

US ARMY TACOM/ARDEC
BATTLEFIELD MAINTENANCE SYSTEM ENGINEERING TEAM
DESCRIPTION FOR PURCHASE

HYDROGRAPHIC SURVEY SYSTEM

1. SCOPE

This Description for Purchase describes the requirements of a Hydrographic Survey System that is used by Army Engineering Divers to Survey a dive site previous to deploying a dive team to the site. The System measures and maps both subsurface topography and the topography of the adjacent land area.

2. SALIENT CHARACTERISTICS.

2.1 Description. The Hydrographic Survey System shall be a fully integrated, survey quality system with sub meter accuracy, providing precise and comprehensive hydrographic surveys for Army Engineer Diving teams. The System shall map underwater environments; seas, rivers, lakes and inland waterways; plus the adjacent shore area. The System shall incorporate a Global Positioning System (GPS), a depth sounding type sonar system, and advanced contour software, that provides a detailed 2D and 3D view mapping capability. The system shall be portable and capable of being packed as components by the use of straps, harnesses, and pouches or bags. The Survey System, including all components, shall be ruggedized, durable, and water resistant, capable of being operated on small watercraft (12-14 foot inflatable boats) and packed onto and operated on the shore. The components required to perform land surveys shall be capable of being backpacked by one person. The end product of the System shall be colored charts showing contour lines and physical on-shore features. Training of operators and maintenance of the system will be required after delivery of the Survey Set to an Army unit.

2.2 Components. The system shall consist of no less than the following components, a GPS data collection and maintenance system, a sonar system, user-friendly software system, a portable Personal Computer (PC), a Plotter, and a software library. The components shall be separate and networked together through the use of electrical cables and the software.

2.3 Digital Global Positioning System Receiver. The System shall be a back packable Digital Global Positioning System (DGPS) controlled by a hand held control and collection device. The System shall survey both water and land areas, with the hand held controller as the recording device on land. The System shall include at least the following components: a 12 channel receiver with batteries and battery charger; an office support module; a hand held data collector with batteries; a hip pack assembly for the

receiver and antenna, a beacon antenna, and the cables and adapters required to assemble and operate the required system. The GPS receiver shall be capable of using differential corrections from Coast Guard beacons, Satellite corrections, base stations, and post processing centers. The receiver shall have sub-meter accuracy when using differential corrections and shall be centimeter accurate when receiving signals from a base station. The receiver shall be fully sealed, dustproof, waterproof, and shock resistant. A rugged carrying and storage case shall be furnished, which provides dustproof, waterproof, and shock resistant protection for all system components (see 2.9). The technical specifications of the GPS shall meet or exceed the requirements of the following table.

GPS RECEIVER

Update rate	1 Hz
Time to first fix	<30 seconds
Size, inches	No greater than 5 x 3 x 9
Weight, pounds	No greater than 2
Power, watts	No greater than 5
Temperature, degrees F	Operating: -22 to 149; Storage -40 to 185
Humidity	100% non condensing

COMBINED GPS/BEACON/SATELITE DIFFERENTIAL ANTENNA

General	Right-hand, circular polarized; omni directional; hemispherical coverage
Size, inches	No greater than 7 x 6
Weight, pounds	No greater than 2
Case	Dust proof, waterproof, shock resistant

HAND HELD DATA COLLECTOR

Size, inches	No greater than 11.0 x 5.0 x 2
Weight, pounds	No greater than, 2.0
Power, watts	< 1
Temperature, degrees F	Operating: -4 to 150; Storage -22 to 176
Humidity	95% non condensing
Casing	UV-resistant plastic, resistant to wind driven rain and dust
Memory	2 Mb internal flash memory
Communications	2 X RS232 ports
Display	240 x 200 graphics led display with backlight

