

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
EQUIPMENT AND PROCUREMENT DIVISION
BID INVITATION**

Bid Number: M-14-043P

BID OPENING LOCATION:
AHTD Equipment and
Procurement Division
11302 W. Baseline Road
Little Rock, AR 72209

MAIL TO:
AHTD Equipment and
Procurement Division
P.O. Box 2261
Little Rock, AR 72203

DELIVER TO:
AHTD Equipment and
Procurement Division
11302 W. Baseline Road
Little Rock, AR 72209

Bid Opening Date: April 22, 2014 Time: 11:00 a.m.

Sealed bids for furnishing the commodities and/or services described below, subject to the Conditions on Page 2 of this Bid Invitation will be received at the above-noted mail and delivery locations until the above-noted bid opening date and time, and then publicly opened at the above-noted bid opening location. **Bids must be submitted on this form, with attachments when appropriate, or bids will be rejected. Late bids and unsigned bids will not be considered.**

In compliance with this Bid Invitation and subject to all the Conditions thereof, the undersigned offers and agrees to furnish any and all items upon which prices are quoted, at the price set opposite each item.

Company Name: _____

Name (Type or Print): _____

Address: _____

Title: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Federal Tax ID or Social Security No.: _____

E-mail Address: _____

Signature: _____

Signature must be legible, original (not photocopied) and in ink.
Unsigned bids will be rejected.

Item No.	Description	Quantity	Unit	Unit Price	Amount
	<p>Global Positioning System (GPS) Survey System with Optional Trade-In as listed on Page 3.</p> <p>To meet the requirements of Arkansas State Highway and Transportation Department Specifications attached to and made a part of this bid.</p> <p>FOB: AHTD – Surveys Division 10324 I-30, Little Rock, AR 72209</p> <p>Global Positioning System proposed to furnish: Brand _____ No. _____</p> <p>Bid Bond in the amount of 5% of total bid price required of all bidders at time of bid opening or bid will be rejected. <u>Personal and company checks are not acceptable as Bid Bonds.</u> See Condition 3 on page 2 of Bid Invitation.</p> <p>Performance Bond in the amount of 5% of total bid price will be required of successful bidder prior to providing goods/services. <u>Personal and company checks are not acceptable as Performance Bonds.</u> See Condition 3 on page 2 of Bid Invitation.</p> <p>The successful bidder will be required to complete delivery within 30 days after award.</p> <p>Bids and Specifications are available on-line by going to the AHTD Web Site – www.arkansashighways.com and clicking on “Commodities and Services Bids/Contracts Information”. Tabulations will also be available at this site within 72 hours after bid opening. If you have any questions, call this office at 501-569-2667.</p> <p>(69-0004)</p>		.		
				TOTAL BID	

