portion of this survey be deferred to them as part of their ongoing public relations. This decision was in mind of their office being in close proximity to the survey area.

APPROVAL SHEET

for

FE-359

Standard procedures were followed in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and the Field Procedures Manual in producing this survey. The data were examined daily during data acquisition and processing.

The field sheet and accompanying records have been examined by me, are considered complete and adequate for charting purposes, and are approved.

Thomas W. Richards
Captain, NOAA
Commanding Officer

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Rockville, Maryland 20852

ORIGINAL

July 19, 1991

MEMORANDUM FOR: Dennis Hill
Pacific Hydrographic Section
Chief, Hydrographic Unit

FROM: Briah K. Connor
Tidal Datums Quality Assurance Section,
Chief, Hydrographic and Marine Boundary Unit

SUBJECT: Approved Water levels and datums for Hydrography Project S-N933-DA-1991 Lake Washington, Washington

Lake Washington is not Tidal. The chart datum for Lake Washington is "Washington Lake Low Water Datum (WLLWD)", which is 20 feet above "Hiram M. Chittenden Locks Datum (HCLD)". Neither WLLWD or HCLD are tidal datums, both are fixed datums. This is based on documentation from the U.S. Army COE and verified by telephone on 7/17/91 with Lawrence Signani and Larry Markle of the Seattle COE Office. They also verified that the water level gauge and staff at the Hiram M. Chittenden Locks, which were used for water level control of February 1991 survey, are relative to HCLD.
Therefore, to refer the hydrographic soundings from the February 1991 survey in Lake Washington to chart datum, subtract 20 feet from the water level observations at the Chittenden Locks gauge. These corrections are to be applied to the hydrographic soundings. It is recommended that vertical datum information on NOAA Nautical Chart #18447, LAKE WASHINGTON SHIP CANAL AND LAKE WASHINGTON be corrected as indicated:

"SOUNDINGS IN FEET"
Below the Locks: at Mean Lower Low Water

above the locks: at WASHINGTON LAKE LOW WATER DATUM which is 20 FEET above HIRAM M. CHITTENDEN LOCKS DATUM

"HEIGHTS"
Vertical clearances above the locks are referenced to MEAN LAKE LEVEL which is 21 FEET above HIRAM M. CHITTENDEN LOCKS DATUM

Vertical clearances for the bridge and cable at the Burlington Northern R.R. Bridge (47°40', 122°24') are referenced to LAKE WASHINGTON ORDINARY HIGH WATER which is 21.85 FEET above HIRAM M. CHITTENDEN LOCKS DATUM

NPD Form 1959 14 Hydrologic Data Page #23

DRAFT ORIGINAL

Project Lake Washington (values noted through March 1 will appear on year's end final sheet) Comp.

Subject Lake Elevation ~ 1991 Chkd.

--- Locks ---783-7001 (0800 hours) Date:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	20.00	20.00	20.37										1
2	20.01	20.00											2
3	20.00	20.00											3
4	20.00	20.00											4
5	20.00	20.00											5
6	20.00	20.00											6
7	20.00	20.02											7
8	20.00	20.00											8
9	20.00	20.00											9
10	20.00	20.00											10
11	20.00	20.00											11
12	20.00	20.00											12
13	20.00	20.00											13
14	20.00	20.00											14
15	20.00	20.00											15
16	20.00	20.05											16
17	20.00	20.08											17
18	20.00	20.10											18
19	20.00	20.09											19
20	20.00	20.16											20
21	20.00	20.17											21
22	20.00	20.17											22
23	20.00	20.22											23
24	20.00	20.25											24
25	20.00	20.28											25
26	20.00	20.3											26
27	20.00	20.32											27
28	20.00	20.35											28
29	20.00	X											29
30	20.00	X											30
31	20.00	X		X		X			X		X		31

