

TP 00013

TP 00013

NOAA FORM 76-35 (3-76)	
U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SURVEY	
<h2 style="text-align: center;">DESCRIPTIVE REPORT</h2>	
THIS MAP EDITION WILL NOT BE FIELD EDITED	
<i>Map No.</i> TP-00013	<i>Edition No.</i> 1
<i>Job No.</i> CM-7901	
<i>Map Classification</i> CLASS III (FINAL)	
<i>Type of Survey</i> SHORELINE	
<h3 style="text-align: center;">LOCALITY</h3>	
<i>State</i> MICHIGAN	
<i>General Locality</i> LAKE MICHIGAN	
<i>Locality</i> LUDINGTON HARBOR	
<div style="border: 1px solid black; padding: 5px; text-align: center;">           1979 and 1982         </div>	
<h3 style="text-align: center;">REGISTRY IN ARCHIVES</h3>	
<i>DATE</i>	

NOAA FORM 76-36A (3-72)		U. S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMIN.	
<b>DESCRIPTIVE REPORT - DATA RECORD</b>		TYPE OF SURVEY <input checked="" type="checkbox"/> ORIGINAL <input type="checkbox"/> RESURVEY <input type="checkbox"/> REVISED	
PHOTOGRAMMETRIC OFFICE Coastal Mapping Unit Atlantic Marine Center, Norfolk, VA OFFICER-IN-CHARGE A. Y. Bryson, CDR		SURVEY TP. <u>00013</u> MAP EDITION NO. <u>(1)</u> MAP CLASS <u>III (FINAL)</u> JOB <u>CM-7901</u> LAST PRECEDING MAP EDITION TYPE OF SURVEY <input type="checkbox"/> ORIGINAL <input type="checkbox"/> RESURVEY <input type="checkbox"/> REVISED JOB PH. _____ MAP CLASS _____ SURVEY DATES: 19__ TO 19__	
<b>I. INSTRUCTIONS DATED</b>			
1. OFFICE		2. FIELD	
Aerotriangulation January 20, 1982 Compilation November 30, 1982		Horizontal Control February 15, 1980 (Photoidentification)	
<b>II. DATUMS</b>			
1. HORIZONTAL: <input checked="" type="checkbox"/> 1927 NORTH AMERICAN		OTHER (Specify)	
2. VERTICAL: <input type="checkbox"/> MEAN HIGH-WATER <input type="checkbox"/> MEAN LOW-WATER <input type="checkbox"/> MEAN LOWER LOW-WATER <input type="checkbox"/> MEAN SEA LEVEL		OTHER (Specify) International Great Lake Datum (1955) Lake Michigan Low Water Datum	
3. MAP PROJECTION Lambert Conformal		4. GRID(S) STATE <u>Michigan</u> ZONE <u>Central</u> STATE _____ ZONE _____	
5. SCALE 1:5,000			
<b>III. HISTORY OF OFFICE OPERATIONS</b>			
OPERATIONS		NAME	DATE
1. AEROTRIANGULATION BY METHOD: <u>Analytic</u> LANDMARKS AND AIDS BY		<u>L. Harrod, Jr.</u>	<u>May 1982</u>
2. CONTROL AND BRIDGE POINTS PLOTTED BY METHOD: <u>Coradomat</u> CHECKED BY		<u>D. Norman</u> <u>L. Harrod, Jr.</u> <u>D. Norman</u>	<u>May 1982</u> <u>May 1982</u> <u>May 1982</u>
3. STEREOSCOPIC INSTRUMENT PLANIMETRY BY COMPILATION CHECKED BY INSTRUMENT: <u>Wild B-8</u> CONTOURS BY SCALE: <u>1:5,000</u> CHECKED BY		<u>C. Klein</u> <u>R. Kravitz</u> <u>NA</u> <u>NA</u>	<u>Nov. 1982</u> <u>Dec. 1982</u>  
4. MANUSCRIPT DELINEATION PLANIMETRY BY CHECKED BY METHOD: <u>Smooth Drafted</u> CONTOURS BY CHECKED BY SCALE: <u>1:5,000</u> HYDRO SUPPORT DATA BY CHECKED BY		<u>C. Klein</u> <u>F. Mauldin</u> <u>NA</u> <u>NA</u> <u>C. Klein</u> <u>F. Mauldin</u>	<u>Nov. 1982</u> <u>Jan. 1983</u>   <u>Dec. 1982</u> <u>Feb. 1983</u>
5. OFFICE INSPECTION PRIOR <del>TO RELEASE</del> Final Review		<u>F. Mauldin</u>	<u>Feb. 1983</u>
6. APPLICATION OF FIELD EDIT DATA BY CHECKED BY		<u>NA</u> <u>NA</u>	 
7. COMPILATION SECTION REVIEW BY		<u>F. Mauldin</u>	<u>Feb. 1983</u>
8. FINAL REVIEW (Final Class III) BY		<u>J. Hancock</u>	<u>April 1983</u>
9. DATA FORWARDED TO PHOTOGRAMMETRIC BRANCH BY		<u>J. Hancock</u>	<u>April 1983</u>
10. DATA EXAMINED IN PHOTOGRAMMETRIC BRANCH BY		<u>G. Fromm</u>	<u>June 1983</u>
11. MAP REGISTERED - COASTAL SURVEY SECTION BY		<u>R. Norman</u>	<u>May 1984</u>

