

D00149

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Reconnaissance Survey
Registry Number: D00149

LOCALITY

State: Massachusetts
General Locality: Vicinity of Cape Cod
Sub-locality: Chatham Harbor and Approaches

2009

CHIEF OF PARTY
CDR Shepard M. Smith
NOAA

LIBRARY & ARCHIVES
DATE

HYDROGRAPHIC TITLE SHEET

D00149

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

State: **Massachusetts**

General Locality: **Vicinity of Cape Cod, MA**

Sub-Locality: **Chatham Harbor and Approaches**

Scale: **1:10,000** Date of Survey: **09/30/2009 to 09/30/2009**

Instructions Dated: **30 September 2009** Project Number: **S-A942-TJ-09**

Vessel: **NOAA Ship *Thomas Jefferson***

Chief of Party: **CDR Shepard M. Smith, NOAA**

Surveyed by: ***Thomas Jefferson* Personnel**

Soundings by: **Reson 7125 multibeam echo sounder.**

Graphic record scaled by: **N/A**

Graphic record checked by: **N/A**

Protracted by: **N/A** Automated Plot: **N/A**

Verification by:

Soundings in: **Meters at MLLW**

Remarks:

- 1) All Times are in UTC.***
 - 2) This is a Navigable Area Hydrographic Survey.***
 - 3) Projection is NAD83, UTM Zone 19.***
- Red, bold, italic comments made during office processing.***

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Descriptive Report to Accompany Hydrographic Survey D00149

Project S-A924-TJ-09
 Vicinity of Cape Cod, MA
 Chatham Harbor and Approaches
 Scale 1:10,000
 September 30th, 2009
NOAA Ship *Thomas Jefferson*

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions S-A942-TJ-09*, dated 30 September 2009.

North Western Limit	South Western Limit	South Eastern Limit	North Eastern Limit
41°41'18.92" N 069°57'03.53" W	41°41'45.5" N 069°56'12.57" W	41°37'39.89" N 069°56'12.35" W	41°45'33.56" N 069°55'10.39" W

Data acquisition was conducted on September 30th, 2009.

The purpose of this project is to provide a baseline dataset to assist AHB in controlling a Bathymetric LIDAR data set (W00203) that is referenced only to the ellipsoid. This data is not intended to proceed to the chart or supersede prior surveys in the area.

	Linear Nautical Miles
LNM Single beam mainscheme only	N/A
LNM Multibeam mainscheme only	23.5
LNM Lidar mainscheme only	N/A
LNM Side Scan Sonar mainscheme only	N/A
Lineal nautical miles of any combination of the above techniques (specify methods)	23.5
LNM Crosslines singlebeam and multibeam combined	0
LNM Lidar Crosslines	N/A
LNM development lines non mainscheme	0
LNM shoreline/nearshore investigations	0
Number of Bottom Samples	2 3
Number of items investigated that required additional time/effort in the field beyond the above survey operations	0
Total number of square nautical miles	0.3866