ORIGINAL

JUL 24 1991

JCS

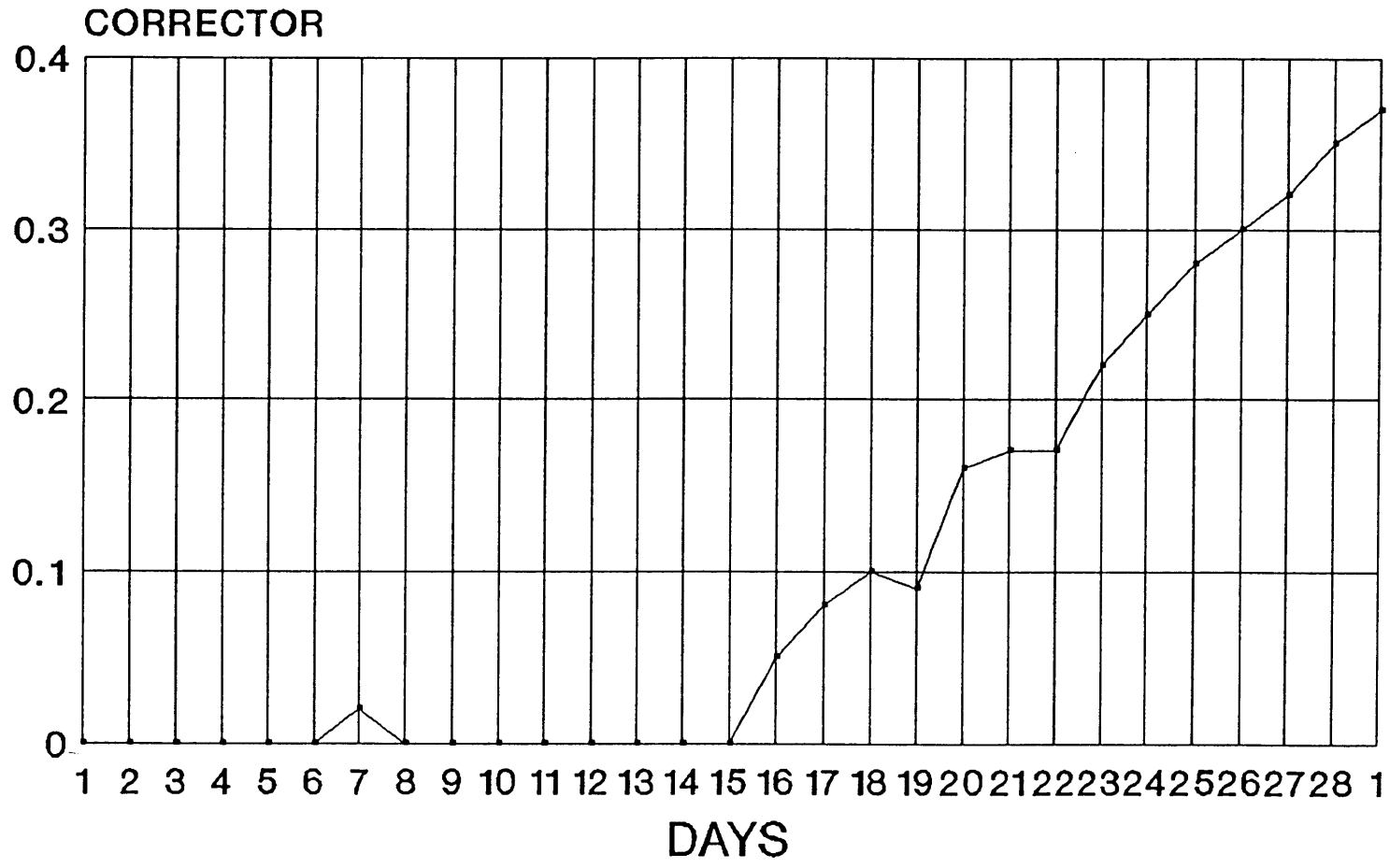
WATER LEVEL CORRECTORS FE-359 MONTH OF FEBRUARY
CORRECTOR IS -20.00 FEET

DAYS	GAGE HT.	CORRECTOR TO BE APPLIED	
1	20.00	0.00	
2	20.00	0.00	
3	20.00	0.00	
4	20.00	0.00	
5	20.00	0.00	
6	20.00	0.00	
7	20.02	0.02	
8	20.00	0.00	
9	20.00	0.00	
10	20.00	0.00	
11	20.00	0.00	
12	20.00	0.00	
13	20.00	0.00	
14	20.00	0.00	
15	20.00	0.00	
16	20.05	0.05	
17	20.08	0.08	
18	20.10	0.10	
19	20.09	0.09	7/24/91 A CHANGE FROM N/OAM1230
20	20.16	0.16	
21	20.17	0.17	
22	20.17	0.17	
23	20.22	0.22	
24	20.25	0.25	
25	20.28	0.28	
26	20.30	0.30	
27	20.32	0.32	
28	20.35	0.35	
MAR 1	20.37	0.37	

JUL 24 1991

FE-359

LAKE LEVEL CORRECTORS FEB-MAR



ORIGINAL

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

FE-359

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO.	B ON PREVIOUS SURVEY NO.	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	
LAKE WASHINGTON	18447									1
PONTIAC BAY	18447									2
SAND POINT	18447									3
WASHINGTON (title)	18447									4
										5
										6
										7
										8
										9
										10
										11
										12
										13
				Approved:						14
										15
				Charles E. Harrington						16
				Chief Geographer - N/CG2x5						17
				SEP 11 1991						18
										19
										20
										21
										22
										23
										24
										25