TP-00013  
COMPILATION SOURCES

## 1. COMPILATION PHOTOGRAPHY

CAMERA(S) Wild RC 10(B), "B" = 152.74mm Wild RC 10(Z), "Z" = 153.15 mm <del>Wild RC 10(Z), "Z" = 153.15 mm</del> Water Level Gage		TYPES OF PHOTOGRAPHY LEGEND (C) COLOR (P) PANCHROMATIC (I) INFRARED		TIME REFERENCE ZONE Eastern MERIDIAN 75th		<input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> DAYLIGHT
<input type="checkbox"/> PREDICTED TIDES <input checked="" type="checkbox"/> REFERENCE STATION RECORDS <input type="checkbox"/> TIDE CONTROLLED PHOTOGRAPHY						
NUMBER AND TYPE	DATE	TIME	SCALE	*STAGE OF <del>Sea</del> Lake level		
79 B(C) 1454-1457	7/2/79	10:32	1:15,000	**580.06 ft.		
82 Z(C) 3012-3017	7/1/82	13:52	1:15,000	579.00 ft.		

REMARKS \*The 1955 International Great Lakes Datum for Lake Michigan is 576.8 ft. Water levels at time of photography are indicated as they were recorded from the Ludington water level gage.

## 2. SOURCE OF MEAN HIGH-WATER LINE:

The term "Mean High Water Line" is not applicable. The shoreline is defined as the visible line of contact on the photographs between land and water. Delineation of the shoreline was derived by photo interpretation of the above listed 1979 photographs. Current 1982 photographs were used to supplement shoreline compilation in areas that have been developed by construction and dredging since the 1979 photography. Refer to the Compilation Report for delineation of shoreline detail.

\*\*The mapping (shoreline) datum for this map is the lake level (580.06) according to the 1979 base photography.

## 3. SOURCE OF MEAN LOW-WATER OR MEAN LOWER LOW-WATER LINE:

Not applicable

## 4. CONTEMPORARY HYDROGRAPHIC SURVEYS (List only those surveys that are sources for photogrammetric survey information.)

SURVEY NUMBER	DATE(S)	SURVEY COPY USED	SURVEY NUMBER	DATE(S)	SURVEY COPY USED

## 5. FINAL JUNCTIONS

NORTH	EAST	SOUTH	WEST
No Survey	No Survey	No Survey	No Survey

## REMARKS

This project consists of one sheet and does not junction with any known contemporary survey in the area.

NOAA FORM 76-36C  
(3-72)CM-7901  
TP-00013U. S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL OCEAN SURVEY

## HISTORY OF FIELD OPERATIONS

I. ☒ FIELD INSPECTION OPERATION (Horizontal Control) ☐ FIELD EDIT OPERATION

OPERATION	NAME	DATE
1. CHIEF OF FIELD PARTY	J. Dunford	August 1981
2. HORIZONTAL CONTROL	RECOVERED BY J. Dunford	August 1981
	ESTABLISHED BY J. Dunford	August 1981
	PRE-MARKED OR IDENTIFIED BY J. Dunford	August 1981
3. VERTICAL CONTROL	RECOVERED BY None	
	ESTABLISHED BY None	
	PRE-MARKED OR IDENTIFIED BY None	
4. LANDMARKS AND AIDS TO NAVIGATION	RECOVERED (Triangulation Stations) BY J. Dunford	August 1981
	LOCATED (Field Methods) BY None	
	IDENTIFIED BY None	
5. GEOGRAPHIC NAMES INVESTIGATION	TYPE OF INVESTIGATION <input type="checkbox"/> COMPLETE <input type="checkbox"/> SPECIFIC NAMES ONLY <input checked="" type="checkbox"/> NO INVESTIGATION	
6. PHOTO INSPECTION	CLARIFICATION OF DETAILS BY None	
7. BOUNDARIES AND LIMITS	SURVEYED OR IDENTIFIED BY NA	

## II. SOURCE DATA

1. HORIZONTAL CONTROL IDENTIFIED		2. VERTICAL CONTROL IDENTIFIED	
		None	
PHOTO NUMBER	STATION NAME	PHOTO NUMBER	STATION DESIGNATION
79 B(C)1096	Big Sable Lighthouse, 1932 (Sub Pts. A & B)		
79 B(C)1091	McDonald, 1932 (Sub Pts. A & B)		
79 B(C)1087	TT No. 36 TEX USGS, 1932 (Sub Pts. A & B)		

## 3. PHOTO NUMBERS (Clarification of details)

None

## 4. LANDMARKS AND AIDS TO NAVIGATION IDENTIFIED

None

PHOTO NUMBER	OBJECT NAME	PHOTO NUMBER	OBJECT NAME

5. GEOGRAPHIC NAMES: ☐ REPORT ☒ NONE6. BOUNDARY AND LIMITS: ☐ REPORT ☐ NONE

## 7. SUPPLEMENTAL MAPS AND PLANS

None

## 8. OTHER FIELD RECORDS (Sketch books, etc. DO NOT list data submitted to the Geodesy Division)

Field Report

1 Bound Notebook including 3 CSI Cards and field observations

NOAA FORM 76-36D  
(3-72)U. S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATIONTP-00013  
RECORD OF SURVEY USE

## I. MANUSCRIPT COPIES

COMPILATION STAGES			DATE MANUSCRIPT FORWARDED	
DATA COMPILED	DATE	REMARKS	MARINE CHARTS	HYDRO SUPPORT
Compilation complete	Feb. 1983	Class III Manuscript	None	None
Final Review, Class III	April 1983	Final Class III Map No field edit performed	Sept 20, 83	Sept 20, 83

