

9204

9204

Diag. Cht. No. 1219-2.

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT
(HYDROGRAPHIC)

Type of Survey **Hydrographic**
Field No. **WH-5-1-71**
Office No. **H-9204**

LOCALITY

State **Delaware**
General Locality **Cape Henlopen**
Locality **Breakwater Harbor**

19 71

CHIEF OF PARTY
G. H. Nixon

LIBRARY & ARCHIVES

DATE **10-22-73**

HYDROGRAPHIC TITLE SHEET

H-9204

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.

WH 5-1-71

State DELAWARE

General locality CAPE HENLOEEN

Locality ~~HARBOR OF REFUGE~~ - BREAKWATER HARBOR

Scale 1:5,000

Date of survey Sept. 13 to Oct. 19, 1971

Instructions dated 5-25; 7-1; 8-5-71

Project No. OPR-492

Vessel NOAA SHIP WHITING

Chief of party CHARLES H. NIXON

Surveyed by K.F. BURKE: J.D. CARPENTER: ^{C.P.} B.A. NORTH: ^{Jr.} P.L. CAMPBELL: J.D. BUS
A.S. SIKES: D.W. YEAGER: R.C. HOGE & W.A. HILL MAN

Soundings taken by echo sounder, hand lead, pole

Graphic record scaled by SHIP PERSONNEL

Graphic record checked by SHIP PERSONNEL

Protracted by CAL-COMP PLOTTER

Automated plot by ATLANTIC MARINE CENTER

Soundings penciled by CAL-COMP PLOTTER & B.J. STEPHENSON

Calcomp 618

Soundings in XXXXX feet at MLW XXXXX

REMARKS:

Chart
411
1218
1219

1109-NO 5dg3
1800 IN AREA

Applied to atls 12-14-73
CPB

See L-22(73)
(1972) Bp 84958
add'nl.

A. PROJECT:

This survey was accomplished in accordance with Project Instructions for OPR 492, Delaware Bay, dated May 25, 1971. Amendments date 1 July 1971 and 5 August 1971.

B. AREA SURVEYED:

The area surveyed extends seaward approximately 1.2 miles from the shoreline of Breakwater Harbor, Lewes, Delaware. The western boundary of the sheet is a line running due north just west of the on-shore angular jetty protecting the Lewes-Cape May ferry terminal. The northern limits of the survey is an east-west line just north of the inner harbor jetty and almost tangent to the tip of Cape Henlopen. The eastern and southern boundaries of the sheet is the shoreline itself. The survey junctions on the west and north with contemporary survey WH-10-2-71, H-9203, scale 1:10,000. JUNCTIONS ON NE WITH H-9154(1970) 1:10,000

The survey was accomplished between 13 September and 19 October 1971. The main system of sounding lines was run at 50 meter spacing. Additional development was done in the vicinity of structures along the shoreline at a scale of 1:2,500.

C. SOUNDING VESSEL:

The sounding vessels used were NOAA Ship WHITING's launches WH-1 and WH-2. Visual detached positions were taken by the ship's Boston Whaler No. 2.

D. SOUNDING EQUIPMENT:

The sounding instruments used were Raytheon DE-723D survey fathometers. Launch 1, WH-1, used survey fathometer number 37019 and Launch 2, WH-2, used survey fathometer number 37018. In addition, a leadline was used to obtain sounding along pier faces. DEPTHS WERE DIGITIZED BY THE DIGITAL CONTROL UNIT.

Bar checks and leadline comparisons were taken daily in the area of the survey as often as sea conditions permitted. The launch fathometer operators continually checked for proper initial settings, stylus arm length, sensitivity anomalies, and A-F scale checks. Nansen and TDC casts were made on the working grounds in water as deep as that encompassed by the survey as an additional source of sounding corrections.

Tide correctors based upon predicted tides of Breakwater Harbor were applied to all soundings on WH-1-71. ^{H-9203} A tide gage was maintained at Breakwater Harbor for obtaining smooth tide data. SMOOTH TIDES WERE OBTAINED FROM THE STANDARD TIDE GAGE AT LEWES, DELAWARE

Fathograms were scanned for any irregularities on the trace in addition to checks on the proper depths. Ship personnel also made a second random check on fathogram scanning to certify all work was carried out properly.

E. SMOOTH SHEET:

The smooth sheet will be plotted on the computer plotter system at the Atlantic Marine Center, Norfolk, Virginia.

F. CONTROL:

The hydrography of the plotter sheet was controlled electronically. The ship's launches WH-1 and WH-2 used Decca Hi-Fix in it's hyperbolic mode. At the beginning of the project numerous visual calibrations were taken throughout the area encompassed by the boat sheet, to insure that adequate control existed. Calibrations were also taken along the shoreline and piers to be sure that no land mass irregularities existed. As an additional check, several sounding lines were run using both visual and hyperbolic control. The resulting data was then plotted and showed very close agreement. Refer to the Visual-Visual, Visual-Hyperbolic Hi-Fix Control Comparison Report.

Visual calibrations were taken by the WHITING launches at least twice daily and at other times when any disagreement between visual and electronic positions were noticed.

Photogrammetric field party 62 and ship's personnel located the Hi-Fix stations. Their locations follow:

<u>STATION</u>	<u>NAME</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>
Master	Wine	38°59'09.271"N.	75°06'48.012"W.
Slave 1	White	38°50'18.490"N.	75°13'33.468"W.
Slave 2	Hi-Fix JOE, 1971	38°56'25.001"N.	74°58'16.975"W.

