FINAL REPORT

BATHYMETRIC SURVEY
PASSAIC RIVER
PASSAIC, NEW JERSEY

2642

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15 August, 1995

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FINAL REPORT
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1.0 INTRODUCTION

Ocean Surveys, Inc. (OSI) performed a precision bathymetric survey in the Passaic River Study Area (PRSA) during the period March 31 through April 17, 1995 as part of an integrated study in support of the multi-discipline PRSA Investigation. Precision bathymetric data was collected the Passaic River Study Area which is defined as extending from the lower boundary at PRSA Station 0+00, which corresponds approximately to USACE station designation 40+00, to an upper boundary at PRSA Station 216+80 which corresponds to USACE station designation 256+80. The Passaic River Study Area includes four complete and one partial Reaches of the Passaic River; the Point No Point, the Harrison, the Newark, the Kearny and Arlington (partial) Reaches, respectively (Figure 1).

In accordance with the SOW requirements, all OSI personnel involved in the survey were trained and certified in accordance with OSHA 29 CFR 1910 120(e)(3). Additionally, all field sampling and survey activities were performed with strict adherence to the Health and Safety Contingency Plan for the Passaic River Study Area dated January 1995 included with the RFP documentation.

2.0 TECHNICAL APPROACH

2.1 Bathymetry Survey Area

Precision bathymetric data was obtained along survey transect lines at 100-foot intervals throughout the defined survey site which extended from 2,100' below the downstream

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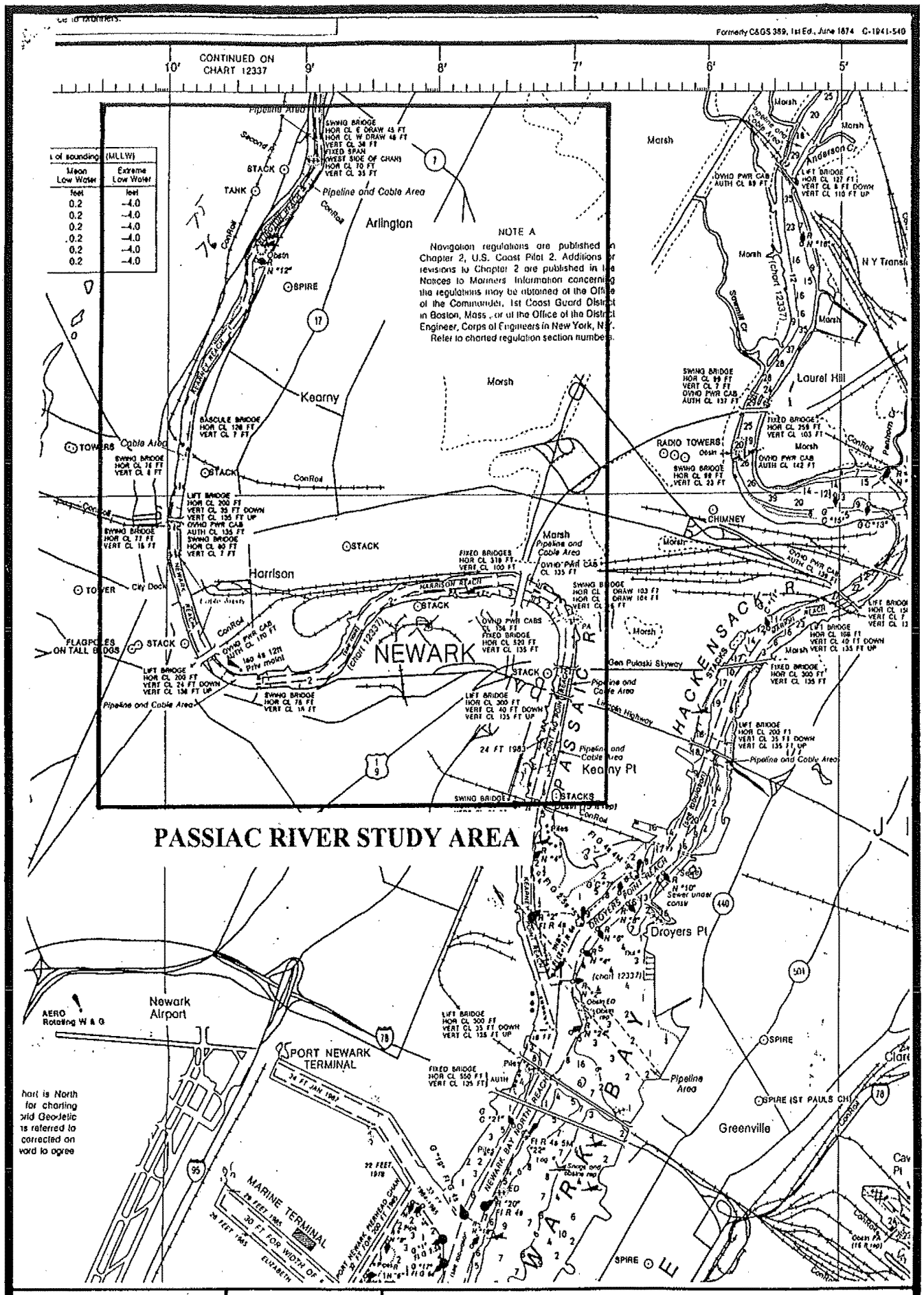

FIGURE NO.	DATE
1	8/15/95
SCALE	BY
NA	GGR

OCEAN SURVEYS, INC. OSI

OLD SAYBROOK, CONNECTICUT

boundary of the Passaic River Study Area to one (1) statute mile above the upstream boundary of the PRSA; i.e., -40+00 to 269+40 as defined in the RFP. This expanded area corresponds to the USACE section 0+00 to 309+40 for the Passaic River.

2.2 Horizontal and Vertical Control

The survey was accomplished employing OSI's Maretrack II state-of-the-art digital hydrographic survey system which includes a specialized navigation computer with proprietary software allowing input and display any desired pre-plot survey trackline, trackline control, real-time data logging and on-board plotting.

This system based on ruggedized 486-level IBM-PC computers and OSI developed software which allows instantaneous flexibility to delineate and run any designed trackline spacing and line orientation representing the most efficient system to allow precision acquisition of data along the specified survey lines.

Vessel positioning was accomplished by use of both a Trimble Model 4000 Differential Global Positioning System (DGPS) and an IMC Hydro-1 laser-based range-azimuth positioning systems. Each of these precision electronic positioning systems were interfaced to the above OSI Maretrack II navigation computer to provide real-time navigation and vessel control information with a resulting vessel positioning accuracy of better than 5.0 feet. The Trimble DGPS positioning was employed for most of the survey activity with the IMC Hydro-1 range azimuth system used in restricted areas and/or under bridges where satellite visibility for the DGPS signals was obscured.

Each of the above navigation systems was configured to operate at a 1- second data rate to yield an extremely high density data set. This data set included a digitally recorded vessel position and depth measurement each 1.5'-2.0' along each survey trackline.

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Water level for vertical datum reference was accomplished by continuous monitoring with a series of three Coastal Leasing, Inc.'s "MicroTide" precision digital tide gauges. These gauges were referenced to the USACE project mean low water (MLW) datum by leveling to USACE and USGS benchmarks in accordance with SOP No. 13 - River State Measurements and Tidal Correction" of the Field Sampling Plan (FSP), Revision No. 1, dated January, 1995. The gauges were set to record water level data at five (5) minute intervals and recordings were time-synchronized with the digitally logged depth data to allow adjustment of the measured water depth data to the specified MLW datum. The tide gauge installed in the central portion of the project site additionally recorded barometric pressure at each 5-minute measurement cycle. The recorded barometric pressure was, in turn, employed to adjust the recorded water levels for variation in barometric pressure during the measurement period to yield the most accurate possible tide data. Tide gauges were installed at the following locations:

1. Con Rail Railroad Bridge

   Gauge S/N: 318

   Reference: TBM "1 & 9" which was established using conventional leveling techniques from First Order Class 1 BM "RV B NJGS." Tide gauge and associated staff were set to NYCOE MLW using onventional leveling techniques from TBM "1 & 9."

2. 80-120 Bulkhead (Opposite Maxus Lister Street Site)

   Gauge S/N: 306 (w/external sensor for barometric pressure)

   Reference: TBM's "M1" & "M2" installed on the North shore of the Passaic River opposite the Lister Street site. Elevations established on the TBM's using conventional leveling techniques from Sta. "N4" at Maxus. Tide gauge and staff "80-100 Lister" were set to NY COE MLW using conventional leveling techniques from TBM's "M1" & M2."

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3. RAPP FENDER

Gauge S/N: 317

Reference: The gauge and staff "Rapp" installed on the South Side of the East Fender at the upper R.R. Bridge at Rapps' Marina. The gauge and staff were leveled to NY COE MLW using conventional leveling techniques from BM's "1279" and "1264."

Specification sheets for the navigation, water level, and all other equipment described in report are included in Appendix A.

2.3 Depth Sounding

All sounding measurements were acquired with a state of the art, survey-grade Odom Echotrac Model DF 3200 MK II dual frequency depth sounder. This echo sounder which was equipped to provide simultaneous depth measurements at 210 and 24 kHz has real-time analog and digital displays plus digital output of each the primary and secondary frequency depth measurements The Odom Echotrac unit additionally incorporates tide, transducer draft and speed of sound adjustment capability to allow acquisition of extremely accurate depth data.

Operationally, data acquisition commenced with daily calibration check of the Trimble DGPS electronic positioning system followed by calibration of the depth sounder employing a conventional "bar check" calibration procedure as detailed in the US Army Corps of Engineers Hydrographic Surveying Manual, EM-1110-2-1003 (28 February, 1991). The DGPS calibration check was performed by transiting the vessel to a location where the antenna of the DGPS was as close as practical to a previously established, coordinated horizontal control point at the Newark fire department dock. The offset distance (generally less than 15 feet) was then measured with a steel tape from the DGPS Antenna to the control point and the offset distance between the known control point location and the indicated DGPS antenna location was compared with the taped offset distance. If offset variations of more than 2.5' were observed, the variance source was

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investigated and survey activities would not commence until the variance source corrected. Calibration checks were performed at the beginning and end of each "high water" sounding period. During the period of this survey, no variations equaling 2.5' or more were observed during any navigation calibration check.

Similarly, prior to the commencement of bathymetric data acquisition, bar checks were performed in the area to be surveyed. Additional bar checks were performed at each 2-hour interval during all depth data acquisition periods and after each high water depth measurement period. During the entire period of the survey, no variations in the initial day's depth sounder calibration requiring adjustment of the depth sounder speed of sound were observed; i.e. the speed of sound within each survey area remained constant for the full period of data acquisition within that portion of the project area.

Following the above DGPS navigation system accuracy check and depth sounder calibration in the area of data acquisition, the navigation computer display of the candidate survey lines was reviewed and the first survey line was highlighted. After verification that all systems were functioning properly, data acquisition along the survey line (transect) commenced during which the OSI Maretrack II navigation system left/right indicator was used to provide guidance to the helmsman to keep the vessel precisely on the desired survey transect. In addition to the left/right indicator, the OSI Maretrack II navigation system computer also displayed both the intended (pre-plot) and actual survey vessel track, the navigation event or "fix" marks, transect stationing, time, date, run number, aids to navigation, survey area limits, the shoreline and other physical shoreline features, and the location of project tide gauges and tide staffs.

As the vessel transited each survey line, vessel position at a 1-second rate, depth data at 10 soundings per frequency per second and "event" or "fix" marks at 10-second intervals were automatically recorded by the Maretrack II navigation computer and data logging system. The event or fix marks were also simultaneously printed on the annotated depth profile along the transect on the Odom Model DF 3200 depth sounder analog record.

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Following acquisition of data along each set of survey lines, the digitally logged data were reviewed on the Maretrack II navigation system CRT display for both confirmation of proper data acquisition and QA/QC review. Additionally, notes documenting each day's survey activities were recorded in the project daily log sheets. A copy of these log sheets are included in Appendix C of this report.

3.0 DATA ANALYSIS AND PRESENTATION

Although OSI's integrated "Maretrack II" system has the capability to process essentially all required data at a remote site, on this project, the system's capability was employed for on-site processing of survey trackline coverage and selected preliminary processing supporting the project QA/QC objectives. Subsequent final processing and generation of all deliverables was accomplished in OSI's home office where expanded analytical and extensive CAD capability is available.

The OSI processing center is built around more than a dozen linked Pentium 90 and 80486/66 computer work-stations. CAD processing is similarly performed on additional linked Pentium 100 and Pentium 120 computer work-stations.

Data analysis involved the generation of survey trackline plots with adjustment for individual sensor layback and offsets from the positioning system antenna. Following generation of the above post-plot tracklines, the bathymetric data were adjusted to the project specified Mean Low Water (MLW) reference datum based upon data recorded with Coastal "MicroTide" precision digital tide gauges. In accordance with the procedural specification of SOP No. 3 Bathymetric Surveying, all soundings were adjusted to the specified USACE MLW datum based on a linear interpolation of tidal heights between the two gauges bracketing the data area.

Presentation of the above bathymetric data has been made as series of contoured boat sheet drawings (OSI drawing nos. 95ES023.1 - .13) at a scale of 1"=100' with individual

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depth values plotted at a 10' interval together with a contour interval of 5'. Reduced size copies of these drawings with enhanced contour notation are included in Appendix B of this report. Complementing the above graphic presentations, drawing files in MicroStation ver. 5.1 together with ASCII files containing final depth measurements along each survey transect have been included as an integral part of the bathymetric survey deliverables.

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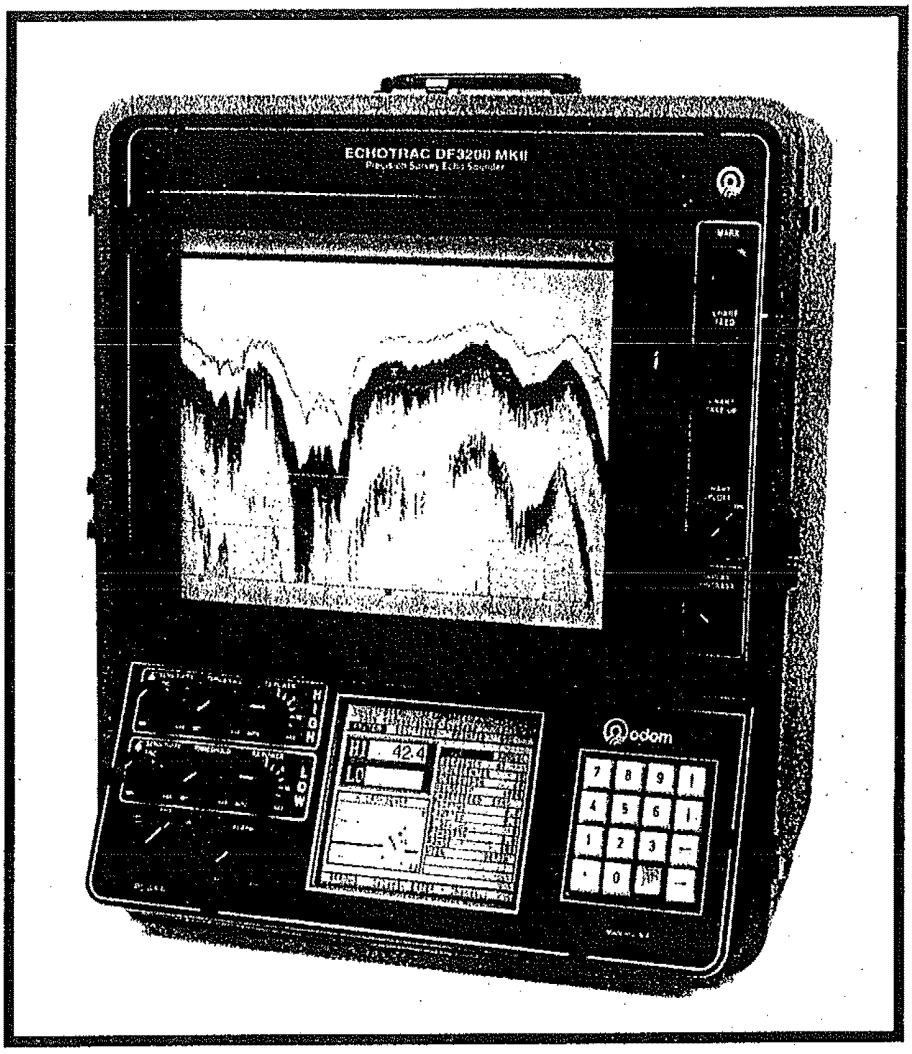
APPENDIX A

PROJECT EQUIPMENT SPECIFICATIONS

ECHOTRAC DF 3200 MKII

Dual Frequency Precision Survey Echo sounder



- SUITABLE FOR SHALLOW WATER HYDROGRAPHIC SURVEYS AND OCEANOGRAPHIC APPLICATIONS
- HIGH RESOLUTION, 8" THERMAL PRINTER, 16 GRAY SCALES
- ADVANCED DSP TECHNOLOGY

odom HYDROGRAPHIC SYSTEMS INC.
8178 G.S.R.I. AVE., Bldg. B. / Baton Rouge, Louisiana 70820, U.S.A.
TEL.: (504) 769-3051 FAX: (504) 766-5122 TELEX: 58-6406

ECHOTRAC MODEL DF3200 MKII
GENERAL DESCRIPTION

This latest generation of the ECHOTRAC dual frequency survey sounder brings into use the best of available new technologies in high resolution thermal printing, microprocessor and DSP techniques, and flat screen graphic displays. Three 16 bit processors share the real time computing tasks of the echo sounder and make it an extremely capable and easily interfaced instrument. Exceptional system response is achieved by employing techniques such as task sharing, asynchronous event processing and multiple scan buffering. The sonar transceiver, echo processor, graphical operator interface and hard copy recorder are all housed in one portable, splash-proof case. The unit which is suited to table top, bulkhead, or rack mounting is equally at home on either small survey launches or large ships. Suitable for use in the shallows of rivers and harbors, the mission variable unit is also capable of working to depths of over 4,000 meters.

