

FE236

Diagram 6450-2

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic Field Examination.
Field No. DA-5-1-78
Office No. FE-236

LOCALITY

State Washington
General Locality Seattle
Locality Lake Union & Lake Washington
Ship Canal
19 81
CHIEF OF PARTY
CDR. N. C. Austin

LIBRARY & ARCHIVES

DATE January 26, 1982

☆U.S. GOV. PRINTING OFFICE: 1980-766-230

Plea 5

CHT.

-18447 A&B App 11/10/68

FE236

LMM

HYDROGRAPHIC TITLE SHEET

FE-0236

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

FIELD NO.

DA-5-1-78

State Washington

General locality Seattle

Locality Lake Union and Lake Washington Ship Canal

Scale 1:5,000 Date of survey Mar. 16, 26; May 18, 1981

Instructions dated Aug. 18, 1980 Project No. S-N916-PMC-80

Vessel NOAA Ship DAVIDSON, Launches DA-1, DA-2 (3131, 3132)

Chief of party CDR. Ned C. Austin, COMDG.

Surveyed by LTJG. D.R. Herlihy, ENS. N.M. Bogue, LTJG D.I. Actor, LTJG. S. J. Konrad, ST. D.M. Lake, ST. K.M. Jangard, AB. L. Caston, OS. D. Arnold

Soundings taken by echo sounder, hand lead, pole Echo Sounder, Sounding Pole

Graphic record scaled by Ship's Personnel

Graphic record checked by Ship's Personnel

Protracted by N/A Automated plot by PMC Xynetics Plotter

Verification by Gordon E. Kay

Soundings in ~~XXXX~~ feet at ~~XXXX~~ ~~XXXX~~ Lake Level which is 20 ft. above MLLW Seattle, Washington

REMARKS: Time Zone: GMT

Velocity corrections included in TRA for shoal investigation off Webster Pt.

Misc. data culled from the D.R. are filed with the survey records

STANDARDS CHECKED

11-12-82. *C. Long*

DESCRIPTIVE REPORT TO ACCOMPANY
FIELD EXAMINATIONS, LAKE UNION AND LAKE WASHINGTON
SHIP CANAL, WASHINGTON (S-N916-PMC-80)

A. PROJECT

Three field examinations were conducted in accordance with project instructions S-N916-PMC-80, dated 18 August 1980, as amended by Change No. 1, dated 21 November 1980.

The items were investigated to acquire additional information for hydrographic survey H-9747 (1978), Lake Union and Lake Washington Ship Canal, Washington. These were a sunken wreck in the south end of Lake Union, a submerged pile in the north end of Lake Union, and a 4 - foot sounding near Webster Point, at the east end of the Lake Washington Ship Canal.

Sections B through R of the Descriptive Report will be presented separately for each item.

SUNKEN WRECK, LAKE UNION, WA

B. AREA SURVEYED

The area surveyed was described in the project instructions as, "...a dangerous sunken wreck, position approximate at latitude 47°37'37.8"N, longitude 122°20'13.8"W,...", and is in the south-west extremity of Lake Union, Wa.

The wreck was investigated and described by DAVIDSON personnel on 16 March 1981 (J.D. 075).

C. SOUNDING VESSEL

DAVIDSON launch DA-1 (EDP No. 3131) was used as a diving platform and to obtain a visual (sextant) fix. No soundings were made with electronic equipment on the launch.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

No echo-sounding equipment was used during the wreck investigation. The least depth was determined by measuring a taut line from the shoalest point on the wreck to a float on the surface. Accuracy was ensured by having a diver at the surface and a diver at the wreck to make sure the line was taut and vertical when it was marked.

Depths were reduced to low water datum (LWD), 20.⁶⁴/₀ feet above MLLW, by obtaining the lake level by telephone from the US Army Corps of Engineers lake level gage at the Hiram Chittenden Locks. The lake level on 16 March 1981 was 20.79 feet, hence a corrector of -0.²/₈ feet was applied to the least

depth observed.

E. HYDROGRAPHIC SHEETS

Not applicable.

F. CONTROL STATIONS

No control was established, monumented, or described for this wreck investigation. Four intersections stations were recovered to obtain a sextant fix and check position. Recovery notes are appended to this report. ✓

G. HYDROGRAPHIC POSITION CONTROL

Position control for this item investigation was visual. Position No. 2001 and a check position were obtained by placing the launch alongside a float, which was secured to the highest point on the wreck and with a sextant, measuring the angles between the following objects: ✓

<u>Object</u>	<u>Station</u>
Left	SEATTLE SHIP CANAL N TRANS TWR LT, 1975
Center	SEATTLE WESTERN ELECTRIC CO TANK, 1952
Right	GREEN STEEPLE, 1915
Left Check	SEATTLE SHIP CANAL S TRANS TWR LT, 1975

Position No. 2001 locates the least depth on the wreck.

Computations are appended to this report.

H. SHORELINE

Not applicable.

I. CROSSLINES

Not applicable.

J. JUNCTIONS

Not applicable.

K. COMPARISON WITH PRIOR SURVEYS

107900 The wreck described in the project instructions was found by DAVIDSON divers after a brief search in the vicinity of the charted position. The wreck is an open wooden hull 20 feet long with an 8 foot beam, resting upright on the bottom with an engine block in its bilges. The wreck's least depth is 11.53 feet (reduced to LWD) at latitude 47°37'38.068"N, longitude 122°20'13.441"W (Pos. No. 2001). Divers investigating the items report that the wreck lies in an area strewn with debris: appliances, car parts, disintegrating wreckage, and general refuse.

The wreck should be charted at the position given above. A general caution concerning obstructions is appropriate for the area. ✓

L. COMPARISON WITH THE CHART

The data presented above was compared to NOS Chart 18447, April 1981 Ed, 1:10,000 scale. The wreck should be charted at the location given above and the symbol "PA" removed from the chart. *concur*

M. ADEQUACY OF SURVEY

This item investigation is sufficiently complete and adequate to warrant its use for charting. ✓

N. AIDS TO NAVIGATION

Not applicable.

O. STATISTICS

Not applicable.

P. MISCELLANEOUS

None

Q. RECOMMENDATIONS

See sections K and L.

R. AUTOMATED DATA PROCESSING

The following HYDROPLOT programs were used with the PDP 8/e computer to process data obtained during this wreck investigation.

<u>Program</u>	<u>Title</u>	<u>Version Date</u>
RK 300	Utility Computations	10/21/80
RK 407	Geodetic Inverse/Direct Computation	9/25/78
AM 602	Elinore	5/20/75

SUBMERGED PILE, LAKE UNION, WA

B. AREA SURVEYED

The area surveyed was described in the project instructions as, "... a submerged pile covered 25 feet at approximately latitude 47°38'58.5"N, longitude 122°19'37.9"W", and is in the north end of Lake Union, WA. The pile was investigated by DAVIDSON personnel on 26 March 1981 (J.D. 085).

C. SOUNDING VESSEL

DAVIDSON launch DA-1 (EDP No. 3131) was used as a diving platform and to obtain a visual (sextant) fix. No soundings were made with electronic equipment on the launch.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

No echo sounding equipment was used during the pile investigation. The least depth was determined by measuring a taut line from the top of the pile to a float on the surface. Accuracy was ensured by having a diver at the surface and a diver at the pile to make sure the line was taut and vertical when it was marked.

Depths were reduced to low water datum (LWD), 20⁴/₈ feet above MLLW, by obtaining the lake level by telephone from the U.S. Army Corps of Engineers lake level gage at the Hiram Chittenden Locks. The lake level on 26 March 1981 was 20.95 feet, hence a corrector of -0.⁴/₉₅ feet was applied to the least depth observed.