## II. LANDMARKS AND AIDS TO NAVIGATION

## 1. REPORTS TO MARINE CHART DIVISION, NAUTICAL DATA BRANCH

NUMBER (pages)	CHART LETTER NUMBER ASSIGNED	DATE FORWARDED	REMARKS
2	902	Sept 20, 83	Landmarks for charts
1	"	"	Navigational Aids for Charts

2. ☐ REPORT TO MARINE CHART DIVISION, COAST PILOT BRANCH. DATE FORWARDED: \_\_\_\_\_3. ☐ REPORT TO AERONAUTICAL CHART DIVISION, AERONAUTICAL DATA SECTION. DATE FORWARDED: \_\_\_\_\_

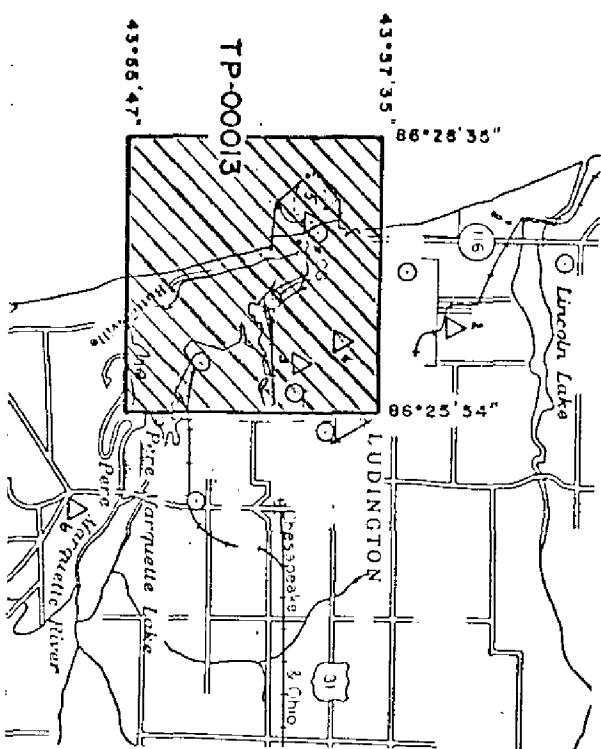
## III. FEDERAL RECORDS CENTER DATA

1. ☒ BRIDGING PHOTOGRAPHS; ☒ DUPLICATE BRIDGING REPORT; ☒ COMPUTER READOUTS.  
 2. ☒ CONTROL STATION IDENTIFICATION CARDS; ☐ FORM ~~NOA 577~~ SUBMITTED BY FIELD PARTIES. 76-40  
 3. ☐ SOURCE DATA (except for Geographic Names Report) AS LISTED IN SECTION II, NOAA FORM 76-36C.  
 ACCOUNT FOR EXCEPTIONS:

4. ☐ DATA TO FEDERAL RECORDS CENTER. DATE FORWARDED: MARCH 1984

## IV. SURVEY EDITIONS (This section shall be completed each time a new map edition is registered)

SECOND EDITION	SURVEY NUMBER TP - _____ (2)	JOB NUMBER PH - _____	TYPE OF SURVEY <input type="checkbox"/> REVISED <input type="checkbox"/> RESURVEY  MAP CLASS <input type="checkbox"/> II. <input type="checkbox"/> III. <input type="checkbox"/> IV. <input type="checkbox"/> V. <input type="checkbox"/> FINAL
	DATE OF PHOTOGRAPHY	DATE OF FIELD EDIT	
THIRD EDITION	SURVEY NUMBER TP - _____ (3)	JOB NUMBER PH - _____	TYPE OF SURVEY <input type="checkbox"/> REVISED <input type="checkbox"/> RESURVEY  MAP CLASS <input type="checkbox"/> II. <input type="checkbox"/> III. <input type="checkbox"/> IV. <input type="checkbox"/> V. <input type="checkbox"/> FINAL
	DATE OF PHOTOGRAPHY	DATE OF FIELD EDIT	
FOURTH EDITION	SURVEY NUMBER TP - _____ (4)	JOB NUMBER PH - _____	TYPE OF SURVEY <input type="checkbox"/> REVISED <input type="checkbox"/> RESURVEY  MAP CLASS <input type="checkbox"/> II. <input type="checkbox"/> III. <input type="checkbox"/> IV. <input type="checkbox"/> V. <input type="checkbox"/> FINAL
	DATE OF PHOTOGRAPHY	DATE OF FIELD EDIT	



CM-7901  
 LUDINGTON HARBOR  
 LAKE MICHIGAN  
 MICHIGAN  
 SHORELINE MAPPING  
 SCALE 1:5,000

SUMMARY TO ACCOMPANY  
DESCRIPTIVE REPORT

CM-7901  
TP-00013

This 1:5,000 scale final Class III shoreline map comprises project CM-7901, Ludington Harbor, Lake Michigan, Michigan.

The purpose of this project was to provide current charting information for nautical chart maintenance. No contemporary hydrographic activity was scheduled with this mapping project; however, a "notes to hydrographer" print was prepared to assist in future surveys.

This final Class III shoreline map portrays a portion of Lake Michigan featuring Ludington Harbor and the navigable waters of Pere Marquette Lake.