SPECIFICATIONS

FREQUENCIES: Either single or dual frequency units available: Standard frequencies 24kHz and 200kHz.
Optional frequencies:
Low (12kHz to 50kHz)
High (100kHz to 1MHz)

PRINTER: Thinfilm thermal print head, 216mm (8.5") wide, 8 dots per mm (203/in.), capable of printing up to 16 gray shades. The fixed-head thermal printer mechanism is virtually silent and generates no dust or noxious odors.

DISPLAY AND KEYPAD: Film Super Twist Nematic (FSTN) Dot Matrix LCD Module (320 x 200 pixels, 0.38mm x 0.52mm dot pitch), Six inch (156.4mm) diagonal measure, on board controller and Fluorescent Back Lighting (CFL). The paper white display provides excellent visibility in all light conditions - bright sun to darkened wheelhouse. In dual frequency operation, both high and low frequency depth values are displayed continuously. The 16 key Nema 12 sealed unit keypad is used by the operator for direct parameter entry and functional control from the front panel.

DIGITIZER: Bottom tracking capabilities of the unit are enhanced by utilizing the Digital Signal Processing features of the digitizer processor. Traditional leading edge or center of energy detection can be used to track bottom returns from both channels. This DSP capability yields a proprietary unambiguous and deterministic bottom detection method, even in the presence of noise and multiple returns.

INTERFACING & ANNOTATION: Four bi-directional RS-232 serial ports are standard. Depth information is output after each sounding cycle with the standard string including values for both the high and low channels in dual frequency operation. Custom output strings conforming to other major echo sounder formats are available. System parameters can be configured via the communication ports. The Echotrac accepts annotation of up to 80 characters (printed on the Fix Mark Line), in the proper format, from various peripherals, positioning, navigation and computer systems.

FIX MARKS: Water depth, time, date, and fix number, are automatically annotated at every Fix mark. Beginning fix numbers, (incrementing or decrementing) can be selected via the front panel key pad or input via the serial interface from a computer. Fix marks can be initiated by command from a computer over the serial or parallel interface, by electrical command (active high, active low, or contact closure) over the dedicated fix input lines, or by internally generated signals from the system clock. The time between internally generated fix marks can be set by the operator.

HEAVE COMPENSATION: Direct connection to the TSS 320B Heave Compensation Control Unit or the new 330 Series of "Intelligent Sensors" via a custom serial port dedicated for heave interfacing.

PAPER DIMENSIONS: Recording Width: 216mm (8.5"), Length: approx. 30m (1181").

CHART RESOLUTION: A Scale width of 15 meters utilizes 1,500 dots of the available 1,728 dots across the array. This configuration yields true, one dot per centimeter resolution on a very usable scale width. Closer analysis of the seabed in shallow water is possible using the 0.5 multiplier which yields a 0 to 7.5 meter minimum scale (resolution = 2 dots/cm).

SCALE LINES: Scale lines are annotated automatically so that at least one set of beginning and ending values can be seen in the chart window at all times. Scale values, scale lines, and annotation are printed in inverse shading through the bottom record. Sounding is not interrupted in order to produce chart annotation.

CHART PAPER SPEED: Chart speed can be varied from a minimum of 0.1 cm/min. to a maximum of 30 cm/min. Software is incorporated in the unit to control the chartspeed of the unit via the RS-232 input, from an external computer.

UNIT DIMENSIONS: 470mm (18.5")H x 432mm (17") Wx279mm (11")D.

WEIGHT: 21.7kg (48 lb.)

POWER REQUIREMENTS: The system operates from DC voltages between 11 and 29 Volts, of sufficient current capacity to supply 100 watts of average power to the load.

OPERATING TEMPERATURE: From 0°C to 55° in conditions of humidity up to 95% non-condensing.

odom
HYDROGRAPHIC SYSTEMS INC.
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TELEX: 58-6406

MicroTide
Product Description

Coastal's MicroTide is an economical, solid-state instrument for monitoring and recording water level in lakes, rivers, and oceans. An on-board microprocessor controls sampling, averaging, and storage. Over 100,000 samples are stored in the standard 128K RAM; options to store over 350,000 samples are available.

MicroTide meassures tides with 0.1% accuracy using an ICS strain gauge pressure sensor (or alternately a Paroscientific Digiquartz sensor).

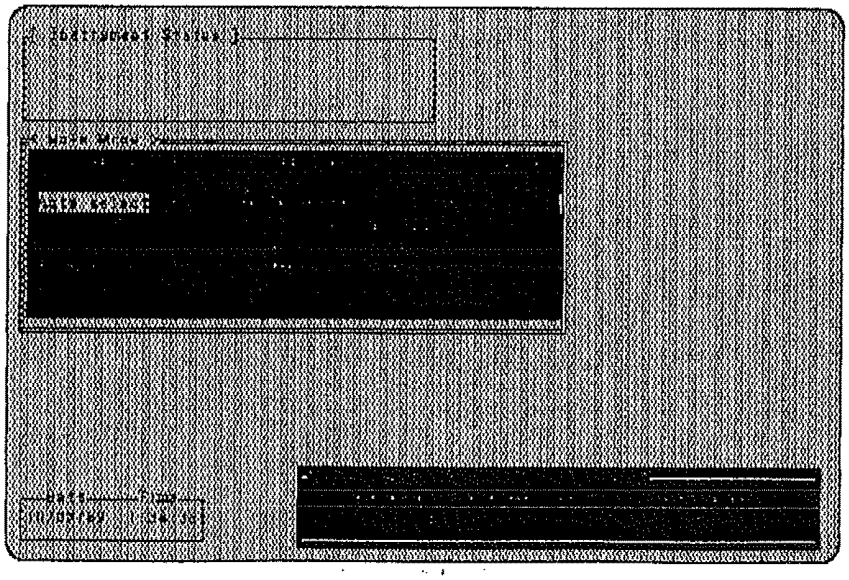
MicroTide's many advantages include:

- *Economy.* Service costs are minimal because MicroTide can run for months on standard alkaline batteries.
- *Reliability.* MicroTide is completely solid-state and uses a proven logger and sensor.
- *Convenience.* MicroTide is controlled by Wizard, user-friendly software that runs on a personal computer.
- *Versatility.* Optional sensors as appropriate can usually be economically added.

Using MicroTide is easy thanks to Wizard. This proprietary, portable PC software uses windows, graphics, and help keys to provide user-friendly control of the instrument. The figure below shows a sample of the Main Menu.

Wizard provides the functions listed below.

- *Instrument Checkout.* Wizard has a monitor mode which displays the sensed data in real time and engineering units.
- *Instrument Initialization.* Wizard allows you to specify the parameters to measure, sampling frequency, and start date and time, and checks your input for errors.
- *Data Retrieval.* Wizard downloads data from the MicroTide via the serial port, or optionally by high speed bus interconnection to the disk drive.
- *Data Processing.* Wizard converts data into engineering units and saves the data in a format which is easily read by programs such as Lotus 123 or dBase.
- *Data Review.* Wizard provides a basic means of examining the data with plots or tabular listings.



Wizard Main Menu

MicroTide Specifications

System Attributes

Item	Description
Clock	Solid state real time, accuracy one minute per year
Data Capacity	*128K* RAM data storage stores almost 100,000 data points up to 512K RAM expansion options store up to 350,000 data points
Dimensions	5.5 inch diameter by 13 inch long stainless steel and UHMW plastic pressure housing; 17 lbs in air
Power Supply	User replaceable standard alkaline D cells
Sample deployment	An example of a deployment would be to: *average* all standard sensors for 1 minute and store this once every 5 minutes For this user selectable sampling scheme, the instrument would be memory limited and should be retrieved after 150 days deployment
User Interface	*Wizard* IBM PC Compatible software uses RS-232 serial interface to fully control sampling parameters, instrument functions and provide ASCII data files in engineering units

Standard Sensors

Parameter	Type	Range	Accuracy	Units
Pressure, Standard	ICS strain gauge	to 100	0.1%	PSIA

Optional Sensors

Parameter	Type	Range	Accuracy	Units
Pressure, Scientific	Paroscientific	to 900	0.005%	PSIA
Temperature, Standard	YSI thermister	-5 to 34	±0.1	°C

Notes

1. Sensor resolution usually 1/4096 of range (12-bit)
2. Optional resolution for scientific sensors 1/65536 of range (16-bit)
3. Sensor ranges representative; hardware or software alternates possible
4. Sample deployment assumes minimum data capacity

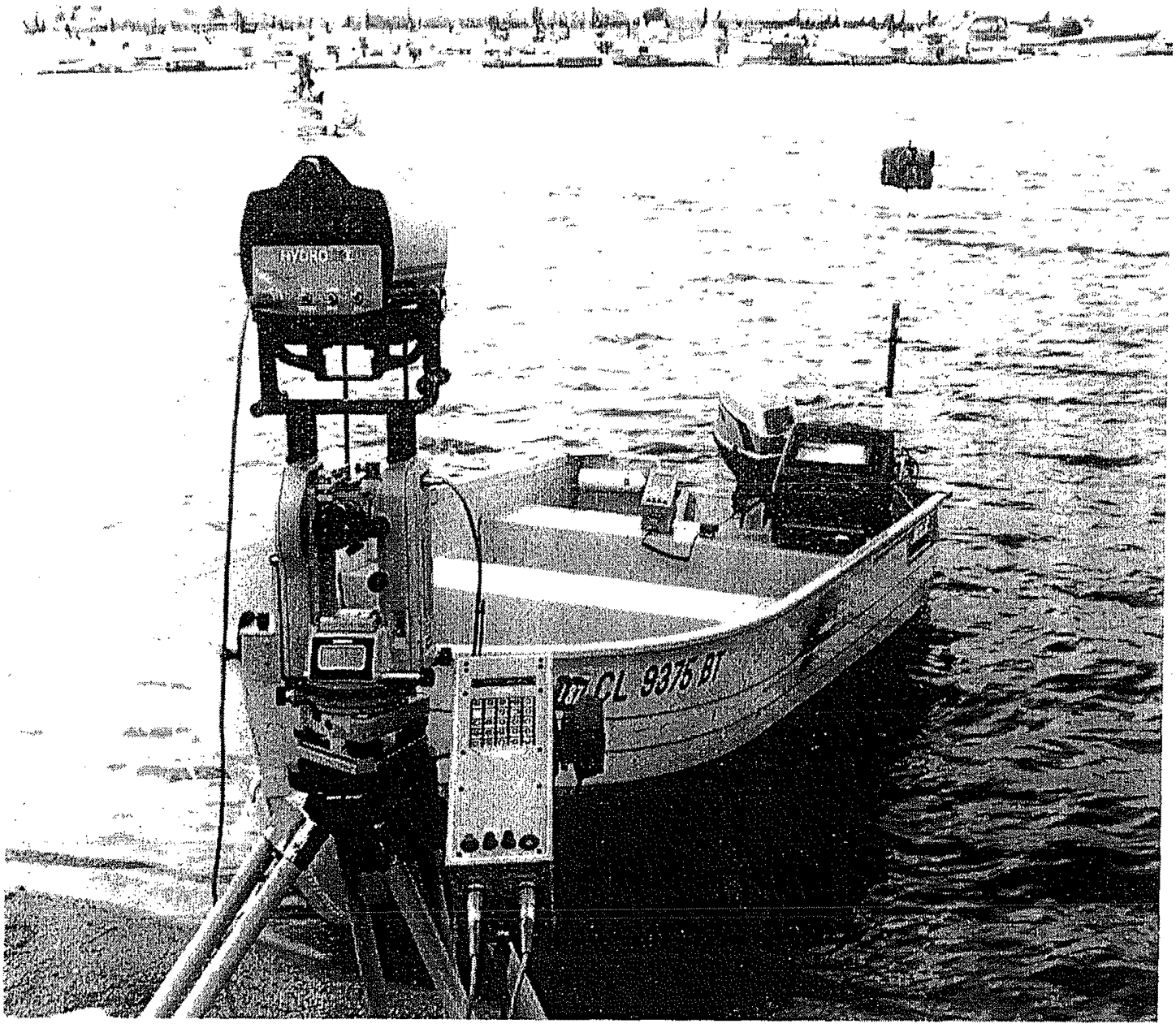
APPENDIX B

BATHYMETRIC SURVEY DRAWINGS

(Reduced Format)

Hydro I

FULLY AUTOMATED RANGE AZIMUTH SURVEYING SYSTEM



THE HYDRO I IS A HIGHLY RELIABLE AND FULLY AUTOMATED HYDROGRAPHIC POSITIONING SYSTEM THAT CAN BE INTERFACED WITH YOUR EXISTING SOUNDING EQUIPMENT AND COMPUTER, TO PROVIDE YOU WITH A COMPLETE HYDROGRAPHIC SURVEYING PACKAGE INCLUDING COMPUTERIZED MAPPING.

International Measurement
and Control Company
300 E. Mineral Suite #5
Littleton, Colorado 80122
(303) 797-7722

SYSTEM OVERVIEW

The Hydro I is a very compact range azimuth surveying system which makes it ideal for small boat situations. The system will automatically collect an (x,y) coordinate and a depth reading at a pre-set distance interval. The diagram below shows an example of the system programmed on a parallel line grid with a 50 ft. offset between lines. It has also been programmed to store an (x,y) coordinate and a depth reading at 10 ft. intervals. After entering the Start and End Points of the first grid line the system will automatically enter new line coordinates when surveying a parallel line grid. When surveying non-parallel lines, line coordinates can be stored and recalled as needed.

NAVIGATE AND SOUND DISPLAY EXAMPLES

The system provides navigation information both for navigating to the Start Point of a grid in the "Navigate Mode" and for keeping on line as soundings are being stored in the "Sound Mode".

NAVIGATE MODE
(Navigating to a New Line)

180°	45°	75'
Azimuth to Start Point	Azimuth of Desired Line	Distance to Start Point

In the Navigate Example in the diagram below, the boat operator would be provided with the information in the display above. From where the boat is located it needs to proceed 75 ft. straight south at a heading of 180° to arrive at the start of the next line which runs at a heading of 45°.

SOUND MODE
(Collecting depths & positions at preset increments)

D ■■■> D

This display would be provided in the Sound Mode Example below. Each block has been assigned a value of 5 ft., therefore the display is indicating the boat is off course to the left 15 ft. The arrow indicates the direction to return to course. The D indicates the data collector is on.

In both navigate and sound mode three additional displays are accessible.

X ± 999999.99 F

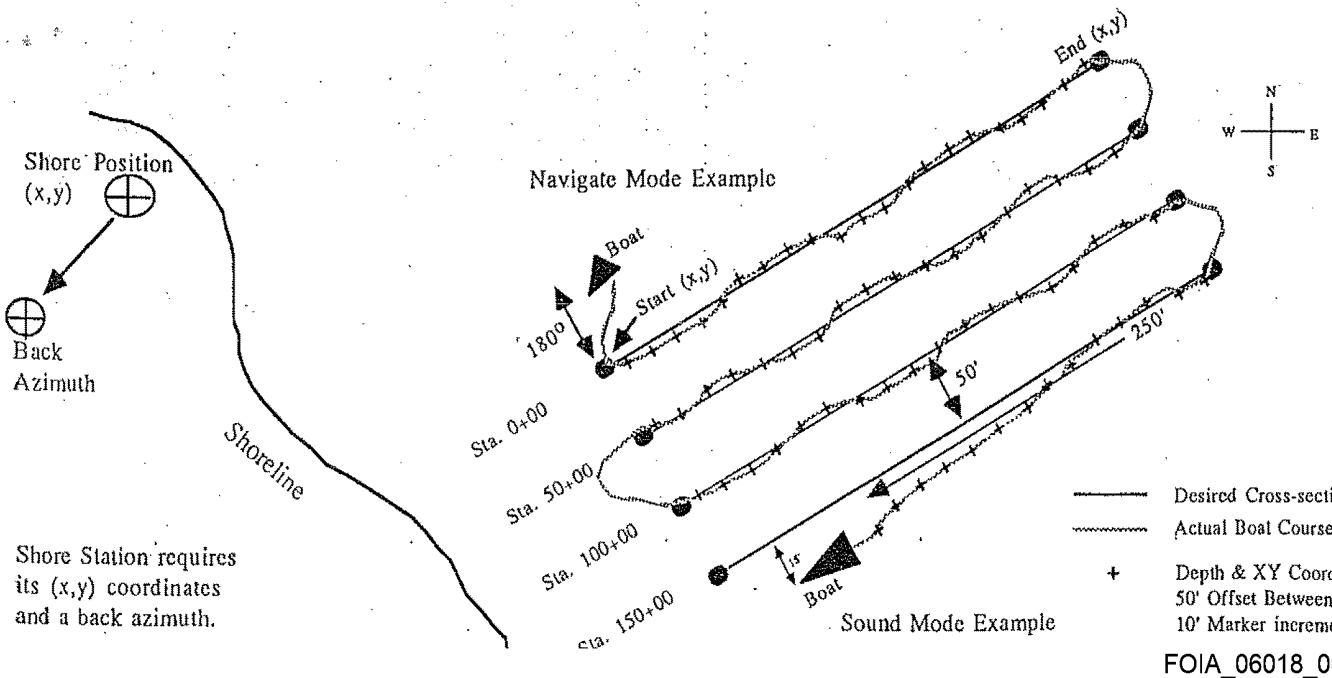
x coordinate of boat position

Y ± 999999.99 F

y coordinate of boat position

- 15 F	+250 N
Distance off line	Distance on line

Refer to Sound Mode Example.
In this situation the boat is off line to the left 15 ft. and 250 ft. along the line from the start point.