Frequency = 1799.6 KHz

A sheet layout of the Hi-Fix stations is included. /

G. SHORELINE: See Review Part 2.

The shoreline on the boat sheet was transferred from Shoreline Manuscript TP-00063, dated 1970. The low water line shown on the manuscript was verified by sounding lines run by the WHITING's launches. Some revision of the manuscript was necessary due to the deterioration of several of the piers. Where the shoreline has been changed from that of the manuscript, a notation has been made on the 1:2,500 scale boat sheet and a copy of the revised manuscript is also included.

For the purpose of clarity, a 1:2,500 scale sheet of the shoreline of Breakwater Harbor was made. The pier corners, isolated piles, and sub-merged objects were all located by means of a three point fix, and when

possible, a check angle. All the dimensions of the piers can be found in the sounding volume for ~~WH 5-1-71~~.^{H-9204}

Soundings were taken along all of the pier faces, and sounding lines run parallel to these faces to adequately define the bottom characteristics of these areas. Numerous marginal notes describing these piers are on the 1:2,500 scale sheet and should be referred to.

H. CROSSLINES:

Crosslines composed 8.0% of the total length of main system sounding lines. The agreement between crosslines and the main system of lines was good in all areas.

I. JUNCTIONS:

The sheet junctions on the north and western limits with contemporary survey WH 10-2-71, H-9203, scale 1:10,000. JUNCTIONS ON NE WITH H-9154(1970) 1:10,000

J. COMPARISON WITH PRIOR SURVEYS: (See Review Par 6)

A comparison was made with prior survey H-7034 of 1945 at a scale of 1:10,000.

Soundings between the breakwater and the piers show a general 1 to 3 feet scouring. Areas near and around the piers and shoreward from the piers indicate good agreement near the east piers and differences up to 15 feet near the ferry pier. The areas near the ends of the jetties show excessive scouring near the water-jetty interface and shoaling up to 10 feet where current eddies are prominent. The area near the tip of Cape Henlopen indicates the point is building in a northwest direction. The spoil area centered at latitude $38^{\circ}47'55''N.$, longitude $75^{\circ}06'15''W.$ is active from ferry channel dredging. The area was surveyed and shows shoaling up to 15 feet compared to the 1945 survey. In general, comparison with H-7034 can only be made by studying the two surveys. The area has changed significantly in numerous areas.

Pre-Survey Review Items:

The entire waterfront area of the boat sheet was to be considered as an item and extensive work was done in this area. The shoreline manuscript TP-00063, 1970 was given a detailed field edit and several changes were found to exist. These items are the extent to which the piers shown on the manuscript have deteriorated into ruins. Where the true location of the pier differs from that of shoreline manuscript, a note has been made on the 1:2,500 scale enlargement sheet of the harbor.

K. COMPARISON WITH THE CHART: (See Review Par 7)

The boat sheet was compared with the 10th edition of Chart No. 411, dated

February 13, 1971. It was the 1:10,000 scale insert of Breakwater Harbor on Chart No. 411, with which the comparison was made.

Agreement was excellent along the inshore area of the chart extending seaward to a line tangent to the pier structures. Shoaling was noted along the entire length of the 300' wide ferry channel running due north past the Delaware Breakwater West End Light, Fl G 4 sec. The controlling depth for this channel was stated to be 17 feet, however, at present a least depth of 12 feet has been found. A letter dated 2 September 1971 was sent to the Chief of Chart Information Branch, C323, concerning the shoaling of the above ferry channel to a 12 foot controlling depth. A copy of the letter has been added as reference to the report. The channel running from the ferry pier eastward to Delaware Breakwater Light shows 10⁹ feet. This channel depth is correct and the new surveys verify the controlling 10 foot depth. 9 FT SOUNDINGS APPEAR ON THE SMOOTH SHEET

The areas near the ends of the breakwater show excessive scouring and shoaling. High currents are scouring the water-jetty interface and shoaling areas of eddy currents. The tip of Cape Henlopen is building to the northwest. Adequate comparison of significant changes can only be made by viewing the boat sheet in detail.

L. ADEQUACY OF THE SURVEY:

The survey is complete and adequate to supercede all prior surveys for charting purposes.

M. AIDS TO NAVIGATION:

The following non-floating aids to navigation are located within the area of the survey:

<u>NAME</u>	<u>CHARACTERISTIC</u>
Delaware Breakwater Light	E. Int R, R Sector, 5 sec.
Delaware Breakwater West End Light	Fl G 4 sec.
Lewes Breakwater Front Light	(Private Aid) E. Int R, 2 sec.
Lewes Breakwater Middle Light <small>LEWES FERRY TERMINAL FOG SIGNAL</small>	(Private Aid) Fl R 4 sec. (PRIVATE AID) 1 STROKE EV. 20 SEC.

The positions of the Delaware Breakwater Lights were checked by Photo Party 62. The Lewes Breakwater Lights are shown on the shoreline manuscript. The positions were verified by means of a three point fix with check angle. They are privately maintained, and are already listed in the Lightlist.

One ferry route exists on the boatsheet, that being the channel running

due north past the Delaware Breakwater West End Light, Fl G 4 sec. A terminal for the Lewes-Cape May ferry exists in Breakwater Harbor at latitude 38°46'58"N., longitude 75°07'11"W. No floating aids to navigation are on this boatsheet.