Table 1: Hydrographic Survey Statistics

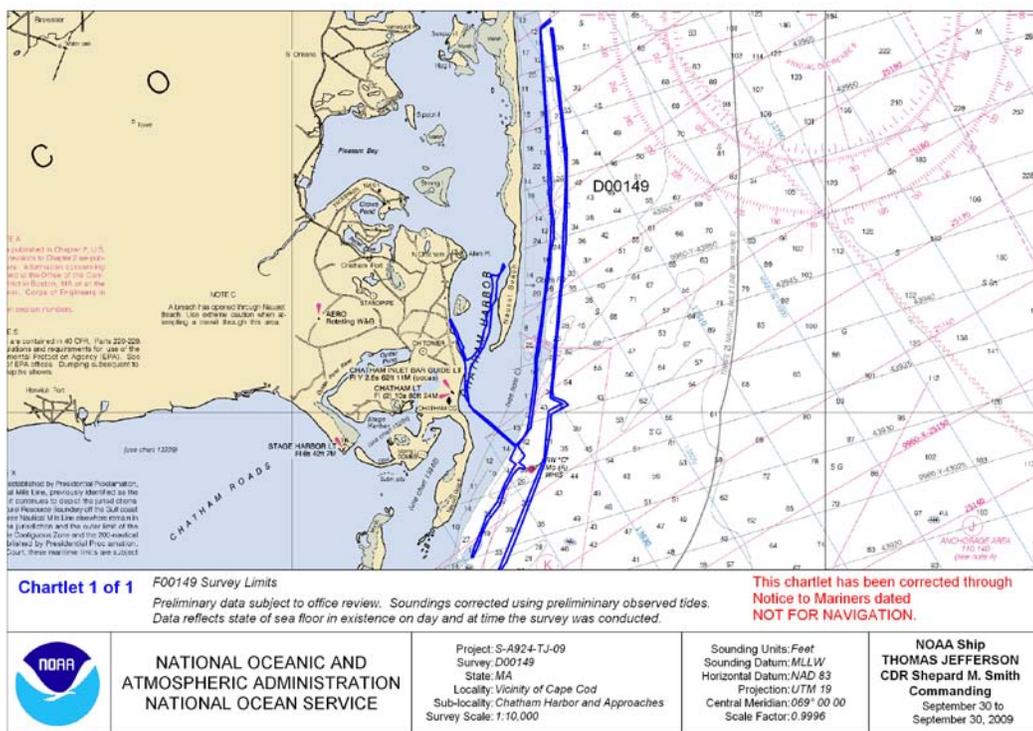


Fig. 1. D00149 Survey Area.

Calendar Date	Julian Day
30-September-2009	273

Table 2: Multibeam Acquisition Date

***Submitted with original field records**

B. DATA ACQUISITION AND PROCESSING

Refer to **S-A942-TJ-09 Data Acquisition and Processing Report (DAPR)** * for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR* are included in this descriptive report.

***Included with AHB H-Cell deliverables**

B 1. EQUIPMENT AND VESSELS

Reson 7125 multibeam soundings, POSPAC data, sound velocity profiles and bottom samples were acquired by NOAA Survey Launch 3102. Vessel configurations, equipment operation and data acquisition and processing were consistent with specifications described in the DAPR*.

In addition, Reson 7125 and POSPAC data were acquired by the ship at anchor for 13 hours at a 1 second ping rate. These data are included with the raw data, but were not processed by the ship.

***Included with AHB H-Cell deliverables**

B 2. QUALITY CONTROL

B 2.1 System Certification and Calibration

Refer to NOAA Ship *Thomas Jefferson's* DAPR* and Hydrographic Systems Readiness Report (HSRR) ** for a complete description of system integration and initial calibration results for equipment and sensors used for this survey.

**Included with AHB H-Cell deliverables **Submitted with original field records*

B.2.2 Sounding Coverage

As per the Letter Instructions*, this survey was conducted to collect multibeam data over a LIDAR dataset. Bathymetry coverage consisted of reconnaissance lines inside and outside of Chatham Harbor, MA. A BASE surface with one meter resolution was created to evaluate the Multibeam sounding set.

**Submitted with original field records*

B 2.3 Crosslines

No crosslines were acquired due to the nature of the survey. One area of overlap does exist and is discussed in section B 2.5 Systematic Errors.

B 2.4 Junctions and Prior Surveys

A junction comparison was performed with survey W00203, an ellipsoidal referenced LIDAR data set provided by the Atlantic Hydrographic Branch. In general, soundings agree within 0.2 meter.