BID INVITATION

STANDARD CONDITIONS

M-14-043P

1. **ACCEPTANCE AND REJECTION:** The Arkansas State Highway and Transportation Department (AHTD) reserves the right to reject any or all bids, to accept bids in whole or in part (unless otherwise indicated by bidder), to waive any informalities in bids received, to accept bids on materials or equipment with variations from specifications where efficiency of operation will not be impaired, and to award bids to best serve the interest of the State.
2. **PRICES:** Unless otherwise stated in the Bid Invitation, the following will apply: (1) unit prices shall be bid, (2) prices should be stated in units of quantity specified (feet, each, lbs., etc.), (3) prices must be F.O.B. destination specified in bid, (4) prices must be firm and not subject to escalation, (5) bid must be firm for acceptance for 30 days from bid opening date. In case of errors in extension, unit prices shall govern. Discounts from bid price will not be considered in making awards.
3. **BID BONDS AND PERFORMANCE BONDS:** If required, a **Bid Bond** in the form of a cashier's check, certified check, or surety bond issued by a surety company, in an amount stated in the Bid Invitation, must accompany bid. Personal and company checks are not acceptable as Bid Bonds. Failure to submit a Bid Bond as required will cause a bid to be rejected. The Bid Bond will be forfeited as liquidated damages if the successful bidder fails to provide a required Performance Bond within the period stipulated by AHTD or fails to honor their bid. Cashier's checks and certified checks submitted as Bid Bonds will be returned to unsuccessful bidders; surety bonds will be retained. The successful bidder will be required to furnish a **Performance Bond** in an amount stated in the Bid Invitation and in the form of a cashier's check, certified check, or surety bond issued by a surety company, unless otherwise stated in the Bid Invitation, as a guarantee of delivery of goods/services in accordance with the specifications and within the time established in the bid. Personal and company checks are not acceptable as Performance Bonds. In some cases, a cashier's check or certified check submitted as a Bid Bond will be held as the Performance Bond of the successful bidder. Cashier's checks or certified checks submitted as Performance Bonds will be refunded shortly after payment has been made to the successful bidder for completion of all terms of the bid; surety bonds will be retained. Surety bonds must be issued by a surety company authorized to do business in Arkansas, and must be signed by a Resident Local Agent licensed by the Arkansas State Insurance Commissioner to represent that surety company. Resident Agent's Power-of-Attorney must accompany the surety bond. Certain bids involving labor will require Performance Bonds in the form of surety bonds only (no checks of any kind allowed). In such cases, the company issuing the surety bond must comply with all stipulations herein and must be named in the U. S. Treasury listing of companies holding Certificates of Authority as acceptable sureties on Federal Bonds and as acceptable reinsuring companies. Any excess between the face amount of the bond and the underwriting limitation of the bonding company shall be protected by reinsurance provided by an acceptable reinsuring company.
4. **TAXES:** The AHTD is not exempt from Arkansas State Sales and Use Taxes, or local option city/county sales taxes, when applicable, and bidders are responsible to the State Revenue Department for such taxes. These taxes should not be included in bid prices, but where required by law, will be paid by the AHTD as an addition thereto, and should be added to the billing to the AHTD. The AHTD is exempt from Federal Excise Taxes on all commodities except motor fuels; and excise taxes should not be included in bid prices except for motor fuels. Where applicable, tax exemption certificates will be furnished by the AHTD.
5. **"ALL OR NONE" BIDS:** Bidders who wish to bid "All or None" on two or more items shall so stipulate on the face of bid sheet; otherwise, bid may be awarded on an individual item basis.
6. **SPECIFICATIONS:** Complete specifications should be attached for any substitution or alternate offered, or where amplification is necessary. Bidder's name must be placed on all attachments to the bid.
7. **EXCEPTIONS TO SPECIFICATIONS:** Any exceptions to the bid specifications must be stated in the bid. Any exceptions to manufacturer's published literature must be stated in the bid, or it will be assumed that bidder is bidding exactly as stated in the literature.
8. **BRAND NAME REFERENCES:** All brand name references in bid specifications refer to that commodity or its equivalent, unless otherwise stated in Bid Invitation. Bidder should state brand or trade name of item being bid, if such name exists.
9. **FREIGHT:** All freight charges should be included in bid price. Any change in common carrier rates authorized by the Interstate Commerce Commission will be adjusted if such change occurs after the bid opening date. Receipted common carrier bills that reflect ICC authorized rate changes must be furnished.
10. **SAMPLES AND LITERATURE:** Samples or technical literature must be provided within 14 days of AHTD request unless AHTD extends time. Failure to provide samples or literature within this period may cause bid to be rejected. When required, samples of items must be furnished free of charge, prior to or after the opening of bids, and, if not destroyed, will be returned upon request at the bidder's expense. Each individual sample must be labeled with bidder's name and item number. Request for return of samples must be made within 10 days following submission of sample. Samples from successful bidders will be retained for comparison with items actually furnished.
11. **GUARANTY:** Unless otherwise indicated in Bid Invitation, it is understood and agreed that any item offered or shipped on this bid shall be newly manufactured, latest model and design, and in first class condition; and that all containers shall be new, suitable for storage or shipment and in compliance with all applicable laws relating to construction, packaging, labeling and registration.
12. **BACKORDERS OR DELAY IN DELIVERY:** Backorders or failure to deliver within the time required may constitute default. Vendor must give written notice to the AHTD, as soon as possible, of the reason for any delay and the expected delivery date. The AHTD has the right to extend delivery if reasons appear valid. If reason or delivery date is not acceptable, vendor is in default.
13. **DEFAULT:** All commodities furnished will be subject to inspection and acceptance by AHTD after delivery. Default in promised delivery or failure to meet specifications authorizes the AHTD to cancel award or any portion of same, to reasonably purchase commodities or services elsewhere and to charge full increase, if any, in cost and handling to defaulting vendor. Applicable bonds may be forfeited.
14. **ETHICS:** *"It shall be a breach of ethical standards for a person to be retained, or to retain a person, to solicit or secure a State contract upon an agreement of understanding for a commission, percentage, brokerage, or contingent fee, except for retention of bona fide employees or bona fide established commercial selling agencies maintained by the contractor for the purpose of securing business."* (Arkansas Code, Annotated, Section 19-11-708).

