

ENVIRONMENTAL FIELD SERVICES

STATEMENT OF OBJECTIVES

Center for Operational Oceanographic Products and Services

National Ocean Service

National Oceanic and Atmospheric Administration

Department of Commerce

TABLE OF CONTENTS

Table of Contents	2
I. Introduction	4
A. Background	4
B. Field Structure – IN Situ Measurement Platforms	5
C. Field Implementation, Operation, Maintenance, and Repair	6
II. Water Levels Objectives	6
A. Installation and Removal of Water Level Stations	6
B. Perform Annual Maintenance at NWLON and Short-Term Water Level Stations	8
C. Upgrade the Existing Data Collection Platform (DCP) System at Existing Water Level Stations	9
D. Provide Emergency/Unscheduled Maintenance at NWLON and Short-Term Water Level Stations	10
E. Perform Major Maintenance at NWLON and Short Term Water Level Stations	11
III. Currents Objectives	11
A. Field Support for Circulation Studies and Tidal Current Measurements for Short-Term Stations	11
B. Emergency Response to Recover a Floating and Drifting Current Meter Mooring	12
C. Vessel Mounted (Towed) Current Meter Operations	13
IV. PORTS [®] Objectives	13
A. Install New PORTS [®] Sites and New Sensors at Existing PORTS [®] Sites	13
B. Perform Routine Maintenance at Existing PORTS [®] Sites	15

C. Upgrade the Data Collection Platform (DCP) Systems at Existing PORTS® Sites	18
D. Perform Emergency/Unscheduled Maintenance at PORTS® Sites	19
E. Perform Major Maintenance at PORTS® Sites	20
V. Quick Response Objective	20
VI. Order of Precedence	21
VII. References	21
VIII. Acronyms	22
Appendix A – Government Furnished Equipment (water level stations)	24
Appendix B – Diagrams of typical coastal and Great Lakes NWLON stations	25
Appendix C – Government Furnished Equipment (current meter deployments)	27
Appendix D – General information for sub-surface, bottom platform, and Side looking deployments	28
Appendix E – Sample sub-surface mooring	34
Appendix F – Sample bottom platforms	35
Appendix G – General information for towed ADCP operations	39
Appendix H – Sample towed system pictures	41

ENVIRONMENTAL FIELD SERVICES

STATEMENT OF OBJECTIVES

I. INTRODUCTION

The purpose of this action is to obtain field support services for the Center for Operational Oceanographic Products and Services.

The National Ocean Service (NOS), Center for Operational Oceanographic Products and Services (CO-OPS), operates a number of short and long term monitoring systems. CO-OPS provides the infrastructure, science, and technical expertise to monitor, assess, and disseminate coastal oceanographic and Great Lakes products and services necessary to support NOAA's dual mission of environmental stewardship and environmental assessment and prediction. CO-OPS strengthens core capabilities through partnership links with outside groups including private organizations.

A. BACKGROUND

NOS is a Federal agency devoted to exploring, understanding, conserving, and restoring the Nation's coasts and oceans. NOS promotes safe navigation, supports coastal communities, sustains coastal habitats, and mitigates coastal hazards. NOS balances environmental protection with economic prosperity and leads the effort to ensure that our Nation's coastal areas remain safe, healthy and productive. NOS is an agency of the US Department of Commerce's (DoC) National Oceanic and Atmospheric Administration (NOAA).

CO-OPS establishes standards for the acquisition and processing of water level and current data; collects and documents user requirements that serve as the foundation for all resulting program activities; designs new and/or improved oceanographic observing systems; develops software to improve data processing capabilities; maintains and operates oceanographic observing systems; performs operational data analysis/quality control; produces/disseminates oceanographic products; and archives the resulting oceanographic data.

Today's monitoring infrastructure allows NOAA's Physical Oceanographic Real-Time System (PORTS[®]) Program and the National Water Level Observation Network (NWLON) to function as operational systems. In addition to PORTS[®] and NWLON, the monitoring infrastructure also supports the National Current Observation Program (NCOP). NCOP provides current measurements to maintain the adequacy of NOAA's *Tidal Current Prediction Tables*. Also, NCOP conducts user requested circulation surveys and special projects.

CO-OPS installs and operates short-term water level stations in support of a variety of programs including hydrographic surveys, marine boundary determination, dredging, climate change, and long-term sea level rise studies. CO-OPS provides a set of water level and coastal current products. These include data and products required by the National Weather Service to meet storm surge and tsunami warning responsibilities.

B. FIELD STRUCTURE - IN SITU MEASUREMENT PLATFORMS

The real-time monitoring infrastructure includes the National Water Levels and PORTS[®] Programs. In addition to the operational platforms distributed around the country and world, there are generally a number of short-term monitoring stations (30 days to several years) deployed for special projects such as hydrographic surveys, photogrammetry, United States Army Corps of Engineers (USACE) dredging activities, marsh restoration, and tidal current prediction adequacy/verification.

An NWLON station is a stand alone system that collects, stores, and transmits water level, meteorological, and other environmental data. The primary requirement of a station is to accurately measure water level information with low power consumption, high reliability, and defined accuracy. The typical NWLON station includes an air acoustic water level sensor with protective well, single or dual orifice Paroscientific pressure sensors, or a shaft angle encoder in a sump (Great Lakes); a redundant pressure-based water level sensor; and a data collection platform with Geostationary Operational Environmental Satellite (GOES) transmitter, rechargeable battery, and solar panel. Many NWLON stations also include sensors that measure air and water temperature, wind speed and direction, and barometric pressure.

While the NCOP supports multiple NOAA missions and applications, its primary function is to support safe and efficient marine navigation. The NCOP is a national reference system (a Federal backbone for an end-to-end system of current observations, data management, data analyses, and dissemination of products to users). The observational component of the program is the execution of systematic short term measurements at a number of locations each year.

PORTS[®] is a decision support tool that improves the safety and efficiency of maritime commerce and coastal resource management through the integration of real-time environmental observations, forecasts, and other geospatial information. PORTS[®] includes sensors, hardware, and associated communications systems allowing the centralized, real-time, data acquisition and dissemination of water levels, currents, and other oceanographic and meteorological data.

PORTS[®] is a partnering effort based on extensive collaboration among NOS and local maritime communities to identify and satisfy user needs. PORTS[®] comes in different sizes and configurations, each designed to meet local user requirements. The modular design of each PORTS[®] installation allows the straight forward integration of additional user specified sensors.

C. FIELD IMPLEMENTATION, OPERATION, MAINTENANCE, AND REPAIR

CO-OPS oversees the implementation, operation, maintenance, and repair of all NOS real-time environmental monitoring systems as well as short-term deployments. CO-OPS installs, documents, operates, and maintains the systems; conducts field reconnaissance; and provides training in the installation, operation, and maintenance of CO-OPS monitoring systems. CO-OPS acquires data from remote systems/sensors via GOES satellite, telephone lines, line of sight (LOS) radios, and wireless IP modems.

CO-OPS has field offices in Chesapeake, Virginia, and Seattle, Washington that operate and maintain the real-time monitoring systems. The offices provide training in support of operational partnerships and technology transfer. In addition, the Seattle office maintains special expertise required to support the gauging systems of the Tsunami Warning System.

As the NOS real-time monitoring infrastructure continues to grow, the outsourcing role will also grow. The installation and maintenance of new PORTS[®] systems are performed in part through private sector contractors.

For all contracted task orders, CO-OPS reserves the right to inspect the work being performed by the contractor, both in process and after completion

II. WATER LEVELS OBJECTIVES

A. INSTALLATION AND REMOVAL OF WATER LEVEL STATIONS

General Overview

The procedures for performing a new water level station installation are described in the "NGWLMS Site Design, Preparation, and Installation Manual, January 1991". The project requirements, specific locations for the installations/deployments, installation/deployment details, and specific systems and sensors that are Government Furnished Equipment (GFE) are included in the specific task orders. The contractor shall provide all necessary vehicles, vessels, tools, labor, and materials for the installation/deployment. All work shall be conducted in accordance with standard CO-OPS' practices, unless otherwise specified. Where required, CO-OPS will provide infrastructure designs to the contractor for new or upgraded stations. CO-OPS recognizes the particular situations will warrant deviations from standard guidelines and will consider alternatives prior to implementation. A sample list of GFE for water level station tasks is included in Appendix A. Diagrams of typical coastal and Great Lakes NWLON stations are included as Appendix B.

Generic Tasks

- Provide site reconnaissance to obtain measurements and information necessary for the preparation of site view drawings.
- Complete the Site Reconnaissance Field Notes in accordance with the guidance provided in CO-OPS Water Level and Meteorological Site Reconnaissance Procedures.
- Prepare site layout drawings showing recovered and proposed bench mark locations, and proposed sensor and DCP locations.
- Prepare a materials list, and installation/deployment plan. CO-OPS will approve.
- Prepare communication plan (e.g., Line-of-Site (LOS) radio, phone, dedicated line). CO-OPS will approve.
- Arrange for the installation of utilities. CO-OPS will place the order and pay for reoccurring electric, phone, and/or cellular costs.
- Identify responsible parties and arrange for permits/licenses (standard NOS license agreement), if required. CO-OPS will execute permits/licenses.
- Arrange for delivery and security of GFE. CO-OPS will pack and ship equipment going to the contractor. The contractor shall be responsible for packing of equipment being returned to CO-OPS and CO-OPS will fund the associated shipping.
- Fabricate or procure all non GFE components. This shall include, but not be limited to, all cables and connectors; instrument enclosures; antennas; solar panels; batteries; desiccant; stands and mounts; meteorological towers, poles, and standoffs; bench mark rods, covers, and disks; and nitrogen tanks and regulators.
- Conduct pre-installation/pre-deployment bench test of fully assembled and configured system to verify operation of all systems/sensors prior to actual installation/deployment in the field.
- Install/deploy systems/sensors.
- Install the bench mark network.
- Conduct the Second Order Class I leveling (Third Order in Alaska, Hawaii, Pacific islands) between the bench marks and the sensor(s) to establish initial elevation relationships between the sensor(s) and bench marks for sensor stability control.
- Conduct static GPS observations on a suitable bench mark that is part of the site's leveling network and concurrently at a NAVD 88 bench mark. The contractor is not responsible for the processing of the GPS data.
- Removal of station at end of project or prior to relocation. Removal includes (1) running closing levels to all benchmarks and the water level sensor; the leveling shall be performed by connecting to all marks and the sensor leveling point with Second Order Class I, precise leveling techniques, performed in accordance with NGS standards for geodetic leveling, and CO-OPS "Users Guide for the Installation of Benchmarks and Leveling Requirements for Water Level Recording Stations, NOAA/NOS October 1987;" (2) removal of the water level measurement system and restoration of the premises, reasonable wear and tear accepted; and (3) completion of the NGWLMS Site Report and other documentation as required. All sensors, data collection platforms, and enclosures

shall be returned (shipped) to CO-OPS. Support equipment such as protective wells, clamps, and towers in good condition shall be cleaned and returned to the contractor's equipment depot for future installations.