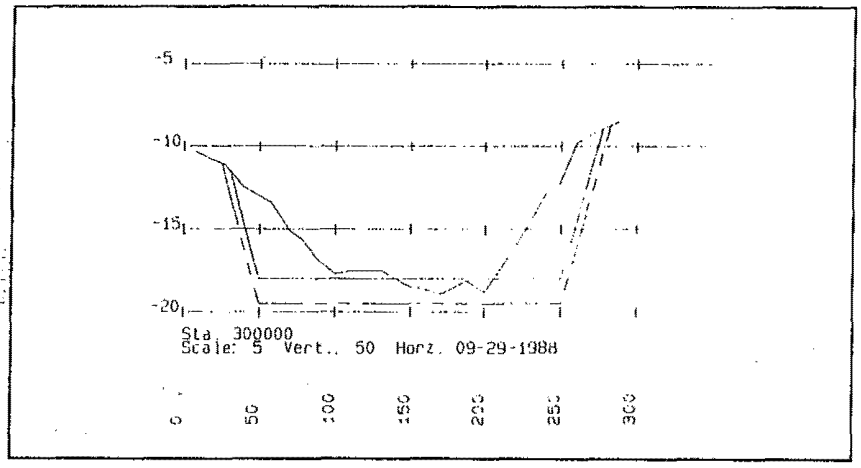


Shore Station requires its (x,y) coordinates and a back azimuth.

FIELD TO FINISH SOFTWARE

The IMC Post Processing software package is IBM compatible, very easy to use, and enables operator to:

A. Download data from Data Collector
B. Edit Data (on screen graphics)
C. Enter Tide Corrections
D. Plot Plan View (color select for depth highlighting)
E. Plot Cross Section View
F. Draw in Desired Dredge Template and Over-Dredge Template
G. Compute Dredge Volumes and Over-Dredge Volumes (fill also)
H. Print out of x, y coord., Dist. on line, Dist. off-line, Depths.



CROSS-SECTION VIEW WITH DREDGE TEMPLATE

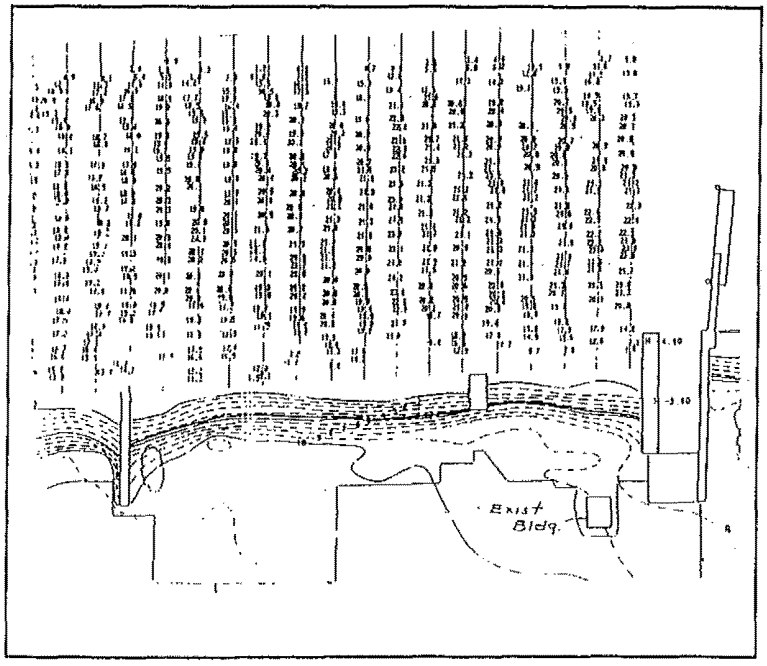
Base Line Information:

Beg. Sta.	North	East
0	513167.000	1364177.000
End sta.	North	East
1800	514927.000	1364554.000
Sta. off set	Section Az.	Total Sections
200	282.0141	10

STATION	NORTH	EAST
0	513167.000	1364177.000
Total Points	Tide correct.	Time of section
18	1.5	13.13333

Pt.	North	East	Off base	Off Line	Sounding
**1	513167	1364180	-3	-1	-19.4
**2	513166	1364159	18	5	-19.4
**3	513170	1364138	39	5	-19.4

PRINTED DATA



PLOT PLAN VIEW
(centered or digitized to existing map)

File name: MJJKE Dredge Quantities calculated 08-29-1988 Page 1

Sta 6400 Template Information

Square feet	-62	Bottom width	200
Avg. end area	-57	Base to CL	-150
Cubic yards	-211	Elev. of finish cut	-21
Total cubic yards	-17281	Side slope ratio	2 :1 Right 2 :1 Left

Sta 6500 Template Information

Square feet	-151	Bottom width	200
Avg. end area	-106	Base to CL	-150
Cubic yards	-394	Elev. of finish cut	-21
Total cubic yards	-17675	Side slope ratio	2 :1 Right 2 :1 Left

Sta 6600 Template Information

Square feet	-79	Bottom width	200
Avg. end area	-115	Base to CL	-150
Cubic yards	-426	Elev. of finish cut	-21
Total cubic yards	-18101	Side slope ratio	2 :1 Right 2 :1 Left

Sta 6700 Template Information

Square feet	-70	Bottom width	200
Avg. end area	-74	Base to CL	-150
Cubic yards	-275	Elev. of finish cut	-21
Total cubic yards	-18376	Side slope ratio	2 :1 Right 2 :1 Left

Sta 6800 Template Information

Square feet	-58	Bottom width	200
Avg. end area	-64	Base to CL	-150
Cubic yards	-237	Elev. of finish cut	-21
Total cubic yards	-18613	Side slope ratio	2 :1 Right 2 :1 Left

Sta 6900 Template Information

DREDGE VOLUME PRINT-OUT

STANDARD SYSTEM EQUIPMENT:

1. Hydro I Laser
2. Lietz DT5 Theodolite
3. Quick Track Endless Tangent
4. Shore/Ship Voice and Data Links
5. Navigator Box
6. 12,000 Point Data Collector (x,y,z=1 Point)
7. Rechargeable Batteries w/chargers
8. RS232 Computer Interface

OPTIONAL EQUIPMENT:

1. IMC Post Processing Software Package
2. Fathometer
3. Fathometer Digitizer
4. Computer
5. Plotter
6. Prisms with omni Directional Cylinder
7. Tri-Pod
8. External Gel Cell Batteries
9. Internal Time Clock
10. High Gain Antennas
11. 30 A.H. Gel Cells

STANDARD SYSTEM FEATURES:

1. Navigation Directional Indicators which include:
   A. Navigation to Start Point of Line
   B. Course Navigation - Left/Right Steering Indicator
2. Interface to Sounder
3. Distance Measurement 5 times per second
4. Vertical & Horizontal angle measurement 2 times per second
5. Conversion to x,y, or station range positioning
6. Position update time .7 seconds
7. Depths recorded at distance intervals
8. Automatic computation of next line coordinates
9. Parallel and non-parallel line modes
10. Real time data output

SYSTEM SPECIFICATIONS

1. HYDRO I LASER: CLASS I EYE SAFE (CFR 21)
   A. Range: 5000m (to a triple prism)
   B. Update Rate: 5 times/sec.
   C. Accuracy: ±2 ft.
   D. Beam Width: 7 milliradians Hor. x 2 milliradians Ver.
   E. Power Source: 12 V DC

2. LIETZ DT5: ELECTRONIC THEODOLITE
   A. Accuracy: ± 5 Arc Sec.
   B. Resolution: 10 Arc Sec.
   C. Power Source: Rechargeable 6 Volt Ni Cad

3. HYDROLINKS (Data Transmitters)
   A. Radio: 4 Watt Half-Duplex Voice/Data Communications
   B. Radio Range: 3 miles
   C. Power Source: 12 VDC

4. DATA COLLECTOR
   A. 12,000 Point Storage (1 Point = x,y, depth)
   B. Real Time Serial Output

Data transferred is standard ACSII format via RS232 Serial Link.

International Measurement & Control Company is continuously upgrading and improving it's products. Specifications may change without notice.

4000RS™ & 4000DS™

DGPS Reference Surveyor and Differential Surveyor

The DGPS solution for real-time sub-meter accuracy utilizing L1 C/A code.

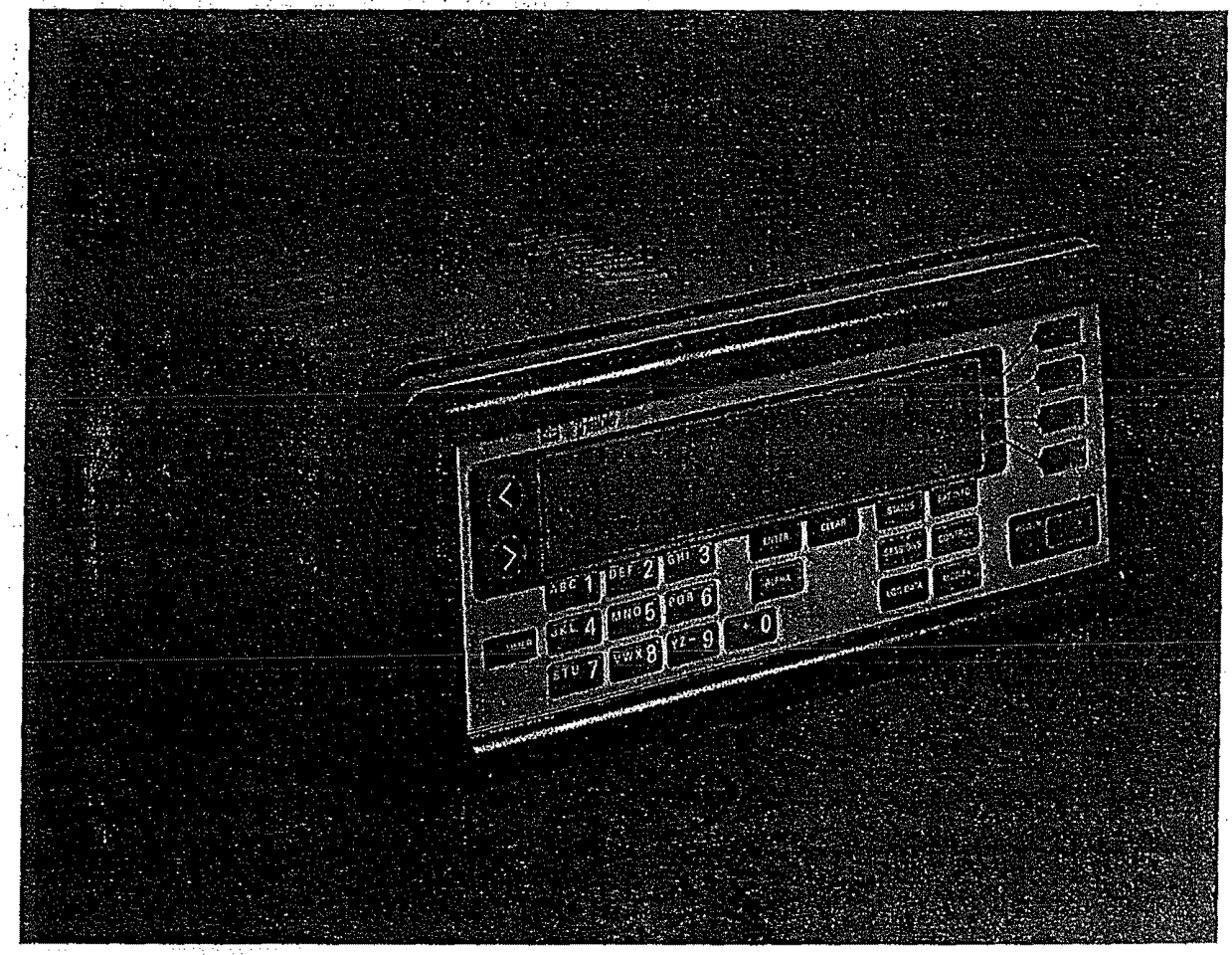
The 4000RS Reference Surveyor and 4000DS Differential Surveyor, built with Trimble's most advanced GPS processor, use carrier-smoothed C/A code measurements to achieve real-time DGPS sub-meter position accuracy. Both receivers feature 9-channels of continuous satellite tracking (12 channels optional), a lightweight, rugged, weatherproof housing, and low-power consumption for extended field operation time from batteries.

The 4000RS and 4000DS are ideal for hydrographic and navigation systems, vessel tracking and other dynamic surveying applications. The 4000RS operates as an autonomous reference station, calculating DGPS corrections in the RTCM SC-104 standard format for transmission to mobile GPS receivers. Advanced carrier aided filtering and smoothing techniques applied to exceptionally low noise C/A code measurements are used to provide the highest performance available in GPS positioning.

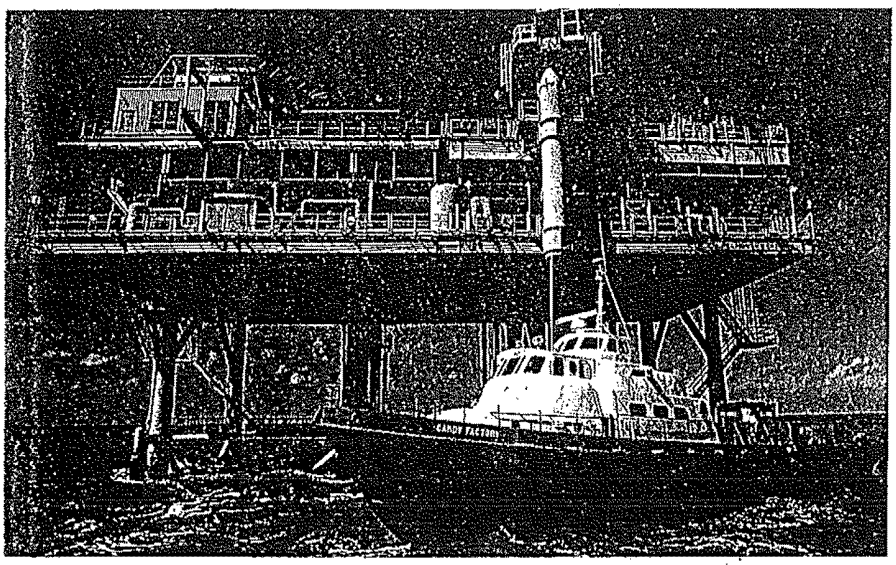
The 4000DS is designed to use DGPS corrections in the RTCM SC-104 standard format broadcast by the 4000RS. The receiver applies the DGPS corrections to its precise C/A code measurements to generate real-time, sub-meter positions at up to a 2 Hz. rate — even under the most challenging operating conditions.

The 4000DS receiver's standard NMEA-0183 version 2 messages, navigation firmware, data and 1PPS outputs allow for optimal flexibility for system integration and interfacing with other instruments. The navigation functions enable waypoint-based route planning with displays for cross track error, steering indicator, and bearing and distance to next waypoint.

While operating, the 4000RS and 4000DS can output binary and ASCII data for archiving or post-mission analysis. In addition, the 4000RS can operate as a mobile receiver with the same features, functionality and options as the 4000DS. For optimum DGPS positioning, combine the receivers with any of Trimble's data communications systems and QA/QC firmware to ensure the integrity of positioning accuracy.

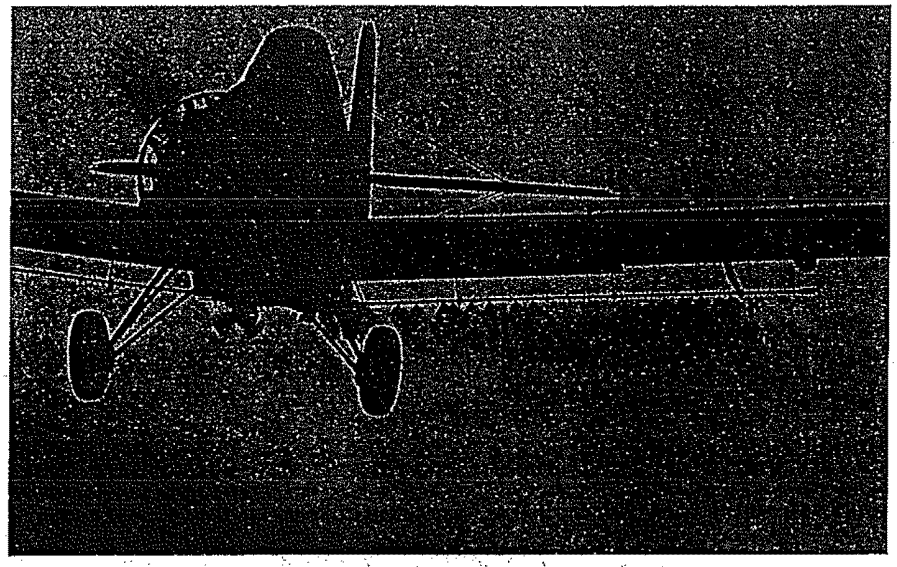


Applications:
Precision GPS Positioning on the ground, at sea and in the air.



HYDRO/DGPS Trimble's HYDRO software provides a totally integrated field-to-finish product that combines your DGPS position with other survey sensors such as echosounders, compasses, sidescan sonar, tide gauges and acoustic positioning equipment. HYDRO also provides navigation and has post-processing capabilities to produce high-quality plots. Additional modules include contouring, profiles, volumes and digitizing. HYDROseismic and HYDROrig have specialized features for the exploration industry's requirements for surveying and rig positioning.

Airborne Applications Traditionally, aerial applications have required multiple pilots as well as numerous human flaggers and associated ground crews. Using TRIMFLIGHT™, a precise DGPS airborne navigation and mapping system, crops can be sprayed effectively and consistently—without flaggers or ground assistance, providing the pilot with graphical proof of where he has sprayed. The system can also be used for a wide variety of other aerial applications, such as geophysical exploration, photogrammetry, GIS data capture and search & rescue.



Tracking Trimble's Barge Monitoring System has taken DGPS one step further by using two-way radio communications. While DGPS corrections are transmitted to vessels for navigation, positions and other status information are reported back to the reference site for display. The system is being used for environmental policing to ensure that the barges dump the material in legal dump sites. If a dump occurs outside these sites, the system will warn the controller.

