

FE385

FE385

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey ... Field Examination

Field No. AHP-10-13-93

Registry No. FE-385

LOCALITY

State Michigan

General Locality... Lake Superior

Sublocality Grand Island Harbor

19 93

CHIEF OF PARTY

..... LCDR J. E. Waddell

LIBRARY & ARCHIVES

DATE August 9, 1994

FE882

88377

P/L
CHTS
CPG
14969
14963
14960 NC

HYDROGRAPHIC TITLE SHEET

FE-385

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.

AHP-10-13-93

State Michigan

General locality Lake Superior

Locality Grand Island Harbor

Scale 1:10,000 Date of survey September 16-20, 1993

Instructions dated August 6, 1993 Project No. S-Z906-AHP

Vessel NOAA Launch 1292

Chief of party LCDR James E. Waddell, Jr., NOAA

Surveyed by Atlantic Hydrographic Party

Soundings taken by echo sounder, ~~hook lead pole~~ Innerspace Model 448 Echo Sounder

Graphic record scaled by Thomas Rybarski

Graphic record checked by Brian Link

Verification by: G.E. Kay

~~Protracted by~~ G.E. Kay Automated plot by PHS Xynetics Plotter

Evaluation by: G.E. Kay

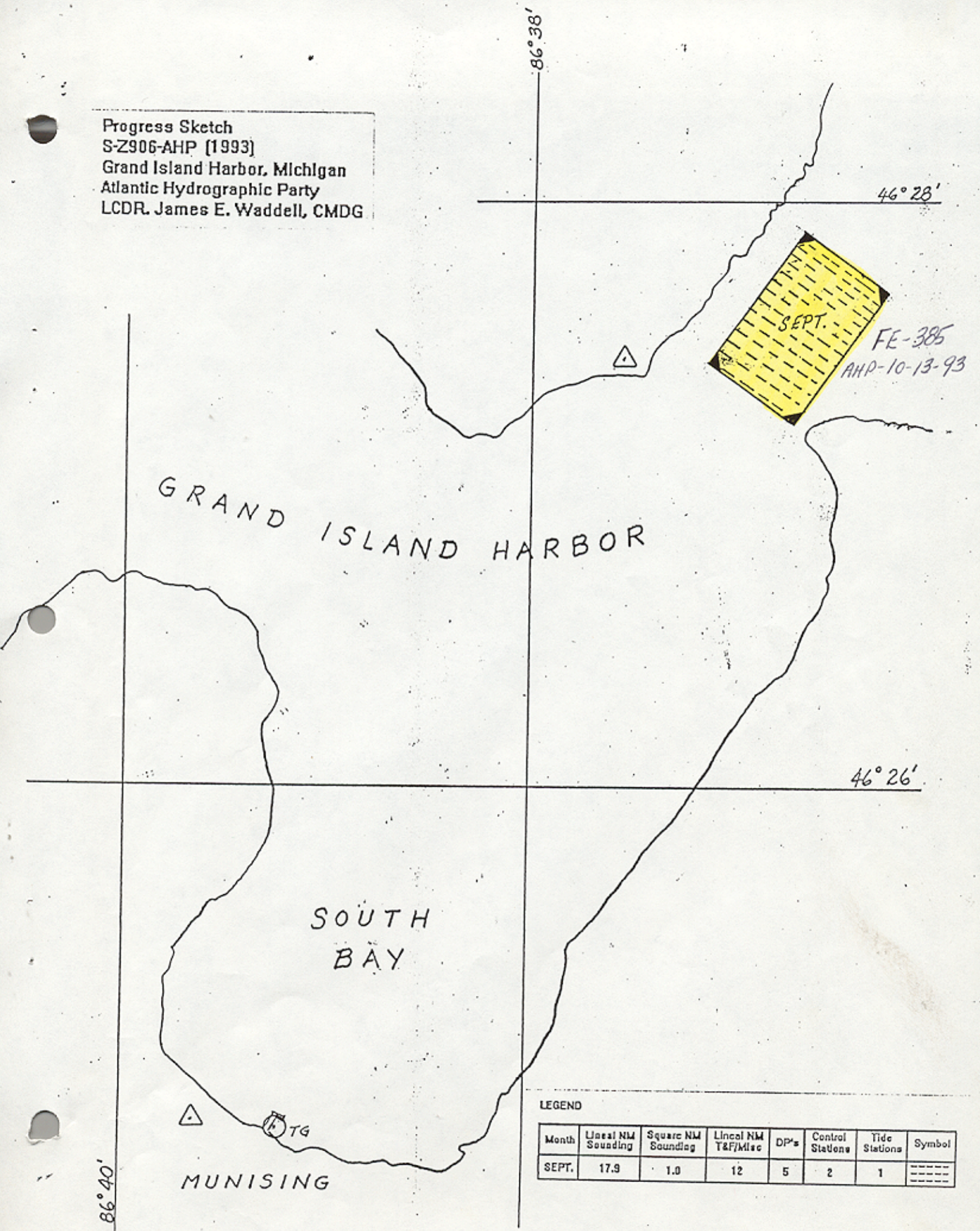
~~XXXXXX~~ METERS AND DECIMETERS

Soundings in ~~fathoms~~ XXXXX ~~feet~~ XXXX at ~~MLW~~ ~~MLD~~ IGLD 1955

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

RWD ✓ AWOIS and SURF 8/10/94

Progress Sketch
 S-Z906-AHP (1993)
 Grand Island Harbor, Michigan
 Atlantic Hydrographic Party
 LCDR. James E. Waddell, CMDG



LEGEND

Month	Lineal NM Sounding	Square NM Sounding	Lineal NM T&F/Misc	DP's	Control Stations	Tide Stations	Symbol
SEPT.	17.3	1.0	12	5	2	1	-----

Descriptive Report to Accompany
FE-385
AHP-10-13-93
S-Z906-AHP
Scale: 1:10,000
Atlantic Hydrographic Party
Chief of Party: LCDR James E. Waddell, Jr., NOAA
1993

A. PROJECT

This survey was conducted in accordance with Hydrographic Project Instructions for S-Z906-AHP, Grand Island Harbor, Lake Superior, Michigan, dated August 6, 1993. No changes to these instructions were issued. ✓