ARKANSAS STATE HIGHWAY & TRANSPORTATION DEPARTMENT
LITTLE ROCK, ARKANSAS
EQUIPMENT & PROCUREMENT DIVISION

Bid No. M-14-043P

BIDDER: _____

ITEM NO.	DESCRIPTION	QUANTITY	SYSTEM UNIT PRICE	EXTENDED AMOUNT
1.	Global Positioning System (GPS) Survey System consisting of: Two GPS RTK Surveying Systems	2 ea.	\$ _____ <i>(System Bid Total per Attachment B)</i>	\$ _____ <i>(System Total X2)</i>

OPTIONAL TRADE-IN:

2. Trimble 4800 GPS Receivers - 5 ea. \$ _____

**ARKANSAS STATE HIGHWAY
AND TRANSPORTATION DEPARTMENT**

NOTICE OF NONDISCRIMINATION

The Arkansas State Highway and Transportation (Department) complies with the Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973, Title VI of the Civil Rights Act of 1964 and other federal equal opportunity laws and therefore does not discriminate on the basis of race, sex, color, age, national origin, religion or disability, in admission or access to and treatment in Department programs and activities, as well as the Department's hiring or employment practices. Complaints of alleged discrimination and inquiries regarding the Department's nondiscrimination policies may be directed to Joanna P. McFadden, Section Head - EEO/DBE (ADA/504/Title VI Coordinator), P. O. Box 2261, Little Rock, AR 72203, (501) 569-2298, (Voice/TTY 711), or the following email address: Joanna.Mcfadden@arkansashighways.com

This notice is available from the ADA/504/Title VI Coordinator in large print, on audiotape and in Braille.

**ARKANSAS STATE HIGHWAY
AND
TRANSPORTATION DEPARTMENT**



BID INVITATION

FOR

**GLOBAL POSITIONING SYSTEM (GPS)
SURVEY SYSTEM**

-- CONSISTING OF --

TWO GPS RTK SURVEYING SYSTEMS

FY 2013 – 2014

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1.0 GENERAL INFORMATION

1.1. Introduction and Background

The purpose of this document is to provide interested parties with information to enable them to prepare and submit a bid for two (2) Global Positioning System (GPS) Survey Systems. The Arkansas State Highway and Transportation Department intends to award a contract for two (2) GPS Survey Systems.

1.2 General Instructions

The evaluation and selection of a contractor shall be based on the information submitted in the bid plus references and any required site visits. Bidders should respond clearly and completely to all requirements.

Note: Bids shall be rejected for failure to respond completely and as specified in the sections that follow.

2.0 BID PROPOSAL ORGANIZATION AND FORMAT

Bids should be submitted and bound with the following sections.

(a) Section A - VENDOR DATA SHEET/REFERENCE DATA SHEET

Include here Attachment A - Reference Data Sheet that has been requested in [Section 3.6](#) in this BID INVITATION.

Each vendor must furnish a list of a minimum of four (4) references that will be capable of verifying information supplied by the vendor in their bid. Vendors should submit additional Reference Data Sheet forms if they have more than four (4) references.

Note: At least one, if not all, of the references listed shall be a Federal Government or State Government agency that has been provided the same item(s) bid. These references may be provided by the manufacturer of the items in lieu of the actual bidder.

(b) Section B - RESPONSE TO GENERAL REQUIREMENTS

- Provide a point-by-point response to each and every general requirement specified in [Section 3.0](#) in this BID INVITATION.
- Responses to general requirements must be in the same sequence and numbered as they appear in this BID INVITATION.
- Responses must indicate that either vendor's bid "does comply" with specifications or that it "does not comply".
- A succinct explanation of how each requirement can be met or cannot be met must be included.

(c) Section C - RESPONSE TO TECHNICAL REQUIREMENTS

- Provide a point-by-point response to each and every technical requirement specified in [Section 4.0](#) in this BID INVITATION.
- Responses to technical requirements must be in the same sequence and numbered as they appear in this BID INVITATION.
- Responses must indicate that either vendor's bid "does comply" with specifications or that it "does not comply."
- A succinct explanation of how each requirement can be met or cannot be met must be included.

(d) Section D - RESPONSE TO PERFORMANCE REQUIREMENTS

- Provide a point-by-point response to each and every performance requirement specified in [Section 5.0](#) in this BID INVITATION.
- Responses to performance requirements must be in the same sequence and numbered as they appear in this BID INVITATION.

- Responses must indicate that either vendor's bid "does comply" with specifications or that it "does not comply."
 - A succinct explanation of how each requirement can be met or cannot be met must be included.
- (e) Section E - RESPONSE TO SUPPORT REQUIREMENTS
- Provide a point-by-point response to each and every support requirement specified in Section 6.0 in this BID INVITATION.
 - Responses to support requirements must be in the same sequence and numbered as they appear in this BID INVITATION.
 - Responses must indicate that either vendor's bid "does comply" with specifications or that it "does not comply".
 - A succinct explanation of how each requirement can be met or cannot be met must be included.
- (f) Section F - ADDITIONAL INFORMATION
- Include additional information that will be essential to an understanding of the bid. This might include diagrams, excerpts from manuals, or other explanatory documentation that would clarify and/or substantiate the bid. Any material included here should be specifically referenced elsewhere in the bid.
- (g) Section G - GLOSSARY
- Provide a glossary of any abbreviations, acronyms, and technical terms used to describe the services or products proposed that are not industry standard. This glossary should be provided even if these terms are described or defined at their first use in the bid.
- (h) Section H – SUMMARY
- Include here Attachment B – Itemized Summary Sheet. Provide a summary with each item provided including model number, manufacturer name, and quantities as specified in Section 4.0. ***This summary sheet must be attached to or included with the bid sheet.*** Vendors shall submit additional Summary Sheet forms if necessary.