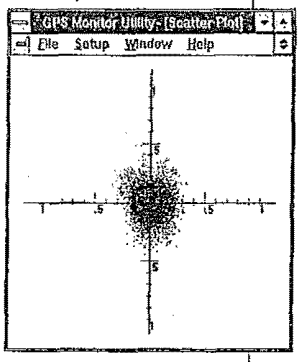
System Integration Components

Data Communications Systems

Trimble offers optimized telemetry systems. The real-time DGPS data communication systems include short-range "license-free" telemetry for line-of-sight environments such as ports, rivers, and coastal regions. For mid-range applications, there are proven HF, VHF and UHF systems for various conditions and licensing requirements. For long-ranges (up to 500 km), Trimble offers MF ground-wave systems. All telemetry components and accessories are tested to ensure system reliability.

GPS Monitor Utility™

The new GPS Monitor Utility is a Microsoft Windows® PC-based DGPS monitoring software tool. This performance analysis package is included with all 4000 Reference Surveyor and Differential Surveyor receivers, and is also available separately.



QA/QC Real-time Quality Assurance

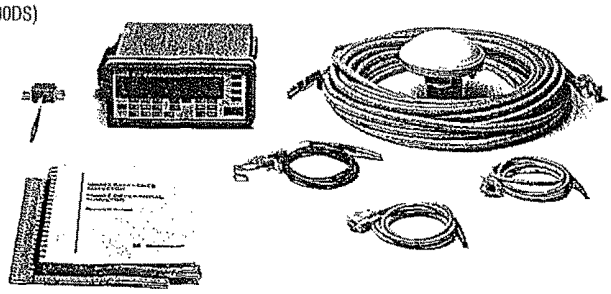
The QA/QC firmware option enables the user to verify the positioning integrity in real-time. QA/QC includes real-time position quality assurance displays, a position quality alarm with definable levels, and data output of quality related information. It provides unprecedented real-time assurances of the receiver's position accuracy so that the operator knows whether the required position quality is being met. If the accuracy falls below acceptable levels, an audible alarm notifies the operator.

Universal Reference Station™

The Universal Reference Station (URS™) is a PC-based software system that works as a dedicated, programmable DGPS reference station for broadcasting corrections to an unlimited number of users. URS collects data from all satellites in view, including pseudo ranges, carrier phase and ephemeris data, and outputs the data and corrections for transmission to mobile receivers that are being used anywhere in range. URS also can also be programmed to collect data for post-processed applications.

Standard Configuration

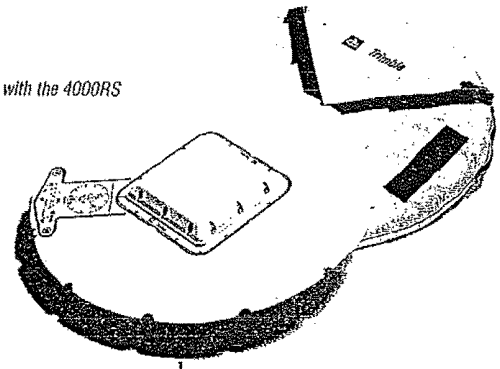
a. Series 4000 GPS receiver (4000DS)
b. Compact dome antenna
c. 30m antenna cable
d. Operating manual
e. Lemo to dual BNC cable
f. 5 pin Lemo to DB9 cable
g. 7 pin Lemo to DB9 cable
h. Dual power input cable



Geodetic Antenna Option

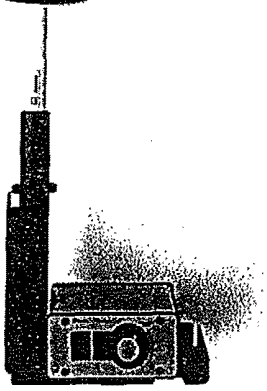
a. Ground plane geodetic antenna
b. Soft case carrying case

The Geodetic Antenna Option is standard with the 4000RS and is optional for the 4000DS.



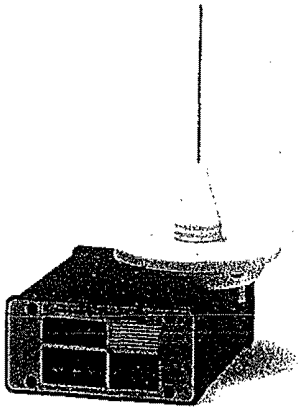
TRIMTALK Series Radio Link Options

TRIMTALK radios are available in various application-specific configurations for reference site, repeater and mobile use. Frequency options are tailored to operation worldwide, including *license-free* in many countries.



NavBeaconXL Option

The NavBeaconXL is designed specifically to receive the differential GPS correction broadcasts from DGPS/MSK radio beacons. Availability of these differential correction broadcasts is increasing rapidly worldwide.



For information about additional options, contact your Trimble sales representative.

4000 RS™ & 4000 DS™

Differential GPS Reference Surveyor and Differential Surveyor

4000 RS Features

Autonomous operation; Filtered and carrier-smoothed RTCM differential corrections (versions 1.0 and 2.0); 0.5 second measurement rate; Data integrity provision; Data link flow control on RTCM port; Triple DC input; L1 geodetic antenna; 30m antenna cable; Automatic mode restoration after power-off; Dual RS-232 I/O ports for data recording; Low power; Lightweight; Portable; Environmentally protected; 1 PPS output; NMEA-0183 outputs; RTCM input and output; 1-year warranty.

4000 DS Features

Less than 1 meter accuracy with Trimble 4000RS; Real-time operation; 0.5 second measurement rate; Data integrity provision; Triple DC input; Compact dome antenna; 30m antenna cable; Automatic mode restoration after power off; Extra RS-232 I/O port for data recording; Low power; portable; Environmentally protected; 1 PPS output; Navigation firmware; NMEA-0183 outputs; Weighted least squares solution; RTCM input; 1-year warranty.

Options

- Firmware update service—4 years
- L1 carrier phase
- 12 channels
- Rack mount
- Event marker
- QA/QC firmware
- Internal memory for datalogging
- Extended hardware warranty
- 4 serial I/O ports

Optional Accessories

- L1 Geodetic antenna
- 30m antenna cable extension, with in-line amplifier
- Office support module: OSM or OSM II
- AC power adapter, 50/60 Hz, 120V or 240V
- Receiver transport case
- TRIMTALK Series radio links
- NavBeacon XL MSK receiver

Physical Characteristics

Size:	9.8"W x 11.0"D x 4.0"H (standard receiver) (24.8cm x 28.0cm x 10.2cm) 16.8"W x 16"D x 5.25"H (rack-mount receiver) (42.7cm x 40.6cm x 13.3cm)
Weight:	6 lbs. (2.7kg) standard receiver 15lbs. (6.8kg) rack-mount receiver 0.5 lbs. (0.2kg) compact dome antenna 5.7 lbs. (2.6kg) L1 geodetic antenna
Power:	Nominal 10.5 to 35 VDC, 7 watts
Operating temp:	-20°C to +55°C
Storage temp:	-30°C to +75°C
Humidity:	100%, fully sealed, buoyant (standard receiver) 95% non-condensing (rack-mount receiver)

Technical Specifications

4000 RS

Pseudorange correction accuracy:	Typically less than 30cm RMS: Low multipath environment
Compatibility:	Corrections may be applied to all differential-equipped GPS receivers

4000 DS

Accuracy:	Typically less than 1m RMS: Assumes at least five satellites and PDOP less than 4
Compatibility:	Accepts RTCM SC-104 corrections Version 1.0 or 2.0

4000 RS and 4000 DS

Tracking:	9 channels of L1 C/A
Start-up time:	Less than 2 minutes from power-on to tracking
Antenna:	External antenna with 30m RG213 cable
RS-232 data link rates:	50-57.6K baud
RTCM message output:	Types 1, 2, 3, 6, 9, 16
NMEA-0183:	ALM, BWC, GGA, GLL, GSA, GSV, RMB, RMC, VTG, WPL, XTE, ZDA
Ports:	Dual serial; Triple power inputs; Antenna; and 1PPS output
Display:	Backlit LCD with four lines of forty alphanumeric characters; Large, easy-to-read characters—2.8mm x 4.9mm; Total viewing area: 32cm²; Adjustable backlight and viewing angle
Keyboard:	Alphanumeric, function, and softkey entry

Specifications subject to change without prior notice.

Trimble

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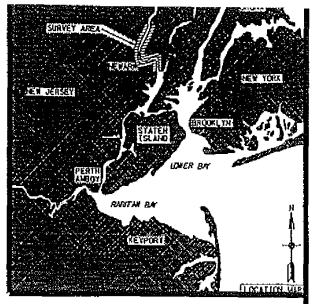
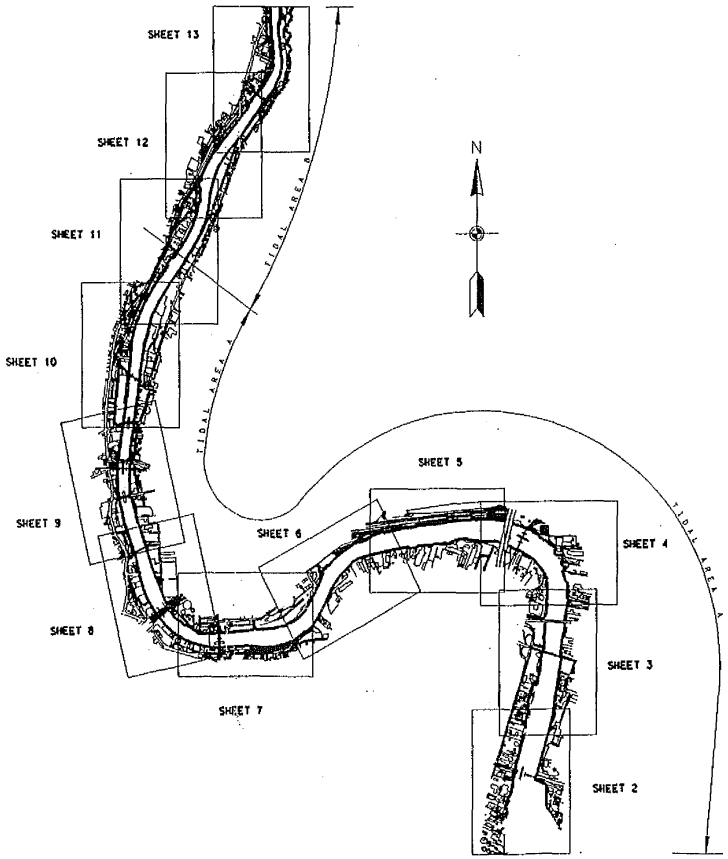
BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY





SURVEY CONTROL DATA			
STATION NUMBER	COORDINATES NORTH	COORDINATES EAST	ELEV. FT. NGVD
N-4	695,243.186	2,147,311.828	7.28
RVB(NJGS)			15.028
DK 9669A			20.297
7282A			17.933
1264			8.490
1279			50.834

AIDS TO NAVIGATION		
DESCRIPTION	COORDINATES NORTH	COORDINATES EAST
R "4" (EBB)	686,772	2,151,031

NOTES:

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2. SOUNDINGS ARE IN FEET AND ARE REFERENCED TO U.S. ARMY C.O.E. MEAN LOW WATER (C.O.E. MLW). THE PLANE OF C.O.E. MLW IS 2.4 FT. BELOW THE PLANE OF NGVD FOR TIDAL AREA A AND 2.3 FT. BELOW THE PLANE OF NGVD FOR TIDAL AREA B.
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4. THE INFORMATION PRESENTED ON THIS CHART REPRESENTS THE RESULTS OF SURVEYS PERFORMED BETWEEN MARCH 31, 1995 AND APRIL 27, 1995 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

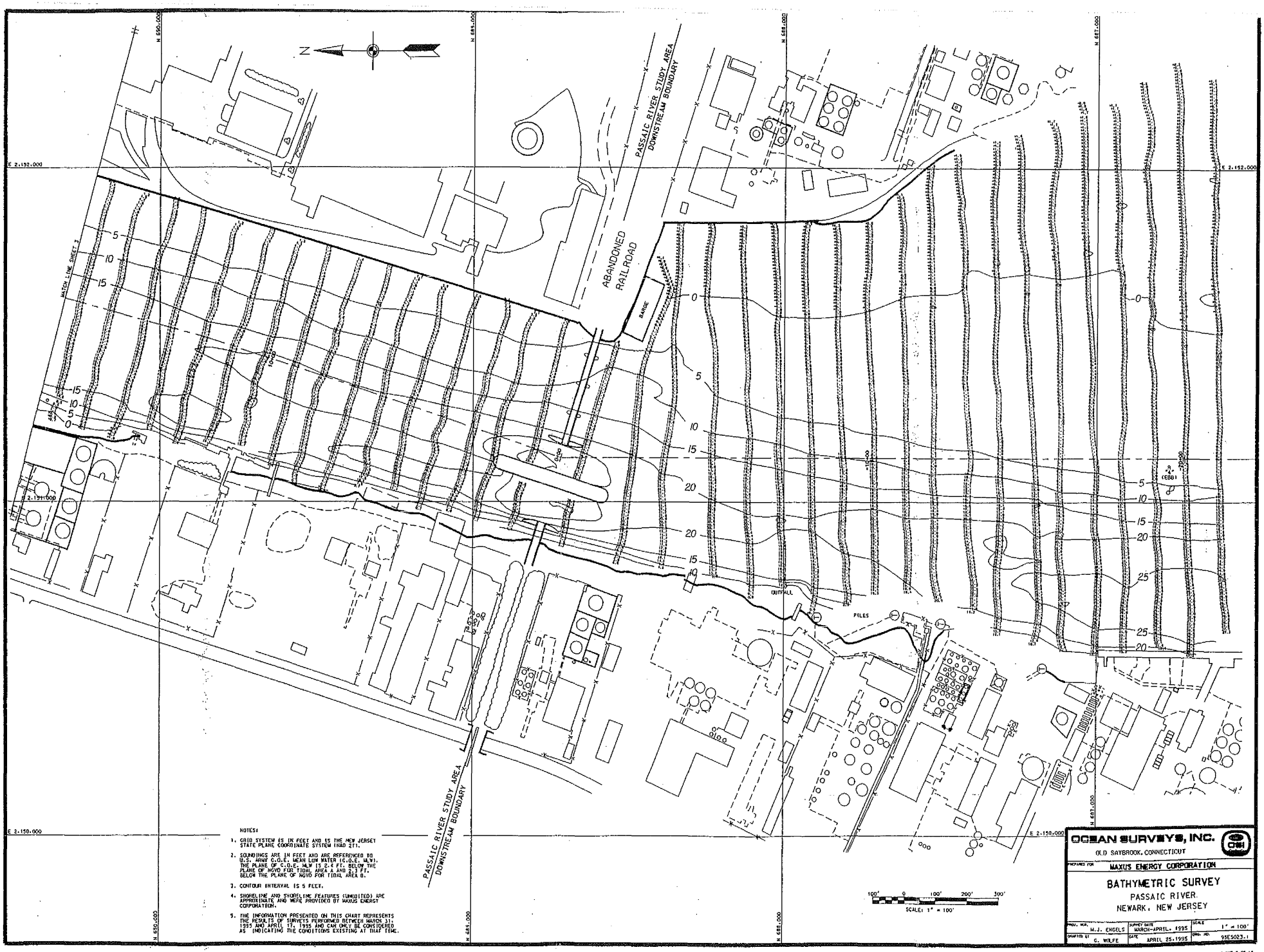
OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT

PREPARED FOR: MAXUS ENERGY CORPORATION

BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

PROJ. MGR. N.J. ENGELS	SURVEY DATE MARCH-APRIL 1995	SCALE 1" = 1500'	
DRAFTED BY G. WOLFE	DATE APRIL 25, 1995	DWG. NO. 95E5023.1	

SHEET 1 OF 13



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OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT

PREPARED FOR: MAXUS ENERGY CORPORATION

BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

PROJ. MGR.: H.J. ENGELS	SURVEY DATE: MARCH-APRIL, 1995	SCALE: 1" = 100'	
DRAFTED BY: G. WOLFE	DATE: APRIL 25, 1995	DWG. NO.: 95E5023.1	

SHEET 2 OF 13

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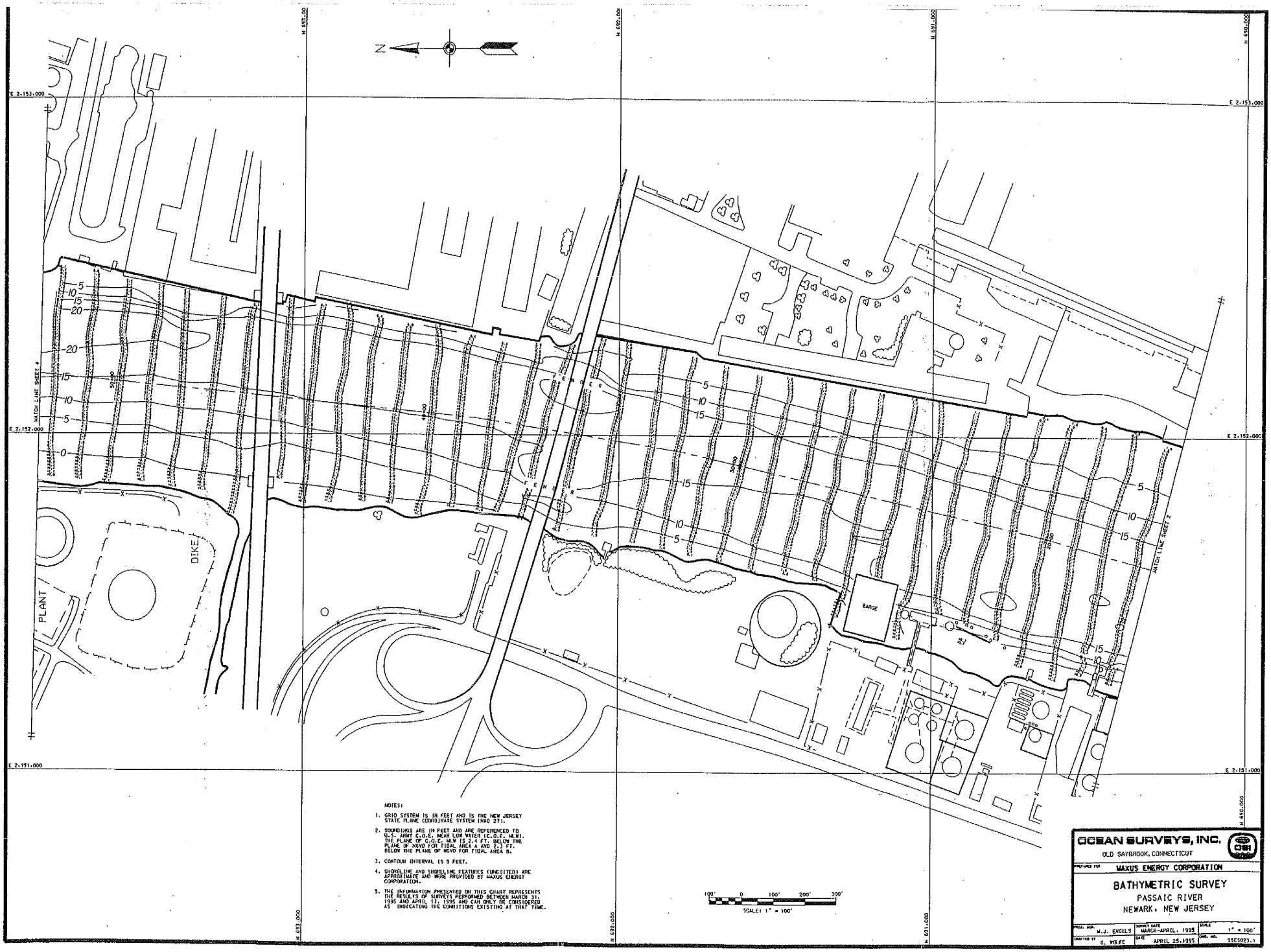