- Prepare documentation and provide metadata for the site, systems, and sensors within 15 working days of completion.

Objective Completion

An installation is successful when all task order requirements have been satisfied and accepted by CO-OPS. Once CO-OPS has acquired 30 days of data, length of time series required for analysis, CO-OPS will determine if any follow on contractor work is required via an emergency maintenance task order.

B. PERFORM ANNUAL MAINTENANCE AT NWLON AND SHORT-TERM WATER LEVEL STATIONS

General Overview

The procedures for performing the annual maintenance are described in the "Appendix F of the NGWLMS Site Design, Preparation, and Installation Manual, January 1991"; and according to the annual project instructions. Appendix F provides the general guidelines for performing annual inspections, and the project instructions provide specific details required for all inspections in the current year and also at each site. "Project Instructions: Installation and Maintenance of Coastal Water Level Stations for Calendar Year 2004, January 2004" are included under References as a sample.

Requirements included in the annual project instructions have precedence over requirements provided in task orders or the SOO. The requirements will be consistent with the scope of requirements provided in the SOO and task orders.

The contractor shall conduct scheduled annual service and preventive maintenance activities to maintain the systems/sensors in good working order. CO-OPS will provide the necessary spare components to support the annual maintenance visits at each site. The contractor shall provide all personnel and miscellaneous hardware meeting CO-OPS specifications such as conduits, wires, voltage meters and electronic test equipment, welding supplies and equipment, leveling equipment, diving equipment, earth digging and other machinery required, as necessary, to perform the annual maintenance. This list is not complete and other equipment and support may be needed to complete the annual maintenance.

This objective also includes the potential reinforcing (hardening) of tide house structures subject to harsh environments.

Generic Tasks

- Run levels to verify the stability of the water level sensor. The leveling shall be performed by connecting to a minimum of five bench marks and the sensor leveling point with Second Order Class I, precise leveling techniques, performed

in accordance with NGS standards for geodetic leveling, and CO-OPS “User’s Guide for the Installation of Benchmarks and Leveling Requirements for Water Level Recording Stations, NOAA/NOS October 1987.”

- Conduct static GPS observations on a suitable bench mark that is part of the site’s leveling network and concurrently at a NAVD 88 bench mark (exact time interval frequency, one to five years, between GPS operations at a particular station is to be determined). The contractor is not responsible for processing the GPS data. See “User’s Guide for GPS Observations, January 2003.”
- For those stations that have single or dual orifice Paroscientific pressure sensors installed as primary sensors, measure the orifice(s) above the primary bench mark.
- Remove the acoustic water level sensor and its calibration tube and replace with a GFE matched pair. The contractor shall return the sensor and calibration tube for recalibration to CO-OPS.
- For those stations subject to harsh environments, reinforce the installations.
- Provide diver services to inspect and clean all underwater components such as the NGWLMS protective well, clamps, brackets, and other support structures such as timber beams and pilings. All diving activities shall meet the OSHA regulations.
- If above or below water inspection results in the discovery of the need for major maintenance, construction, or station re-installation, the task is no longer annual maintenance and should be immediately reported to CO-OPS. Additional work would be accomplished through a separate task order.
- Remove the wind sensor nose cone, if installed, and replace with a GFE nose cone. The contractor shall return the nose cone for recalibration to CO-OPS.
- Remove the conductivity sensor, if installed, and replace with a GFE sensor. The contractor shall return the conductivity sensor for recalibration to CO-OPS.
- Any specific requirements outlined in Section 2.0 Individual Station Requirements, of the Project Instructions.
- Following each station visit, the contractor shall complete and submit to CO-OPS a Next Generation Water Level Measurement System (NGWLMS) Site Report describing the maintenance and repair action performed within 15 working days of completion.

Objective Completion

Station maintenance is successful when all documentation has been accepted by CO-OPS.

C. UPGRADE THE DATA COLLECTION PLATFORM (DCP) SYSTEM AT EXISTING WATER LEVEL STATIONS

General Overview

Part of the CO-OPS long-term plan of modernization includes upgrading the existing primary DCP (Sutron 9000), to the new primary DCP (Sutron XPERT 9200), and the existing backup DCP (Sutron 8200) to the new backup DCP (XPERT DARK 9210).

Information about the Sutron XPERT system is located at <http://www.sutron.com/PDFs/NOSG3WaterLevelStation.pdf>

The project requirements, specific locations for the upgrades, upgrade details, and specific systems, that are Government Furnished Equipment (GFE), are contained in the task order. The contractor shall provide all necessary vehicles, vessels, tools, labor, and materials for the upgrade. All work shall be conducted in accordance with standard CO-OPS' practices, unless otherwise specified.

Generic Tasks

- The existing primary DCP Sutron 9000 shall be upgraded to the new DCP Sutron XPERT system and the existing back up DCP Sutron 8200 shall be upgraded to new redundant DCP Sutron XPERT DARK at locations specified in the specific task orders.
- The contractor shall complete the NGWLMS Site Report and other documentation as required, after the upgrade at each water level station and provide that to CO-OPS within 15 days of completion.
- The contractor shall return the replaced DCPs (Sutron 9000s and 8200s) to CO-OPS.

Objective Completion

A station DCP upgrade is successful when all documentation has been accepted by CO-OPS. Completion includes the return of old hardware to CO-OPS.

D. PROVIDE EMERGENCY/UNSCHEDULED MAINTENANCE AT NWLON AND SHORT-TERM WATER LEVEL STATIONS

General Overview

The contractor shall conduct emergency or unscheduled maintenance to systems/sensors to correct problems or to repair failures as directed by CO-OPS. For specific emergency visits, CO-OPS shall provide the specific parts to replace the inoperative components. The contractor shall provide all necessary vehicles, vessels, tools, labor, and materials for the repair. All work shall be conducted in accordance with standard industry practices, unless otherwise specified.

Generic Tasks

- This effort shall consist of a station visit to identify and correct operational problems with the station. The contractor is expected to respond and correct the problem within 72 hours after notification by CO-OPS of a station problem.
- The contractor may be required to perform unscheduled servicing to install improved sensors, software updates, or utilities as required.

Objective Completion

Emergency maintenance is successful when all task order requirements have been satisfied.

E. PERFORM MAJOR MAINTENANCE AT NWLON AND SHORT TERM WATER LEVEL STATIONS

Generic Overview

The contractor shall recommend, and conduct, once approved by CO-OPS, major maintenance tasks that lie outside the scope of the maintenance tasks specified in Sections II.B-D. Major maintenance tasks shall be considered to be significant tasks in terms of maintaining or improving the station infrastructure, ensuring the collection of high quality data, or emergency repairs caused by storms or accidents.

Generic Tasks

- Major maintenance tasks shall be identified during the annual maintenance visit, to be accomplished at a later date either during the same task order year or the following year. GFE will be limited to the list provided in the Statement of Objectives, unless specified otherwise.
- Major maintenance may require an emergency/unscheduled maintenance visit as a prerequisite for determining the scope of work. The contractor and CO-OPS will mutually determine the scheduling of the approved major maintenance work, depending on existing schedules and availability of supplies.
- Some examples of major maintenance tasks, but not limited to, are as follows: (1) repair of damaged protective wells, (2) replacement of several well brackets or supporting structures, (3) replacement of the equipment shelter, (4) multiple repairs required after storm damage, and (5) relocation of the station for various reasons.

Objective Completion

Major maintenance is successful when all task order requirements have been satisfied and all documentation has been accepted by CO-OPS.

III. CURRENTS OBJECTIVES

A. FIELD SUPPORT FOR CIRCULATION STUDIES AND TIDAL CURRENT MEASUREMENTS FOR SHORT TERM STATIONS

General Overview

CO-OPS collects, analyzes, and interprets near-shore oceanic and estuarine currents in the United States and its possessions. Although these data support multiple requirements, the primary focus is in support of the annual publication of NOAA's Tidal Current Prediction Tables (under 33 CFR §146.33) as well as statutory authorization (33 USC §883a-b) to disseminate data and tidal current predictions. These data are used for navigational, scientific, engineering, legal, and recreational applications.

In general, current meter deployments are to cover 30-70 days at each station, are self contained and do not require periodic maintenance or inspection. Horizontal looking current profilers require a land or structured based site, an external power and data collection platform and may be installed for periods of no less but greater than 30 days. Specific length of deployments and operations are determined upon selection of the station. CO-OPS will select all station locations.

Generic Tasks

The project requirements, specific locations for the installations/deployments, installation/deployment details, and specific systems and sensors that are GFE (see Appendix C for sample equipment) are contained in the specific task orders.

- Sub-surface current meter deployments. See Appendix D for additional generic information. See Appendix E for sample sub-surface mooring.
- Bottom platform mooring. See Appendix D for additional generic information. See Appendix F for sample bottom platform diagram.
- Surface buoy-mounted systems. See Appendix D for additional generic information.
- Horizontal looking current profilers mounted to structures such as piers, bridges, or dolphins. See Appendix G for additional generic information.

Objective Completion

Deployment and recovery operations are successful when all task order requirements have been satisfied.

B. EMERGENCY RESPONSE TO RECOVER A FLOATING AND DRIFTING CURRENT METER MOORING

General Overview

All sub-surface mooring and buoy mounted current meters will contain an ARGOS tracking beacon in the event that the mooring/buoy surfaces or breaks away outside of the time of the selected recovery period.