The purpose of project S-Z906-AHP is to verify the positioning of a charted shoal, at the U.S. Coast Guard's request, so that proper placement of Sand Point Lighted Bell Buoy 3 may be accomplished. ✓

There is no sheet letter for this survey. ✓

B. AREA SURVEYED

The area surveyed for FE-385 lies on the eastern approach to Munising Harbor, north of Sand Point, between the point and the eastern shore of Grand Island. The area is bounded by the following geographic points: ✓

North - 46°28'00"N, 086°36'37⁶/₂"W
South - 46°27'07"N, 086°36'43⁶/₂"W ✓
East - 46°27'40"N, 086°36'05"W
West - 46°27'27⁶/₂"W, 086°37'14⁶/₂"W

This survey was conducted from September 16, 1993 (DN 259) to September 20, 1993 (DN 263). ✓

C. SURVEY VESSELS

NOAA launch 1292 (EDP No. 1292), a 21-foot MonArk, was used to collect all data on this survey. No problems were encountered with the vessel. ✓

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The Hydrographic Data Acquisition and Processing System (HDAPS) was used to process all hydrographic data for this survey. Listings of version numbers for the various HP-DPS programs used for all data processing are appended to this report. In addition to the HDAPS, the following non-HDAPS computer programs were used: ✓

VELOCITY	Ver. 1.11 (3/9/90)
NADCON	Ver. 1.01
MONITOR	Ver. 1.31

PC-DAS programs, in the NOAAEXE directory, Version 5.00 were used for on-line data acquisition on the survey vessel for the entire survey. This version has DGPS capabilities, including the new sensor initialization program. ✓

E. SONAR EQUIPMENT

Not Applicable. ✓

F. SOUNDING EQUIPMENT

Innerspace depth sounder, model 448, serial number 187, was used for echo sounding data collection for the entire survey. No problems were experienced with this echo sounder. ✓

A standard lead line calibrated in meters, serial number 1292, was used during this survey for comparison readings with the echo sounder. No pole soundings were obtained on this survey. ✓