N. STATISTICS:

<u>SOUNDING VESSEL</u>	<u>MILES OF SOUNDING LINES</u>	<u>NUMBER OF BOTTOM SAMPLES</u>	<u>NUMBER OF POSITIONS</u>	<u>NUMBER OF DETACHED POSITIONS</u>
WH 1	25.3		256	7
WH 2	57.4	45	675	1
Whaler	—	—	—	<u>90</u>
TOTAL	82.7	45	931	98

NOTE: An additional 102 visual detached positions were taken while inspecting piers and obtaining soundings along the faces.

Area surveyed = 1.2 square miles

Percent of crosslines = 8.0%

O. MISCELLANEOUS:

None

P. RECOMMENDATIONS:

None

Q. REFERENCES TO REPORTS:

1. OPR 492 Fathometer Report, Delaware Bay, 1971.
2. OPR 492 Hi-Fix Report, Delaware Bay, 1971.
3. Velocity Tables.
4. List of Signals.
5. Parameter Tape Listing.
6. C&GS Form 567.
7. Visual-Visual, Visual-Hyperbolic Hi-Fix Control Comparison Report, NOAA Ship WHITING, OPR-492-71, Delaware Bay.
8. Shoreline Manuscript, TP-00063, 1970.
9. Letter to Chief of Chart Information Branch.

APPROVAL SHEET

Submitted by: *Robert C. Hoge*
Robert Hoge
LTJG, NOAA

Supervision of field and office work on this hydrographic survey was continuous on a day to day basis to insure completeness of the survey and to insure that the work was in accordance with instructions.

Hydrography completed on this boat sheet is complete and adequate to supersede prior surveys for charting.

Approved and Forwarded:

Charles H. Nixon
Charles H. Nixon
CDR, NOAA

List of Control

H-9204 (WH-5-1-71)

Triangulation stations:

number	Lat.	Long.
356	Lewis W. Oil Factory Chy 1962 38°46'53.55"	75°07'00.11"
358	Delaware Breakwater Lighthouse 1927-62 38°47'49.22"	75°06'01.24"
360	Delaware Breakwater W. End Light 1973-72 38°48'01.38"	75°07'01.27"

Topographic stations:

366	38°47'15.80"	75°07'06.76"
368	38°47'06.71"	75°07'18.65"

CFN3-1
4-6-71

ATLANTIC MARINE CENTER

PROJECTION PARAMETERS

POLYCONIC OR MODIFIED TRANSVERSE MERCATOR

1. Project No. OPR 492 4. Requested By _____
2. Reg. No. H-9204 5. Ship or Office _____
3. Field No. WH 5-1-71 6. Date Required _____

7. Polyconic Modified Transverse Mercator

8. Central Meridian of Projection _____° _____' _____"

9. Survey Scale: 1:5,000

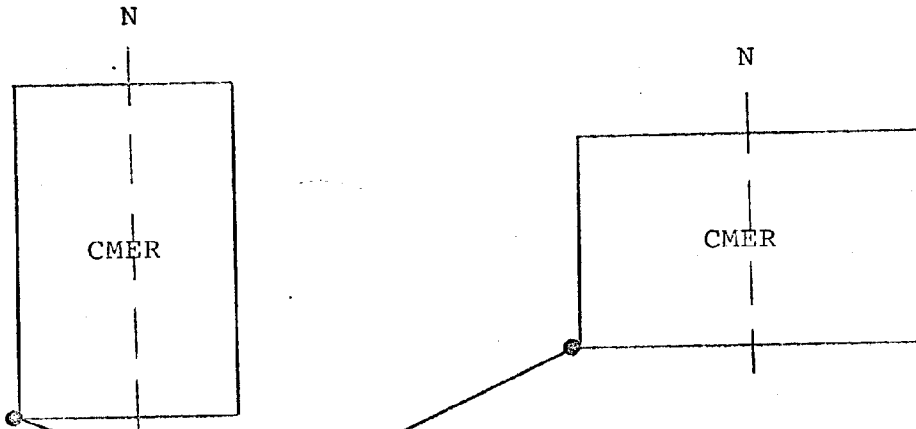
10. Size of Sheet (check one):

36 x '54 36 x 60 Other Specify _____

11. Sheet Orientation (check one):

NYX = 1

NYX = \emptyset



12. Plotter Origin: S.W. Corner of Sheet (not necessarily a grid intersection)

Latitude 38 ° 46 ' 25 "

Longitude 75 ° 07 ' 35 "

13. G.P.'s of triangulation and/or signals attached.

14. Material Desired: Tracing Paper Mylar

Smooth Sheet Other Specify _____

15. Remarks: _____

ATLANTIC MARINE CENTER
ELECTRONIC CONTROL PARAMETERS

1. Project # OPR-492 2. Reg. # H-9204 3. Field # WH 5-1-71
 4. Type of Control Hi-Fix Hyperbolic (Hi-Fix, Raydist, EPI, etc.)
 5. Frequency 1799.6 (for conversion of electronic lanes to meter)
 6. Mode of Operation (check one):

Range-Range

Range One (R₁)
 Station I.D. _____
 Range Two (R₂)
 Station I.D. _____

Range-Visual

Lat. _____ ° _____
 Long. _____ ° _____
 Lat. _____ ° _____
 Long. _____ ° _____

Hyperbolic (3-station)

Slave One
 Station I.D. White
 Master
 Station I.D. Wine
 Slave Two
 Station I.D. Hi-Fix JOE 1971

Hyper-Visual

Lat.	<u>38</u>	°	<u>50</u>	'	<u>18.490</u>
Long.	<u>75</u>	°	<u>13</u>	'	<u>33.468</u>
Lat.	<u>38</u>	°	<u>59</u>	'	<u>09.271</u>
Long.	<u>75</u>	°	<u>06</u>	'	<u>48.012</u>
Lat.	<u>38</u>	°	<u>56</u>	'	<u>25.001</u>
Long.	<u>74</u>	°	<u>58</u>	'	<u>16.975</u>

7. Location of Survey:

Range-Range

Imagine an observer is standing at R₁ Station and looking directly at R₂ (check one):

Survey area is to observer's Right A=0

Survey area is to observer's Left A=1

Hyperbolic

Looking from survey area toward Master Station:

Slave One must be to observer's Left.