E. HYDROGRAPHIC SHEETS

Not applicable.

F. CONTROL STATIONS

No control was established, monumented, or described for this pile investigation. One triangulation station and three intersection stations were recovered to obtain a sextant fix and check position. Recovery notes are appended to this report.

G. HYDROGRAPHIC POSITION CONTROL

Position control for this item investigation was visual. Range-azimuth positioning was used to provide a starting point for the diver search. Once the piling was located, a float was sent to the surface on a taut line attached to the high point of the pile. Position No. 2002 and a check position were obtained by placing the launch alongside the float and using a

sextant to measure the angles between the following objects:

<u>Object</u>	<u>Stations</u>
Left	LEEDY, 1953
Center	SEATTLE SHIP CANAL S TRANS TWR LT, 1975
Right	ST MARKS EPISCOPAL CHURCH APEX, 1932
Left Check	SEATTLE BLESSED SACRAMENT, 1934

Position No. 2002 locates the least depth on the pile.

Computations are appended to this report.

H. SHORELINES

Not applicable.

I. CROSSLINES

Not applicable.

J. JUNCTIONS

Not applicable.

K. COMPARISON WITH PRIOR SURVEYS

10/22/82
The submerged pile described in the project instructions was found by DAVIDSON divers after a brief search in the vicinity of the charted position of the wreck described by the 1978 survey (H-9747). The pile is 3 feet in diameter and wrapped in steel cable, which also litters the bottom in the area. The pile rises 2.5 feet above the hull of the wreck mentioned in Section 1.8 of the project instructions. The pile's least depth is ~~24.1~~^{23.7} feet (reduced to LWD) at latitude 47°38'58.80"N, longitude 122°19'38.00"W (Pos. No. 2002).

The notation submerged pile should be added to the chart at the position given above, with the least depth indicated. *concur*

A Danger to Navigation Report describing the item has been sent to the Commandant, 13th Coast Guard District, Seattle, WA, and to the Director, Pacific Marine Center, Seattle, WA. A copy of the report and radio message is appended to this report.

L. COMPARISON WITH THE CHART

The data presented above was compared to NOS Chart 18447, April 1981 Ed, 1:10,000 scale. No submerged piling is shown on the chart. The submerged pile should be charted as recommended in Section K. *concur (the subm pile is 16 m N.W. of the position of the least depth of 27ft on the wreck on H-9747)*

M. AUROGACY OF SURVEY

LNM 1/82
N/M 5/1/82

M. ADEQUACY OF SURVEY

This item investigation is sufficiently complete and adequate to warrant its use for charting.

N. AIDS TO NAVIGATION

Not applicable.

O. STATISTICS

Not applicable.

P. MISCELLANEOUS

None.

Q. RECOMMENDATIONS

See section K and L.

R. AUTOMATED DATA PROCESSING

The following HYDROPLOT programs were used with the PDP 8/e computer to process data obtained during this item investigation.

<u>Program</u>	<u>Title</u>	<u>Version Date</u>
RK 300	Utility Computations	10/21/80
RK 407	Geodetic Inverse/Direct Computation	9/25/78
AM 602	Elinore	5/20/75

SHOAL INVESTIGATION, WEBSTER PT, WA

B. AREA SURVEYED

The area surveyed is in the vicinity of Webster Point, Lake Washington, WA, at the east end of the Lake Washington Ship Canal. The investigation was conducted on 18 May 1981 (J.D. 138).

C. SOUNDING VESSEL

DAVIDSON launch DA-2 (EDP No.3132) was used to obtain soundings during this item investigation. No unusual sounding vessel configurations were used and no problems were encountered.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

A Ross Fineline Model 5000 fathometer was used on DA-2 (3132) to obtain soundings during the shoal investigation. The fathometer performed well in depths from 4 feet to 39 feet. Components were as follows:

Fathometer S/N 1080
Digitizer S/N 1048
Transceiver S/N 1093

The fathometer initial was adjusted to zero as needed throughout the hydrography.

Bar checks were performed at 6 foot intervals from 6 feet to 48 feet before and after hydrography. Analysis of the results yielded a TRA correction of +1.2 feet. This was applied to all soundings.

Soundings were reduced to low water datum (LWD), 20.⁴~~0~~ feet above MLLW, by obtaining the lake level by telephone from the U.S. Army Corps of Engineers lake level gage at the Hiram Chittenden Locks. The lake level on 18 May 1981 was 21.81 feet, hence a corrector of ~~-1.8~~^{-1.2} feet was applied to all soundings.

No velocity corrections have been applied to the soundings obtained during the field examination. *Applied during verification*

E. HYDROGRAPHIC SHEETS

The field sheet was prepared on the DAVIDSON's PDP 8/e HYDROPLOT system. All data will be forwarded to the Pacific Marine Center, Seattle, WA, for verification.

F. CONTROL STATIONS

No control was established, monumented, or described for this item investigation. One triangulation station and four intersection stations were recovered to provide control. Recovery notes are appended to this report.

G. HYDROGRAPHIC POSITION CONTROL

Range-azimuth methods were used to provide sounding line position control for the three sounding lines ran as part of this item investigation (Positions 4001-4009). The control setup duplicates that used during the 1978 Survey. A Motorola Mini Ranger III system was used to provide ranges with components as follows:

Shore Station (Medical, 1973)	Code 1	S/N 723
DA-2 R/T	S/N 719	
Console	S/N 707	

Azimuths were measured by a Wild T-2, S/N 26423, on station Medical 1973.

The Mini Ranger III system was calibrated and baseline correctors determined at PMC on 6 March 1981 (J.D. 065) and

20 May 1981 (J.D. 140). Results were as follows:

<u>DATE</u>	<u>CONSOLE/R-T</u>	<u>CODE</u>	<u>BASELINE CORRECTORS</u>
3/6/81	707/719	1	+2 Meters
5/20/81	707/719	1	-3 Meters
			mean 0 Meters

The mean corrector, 0 meters, was applied to plot the sounding lines and detached position.

A Mini Ranger III system check was obtained immediately before and after the item investigation by placing the launch R/T unit alongside WEBSTER PT LT, 1956, and comparing with the computed slope distance from station MEDICAL, 1973. Three readings within 2.5 meters of the computed distance were observed as required to obtain a successful Mini Ranger system check.

A range-azimuth position with a check angle was used to locate the least depth on the shoal, which was determined by diver investigation. The diver marked the spot of least depth with a float on a taut line anchored on the bottom. The launch was placed alongside the float and a range-azimuth position with visual check angle (SEATTLE TV STATION KING TOWER - UNIVERSITY POWER PLANT STACK, Position NO. 4010) was obtained. Computations are appended to this report.

The Mini Ranger III system performed well throughout this investigation.

H. SHORELINE

Not applicable.

I. CROSSLINES

No crosslines were run during this investigation.

J. JUNCTIONS

Butt junction was effected with with H-9747 (1978) during A.C.I.
Not applicable.

K. COMPARISON WITH PRIOR SURVEYS

Sounding lines run during this item investigation verify the existence of the 4-foot sounding just off Webster Pt. The 2350 meter arc run during the 1978 survey was repeated. Fourteen soundings are coincident: nine agreed exactly, two were within one foot, and three agreed within two feet. The 2325 meter and 2375 meter arcs confirm the shoal as delineated on H-9747 (1978). Four soundings on the 2375 meter arc were coincident with soundings from H-9747. Two agreed exactly, one within one foot, and one within two feet.