G. CORRECTIONS TO SOUNDINGS

Corrections for the speed of sound through the water column were computed from data obtained with a Seabird Electronics, Seacat Velocity Probe Model 19-03, serial number 192276-287. This instrument was calibrated by the manufacturer on March 19, 1993. A copy of this calibration is in the Survey Separates, section IV.*

Program VELOCITY was used for computing the speed of sound correctors. Speed of sound corrections were applied to the plotter sheets using the HDAPS "Reapply Depth Correctors" function as required by the Field Procedures Manual. Copies of the tables and support documentation are in the Survey Separates, section IV.*

** filed with the survey records*

The following speed of sound casts were taken on this survey:

No.	DN	DATE	Latitude	Longitude	Depth Actual/Extended
1	259	9/16/93	46°26.5'N	086°38.5'W	45.2m/58.7m
2	263	9/20/93	46°26.5'N	086°38.5'W	42.0m/54.5m

Each table was used on the respective day of hydrography, there were only the two days of hydrography, and each is recommended for final processing at the Pacific Hydrographic Section.

Survey records were scanned by AHP employees in accordance with the Hydrographic Manual. Digital readings while scanning took precedence over the analog trace for correcting or inserting significant peaks and deeps between selected soundings, missed depths, incorrectly digitized soundings, and the effects of sea and swell action.

Lead line comparisons were conducted each day of hydrography to determine an instrument corrector. The average corrector for the Innerspace depth sounder, S/N 187, was 0.0 meters. The lead line, calibrated in meters, was checked on 6/23/93. No lead line corrections were necessary. A lead line comparison form, as well as the lead line calibration form, can be found in the Survey Separates.

A static draft of 0.3 meter was applied to all sounding plots using the HDAPS REAPPLY program. The draft was measured by subtracting the difference from a punch mark on the side of launch 1292, 0.6 meters above the transducer, to the water surface.

Settlement and squat measurements for vessel 1292 were performed on March 31, 1993 using the level method. Settlement and squat correctors were applied to all sounding plots using the HDAPS REAPPLY program. Data from the settlement and squat test are included in the Survey Separates, section IV.*

Daily water level correctors determined by readings taken from the staff at station 908-9013, Munising, Michigan were applied to the plotter sheet. The readings were reduced to the IGLD of 1955 for Lake Superior of 600.0 feet (182.88 meters). An abstract of the determination of the daily correctors is included in the Survey Separates.*

Actual water level heights were requested from the Great Lakes Section, N/OES211, in a letter dated November 1, 1993. A copy of the letter is appended to this report.*

* filed with the survey records. ³

H. CONTROL STATIONS

The horizontal control datum for this project is the North American Datum of 1983. Station 001, MFRL was used as the base station antenna site for the Global Positioning System (GPS) for the entire survey. ✓

Station 001, MFRL 1993, was located by GPS observations between NGS first and second order stations and MFRL 1993. Station ABLH (002) was also located by the same methods for use as a DGPS calibration point. Station ABLH was also used for locating the Grand Island East Channel Abandoned Lighthouse, requested by the U.S. Coast Guard. The Horizontal Control Report was written by AHP and submitted with the field records to the Chief, Pacific Photogrammetry Party, N/CG2333. A list of the control stations is ~~appended~~ *attached* to this report. ✓

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS was used as the method of positioning for all hydrographic data on this survey. An Ashtech model XII receiver, serial number 700283E1389 was used for the reference station. An Ashtech Sensor, serial number 700417B1207 was used for the remote station on vessel 1292. Maxxon VHF radios using channel one (Frequency 170.200 MHz) were used as the data link between reference and remote stations. ✓

To confirm the reference site as required by section 3.4.6.3 of the Field Procedures Manual, program MONITOR was run for 24 hours starting on September 13, 1993. The GPS availability at this site was determined to be 99.8% from this test. A copy of the outlier.sum file from the test, showing the statistics, as well as the "Plot of Radial Error in Position", is included in the Survey Separates. *Filed with the survey records* ✓

Performance checks, as required by section 3.4.4 of the Field Procedures Manual, were accomplished by comparing the DGPS position of the vessel to a point established with GPS by AHP to Third-Order standards. Performance checks were obtained daily. "DGPS Fixed Point Performance Check" forms used during this survey are in the Survey Separates. *Filed with the survey records* ✓