Slave Two must be to observer's Right.

8. This form is submitted as an aid in preparing a boat sheet.

This form applies to all data on this survey.

This form applies to part of the data on this survey.

Vessel EDP #	From		To		Position Numbers (inclusive)
	Time	Day	Time	Day	
_____	_____	_____	_____	_____	_____ to _____
_____	_____	_____	_____	_____	_____ to _____
_____	_____	_____	_____	_____	_____ to _____

9. Remarks: _____

39° 00' N.

75° 00' W

Master



Slave 1



Cape Henlopen

Cape May



Slave 2

Hi-Fix Layout

WH-10-2-71

WH-5-1-71

Overlay to NOS Chart 1109

NOAA Ship Whiting

Project CPR 492

Delaware Bay

Cdr. C.H. Nixon, Comdg.

TIDE NOTE

Smooth tides for WH 5-1-71 were obtained from the standard tide gage at Lewes, Delaware, latitude $38^{\circ} 47.1$ N, longitude $75^{\circ} 07.0$ W. POSITION OF THIS GAGE IS SHOWN ON Sp. 84958 IN LAT. $38^{\circ} 47.07'$, LONG. $75^{\circ} 07.97'$

Mean low water on the staff was 2.5 feet as determined by Tides Division, Rockville, Maryland.

WHITING personnel logged the smooth tide hourly heights furnished by Rockville; and submitted these tapes to AMC with the rest of the data.

The time meridian was 0° West, Greenwich Mean Time.

All soundings on this ^{BOAT} sheet are based on predicted tides for Breakwater Harbor.

001349 0 0044
001411 0 0046
001479 0 0048
001541 0 0050
001609 0 0052
999999 0 0052
000056 0 0000 0005 000 000000 000000
000111 0 0002
000165 0 0004
000228 0 0006
000271 0 0008
000323 0 0010
000376 0 0012
000429 0 0014
000482 0 0016
000536 0 0018
000590 0 0020
000644 0 0022
000698 0 0024
000752 0 0026
000805 0 0028
000858 0 0030
000911 0 0032
000964 0 0034
001018 0 0036
001072 0 0038
001124 0 0040
001175 0 0042
001227 0 0044
001280 0 0046
001333 0 0048
001387 0 0050
001440 0 0052
001494 0 0054
001548 0 0056
001603 0 0058
999999 0 0058
000061 0 0000 0006 000 000000 000000
000121 0 0002
000182 0 0004
000243 0 0006
000303 0 0008
000364 0 0010
000425 0 0012
000486 0 0014
000549 0 0016
000610 0 0018
000670 0 0020
000726 0 0022
000784 0 0024
000842 0 0026
000900 0 0028
000959 0 0030
001018 0 0032
001076 0 0034
001133 0 0036
001191 0 0038
001250 0 0040
001308 0 0042
001365 0 0044
001426 0 0046
001486 0 0048
001546 0 0050
001603 0 0052
001663 0 0054
999999 0 0054

000780 0 0022
000850 0 0024
000915 0 0026
000989 0 0028
001065 0 0030
001141 0 0032
001220 0 0034
001299 0 0036
001378 0 0038
001453 0 0040
001530 0 0042
001610 0 0044
999999 0 0044
000052 0 0000 0003 000 000000 000000
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000159 0 0004
000210 0 0006
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000313 0 0010
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000421 0 0014
000478 0 0016
000534 0 0018
000589 0 0020
000644 0 0022
000700 0 0024
000755 0 0026
000810 0 0028
000866 0 0030
000920 0 0032
000975 0 0034
001030 0 0036
001089 0 0038
001142 0 0040
001199 0 0042
001253 0 0044
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001365 0 0048
001420 0 0050
001472 0 0052
001529 0 0054
001582 0 0056
001639 0 0058
999999 0 0058
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000100 0 0002
000150 0 0004
000199 0 0006
000247 0 0008
000295 0 0010
000345 0 0012
000390 0 0014
000444 0 0016
000500 0 0018
000565 0 0020
000634 0 0022
000700 0 0024
000765 0 0026
000830 0 0028
000894 0 0030
000960 0 0032
001023 0 0034
001090 0 0036
001157 0 0038
001219 0 0040
001281 0 0042