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 77-27(H)
(9-83)

U.S. DEPARTMENT OF COMMERCE

HYDROGRAPHIC SURVEY STATISTICS

REGISTRY NUMBER
FE-359

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET (Page Size)	1	SMOOTH OVERLAYS: POS., ARC, EXCESS	6
DESCRIPTIVE REPORT	1	FIELD SHEETS AND OTHER OVERLAYS	5

DESCRIPTION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS	
ACCORDION FILES	1					
ENVELOPES						
VOLUMES						
CAHIERS						
BOXES						

SHORELINE DATA

SHORELINE MAPS (List): NA

PHOTOBATHYMETRIC MAPS (List): NA

NOTES TO THE HYDROGRAPHER (List): NA

SPECIAL REPORTS (List):

NAUTICAL CHARTS (List):

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS		
	VERIFICATION	*EVALUATION*	*TOTALS*
POSITIONS ON SHEET			240
POSITIONS REVISED		2	2
SOUNDINGS REVISED	14		14
CONTROL STATIONS REVISED			
	TIME-HOURS		
	VERIFICATION	*EVALUATION*	*TOTALS*
PRE-PROCESSING EXAMINATION			
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS	28		28
VERIFICATION OF SOUNDINGS	42		42
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	29		29
COMPARISON WITH PRIOR SURVEYS AND CHARTS		2	2
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		71	71
GEOGRAPHIC NAMES			
OTHER*			
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS	99	73	172

Pre-processing Examination by M. Brown	*Beginning Date* 3/15/91	*Ending Date* 4/11/91
Verification of Field Data by E. Domingo	*Time (Hours)* 99	*Ending Date* 9/4/91
Verification Check by S. Otsubo, B.A. Olmstead	*Time (Hours)* 11	*Ending Date* 9/13/91
Evaluation and Analysis by B.A. Olmstead	*Time (Hours)* 60	*Ending Date* 12/3/91
Inspection by D. Hill	*Time (Hours)* 3	*Ending Date* 1/15/92

EVALUATION REPORT

FE-359

1. INTRODUCTION

Survey FE-359 is a field examination accomplished by the NOAA Ships RAINIER and DAVIDSON under the following Project Instructions.

S-N933-DA, dated February 5, 1991
CHANGE NO. 1, dated February 19, 1991

Survey FE-359 was conducted by personnel of the NOAA Ships RAINIER and DAVIDSON during February of 1991. The purpose of this survey was to provide contemporary hydrographic data around NOAA's Sand Point facility and to train personnel in survey operations. Change No. 1, dated February 19, 1991 revised the project to S-N933-DA. However, the three launches used to conduct this survey were assigned to the NOAA Ship RAINIER.

This survey occurred in the State of Washington and encompasses that portion of Lake Washington around Sand Point. Specifically, this area includes Pontiac Bay and vicinity, to include the area around the NOAA staging pier. The surveyed limits extend from latitude 47/41/10N to latitude 47/41/32N and longitude 122/15/00W to longitude 122/15/56W. The survey area is characterized by a small sheltered bay (exception being inclement weather from the north), surrounded by relatively flat approaches to the shoreline. NOAA's Western Administrative Support Center and the Naval Station Puget Sound reside on the southern side of Pontiac Bay. The bottom consists primarily of fine sand and brown mud. Depths range from 1.3 to 48 meters.

The Corps of Engineers water level gauge for the Hiram M. Chittenden Locks was used for the vertical datum determination for this survey. The field sheet tide correctors were determined by subtracting 20.57 feet from the daily water level observations at the Hiram M. Chittenden Locks gauge. The smooth sheet tide correctors were determined by subtracting 20 feet from that guage, to correct the observed values to WASHINGTON LAKE LOW WATER, which is 20 feet above HIRAM M. CHITTENDEN LOCKS DATUM, according to the attached Tidal Datums Quality Assurance Section letter, Approved Water Levels and Datums for Hydrographic Project S-N933-DA-1991, Lake Washington, Washington, July 19, 1991. Of historical note, the following information is provided. Although Lake Washington is not tidal, during the middle part of February the annual process of raising the water levels is begun and is gradually increased by 1.5 feet on May 1. The water level is lowered each Fall to minimize winter storm damage to lakeside property.

The field sheet parameters have been revised to center the hydrography on the smooth sheet and to change the projection to polyconic. The TRA, sound velocity and electronic control correctors are adequate. An accompanying computer printout contains the parameters and the correctors.