The HDOP during this survey never exceeded the maximum allowed value of 3.8. This was calculated by the formula found in the Field Procedures Manual, using an ESE value of 4m, an EPE value of 15m, and an EDE value of 0.2m. ✓

J. SHORELINE

Shoreline shown on the final field sheet plot included with this survey was transferred by hand from TP-01054, 1:10,000 scale from CM-8501, but is for orientation purposes only. Program NADCON was used to determine the correction between the 1927 datum T-map and the 1983 datum survey. Further discussion of shoreline and datum discrepancies is in section O.

No shoreline verification was requested in the Project Instructions for S-Z906-AHP.

K. CROSSLINES

Twelve lines totaling 5.9 miles of hydrography were run crossing the mainscheme. These lines were run to develop the shoal which the mainscheme crosses. These crosslines equal 33% of the total miles of hydrography run. Soundings from the crosslines agree within 0.3m when compared to the mainscheme.

L. JUNCTIONS

Not Applicable.

M. COMPARISON WITH PRIOR SURVEYS *SEE Evaluation Report section 6*

Comparison with prior surveys will be accomplished by N/CG245.

N. ITEM INVESTIGATION REPORTS

One item, number 2364, was assigned and addressed on this project.

N.1 SUMMARY OF ITEMS INVESTIGATED

<u>AWOIS No.</u>	<u>Section</u>	<u>Status</u>	<u>Recommendation</u>
2364	N2.	Resolved	Chart at surveyed position.

N2. AWOIS ITEM 2364

Item Description: Submerged Wreck, 275' Wooden Schooner

Source: CL405/83--CES 14696 OPR-Z451-HSB-81 (BP119371)

AWOIS Position: 46/27/25.53N[✓] 086/36/59.36[✓] ✓

Required Investigation: ES, DI

Charts Affected: 14969

INVESTIGATION

Date(s)/DN(s): 9/20/93

Project/Survey: S-Z906-AHP/FE-385

Position Numbers: 175

Launch Number: 1292

Investigation Used: Echo Sounder/Local Knowledge ✓

Position Determined By: DGPS

Investigation Summary: The wreck is seasonally marked by the Alger Underwater Preserve from May through October. Because no diving capability existed on the field party, an echo sounder search over the wreck was done. A ~~least~~ ^{21.1m (69.2 ft)} depth of 21.1m (69.2 ft) was found over the wreck. This depth is corrected for ~~unverified~~ water levels to LWD IGLD 1955. ^{MINIMUM}

CHARTING RECOMMENDATION

The wreck[✓] should be charted at the surveyed position of 46/27/25.27N, 086/36/53.26W with the presently charted and shoaler least depth of 67 ft (20.4m). ^{CONGRUA}

O. COMPARISON WITH THE CHART

This survey was compared with Chart 14969, 1:30,000 scale, 20th edition, dated February 16/91. This chart is compiled on the North American Datum of 1902.* ✓

No dangers to navigation were identified on this survey. ✓

A valid sounding comparison was impossible because of the discrepancy on chart 14969 discussed in section 6.11.1. of the Project Instructions, which discusses a significant error in longitude on chart 14969. ✓

A comparison of the surveyed position of the Grand Island East Channel Abandoned Lighthouse with the 1986 TP-01054 position shows agreement, while the comparison with chart 14969 shows a 115m disagreement. The lighthouse was located to third-order standards at 46°27'23.91549"N, 086°37'23.07369"W. A NOAA form 76-40 is attached to this report. ✓

The T-map is compiled on a NAD 1927 datum which has a shift value to NAD 1983 of -6.076m of latitude and 12.304m of longitude. The chart is compiled on NAD 1902* datum which has a shift value to NAD 1983 of -15.967m of latitude and 16.752m of longitude. ✓

Without considering the datum shift values, the disagreement between the chart and the T-map and this survey is also evident by a shift of the shoreline approximately 115m west of the T-map shoreline. This same amount of shift is evident when comparing the item 2364 wrecks charted position to the position found by this survey. All of this suggests that chart 14969 is compiled with an approximate 115m longitudinal error. ✓