2.1 Multiple Bids

Multiple bids from a vendor will be permissible. However, each bid must conform fully to the requirements for bid submission. Each such bid must be separately submitted and labeled as Bid #1, Bid #2, etc. on each page included in the response. Alternate plans do not constitute multiple bids.

2.2 Demonstrations

Bidders may be required to install and demonstrate their product(s) and/or service(s) at an Arkansas State Highway and Transportation Department site. Product(s) being demonstrated must be delivered to the Department site. Any demonstration shall be done prior to the bid opening date as shown on the bid invitation. The Department will furnish detailed specifications concerning the demonstration site and particular tests it will use to exercise the bidder's product(s) and/or service(s) no later than the date of notification of product demonstration.

Bidders who demonstrate a product(s) and/or service(s) shall also comply with all other requirements as specified in this document.

Failure of a bidder to furnish the product(s) and/or service(s) it has proposed for demonstration within the time constraints of the preceding paragraph will result in rejection of the bid. Failure of any product(s) and/or service(s) furnished by the bidder for the purposes of this demonstration must be identical in every respect to those that will be furnished for acceptance testing under the terms of the Department contract.

3.0 GENERAL BID REQUIREMENTS

Vendors must respond to the general requirements in this selection in accordance with the instruction given in Section 2.0 (b) above.

3.1 Equipment Description

The Department desires to procure hardware and software that utilize the Global Navigation Satellite System (GNSS) to include the NAVSTAR Global Positioning System (GPS) and the Global Orbiting Navigation Satellite System (GLONASS) for survey data collection. The receivers must be capable of acquiring and simultaneously tracking the L1, L2, and L5 carrier frequencies, the L1 coarse Acquisition (C/A) Code, the L1 and L2 Precise (P) codes and the L2C codes. The receivers must maintain performance capabilities outlined in this specification when Selective Availability (SA) and Anti-Spoofing (A-S) are implemented. The GPS Survey System, to include accompanying software, shall be from a single manufacturer and must be the latest model in current production as offered to commercial trade. The vendor represents that all equipment furnished shall be new. Demonstrator, prototype, and discontinued models or releases will not be accepted.

The Department desires to procure additional hardware, firmware and software required to give the user of L1, L2, and L5 frequency GNSS receivers (as described above) the capability of Real-Time Kinematic (RTK) Surveying. The RTK system components shall be from the same manufacturer of the GPS receivers (as described above) and must be the latest model in current production as offered to commercial trade. The vendor represents that all equipment furnished shall be new. Demonstrator, prototype, and discontinued models or releases will not be accepted.

3.2. Objectives

The GPS Survey System shall comprise of hardware and software involved with mission planning, data acquisition, data analysis, data adjustment and data submittal. The Department's objective is for replacing existing GPS hardware and software with new hardware and software and integrating GNSS equipment into different applications. Our objective is for two (2) GPS Survey Systems with Real-Time Kinematic (RTK) capabilities for control, right-of-way staking, topographic surveys and construction layout.

3.3. Needs

The Department has a need to collect, process, and adjust GNSS observational data using positioning techniques described under Section 4.0. for geodetic, engineering, right-of-way staking, topographic surveys and construction layout. All GPS Survey Systems shall be interchangeable and capable to provide uninterrupted ease in data acquisition and post-processing of GNSS observational data.

The Department has a need to have the capability to perform RTK surveys for various applications and be compatible with the SDMS data format. The Department has a need to have the latest technology that provides the most cost effective and productive system for the applications specified.

The Department has a desire to provide functionality to collect data using procedures that comply with the SDMS data collection format as described in the AASHTO SDMS Technical Data Guide 2000 for Transportation Data Exchange and Archive. This file is available through the Surveys Division of the Arkansas Highway and Transportation Department at:

http://www.ahtd.ar.gov/surveys_division/manuals.aspx

The Department requires that output data is in the SDMS calculated (.CAL) file format or SDMS points, attributes, and chains (.PAC) file format as described in the Section 4.0.

3.4. Organization Capabilities

Describe the firm's experience and capabilities in providing similar services to those required. Be specific and identify projects, dates, and results.

3.5. Staff Qualifications

Provide resumes describing the educational and work experiences for each of the key staff that would be assigned to the project.

3.6. [Bidder References](#)

Bidders must include in their proposals, a list of organizations, including points of contact (name, address, and telephone number), that can be used as references for work performed in the area of service required. Selected organizations may be contacted to determine the quality of work performed and personnel assigned to the project. The results of the reference check will be provided to reviewers and used in scoring the written bid. [Attachment A - Reference Data Sheet](#) as described in [Section 2.0\(a\)](#) will be considered your response to this section.