A diver investigation was conducted after the sounding lines confirmed the existence of the shoal, to describe the area and determine the least depth.

The shoal area is characterized by a layer of mud and silt over a hard bottom. The shoal is generally flat and lies just outside an area of private piers where small craft are moored. A least depth of ~~3.8~~^{4.8} feet (reduced to LWD) was determined by sounding pole at latitude 47°38'52.2" N, longitude 122°16'32.1" W (Position No. 4010). Identification of the location of the least depth was somewhat difficult due to the flatness of the bottom. *added bottom char M to smooth sheet.*

A 0.3 foot discrepancy exists between the least depth ~~3.5~~^{3.8} feet, reduced to LWD) and the Ross fathometer (~~3.5~~^{4.1} feet, reduced to LWD). This may be attributable to the layer of mud and silt over the hard bottom; the fathometer return is from the mud and silt while the sounding pole was planted firmly on the harder substrate. Plotted field sheet depths exaggerate the discrepancy because of the round-off routine in the plotting program. *Post#40018*

It is recommended that the area be charted as shown on H-9747 (1978) using the sounding pole least depth and position determined during this investigation. The 6-foot sounding shown inshore of the shoal area on H-9747 was not found during this investigation and should not be charted. *Common area of H-9747 (1978) is superseded by pres. survey depths*

The area is marked by a fixed aid to navigation, the Webster Point Light, No. 2470 in the Light List, Volume III, Pacific Coast and Pacific Islands, 1981 edition. In view of the proximity of the private piers mentioned above, the shoal does not constitute a hazard to vessels transiting the Lake Washington Ship Canal.

L. COMPARISON WITH THE CHART

The item investigation area was compared with NOS Chart 18447, April 1981 Ed., 1:10,000 scale. The chart shows a 10 foot sounding in the shoal area where the ~~10~~^{4.8} foot least depth was found. The chart should be amended to reflect depths observed during this investigation, which suggest shoaling near the shoreline in the Webster Pt. vicinity. However, as mentioned above, the area does not constitute a hazard to vessels in the Lake Washington Ship Canal. *CONCUR*

M. ADEQUACY OF SURVEY

This field examination is sufficiently complete and adequate to warrant its use for charting. No velocity corrections were applied to electronically-obtained soundings on this field examination. *Applied during verification*

N. AIDS TO NAVIGATION

Not applicable.

O. STATISTICS

<u>Launch</u>	<u>Number of Positions</u>	<u>Naut. Miles of Sounding Lines</u>	<u>Square Miles of Sounding Lines</u>
DA-2(3132)	9	0.55	0.01

P. MISCELLANEOUS

All data was hand recorded in a sounding volume. In-between soundings were hand-picked from the fathogram.

Q. RECOMMENDATIONS

See Sections K and L.

R. AUTOMATED DATA PROCESSING

The following HYDROPLOT programs were used with the DAVIDSON's PDP 8/e computer system to process data acquired during this investigation.

<u>PROGRAM</u>	<u>TITLE</u>	<u>VERSION DATE</u>
RK 201	Grid, Signal, and Lattice Plot	04/18/75
RK 212	Visual Station Table Load	04/01/74
RK 216	Range-Azimuth Non-Real Time Plot	02/09/81
RK 300	Utility Computations	10/21/80
RK 330	Reformat and Data Check	05/04/76
RK 407	Geodetic Inverse/Direct Computation	09/25/78
AM 602	Elinore	05/20/75

S. REFERRAL TO REPORTS (ALL ITEM INVESTIGATION AREAS)

Water Level Note.

Respectfully submitted,

Neil M. Bogue

Neil M. Bogue

LT(jg), NOAA

Approved and forwarded,

N. C. Austin

N. C. Austin, CDR, NOAA

Commanding Officer

NOAA Ship DAVIDSON

S-N916-PMC-80
DA-5-1-78 (H-9747)
Signal Tape Printout

001 0 47 37 14445 122 20 52973 000 0000 000000
Seattle Space Needle, 1962
002 0 47 37 35815 122 19 54035 000 0000 000000
Seattle Western Electric Co Tk, 1952
003 0 47 39 15913 122 19 18050 000 0000 000000
Seattle Ship Canal N Trans Twr, 1975
004 0 47 39 08155 122 19 18193 000 0000 000000
Seattle Ship Canal S Trans Twr, 1975
005 0 47 37 15004 122 19 50335 000 0000 000000
Green Steeple, 1915
006 0 47 38 41987 122 20 00150 000 0000 000000
Seattle, Lake Union Park, Stack, 1975
007 0 47 39 11813 122 19 38595 000 0000 000000
Leedy, 1953
008 0 47 39 59498 122 19 03107 000 0000 000000
Seattle Blessed Sacrament, 1934
009 0 47 39 30801 122 18 27351 000 0000 000000
Seattle U of Wash Denny Hall, 1934
010 0 47 39 29394 122 18 32829 000 0000 000000
Flagpole 2, 1915
011 0 47 37 55588 122 19 12081 000 0000 000000
St Marks Episcopal Church Apex, 1932
012 0 47 38 59515 122 18 23971 250 0000 000000
Medical, 1973
013 0 47 38 51942 122 15 29254 139 0000 000000
Webster Point Light, 1956
014 0 47 37 55310 122 20 59323 000 0000 000000
Seattle TV Station King Tower, 1953
015 0 47 39 13535 122 18 08309 000 0000 000000
University Power Plant Stack, 1915



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY

NOAA Ship DAVIDSON S-331
1801 Fairview Avenue East
Seattle, Washington 98102

Ref: CPM/101-3A
Set 6-13

DATE : 25 June 1981
TO : OA/CPM - C. K. Townsend
FROM : OA/CPM331 - *N. C. Austin*
N. C. Austin
Commanding Officer
NOAA Ship DAVIDSON
SUBJECT: Follow-up to Danger to Navigation Report

The submerged pile referenced herein was investigated by personnel from the NOAA Ship DAVIDSON in conjunction with project instructions S-N916 - PMC-80, Field Examination, Lake Union and Lake Washington Ship Canal, Washington. This field examination is intended to supplement project S-N203-DA-78, and data reported on H-9747.

Since the reduced depth is less than 25 feet, the enclosed Danger to Navigation Report was submitted to USCG District 13 Headquarters in compliance to section 9.0 of the project instructions.

Subm pile is covered 23ft at the chart Datum



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6-13



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY

NOAA Ship DAVIDSON S331
1801 Fairview Avenue East
Seattle, Washington 98102

Ref: CPM/101-3M
Ser 6-14

25 June 1981

Commander
Thirteenth Coast Guard District
915 Second Avenue
Seattle, Washington 98174

Dear Sir:

The enclosed documents refer to a submerged pile recently investigated by personnel from the NOAA Ship DAVIDSON. The pile lies on the north side of a sunken barge. Both the barge and pile were observed during a 1978 survey, but a least depth was reported for the barge only.

The Danger to Navigation report is issued in compliance with DAVIDSON project instructions S-N916-PMC-80. The original radio transmission occurred on 19 June 1981.

Sincerely,

N. C. Austin, CDR, NOAA
Commanding Officer
NOAA Ship DAVIDSON S331

NCA:ws



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tradition of service to the Nation

The DAVIDSON'S Mini-Rangers were calibrated in accordance with the PMC OORDER on 6 March 1981 (JD 065). The calibration range was from the vent pipe on top of the Lake Union Bldg. to NOAA PMC South pier, wood screw with painted X. The computed distance was 725.1 meters.

An abstract of correctors is shown in the table below.