2.4 Sonar system (depth sounder). The sonar system shall feature a single beam echo sounder specifically designed to perform hydrographic surveys on seas, rivers, lakes, and inland waterways. The system shall be used as a conventional echo sounder with data out to either a built-in signal port (RS232C) or with provisions to time tag, record, and store data internally for use with post processing software. The design shall use state-of-the-art active transducers to provide a high quality digital trace with low data dropout. The graphic display shall have an LCD (Liquid Crystal Display) type graphic

display that continuously updates a time history of the data as collected together with alphanumeric information. The displays shall be capable of being scaled up or down by the use of keys on the front of the control unit. The echo sounder system shall consist mainly of a portable control unit, a transducer, a transducer cable, a transducer mount, a serial cable, batteries, battery charger, c-clamp (5-inch, rugged, with a full length screw), and manuals or any other items deemed necessary. The System shall be compatible with Windows 95/98/2000/NT operating system software. A rugged carrying and storage case shall be furnished, that contains all system components (see 2.9). The technical specifications of the echo sounder shall meet or exceed the requirements of the following table. Where a range is shown, the echo sounder shall have the capability of operating throughout the entire range.

Transducer frequency	200 kHz active transducer
Beam spread	8 to 10 degrees
Depth range	0.30m to 50.00 m (Software limited)
Accuracy	± 0.025 m
Sound velocity range	1400 to 1600 m/sec
Pulse frequency	1 Hz
Internal power	12.0 V x 2.0 Ah internal sealed lead battery
Usable battery life	4-8 hrs between charges
Stand-by battery life	5000 hrs
Battery charge	External charger, 120 V ac 8 hrs
Internal memory	512 kb
Data output	ASCII, NEMA, navitronic, odam, atlas, elac, geotronics
Data format	RS232C 9600 BAUD 8 bit 1 stop bit no parity
Operating temperature range	32 to 113 degrees F (0 to 45 degrees Celsius)
Weight, pounds	No greater than 11

2.5 Software system. The software system shall be user friendly for operators with a general operational knowledge of Personal Computer Systems. The software system shall have a 3-D capability that integrates all aspects of land modeling, mapping, design, and engineering. The software shall be commercially available and have been used for the intended purpose, so that a lengthy break-in period will not be required before it can function properly when first deployed.

2.5.1 GPS Software. The software, supplied with the GPS Receiver shall perform, but not be limited to the following functions; the import and export of data between the Data Collector and the PC, data viewing and editing, coordinate system conversion, rendering quick maps, and data export for rendering in other software.

2.5.2 Mapping Software. A software system shall be provided to interpolate the collected data to form a map. The software shall have the capability to stop the mapping when in close proximity to shore or facilities by establishing an X and Y boundary then identifying Z as zero. The software shall be capable of creating a boundary file by using

a digitizing feature in the map-making software, or by using an export boundary file macro in the GPS software or by importing boundary files from other sources. The digitizing feature in the map-making software shall provide the means to transfer data directly from the GPS software to the Map-making software with out the use of other software.

2.6 Personal computer (PC). A rugged, notebook type, portable Personal Computer (PC) shall be provided. The PC shall have a rugged, durable, magnesium alloy case with a carrying handle. The LCD (Liquid Crystal Display) type screen, keyboard, and touch pad shall be moisture and dust-resistant. The PC shall also have sealed port and connector covers, removable HDD (Hard Disc Drive) mounted in shock absorbing gel and stainless steel case, a ruggedized port connector, and rugged and dust-resistant LCD hinges. The CPU (Central Processing Unit) shall have no less than a 12-inch LCD screen with a Mobile Intel Pentium III Processor of no less than 500 MHz. The PC shall have no less than 192 MB SDRAM, no less than 20 GB for the HDD and 1.44 MB for the FDD (Floppy Disc Drive). The PC shall accommodate an external mouse, a battery charger, 56.6 kB modem, a zip drive and a CD-DVD drive. Power for the PC shall be supplied by a Lithium Ion 10.8 volt, 3750 mA per hour battery or through a 100 to 240 volt, 50 and 60 hertz AC adapter equipped for sensing and switching worldwide power supplies. The PC software shall be Microsoft Windows 2000 with Microsoft Office 2000 professional. The PC display shall be no less than a 12 inch 800 x 600 TFT Active Matrix Color LCD with an anti-reflective screen for viewing in bright sunlight. The input to the PC shall be through an industry standard keyboard; enhanced pressure sensitive touch pad, with a signature capturing function; and a touchscreen type LCD. The following accessory items shall be provided with each PC:

- a. An external mouse with the track ball on top.
- b. A 24X (max) CD-ROM drive.
- c. An AC adapter.
- d. An extra Lithium Ion battery.
- e. A battery charger for the lithium battery.
- f. Any external cables required for operation.

The PC with all cables and accessory items shall be packed in a padded, ruggedized, waterproof, dustproof carrying case for both storage and transportation (see 2.9).

2.7 Plotter. The plotter shall be a portable color printer compatible with Windows 95/98/2000/NT operating system software or latest version. The Plotter shall be supplied with a leg kit and the roll feed. The technical specifications of the plotter shall meet or exceed the requirements of the following table. The plotter with all cables, accessory items and extra supplies shall be packed in a padded, ruggedized, waterproof, dustproof carrying case for both storage and transportation (see 2.9). The case shall be designed to allow plotter operation while the plotter is still in the case.

Media sizes, inches	No less than 8.3 to 24 wide
Print length	Sheets - 64 inches, Roll - 150 feet
Print Technology	Thermal Inkjet

Print quality, black, best	No less than 600 dots per inch (dpi)
Print quality, color, best	No less than 300 dpi
Print cartridges	4 - black, cyan, magenta, yellow
Print capacity, ml	40
Print languages, Standard	HP-GL/2, HP-GL, HP-RTL
Media type	Paper (plain, vellum, coated, glossy), film (vellum, coated, clear, matte), HP Translucent Bond for black output only
Media handling	Sheet feed, roll feed, automatic cutter
Document finishing	Sheet feed, roll feed, automatic cutter
Memory	No less than 36 MB
Connectivity	IEEE 1284 - compliant bi-directional parallel, RS-232C
Print speed, normal quality, minutes	Line drawings < 4:00 (2 x 3 ft)
Print speed, best quality, minutes	Line drawings < 4:00; Images: 18:00 (2 x 3 ft)
Dimensions (W x D x H), inches	No greater than 45 x 10 x 14.5
Weight, pounds	No greater than 63

2.8 Software Library. A Software Library shall be provided, that includes commercial manuals for all software, system, and equipment supplied. The manuals shall provide information and data as required to start up, operate, maintain, and repair the respective systems and equipment. The manuals shall all be enclosed in one rugged, dust proof, waterproof case (see 2.9). The Library shall include manuals as required for the following systems and equipment:

- GPS software manuals package
- Omnistar GPS manuals
- Modeling software package
- System manuals
- Echo sounder manuals
- Manuals for the personal computer
- Plotter manuals.

2.9 Carrying Case. The carrying and storage cases for the Hydrographic Survey System components shall meet or exceed the requirements specified herein.

2.9.1 Performance. The cases shall retain their contents so that they do not move around inside the case during transportation and storage, regardless of the orientation of the case. The cases shall protect their contents from damage when dropped with the case closed and latched, and shall prevent the entry of dust and water. The case shall not be damaged or come open when the loaded case is dropped from a height of no less than 36 inches onto a concrete or steel deck at ambient temperatures of 0 degrees F to 120 degrees F.

2.9.2 Crush resistance. The case shall withstand, without damage or permanent deformation, a load equal to or greater than 10 times the weight of the fully loaded case, applied from above for 5 minutes. After the removal of the applied load the case shall regain its original shape within 5 minutes.