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BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

PROJ. MGR. M.J. ENGELS	SURVEY DATE MARCH-APRIL, 1995	SCALE 1" = 100'	
DRAFTED BY G. WOLFE	DATE APRIL 25, 1995	DWG. NO. 95ES023.1	

SHEET 3 OF 13

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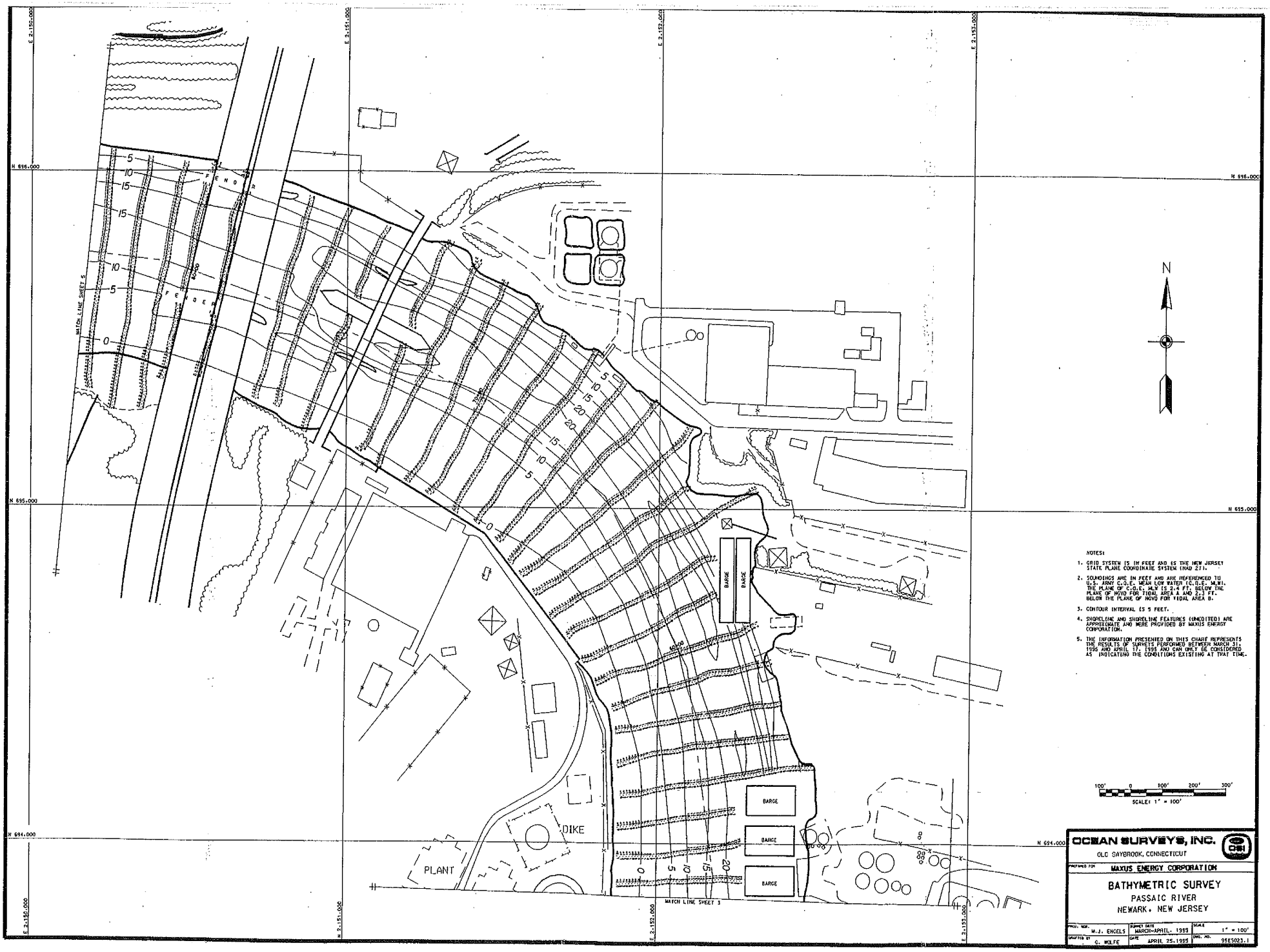
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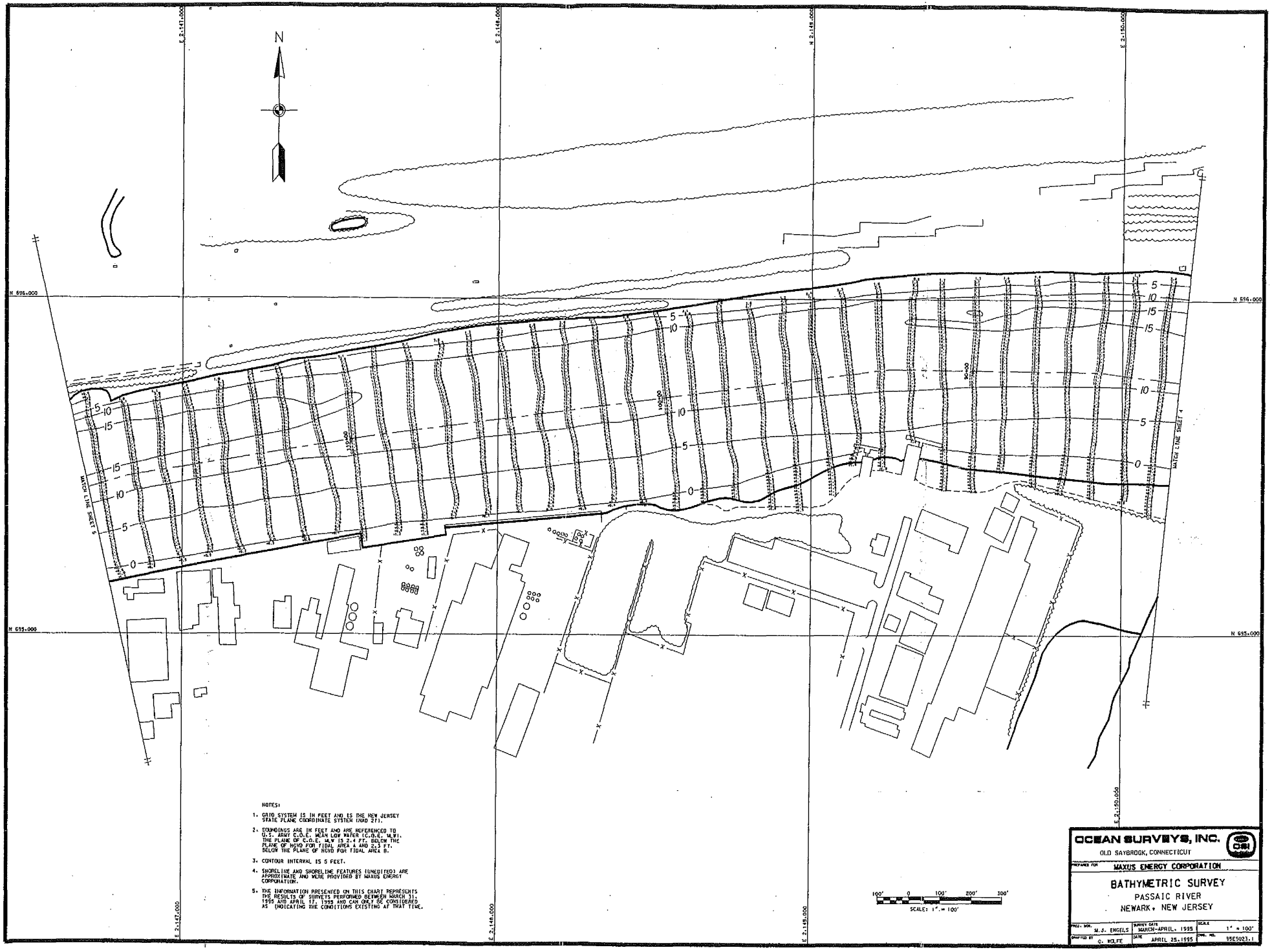
SCALE: 1" = 100'
OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT
PREPARED FOR MAXUS ENERGY CORPORATION
BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY
PROJ. MGR. M.J. ENGELS
SURVEY DATE MARCH-APRIL, 1995
SCALE 1" = 100'
DRAFTED BY G. WOLFE
DATE APRIL 25, 1995
DWG. NO. 95E5023.1
SHEET 4 OF 13



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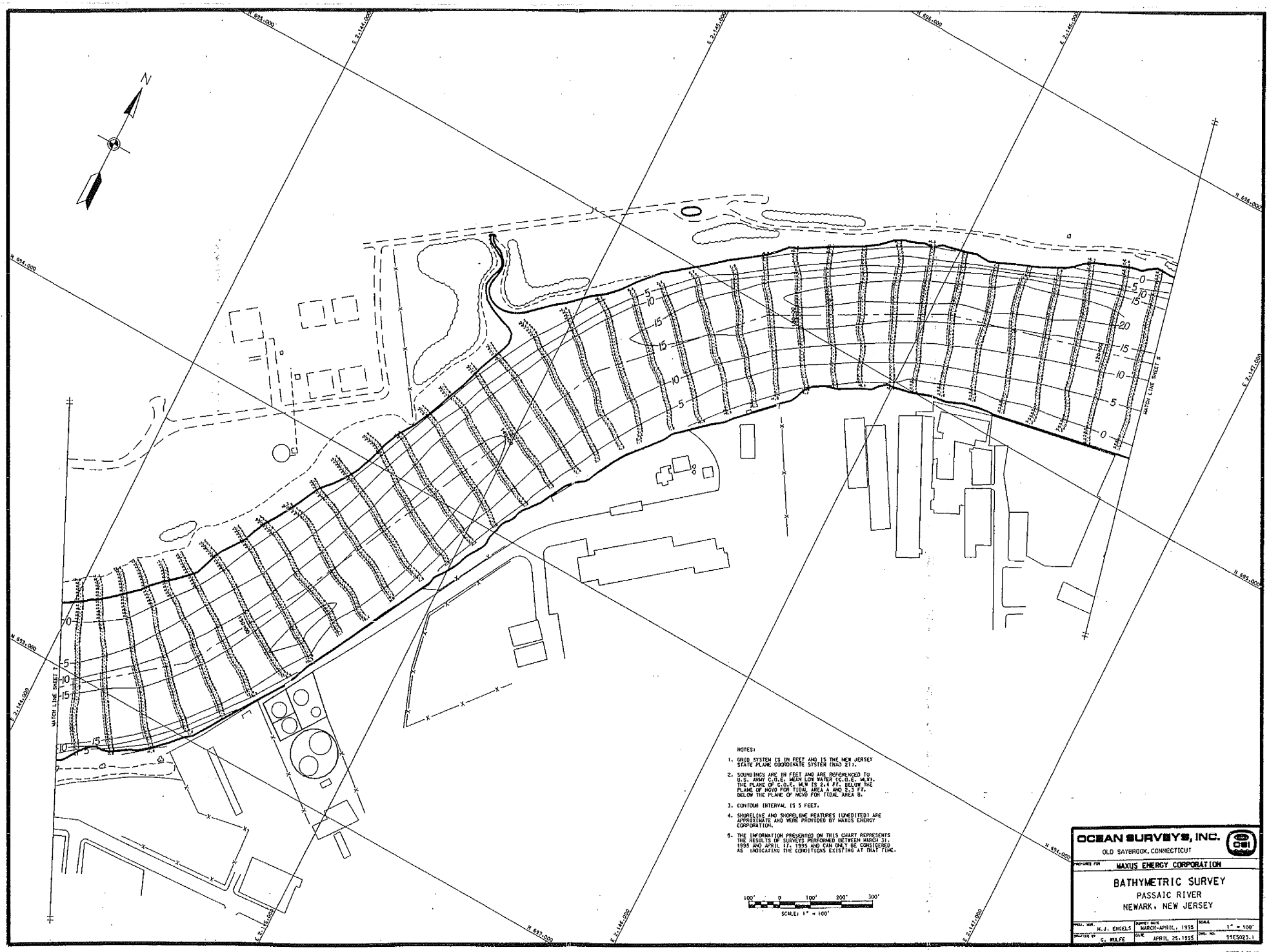
OLD SAYBROOK, CONNECTICUT

PREPARED FOR: MAXUS ENERGY CORPORATION

BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

FIELD WORK: M.J. ENGELS	SURVEY DATE: MARCH-APRIL, 1995	SCALE: 1" = 100'	
DRAFTED BY: Q. WOLFE	DATE: APRIL 25, 1995	DWG. NO.: 95E5023.1	

SHEET 8 OF 13



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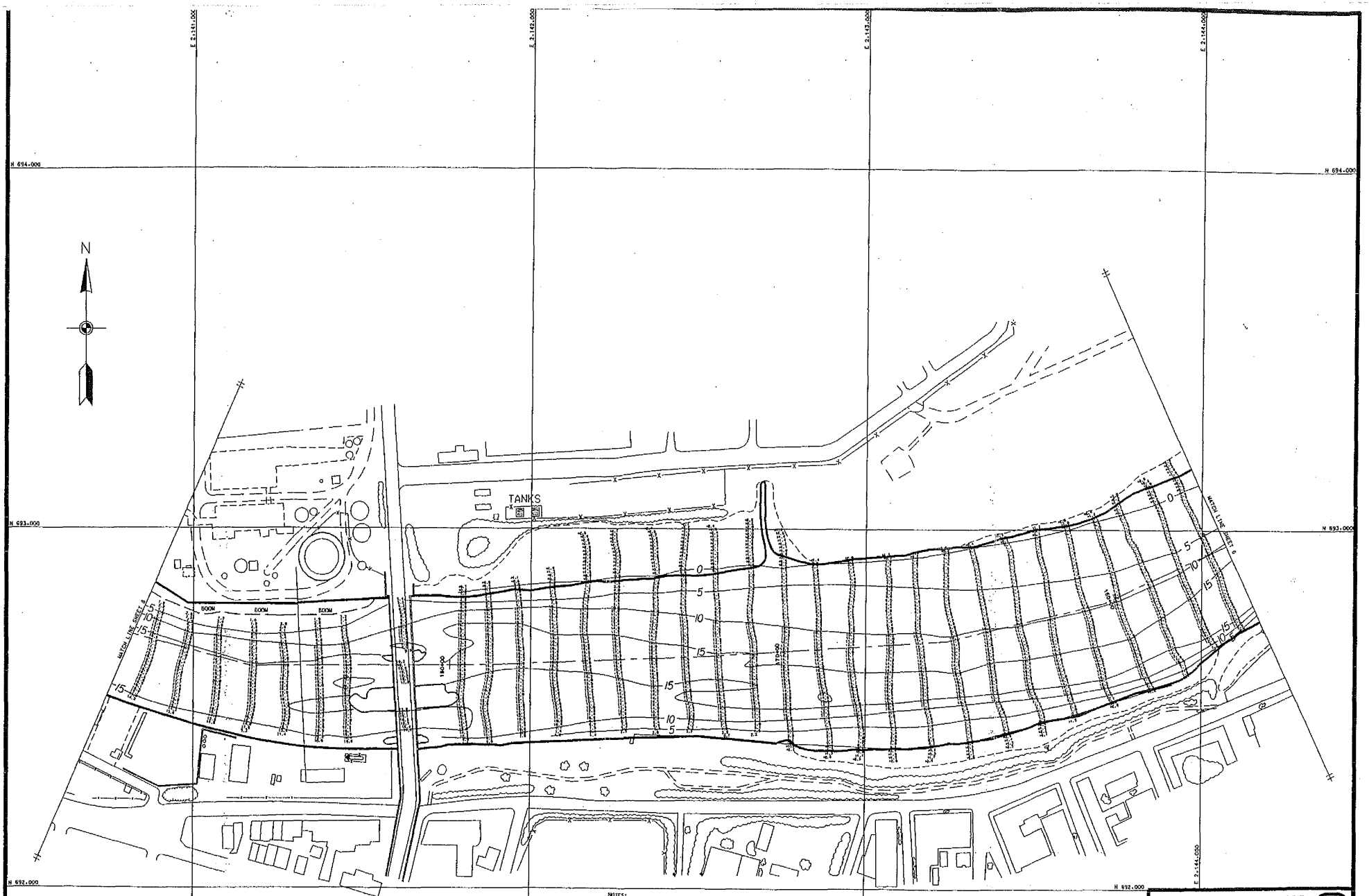