Photo coverage was adequately provided by one strip of 1:30,000 scale and one strip of 1:15,000 scale natural color photographs, both exposed with the Wild RC-10 (B) camera. The 1:30,000 scale photographs were taken June 11, 1979 for aerotriangulation and the 1:15,000 scale photographs were taken July 2, 1979 for compilation. An additional strip of natural color photography was taken June 1, 1982, using the RC-10 (Z) camera at 1:15,000 scale to supplement the base compilation. These photographs were used to assist in photo interpretation and for delineation of new marine facilities that have been constructed since the 1979 photography.

Field work prior to compilation was accomplished in August 1981; this involved the establishment of horizontal control by field photo-identification methods specified to meet aerotriangulation requirements.

Analytic aerotriangulation of the 1979 photography was adequately provided by the Washington Science Center in May 1982. Afterwards, when the June 1, 1982, photographs were available, aerotriangulated control points were transferred to one stereo-model covering the harbor entrance area, permitting compilation using instrument methods.

Compilation was performed by the Coastal Mapping Unit at the Atlantic Marine Center in February 1983. The map was compiled from the 1979 photography and supplemented by the 1982 photographs as indicated in the Compilation Report.

There was no field edit accomplished for this map.

Final review was performed at the Atlantic Marine Center in April 1983. A Chart Maintenance Print was prepared and forwarded to the Marine Charts

CM-7901  
TP-00013

Branch. Also a copy of this Class III map was prepared as "Notes to Hydrographer."

This Descriptive Report contains all pertinent information used to compile this Final Class III map. The original base manuscript and all related data were forwarded to the Washington Science Center for final registration.



## FIELD INSPECTION

TP-00013

CM-7901

There was no field inspection prior to compilation. Field work accomplished was limited to the recovery and identification of the horizontal control necessary for the aerotriangulation of the project.

## PROJECT REPORT

CM-7901

LUDINGTON HARBOR  
LAKE MICHIGAN  
MICHIGAN

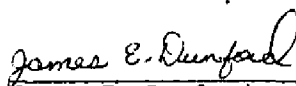
The Project was completed according to Project Instructions from  
OA/C3 - Roger Lanier, dated 2/15/80.

Three horizontal control stations were photoidentified in the areas indicated on the control requirement diagram. Two substitute stations were established by 3rd order traverse for each station. No control could be found in the area of Station No. 1. A 3rd order traverse was made from Big Sable Lighthouse to the substitute stations.

Field work was accomplished during this period 8/6/81 to 8/9/81 excluding driving time to and from Project.

All records and data sent to OA/C3415.

Submitted by:

  
James E. Dunford

Photogrammetric Plot Report  
Ludington Harbor Lake Michigan, Michigan

CM-7901  
May 1982

21. Area Covered

This area covered by this report is Ludington Harbor Lake Michigan, Michigan. It is covered by one (1) 1:5,000 scale manuscript, TP-00013.

22. Method

Two strips of color photographs were bridged by standard analytic aerotriangulation methods and adjusted to ground on the Lambert Conformal State Plane Coordinate System, Michigan Central Zone. One strip was 1:30,000 scale and the other was 1:15,000 scale photography.

23. Adequacy of Control

The horizontal control provided was sparse. Tie points were picked on the 1:30,000 scale photos and transferred to the 1:15,000 scale photos to supplement photoidentified control, strengthen and ensure adequate junctioning between the strips, as well as for additional control for the strip adjustments. The project will meet national standards of map accuracy.

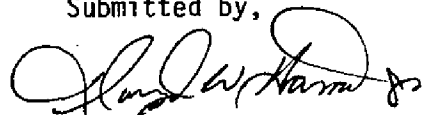
24. Supplemental Data

Vertical control was taken from USGS quads.

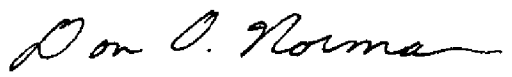
25. Photography

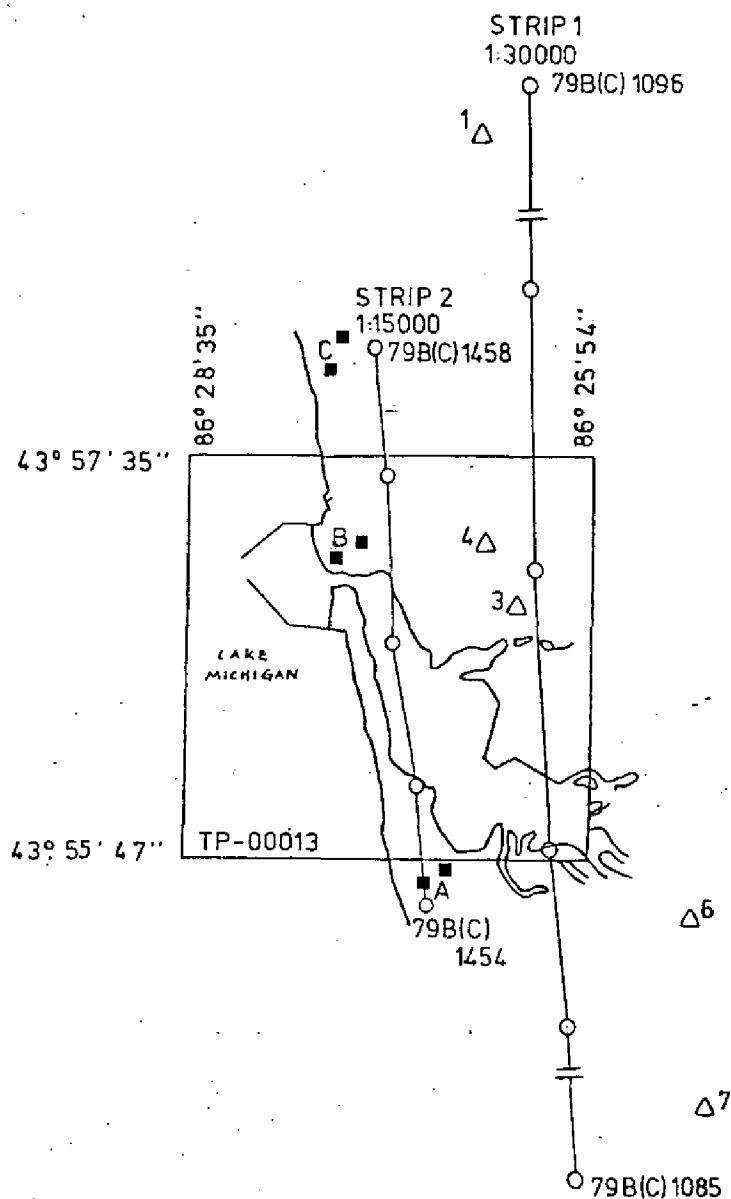
The coverage and quality of the photographs proved adequate for the project. The photographs in the area of Ludington Harbor South Pierhead Light are obsolete. Additional photographs will be taken this summer to cover this area.