Pat. Cahier

11/1/72

H-9204 TCTI TAPE PRINTOUT

WH-5-1-71

OPR 492

I changed on 11/1/72 WPT NEEDS TO BE JEA

000000	0	1005	0004	267	293100	009204
000000	0	1005	0005	267	293100	009204
000000	0	1005	0006	287	293100	009204
000000	0	1005	0004	256	293200	009204
000000	0	1005	0005	267	293200	009204
000000	0	1005	0006	287	293200	009204

rc/ti P.O. CHECKED BY WLS
 DATE 11/1/72
 VERIFICATION BR., AMC

H-9204 VELOCITY TAPE PRINTOUT

vel P.O. CHECKED BY WLS
 DATE 11/1/72
 VERIFICATION BR., AMC

000051	0	0000	0001	000	000000	000000
000110	0	0002				
000167	0	0004				
000227	0	0006				
000287	0	0008				
000345	0	0010				
000402	0	0012				
000463	0	0014				
000522	0	0016				
000582	0	0018				
000642	0	0020				
000702	0	0022				
000761	0	0024				
000822	0	0026				
000880	0	0028				
000940	0	0030				
001000	0	0032				
001058	0	0034				
001118	0	0036				
001178	0	0038				
001238	0	0040				
001298	0	0042				
001356	0	0044				
001414	0	0046				
001474	0	0048				
001532	0	0050				
001596	0	0052				
001655	0	0054				
001720	0	0056				
999999	0	0056				
000059	0	0000	0002	00	000000	000000
000117	0	0002				
000181	0	0004				
000243	0	0006				
000309	0	0008				
000374	0	0010				
000440	0	0012				
000508	0	0014				
000575	0	0016				
000645	0	0018				
000713	0	0020				



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

Date: 2 September 1971

Reply to
Attn of: Commanding Officer
NOAA Ship WHITING

Subject: Chart Letter

To: Chief Chart Information Branch, C323

As determined during a preliminary reconnaissance of Breakwater Harbor (Lewes, Del.) conducted by WHITING launches on August 16, 1971, shoaling exists in the Lewes Ferry Channel; latitude 38-47-12N, longitude 75-07-04W to latitude 38-48-00N, longitude 75-07-04W. The channel is shown as a dredged depth of 16 ft. on C&GS chart 1219, 23rd edition August 1, 1970 and as 17 feet for a width of 300 feet as of June 1964 on C&GS chart 411, 10th edition February 13, 1971.

Our preliminary survey indicates a controlling depth of 12 feet at mean low water.

A resurvey of the Breakwater Harbor area, including the Ferry Channel, is planned for this season before the WHITING returns to Norfolk in October.

A handwritten signature in cursive script, reading "Charles H. Nixon".

Charles H. Nixon
CDR, NOAA

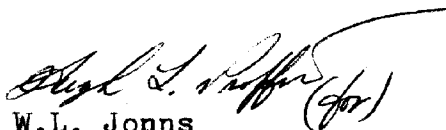
VERIFICATION NOTE

H-9204

GENERAL

This appears to be an excellent basic survey. Soundings are in good agreement at crossings except in the Northwest portion where small sandwaves create minor apparent discrepancies.

Some small discrepancies were noted in time and course between soundings, particularly in the shoal water between the piers at the South side of the sheet. This condition could be attributed to erratic steering, dial roll, or signal reflection from the many piers and breakwaters in the area. Some adjustments were made to positions and soundings to improve agreement in depths and to correct obvious position displacement.



W.L. Jonns
Chief, Verification Br., AMC

Norfolk, Va.
Oct. 15, 1973

Fig. 18.

DESCRIPTIVE REPORT DATA RECORD		
PART I SMOOTH SHEET PREPARATION		
	PREPARED BY/OPERATOR	DATE
A. PLOTTER OPERATOR		
B. DISTORTION MARKS PLOTTED		
C. PROJECTION INTERSECTIONS PLOTTED		
D. POINTS OF ELECTRONIC CONTROL ARCS PLOTTED		
E. OVERLAYS PREPARED BY		
1. POSITION NUMBER		
2. EXCESS SOUNDINGS		
3. PRELIMINARY SMOOTH PLOT		
4. LIST OTHERS		
A.		
B.		
F. SOUNDING SELECTION BY		
G. PLOTTER INPUT	PREPARED	
H.	CHECKED	
I. DESCRIPTIVE REPORT ADDENDUMS		
PART II SMOOTH SHEET COMPLETION		
	CARTOGRAPHER	DATE
A. DISTORTION SCALE TICKS IDENTIFIED BY NOTE		
B. PROJECTION INTERSECTIONS VERIFIED BY	Billy J. Stephenson	5-22-73
C. PROJECTION LINES RULED BY	EDP (AMC)	5-14-73
D. ELECTRONIC CONTROL ARCS RULED AND LOCATION VERIFIED	EDP (AMC)	5-14-73
E. OVERLAYS COMPLETED BY		
1. POSITION NUMBER LEADERS ADDED	Billy J. Stephenson	1-12-73
2. EXCESS SOUNDING OVERLAY COMPARED	Billy J. Stephenson	4-2-73
3. PRELIMINARY SMOOTH PLOTS COMPARED	Billy J. Stephenson	4-30-73
4. OTHERS UTILIZED		
A.		
B.		
F. DESCRIPTIVE REPORT ADDENDUM	Billy J. Stephenson	6-19-73
G. CONTROL STATIONS VERIFIED	Billy J. Stephenson	12-11-72
H. POSITIONS MANUALLY PLOTTED	Billy J. Stephenson	1-12-73
I. MANUAL PLOT VERIFIED		
J. SHORELINE APPLIED	Billy J. Stephenson	5-22-73
K. BOTTOM CHARACTERISTICS ADDED	Billy J. Stephenson	6-11-73
L. NOTES AND DEPTH CURVES ADDED	Billy J. Stephenson	6-12-73

12/11/72

ATLANTIC MARINE CENTER
APPROVAL SHEET
FOR
AUTOMATED SURVEY H- 9204

- 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 printout has/~~xxxxxx~~ been made. A new final sounding printout has/~~xxxxxx~~ been made.