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SCALE: 1" = 100'

OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT

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PASSAIC RIVER
NEWARK, NEW JERSEY

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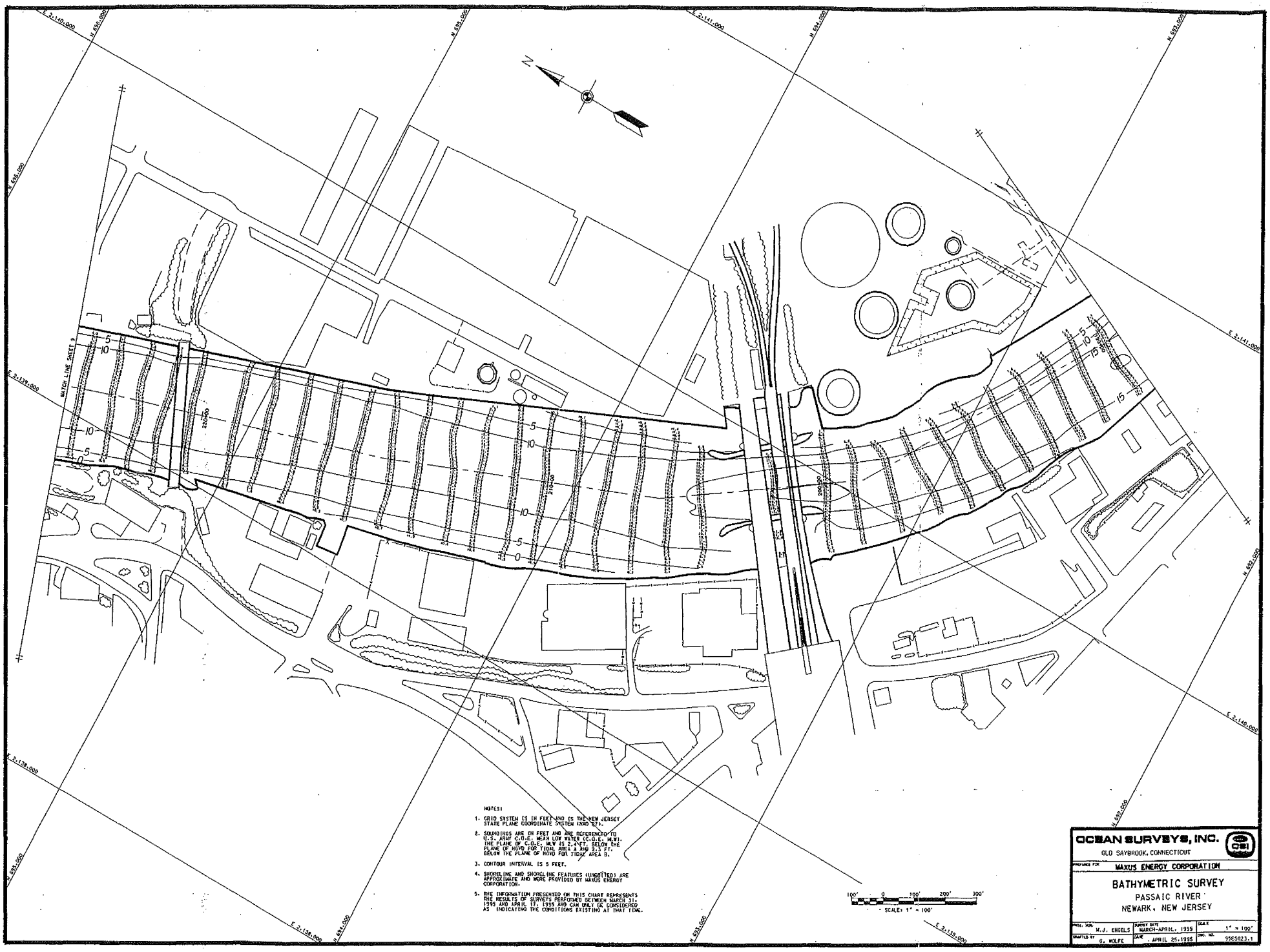
SHEET 7 OF 13



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SHEET 8 OF 13

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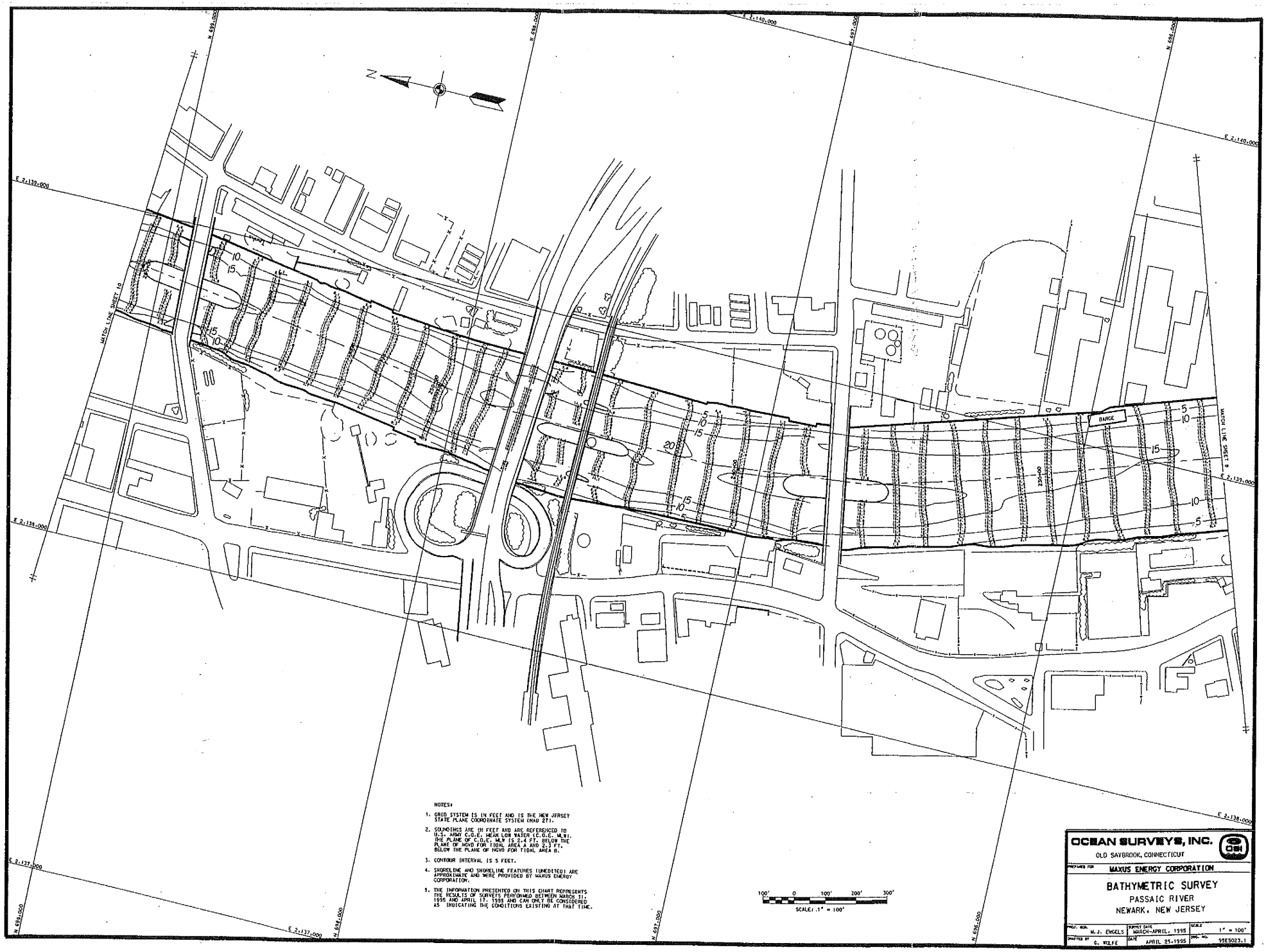

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3. CONTOUR INTERVAL IS 5 FEET.
4. SHORELINE AND SHORELINE FEATURES (UNEDITED) ARE APPROXIMATE AND WERE PROVIDED BY MAXUS ENERGY CORPORATION.
5. THE INFORMATION PRESENTED ON THIS CHART REPRESENTS THE RESULTS OF SURVEYS PERFORMED BETWEEN MARCH 31, 1995 AND APRIL 17, 1995 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT

PREPARED FOR MAXUS ENERGY CORPORATION

BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

PROJ. MGR. H.J. ENGELS	SURVEY DATE MARCH-APRIL, 1995	SCALE 1" = 100'	
DRAFTED BY G. WOLFE	DATE APRIL 25-1995	DWG. NO. 95ES023.1	

SHEET 8 OF 13

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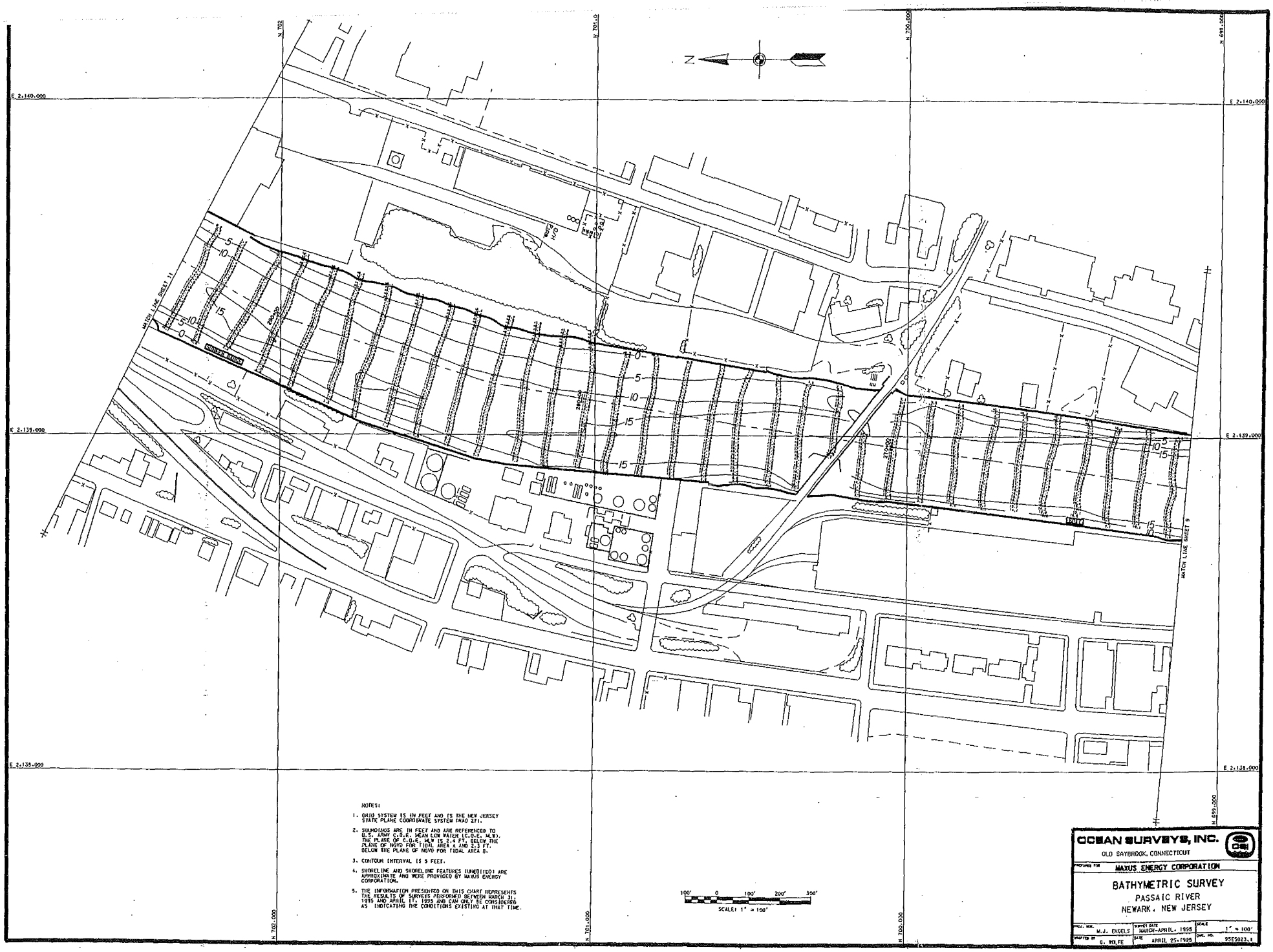

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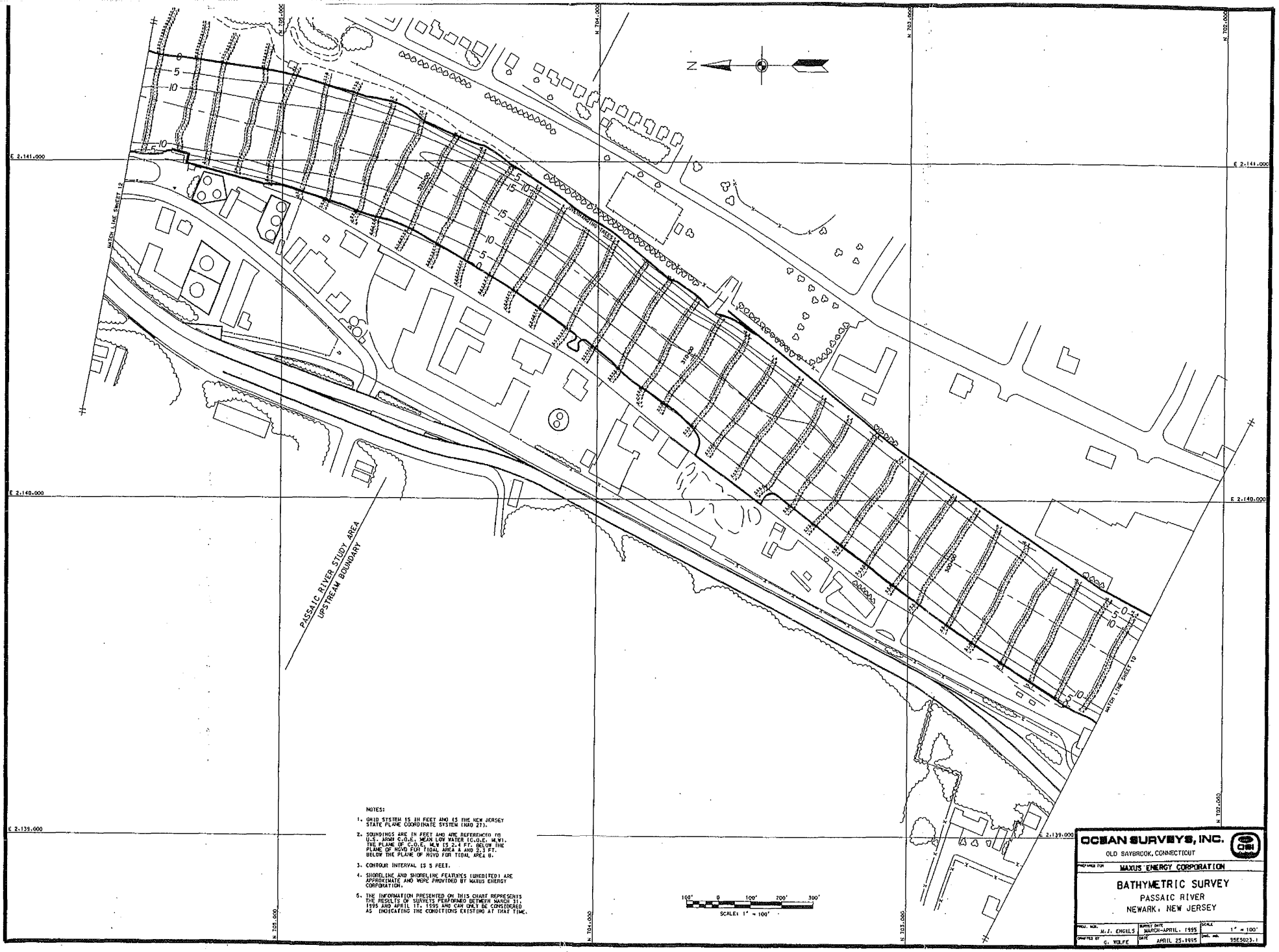

NOTES:

1. GRID SYSTEM IS IN FEET AND IS THE NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD 27).
2. SOUNDINGS ARE IN FEET AND ARE REFERENCED TO U.S. ARMY C.O.E. MEAN LOW WATER (C.O.E. M.W). THE PLANE OF C.O.E. MLW IS 2.4 FT. BELOW THE PLANE OF NGVD FOR TIDAL AREA 1 AND 2.1 FT. BELOW THE PLANE OF NGVD FOR TIDAL AREA 8.
3. CONTOUR INTERVAL IS 5 FEET.
4. SHORELINE AND SHORELINE FEATURES (UNEDITED) ARE APPROXIMATE AND WERE PROVIDED BY MAXUS ENERGY CORPORATION.
5. THE INFORMATION PRESENTED ON THIS CHART REPRESENTS THE RESULTS OF SURVEYS PERFORMED BETWEEN MARCH 31, 1995 AND APRIL 17, 1995 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT

PREPARED FOR: MAXUS ENERGY CORPORATION

BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

PROJ. MGR. N.J. ENGELS	SURVEY DATE MARCH-APRIL, 1995	SCALE 1" = 100'	
DRAFTED BY G. WOLFE	DATE APRIL 25, 1995	PROJ. NO. 95E5023-1	