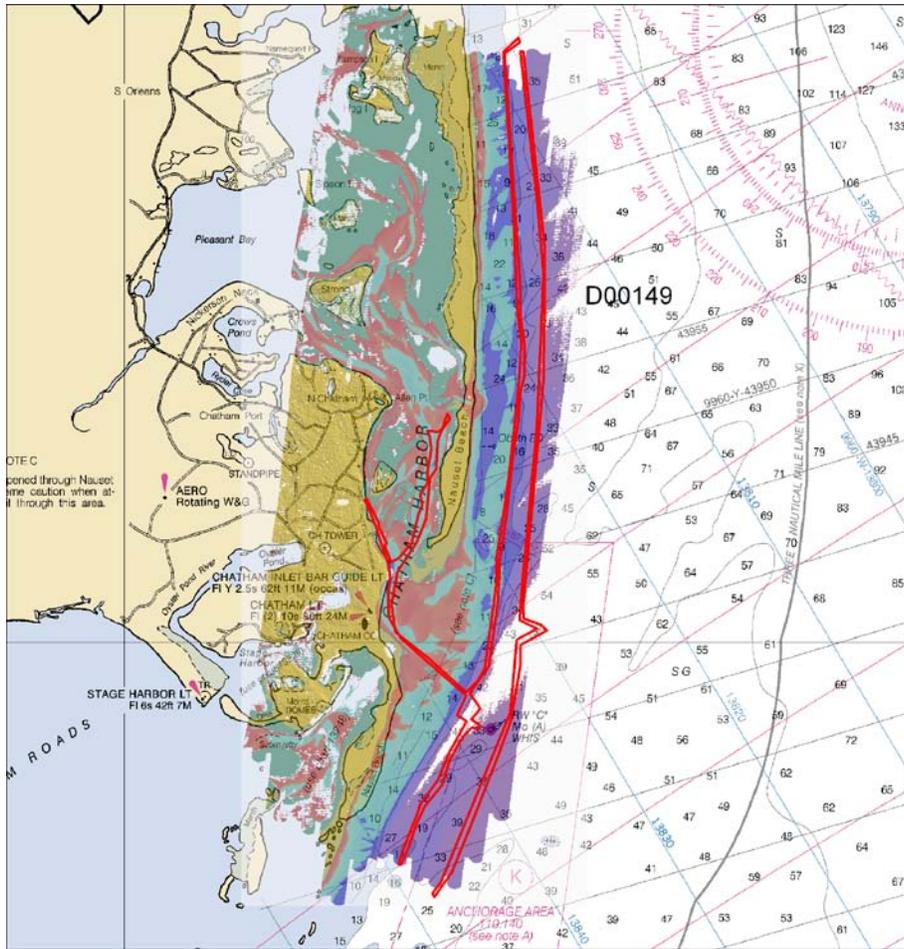


Fig 2. D00149 Junction Survey.

B 2.5 Systematic Errors

No significant artifacts due to systematic errors were observed in the data. One area of overlapping mainscheme data shows the extent of standard deviations between acquisition times. Figure 3 shows an example of the residual error values.

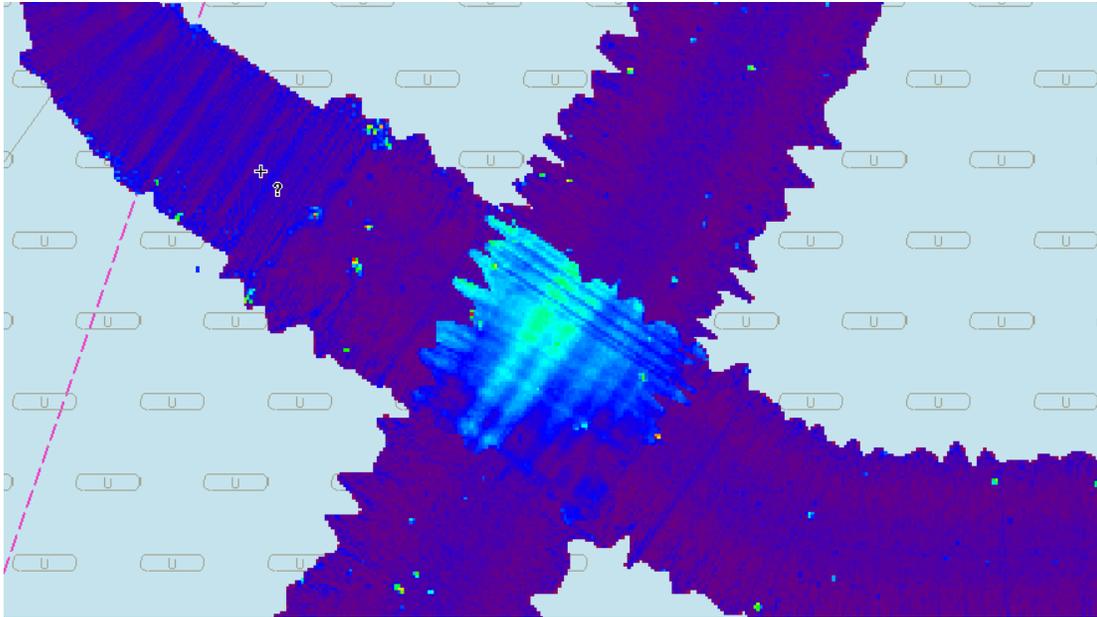


Fig 3. Junction lines. Color map: purple 0.01, light blue 0.15 std deviation.