Submitted by,

  
Lloyd W. Harrod, Jr.

Approved and Forwarded:

  
Don O. Norman  
Chief, Aerotriangulation Section



CM-7901  
LUDINGTON HARBOR  
LAKE MICHIGAN  
MICHIGAN  
SHORELINE MAPPING  
SCALE 1:5,000

LEGEND  
△ TRIANGULATION  
■ TIE POINT

CM-7901

## Ludington Harbor Lake Michigan, Michigan

Fit to Control -X and Y in Feet

	<u>Strip 1</u>		<u>X</u>	<u>Y</u>
▲ 7. TT # 36 Tex	Sub pt. 1	(088101)	.000	.000
	Sub pt. 2	(088102)	1.615	-.592
▲ 6. McDonald	Sub pt. 1	(092101)	.000	.000
3. Ludington, Emanuel Lutheran Church Spire 1932		(093111)	1.668	-.809
4. Ludington, Mason City Courthouse, Cupola, 1932		(093110)	1.907	1.657
▲ 1. Big Sable Light	Sub pt. 1	(096101)	.000	.000
	Sub pt. 2	(096102)	-.892	.964
▲	Stations held in the strip adjustments			

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Ludington Harbor Lake Michigan, Michigan

Fit to Control -X and Y in Feet

	<u>Strip 2</u>	<u>X</u>	<u>Y</u>
▲ A - Tie from Strip 1	(454801)	-.094	-.232
▲ A - " " " "	(454802)	-.097	.270
" " " "	(454803)	.427	-.369
" " " "	(454804)	-1.768	-1.435
▲ B - Tie from Strip 1	(456801)	.128	-.144
▲ B - Tie from Strip 1	(456802)	-.190	.055
" " " "	(456803)	1.835	-.652
" " " "	(456804)	-.655	-.357
3 - Ludington Emanuel Lutheran Church Spire, 1932	(456111)	2.377	.892
4 - Ludington, Mason City Courthouse Cupola, 1932	(456110)	2.133	1.291
▲ C - Tie from Strip 1	(458801)	.539	.318
▲ C - " " " "	(458802)	-.481	-.267
" " " "	(458803)	.877	-1.014
" " " "	(458804)	1.275	-1.013
▲ Stations held in the strip adjustments			

CM-7901  
Ludington Harbor Lake Michigan, Michigan  
May 1982

Ratio values for 1:15,000 scale color bridging photographs

79B(C) 1454-1458      X 2.97

## DESCRIPTIVE REPORT CONTROL RECORD

MAP NO. TP-00013	JOB NO. CM-7901	SOURCE OF INFORMATION (Index)	AEROTRI- ANGULATION POINT NUMBER	GEODETIC DATUM NA 1927		ORIGINATING ACTIVITY Coastal Mapping Unit Atlantic Marine Center, Norfolk, VA		
				STATE ZONE	Central	COORDINATES IN FEET STATE ZONE	Geographic Position $\phi$ LATITUDE $\lambda$ LONGITUDE	REMARKS
LUDINGTON EMANUEL LUTH. CHURCH SPIRE, 1932 r65 (N.D.)	Quad 430861 Sta 1017	3		X=	1,444,709.46	$\phi$	43°57'05".92	
				Y=	238,725.49	$\lambda$	86°26'30".52	
LUDINGTON, MASON CO. COURT- HOUSE, CUPOLA, 1932 r65 (N.D.)	Quad 430861 Sta 1023	4		X=	1,444,107.68	$\phi$	43°57'18".107	
				Y=	239,975.73	$\lambda$	86°26'39".187	
				X=		$\phi$		
				Y=		$\lambda$		
				X=		$\phi$		
				Y=		$\lambda$		
				X=		$\phi$		
				Y=		$\lambda$		
				X=		$\phi$		
				Y=		$\lambda$		
				X=		$\phi$		
				Y=		$\lambda$		
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				X=		$\phi$		
				Y=		$\lambda$		
				X=		$\phi$		
				Y=		$\lambda$		
				X=		$\phi$		
				Y=		$\lambda$		
COMPUTED BY				COMPUTATION CHECKED BY				DATE
LISTED BY C. J. Klein		DATE 11/30/82		LISTING CHECKED BY K. Kravitz				DATE 12/7/82
				HAND PLOTTING BY				DATE



## COMPILATION REPORT

TP-00013

31. DELINEATION

Base delineation was by office interpretation of the July 2, 1979, 1:15,000 scale compilation photography using the Wild B-8 stereoplotting instrument. Additional photography dated June 1, 1982, was provided at the same scale to supplement the base photography because of new marine development. This photo data was applied by graphic and instrument methods. Refer to form 76-36B for a complete listing of all compilation photographs. All photography was adequate except the 1982 photographs did not cover the extreme southeast portion of the map.