A digital file has been generated for this survey as required by Hydrographic Survey Guideline No. 52, Standard Digital Data Exchange Format, April 15, 1986. Certain descriptive information, however, may not be in the digital record due to the restrictions of the presently available cartographic codes. The user should refer to the smooth sheet for complete information.

2. CONTROL AND SHORELINE

Sections H and I of the hydrographer's report contain adequate discussions of horizontal control and hydrographic positioning. Additional detailed information on horizontal control is located in the Horizontal Control Report included with the separates.

Positions of horizontal control stations used during hydrography are published and 1991 field values based on NAD 83. These values were used during office processing for the computation of postions. The smooth sheet and accompanying overlays are annotated with NAD 27 adjustment ticks based on values determined with the NGS program NADCON. Geographic positions based on NAD 27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections.

Latitude: -.646 seconds (-19.950 meters)
Longitude: 4.452 seconds (92.805 meters)

The year of establishment of control stations shown on the smooth sheet originates with the NGS listing and the Horizontal Control Report for this project.

The quality of several positions exceeds limits in terms of error circle radius and residual. A review of the data, however, indicates that none of these fixes are used to position dangers to navigation. The features or soundings located by these fixes are consistent with the surrounding data and are considered acceptable with the following exceptions; 5190 9th out to 5192 and 6009. Positions 5190 9th out to 5192 and 6009 have been rejected during office processing. Reference Section 4, Condition of Survey, for additional information.

As there are no contemporary shoreline maps within the area of this field examination, shoreline from Chart 18447, 23rd Ed., September 30, 1989 has been shown in brown on the field examination. Prior photogrammetric source data for the chart originates with NANCI(1983), TP-00646(1977-78), TP-00650(1977-78) and old blueprints. There are three specific areas where revisions to the charted shoreline have been made:

a.) The shoreline change, centered at latitude 47/41/23N, longitude 122/15/54W, is along the face of a naval pier. This revision is depicted on the field examination in dashed red from the field sheet without supporting positional information.

b.) The four corners of the NOAA staging pier were located during horizontal control and used to draw the pier. The two finger piers located inshore of the staging pier were positioned hydrographically. These features have been transferred to the field examination in red from the final field sheet.

c.) A portion of the mean high water line measuring approximately 250 meters in length has been revised east of the NOAA staging pier; latitude 47/41/16N, longitude 122/15/16W to longitude 122/15/28W. This area has been shown in dashed red from the final field sheet without supporting positional information.

These revisions are considered adequate to supersede the charted shoreline within the common areas. However, it is recommended that the shoreline around Sand Point and Pontiac Bay be recompiled from current photography.

3. HYDROGRAPHY

With the exceptions noted in this report, hydrography is adequate to:

a. delineate the bottom configuration, determine least depths, and draw the standard depth curves;

b. reveal there are no significant discrepancies or anomalies requiring further investigation; and

c. show the survey was properly controlled and soundings are correctly plotted.

In addition, the following are noted; the survey area inshore of the two meter depth curve was not sounded. Here, the bottom configuration, least depths and standard depth curves could not be portrayed. Several soundings plotted along the NOAA staging pier and have been offset from the pier face to improve legibility.

4. CONDITION OF SURVEY

The hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, and the Field Procedures Manual, April 1990 Edition, except as follows.

Third Order Class I positions for the privately maintained NOAA pier clearance lights, were obtained in 1983 and subsequently verified during this field examination. However, the hydrographer failed to graphically portray these fixed aids on the final field sheet. The location, description, and observed light characteristics of each fixed aid shall be entered in the hydrographic records. Reference the Field Procedures Manual, Figure 6.1, Section P., Aids to Navigation.

The hydrographer should have included a difference in meters between the charted PA and the 1983 surveyed positions of the east and west NOAA pier clearance lights. In addition, a statement by the hydrographer should have been included as to whether the aids adequately serve the apparent purpose for which they were established. Reference that section of the Field Procedures Manual as noted above.

Project instructions specified that the inshore limit of sounding is the 1-meter depth curve. However, this field examination generally provides no survey coverage inside of the two meter depth curve. The hydrographer does not provide any justification as to this deficiency which prevented the portrayal of the standard 1-meter and most of the 2-meter depth curves. Reference the Project Instructions, Section 1.8, Scope.

Due to the following deficiencies, AWOIS item 51893 remains partially unresolved; (1) the two northernmost submerged piles were not included within the 30 meter radius dive conducted on DN 045, detached position 5218, (2) although the bottom drag conducted on DN 059, positions 6000-6002, was run between the two northernmost submerged piles, there was no documentation as to drag coverage and effective depths. Reference the Field Procedures Manual, Figure 6.1, Descriptive Report Checkoff List, Sections C, F, and M.