In summary, it appears that TP-01054 is accurate for a shoreline source for chart 14969 and this chart should be recompiled based on this T-map. Soundings from this survey should supersede those currently charted in the common areas, after the chart is recompiled, *however, retaining the 67 foot depth on the wreck at the presently located position. Latitude 46/27/25.24N Longitude 86/36/53.27W.*

P. ADEQUACY OF SURVEY

This field examination survey is complete and adequate for use in nautical chart updating. ✓

* Theoretically the chart is compiled on NAD 02, however it appears to be on an arbitrary unknown datum.

Q. AIDS TO NAVIGATION

The green lighted bell buoy, G"3", BELL, USCG 1992 Light List Number 13915 and red nun buoy, R"4", USCG 1992 Light List Number 13920 were the only aids to navigation addressed on this survey. ✓

^{32.75}
The G"3" buoy was found in 39ft (12m) of water at 46°27'28.24"N, 086°36'43.00"W. This buoy adequately marks the Sand Point Shoal, which is its intended purpose. This location is about 50 meters west of the charted location, which shows the buoy in 3 feet of water. This disagreement does not take into account the chart compilation error discussed in section O. ✓

Buoy JRN"4" was found in 60ft (18.3m) of water at 46°27'28.24"N, 086°37'02.91"W. This location is 50m south of the charted location, and adequately marks the western side of the natural channel. Again, the compilation error of the chart was not accounted for when comparing the positions. ✓

No other aids to navigation were addressed as part of FE-385. ✓

R. STATISTICS

Description

Total Positions	177
Detached Positions	5
Total Miles of Hydrography	17.9
Bottom Samples	2
Velocity Casts	2
Water Level Stations	1
Days of Production	2

 ✓

S. MISCELLANEOUS

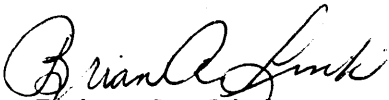
Two bottom samples were taken on this survey. Submission of the samples was not requested by the Smithsonian Institution. ✓

T. RECOMMENDATIONS

No additional field work is required on this survey to comply with the Project instructions. Specific survey recommendations are made in section O. ✓

U. REFERRAL TO REPORTS

<u>Title</u>	<u>Transmittal Information</u>
Horizontal Control Report for S-Z906-AHP	Pacific Photogrammetry Party (N/CG2333) Seattle, WA 12/93
User Evaluation Report S-Z906-AHP	Pacific Hydrographic Section (N/CG245) Seattle, WA 12/93
Coast Pilot Report S-Z906-AHP	Pacific Hydrographic Section (N/CG245) Seattle, WA 9/93

Submitted by:  Brian A. Link
Atlantic Hydrographic Party

APPROVAL SHEET

FIELD EXAMINATION

S-Z906-AHP

AHP-10-13-93

FE-385

1993

This field examination was conducted in accordance with the project instructions for S-Z906-AHP, the hydrographic manual, the hydrographic survey guidelines, and the field procedures manual. The survey data and reports were completed under frequent supervision. All sounding plots were reviewed in their entirety and all supporting records were checked.

This survey is complete for the area described in Section B of this report.



James E. Waddell, Jr.
Lieutenant Commander, NOAA
Chief, Atlantic Hydrographic Party

Control Station List
S-Z906-AHP
FE-385
AHP-10-13-93

001	-	46°24'53.96090"N	086°39'40.65867"W	MFRL	1993
002	-	46°27'23.78730"N	086°37'22.87355"W	ABLH	1993

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service

Water Level Note for Hydrographic Sheet

ORIGINAL

Processing Division : Pacific Hydrographic Section (N/CG 245)
Seattle, WA

Hourly heights are approved for: Munising Harbor, MI (909-9013)
Water Level Station

Period: 9/16/93 (259) and 9/20/93 (263)

Hydrographic Sheet: AHP-10-13-93

Registry No: FE-385

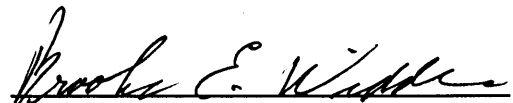
Project: S-Z906-AHP

Locality: Michigan, Lake Superior
Grand Island Harbor

Plane of reference: Low Water Datum (IGLD 1955 : 600.0 Feet)