A comparison between both sets of photography was made throughout the entire map ensuring the portrayal of cultural development as reflected on the 1982 supplemental photographs. Additionally, one natural shoreline change, contrary to the 1979 photographs, was necessary between South Pierhead Lt. 6 and the south breakwater. This shoreline revision was unavoidable due to bulkhead construction and significant dredging activity along the southside harbor entrance.

32. CONTROL

Horizontal control was adequate. Refer to the Photogrammetric Plot Report, dated May 1982.

33. SUPPLEMENTAL DATA

None

34. CONTOURS AND DRAINAGE

Contours are not applicable to this project. Drainage was compiled by instrument methods using the Wild B-8 stereoplotter.

35. SHORELINE AND ALONGSHORE DETAILS

The shoreline and alongshore details were compiled from office interpretation of the mapping photographs as indicated in item #31. Marsh and grass in water limits in the southeast portion of the map were difficult to delineate due to their intricate patterns and sun glare on the 1979 photographs. However, a comparison with the 1982 photographs supported the general delineation of this area.

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Two complex marinas just inside the harbor entrance and a number of man-made features within Pere Marquette Lake were delineated from the 1982 supplemental photographs.

36. OFFSHORE DETAILS

According to the 1979 photographs, three offshore spoil areas south of the harbor breakwaters are deposits from the dredging activity that was operating in the vicinity of South Pierhead Light 6. These spoil areas do not appear on the 1982 supplemental photos but were retained to adequately represent the 1979 base compilation.

The four piles offshore of Stearns Park, just north of the harbor breakwaters, were compiled but they are probably seasonal swimming markers as they do not appear on the 1982 photographs.

37. LANDMARKS AND AIDS

Appropriate 76-40 forms were submitted for the 14 charted landmarks and 4 navigational aids common to this map. All positions were referenced to the 1982 compilation.

38. CONTROL FOR FUTURE SURVEYS

None

39. JUNCTIONS

Refer to the Data Record Form 76-36B, item 5 of the Descriptive Report.

40. HORIZONTAL AND VERTICAL ACCURACY

See item #32.

46. COMPARISON WITH EXISTING MAPS

A comparison was made with the following U.S. Geological Survey Quadrangle: Ludington, Michigan, scale 1:62,500, dated 1959.

47. COMPARISON WITH NAUTICAL CHARTS

A comparison was made with the following National Ocean Survey charts: 14937, scale 1:5,000, February 17, 1979, 20th edition; 14907, scale 1:120,000, May 8, 1982, 20th edition.

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ITEMS TO BE APPLIED TO NAUTICAL CHARTS IMMEDIATELY

The entire harbor entrance area should be applied immediately to Nautical Chart 14937.

ITEMS TO BE CARRIED FORWARD

None

Submitted by,

*Carl J. Klein*

Carl J. Klein  
Cartographic Technician

Date: January 14, 1983

Approved,

*James L. Byrd, Jr.*

James L. Byrd, Jr.  
Chief, Coastal Mapping Unit

## REVIEW REPORT TP-00013

## SHORELINE

CM-7901

61. GENERAL STATEMENT:

Refer to the Summary included in this Descriptive Report.

62. COMPARISON WITH REGISTERED TOPOGRAPHIC SURVEYS:

Not applicable

63. COMPARISON WITH MAPS OF OTHER AGENCIES:

A comparison was made with U.S.G.S. quadrangle Ludington, Michigan, 1:62,500 scale, dated 1959.

64. COMPARISON WITH CONTEMPORARY HYDROGRAPHIC SURVEYS:

No contemporary hydrographic survey was conducted in the area common to this final map.

A copy of the final Class III map was prepared and submitted as "Notes to Hydrographer" in the event of future hydrographic activity.

65. COMPARISON WITH NAUTICAL CHARTS:

A comparison was made with the following NOS charts:

14937, 20th edition, February 17, 1979, 1:5,000 scale  
14907, 20th edition, May 8, 1982, 1:120,000 scale.

A "Chart Maintenance Print" was prepared and forwarded to the Marine Charts Branch.

66. ADEQUACY OF RESULTS AND FUTURE SURVEYS:

This map complies with the Project Instructions and meets the requirements for National Standards of Map Accuracy.

Submitted by,  
*Jerry L. Hancock*  
Jerry L. Hancock  
Final Reviewer

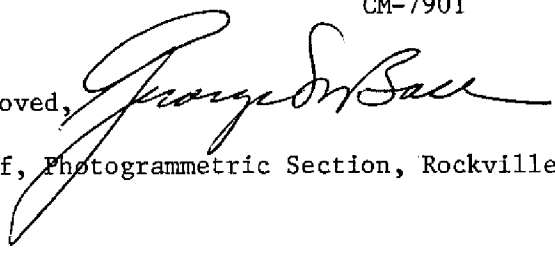
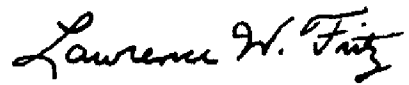
Approved for forwarding,  
*Billy H. Barnes*  
Billy H. Barnes  
Chief, Photogrammetric Section, AMC

## REVIEW REPORT TP-00013

## SHORELINE

CM-7901

Approved,

  
Chief, Photogrammetric Section, Rockville  
Chief, Photogrammetry Branch

March 18, 1983

GEOGRAPHIC NAMES

FINAL NAME SHEET

CM-7901 (Ludington Harbor, Michigan)

TP-00013

Buttersville

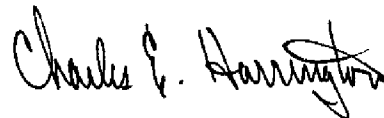
Chesapeake and Ohio (RR)

Lake Michigan

Ludington

Pere Marquette Lake

Approved by:

A handwritten signature in cursive script, reading "Charles E. Harrington".