3.7. [Summary](#)

The Department has a need to collect, process, and adjust GNSS observational data for geodetic, engineering, right-of-way staking, topographic surveys, construction layout, and mapping. Specifically, the GNSS receivers shall be used in the following manner:

- Two (2) GPS Real-Time Kinematic (RTK) systems (i.e. consisting of GPS Survey System, software with hardware locks or validation codes, RTK communications, and base radio system) which satisfy specifications under [Section 4.1](#).

4.0. TECHNICAL REQUIREMENTS

Vendors must respond to the technical requirements in this section in accordance with the instructions given in [Section 2.0\(c\)](#) above.

4.1. Global Positioning System (GPS) Survey System

The GPS Survey System shall include GNSS antennas with internal receivers, internal receive/transmit radios, internal batteries, and Bluetooth wireless technology. In addition the system shall include battery chargers, external receiver batteries, an external radio modem kit, tripods, range pole kit, a compatible data collector, height of instrument measuring devices, and carrying cases. The receivers shall have the ability to acquire and simultaneously track L1, L2, and L5 carrier frequencies and record and process L1 (C/A) Course Acquisition Code, L1 and L2 Precise (P) codes, and L2C codes.

4.1.1 GPS Survey System Hardware

4.1.1.1 Integrated Antenna, Receiver, Radio, and Power Supply Unit Dimensions & Weight

Each Integrated GNSS antenna, receiver, radio, and power supply unit shall satisfy the following requirements:

- As an individual unit, it shall have maximum dimensions of 8" (20.3 cm) wide by 10" (25.4 cm) high and weighs less than 4.0 lbs. (1.8 kg).
- As a complete RTK unit, which includes internal radio modem and antenna, range pole, battery, and survey data collector with bracket, has a maximum weight of 9.0 lbs. (4 kg).

4.1.1.2 Power Requirements

Each GPS Survey System shall satisfy the following requirements:

- A receiver that can operate at a low wattage range of 3.2 watts while powering internal radio modem and survey controller.
- The receiver shall be capable of being powered by nominal 11 – 28 VDC.
- The operator shall be capable of switching power sources without interrupting receiver tracking.

4.1.1.3 External Interface

Each GPS Survey System shall have the following:

- Dual RS 232 ports.
- AC and DC power capability.
- Compatible with Data Collector as described in Section 4.1.1.4.
- Capable of downloading at minimum 115,200 baud.

4.1.1.4 Survey Data Collector

The survey data collector shall be capable of the following:

- Each receiver shall be capable of using an external data collector for post-processed and real-time kinematic surveying.
- Must operate utilizing Microsoft Windows Mobile 6.0 or later.
- Minimum memory capacity of 4 GB or larger for uploading, downloading, and exchanging data files, geoid files, and feature code lists.
- The data collector shall have sufficient power to operate separately during data transfer operations.
- Shall have a full physical alpha-numeric keypad with all 26 letters and 10 numbers.
- Compatible with AASHTOWare® SDMS®.

- Allows continuous visible monitoring of GPS receiver, battery, satellites and radio/modem link.
- Should allow changing of radio/modem frequencies and communication parameters while in the field.
- Contains software with multi-tasking windowed environment to allow multiple survey operations simultaneously.

4.1.1.5 Display

Each GPS Survey System shall be capable of the following:

- The display on the receiver shall contain a minimum of three (3) LED indicators for power, satellites tracked and data storage/transmission.
- The display of the external survey data collector shall be a lit LCD with the capacity of reading alphanumeric characters. The display must have easy to read characters.
- The display of the external survey data collector shall have a visual representation of remaining battery power during data collection operation. Monitoring of remaining battery power must be accessible in real-time and not effect the data collection.
- The voltage of all batteries being used must be displayed on the external survey data collector indicating the remaining battery charge.

4.1.1.6 Internal Memory

Each GPS Survey System shall be capable of the following:

- A minimum of 50 MB of internal logging memory capable of logging fifty (50) hours of six (6) satellite L1/L2 data at a 15 second Epoch interval.
- The data must be able to download to a Microsoft Windows personal computer through a RS232 port or USB port during and after data collection operation.
- A warning must precede file deletion. Files must be recoverable on a first-in, last-out basis.

4.1.1.7 Environmental

Each receiver for the GPS Survey System shall operate within the following environmental extremes without sustaining damage and interruption of data collection:

- System shall have a IP67 environmental rating.
- Receiver operating temperature between -40 to +65 degrees Celsius with internal batteries.
- Receiver must be 100% waterproof, fully sealed.
- Radio shall be sealed and weatherproof.
- Shock resistant – able to withstand a two (2) meter pole drop.