B 3. CORRECTIONS TO ECHO SOUNDING

HDSC sounding data were reduced to mean lower-low water (MLLW) using verified water levels from the tide gauge located at Chatham, MA (8447435). No tide zoning was provided. The location of the gauge to the survey area is illustrated in Fig. 4.

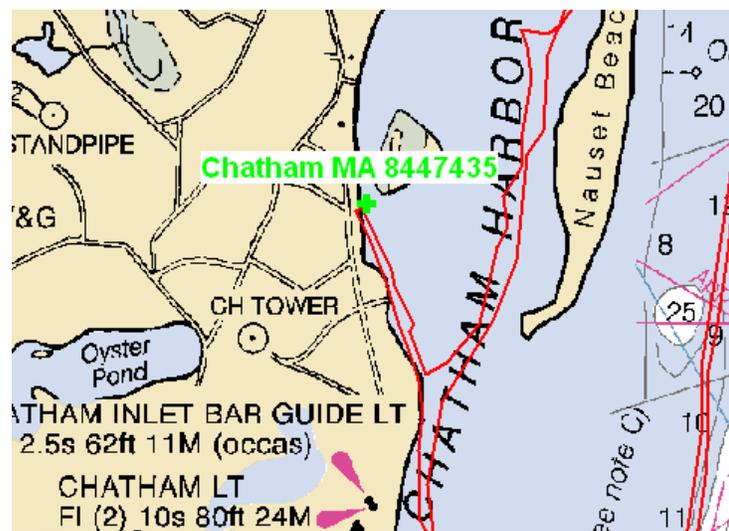


Fig 4. Tide Gauge Location

All other datum reduction procedures conform to those outlined in the DAPR*.

All methods and instruments used for sound velocity correction were as described in the DAPR*. A table detailing all sound velocity casts is located in Separate II** of this Descriptive Report.

Sound velocity corrections for this survey were applied using data from the Seabird 19plus CTD only. Application in CARIS HIPS was nearest in distance in time within 3 hours for all data.

**Included with AHB H-Cell deliverables*

***Submitted with original field records*

B 4. DATA PROCESSING

B 4.1 Total Propagated Error

For the 2009 field season, Total Propagated Error (TPE) parameters for sound speed and tides are calculated separately for each project. The project-specific parameters for S-A942-TJ-09, Survey D00149 are as follows:

Vessel	Tide Values		Sound Speed Values	
	Measured	Zoning	Measured	Surface
3102	0.09	0.10	4	0.2

Table 3: TPE Parameters

There was no tide zoning error given for the survey, but our best approximation for the error is 0.10m. These TPE values in table 3 were calculated for all MBES data immediately following CARIS Merge.

B 4.2 BASE Surfaces and Mosaics

The following table lists the BASE Surface submitted as part of Survey D00149:

<i>Name of Surface</i>	<i>Resolution</i>	<i>Type</i>	<i>Purpose</i>
D00149_CUBE_NOAA_1M_Final	1.0 meter	CUBE	Sounding Evaluation

Table 4: BASE Surfaces

This survey was processed using the Combined Uncertainty and Bathymetry Estimator (CUBE) algorithm. The CUBE configuration was set to NOAA_1m for the one meter coverage surface. Refer to the 2009 Data Acquisition and Processing Report*, 2009 Field Procedures Manual, and CARIS HIPS and SIPS User Guide for further discussion.

**Included with AHB H-Cell deliverables*

B 4.3 Data cleaning

The survey data was cleaned using the swath and subset editor tools in CARIS. All areas of the BASE surface that indicated a high standard deviation were examined and cleaned as required such that no residual errors exist in the surface that exceed the IHO order 1 depth accuracy requirements.