Charles E. Harrington  
Chief Geographer  
Nautical Charting Division

DISSEMINATION OF PROJECT MATERIAL  
CM-7901  
LUDINGTON HARBOR LAKE MICHIGAN, MICHIGAN

NATIONAL ARCHIVES/FEDERAL RECORD CENTER

Brown Jacket

Field Notebook: Containing CSI Cards and Field Observations  
Bridging Photographs  
Computer Printout

Project Completion Report

BUREAU ARCHIVES

Registration Copy of Map  
Descriptive Report of Map

REPRODUCTION DIVISION

8X Reduction Negative of Map

OFFICE OF STAFF GEOGRAPHER

Geographic Names Standard

NOAA FORM 76-40 (8-74) Replaces C&GS Form 567.										U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION										ORIGINATING ACTIVITY	
NONFLOATING AIDS OR LANDMARKS FOR CHARTS																					
TO BE CHARTED <input checked="" type="checkbox"/> TO BE REVISED <input type="checkbox"/> TO BE DELETED		REPORTING UNIT (Field Party, Ship or Office) Coastal Mapping Unit Atlantic Marine Center Norfolk, VA		STATE Michigan		LOCALITY Ludington Harbor		DATE Dec. 1982												<input type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> COMPILATION ACTIVITY <input type="checkbox"/> FINAL REVIEWER <input type="checkbox"/> QUALITY CONTROL & REVIEW GRP. <input type="checkbox"/> COAST PILOT BRANCH (See reverse for responsible personnel)	
OPR PROJECT NO.		JOB NUMBER CM-7901		SURVEY NUMBER TP-00013		DATUM NA 1927		POSITION		METHOD AND DATE OF LOCATION (See instructions on reverse side)		CHARTS AFFECTED									
CHARTING NAME		DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses.)		LATITUDE ° / ' / D.M. Meters		LONGITUDE ° / ' / D.P. Meters															
MAST*	R Bn 308			43 57	11.61	86 27	38.88		82 Z(C) 3014 6/1/82		14937 14907										
RTR*	Visible on 1979 photos but does not appear on 1982 photographs.	43 57.2		86 27.6				Not visible on 1982 photos		" "											
NWS SIG STA		43 57.2		86 27.5				Not visible on 1979 or 1982 photos		" "											
RTR*		43 56	57.07	86 26	59.99			82 Z(C) 3014 6/1/82		" "											
STACK*		43 57	10.27	86 26	58.90			82 Z(C) 3014 6/1/82		" "											
SPIRE	Westerly of two	43 57	08.35	86 26	47.87			82 Z(C) 3014 6/1/82		" "											
SPIRE*	Easterly of two *Aerotriangulation positions	43 57	08.35	86 26	47.32			82 Z(C) 3014 6/1/82		" "											
SPIRE	(Ludington, Emanuel Lutheran Church Spire, 1932)	43 57	05.92	86 26	30.52			82 Z(C) 3014 6/1/82		" "											
TOWER	(Ludington, Mason Co. Courthouse Cupola 1932)	43 57	18.107	86 26	39.187			82 Z(C) 3014 6/1/82		" "											
TR		43 56	54.50 1682	86 26	56.86 1268			82 Z(C) 3014 6/1/82		" "											

\*Aerotriangulation Positions



RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	
POSITIONS DETERMINED AND/OR VERIFIED	C. J. Klein
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	<input type="checkbox"/> PHOTO FIELD PARTY <input type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'	
<b>OFFICE</b> <b>I. OFFICE IDENTIFIED AND LOCATED OBJECTS</b> 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	<b>FIELD (Cont'd)</b> <b>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.</b> EXAMPLE: P-8-V 8-12-75 74L(C)2982
<b>FIELD</b> <b>I. NEW POSITION DETERMINED OR VERIFIED</b> 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	<b>II. TRIANGULATION STATION RECOVERED</b> 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  <b>III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH</b> Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75  <b>**PHOTOGAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.</b>
*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods.	