A list of the control stations used to control the survey and calibrate hydrographic positioning for the survey was included in the descriptive report. However, the stations not applying to the survey were not crossed out or the stations applying underlined. Reference the Field Procedures Manual, descriptive report appendices, item III, List of Horizontal Control Stations.

Positions 5190 9th out to 5192 and 6009 plot in error. The raw data reflects that these lines were run in areas of weak geometry and poor control. At the above positions, depths of 1.4 and 1.9 meters plot in surrounding depths exceeding seven meters. Track plots should be reviewed to determine their consistency and viability. If unrealistic accelerations or along track spacing appears unrealistic, the data must be further analyzed. Reference the HDAPS Users Manual, page 2.26, Computation of Vessel Position, identification and treatment of problem positioning data.

A comparison with the prior survey should discuss general trends such as shoaling or deepening that have occurred in the survey area. Give conclusions or opinions as to the reasons for significant differences. In addition, significant changes in the shoreline should be accounted for in a like quantifiable manner discussing degree of accretion or erosion. Reference the FPM Figure 6.1, Section M, Comparison with Prior Surveys.

5. JUNCTIONS

There are no contemporary junction surveys. Charted soundings and depth curves within the common areas reveal adequate agreement in depths greater than 18 meters. However, larger discrepancies up to seven meters, with depths and charted contours are readily evident inside of ten meters. These differences can be attributed to the different vertical datums for the charted soundings and recent dredging activities. Reference Section 6, Comparison with Prior Surveys, concerning discrepancies with vertical datums.

6. COMPARISON WITH PRIOR SURVEYS

H-2608 (1902) 1:10,000

Survey H-2608 was superseded upon final field processing and subsequent office review of H-9742 during 1978-79. However, the present chart still reflects sounding information from this older prior survey. The descriptive report for H-9742 should be referenced for further information concerning comparisons and noted depth differences with survey H-2608. A copy of the applicable page is attached.

H-9742 (1978) 1:10,000

A comparison with prior survey H-9742 reveals that present depths are generally shoaler by 1-2 meters throughout the common area. Approximately one meter of this change is due to a combination of dissimilar water level datums and velocity correctors. However, inshore of the ten meter depth curve from latitude 47/41/23N, longitude 122/15/22W to longitude 122/15/42W, present soundings are 2-7 meters deeper. This is attributed largely to the dredging and construction of the NOAA staging pier and associated facilities. In conjunction with dredging activities and pier construction, the shoreline from latitude 47/41/16N, longitude 122/15/16W to longitude 122/15/28W, has been altered approximately 20-40 meters. This shift of the mean high water line reflects both a movement inshore and offshore due to fill and cut activities since 1978.

The following features plotted on survey H-9742 were not investigated or inadequately resolved by the hydrographer. These features have been brought forward to this survey and shown as listed.

Feature/Sounding	Latitude(N)	Longitude(W)	AWOIS
subm dolphin	47/41/25	122/15/55.5	
subm dolphin	47/41/24.5	122/15/54	
subm pile	47/41/21	122/15/26	51893
subm pile	47/41/22	122/15/25	51893

There are no AWOIS items originating from prior survey H-9742 applicable to the present survey. However, the charted submerged piles defined as AWOIS 51893, were shown as visible during 1978 survey operations. As the 1978 positioning is the best available, these features have been transferred to the field examination from survey H-9742 as shown above.

With the transfer of the features noted above, survey FE-359 is adequate to supersede the prior surveys for the area of common coverage.

7. COMPARISON WITH CHART

Chart 18447, 23rd edition, dated Sept. 30, 1989; scale 1:25,000

a. Hydrography

Charted hydrography originates with prior survey H-2608 (1902) and miscellaneous sources and requires no further discussion except as noted; the ramp charted at latitude 47/41/16N, longitude 122/15/42W, and the pier charted at 47/41/12N, longitude 122/15/04W, were not addressed by the hydrographer and should be retained on the chart.

With the exception of those items listed above, survey FE-359 is adequate to supersede charted hydrography within the common area.

b. AWOIS

All AWOIS items originate with miscellaneous sources. Refer to the hydrographer's report for discussion and disposition of these features, supplemented as follows.