<u>Console/R-T Serial Numbers</u>	<u>Code 1</u>	<u>Code 2</u>	<u>Code 3</u>	<u>Code 4</u>	<u>Code 5</u>	<u>Code 6</u>
707/719	+2	+2	+1	+1	+1	0
710/721	+1	+2	0	+2	0	+1
716/709	0	0	-1	0	0	-1

SHIP'S COPY

The DAVIDSON'S Mini-Ranger were calibrated in accordance with the PMC OPRORDER on 20 May 1981 (JD-140). The calibration range was from the vent on top of the Lake Union Building to NOAA PMC North Pier, Hexnut head bolt with painted marked circle. The distance was 753.3 meters.

An abstract of correctors is shown in the table below.

Cable Length 100 feet:

Console/R-T Unit

<u>Serial Numbers</u>	<u>Code 1</u>	<u>Code 2*</u>	<u>Code 3</u>	<u>Code 4</u>	<u>Code 5</u>	<u>Code 6</u>
707/719	-3	0	-3	-2	-5	-2
710/721	-3	+1	-2	+2	-1	0
716/709	+1	0	0	+7	+2	+3

Cable Length 25 feet:

707/719	-3	0	-1	+1	-1	0
710/721	-4	+1	-3	+1	-2	-1
716/709		0				

* Code 2 correctors are result of Post Adjustment calibration.

WATER LEVEL NOTE
S-N916-PMC-80
FIELD EXAMINATIONS
LAKE UNION AND LAKE WASHINGTON SHIP CANAL, WA

All soundings and depths obtained during this project were reduced to Low Water Datum (LWD), 20.00 feet above MLLW, in accordance with section 5.0 of the project instructions.

Lake levels were obtained by telephone from the U.S. Army Corps of Engineers lake level gage at the Hiram Chittenden Locks, Seattle, WA. They were as follows:

<u>DATE</u>	<u>LAKE LEVEL</u>	<u>DAILY CORRECTOR</u>
16 March 1981 (J.D. 075)	20.79 ft	0.2 0.8 ft
26 March 1981 (J.D. 085)	20.95 ft	0.4 0.95 ft
18 May 1981 (J.D. 138)	21.81 ft	1.2 1.8 ft

Copies of the lake level gage trace for these dates are appended to this report.