Remarks: The following hourly heights are approved for Munising
Harbor station 909-9013:

<u>UTC</u>	<u>9/16/93</u> (259)	<u>UTC</u>	<u>9/20/93</u> (263)
1700	601.36	1300	601.26
1800	601.16	1400	601.26
1900	601.16	1500	601.26
2000	601.26	1600	601.26
2100	601.36		


Chief, Great Lakes Section
1-14-94

GEOGRAPHIC NAMES

FE-385

Name on Survey	<div style="display: flex; justify-content: space-between;"> A ON CHART NO. 14969 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 </div>											
	GRAND ISLAND	X										
GRAND ISLAND HARBOR	X											2
MICHIGAN (title)	X											3
SAND POINT	X											4
SUPERIOR, LAKE	X											5
THUMB	X											6
												7
												8
												9
												10
												11
												12
												13
												14
												15
									Approved:			16
									<i>Charles E. Harrington</i>			17
										Chief Geographer - N/CG245		
												19
									JUL - 8 1994			20
												21
												22
												23
												24
												25

15

HYDROGRAPHIC SURVEY STATISTICS

FE-385

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION			AMOUNT
SMOOTH SHEET		In Report	SMOOTH OVERLAYS: POS., ARC, EXCESS			
DESCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS			3
DESCRIP-TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/SOURCE DOCUMENTS	
ACCORDION FILES						
ENVELOPES	1					
VOLUMES						
CAHIERS						
BOXES						

SHORELINE DATA

SHORELINE MAPS (List): TP-01054

PHOTOBATHYMETRIC MAPS (List):

NOTES TO THE HYDROGRAPHER (List):

SPECIAL REPORTS (List):

NAUTICAL CHARTS (List): 14969 20th Ed., 2/16/91

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			168	
POSITIONS REVISED				
SOUNDINGS REVISED				
CONTROL STATIONS REVISED				
	TIME-HOURS			
	VERIFICATION	EVALUATION	TOTALS	
PRE-PROCESSING EXAMINATION				
VERIFICATION OF CONTROL				
VERIFICATION OF POSITIONS	18		18	
VERIFICATION OF SOUNDINGS	21		21	
VERIFICATION OF JUNCTIONS				
APPLICATION OF PHOTOBATHYMETRY				
SHORELINE APPLICATION/VERIFICATION				
COMPILATION OF SMOOTH SHEET	21		21	
COMPARISON WITH PRIOR SURVEYS AND CHARTS		13	13	
EVALUATION OF SIDE SCAN SONAR RECORDS				
EVALUATION OF WIRE DRAGS AND SWEEPS				
EVALUATION REPORT		12	12	
GEOGRAPHIC NAMES				
OTHER: Digitization				
*USE OTHER SIDE OF FORM FOR REMARKS	TOTALS	60	25	85

Pre-processing Examination by LT Donald Haines	Beginning Date 1/13/94	Ending Date 1/20/94
Verification of Field Data by Gordon E. Kay	Time (Hours) 60	Ending Date 6/20/94
Verification Check by	Time (Hours)	Ending Date
Evaluation and Analysis by Gordon E. Kay	Time (Hours) 25	Ending Date 7/6/94
Inspection by Dennis Hill	Time (Hours) 4	Ending Date 7/15/94

NOAA FORM 76-40
(8-74)

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

ORIGINATING ACTIVITY

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

Replaces C&GS Form 567.

- 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
- TO BE REVISED
- TO BE DELETED

REPORTING UNIT
(Field Party, Ship or Office)

AHP

STATE

MICHIGAN

LOCALITY

GRAND ISLAND HARBOR

DATE

9/93

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

PROJECT NO.