Date: Oct. 11, 1973

Signed:

W.L. Jonns *(for)*

Title: Chief, Verification Branch

- B. The verified smooth sheet has been inspected, is complete, and meets the requirements of the Hydrographic and AMC Manuals. Exceptions are listed in the verifier's report.

Date: Oct. 11, 1973

Signed:

C. Dale North, Jr. *C. Dale North Jr*

Title: Chief, Processing Division

May 14, 1973

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Atlantic Marine Center

Hourly heights are approved for 362

Tide Station Used (NOAA form 77-12): Lewes, Delaware

Period: Sept. 13 - Oct 28, 1971

HYDROGRAPHIC SHEET: H-9204

OPR: 492

Locality: Delaware Bay

Plane of reference (mean ~~lower~~ low water): 2.5 feet

Height of Mean High Water above Plane of Reference is 4.1 feet

Remarks: Zoning: Use Lewes, Delaware gage directly.

Robert A. Cummins

Chief, Tides Branch

GEOGRAPHIC NAMES

H-9204

Name on Survey	Source of Name										
	A	B	C	D	E	F	G	H	K		
BREAKWATER HARBOR											1
CAPE HENLOPEN											2
											3
											4
											5
											6
											7
											8
											9
											10
											11
											12
											13
											14
											15
											16
											17
											18
											19
											20
											21
											22
											23
											24
											25

Approved by
Chas. E. Harrington
 Staff Geographer
 2-26-1974

FORM C&GS-946
(REV. 11-65)
(PRESC. BY
HYDROGRAPHIC
MANUAL 20-2,
6-64, 7-13)

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

HYDROGRAPHIC SURVEY STATISTICS
HYDROGRAPHIC SURVEY NO. H-9204

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT			
SMOOTH SHEET & PNO	1	BOAT SHEETS	3			
DESCRIPTIVE REPORT	1	OVERLAYS	3			
DESCRIPTION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS / SOURCE DOCUMENTS
CORDIAN Folder	1		2			
CAMERS	1					
VOLUMES	2					
BOXES			2			

T-SHEET PRINTS (1.1x1) ~~ED 00063~~

SPECIAL REPORTS (1.1x1) See paragraph Q. of Descriptive Report
Tides filed in cahier

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

PROCESSING ACTIVITY	AMOUNTS			
	PRE-VERIFICATION	VERIFICATION	REVIEW	TOTALS
POSITIONS ON SHEET				1029
POSITIONS CHECKED		188	48	
POSITIONS REVISED		21	0	
DEPTH SOUNDINGS REVISED		91	29	
DEPTH SOUNDINGS ERRONEOUSLY SPACED		300	<i>→ caused by apparent dial error - see Pos. 0149</i>	
SIGNALS ERRONEOUSLY PLOTTED OR TRANSFERRED				
	TIME (MANHOURS)			
TOPOGRAPHIC DETAILS		40	2	
JUNCTIONS		8	35	
VERIFICATION OF SOUNDINGS FROM GRAPHIC RECORDS		17	4	
SPECIAL ADJUSTMENTS Card Punch	29		50	<i>PIER INSETS</i>
ALL OTHER WORK		193	112	
TOTALS	29	258	213	

PRE-VERIFICATION BY B.T. DAVIS, E.J. FIELDS, R.G. ROBERSON

VERIFICATION BY B.J. STEPHENSON

REVIEW BY C.D. MEADOR
see 7AP 29 Nov 2-15-75

BEGINNING DATE	ENDING DATE
12/19/72	3/9/73
BEGINNING DATE	ENDING DATE
10/20/72	6/19/73
BEGINNING DATE	ENDING DATE
10/11/74	1/13/75

Reg. No. H-9204

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

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

CARDS CORRECTED

DATE _____ TIME REQ'D _____ INITIALS _____

REMARKS:

Reg. No. H-9204

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 11/6/80 TIME REQ'D. _____ INITIALS FEK

REMARKS:

H-9204

Items for Future Presurvey Review

The bottom is considered adequately developed on the present survey. Variable differences were noticed since the early surveys. These differences are attributed to scouring currents, dredging, and spoiling.

<u>Position Index</u>		<u>Bottom Change</u>	<u>Use</u>	<u>Resurvey</u>
<u>Lat.</u>	<u>Long.</u>	<u>Index</u>	<u>Index</u>	<u>Cycle</u>
384	0751	4	9	10 Years

OFFICE OF MARINE SURVEYS AND MAPS

MARINE CHART DIVISION

HYDROGRAPHIC SURVEY REVIEW

REGISTRY NO. H-9204

FIELD NO. WH-5-1-71

Delaware, Cape Henlopen, Breakwater Harbor

PROJECT NO.: OPR-492

SCALE: 1:5,000

SOUNDINGS: Raytheon DE-723D Depth
Recorder, Leadline, Pole

CONTROL: DECCA Hi-Fix Hyper-
bolic Mode, Sextant
Fixes on Shore Sig-
nals

Chief of Party	C. H. Nixon
Surveyed by	K. F. Burke
.....	J. D. Carpenter
.....	C. D. North, Jr.
.....	P. L. Campbell
.....	J. D. Busman
.....	A. S. Sikes
.....	D. W. Yeager
.....	R. C. Hoge
.....	W. A. Hill
Automated Plot by	Cal-Comp. Plotter, AMC
Verified and Inked by	B. J. Stephenson (AMC)
Reviewed by	C. D. Meador
	Date: 1/13/75
Inspected by	F. B. Powers

1. Description of the Area

This survey covers Breakwater Harbor, Lewes, Delaware.