Respectfully submitted,

Neil M. Bogue

Neil M. Bogue
LT(jg), NOAA

Approved and forwarded,

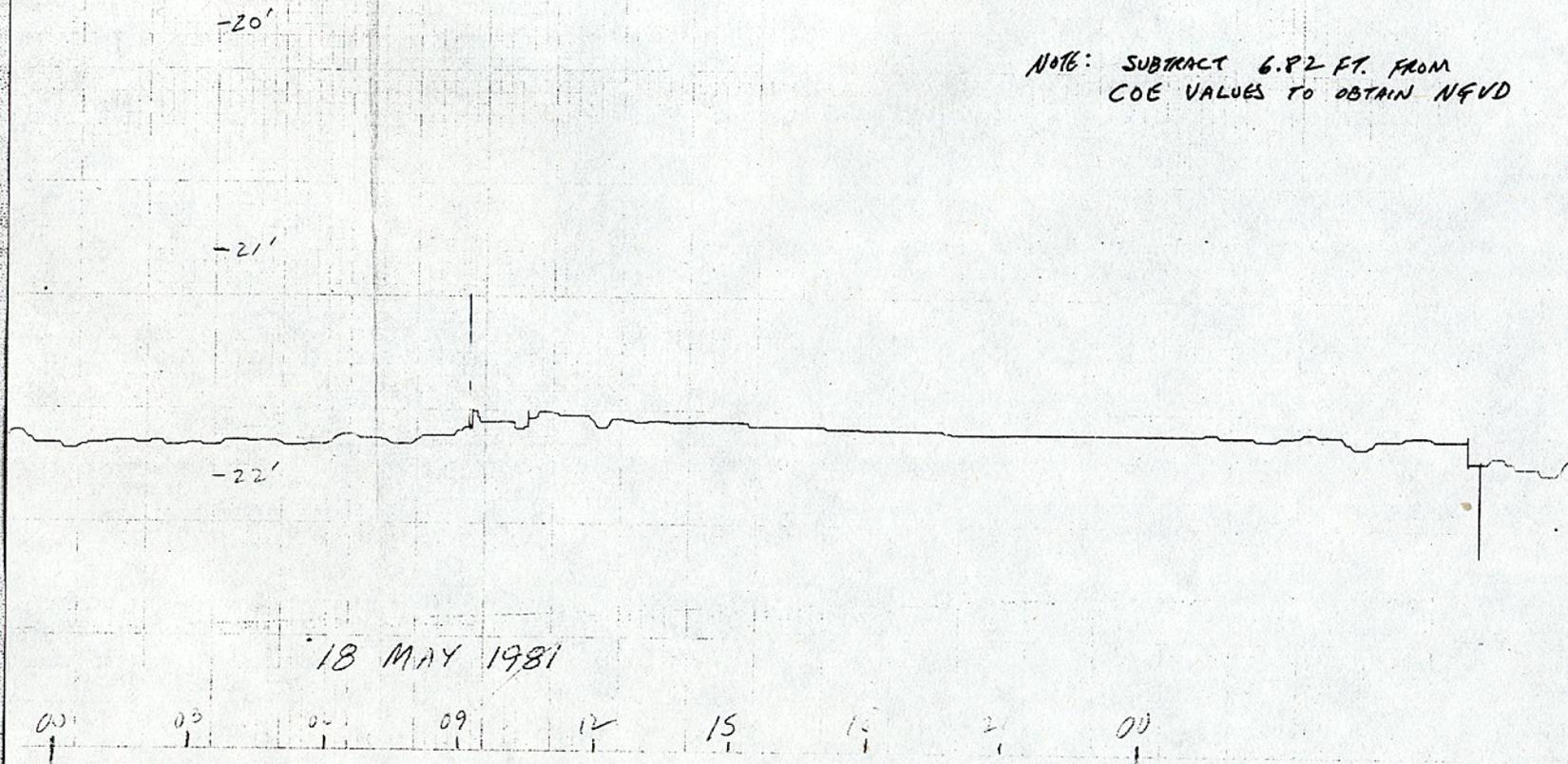
N. C. Austin

N. C. Austin, CDR, NOAA
Commanding Officer
NOAA Ship DAVIDSON

Sheet 1

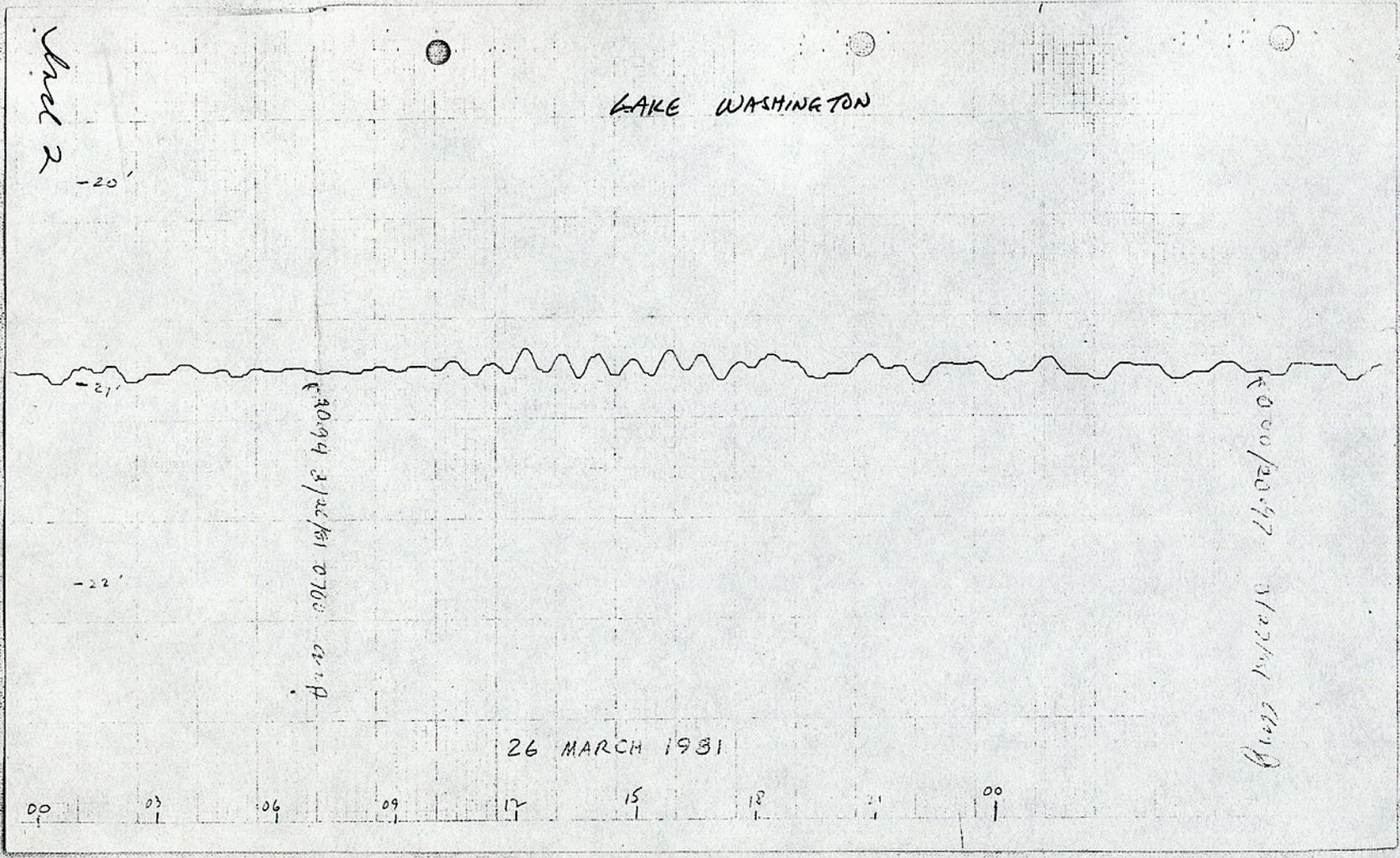
LAKE WASHINGTON

NOTE: SUBTRACT 6.82 FT. FROM
COE VALUES TO OBTAIN NGVD



Sheet 2

LAKE WASHINGTON



-20'

-21'

-22'

26 MARCH 1931

00

03

06

09

12

15

18

21

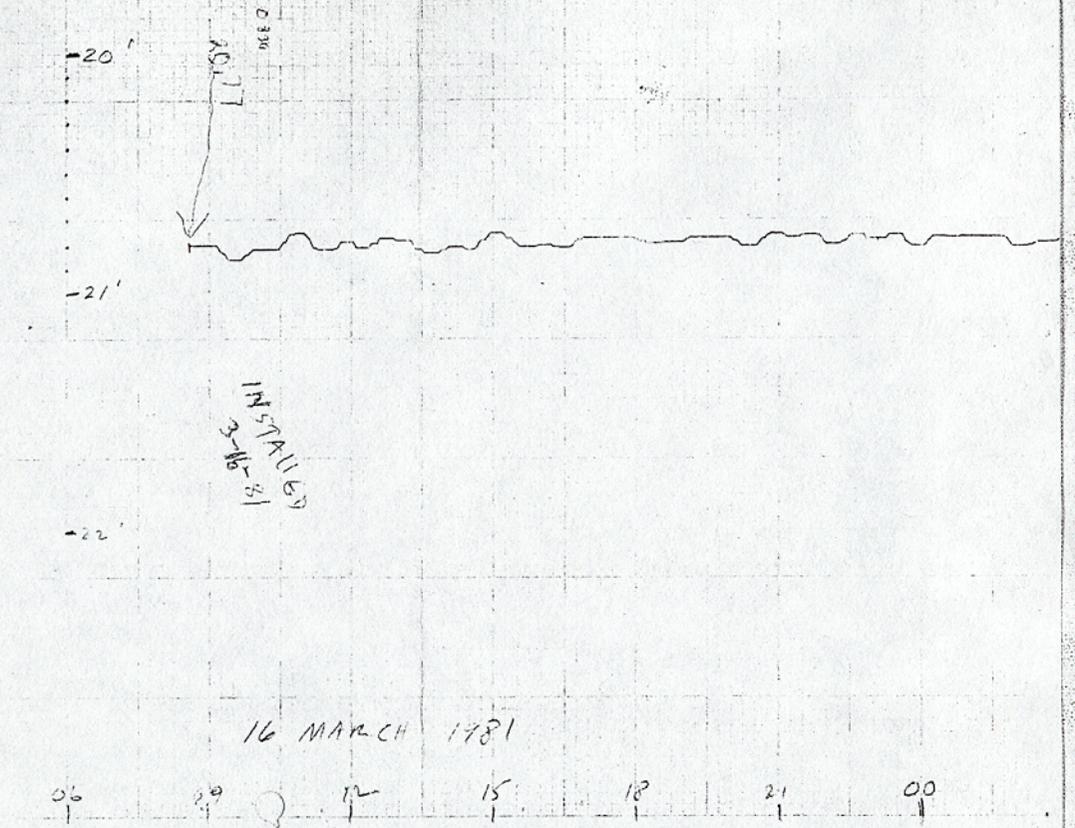
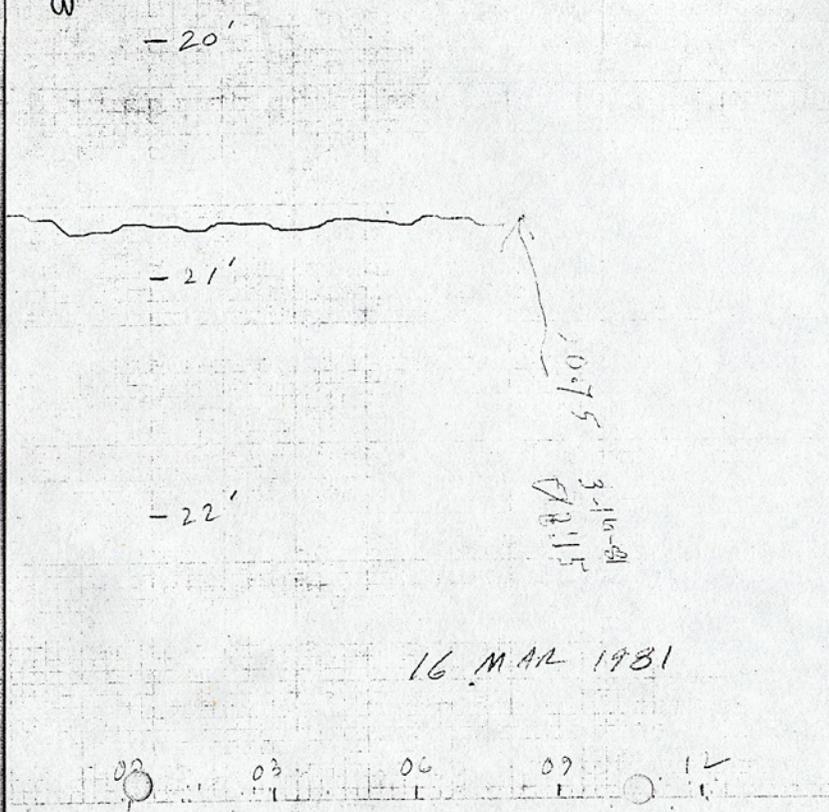
00