The investigation of AWOIS item 51893 is inadequate. The dive conducted on DN 045, position 5218, a thirty meter radius circle search, did not include the two northernmost submerged piles. Although a bottom drag was conducted running through the center of this item (positions 6000-6002), documentation of sweep coverage and drag depth was not provided. The two northernmost submerged piles should remain charted and shown as depicted on the field examination. Reference Section 6, Comparison with Prior Surveys.

c. Controlling Depths

There are no Federal or privately maintained channels within the survey area. However, this field examination does provide updated depth information for vessels accessing the NOAA staging pier.

d. Aids to Navigation

Two privately maintained fixed aids mark the east and west corners of the NOAA staging pier. These fixed aids were initially located in 1983 using Third Order Class I methods and verified during survey operations. These features continue to serve their intended purpose. There are no floating aids that fall within this field examination.

e. Geographic Names

Names appearing on the smooth sheet and in the survey title have been approved by the Chief Geographer.

f. Dangers to Navigation

One danger to navigation was generated during the survey. During office review, a shoaler depth was found and reported 18 meters west of a danger reported by the NOAA Ship RAINIER. Both dangers to navigation were subsequently retracted during further office review. Copies of these reports are attached.

8. COMPLIANCE WITH INSTRUCTIONS

Survey FE-359 adequately complies with the Project Instructions except as noted in Secton 4 of this report.

9. ADDITIONAL FIELD WORK

This is a good field examination. Additional work to resolve AWOIS item 51893, the two submerged dolphins transferred from survey H-9742, and the pier and ramp as noted in Section 7, should be assigned on a low priority basis. In addition, shoreline should be recompiled from current photography.

Bruce A. Olmstead
Bruce A. Olmstead
Senior Cartographer

K. COMPARISON WITH PRIOR SURVEYS

There are two prior surveys (H-9337 and H-2608) for the project area, the most recent being H-9337, 1971, 1:10,000. Comparisons were made where current soundings overlaid soundings from the 1971 survey. Approximately 55% of all soundings agree exactly. Thirty-five percent of the current survey's soundings are 1-3 feet shoaler than the 1971 survey. Areas of greatest disagreement are on rapidly sloping bottom, and even in those areas, maximum differences are less than three feet in ninety percent of the comparisons.

There was a large "void" in the previous survey just north of Sand Point in which no comparisons could be made. This area was surveyed with forty-five meter spacing. No significant features were found.

In general, discrepancies in soundings between the 1971 and current survey can be attributed to the lack of sounding reduction on the 1971 survey. H-9337 has never been verified and it has been learned that the 1971 survey has not been corrected for sound velocity or trace initial (1971 survey used a Raytheon 723) and that incorrect figures were used in the reduction to mean lake level. It is interesting to note that while field work done on H-9337 was of such poor quality that it was not worth the effort to verify this survey, we were required to compare with it.

A comparison was also made to the other survey of this area: H-2608, 1902, 1:10,000. H-2608 has two projections displayed, neither of which appears to be the NA, 1927 datum. A sounding datum problem also exists. The original soundings were based on a mean lake level of 3.66 feet. Later in 1921 the Division of Tides and Currents added a note to the survey that soundings could be reduced to mean lake level by subtracting 8.5 feet. It is doubtful that this is the same mean lake level that the Army Corps of Engineers uses at the present time. Based on a best fit of the two surveys, 95% of all soundings of the current survey were one to four feet shoaler than the 1902 survey. No major discrepancies were noted.

There were no presurvey review items contained within the limits of this survey.

L. COMPARISON WITH THE CHART

The largest scale chart of the area is Lake Washington Ship

APPROVAL SHEET
FE-359

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproval of charted data. The digital data have been completed and all revisions and processing have been entered in the magnetic tape record for this survey. Final control, position, and sounding printouts have been made and are included with the survey records. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

for _____ Date: 1/15/92
Dennis J. Hill
Chief, Hydrographic Processing Unit
Pacific Hydrographic Section