Generic Tasks

Emergency response may require additional recovery time and contractor ship requirements. Government personnel will be responsible for tracking the platform. The contractor shall be responsible for platform recovery. Government personnel may accompany the contractor during recovery.

Objective Completion

Emergency response is successful when all task order requirements have been satisfied.

C. VESSEL MOUNTED (TOWED) CURRENT METER OPERATIONS

General Overview

Vessel mounted current meter operations (towed studies) are used to determine locations for short and long term current meter deployments. System components are GFE.

Generic Tasks

- Towed studies are conducted over an entire tidal cycle (12.4 hours) for a 1-2 day period per site.
- See Appendix H for additional general operational information. See Appendix I for sample system pictures.

Objective Completion

Towed operations are successful when all task order requirements have been satisfied.

IV. PORTS[®] OBJECTIVES

A. INSTALL NEW PORTS[®] SITES AND NEW SENSORS AT EXISTING PORTS[®] SITES

General Overview

PORTS[®] is a program that supports safe and cost-efficient navigation by providing ship masters and pilots with accurate real-time information required to avoid groundings and collisions. It is a decision support tool used to measure and disseminate observations and predictions of water levels, currents (from bottom platforms, side looking ADCPs, and surface buoy-mounted ADCPs), bridge clearance (air gap), and meteorological parameters (e.g., wind speed and direction, air and water temperature, and barometric pressure).

There are many other sensors presently recognized by CO-OPS as having significant benefits to the maritime community which have not yet been incorporated into the standard suite of PORTS[®] instrumentation. Some of these are visibility, wave height and period, and water quality. These and other sensors may be added to the operational suite of PORTS[®] sensors after testing and acceptance.

The contractor shall provide all necessary vehicles, vessels, tools, labor, and materials for the installation/deployment. All work shall be conducted in accordance with standard CO-OPS practices, unless otherwise specified. CO-OPS recognizes that particular situations will warrant deviations from standard guidelines and will consider alternatives prior to implementation.

Generic Tasks

The project requirements, specific locations for the installations/deployments, installation/deployment details, and specific systems and sensors that are Government Furnished Equipment (GFE) are contained in the specific task orders.

- Provide site reconnaissance to obtain measurements and information necessary for the preparation of site view drawings.
- Prepare site drawings, materials list, and installation/deployment plan. CO-OPS will approve.
- Prepare communication plan (e.g., LOS radio, phone, dedicated line). CO-OPS will approve.
- Arrange for the installation of utilities. CO-OPS will place the order and pay for reoccurring electric, phone, and/or cellular costs.
- Identify responsible parties and arrange for permits/licenses (standard NOS license agreement), if required. CO-OPS will execute permits/licenses.
- Arrange for delivery and security of GFE. CO-OPS will pack and ship.
- Fabricate or procure all non GFE components. This shall include, but not be limited to, all cables, conduit, and connectors; instrument enclosures; antennas; solar panels; batteries and A/C chargers; desiccant; stands and mounts; underwater platforms and weights; meteorological towers, poles, and standoffs; bench mark rods, covers, and disks; and nitrogen tanks and regulators.
- Conduct pre-installation/pre-deployment bench test of fully assembled and configured system to verify operation of all systems/sensors prior to actual installation/deployment in the field.
- Install/deploy systems/sensors. The contractor shall provide all necessary vehicles, vessels, tools, labor, and materials for the installation/deployment. All work shall be conducted in accordance with NOS/CO-OPS practices, unless otherwise specified. CO-OPS recognizes that particular situations will warrant deviations from standard guidelines and will consider alternatives prior to implementation.
- Install the bench mark network, if applicable.
- Conduct the Second Order Class I leveling between the bench marks and the sensor(s) to establish initial elevation relationships between the sensor(s) and bench marks for sensor stability control.
- Conduct static GPS observations on a suitable bench mark that is part of the water level measuring station's leveling network and concurrently at a NAVD 88 bench mark. The contractor is not responsible for the processing of the GPS data. See "User's Guide for GPS Observations, January 2003."
- Prepare documentation and provide metadata for the site, systems, and sensors within 15 working days of completion.

Objective Completion

A PORTS[®] installation is successful when all task order requirements have been satisfied and accepted by CO-OPS. Once CO-OPS has acquired 30 days of data, length of time series required for analysis, CO-OPS will determine if any follow on contractor work is required via an emergency maintenance task order.

B. PERFORM ROUTINE MAINTENANCE AT EXISTING PORTS® SITES

General Overview

The contractor shall conduct scheduled service and preventive maintenance activities to maintain the systems/sensors in good working order.

CO-OPS will provide the necessary spare system components to support the maintenance visits at each site. The contractor shall provide all personnel and miscellaneous hardware meeting CO-OPS specifications such as conduits, wires, voltage meters and electronic test equipment, welding supplies and equipment, leveling equipment, diving equipment, earth digging and other machinery required, as necessary, to perform the annual maintenance. This list is not complete and other equipment and support may be needed to complete the annual maintenance.

This objective also includes the potential reinforcing (hardening) of PORTS® related structures such as tide houses.

Generic Tasks

- One-Month Interval – Clean conductivity sensor (if installed) of marine growth.
- Two-Month Interval - Inspect all the above water components of systems/sensors (e.g., instrument enclosures; locks; antennas; solar panels; batteries; desiccant; stands and mounts; meteorological towers, poles, and standoffs; conduit, cables, and connectors; and nitrogen gas cylinder supply). Clean, repair, or replace, as necessary. Particular attention shall be made to inspect the wind sensor bearings.
- Six-Month Interval - Employ diver services to inspect all underwater components of current meters. Clean the ADCP heads.
- 12-Month Intervals - Conduct one-month, two-month, and six-month service interval maintenance. In addition, divers shall remove and replace the transponders on the current meter platforms with GFE spare transponders. The contractor shall clean the transponders, replace internal batteries, test, and make ready for reissue. The divers shall also inspect and clean marine growth from the water level measurement system's protective pipe and intake. The conductivity sensor shall be removed and replaced with GFE spare sensor. The contractor shall refurbish the conductivity sensor, repaint, and make ready for reissue. The acoustic water level sensor and its calibration tube shall be removed and replaced with a GFE spare matched pair. The contractor shall return the acoustic sensor to CO-OPS for recalibration. For those stations that have single or dual orifice Paroscientific pressure sensors installed as primary sensors, measure the orifice(s) elevation above the primary bench mark. Levels shall be run between the bench marks and the sensor(s) to ensure stability of the sensor(s). The wind sensor nose cones shall be replaced. The contractor shall return the nose cones to CO-OPS for recalibration.
- 24-Month Interval - In addition to the 12-month servicing, the ADCP shall be replaced with a GFE spare. Replace gel cell batteries in ADCP top side

electronics and other DCP sites. The contractor shall properly dispose of old batteries. The wind sensor bearings shall be replaced.

- 48-Month Interval - In addition to the 12-month servicing, the entire ADCP, platform, transponder, armored underwater cable, and supporting hardware shall be replaced. The contractor shall remove and properly dispose old armored cable. The replacement ADCP and transponder will be GFE spare.
- Spare electronic systems, replaceable internal components to GFE, and sensors. The contractor shall return all removed GFE to CO-OPS or its designated depot or repair facility. A new or refurbished replacement will be provided. It is the contractor's responsibility to bench test all systems/sensors prior to use in the field.

Generic Tasks for Annual Maintenance at PORTS[®] Water Level Measurement Stations

The procedures for performing the annual maintenance at PORTS[®] water level measurement stations are described in "Appendix F of the NGWLMS Site Design, Preparation, and Installation Manual, January 1991"; and according to the annual project instructions. "Project Instructions: Installation and Maintenance of Coastal Water Level Stations for Calendar Year 2004, January 2004" are included under References as a sample. Requirements provided in the annual project instructions have precedence over requirements provided in task orders or the SOO.

- Run levels to verify the stability of the water level sensor. The leveling shall be performed by connecting to a minimum of five bench marks and the sensor leveling point with Second Order Class I, precise leveling techniques, performed in accordance with NGS standards for geodetic leveling, and CO-OPS "User's Guide for the Installation of Benchmarks and Leveling Requirements for Water Level Recording Stations, NOAA/NOS October 1987."
- Conduct static GPS observations on a suitable bench mark that is part of the site's leveling network and concurrently at a NAVD 88 bench mark (exact time interval, one to three years, between GPS operations at a particular station is to be determined). The contractor is not responsible for processing the GPS data. See "User's Guide for GPS Observations, January 2003."
- For those stations that have single or dual orifice Paroscientific pressure sensors installed as primary sensors, measure the orifice(s) above the primary bench mark.
- Remove the Acoustic water level sensor and its calibration tube and replace with a GFE matched pair. The contractor shall return the sensor and calibration tube for recalibration by CO-OPS.
- For those stations subject to harsh environments, reinforce the installations.
- Provide diver services to inspect and clean underwater components such as the NGWLMS protective well, clamps, brackets, and other support structures such as timber beams and pilings. All diving activities shall meet the OSHA regulations.
- If above or below water inspection results in the discovery of the need for major maintenance, construction, or station re-installation, the task is no longer annual maintenance and should be immediately reported to CO-OPS. Additional work would be accomplished through a separate task order.

- Remove the wind sensor nose cone, if installed, and replace with a GFE nose cone. The contractor shall return the sensor for recalibration by CO-OPS.
- Remove the conductivity sensor, if installed, and replace with a GFE sensor.
- Perform any specific requirements outlined in Section 2.0 Individual Station Requirements, of the Project Instructions.
- Following each station visit, the contractor shall complete and submit to CO-OPS a Next Generation Water Level Measurement System (NGWLMS) Site Report describing the maintenance and repair action performed within 15 working days of completion.

Generic Tasks for Maintenance at PORTS[®] Real-time Current Measurement Stations

The procedures for operating and maintaining real-time current measurement stations are described in the CO-OPS Standard Operating Procedure “*Current Meter Installation, Operations, and Maintenance (Draft), dated December 1999*”.