03:00 PM 3/26/31 0760 21.8

06:00 PM 3/26/31 0760 21.8

Line 3

LAKE WASHINGTON



- 9741
9742



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C3311/JRH

TO: Jim Green
Chief, Verification Branch
Processing Section
Pacific Marine Center

FROM: James R. Hubbard *sent*
Chief, Tidal Datum Section
Tides and Water Levels Branch
Oceanographic Division

SUBJECT: Chart Datum for Lake Washington

Chart datum in Lake Washington (Low Water of The Lake) is 20.00 ft. above MLLW at Seattle, based on the NGVD-MLLW relationship (6.25 ft.), and bench mark 28.44' at Hiram M. Chittenden Locks, (elevation 21.55 ft. above NGVD determined by USCE in 1973).

Subtract 20.64 ft. from water recordings obtained from the USCE gage and staff at Hiram M. Chittenden Locks, to refer heights to Lake Washington chart datum.



GEOGRAPHIC NAMES

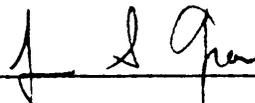
FE-236

Name on Survey	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">A ON CHART NO. 78447</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">B ON PREVIOUS SURVEY NO.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">C ON U.S. QUADRANGLE MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">D FROM LOCAL INFORMATION</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">E ON LOCAL MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">F P.O. GUIDE OR MAP</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">G RAND McNALLY ATLAS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">H U.S. LIGHT LIST</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">K</div> </div>										
	Lake Union	X									
Lake Washington	X										2
Union Bay	X										3
Webster Point	X										4
											5
											6
											7
											8
											9
											10
											11
											12
											13
											14
											15
											16
											17
									Approved:		18
											19
									<i>Chas. E. Hammond</i>		20
									Chief Geographer - C3x5		21
									5 May 1982		22
											23
											24
											25

APPROVAL SHEET
FOR
SURVEY FE-236

- A. All revisions and additions made on the smooth sheet during verification have been entered in the magnetic tape records for this survey. A new final position print-out has been made. A new final sounding print-out has been made.
- B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the Hydrographic Manual. Exceptions are listed in the verifier's report.

Date: 12/14/81



Chief, Verification Branch

HYDROGRAPHIC SURVEY STATISTICS

FE-236

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET		3	BOAT SHEETS & PRELIMINARY OVERLAYS		7	
DESCRIPTIVE REPORT		1	SMOOTH OVERLAYS: POSARC, EXCESS		4	
DESCRIP- TION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/ SOURCE DOCUMENTS
ENVELOPES						
CAHIERS						
VOLUMES						
BOXES			1 Smooth Plo, Fath, Raw Data, Spa Vol.,			
T-SHEET PRINTS (List)		NONE				
SPECIAL REPORTS (List)		NONE				

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS		
	PRE- VERIFICATION	VERIFICATION	TOTALS
POSITIONS ON SHEET			12
POSITIONS CHECKED	0	12	12
POSITIONS REVISED	0	5	5
SOUNDINGS REVISED	0	9	9
SOUNDINGS ERRONEOUSLY SPACED	0	0	0
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED	0	0	0
	TIME - HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	2	0	2
VERIFICATION OF CONTROL	0	1	1
VERIFICATION OF POSITIONS	0	1	1
VERIFICATION OF SOUNDINGS	0	7	7
COMPILATION OF SMOOTH SHEET	0	6	6
APPLICATION OF TOPOGRAPHY	0	N/A	0
APPLICATION OF PHOTOBATHYMETRY	0	N/A	0
JUNCTIONS	0	1	1
COMPARISON WITH PRIOR SURVEYS & CHARTS	0	3	3
VERIFIER'S REPORT	0	6	6
OTHER	0	2	2
TOTALS	2	27	29
Pre-Verification by James S. Green	Beginning Date Sept. 9, 1981	Ending Date Sept. 9, 1981	
Verification by Gordon E. Kay	Beginning Date Sept. 30, 1981	Ending Date Nov. 9, 1981	
Verification Check by Stanley H. Otsubo, James S. Green	Time (Hours) 9	Date Dec. 3, 1981	
Marine Center Inspection by H.I.T.	Time (Hours) 2	Date Dec 14, 1981	
Quality Control Inspection by E.A. Saulsbury	Time (Hours) 4	Date 5-5-82	
Requirements Evaluation by Dennis Hill	Time (Hours) 2	Date 10/20/82	

B.K. Myers Inv 6/11/82

122° 16' 45"

122° 16' 30"

122° 16' 15"

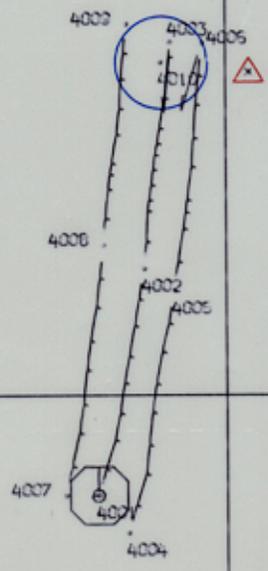
47° 39' 00"

2000
[12]

2500
[12]

MEDICAL, 1973

13 WEBSTER POINT LIGHT, 1956



47° 38' 45"

POSITION OVERLAY FE-236

47° 38' 30"

122° 16' 45"

122° 16' 30"

122° 16' 15" 47° 39' 00"

13 WEBSTER POINT LIGHT, 1956

8



31 31
32 32
32 30

47° 38' 45"

EXCESS OVERLAY FE-236

47° 38' 30"

3 SEATTLE SHIP CANAL
N TRANS TWR, 1975

122°19'45"

122°19'30"

△ 122°19'15"

47°39'15"

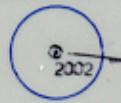


7 LEEDY, 1953



4 SEATTLE SHIP CANAL
S TRANS TWR, 1975

47°39'00"



POSITION OVERLAY FE-236

47°38'45"

6 SEATTLE, LAKE UNION PARK,
STACK, 1975

47°37'45"

2 SEATTLE WESTERN ELECTRIC
CO TK, 1952



POSITION OVERLAY FE- 236

47°37'30"

122° 20' 15"

122° 20' 00"

122° 19' 45"

S-N916-PMC-80

FIELD EXAMINATION (FIELD SHEET)

LAKE WASHINGTON

SCALE 1:5,000

SURVEYED MAY 1981

SOUNDINGS IN FEET

REDUCED TO LOW WATER DATUM

47 39 00

D.P.
(fix 4010, JD-138)

depth on shoal area = 38 feet taken by
sounding pole

4	4	8
5	10	18
10	29	30
29	30	30
30	30	30
30	30	31
31	31	29
33	36	35
36	36	37
36	38	37
37	38	39
37	39	37
37	39	41
37	39	40
36	39	40
36	37	39
34	35	35
33	34	34
33	34	34
31		

47 38 45

47 38 30

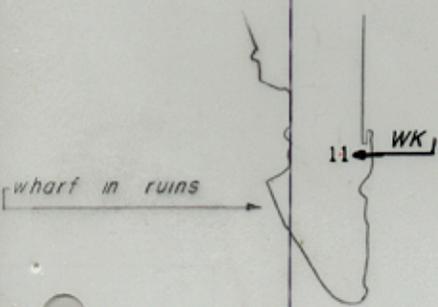
122 16 45

122 16 30

122 16 15

47°37'45"

LAKE UNION



2 SEATTLE WESTERN ELECTRIC
CO TK, 1952



FE-236
LAKE UNION
MARCH 1981
SCALE: 1:5000

47°37'30"

SOUNDING IN FEET at LOW WATER DATUM which is
20 FEET above MLLW SEATTLE, WA.