I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

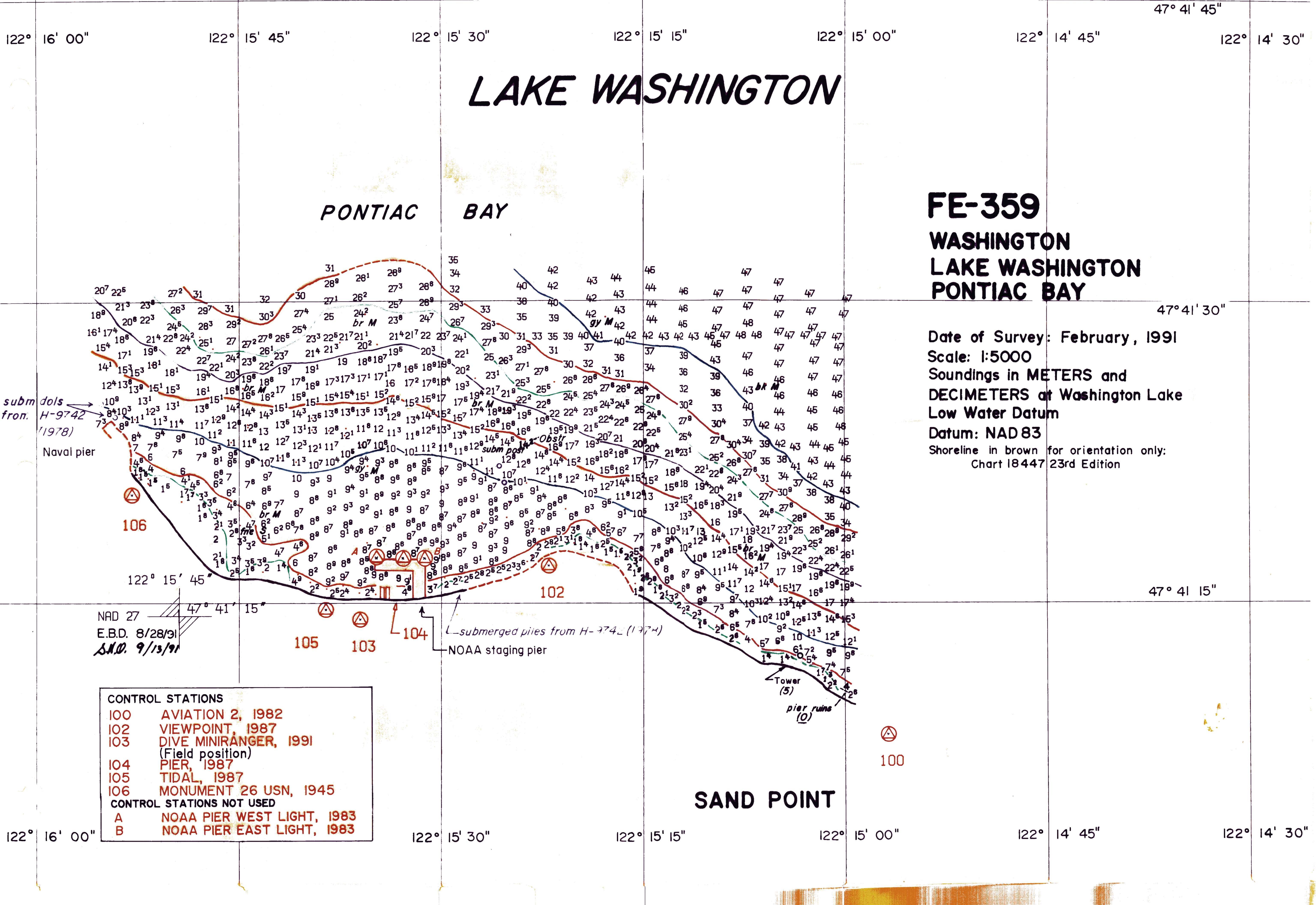
_____ Date: 1/17/92
Commander Douglas G. Hennick, NOAA
Chief, Pacific Hydrographic Section