For real time current measurements in navigation channels, CO-OPS generally uses RD Instruments Workhorse acoustic Doppler current profilers (ADCPs) mounted in bottom platforms. These instruments must be cabled to a data collection platform located on the shore.

For real time current measurements near piers and other structures CO-OPS generally uses the Sontek Side Looking Acoustic Doppler Profiler (SL-ADP) or the RDI Workhorse H-ADCP that can be mounted to vertical surfaces to measure the currents at a single depth. These instruments must be cabled to a data collection platform on the pier. These sensors are usually installed 15 feet below MLLW (or ½ of the distance between the bottom and MLLW for water depths less than 30 feet). A critical component of these installations is that the instrument’s tilt and roll can not exceed 1 degree in either axis, as measured by the SL-ADP.

Some deployments may use acoustic releases for recovery of the instrumentation from the sea bottom. CO-OPS uses either the ORE Coastal Acoustic Release Transponder (CART), Benthos 867-A or Benthos 875-PUB shallow water acoustic transponding releases. Both manufacturers’ releases can be communicated with using the Benthos DS-8000 Acoustic Deck Unit for recovery and location of the units. The CART releases are used in tandem on a mooring line; the Benthos 867-A is used as a single release with bottom mounted systems.

- The contractor shall provide instrument set up, deployment, and recovery operations. The contractor shall provide qualified personnel and ship support for deployment and recovery operations.
- The contract vessel shall have sufficient line or wire and a capstan/winch capable of 2000 lbs of working load. The vessel will be required to load/offload all equipment at the designated shore based site and have a lifting capacity of up to 2000 lbs for loading/offloading, deployments and recovery work. Other requirements include adequate deck space to accommodate the platform and cable

reel spool, and navigational instrumentation including a DGPS and depth sounder. Captain and crew of the vessel must hold all required USCG licenses and meet safety standards per USCG regulations.

- Final preparations, sensor checkouts and assembly prior to deployment shall be performed before deployment. All instrument specific parameters will be determined and provided by CO-OPS. The contractor shall collect all associated metadata during sensor setup, deployment, recovery, and data retrieval. Forms and minimum specifications for the metadata will be supplied by CO-OPS. Log sheets shall be thoroughly filled out for the deployments and recoveries. The log sheets shall include ADCP serial number, deployment and recovery date, exact time with zone description, GPS position, station depth (from ship's sounding), field personnel names, and ship name.
- The contractor shall maintain a facility for receiving and storage of spare equipment (e.g. bottom platforms, cable spools, etc.). All electronic equipment, tools and hardware shall be stored in a secure, environmentally controlled site to prevent degradation and theft of the equipment. The storage of shipping containers should be appropriate to their construction.
- Upon recovery, the contractor shall be responsible for refurbishing and storing platform components, and/or securely packaging and shipping equipment to the CO-OPS designated facility.
- Depending on the type of bottom platform being used, the deployment, inspection or recovery of the ADCP shall be accomplished by either; 1) sending divers down to install/remove the ADCP or to detach/attach a line to the platform, or 2) activating an acoustic signal which releases the platform from the lowering line (for deployment) or releases a flotation pod and instrument pack from the platform (which floats to the surface for retrieval).
- The contractor shall adhere to the "draft NOAA Administrative Order (NAO) Ship Charter Policy." The contractor-supplied ship must meet all applicable required Coast Guard safety regulations before any work commences.

Objective Completion

PORTS[®] maintenance is successful when all task order requirements have been satisfied and accepted by CO-OPS.

C. UPGRADE THE DATA COLLECTION PLATFORM (DCP) SYSTEMS AT EXISTING PORTS[®] SITES

General Overview

Part of the CO-OPS long-term plan of modernization includes upgrading the existing primary DCP (Sutron 9000), to the new primary DCP (Sutron XPERT 9200), and the existing backup DCP (Sutron 8200) to the new backup DCP (XPERT DARK 9210). Information about the Sutron XPERT system is located at <http://www.sutron.com/PDFs/NOSG3WaterLevelStation.pdf>

The project requirements, specific locations for the upgrades, upgrade details, and specific systems, that are Government Furnished Equipment (GFE), are contained in the task order. The contractor shall provide all necessary vehicles, vessels, tools, labor, and materials for the upgrade. All work shall be conducted in accordance with standard industry practices, unless otherwise specified.

Generic Tasks

- The existing primary DCP Sutron 9000 shall be upgraded to the new DCP Sutron XPERT system and the existing back up DCP Sutron 8200 shall be upgraded to new redundant DCP Sutron XPERT DARK at locations specified in the specific task orders.
- The contractor shall complete the NGWLMS Site Report and other documentation as required, after the upgrade at each water level station and provide that to CO-OPS within 15 days of completion.
- The contractor shall return (ship) the replaced DCPs (Sutron 9000s and 8200s) to CO-OPS.

Objective Completion

A station DCP upgrade is successful when all documentation has been accepted by CO-OPS. Completion includes the return of old hardware to CO-OPS.

D. PERFORM EMERGENCY/UNSCHEDULED MAINTENANCE AT PORTS[®] SITES

General Overview

The contractor shall conduct emergency or unscheduled maintenance to systems/sensors in order to correct problems or to repair failures as directed by CO-OPS. For specific emergency visits, CO-OPS will provide the specific parts to replace the inoperative components. The contractor shall provide all necessary vehicles, vessels, tools, labor, and materials for the repair. All work shall be conducted in accordance with standard CO-OPS practices, unless otherwise specified.

Generic Tasks

- The contractor shall be available via cell phone with voice mail messaging and email with four hours response time to remotely access systems and attempt to restore functions, reboot, or reload software. If remote repair attempts fail, the contractor shall notify the Technical Representative (TR), Task Manager, to receive emergency/unscheduled repair instructions.
- The contractor may be required to perform unscheduled servicing to install improved sensors, software updates, or utilities as required. Unscheduled servicing will be conducted after obtaining emergency/unscheduled maintenance instructions from CO-OPS.

Objective Completion

PORTS[®] emergency/unscheduled maintenance is successful when all task order requirements have been satisfied and accepted by CO-OPS.

E. PERFORM MAJOR MAINTENANCE AT PORTS[®] SITES

Generic Overview

The contractor shall recommend, and conduct, once approved by CO-OPS, major maintenance tasks that lie outside the scope of the maintenance tasks specified in Sections IV.B-D. Major maintenance tasks shall be considered to be significant tasks in terms of maintaining or improving the station infrastructure, ensuring the collection of high quality data, or emergency repairs caused by storms or accidents.

Generic Tasks

- Major maintenance tasks shall be identified during the maintenance visits, to be accomplished at a later date either during the same task order year or the following year. GFE will be limited to the list provided in the Statement of Objectives, unless specified otherwise.
- Major maintenance may require an emergency/unscheduled maintenance visit as a prerequisite for determining the scope of work. The contractor and CO-OPS will mutually determine the scheduling of the approved major maintenance work, depending on existing schedules and availability of supplies.
- Some examples of major maintenance tasks, but not limited to, are as follows: (1) repair of damaged water level protective wells, (2) replacement of several well brackets or supporting structures, (3) replacement of the equipment shelter, (4) multiple repairs required after storm damage, and (5) relocation of the station for various reasons.

Objective Completion

Major maintenance is successful when all task order requirements have been satisfied and all documentation has been accepted by CO-OPS.

V. QUICK RESPONSE OBJECTIVE

General Overview

At certain times, CO-OPS receives requests to provide information on water levels, currents, meteorological and oceanographic parameters (consistent with the typical parameters that CO-OPS measures normally) in response to an environmental incident or a national disaster. Examples of incidents for which CO-OPS has received support requests include the recent oil spill in the Delaware River caused by the MV Anthos 1, the crash of Egypt Air Flight 990 off Martha's Vineyard in November 1999, and the sinking of the MV Bow Mariner off Virginia's Eastern Shore in February 2004. During such incidents, there may only be a day or two between the time of CO-OPS being notified that information is requested and when the instruments are needed on site and in the

water. CO-OPS has been building a capability to respond to these incidents by developing a vessel mounted (towed) current meter system that can be installed on a boat of opportunity and a relatively small, compact surface buoy that can be quickly transported and deployed in protected waters using a vessel with minimal deck space and lifting capacity. The towed current meter system is the same system as described in Section III under CURRENTS OBJECTIVES. All system components are GFE.

Every incident is different and will involve different requirements, the contractor responsibilities shall be to assist in logistics planning, execution, and field support. CO-OPS personnel will be onsite and will be responsible for collecting and dissemination of all data and liaison with on-scene incident commanders. Since CO-OPS is still in the process of developing the quick response systems, not all of the standard operating procedures (SOPs) have been written. CO-OPS will distribute these standardized procedures to the contractor as they are developed. Until then, CO-OPS will not require that the contractor be responsible for the hardware checkout and maintenance.

Generic Tasks

- Logistics planning and installation of GFE equipment on vessel of opportunity at incident location. Logistics may or may not include providing a vessel.
- On-site sensor and system checkout of GFE equipment prior to deployment.
- Sensor maintenance during the time that it is deployed for the incident.

Objective Completion

A quick response is successful when all task order requirements have been satisfied and accepted by CO-OPS.

VI. ORDER OF PRECEDENCE

All requirements, specifications, and procedures as specified in the specific task orders shall have the highest order of precedence, followed by those in these generic objectives. If there is ever an inconsistency or conflict among detailed task orders, generic objectives, or references, the specific task orders shall be followed.