Shoreline in pencil from H-9747 1:5000 (1978)

122° 20' 15"

122° 20' 00"

122° 19' 45"

122° 16' 45"

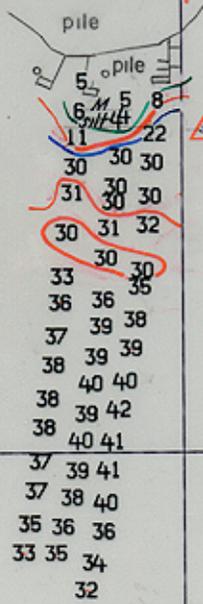
122° 16' 30"

122° 16' 15"

47° 39' 00"

13 WEBSTER POINT LIGHT, 1956

WEBSTER PT



JOINS H-9747 (1978)

JOINS H-9747 (1978)

UNION BAY

LAKE WASHINGTON

47° 38' 45"

FE-236
UNION BAY
MAY 1981

SCALE: 1:5000

SOUNDINGS IN FEET at LOW WATER DATUM which is
20 FEET above MLLW SEATTLE, WA.

Shoreline in pencil from H-9747 1:5000 (1978)

47° 38' 30"

3 SEATTLE SHIP CANAL
N TRANS TWR, 1975

122° 19' 45"

122° 19' 30"

△ 122° 19' 15"

47° 39' 15"

△

7 LEEDY, 1953

△

4 SEATTLE SHIP CANAL
S TRANS TWR, 1975

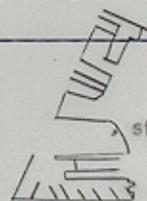
boathouse

ramp

LAKE UNION

47° 39' 00"

23 subm pile



storm drain

storm drain

FE-236

LAKE UNION

MARCH 1981

SCALE : 1:5000

SOUNDING IN FEET at LOW WATER DATUM which is
20 FEET above MLLW SEATTLE, WA.

Shoreline in pencil from H-9747 1:5000 (1978)

47° 38' 45"

6 SEATTLE, LAKE UNION PARK,
STACK, 1975

NAME AGENCY NATIONAL OCEAN SURVEY NOAA SHIP DAVIDSON	PRECEDENCE	SECURITY CLASSIFICATION UNCLAS
	ACTION: PRIORITY	
ACCOUNTING CLASSIFICATION NØ3123	INFO:	STANDARD FORM 14 MARCH 1957 GENERAL SERVICES ADMINISTRATION FPMR (41CFR) 101-35.306
	TYPE OF MESSAGE <input type="checkbox"/> SINGLE <input type="checkbox"/> BOOK <input type="checkbox"/> MULTI-ADDRESS	
THIS BLOCK FOR USE OF COMMUNICATIONS UNIT		TELEGRAPHIC MESSAGE OFFICIAL BUSINESS U. S. GOVERNMENT

MESSAGE TO BE TRANSMITTED (Use double spacing and all capital letters)

THIS COL. FOR AGENCY USE

P 191805Z JUN 1981
FM NOAA DAVIDSON
TO CGD TITUSVILLE SEATTLE WA

BT

UNCLAS // NØ3123

PPP REPORT OF DANGER TO NAVIGATION.
(23 ft - corrected depth)
SUBMERGED PILE COVERED BY 24.1 FEET AT
LAKE UNION LOW WATER DATUM (LWD) INVESTIGATED;
CHART NO. 18447; LATITUDE 47/38/58.80 N;
LONGITUDE 122/19/38.01 W; DISTANCE 0.38
NAUTICAL MILES, BEARING 042 DEGREES TRUE
FROM GASWORKS PARK STACK.
THIS PILE IS ADJACENT TO AND PROJECTS 2.5
FEET ABOVE A SUNKEN BARGE INVESTIGATED IN 1978.
SURROUNDING DEPTHS ARE 30 - 33 FEET. // END

START MESSAGE ADDRESS HERE

DO NOT TYPE MESSAGE BEYOND THIS LINE

PAGE NO. 1	NO. OF PAGES 1
---------------	-------------------

NAME AND TITLE OF ORIGINATOR (Type) CDR N.C. AUSTIN	ORIGINATOR'S TEL. NO. 442-4450	DATE AND TIME PREPARED 19Ø4ØØZ JUN 1981
I certify that this message official business, is not personal, and is in the interest of the Government.		SECURITY CLASSIFICATION

UNCLAS

PACIFIC MARINE CENTER
VERIFIER'S REPORT

REGISTRY NO. FE-236

FIELD NO. DA-5-1-78

Seattle, Washington, Lake Union and Lake Washington Ship Canal

SURVEYED: March 16, 26 & May 18, 1981

SCALE: 1:5,000

PROJECT NO. S-N916-PMC-80

SOUNDINGS: Lead Line
Ross Fineline Model 5000

CONTROL: Mini Ranger
Range/Azimuth
Sextant Fixes

Chief of Party..... CDR. Ned C. Austin

Surveyed by..... LTJG D. R. Herlithy, LTJG D.I. Actor,
LTJG S.J. Konrad, ENS N.M. Bogue,
ST. D.M. Lake, ST. K.M. Jangard

Automated Plot by..... PMC Xynetics Plotter

Verified by..... Gordon E. Kay

I. INTRODUCTION

This survey, FE-236(DA-5-1-78), is a Field Examination performed by the NOAA Ship DAVIDSON of the following:

<u>Object</u>	<u>Locality</u>	<u>Date</u>
sunken wreck	Lake Union	March 16, 1981
submerged pile	Lake Union	March 26, 1981
4 foot shoal	Union Bay	May 18, 1981

FE-236 was conducted as per Project Instruction S-N916-PMC-80 dated August 18, 1981 and Change No. 1 dated November 21, 1980. ✓

This data was acquired to supplement H-9747. ✓

No unusual problems were encountered during the verification process except for the daily tide correctors that were adjusted by the datum value of 20.64. ✓

Lake level heights were verified by phone conversation on September 14, 1981 with the U. S. Army Corps of Engineers, District Engineer at the Hiram Chittenden Locks, Seattle, Washington. This confirmed the lake level heights in the Ship's Descriptive Report, paragraph D. ✓

2. CONTROL AND SHORELINE

See Ship's Descriptive Report, paragraphs F and G for an adequate description ✓
of control.

Shoreline, for reference purposes only, was transferred from H-9747 1:5000 ✓
(1978) and is in pencil.

3. HYDROGRAPHY

The development of the bottom configuration and the determination of least
depths are adequate for this survey. *concur*

There are no crosslines or bottom samples. Standard depth curves have been
completed within the limits of this Field Examination. *Pg 9 of D.R. "The shoal area
is characterized by a layer of mud & silt over a hard
bottom". M & silt were added to SS during Q.C.I. (4 ft sdgs. in
lat. 41° 38.87' N,
long. 122° 16.53' W)*

4. CONDITION OF SURVEY

The smooth sheet and accompanying overlays, hydrographic records and reports ✓
are adequate and conform to the requirements stated in the Hydrographic Manual.