4.1.1.8 General Operation

Each GPS Survey System shall be capable of the following functions:

- Single button On/Off operation with a minimum of three LED indicator lights for monitoring of GPS survey operations.
- Log data and provide positions at a 5 Hz (5 positions per second) rate with low latency (0.1 second), in post-processed or real-time applications.
- Capable of logging data at operator selected intervals between one (1.0) second and sixty (60) seconds.
- GNSS satellite acquisition less than two (2) minutes from power-on to survey start.
- Provide an option to perform unmanned or unattended GNSS surveys after starting the system.

- The receiver and/or data collector shall have a user adjustable audible alarm or warning display to monitor if a minimum number of satellites are being tracked during kinematic surveys available on the survey data collector.
- Storing and using 99 waypoints for navigation. The external survey data collector shall display to the operator the bearing and range to destination.
- Store separate default parameters (elevation mask, receiver sync time, and minimum number of satellites) for Static, Fast/Rapid Static, and Kinematic Surveys.
- The receiver and/or data collector shall have a user definable PDOP alarm or warning message to alert the operator of poor quality data.
- The receiver and/or data collector shall be capable of accepting the height of antenna in meters, centimeters, feet, and inches.

4.1.1.9. Survey Techniques

The GPS Survey System, in conjunction with AASHTOWare® SDMS® software, must be able to measure and record coordinates following the Department's current procedures, as outlined in *Requirements and Procedures for Design Surveys and Parcel Surveys* as published by the Arkansas Highway & Transportation Department.

This document may be found at http://www.ahtd.ar.gov/surveys_division/manuals.aspx or by contacting the Surveys Division of the Arkansas Highway & Transportation Department.

Each GPS Survey System shall be capable of performing Static, Fast/Rapid Static, Kinematic, and Real-Time Kinematic Surveys.

- Static Survey Operation. Static surveys shall be able to be performed in the following modes:
 - ⇒ The user shall be capable of utilizing a single function for power (on/off) and a single function to start logging to initiate a Static survey or through the use of an external datacollector as specified in Section 4.1.1.4.
- Kinematic Survey Operation. Kinematic surveys shall be able to be performed in the following modes:
 - ⇒ Continuous survey.
 - ⇒ Stop & Go survey.
 - ⇒ Real-Time Kinematic Surveying (RTK).
 - ⇒ During an RTK survey, the GPS receiver must also be able to collect raw data when the radio link is broken for post-processed infill later in the office.

4.1.1.10 Tracking

Each GPS Survey System shall be capable of the following functions:

- Track a minimum of twenty (20) satellites simultaneously.
- Exhibit no inter-channel bias.
- When Anti-Spoofing (P-code encryption) is not activated, the receiver shall be capable of centimeter level precision.
- When Anti-Spoofing (P-code encryption) is activated, the receiver shall be capable of tracking L1 C/A code, and the full cycle L1 and L2 carrier phases.
- Indicate unhealthy satellites during tracking mode.
- Capable of tracking WAAS without any additional hardware or software or additional antennas

4.1.1.11. Antenna

Each GPS Survey System shall have an antenna that is capable of the following functions:

- Receive the L1 (1575.42 MHz), L2 (1227.6 MHz), and L5 (1176.45 MHz) carrier frequencies.
- The same antenna must be utilized for Static, Fast/Rapid Static, Kinematic, and Real-Time Kinematic surveying techniques.
- Mount on a standard surveying tribrach adapter having a 5/8-inch by 11 threads per inch male thread.
- The distance between the ground plane and the phase center of the antenna shall be provided.
- The antenna shall be of minimum size and weight for effective data collection. The size and type shall be such to reduce or minimize the effects of multipath.
- The antenna, to increase portability, shall be enclosed in a case of sufficient quality and durability to facilitate transport and maintain protection against damage.

4.1.1.12. Height of Instrument Measuring Device

A device to measure the height from the antenna ground plane to the top of survey mark shall be supplied with each GPS Survey System.

The Height of Instrument device shall be constructed to the following guidelines:

- Record the Height of Instrument in the metric system (to nearest millimeter) and in the English system (to nearest hundredth of a foot).
- Must be of suitable material to allow daily usage for one year without breakage, error in calibration or fluctuation in length resulting from temperature.
- The Height of Instrument device shall fold, collapse or retract to permit rapid measurement without building or constructing device on site.
- The size of the Height of Instrument device shall be determined by the allowable space in the carrying case.

4.1.2. Other Hardware and Accessories

4.1.2.1. Batteries

For Kinematic Survey operations while roving (***Internal Rover Batteries***):

- Four (4) lightweight Lithium ion batteries are to be supplied with each system.
- Must provide at least four (4) hours of operation time at nominal temperatures per battery.
- The battery(s) shall power the receiver.
- A battery charger capable of charging at least two (2) batteries must be supplied. The charger must have LED's for power on, charging, and fully charged modes.
- The lithium ion batteries included above are to be interchangeable with the GPS Survey System when it is tripod mounted.

When the GPS Survey System is tripod mounted, the receiver shall be powered by a 6 AH battery, capable of providing sufficient power to operate the receiver in excess of eight (8) hours of continuous operation at nominal temperatures.