VII. REFERENCES

- Draft NOAA Administrative Order (NAO) Ship Charter Policy
- Next Generation Water Level Measurement System (NGWLMS) Site Design, Preparation, and Installation Manual, NOAA/NOS, January 1991
- Project Instructions: Installation, Operation, and Maintenance of Coastal Water Level Stations for Calendar year 2004, January 2004
- User's Guide for Installation of Bench Marks and Leveling Requirements for Water Level Stations, NOAA/NOS, October 1987
- CO-OPS Water Level and Meteorological Site Reconnaissance Procedures

- Site Reconnaissance Field Notes
- Water Level Station Site Report, CO-OPS Form FODSR12-00f
- User's Guide for GPS Observations, January 2003
- Current Meter Installation, Operations, and Maintenance (Draft), dated December 1999

Some of these references are available on the web at <http://co-ops.nos.noaa.gov/pub.html>. All other references can be obtained by contacting:

Joseph M. Welch
 Center for Operational Oceanographic Products and Services
 National Ocean Service
 SSMC4, Station 6544
 1305 East West Highway
 Silver Spring, MD 20910-3281
 (301) 713-2897 x129 or marty.welch@noaa.gov

VIII. ACRONYMS

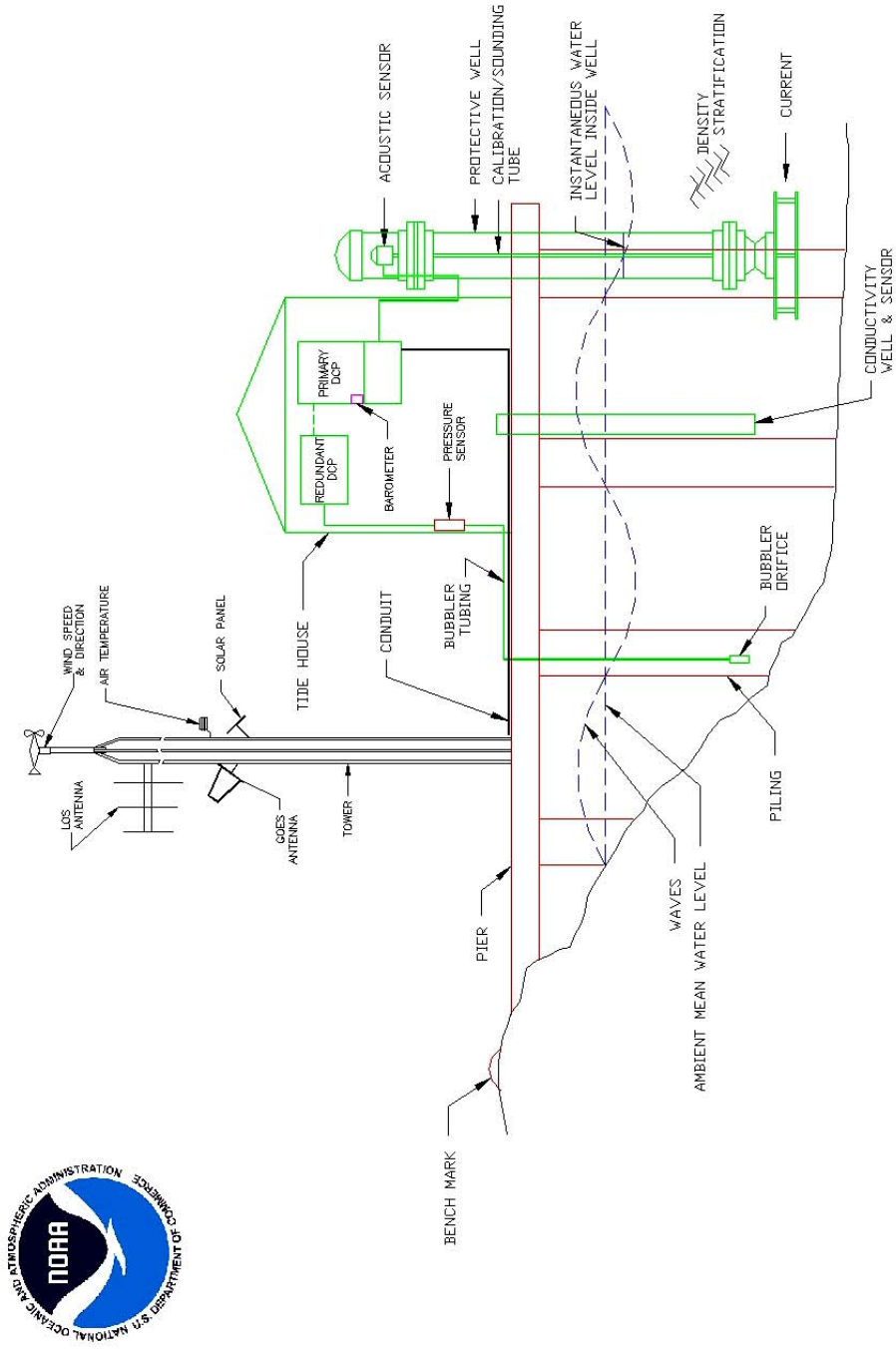
ADCP	Acoustic Doppler Current Profiler
CART	Coastal Acoustic Release Transponder
CFR	Code of Federal Regulations
CO-OPS	Center for Operational Oceanographic Products and Services
CORMS	Continuous Operational Real Time Monitoring System
DCP	Data Collection Platform
DGPS	Differential Global Positioning System
DoC	Department of Commerce
GFE	Government Furnished Equipment
GPS	Global Positioning System
GOES	Geostationary Operational Environmental Satellite
HCP	Horizontal Current Profiler
LOS	Line of Sight
NAO	NOAA Administrative Order
NAVD	North American Vertical Datum
NCOP	National Current Observation Program
NGS	National Geodetic Survey
NGWLMS	Next Generation Water Level Measurement System
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NWLON	National Water Level Observation Network
OSHA	Occupational Safety and Health Administration
PORTS [®]	Physical Oceanographic Real-Time System
QA	Quality Assurance
QC	Quality Control

SUBS	Streamlined Underwater Buoyancy System
TR	Technical Representative
TRBM	Trawl Resistant Bottom Mount
US	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard

Appendix A – Government Furnished Equipment (water level stations)

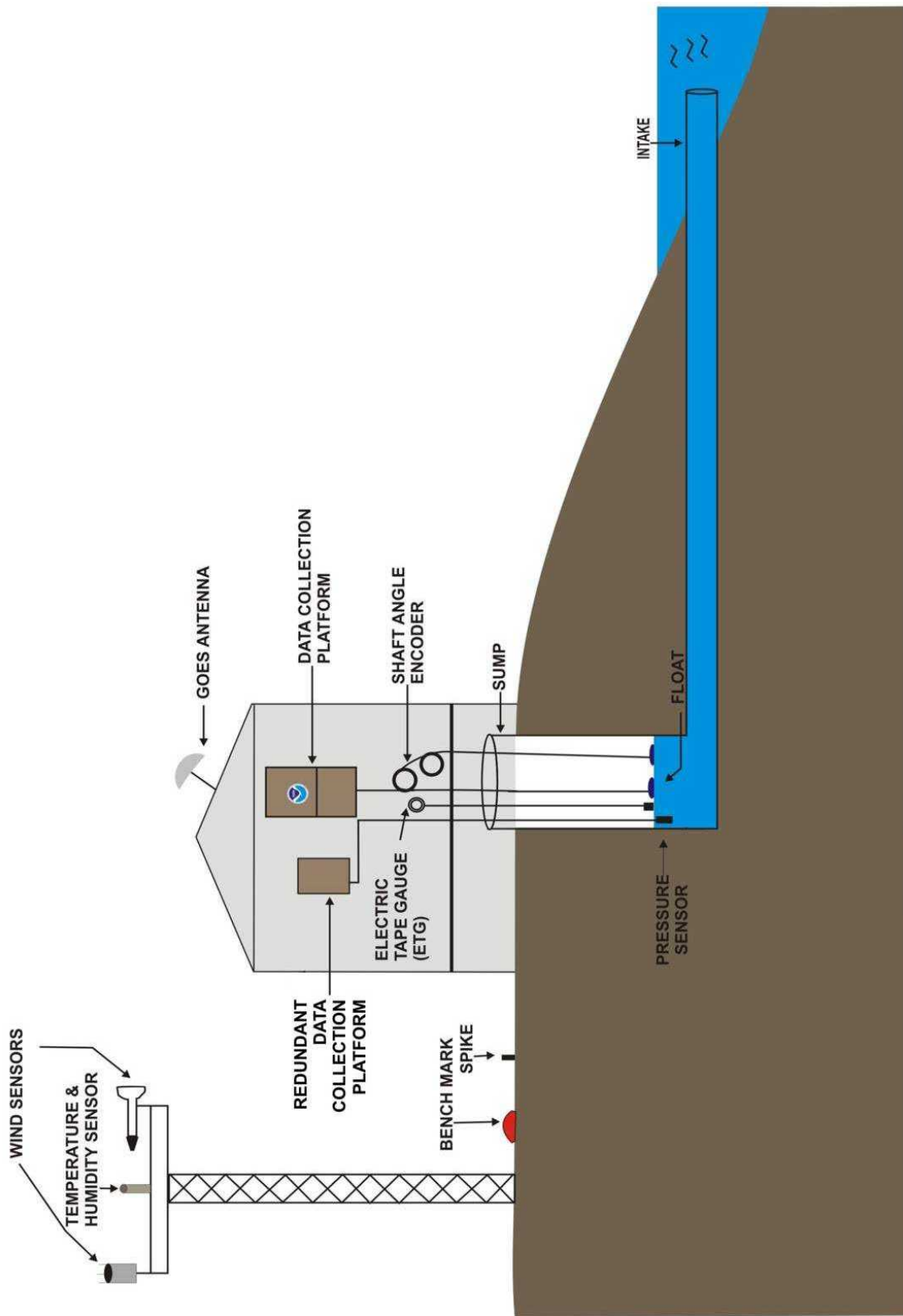
- Relevant historical information for the site
 - Tidal datums
 - Historic bench mark descriptions
 - Historic current/hydro survey data
 - GOES transmission information (azimuth and elevation)
- Contact information for property owners, harbor masters, etc., if any
- Sample systems and sensors
 - Tide station equipment shelter (heated, if possible), if a suitable location to house the water level collection equipment is not found during the reconnaissance;
 - A primary Data Collection Platform (DCP);
 - A single or multiple suite of sensors to be installed as primary sensor(s);
 - A redundant DCP;
 - A redundant pressure sensor;
 - A suite of ancillary sensors, one each of barometer, wind sensor, water temperature sensor, and air temperature sensor;
 - The Government will supply spare components as required to support the annual maintenance of the NWLON stations;
 - The Government will supply spare components as required to support the emergency maintenance of the NWLON stations; and
 - Government will supply the Sutron XPERT DCP as primary DCP and Sutron Xpert Dark DCP as backup for the NWLON stations subject to DCP upgrade.