2.9.3 Impact resistance. When fully loaded, closed, latched and placed in its normal resting position in an ambient environment the case shall withstand an impact from a steel bar, with a cross section no larger than 3/16 X 1 inch, weighing no less than 3.5 pounds, free falling from a height of 8 feet, and landing narrow end down on the case. The case shall absorb this blow without suffering permanent deformation to its general overall configuration, including its ability to close with the same mating accuracy that existed before the impact was sustained. The case walls shall have absorbed the shock of the impact such that the contents of the case shall not be damaged by the impact, regardless of how delicate those parts may have been. The impact shall not cause penetration of the case wall by the steel bar. Denting of the exterior wall is expected.

2.9.4 Closure integrity. The case shall close evenly and squarely and mating parts shall not slip over each other or mismatch when the load in 2.9.3 is applied from above. The case shall prevent the entry of dust and rainwater. Closure shall be securely maintained with clasps extending from one shell to the other shell and fastening onto the other shell. Also, when the top is pulled with a force equal to or greater than 10 times the weight of the total loaded case, with the clasps secured, the top shall not separate from the case or permanently deform.

2.9.5 Components. The cases shall consist of the following principal components as required according to size and type; exterior shell, handle, closure clasps, hinge, and foam inserts.

2.9.5.1 Shells. The shells may be any size relative to each other that will provide easy opening and closing, a secure fit for the items held and transported, easy entry into the case, and easy removal and replacement of the stored items. The shells shall also accommodate the hinges, handles, clasps, and any required padding or restraint materials. The case shall open easily and remain open. The cases shall be able to be secured with a padlock.

2.9.5.2 Handle. The cases shall have at least one handle. Any case that has a total loaded weight of 40 pounds or more shall have two handles, one opposite the other. Handles may be molded as integral parts of the shell or may be attached on a swiveling joint so that the handles can be made to lay flat. Handles shall provide a full four-finger wrap around grip while wearing insulated work gloves. Attached handles shall not detach from the case or permanently deform the case when they are pulled with a force equal to 10 times the weight of the loaded case.

2.9.5.3 Clasps. The cases shall utilize at least two clasps for closure security while meeting the requirements of 2.9.3.

2.9.5.4 Hinge. The hinge shall contribute to the integrity of the closure and the shells shall not come unhinged when dropped in accordance with 2.9.1.

2.9.5.5 Foam inserts. The cases shall be provided with foam padding inserts as required to protect the contents from damage that would affect their operation or useful life when the loaded case is dropped in accordance with 2.9.1. The foam shall be made of either polyurethane or polyethylene and shall be die cut or otherwise custom contoured to fit the intended item. The foam shall retain the item in position when the case is closed.

3. REGULATORY REQUIREMENTS.

The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

4. QUALITY ASSURANCE PROVISIONS

4.1 Product conformance. The products shall meet the salient characteristics stated herein, conform to the producer's own drawings, specifications, standards, and quality assurance practices; and shall be the same products offered for sale in the commercial market. The Government reserves the right to require proof of such conformance prior to first delivery and thereafter as may be otherwise provided for under the provisions of the contract.

4.1.1 Responsibility for inspection. Unless otherwise specified in the contract, the supplier is responsible for the performance of all inspection and testing to verify the salient requirements as specified herein. The supplier may use his own or any other facilities for verifying the salient requirements unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth herein where such inspections are deemed necessary to assure that the supplied items conform to prescribed requirements.

4.2. Quality conformance inspection. Quality conformance inspection shall be applied to production units being offered for acceptance under the contract. The inspection shall consist of a product acceptance examination (see 4.3). Failure of any System to pass this examination shall be cause for rejection of the unit.

4.3 Product acceptance examination. The complete Survey System shall be operated by Dive Team personnel at Fort Eustis, VA to determine that the system is operating in accordance with the requirements stated herein. The System shall provide colorized charts of an area that includes both land and underwater terrains and shall prove to operate in a straightforward manner by the average, trained, Army Diver.

5. PACKAGING

The packaging, packing, preservation, labeling, and marking shall be as specified in the contract or order.