The bottom slopes gradually except in the channel areas and in the immediate vicinity of the Delaware Breakwater. In the latter area, currents sweeping around the breakwater have scoured depressions of 20 to 53-ft. depths to form two natural channels joining each of the federally maintained channels in the Harbor.

Sand ridges, 1-3 ft. in height, exist throughout the harbor and adjacent areas.

The predominant bottom characteristics are mud, sand, and shell.

2. Control and Shoreline

The control is adequately described in paragraph F of the Descriptive Report.

The shoreline originates with the advance manuscript of Tp-00063 (1969-1970). Minor revisions in red are by the hydrographer.

3. Hydrography

A. Depths at crossings are in good agreement. Several crossline differences of 1 ft. in depth exist. Some of these differences can be attributed to sand ridges in the area while the cause of other differences are not readily apparent.

B. The usual depth curves are adequately delineated. The 36, 40, and 50 ft. supplemental depth curves were added to accentuate the bottom topography.

C. The development of the bottom configuration is adequate.

4. Condition of the Survey

The field work, sounding records, smooth plotting, and Descriptive Report are adequate and conform to the requirements of the Hydrographic Manual, supplemented by the Instructions Manual-Automated Hydrographic surveys.

5. Junctions

Adequate junctions were effected with H-9203 (1971) on the west and north and with H-9154 (1970) on the northeast.

6. Comparison with Prior Surveys

A.	H-118 (1842-43) 1:20,000	H-148 (1841-43) 1:20,000
	H-119 (1842) 1:20,000	H-801 (1863) 1:5,000
B.	H-1566 (1883) 1:20,000	H-3076 (1910) 1:10,000
	H-2192 (1894) 1:10,000	H-3526 (1913) 1:10,000
	H-2532b (1901) 1:20,000	H-4942 (1929) 1:20,000
	H-2653 (1903) 1:10,000	

These surveys have been compared with and were superseded by H-7034 (1945). Further consideration of these surveys is not necessary in the present review.

C. H-7034 (1945) 1:10,000

The area of the present survey is completely covered by this survey.

A comparison between the present and prior surveys reveals variable differences of minus 4 to plus 4 feet except in areas affected by scouring currents, borrowing, dredging, and deposition of spoil where the changes are greater.

The end of Cape Henlopen has accreted 533 meters to the NNW. Between lat. 38°47'30"N and lat. 38°47'55"N the high water line has receded as much as 110 meters and between lat. 38°47'14"N and lat. 38°47'30"N has accreted as much as 90 meters.

The Lewes Breakwater and the Lewes-Cape May Ferry Channel were nonexistent in 1945.

Two pile and two pier ruins were carried forward to the present survey from H-7034.

With these additions, the present survey is adequate to supersede this survey within the common area.

D. F.E. No. 12 (1951) 1:10,000

This survey covers a small area in the immediate vicinity of Cape Henlopen.

The present survey depths are generally 2-11 feet shoaler than prior depths except at the entrance to the harbor, where minor deepening of 2-9 feet is apparent. The point of Cape Henlopen has accreted 543 meters since 1951 and receded as much as 107 meters east of the Delaware Breakwater. These differences result from natural changes.

The present survey is adequate to supersede this survey within the common area.

7. Comparison with Chart 12216, 14th Ed., (latest print date November 12, 1974)

A. Hydrography

The charted hydrography originates with the previously discussed surveys which require no further consideration, with prior and subsequent Corps of Engineers blueprints [Bp 47916 (1951), Bp 74519 (1968), Bp 89529 (1974)], with private sources [Bp 67641 (1964), Bp 83601 (1972)], and with Chart Letters [Cl-514 (1962), L-1023 (1971)], supplemented by the partial application of depths from the boat sheet and verified smooth sheet of the present survey.

Attention is directed to the following:

1. Bp 90632 (1975) has been prepared to identify charted information subsequent to the present survey that should be retained on the chart.
2. The submerged wreck (16 ft. reported) charted in lat. 38°48.15', long. 75°07.29' from chart letter 1023 of 1971 was not disproved by the hydrographer and should be retained as charted.

3. The two piers charted in the vicinity of lat. 38° 46.95', long. 75°07.03' from the present survey are pipelines and should be revised to the pipeline symbol in accordance with Chart No. 1, page 5.

Except as noted, the present survey is adequate to supersede the charted hydrography within the common area.

B. Controlling Depths

The controlling depth notes for the channels in Breakwater Harbor originate with Corps of Engineers Bp 89529 (1974) which is subsequent to the present survey and supersede the present survey information.

C. Aids to Navigation

There are no charted floating aids to navigation within the survey area. The fixed aids on the present survey agree with the charted positions and adequately mark the features intended.

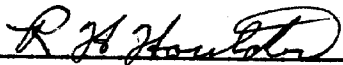
8. Compliance with Instructions

This survey adequately complies with the Project Instructions except, that the presurvey review items were not verified or disproved by the field party.


9. Additional Field Work

This is an excellent basic survey and no additional field work is recommended.