C. VERTICAL AND HORIZONTAL CONTROL

As per FPM section 5.2.3.2.3 a HVCR report was not filed as no horizontal and vertical control stations were established by the field party for this survey. A summary of horizontal and vertical control for this survey follows.

C 1.1 Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. Differential corrections from the U.S. Coast Guard beacon at Acushnet, MA (kHz 306) were used during this survey.

No horizontal control stations were established by the field party for this survey.

C 1.2 Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) station at Chatham, MA (8447435) serves as datum control for D00149. A request for delivery of final approved (verified) tides for this survey was not forwarded to N/OPS1, as no tide control was requested in the Project Instructions* (See email App. IV**). Verified tides were applied to all sounding data on October 13, 2009.

** Submitted with original field records **Appended to this report*

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Chart/ENC	Edition/Date	Corr. For NM	Corr. For LNM	Scale
13248	10 th Ed., Mar 17/01	NA	NA	1:20,000
USMA43M	NA	NA	NA	NA

Table 5. Chart Editions

D 1.1 Chart 13214 Comparison

Soundings are generally comparable with charted depths, with differences in charted and survey soundings 2 feet or less

D.1.2 ENC 4MA23M

Soundings are generally comparable with charted depths, with differences in charted and survey soundings 1 meter or less.

D.2 Additional Results

D.2.1 Automated Wreck and Obstruction Information Service (AWOIS) Items

AWOIS #1944 is located within the limits of D00149. This item was not investigated. *Concur.*

D.2.4 Shoreline

There is significant shoreline change at the northern limits of Chatham Harbor. As indicated in recent shoreline imagery, a passage to open water has opened through the land marked Nauset Beach. A small fishing boat was observed transiting the passage, although it was deemed unsafe to survey in the area due to large breakers. *Concur.*

D.2.5 Charted Features

There is one charted wreck within the sheet limits of survey D00149. See AWOIS above. *Concur.*

D.2.6 Charted Pipelines and Cables

There are no charted pipelines or cables in the survey area. *Concur.*

D.2.7 Bridges, Ferry Routes, and Overhead Cables

There are no ferry routes, bridges, or overhead cable crossings within the limits of the survey. *Concur.*

D.3 Dangers to Navigation and Shoals

D 3.1 Dangers to Navigation

No dangers to navigation were found or reported to the NOAA's Office of Coast Survey. *Concur.*

D 3.2 Shoals

There was shoaling at entrance to Chatham Harbor and it was marked by temporary buoys and ATONS. Large fishing vessels were observed crossing the shoal at high water, but no channel is depicted on the chart. Further survey is recommended to adequately develop the natural channel for navigation. Other areas depicted as shoal on the chart are navigable, as marked by the buoys listed in Appendix II *. *Concur.*

**Appended to this report*

D.4 Aids to Navigation

There are 15 Aids to Navigation (ATON) within the limits of D00149, two of which are charted but not positively identified during the survey. See Feature Report* for detailed information on uncharted buoys.

**Submitted with original field records*

D.5 Coast Pilot Information

The Hydrographer has no recommendations for changes or addenda to the Coast Pilot. *Concur.*

D.6 Miscellaneous

Bottom Samples

Bottom samples were collected at charted locations within the survey area. A list of all bottom samples acquired during Survey D00149 is contained in Appendix V*. *Concur.*

**Appended to this report*

Environmental Conditions and Notes

No unusual environmental conditions were noted.

D.8 Adequacy of Survey

This survey is considered complete and adequate to supersede charted depths within the common area as per requirements specified in the Project Letter Instructions*.

**Submitted with original field records*

Summary and Recommendations for Additional Work

Additional work is recommended to update the nautical charts in this area. Significant changes to navigation have been noted. *Concur.*

E. APPROVAL

As Lead Hydrographer, I have ensured that standard field surveying and processing procedures were followed in producing this examination in accordance with the Office of Coast Survey Hydrographic Surveys Division's *Field Procedures Manual*, and NOS *Hydrographic Surveys Specifications and Deliverables*. Field operations for this basic hydrographic survey were conducted under my daily supervision with frequent checks of progress and adequacy.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to N/CS33, Atlantic Hydrographic Branch.