- Each GPS Survey System must include two (2) of the external 6 AH batteries mentioned above and necessary cables. (***External Rover Static Batteries***)
- Each GPS Survey System must include a sealed gel-cell type battery to power the base receiver and external radio/modem unit as described in [Section 4.1.2.3](#) and necessary cables. The battery shall be capable of providing power for a minimum of 12 hours to the system before recharging. A standard battery charger shall also be provided. (***External Base/Radio Battery***)

4.1.2.2. Real-Time Kinematic Survey Operation

The GPS Survey system shall have the following capabilities:

- Initialization
 - ⇒ Static Initialization.
 - ⇒ On-The-Fly (OTF) Initialization without operator intervention and while the operator is moving.
 - ⇒ The system shall be capable of operating in Real-Time, after the base is started, without the use of an external data collector at the base.
 - ⇒ Switch to post-process kinematic mode when RTK telemetry (radio link) is lost.
- The RTK Survey system shall be capable of working in the following coordinate systems:
 - ⇒ Local or "assumed" system.
 - ⇒ Geodetic Coordinates (ϕ, λ , and h or X, Y and Z).
 - ⇒ State Plane Coordinate System.
 - ⇒ User defined projections.
- The RTK Survey System shall be capable of performing calibrations. A calibration is defined as a mechanism that calculates parameter for transforming WGS-84 coordinates into local grid coordinates (NEE). Provided the projection and datum transformations are defined, the calibrations can be performed of 1d, 2d, and 3d points. If projection and datum transformation are not defined, then at least one 3d point must be used in the calibration.
 - ⇒ The survey data collector shall be capable of performing "in-field" least squares GPS calibrations, including automatic calibrations, using up to twenty (20) 1d, 2d or 3d stations.
 - ⇒ The calibration procedure must also be able to be performed in the accompanying automated mapping software with the capability to define a minimum of twenty (20) 1d, 2d or 3d station points.
 - ⇒ The survey data collector shall be capable of uploading a multistation calibration that was derived from the survey software.
 - ⇒ As part of the calibration process, the system must be able to create an inclined plane, enabling the modeling of vertical heights. Additionally, a geoid file containing geoid/ellipsoid separations must be able to be uploaded into the survey data collector, thereby further improving the system's ability to accurately model orthometric elevations.
 - ⇒ The calibration must be able to be performed at anytime throughout the course of the survey. Prior to beginning the survey, if WGS-84 position(s) are known, they may be hand entered into the survey data collector eliminating the need to directly occupy control stations. Alternatively, as new control points are surveyed, automatic calibrations may be performed by measuring the designated points. System must then apply calibration to all previously surveyed points. Error residuals for each point in the calibration must also be available for display.
- The RTK Survey system shall be capable of performing conventional style offset routines while in the data collection mode including from a baseline, bearing and distance from a point; and, a four-point intersection. The calculations and coordinates for offset points must be allowed and created while in the field. The results must be user defined in terms of sea level, ground, or grid distance.
- The RTK Survey system shall be capable of performing point inverse calculations as well as other conventional style COGO routines. The display of the COGO results must be user defined in terms of sea level, ground, or grid distance.

- The RTK Survey system shall be capable of importing coordinate files; keyboard entry of coordinate; and calculating coordinates using COGO functions. With these coordinates, depending on the stakeout method used, a text display of stakeout values will include azimuth, horizontal distance, vertical distance (cut/fill) stationing, and offset (left/right).

In addition, the survey data collector shall also have a graphical arrow indicating the direction of the stakeout point from the present position. The items that follow shall be able to be staked out.

- ⇒ Stake Out Points, including the point number, azimuth or quadrant bearing, cut or fill, and the horizontal distance to the point to be staked out.
- ⇒ Stake Out Lines, including stakeout of points along a predefined line. The user shall be capable of entering or uploading the end points of the line to the data collector or observing the endpoints of the line. While staking out lines, the following “stake to” fields shall be available:
 - Station on the Line
 - Station/Offset from Line
 - Slope from Line
- ⇒ Stake Out Curves, including stake out of points along a circular curve. While staking out curves, the following “stake to” options shall be available:
 - Station on the Curve
 - Station/Offset from Curve
- ⇒ Stake Out Terrain Models, including stake out of a digital terrain model. The Survey data collector display must show the vertical distance above (fill) or below (cut) the DTM.
- The RTK Survey system shall be capable of using and operating current geoid models.
- The RTK Survey system shall be capable of allowing the user to view point numbers, feature codes, coordinates (WGS-84, local or grid) and attributes for each point collected.
- The RTK Survey system shall be capable of allowing the user to edit/enter feature codes and point names.
- The RTK Survey system shall be capable of continuing data collection when radio communication has been lost which will enable the user to post-process the observational data.
- The RTK Survey system shall be capable of quality control checks.
 - ⇒ System shall store the base station position as broadcast in the project database and compare to what the system is using for computations. If system detects that the base has been moved, a warning message must be displayed.
 - ⇒ Option for storing QA/QC records for each point shall be available. QA/QC records shall be able to be viewed from data collector and include horizontal and vertical precision and standard deviations.