Appendix B - Diagrams of typical coastal and Great Lakes NWLON stations



CURRENT NOAA WATER LEVEL STATION – FULL CONFIGURATION





Appendix C - Government Furnished Equipment (current meter deployments)

Current Measurements – Note: not all equipment will be required for every Task Order involving current measurements.

1. RD Instruments Acoustic Doppler Current Profilers;
2. Sontek, Inc. Side Looker Acoustic Doppler Profilers (SL-ADP);
3. Weather-proof enclosure and data collection electronics for the SL-ADP including batteries, charging system and data storage cards;
4. Sontek cables for SL-ADP;
5. RD Instruments batteries, cables memory cards;
6. Streamlined Underwater Buoyancy System (SUBS) A2 and B3 buoys;
7. ORE Coastal Acoustic Release Transponder (CART) systems;
8. Benthos 867-A shallow water acoustic release systems;
9. Benthos DS_8000 Acoustic Deck Unit;
10. ARGOS tracking beacons;
11. Mooring cable, chains and hardware;
12. Additional floatation;
13. Seabird Inc. Model SBE16 self contained Conductivity, Temperature and Pressure sampler, cable and batteries.
14. Trawl Resistant Bottom Mount (TRBM) floatation pod and aluminum bases and replacement spectra line;
15. UAT-367 Transponders and batteries; and
16. Deployment Release, Peck and Hale quick release and deployment bridal for TRBM.
17. YSI Vfin Towed ADCP Body
18. Aluminum ADCP towing clamp and pole mount for towed ADCP operation.

Appendix D – General Information for sub-surface, bottom platform and side looking deployments

1. Acoustic Doppler Current Profiler (ADCP) Specifications
 - a. For non real time tidal current deployments, CO-OPS will be using RD Instruments Workhorse acoustic Doppler current profilers (ADCPs). These instruments are self contained, internally recording, and can be deployed in numerous platforms or moorings. CO-OPS will use 300, 600, or 1200 kHz systems depending on the water depth of the instrument. The 300 kHz ADCP is limited to profiling 165 meters in the long range mode, the 600 kHz model has a range to 70 meters, and the 1200 kHz instrument has a range of 20 meters. All ADCPs will be fitted with optional pressure sensors, depth rated to accommodate the maximum range.
 - b. For tidal current measurements near piers and other structures CO-OPS uses the Sontek Side Looking Acoustic Doppler Profiler (SL-ADP) or the RDI Workhorse H-ADCP that can be mounted to vertical surfaces to measure the currents at a single depth. These instruments do not have internal batteries or data storage capacity and must be cabled to a data collection platform on the pier. These sensors are usually installed 15 feet below MLLW (or ½ of the distance between the bottom and MLLW for water depths less than 30 feet). A critical component of these installations is that the instrument's tilt and roll can not exceed 1 degree in either axis, as measured by the SL-ADP.
2. Acoustic Release Specifications (applicable to bottom mounted ADCPs only)

All stand-alone deployments use acoustic releases for recovery of the instrumentation. CO-OPS uses either the ORE Coastal Acoustic Release Transponder (CART), Benthos 867-A or Benthos 875-PUB shallow water acoustic transponding releases. Both manufacturers' releases can be communicated with using the Benthos DS-8000 Acoustic Deck Unit for recovery and location of the units. The CART releases are used in tandem on a mooring line; the Benthos 867-A is used as a single release with bottom mounted systems. New batteries will be installed by CO-OPS prior to the field season.

3. Bottom Mounted Platform Specifications

CO-OPS uses 2 types of bottom mounted platforms for the non real time ADCP deployments.

- a. The Flotation Technologies' model AL-200 is used for Trawl-resistant Bottom Mount (TRBM) deployments. These are for relatively shallow deployments of approximately 50 meters or less, or where trawling or other hazards are likely. These can be deployed with a single Benthos 867-A shallow water acoustic transponding release. The flotation pod contains both the acoustic release and the ADCP. The TRBM requires a deck space of approximately six feet by six feet for storage and on a ship. TRBM deployments require the platform to be lowered to the bottom and then released with the GFE acoustic release. An underwater acoustic transponder is attached to the platform prior to deployment and is used for verification of location at recovery. See Appendix F1 for a diagram of the TRBM
- b. The ES-2 bottom mount platform is functionally similar to the TRBM except that it is approximately 18 inches taller and uses the Benthos 875-PUB pop buoy for the acoustic release. This release deploys a pop up buoy that is attached to the platform. The pop up buoy does not contain the ADCP which must be recovered with the platform. The ES-2 platform requires the same amount of deck space as the TRBM and is deployed in the same manner. See Appendix F2 for an example of the ES-2 platform.

4. Subsurface Mooring Specifications

For deep water stations where fishing is not a concern, CO-OPS may require the Streamlined Underwater Buoyancy System (SUBS) A2 buoy system from Open Seas Instrumentation Inc. to be used. The SUBS moorings consist of a plastic streamlined buoy that contains flotation and the ADCP, a length of cable or chain with additional flotation, dual acoustic releases and an anchor that may weigh up to 1000 lbs. The mooring cable lengths are variable being determined by the water depth in which the moorings are deployed. Depending on the station depth, the maximum mooring length could be up to 200 meters. For the shallowest stations the moorings would be no more than 10 meters in total length. The amount of flotation will be calculated based on station depth, expected current strength, and mooring weight. Flotation will consist of a second SUBS unit (model B3) and/or flotation balls. ARGOS tracking beacons (GFE) shall be incorporated on all ADCP-SUBS moorings in order to track the unit if it surfaces at some time other than the recovery.

CO-OPS will perform tracking of the beacon. See Appendix E for an example of the SUBS mooring design.

5. Contractor Current Meter Deployment and Recovery General Requirements

- a. The contractor shall provide on-site instrument set up, deployment, and recovery operations. The contractor shall provide qualified personnel and ship support for deployment and recovery operations. This shall include providing a ship capable of the required work, a shore based site for logistics that includes facilities for the receiving, storage and shipment of all equipment, and at least one electronic technician familiar with RDI ADCPs and oceanographic acoustic releases. All GFE will be shipped by CO-OPS to the contractor-specified logistics site. Final preparations, sensor checkouts and assembly prior to deployment will be inspected by CO-OPS. All instrument specific parameters will be determined and provided by CO-OPS.
- b. All instrument deployments and recoveries shall occur during daylight hours and as close to predicted “slack” water periods (minimum current) as possible. A slack is preferable, particularly on the recovery, since the ship needs to be able to hold station while the equipment is brought on board. No anchoring will be required for either system deployments or recoveries. CO-OPS will provide tidal current predictions for the deployment and recovery time periods, once those dates are determined.
- c. The contractor will collect all associated metadata during sensor setup, deployment, recovery, and data retrieval. Forms and minimum specifications for the metadata will be supplied by CO-OPS. Log sheets will be thoroughly filled out for the deployments and recoveries. The log sheets will include ADCP serial number, deployment and recovery date, exact time with zone description, GPS position, station depth (from ship’s sounding), field personnel names, and ship name. The stations will not require any periodic inspections. The instruments must be in the water for at least 35 days and not more than 75 days. Side looking ADCPs may be deployed for longer periods based on the requirements of the specific task order. The contractor shall be responsible for clean up and maintenance of the mooring gear prior to its redeployment.
- d. The contractor shall maintain a storage facility to hold all unused equipment during the project period. Upon completion of the final recovery, the contractor shall be responsible for securely

packaging and shipping of all equipment to the CO-OPS designated facility. All shipping costs will be paid by CO-OPS. All electronic equipment, tools and hardware shall be stored in a secure, environmentally controlled site to prevent degradation and theft of the equipment. The storage of shipping containers should be appropriate to their construction.

6. Contractor Deployment and Recovery of Bottom Mounted ADCP Platforms
 - a. TRBM and ES-2 deployments will include lowering the platform to the bottom. This requires the contract ship to have sufficient line or wire and a capstan/winch capable of 2000 lbs of working load. The platform is lifted from the deck using a deployment bridle with an acoustic release. The bridle/release is of 5-10 feet height. The platform is lowered into the water until the deployment line/wire is slackened. The wire/line is then taken up until taut and the deployment GFE acoustic release is triggered. See Appendix F3.
 - b. Recovery of the bottom platforms at the end of deployment is accomplished by sending an acoustic signal which releases the flotation pod and instrument pack for the TRBM or just the flotation pod for the ES-2. The pod floats to the surface for retrieval. With both platform types the pod is tethered to the base using Spectra line (up to 3/8 inch diameter, line is GFE). The Spectra line is used to recover the base. The pod will be brought on board and the Spectra line secured prior to removal/cutting from the base unit. The slack is then taken from the Spectra line. Once the slack is out, the line should be taken to power on a winch or capstan. When the base is at the surface an additional line(s) will be tied for safety. If necessary the base can then be rinsed, and/or brought on board.
7. Contractor Deployment and Recovery of ADCP-SUBS
 - a. ADCP-SUBS moorings are deployed by first placing the buoy in the water and allowing the rest of the mooring to pay out, with the exception of the anchor. Once on station, the anchor can be deployed by jettisoning it directly from the stern of the ship. An alternative deployment method may be the use of a quick release shackle to deploy the anchor after the mooring has been streamed out and the anchor has been placed at the water's edge. It should be noted that in any deployment method, the ADCP buoy and flotation shall be deployed first with the anchor deployed last and

only when it is clear that the mooring string is streaming straight and with out any potential kinks or tangles.

- b. The ensuing recoveries shall occur by commanding an acoustic release mounted above the anchor on the mooring. The ADCP-SUBS will then surface leaving the anchor behind. The unit may be recovered with a small ship if such conditions favor a small ship. The main recovery ship shall hoist the recovered mooring on to its deck, making sure that the ADCP, the acoustic releases and the floatation are protected from damage.