The Data Acquisition and Processing Report for S-A942-TJ-09 is submitted separately and contains additional information relevant to this survey.

Approved and Forwarded:

 Jasper Schaer
2009.10.30 08:03:41
-05'00'

 shepard smith
2009.10.30 08:05:01 -05'00'

LT Jasper D. Schaer, NOAA
Field Operations Officer

CDR Shepard M. Smith, NOAA
Commanding Officer

In addition, the following individual was responsible for overseeing data acquisition and processing of this survey:

Survey Manager:  daniel wright
2009.10.30 08:04:31
-05'00'

Daniel B. Wright, NOAA
Chief Hydrographic Survey Technician

Appendix I

Dangers to Navigation

No Dangers to navigation were reported for survey D00149.

Appendix II

Survey Features Report

1. AWOIS Items

-none

2. Charted Features

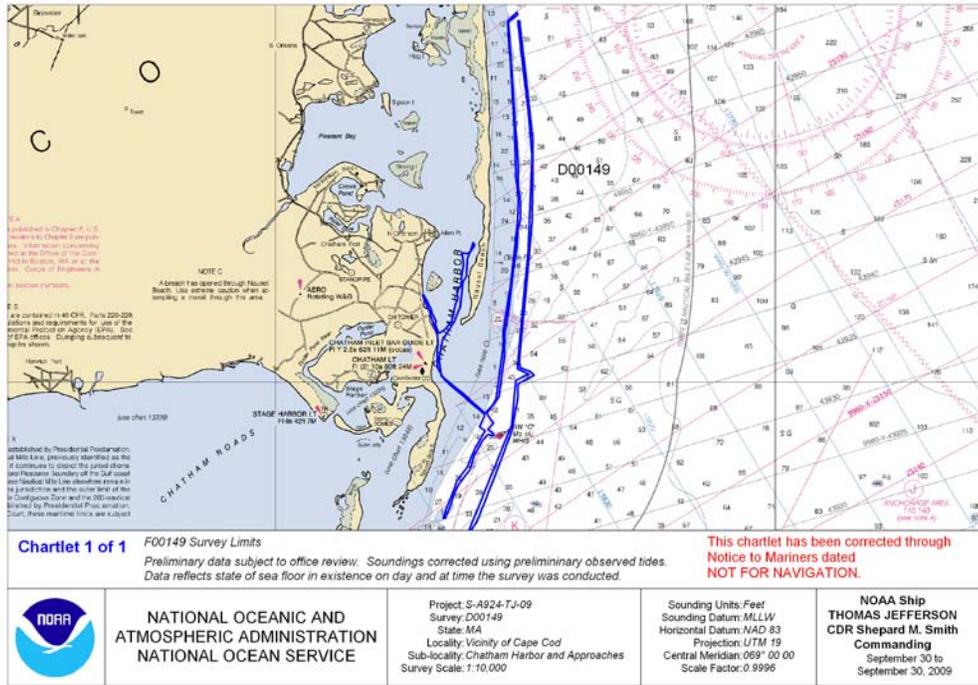
-none

3. Uncharted Features

-18

Appendix III

Progress Sketch



Thomas Jefferson
Survey Progress Estimate

FY2009 Field Season

OPS		FIELD															
Project Number and Name	Sheet Identifier	Registry Number	HQ Estimated SNM	Sheet Start Date	Sheet End Date	Smooth Tides Request Date	Smooth Tides Received Date	Cumulative % Complete at the end of March	Cumulative % Complete at the end of April	Cumulative % Complete at the end of May	Cumulative % Complete at the end of June	Cumulative % Complete at the end of July	Cumulative % Complete at the end of August	Cumulative % Complete at the end of September	Cumulative % Complete at the end of October	Cumulative % Complete at the end of November	Cumulative % Complete at the end of December
Chatham, MA	1	D00149		9/30/09	9/30/09	10/1/09											100%

Appendix IV

Tides and Water Levels

1. Tide Notes

2. Request for Approved Tides

-n/a

3. Final Tide Notes

-n/a

Appendix V

Supplemental Survey Records & Correspondence