NOAA FORM 76-40 (8-74) Replaces CGS Form 567.				U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION				NONFLOATING AIDS OR LANDMARKS FOR CHARTS				ORIGINATING ACTIVITY					
REPORTING UNIT (Field, Party, Ship or Office)		STATE		LOCALITY		DATE		<input type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> COMPILATION ACTIVITY <input type="checkbox"/> FINAL REVIEWER <input type="checkbox"/> QUALITY CONTROL & REVIEW GRP. <input type="checkbox"/> COAST PILOT BRANCH (See reverse for responsible personnel)				METHOD AND DATE OF LOCATION (See instructions on reverse side)				CHARTS AFFECTED	
TO BE CHARTED <input checked="" type="checkbox"/> TO BE REVISED <input type="checkbox"/> TO BE DELETED		COASTAL Mapping Unit Atlantic Marine Center Norfolk, VA		Michigan		Ludington Harbor		Dec. 1982									
The following objects HAVE <input type="checkbox"/> HAVE NOT <input checked="" type="checkbox"/> been inspected from seaward to determine their value as landmarks.		JOB NUMBER		SURVEY NUMBER		DATUM		POSITION									
OPR PROJECT NO.		CM-7901		TP-00013		NA 1927											
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											
CROSS	Father Marquette Memorial Cross	43 56	30.10	86 27	10.36	231	82 Z(C) 3014	6/1/82					14907 14937				
STACK		43 56	25.86	86 26	24.35	543	82 Z(C) 3014	6/1/82					" "				
STACK		43 56	24.40	86 26	21.21	473	82 Z(C) 3014	6/1/82					" "				
TR		43 56	55.02	86 26	10.36	231	82 Z(C) 3016	6/1/82					" "				
													Q				

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RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	
POSITIONS DETERMINED AND/OR VERIFIED	C. J. Klein
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	<input type="checkbox"/> PHOTO FIELD PARTY <input type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> OTHER (Specify)
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'	
(Consult Photogrammetric Instructions No. 64.)	
<b>OFFICE</b> <b>I. OFFICE IDENTIFIED AND LOCATED OBJECTS</b> 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	<b>FIELD (Cont'd)</b> <b>B. Photogrammetric field positions** require</b> 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
<b>FIELD</b> <b>I. NEW POSITION DETERMINED OR VERIFIED</b> Enter the applicable data by symbols as follows: F - Field L - Located V - Verified 1 - Triangulation 2 - Traverse 3 - Intersection 4 - Resection P - Photogrammetric Vis - Visually 5 - Field identified 6 - Theodolite 7 - Planetable 8 - Sextant A. Field positions* require entry of method of location and date of field work. EXAMPLE: F-2-6-L 8-12-75	<b>II. TRIANGULATION STATION RECOVERED</b> 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 <b>III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH</b> Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75
*FIELD POSITIONS are determined by field observations based entirely upon ground survey methods. **PHOTOGRAMMETRIC FIELD POSITIONS are dependent entirely, or in part, upon control established by photogrammetric methods.	

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			
REPORTING UNIT (Field Party, Ship or Office)		STATE		LOCALITY		DATE		<input type="checkbox"/> HYDROGRAPHIC PARTY <input type="checkbox"/> GEODETIC PARTY <input type="checkbox"/> PHOTO FIELD PARTY <input checked="" type="checkbox"/> COMPILATION ACTIVITY <input type="checkbox"/> FINAL REVIEWER <input type="checkbox"/> QUALITY CONTROL & REVIEW GRP. <input type="checkbox"/> COAST PILOT BRANCH				(See reverse for responsible personnel)			
TO BE CHARTED <input checked="" type="checkbox"/> TO BE REVISED <input type="checkbox"/> TO BE DELETED		Coastal Mapping Unit Atlantic Training Center Norfolk, VA		Michigan		Ludington Harbor		December 1982							
The following objects HAVE <input type="checkbox"/> HAVE NOT <input checked="" type="checkbox"/> been inspected from seaward to determine their value as landmarks.		SURVEY NUMBER		DATUM		POSITION		METHOD AND DATE OF LOCATION (See instructions on reverse side)		CHARTS AFFECTED					
OPR PROJECT NO.		JOB NUMBER		LATITUDE		LONGITUDE		OFFICE		FIELD					
CM-7901		TP-00013		NA 1927											
DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses.)		° /		° /		D.P. Meters									
Ludington South Breakwater Light (Light was physically relocated between 1979 & 1982)		43 57		06.77		08.61		82 Z(C) 3014 6/1/82				14937 14907			
* Ludington North Breakwater Light		43 57		13.03		09.67		82 Z(C) 3014 6/1/82				" "			
* Ludington North Pierhead Light		43 57		10.58		44.90		82 Z(C) 3014 6/1/82				" "			
Ludington South Pierhead Light 6 (Currently uncharted but listed in 1982 Light List.)		43 57		05.70		35.84		82 Z(C) 3014 6/1/82				" "			
*Aerotriangulation Position						799									

1982

RESPONSIBLE PERSONNEL	
TYPE OF ACTION	NAME
OBJECTS INSPECTED FROM SEAWARD	
POSITIONS DETERMINED AND/OR VERIFIED	C. J. Klein
FORMS ORIGINATED BY QUALITY CONTROL AND REVIEW GROUP AND FINAL REVIEW ACTIVITIES	
INSTRUCTIONS FOR ENTRIES UNDER 'METHOD AND DATE OF LOCATION'	
(Consult Photogrammetric Instructions No. 64.)	
<b>OFFICE</b> <b>I. OFFICE IDENTIFIED AND LOCATED OBJECTS</b> 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	<b>FIELD (Cont'd)</b> <b>B. Photogrammetric field positions*</b> 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
<b>FIELD</b> <b>I. NEW POSITION DETERMINED OR VERIFIED</b> 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	<b>II. TRIANGULATION STATION RECOVERED</b> 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  <b>III. POSITION VERIFIED VISUALLY ON PHOTOGRAPH</b> Enter 'V-Vis.' and date. EXAMPLE: V-Vis. 8-12-75  <b>**PHOTOGRAMMETRIC FIELD POSITIONS</b> are dependent entirely, or in part, upon control established by photogrammetric methods.
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