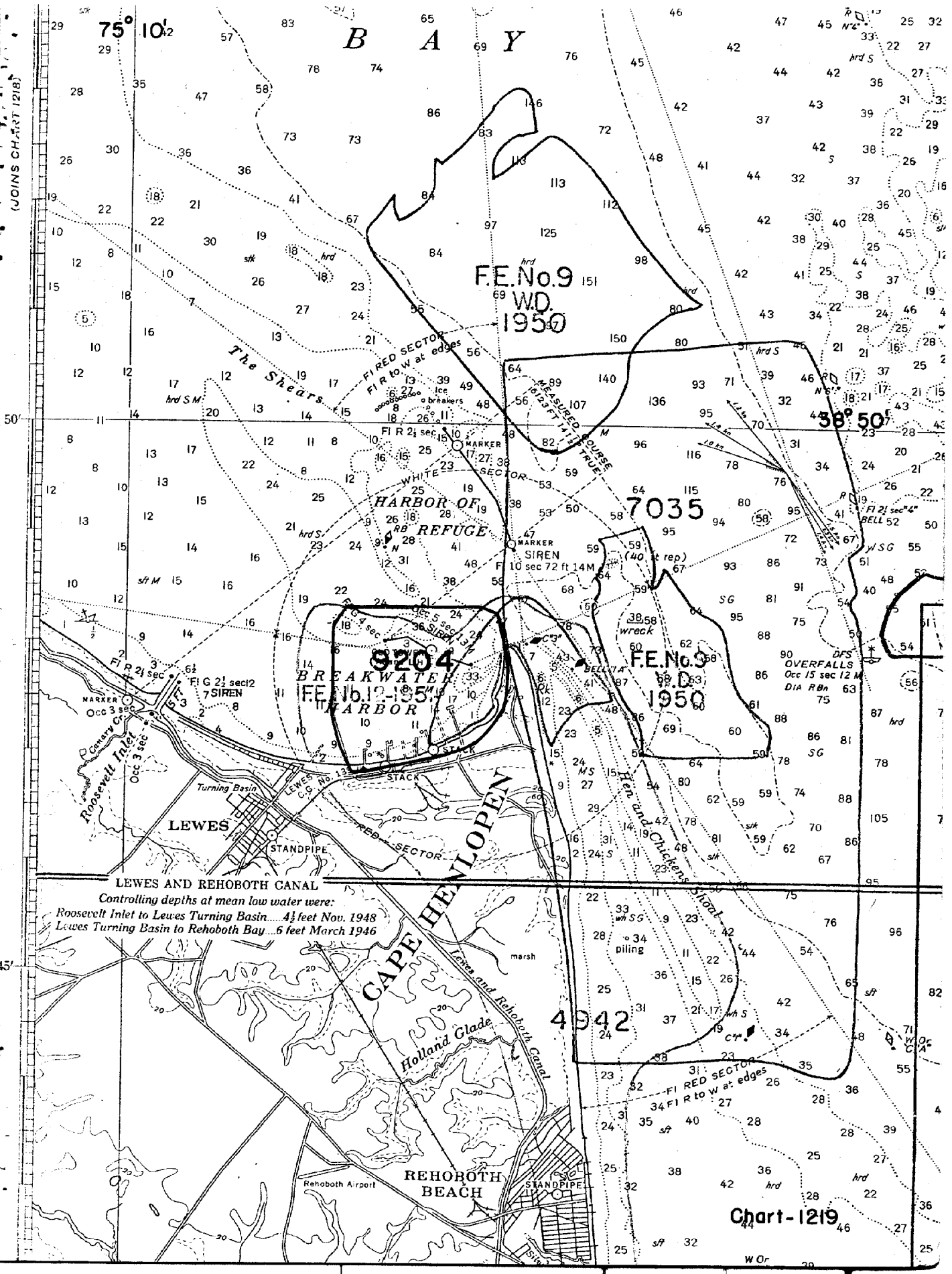
Examined and Approved:



Chief
Marine Chart Division



Associate Director
Office of Marine Surveys and Maps



LEWES AND REHOBOTH CANAL
 Controlling depths at mean low water were:
 Roosevelt Inlet to Lewes Turning Basin... 4½ feet Nov. 1948
 Lewes Turning Basin to Rehoboth Bay... 6 feet March 1946

Chart-1219

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-9204

INSTRUCTIONS

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

CHART	DATE	CARTOGRAPHER	REMARKS
1411	1-23-74	D. Hopkins	Full Part Before After Verification Review Inspection Signed Via Drawing No.
1219	2-13-74	Harold Howard	Full Part Before After Verification Review Inspection Signed Via Drawing No. THRU CHART 411 # 21
1218	8/6/74	Douglas C. Hopkins	Full Part Before After Verification Review Inspection Signed Via Drawing No. THRU CHART 411 Aug. #22
411	1/28/76	Richard L. Hogan	Full Part Before After Verification Review Inspection Signed Via Drawing No.
1219	4/29/76	Richard L. Hogan ajr	Full Part Before After Verification Review Inspection Signed Via Drawing No. THRU CHART 411
1218	5/3/76	Richard L. Hogan ajr	Full Part Before After Verification Review Inspection Signed Via Drawing No. THRU CHART 411
1109	1/3/77	Richard L. Hogan	Full Part Before After Verification Review Inspection Signed Via Drawing No. THRU CHART 1219
			Full Part Before After Verification Review Inspection Signed Via Drawing No.
			Full Part Before After Verification Review Inspection Signed Via Drawing No.
			Full Part Before After Verification Review Inspection Signed Via Drawing No.