8. Contractor installation and recovery of the Side Looker ADCPs

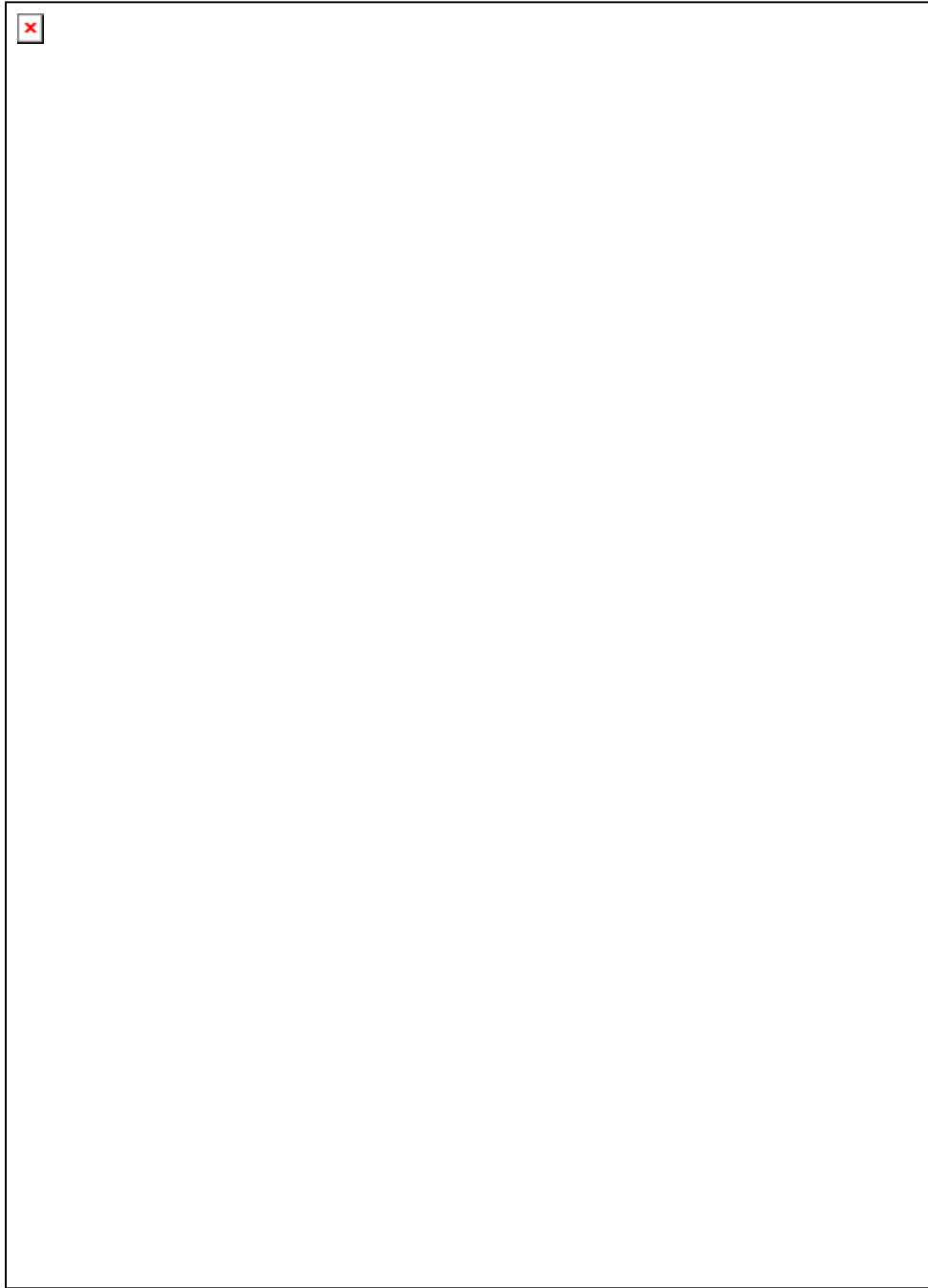
- a. CO-OPS will provide the contractor with the Side Looker ADCP (SL-ADCP), the appropriate SL-ADCP mounting structure, cabling and surface data collection electronics. The contractor will be responsible for installing the SL-ADCP mount, the cabling and the surface electronics. Incidental mounting supplies, (i.e. mounting straps, misc. nuts and bolts, etc.) will be the responsibility of the contractor. Additional specifications for the installation of a SL-ADP are included in the pertinent task orders. CO-OPS will be responsible for obtaining all required permissions for mounting the SL-ADP and its associated equipment from the pier owners and other required entities. See Appendix F4.
- b. At the conclusion of the task order project the contractor will be responsible for the removal of the SL-ADP, data collection electronics, and all mounting hardware.

9. Ship Requirements

The contractor shall adhere to the “draft NOAA Administrative Order (NAO) Ship Charter Policy” (see appendix I). The contractor-supplied ship must meet all applicable required Coast Guard safety regulations before any work commences. All contract vessels will be inspected for compliance and approved by CO-OPS or a CO-OPS designated representative prior to equipment loading and instrument deployment. The vessel will be required to load/offload all equipment at the designated shore based site and have a lifting capacity of up to 2000 lbs for loading/offloading, deployments and recovery work. Other requirements include adequate deck space to accommodate the appropriate number of platforms or mooring systems to be deployed or recovered, navigational instrumentation including a DGPS and depth sounder, bunk quarters for NOAA and contractor personnel when overnight stay may be required.

Captain and crew of the vessel must hold all required USCG licenses and meet safety standards per USCG regulations.

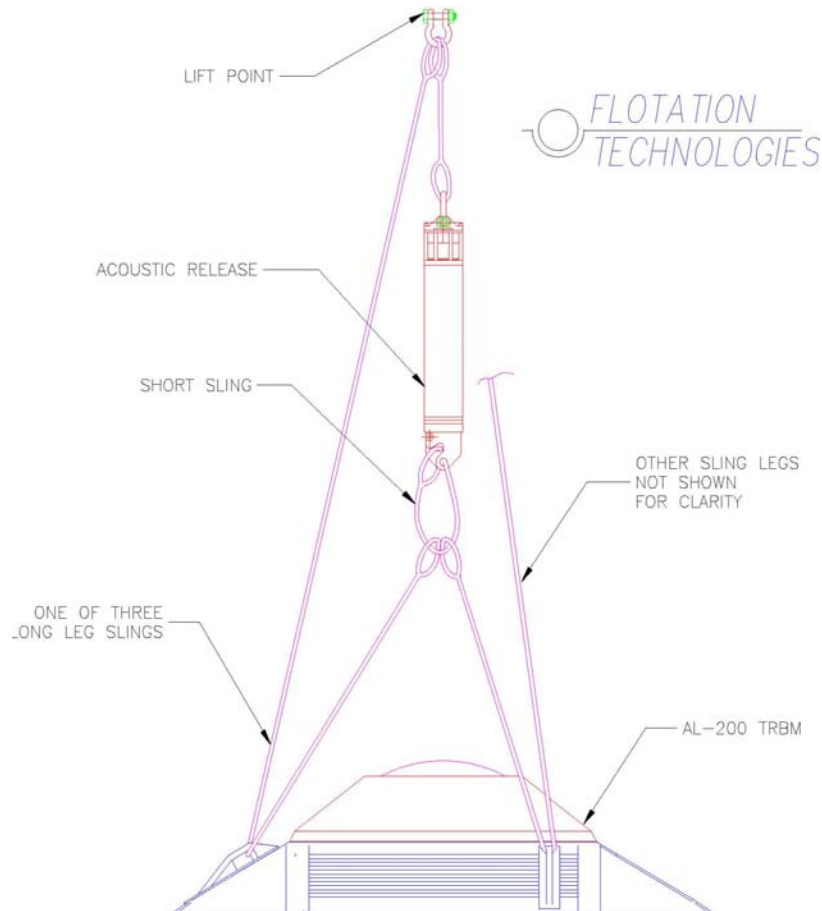
Appendix E – Sample sub-surface ADCP Mooring