5. JUNCTIONS

FE-236 junctions with contemporary survey H-9747(1978) 1:5,000. There were no
problems in accomplishing the junction. *Do not concur, FE-236 (1981) supersedes common
items or areas of H-9747 (1978), butt junction was effected in the area south of Webster Pt.
(minor depth conflicts plus hydrographi-
er's recommenda-
tion to disregard
6 ft. sdg. on H-9747 -
see D.R. pg. 9, par 4)*
All depth curves are drawn and complete. The junction notes are inked.

6. COMPARISON WITH PRIOR SURVEY

FE-236 was compared with H-9747 1:5,000(1978) with the following results:

sunken wreck H-9747 (17 feet) FE-236 (11 feet)

The location of the wreck is in the same position on H-9747 and Chart 18447, but the new least depth should be charted. *The new
position of the wreck is approx. 5
meters east of the position of the 17 ft.
sdg on H-9747. Chrt. pos. as shown on the pres
survey.*

submerged pile H-9747 (27 feet) FE-236 (23 feet)

This pile rises 2.5 feet above the charted sunken wreck (source is H-9747). *Do not
concur,
chart 23 ft sdg.
& label subm pile.*
This new least depth should be charted with the notation "WK" added.

4 foot shoal H-9747 (4 feet) FE-236 (4 feet)

This field examination confirms the existence of this shoal. *concur*

There are no Pre-Survey Review items. It is recommended that FE-236 supersede
H-9747 for the above items. *concur*

7. COMPARISON WITH CHART

FE-236 was compared with Chart 18447 April 1981 Ed., 1:10,000 with the
following results:

sunken wreck - notation "PA" should be removed and new least depth (11 feet) charted. See Verifier's Report, Section 6 and Ship's Descriptive Report, paragraph L. *cht "11wk" in the pos. shown on the present survey.* N/M 82

submerged pile - notation "WK" should be added and new least depth (23 feet) charted. See Verifier's Report, Section 6 and Ship's Descriptive Report, paragraph L. *Do not concur, subm pile covered by a least depth of 23 feet should be appropriately charted.* N/M 182

4 foot shoal - least depth of 4 feet should be charted. See Ship's Descriptive Report, paragraph L. *concur* LNM 182

There are no controlling depths. There is one fixed aid to navigation - Webster Point Light, No. 2470 in the Light List which adequately marks Webster Point. It is recommended that FE-236 supersede the chart over its common areas. ✓

8. COMPLIANCE WITH INSTRUCTION

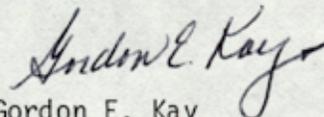
FE-236 complies with the following Project Instructions and changes: ✓

S-N916-PMC-80	August 18, 1980
Change No. 1	November 21, 1980

9. ADDITIONAL FIELD WORK

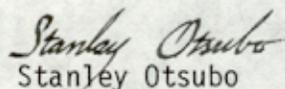
FE-236 is a good field examination. Additional work is not required. ✓

Respectfully submitted,



Gordon E. Kay
Cartographic Technician
November 9, 1981

Examined and Approved:



Stanley Otsubo
Team Leader, Verification Branch



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Pacific Marine Center
1801 Fairview Avenue East
Seattle, Washington 98102

December 14, 1981

OA/CPM3/JWC

TO: OA/CPM - Charles K. Townsend 

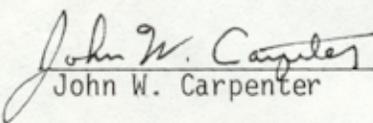
FROM: OA/CPM3 - John W. Carpenter 

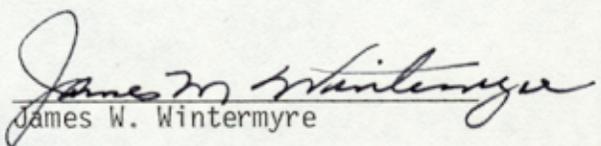
SUBJECT: PMC Hydrographic Inspection Team Report for Survey FE-236

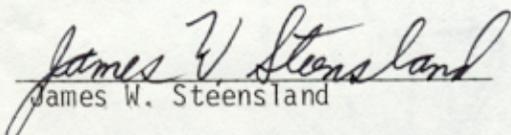
hydrographic

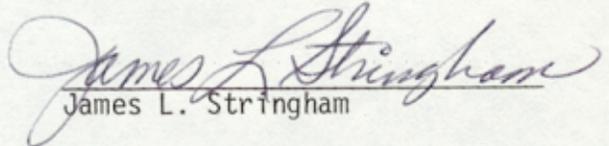
This survey is a field examination survey in Lake Union and Lake Washington Ship Canal, Seattle, Washington. This survey was conducted by NOAA Ship DAVIDSON in 1981 in accordance with Project Instructions S-N916-PMC-80 dated August 18, 1980, and Change No. 1 dated November 21, 1980.

The inspection team finds FE-236 to be an adequate field examination. Administrative approval is recommended. **CONCUR**


John W. Carpenter


James W. Wintermyre


James W. Steensland


James L. Stringham



10TH ANNIVERSARY 1970-1980
National Oceanic and Atmospheric Administration

A young agency with a historic
tradition of service to the Nation

REGISTRY NO. FE-236 (1981)

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:

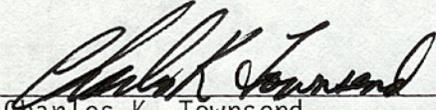
MAGNETIC TAPE CORRECTED

DATE _____ TIME REQUIRED _____ INITIALS _____

REMARKS:

ADMINISTRATIVE APPROVAL
FE-236

The report of this survey has been examined and the survey is an adequate field examination. *CONCUR*



Charles K. Townsend
Director
Pacific Marine Center

12/15/01

Date



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

C352:FPS

May 5, 1982

TO: Glen R. Schaefer *RS*
Chief, Hydrographic Surveys Division

THRU: Chief, Quality Control Branch *qm*

FROM: F. P. Saulsbury *F. P. Saulsbury*
Quality Evaluator

SUBJECT: Quality Control Report for FE-236 (1981), Washington, Seattle, Lake Union and Lake Washington Ship Canal

A quality control inspection of FE-236 was accomplished to monitor the survey for adequacy with respect to data acquisition, delineation of the bottom, determination of least depths, navigational hazards, junctions, sounding line crossings, smooth plotting, decisions made and actions taken by the verifier, and the cartographic presentation of data. In general, the survey was found to conform to the National Ocean Survey's standards and requirements except as stated in the Verifier's Report, the HIT Report, and comments appended to items in the Verifier's Report during quality control inspection. Pages of the Verifier's Report containing comments appended during quality control inspection are to be furnished verification.

cc:
C351





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY
Rockville, Md. 20852

NOV 10 1982

C351:DJH

TO: CPM - Charles K. Townsend
FROM: C3 - C. William Hayes *C. William Hayes*
SUBJECT: FE-236 (1981), S-N916, Washington, Seattle, Lake Union and Lake
Washington Ship Canal, Report of Compliance with Project Instructions

The smooth sheet and Descriptive Report for the subject survey have been examined. This survey, except as noted in the Quality Control Report, dated May 5, 1982 (copy attached), and the Hydrographic Survey Inspection Team Report, dated December 14, 1981, is complete and adequate for the purposes intended and is in compliance with Project Instructions S-N916-PMC-80, dated August 18, 1980.

Attachment

cc:
C352 w/o att.