S-2906

JOB NUMBER

SURVEY NUMBER

FE-385

DATUM

NAD 1983

METHOD AND DATE OF LOCATION

(See instructions on reverse side)

CHARTS
AFFECTED

POSITION

CHARTING
NAME

DESCRIPTION
(Record reason for deletion of landmark or aid to navigation.
Show triangulation station names, where applicable, in parentheses)

LATITUDE

LONGITUDE

° ' "

D.M. Meters

° ' "

D.P. Meters

OFFICE

FIELD

ABAND
LH

GRAND ISLAND EAST CHANNEL
ABANDONED LIGHTHOUSE

46 27

23.41549

86 37

23.07369

F-2-6-L

14969

RESPONSIBLE PERSONNEL

TYPE OF ACTION	NAME	ORIGINATOR
OBJECTS INSPECTED FROM SEAWARD	<i>BRIAN A. LINK</i>	<input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
POSITIONS DETERMINED AND/OR VERIFIED	<i>BRIAN A. LINK</i>	FIELD ACTIVITY REPRESENTATIVE
		OFFICE ACTIVITY REPRESENTATIVE
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES		<input type="checkbox"/> REVIEWER <input type="checkbox"/> 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.

EVALUATION REPORT

FE-385

1. INTRODUCTION

Survey FE-385 is a field examination survey accomplished by the Atlantic Hydrographic Party under the following Project Instructions.

S-Z906-AHP, dated August 6, 1993

This survey was conducted in Michigan, and covers an area in Lake Superior situated near Grand Island Harbor. The surveyed area is bounded by latitude 46/28/00N to the north and latitude 46/27/07N to the south. The eastern limit is longitude 86/36/05W. The western limit is longitude 86/37/12W. Depths range from one-half meter on the shoal to 36.0 meters.

Depth curves depicted on the smooth sheet were selected from those authorized through HSG 69. However, instead of drafting all authorized curves only those curves that were coincidental to the depth curves on the largest scale chart was drafted. The selected curves on this survey are the 6 and 18-foot curves (2 and 5-meter curves). A note has been added to the smooth sheet to identify these values.

Field water level reductions of soundings were determined from unverified heights obtained from the actual heights (one reading a day) from Munising, Michigan, (908-9013) gage. These values were used for the reduction of soundings during field processing. Approved hourly heights zoned from Munising Harbor, Michigan, (gage 909-9013) were used during office processing.

The field sheet parameters have been revised to center the hydrography on the smooth sheet and to change the projection to polyconic. NAD 83 is used as the horizontal datum for plotting and position computation. The offset values and sound velocity correctors are adequate. An accompanying computer printout contains the parameters and the correctors.

A digital file has been generated for this survey that includes categories of information required to comply with 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 a complete depiction of the survey data.

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 found in the Horizontal Control Report for S-Z906-AHP, dated September 1993.

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 3.80 was computed for survey operations. After reviewing all survey data, none of the data exceeds an HDOP value of 3.80.

Positions of horizontal control stations used during this survey are field values based on NAD 83.

The smooth sheets and accompanying overlays are annotated with an NAD 27 adjustment tick 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:	0.210 seconds	(6.481 meters)
Longitude:	-0.534 seconds	(-11.405 meters)

The year of establishment of control stations shown on the smooth sheet originates with the previously referenced horizontal control report and the hydrographer's signal list.

Shoreline is from registered shoreline map TP-01054, at a scale of 1:10,000, on NAD 1927. According to Project Instructions, section 4.1.1, this survey follows navigable area survey guidelines and does not require shoreline verification. Therefore, the shoreline on the smooth sheet is in brown ink and is for orientation purposes only.

3. HYDROGRAPHY

Except as note below, and elsewhere in this report, hydrography is adequate to:

- a. delineate the bottom configuration, determine least depths, and draw the required 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.

Standard charted depth curves were adequately drawn and developed except for the zero curve, this is because the inshore limit as defined by the Project Instructions, section 1.8. is 0.7 meters under the keel. Depth curves shown on the smooth sheet are the 2 and 5-meter curves.

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, March 1993 Edition, except as follows.

The survey found a minimum depth of ⁶⁹~~70~~ feet (21.⁰~~3~~ meters) over a sunken wreck, AWOIS item 2364. This depth is two feet deeper than the previous reported least depth of 67 feet (CL405/83 survey 1983, CES 14696-OPR-Z451-HSB-81, BP119371). The reason for this difference of 3 feet was never investigated by the field party nor was the required sounding line spacing adequate to alter the previously reported least depth. According to surveying specifications listed in FPM 7.2.3.2, the minimum line spacing required to adequately investigate this feature using an echo sounder is 18 meters. The hydrographer performed only 50 meter line spacing.