Appendix F – Sample platforms

F1 – Trawl Resistant Bottom Mount (TRBM) ADCP platform

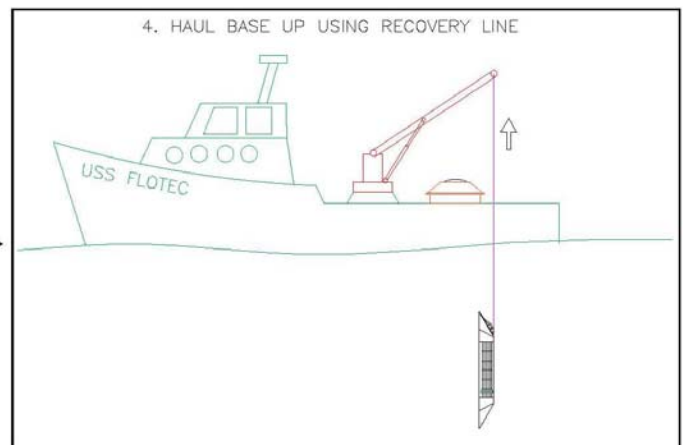
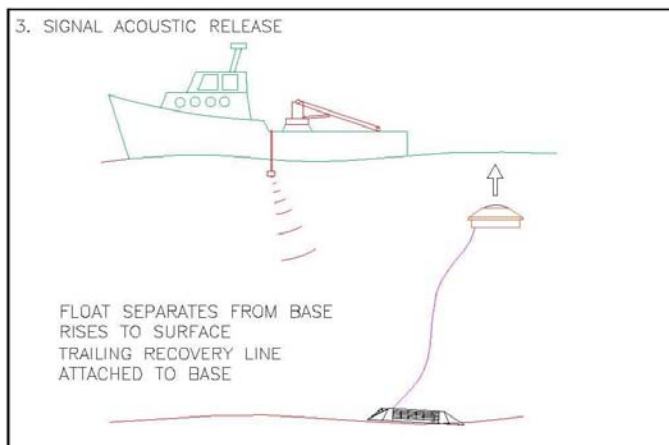
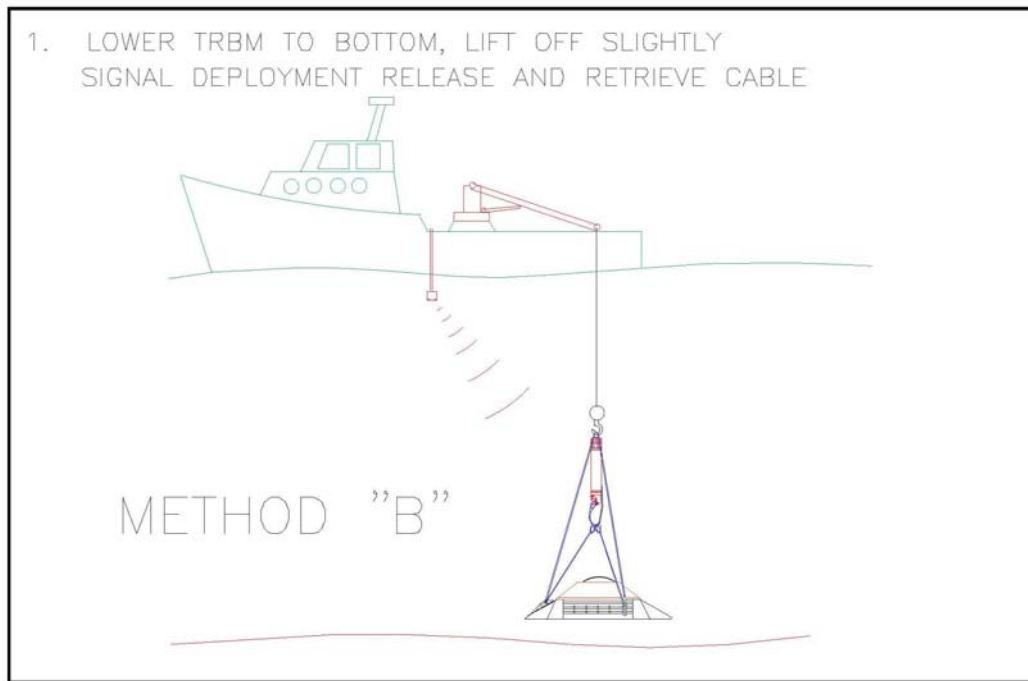
RIGGING DIAGRAM FOR AL-200 DEPLOYMENT



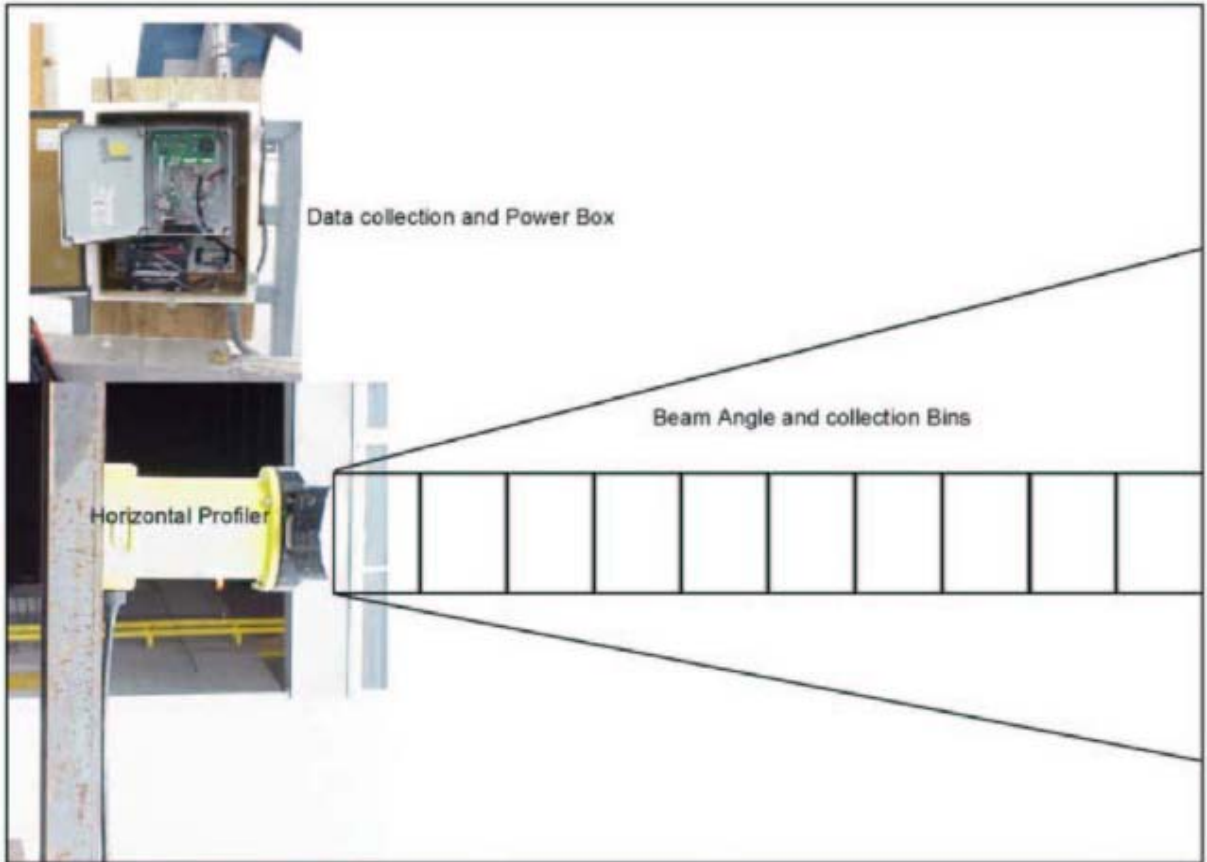
Appendix F2 – ES2 bottom mounted ADCP platform



Appendix F3 – Deployment and recovery procedures for TRBM



Appendix F4 – Side looker acoustic Doppler profiler



Appendix G – General information for towed ADCP operations

Depending on the application, CO-OPS has two ways to collect towed ADCP data. Both systems collect data in real time using RDI data collection software designed for towed ADCP operation (Winriver). DGPS data is incorporated into the collected data stream to provide accurate positioning information. Currently, CO-OPS has been using a Trimble DGPS that can be temporarily mounted on any vessel to collect this data. The two towing systems are described in more detail below. See Appendix H for pictures of the two systems.

1. Towed ADCP Specifications

- a. The YSI VFIN can be used with RDI Workhorse ADCPs in the shorter Monitor housing. The VFIN can accommodate either the 300, 600, or 1200 kHz systems depending on the water depth of the planned track lines. This system is towed off the side of the vessel with a towline and a separate power/data cable.
- b. CO-OPS also has a pole mounted ADCP system that is installed by clamping it to the side of the vessel. The RDI Workhorse in the longer Sentinel housing is clamped on to a pole which is attached to a pivoting arm. This arm is inserting into a slot on a C-clamp type of mount that is securely fitted to the side of the vessel. When not actively collecting data, the ADCP pole can be rotated out of the water and tied off.

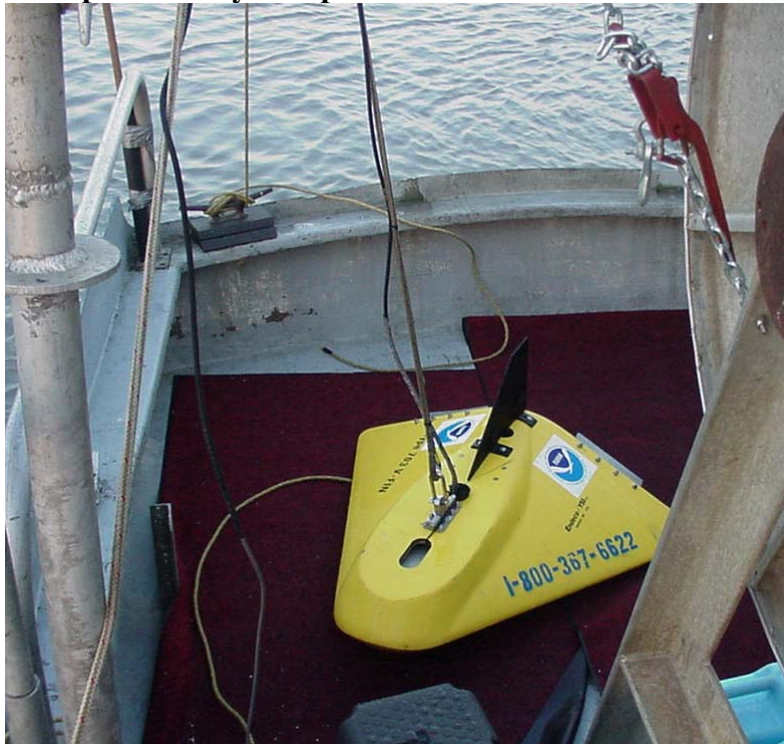
5. Contractor Towed ADCP General Requirements

- a. The contractor shall provide logistic support, on-site equipment set up, deployment, and recovery operations. The contractor shall provide qualified personnel and ship support for towed ADCP operations. This shall include providing a ship capable of the required work, a shore based site for logistics that includes facilities for the receiving, storage and shipment of all equipment. All GFE will be shipped by CO-OPS to the contractor-specified logistics site. The contractor will be responsible for installing the towed ADCP system on the ship but CO-OPS personnel will operate the system and collect all data. Final preparations, sensor checkouts and assembly prior to deployment will be inspected by CO-OPS.
- b. Since CO-OPS has two systems for collecting towed ADCP data, CO-OPS personnel and the contractor will work together to determine which system should be used for the specific operations. Specific details will be contained in the Task Orders. These details

will include information on the area of operations, the data collection time periods and precise information on the track lines to be run.

- c. The contractor shall maintain a storage facility to hold all unused equipment during the project period. Upon completion of the final data collection cruise, the contractor shall be responsible for securely packaging and shipping of all equipment to the CO-OPS designated facility. All shipping costs will be paid by CO-OPS. All electronic equipment, tools and hardware shall be stored in a secure, environmentally controlled site to prevent degradation and theft of the equipment. The storage of shipping containers should be appropriate to their construction.

Appendix H – Sample towed system pictures



YSI Vfin towed ADCP body



Pole Mounted Towed ADCP mount