****

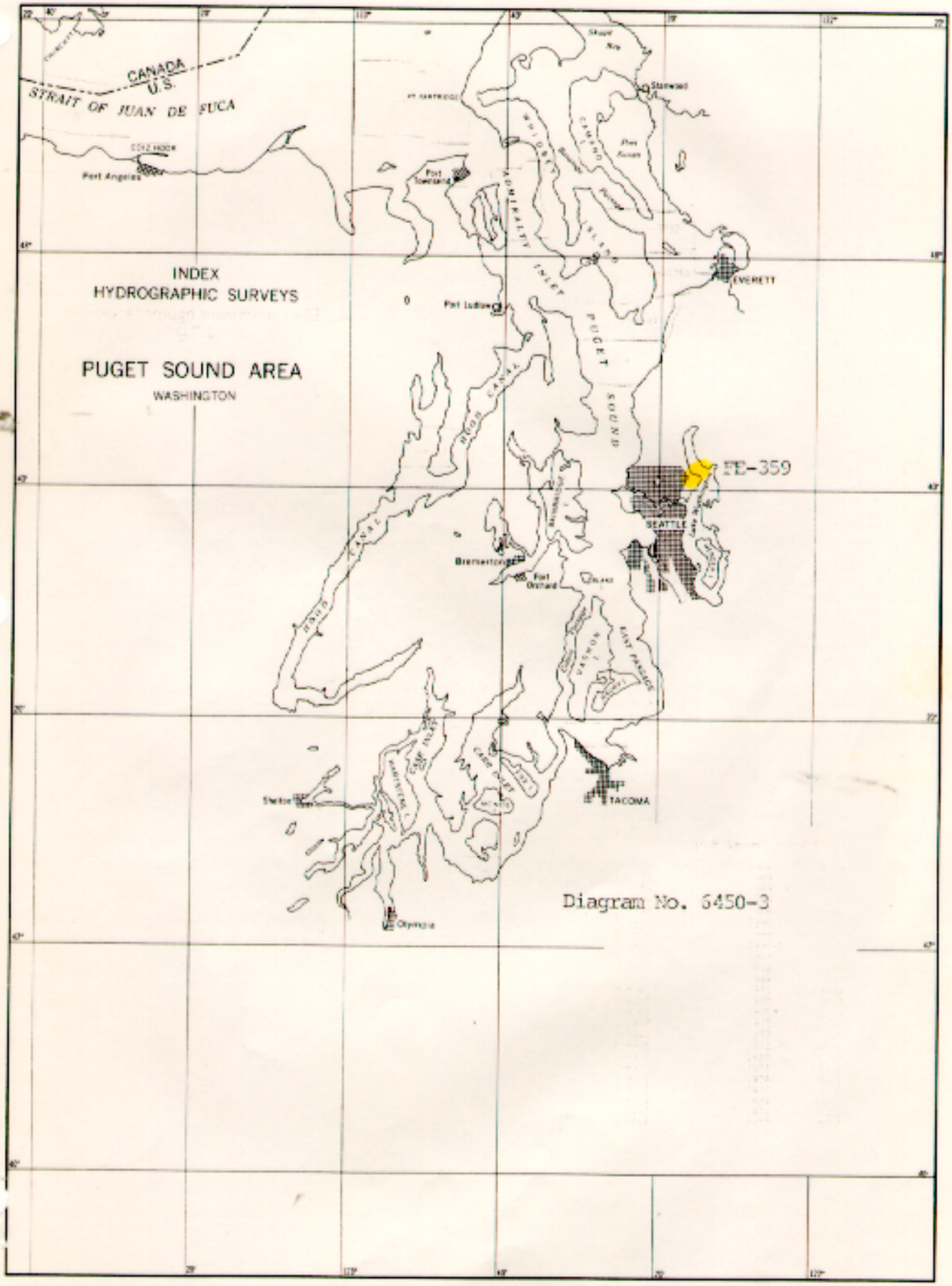
Final Approval

Approved:

_____ Date: 12-6-94
J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic Survey


LAKE WASHINGTON
PONTIAC BAY
FE-359
WASHINGTON
LAKE WASHINGTON
PONTIAC BAY
Date of Survey: February, 1991
Scale: 1:5000
Soundings in METERS and DECIMETERS at Washington Lake Low Water Datum
Datum: NAD 83
Shoreline in brown for orientation only: Chart 18447 23rd Edition
subm dols from H-9742 (1978)
Naval pier
submerged piles from H-9742 (1978)
NOAA staging pier
Tower (5)
pier ruins (0)
NAD 27
E.B.D. 8/28/91
S.A.D. 9/13/91
SAND POINT
CONTROL STATIONS
100 AVIATION 2, 1982
102 VIEWPOINT, 1987
103 DIVE MINIRANGER, 1991 (Field position)
104 PIER, 1987
105 TIDAL, 1987
106 MONUMENT 26 USN, 1945
CONTROL STATIONS NOT USED
A NOAA PIER WEST LIGHT, 1983
B NOAA PIER EAST LIGHT, 1983
122° 16' 00"
122° 15' 45"
122° 15' 30"
122° 15' 15"
122° 15' 00"
122° 14' 45"
122° 14' 30"
47° 41' 45"
47° 41' 30"
47° 41' 15"

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey
Rockville, Maryland



NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. FE-359

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
18441	3/26/91	Stanley Osubo	~~Full~~ ~~Part~~ ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. Examined, No corrections Appl'd.
18003	3/26/91	Stanley Osubo	~~Full~~ Part ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. Examined, No corrections Appl'd.
18447	4/29/91	AHUSCEN	~~Full~~ Part Before ~~After~~ Marine Center Approval Signed Via Partial application of
			Drawing No. sndgs. from field sheet.
18007	5/21/91	AHUSCEN	~~Full~~ Part Before ~~After~~ Marine Center Approval Signed Via EXAMINED. No
			Drawing No. CORRECTIONS APPLIED.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. FE-359

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
18441	3/26/91	Stanley Otsubo	~~Full~~ Part ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. Examined, No corrections Appl'd.
18003	3/26/91	Stanley Otsubo	~~Full~~ Part ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. Examined, No Corrections Appl'd.
18447(B)	4-1-91	B. Stewart	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. ~~#35 Appl. thru LNM's 12-14/91~~ [illegible]
			~~[illegible] Applied #35 dwg #35.~~
18441	10-6-92	R. Elliott	Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No. 57
			No Corr. RE
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.