5. JUNCTIONS

Not applicable.

6. COMPARISON WITH PRIOR SURVEYS

Survey FE-385 was compared with the following prior surveys.

LS-220 (1859), 1:16,000, local datum

LS-1125 (1906), 1:5,000, local datum

The comparison between the prior and present surveys was accomplished using same scale graphics with best fit alignment along the shoreline of Sand Point and the Thumb on Grand Island. Soundings from these prior surveys do not fit well to the present survey data. This poor fit is attributed to differences in vertical and horizontal datums and the standards of equipment used on the surveys.

There are no AWOIS items that originate with these prior surveys within the common area.

Survey FE-385 is adequate to supersede these prior surveys within the area of common coverage.

7. COMPARISON WITH CHART

Survey FE-385 was compared with the following chart.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
14969	20th	February 16, 1991	1:30,000	NA-1902 <i>See note; Hydro Report - page 7</i>

a. Hydrography

Charted hydrography originates with ~~the prior surveys mentioned in section 6 and miscellaneous sources.~~ *Chart Evaluation Survey 14969-OPR-Z451, Filed as CL405/83; BP119371.*

With the exception of the charted 67 foot least depth over the wreck, survey FE-385 is adequate to supplement the charted hydrography within the survey area.

b. AWOIS

There is one AWOIS item assigned for investigated within the limits of this survey. This item is AWOIS number 2364, a sunken wreck. This feature position was verified, however, the least depth was not verified. See discussions in sections 4 and 9 of this report and in the hydrographer's report.

c. Controlling Depths

There are no charted channels with controlling depths within the limits of this survey.

d. Aids to Navigation

During this survey the following aids to navigation were positioned.

<u>Aid</u>	<u>Light List Number</u>	<u>Latitude North</u>	<u>Longitude West</u>
Trout Point Lighted Bell Buoy 3	314590	46/27/28.25	086/37/02.98
Sand Point Lighted Bell Buoy 4	314595	46/27/32.75	086/36/44.00

Grand Island East Channel Abandoned Lighthouse was located as requested in the Project Instructions. This light was located at latitude 46/27/23.91549N, longitude 86/37/23.07369W.

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


No dangers to navigation were discovered during this survey. No dangers were found during office processing.

8. COMPLIANCE WITH INSTRUCTIONS

With the exception of the investigation of AWOIS item 2364 survey FE-385 adequately complies with the Project Instructions.

9. ADDITIONAL FIELD WORK

With the exception of the investigation of AWOIS item 2364 this is an adequate hydrographic survey.


Gordon E. Kay
Cartographer

APPROVAL SHEET
FE-385

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.

Dennis Hill

Date: 7/15/94

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.

Kathryn A. Timmons

Date: 7/26/94

Commander Kathryn A. Timmons, NOAA
Chief, Pacific Hydrographic Section

Final Approval

Approved:

J. Austin Yeager

Date: 10/27/94

J. Austin Yeager
Rear Admiral, NOAA
Director, Coast and Geodetic Survey

FE-385

MICHIGAN, LAKE SUPERIOR GRAND ISLAND HARBOR

Date of Survey: September 1993

Scale: 1: 10,000

Soundings in METERS AND DECIMETERS at IGLD 1955

Datum: NAD 1983

AWOIS item: 2364

Sheet 1 of 1

Shoreline in brown for orientation only: Shoreline map TP-01054

86° 37' 00"

Depth Curves

2 m - Green

5 m - Red

46°28'00"

NAD 27

46° 28' 00"

7/1/94 G.E.K.
v.c.z.d.

GRAND ISLAND

LAKE SUPERIOR

THUMB

46°27'30"

002

ABLH, 1993

(field position)
(Abandoned Lighthouse)
(Landmark: 30 meters above ground)

GRAND ISLAND HARBOR

SAND POINT

86° 37' 30"

86° 37' 00"

86° 36' 30"