SHEET 11 OF 13

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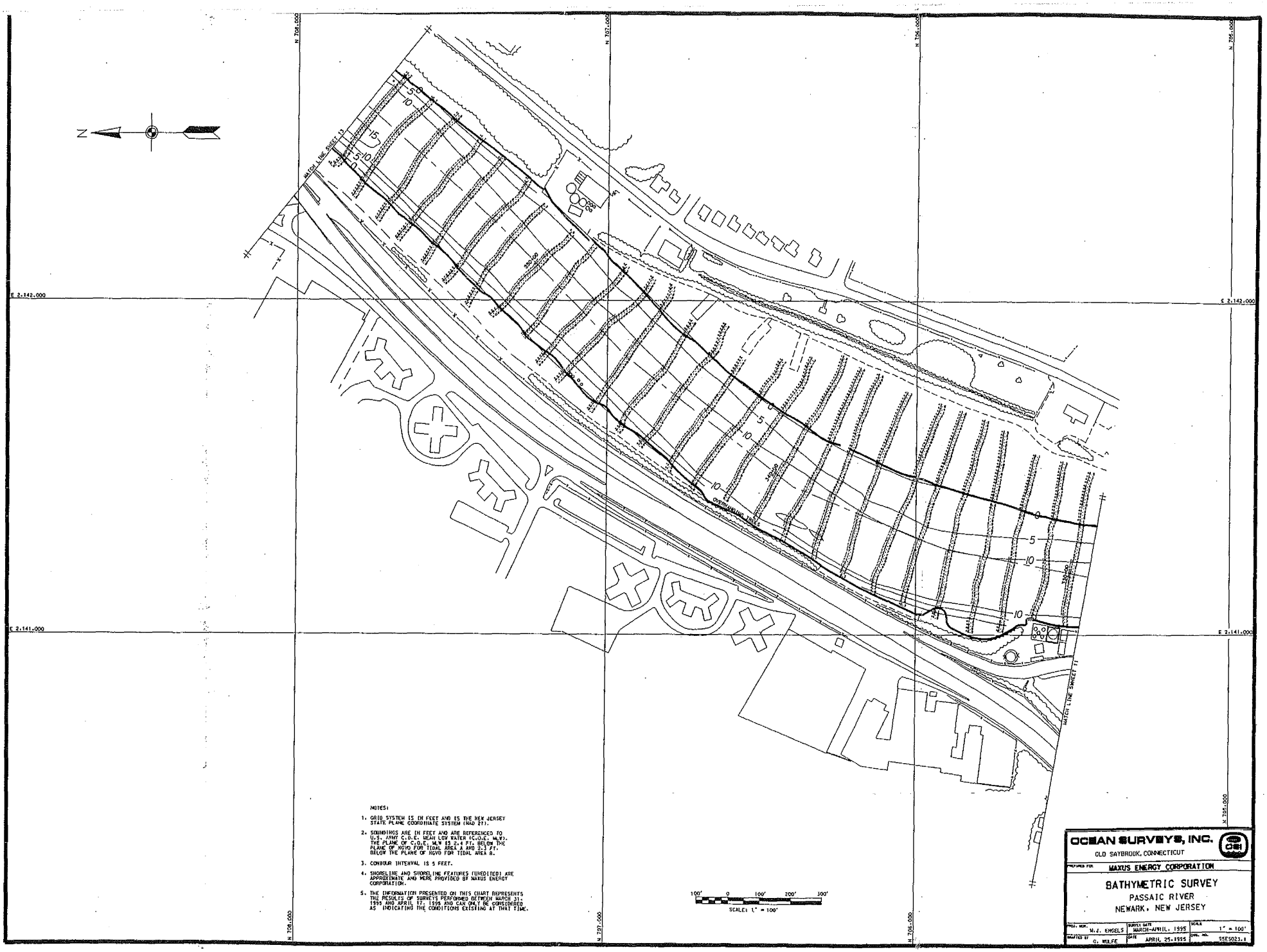

NOTES:

1. GRID SYSTEM IS IN FEET AND IS THE NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD 27).
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5. THE INFORMATION PRESENTED ON THIS CHART REPRESENTS THE RESULTS OF SURVEYS PERFORMED BETWEEN MARCH 31, 1995 AND APRIL 17, 1995 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT

PREPARED FOR: MAXUS ENERGY CORPORATION

BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

PROJ. MGR. W.J. ENGELS	SURVEY DATE MARCH-APRIL, 1995	SCALE 1" = 100'	
DRAFTED BY G. MULFE	DATE APRIL 25, 1995	DWG. NO. SSES023.8	

SHEET 12 OF 13

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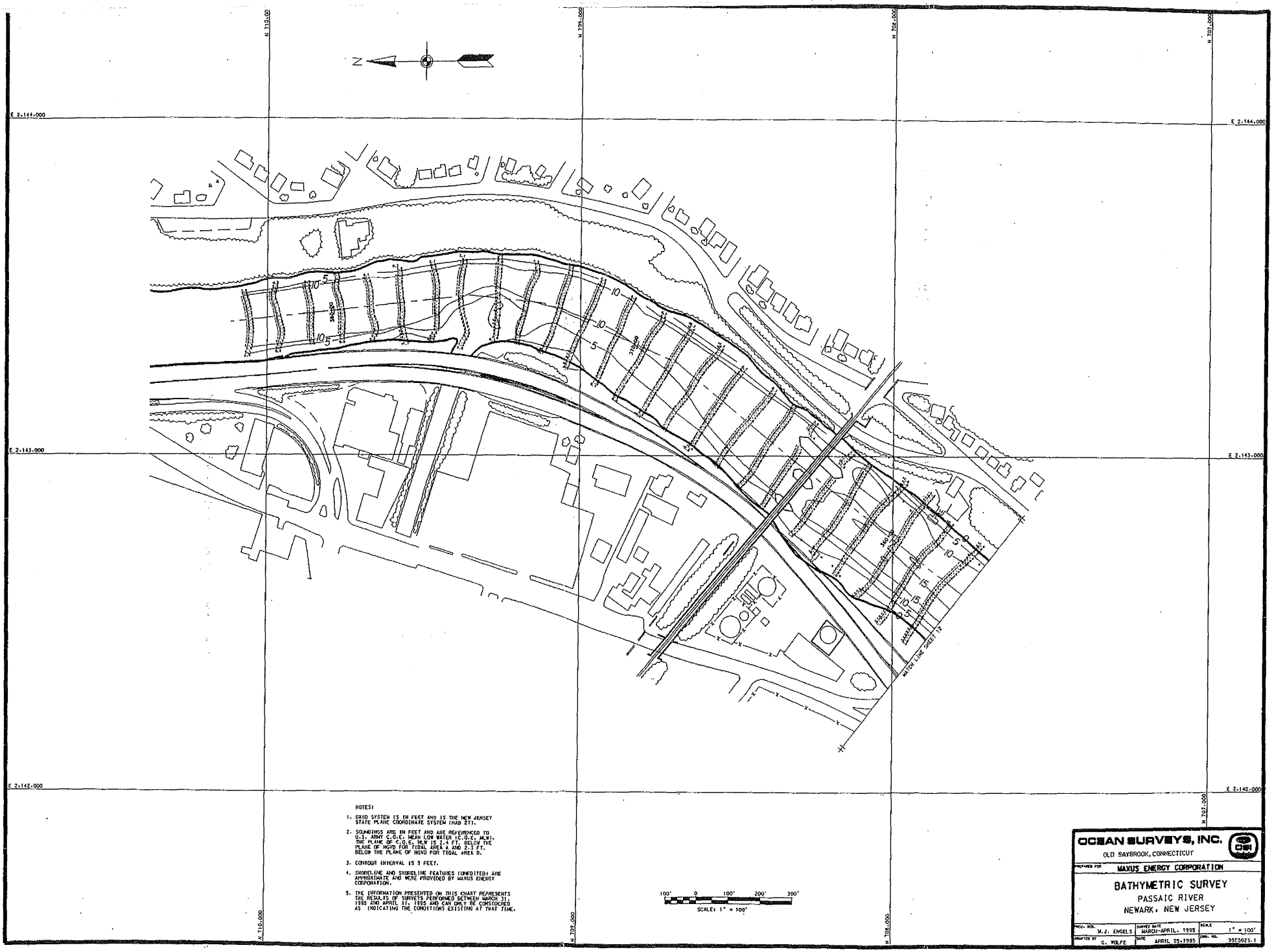

NOTES:

1. GRID SYSTEM IS IN FEET AND IS THE NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD '27).
2. SOUNDINGS ARE IN FEET AND ARE REFERENCED TO U.S. ARMY C.O.E. MEAN LOW WATER (C.O.E. MLW). THE PLANE OF C.O.E. MLW IS 2.4 FT. BELOW THE PLANE OF NGVD FOR TIDAL AREA A AND 2.3 FT. BELOW THE PLANE OF NGVD FOR TIDAL AREA B.
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5. THE INFORMATION PRESENTED ON THIS CHART REPRESENTS THE RESULTS OF SURVEYS PERFORMED BETWEEN MARCH 31, 1995 AND APRIL 17, 1995 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME.

OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT

PREPARED FOR: MAXUS ENERGY CORPORATION

BATHYMETRIC SURVEY
PASSAIC RIVER
NEWARK, NEW JERSEY

PROJ. MGR. M.J. ENGELS	SURVEY DATE MARCH-APRIL, 1995	SCALE 1" = 100'	
DRAFTED BY G. WOLFE	DATE APRIL 25, 1995	DWG. NO. 95E5023.1	

SHEET 13 OF 13

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APPENDIX C

BATHYMETRIC SURVEY
DAILY FIELD LOGS

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 27-MARCH-95

Personnel: M. ENGELS, M. BROWN, T. WARD

Navigation Station Locations:

Time	Activity
0600	AT OFFICE FOR N.J.
0645	EN ROUTE TO N.J. · TRUCK ROLLOVER · RE ROUTE
1130	LAUNCH & RIG BOAT
1240	ARRIVE @ NEWARK FIRE TRAINING STATION.
	MET WITH STEVE & TODD WARD FOR
	SAFETY MEETING & BRIEFING. (STEVE FELDMAN)
1405	HEADING NORTH ON RIVER TO INSTALL UPPER
	TIDE GAGE.
	BRIDGE ST. BRIDGE NOT OPEN AFTER 1630
1415	TURNED TO INSTALL SOUTHERN TIDE GAGE.
1540	INSTALLED TIDE GAGE @ LOWER R.R. BRIDGE.
1800	LEVELED 3 TBM'S @ LINCOLN BRIDGE
1915	@ FIRE STATION, SECURING BOAT

OSI Project Manager

Todd Ward
Authorized Client Representative

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 28-MARCH-95

Personnel: M. ENGELS, M. BROWN, T. ~~B~~ WARD MC.

Navigation Station Locations:

Time	Activity
0715	@ BOAT @ FIRE STATION. NORTH TO UPPER R.R. BRIDGE TO INSTALL TIDE GAGE. GAGE INSTALLED
1030	LEVEL TIDE GAGE FROM STA. 1279 TRAVEL SOUTH TO INSTALL TIDE GAGE OPPOSITE MAXUS SITE.
1330	INSTALLING GAGE.
1630	LEVELING TBM'S @ GAGE FROM BM N-4 @ MAXUS SITE.
1700	BOAT @ FIRE STATION, SECURING BOAT & PAPERWORK
1730	BOAT SECURE.

OSI Project Manager

Todd Ward
Authorized Client Representative

FORM #2

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 29-MARCH-95

Personnel: M. ENGELS, M. BROWN, T. WARD

Navigation Station Locations:

Time	Activity
0730	ARRIVE @ BOAT @ FIRE STATION
0830	PICK LOCATION @ G.O.D. DOCK FOR TIDE STAFF
	P.K. NAIL SET FOR LATER WATER LEVEL TRANSFER
0900	LEVEL RUN FROM STA 7282A TO TBM 'FIRE'
	@ FIRE STATION
1130	STAFF INSTALLED @ MLW @ FIRE STATION.
	STAFF SET @ U.S. GEOLOGICAL GAGE.
1200	INSTALLING TIDE STAFFS @ LINCOLN BRIDGE &
	CHECKING ELEV. OF RVB TO NGCS NO. 4 1953
1408	2 STAFFS @ LINCOLN BRIDGE INSTALLED.
1520	INSTALLED STAFF @ SOUTH ABANDOND R.R. BRIDGE
1530	INSTALLING STAFF @ MAXUS LOCATION (NORTH
	SIDE OF PASSAIC RIVER.
1610	LEVEL IN TIDE GAGE @ MAXUS LOCATION.
1640	RECOVERING VERT. CONTROL POINT 9658
1710	RETURNING TO DOCK @ FIRE STATION.
1720	@ FIRE STATION DAILY LOG & CLEAN UP
1745	BOAT SECURE.

OSI Project Manager

Todd Ward
Authorized Client Representative

FORM #2

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: MAXUS PASSAIC RIVER Date: 30-MARCH-95

Personnel: M. ENGELS, M. BROWN, T. WARD

Navigation Station Locations:

DIFF STATION @ N-4

Time	Activity
0700	@ BOAT @ FIRE STATION - ORGANIZE
0735	LEFT DOCK - NEED HIGH SLACK FOR WATER LEVEL
0750	WATER LEVEL TRANSFER FROM TBM 'M2' TO TBM 'G.O.D.'
0810	WATER LEVEL CHECK FROM 'M2' TO TBM '149' TO VERIFY ELEV.
0830	INSTALLING STAFF @ TBM 'G.O.D.'
0920	EN ROUTE TO ELIZ. HARBOR MARINA FOR FUEL. UP STREAM MARINA NOT OPEN FOR FUEL.
0950	FUEL DOCK, FUELING BOAT.
1000	FUELING COMPLETE
1042	@ FIRE DOCK TO INSTALL DIFF. GPS @ MAXUS SITE - N-4.
11:30	NEED TO SWAP & REPROGRAM DIFF. CORRECTOR TRANSMITTER, ELECTRONICALLY NOISY ENVIRONMENT.
1330	LOADY BATHY EQUIPMENT, INSTALLING TRANSDUCER SWAPPING EPROMS ON ECHOTRACK, COMM. PROBLEMS CHECK-OUT HYDROLAB TC-2 - TUNE ECHOTRACK BAR CHECK & DATA COLLECTION CHECK-OUT RETURN TO FIRE STATION. DOCK. - SECURE BOAT DAILY LOG & BOAT CLEAN-UP
1830	LEAVING BOAT

OSI Project Manager

Todd Ward
Authorized Client Representative

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: MAXUS / PASSAIC RIVER Date: 31 MARCH 95

Personnel: M. ENGELS, ~~T.~~ M. BROWN, T. WARD, C. FIRSTENBERG.

Navigation Station Locations:

600 N.W. WIND 8 40°, 29.91

1100 W WIND 7 49° 29.90↓

1300 NW 12 49° 29.88

Time	Activity
0515	ARRIVE @ BOAT.
0530	READY BOAT FOR BATHY SURVEY (BLOWN FUSE)
0635	BAR CHECK. 5'-20'
0700	CONDUCTIVITY CHECK
0845	BARV CHECK 5'-20'
0857	CONDUCTIVITY & TEMP ✓ 5'-20'
1121	FINISHED BATHY TRANSECTS
	CONDUCTIVITY NEEDS NEW CABLE / FIXED.
11:57	START TIE LINES, CENTERLINE +/-
1250	FUELING GENERATOR.
1300	TIE LINES
1330	TIE LINES COMPLETE
1340	BARV & CONDUCTIVITY.
1500	COMPLETED MOVING TIDE GAGE OPPOSITE
	MAXUS PROPERTY. LOWERED 1.00 FEET
1530	NAVIGATION CHECK @ PCR-3
1600	DECON BOAT (WASH DOWN)
1615	@ FIRE STATION - SECURING BOAT.

OSI Project Manager

Todd Ward

Authorized Client Representative

FORM #2

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MARCS Date: 01-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD (E.A.)

Navigation Station Locations:

GPS REF. STATION @ N-4 (LISTER STREET PROP)

Time	Activity
0645	ARRIVED @ BOAT - FUEL GEN - INITAILIZE COMP.
	TIME SYNC. TO GPS TIME (O.K.)
0700	CONDUCTIVITY CAST
0730	AT SURVEY SITE - BAR CHECK
0749	BAR✓ COMPLETE
↓	BATHY
1030	BAR✓ & CONDUCTIVITY (ROLL #2)
1136	TIELINES - UNABLE TO SURVEY MUD FLATS -
1223	BAR✓
1300	GPS NAVIGATION CHECK @ PCR-3
1400	Searching for control PT. PCR
1419	Recovered PT. PC 11
1515	RECOVERING CONTROL PTS. FOR HYDRO-1 SETUP
	UNDER BRIDGES
	UNABLE TO FIND PCR-20
1600	SETTING SOUNDING POINT "MOORE"
	1 @ N-4 TO TURN ANGLES & DIST. TO LOCATE
	SOUNDING POINT "MOORE"
1645	RECOVERING SURVEY EQUIPMENT @ "MOORE" &
	PCR-11.
1650	SECURING BOAT @ FIRE DOCK.
1700	CLEAN BOAT & UPDATE PAPERWORK.

OSI Project Manager

Todd Ward
Authorized Client Representative

FORM #2

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 02-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD, M. DOBBINS

Navigation Station Locations:

N4 DIFF GPS, "MOORE" HYDRO 1

*ALL TIMES SET AHEAD 1 HR. (INSITU GAGES NOT CHANGED)

Time	Activity
0700	ARRIVED @ BOAT @ FIRE STATION (HYDRO1-ON BOARD
	COMPUTING COORDS FOR SOUNDING POINT "MOORE"
0819	LEFT DOCK EN ROUTE TO "MOORE"
0830	~~@~~ HYDRO 1 SET @ "MOORE"
0855	BAR ✓ 5'-20'
	CONDUCTIVITY 5'-20'
0910	BATHY.
1110	BAR ✓ 5'-20'
1120	CONDUCTIVITY 5-20' · HYDRO 1 BOAT UNIT FAILED
	BATHY
1325	BAR ✓
	BATHY
1345	CONDUCTIVITY
1348	TIELINES
1448	BAR CHECK
1458	CONDUCTIVITY
1517	EN ROUTE TO ELIZ FOR FUEL
1540	@ ELIZ. MARINA FUELING BOAT.
1700	RECOVERING CONTROL @ PCR19 RECOVERED
	RECOVERED DRILL HOLE OF OLD PCR 33
1800	NAV. (GPS) CHECK ON PCR 33
1830	@ FIRE DOCK

OSI Project Manager

Todd Ward

Authorized Client Representative

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: MAXUS / PASSAIC RIVER Date: 03-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD

Navigation Station Locations:

GPS REF STA @ N-4

Time	Activity
0755	ARRIVED @ FIRE STATION
0810	ESTABLISHING HORIZONTAL CONTROL POINT @
0840	FIRE STATION POINT NAMED "FIREBOAT"
0910	CONTROL WORK COMPLETED. GPS NAV. CHECK
0915	PERFORMED @ "FIREBOAT"
	BOAT LEFT FOR PCR 19
0920	ENROUTE TO SURVEY SITE.
0923	GPS NAV. CHECK @ PCR-19 66 CO-E DISK
0945	BAR ✓ 5'-25'
1000	CONDUCTIVITY ✓ 1'-5'-20'-25'
	BATHY 83 → 59 (OSI SURVEY LINES) 25
1205	BAR ✓ 5'-25'
1215	CONDUCTIVITY
1228	BATHY 58-52 (OSI SURVEY LINES) 7
1300	FUEL GENERATOR
1310	BATHY 51-40 (OSI SURVEY LINES) 12
1350	RAN ON TOP OF OLD BROKEN PILES 5 MIN TO GET
	OUT OF UNDERWATER OBSTRUCTIONS
	NOTE WAVES IN MIDDLE OF RIVER (WHITECAPS)
	@ 2FT - POOR DATA, BOAT ROLL (LINES 41 & 40)
1430	BAR ✓
1440	CONDUCTIVITY ✓

OSI Project Manager

Todd Ward

Authorized Client Representative

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: MAXUS / PASSAIC RIVER Date: 03-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD

Navigation Station Locations:

GPS REF STA @ N-4

Time	Activity
0755	ARRIVED @ FIRE STATION
0810	ESTABLISHING HORIZONTAL CONTROL POINT @
0840	FIRE STATION POINT NAMED "FIREBOAT"
0910	CONTROL WORK COMPLETED. GPS NAV. CHECK
0915	PERFORMED @ "FIREBOAT"
	BOAT LEFT FOR PCR 19
0920	ENROUTE TO SURVEY SITE.
0923	GPS NAV CHECK @ PCR-19 66 CO-E DISK
0945	BAR ✓ 5'-25'
1000	CONDUCTIVITY ✓ 1'-5'-20'-25'
	BATHY 83 → 59 (OSI SURVEY LINES) 25
1205	BAR ✓ 5'-25'
1215	CONDUCTIVITY ✓
1228	BATHY 58-52 (OSI SURVEY LINES) 7
1300	FUEL GENERATOR
1310	BATHY 51-40 (OSI SURVEY LINES) 12
1350	RAN ON TOP OF OLD BROKEN PILES 5 MIN TO GET
	OUT OF UNDERWATER OBSTRUCTIONS
	NOTE WAVES IN MIDDLE OF RIVER (WHITECAPS)
	@ 2FT - POOR DATA, BOAT ROLL (LINES 41 & 40)
1430	BAR ✓
1440	CONDUCTIVITY ✓

OSI Project Manager

Todd Ward

Authorized Client Representative

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 03-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD

Navigation Station Locations:

GPS REF STA. @ MAXUS N-4

Time	Activity
1457	TIE LINES BETWEEN PT. NO PT. BRIDGE & PULASKI SKYWAY. SEAS UP TO 2' SEA STATE RAPIDLY ~~INCREASING~~ DEGRADING, DATA QUALITY POOR. ME.
1540	TIE LINES SOUTHOF RTE 1 & 9 BRIDGE
1613	TIE LINES COMPLETE
1630	BARV COMPLETE
1635	CONDUCTIVITY COMPLETE
1650	@ FIRE STATION TO PICK UP TIDE BDS. & TO REPLACE BADLY DAMAGED PROP.
1720	REPAIRS COMPLETED UNDERWAY TO RECOVER HORIZ. CONTROL FOR UNDER BRIDGES SURVEYS & B.M. FOR TIDE STAFFS.
ME 1745	ESTABLISHING TIDE STAFF @ NORTHERN R.R. BRIDGE (USING "BELLEVILLE" NGVD => MLW CONVERSION)
1810	"RAPP" STAFF SET TO MLW
1815	EN ROUTE TO FIRE STATION
1840	@ FIRE STATION
1845	NAV. CHECK @ "FIRESTATION" (FIREBOAT)
1900	DOWNLOAD & REVIE DATA.
	M. Engels

OSI Project Manager

Todd Ward
Authorized Client Representative

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 04-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD, SANDRA STAIGERWALD

Navigation Station Locations:

GPS REF STA SET @ N-4

Time	Activity
0800	ARRIVED @ BOAT @ SURVEY SITE (FIRE STATION)
0830	GPS NAV. @ "FIREBOAT"
0845	UNDERWAY TO LOWER END OF SURVEY SITE
0900	ROTATED DIRECTIONAL GPS RADIO ANT. S.S.E
0915	BAR ✓ - COMPLETED @ 0930 5'-25'
0938	CONDUCTIVITY COMPLETO 1'-5'-20'-25'
	TIE LINES
1020	BAR ✓ TO 30'
1030	TIE LINES
1040	INSTALLED DIFF. REPEATER @ G.O.D. AREA.
1055	BATHY (40-26)
1235	BAR ✓
ME ~~1~~ 1253	CONDUCTIVITY.
	BATHY -
1352	HALT SURVEY (HIGH WINDS - WEATHER RADIO
	BROADCASTING SEVERE WEATHER ON THE WAY,
	LIGHTNING, HAIL & HIGH WINDS.) TRYING TO
	WAIT OUT STORM.
1400	EN ROUTE TO FIRE STATION TO TAKE COVER
1410	@ FIRE STATION, HIGH WINDS, RAIN.
	RESTOCK OIL & LOADED NEW HYDRA 1 ABOARD.
1530	WEATHER CLEAR, RUNNING BACK TO SURVEY
	SITE FOR POST SURVEY BAR ✓

OSI Project Manager

Sandra M. Staigerwald (EA)
Authorized Client Representative

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS. Date: 05-APRIL-95

Personnel: M. ENGELS, M. BROWN, S. STAIGERWALD, M. DOBBINS.

Navigation Station Locations:

SEE PAGE 1

Time	Activity
1400	ARRIVED @ FIRE STATION FOR TIDE STAFFS TO HEAD NORTH FOR TIDE STAFF INSTALLATION & LEVEL RUNS.
1409	LEVEL RUN FROM STA #9658 TO BRIDGE ST. BRIDGE. TWO TBM'S SET.
1618	TWO TIDE STAFFS LEVELED & INSTALLED ON BRIDGE ST. BRIDGE.
1625	RUNNING LEVEL FROM BRIDGE ST. BRIDGE NORTH
1835	BACK @ FIRE STATION OFF LOAD PERSONELL.

OSI Project Manager

Sandra M. Staigerwald
Authorized Client Representative

FORM #2

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS. Date: 06-APRIL-95

Personnel: M. ENGELS, M. BROWN, S. STAIGERWALD

Navigation Station Locations:

GPS NAV. W/ DIFFERENTIAL @ MAXUS N-4

Time	Activity
0735	ARRIVED @ FIRE STATION - FUEL GENERATORS
	CLEANED BOAT FROM THE DAY BEFORE.
	PAPERWORK CATCH-UP
0830	PHONE CALLS FOR DATA TRANSFER / ORGANIZE
0900	
0940	SET LEVEL ON CLAY ST. BRIDGE
1100	ESTABLISHED TBM "BOLT"
1215	SET REPEATER UP AT G.O.D
1245	BARCHECK
1246	CONDUCTIVITY CHECK
	POOR RADIO MODEM DATA @ SOUTHERN END OF SITE
	MOVE TO FIRE STATION AREA TO SURVEY
1341	BAR ✓ & CONDUCTIVITY
	BATHY
1530	BAR ✓ & CONDUCTIVITY
1620	BATHY FINISHED
1630	TIE LINES.
1720	FINAL BAR ✓ & CONDUCTIVITY
1730	REMOVED REPEATER.
1800	@ FIRE STATION
1815	CLEAN & ORGANIZE BOAT
/	/

OSI Project Manager

Authorized Client Representative

FORM #2

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 07-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD.

Navigation Station Locations:

DIFF GPS, REF STATION SET @ NB-18

Time	Activity
0900	FIRE STATION, SETUP COMPUTERS, NEW PAPER
0930	EN ROUTE TO UPPER PASSAIC RIVER FOR FUEL
	AND CHECK UPPER TIDE GAGE
0950	UPPER GAGE, CHECKS OUT GOOD.
1015	@ RAPPS BOATYARD FOR FUEL.
1100	BOAT FUELED.
1130	REMOVED REF STA. FROM N-4 @ MAXUS.
1200	GPS REF STA. SET @ NB18
1250	CUTTING PLASTIC SHEET FROM PROPS.
1300	NAV GOOD IN SURVEY SITE
1310	NAV CHECK @ NB 19
1327.	CONDUCTIVITY ✓ 1'-5'-30'
1340	BAR ✓ 5'-30'
	BATHY
1603	CONDUCTIVITY ✓ 1'-5'-~~35~~ ME 30'-34'
1610	BAR ✓ 5'-30'
	BATHY -
1810	BAR ✓ 5'-30'
1820	CONDUCTIVITY
1830	GPS NAV CHECK @ NB-19
1840	RECOVER DIFF GPS STATION
1900	@ FIRE DOCK, CLEANUP 1915

OSI Project Manager

Todd Ward
Authorized Client Representative

FORM #2

OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS Date: 09-APRIL-95

Personnel: M. ENGELS, M. BROWN, T. WARD.

Navigation Station Locations:

DIFF GPS SET @ N-4 (MAXUS SITE)

Time	Activity
10:15	ARRIVE @ FIRE STATION - LOAD & PREP BOAT.
1030	INSTALL FENDERS @ BULKHEAD PILINGS, PREVENT
	BOAT FROM CATCHING ON U/W PILES (FLOAT BOAT)
1200	SET GPS REF. STATION @ MAXUS SITE
	CONTROL PT N-4.
1315	GPS NAV CHECK @ "FIREBOAT"
1335	HEADING NORTH TO SURVEY SITE.
1420	INSTALLED SOUTH CLAY ST. STAFF.
1435	CONDUCTIVITY. ✓
1445	BAR ✓
1455	BATHY. ✓
1650	BAR ✓
1655	CONDUCTIVITY ✓
1701	BATHY ✓
1850	TIE LINES.
1930	BAR ✓
1940	CONDUCTIVITY ✓
1955	ARRIVED @ DOCK.
2000	GPS NAV CHECK.
2015	CLOSE UP BOAT.

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91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC R. / MAXUS Date: 10-APRIL-90

Personnel: M. EVERELS, M. BROWN, T. WARD.

Navigation Station Locations:

GPS REF STATION @ N-4 (MAXUS)

Time	Activity
1020	ARRIVED @ BOAT.
1130	DOWNLOAD LOWER RR BRIDGE TIDE GAGE
1200	MET CORING BOAT.
1300	LEVEL RUN FROM M2 TO "BENCH" FOR TIDE
	STAFF INSTALLATION
1550	BAR ✓
1602	CONDUCTIVITY ✓
1605	BATHY
1616	LOTS OF DEBRIS IN RIVER, CLEARING DUCER
	SKIPPING LINES TO GET AWAY FROM DEBRIS.
1818	BAR ✓
1830	COND. ✓
1840	BATHY ✓
1956	BAR ✓
2000	CONDUCTIVITY.
2015	BACK TO DOCK.
2050	PAPERWORK & NAV ✓

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91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / NAVUS Date: 11-APRIL-95

Personnel: M. ENGELS, M. BROWN, S. RIEVES

Navigation Station Locations:

GPS REF STATION SET @ N-4.

Time	Activity
0730	ARRIVED @ NAVUS 80-120 LISTER
0745	ARRIVED @ FIRE STATION.
0800	GPS NAV CHECK FOR CORING BOAT.
0830	PICKING UP ANCHOR BUOYS FOR CORE BOAT. (VAN)
1300	@ FIRE STATION - TO DELIVER SUPPLIES TO CORE BOAT
1353	ARRIVED @ CORE BOAT, DROP OFF SUPPLIES.
1410	PICK-UP LUNCH FOR CORE PERSONNEL
1415	UNDERWAY TO CLAY ST. TO RUN LEVEL FROM BOLT.
1530	LEVELED TBM "JACKNIFE"
1545	GOING FOR PORTABLE FUEL @ MERIT.
1730	3 FUEL RUNS COMPLETED 78 GALS OF FUEL.

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OCEAN SURVEYS, INC.

91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER STUDY/MAXUS Date: 12 - APRIL-95

Personnel: GEORGE RENOLDS, MIKE ENGELS, MATT BROWN, STEVE GADOMSKI

Navigation Station Locations:

DIFF G.P.S. @ MAXUS "N.Y"

Time	Activity
0800	ARRIVED AT FIRE STATION
	INSTALLED PINGER, SIDE SCAN SONAR, ~~MAGNITOMINER~~ M.E. MAGNITOMETER
	EQUIPMENT WHICH ARRIVED ON EVENING OF THE ELEVETH
1200	TOWE EQUIP. @ LOWER END OF SURVEY
	SITE
1730	RETURNING TO FIRE STATION TOWING
	MAGGY, SIDESCAN & PINGER
1800	BACK TO FIRE STATION TO SECURE EQUIPMENT.
1900	BOAT & EQUIPMENT SECURE.

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91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER / MAXUS. Date: 13-APRIL-95

Personnel: M. ENGELS, M. BROWN, G. REYNOLDS

Navigation Station Locations:

GPS REF STA. SET @ N.4

HYDRO.1 @ "FIREBOAT" B.S. @

Time	Activity
0700	ARRIVED @ FIRE STA TO LOAD MACHINES & ORGANIZE
0815	LEFT DOCK EN ROUTE TO CORE LOCATIONS 202-203 OSI LINE# 26 (TRANSECT 25)
0900	SCANNING SITE 203, FOUND LONGITUDINAL DEBRIS ALONG SIDE & PARALLEL TO BULKHEAD, NOTIFIED
0930	CORING BOAT. SETTING-UP TRACKLINES FOR OTHER CORE LOCATIONS.
1150	SCANNING CORE LOCATION 202
1245	SCANNING CORE LOCATION 203
1445	SCANNING CORE LOCATION
1645	@ FIRE STATION - PREPARING FOR HYDRO1 BATHY UNDER THE R.R. BRIDGE & JACKSON ST. BRIDGE OPPOSITE NEWARK FIRE DEPT
1930	SECURE BOAT

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91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER STUDY / HAXUS Date: 14 APRIL 95

Personnel: MIKE ENGLES, MATT BROWN, SEAN MCGONIGAL

Navigation Station Locations:

GPS SET @ N-4

Time	Activity
0530	ARRIVED @ FIRE STATION (GATE LOCKED)
MC ~~0555~~	LOAD EQUIP W PAPER & COMPUTER SETUP
0550	GPS NAV CHECK @ "FIREBOAT"
0600	UNDERWAY TO NORTH END OF SITE
0620	BAR ✓
0630	CONDUCTIVITY ✓
0640	BATHY
0830	BAR ✓
0840	CONDUCTIVITY
0845	BATHY
0908	TIE LINES.
0950	GPS NAV CHECKED PER ~~JS~~ MC 5.1
1020	BAR ✓
1025	CONDUCTIVITY ✓
1030	REPLACING 2 BADLY DAMAGED PROPS @ "RAPPS"
	BOATYARD.
1100	DATA REVIEW
1120	TO FIRE STATION, RAN TRANSECT (OD LINE 219)
1200	LUNCH
	WENT TO I-95 TO FOR SPOT SOUNDING - TIDE
	TOO LOW FOR REMAINING LINES.
1245	CHECKED IN WITH CORING BARGE, OK.

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91 SHEFFIELD STREET OLD SAYBROOK, CONN 06475 TELEPHONE 203/388-4631

DAILY FIELD LOG

Project Title/Client: PASSAIC RIVER N.J. / MAXUS Date: 17-APRIL-95

Personnel: M. ENGELS, M. BROWN, M. DOBBINS

Navigation Station Locations:

GPS REF STATION SET @ MAXUS N-4

HYDRO 1 LOCATION @ S.P. "MOORE"

Time	Activity
0700	ARRIVED @ FIRE STATION. FUEL GEN., ADD PAPER TO SOUNDER, PREP.
0730	FUEL BOAT => 0830
0915	LEFT FIRE STATION, EN ROUTE TO 80-120 LISTER TO INSTALL HYDRO 1 B.S.
0930	BS SET @ N-4 - GETTING BATHY LOGS @ E/A TRAILER
0945	SETTING HYDRO 1 @ "MOORE" S.P.
1013	BAR ✓
1022	CONDUCTIVITY ✓
1030	BATHY UNDER I-95 BRIDGE
1120	TIE LINES ✓
1150	BAR ✓
1202	CONDUCTIVITY.
1230	LUNCH RUN FOR CORING BARGE
1250	DOWNLOAD LOWER RR BRIDGE TIDE GAGE
1335	DOWNLOADING 80-120 GAGE (OPPOSITE MAXUS)
1400	RUNNING LEVEL FROM STA 1279 TO JACKNIFE
1800	BACKED BOAT @ "RAPPS"
1815	HEADING TO FIRE STATION.
1830	BACK @ FIRE STATION - START PREP FOR GEOPHYSICAL
1900	LEAVING DOCK FOR HOME

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