4.1.2.3. Real-Time Kinematic Radio/Modem Communication Link

- Environmental
 - ⇒ Operating temperature between -20 to +55 degrees Celsius.
 - ⇒ Weatherproof casing, 100% fully sealed when access panels are securely latched.
- General Characteristics
 - ⇒ The radio/modem link shall comprise of a base system, complete with radio/modem, power cables, and antenna, along with accompanying rover components.
 - ⇒ The rover radio/modem shall be integrated with the rover receiver.
 - ⇒ Capable of a minimum wireless data rate of 9600 BPS.

- ⇒ Minimum of sixteen (16) channels with channel spacing at 6.25 kHz.
- ⇒ Operate in frequency range 430 – 470 MHz.
- ⇒ Preprogrammed to three (3) channels at 453.5500 MHz, 453.6500 MHz, and 458.5500 MHz
- ⇒ Mode: High gain UHF and GMSK Modulation
- ⇒ Channels must be selectable from radio without interface to other external devices (e.g. Personal Computer, etc.).
- ⇒ The base radio antenna must be tripod mounted to allow separation of radio and receiver and to enable strategic placement of antenna maximizing signal travel.
- ⇒ System shall be capable of receiving information from base receiver to a rover receiver up to 6 miles depending on ideal conditions, topography and line of sight. If this is not possible then a repeater unit or extended range antenna and accessories must be provided.

4.1.2.4. Carrying Cases

Each receiver shall have carrying cases to hold the base receiver, rover receiver, cables, batteries, antenna (without groundplane), antenna cables, data transfer cables, and receiver operation manual.

There shall be sufficient carrying cases supplied to allow transport of the complete system. These cases must be convenient to carry by one person from the transport vehicle to the setup location. Also when the system is not in use these carrying cases shall be used for storage.

4.1.2.5. Hardware Operating Manuals

Each GPS Survey System shall include, at no additional charge, one (1) set of hardware operation manual(s) in pdf format. The manual(s) stated in easily understood English shall show a logically sequenced step-by-step description of the total system in general and they shall include specific sections devoted to the detailed operation of each system component.

4.1.2.6. Software Operating Manuals

Each GPS Survey System shall include, at no additional charge, one (1) set of software operation manual(s) in pdf format. The manual(s) stated in easily understood English shall show a logically sequenced step-by-step description on the operation of each software module described under [Section 4.1.3](#) in general and they shall include specific sections devoted to the detailed operation of each software component. In addition, the vendor shall provide data tutorials that can be used to familiarize the user with baseline processing and network adjustment.

4.1.2.7. Range pole

In order to facilitate the portability of the antenna the following item shall be required:

- Strong, lightweight aluminum 2 meter range pole.
- Bipod to stabilize the stationary range pole.
- Range pole carrying case

4.1.2.8. Tripod

- One Fixed Height Tripod capable of holding the base antenna to be utilized during Static GPS Collection shall be provided.
- One (1) Tripod with Telescoping Antenna Mast capable of supporting an external radio antenna. The tripod and mast combination shall have the ability to achieve a height of 13ft. A carrying case shall be provided.

4.1.3. [Software Specifications](#)

4.1.3.1. [Minimum Configuration](#)

The software shall be capable of operating and running on the following:

- Computer: IBM PC or compatible with at least a Dual Core 3 GHz processor.
- Random Access Memory (RAM): Minimum of 4 GB.
- Hard drive available (free) disk space: Minimum of 50 GB.
- Mouse: Microsoft® or compatible.
- Software: Microsoft® Windows™ XP or 7

4.1.3.2. [General Operation](#)

The software package shall include modules for: mission planning; baseline processing; datum transformation and coordinate conversion; least squares network adjustment; and mapping. The user will not be required to exit the main program to access any of the aforementioned modules.

4.1.3.3. [Mission Planning](#)

The software shall be capable of performing the following:

- Compute optimal observation periods and incorporate multi-site satellite obstruction diagrams.
- Allow the user to enter and store station names and the latitude and longitude (ϕ, λ) for the desired locations.
- Allow the user to enter and store elevation cut-off angle and adjustable time intervals starting at five (5) minutes up to thirty (30) minutes.
- Produce a world map that can be used to extract the approximate location of a desired station.
- Accept the offset from Universal Time Coordinated (UTC) and the local time zone.
- Automatically utilize the most recent satellite almanac. In addition, the user shall have the capability to access ephemeris files from previous dates to determine satellite visibility diagrams.
- Display and print satellite number (PRN), azimuth and elevation of satellite and PDOP in relation to desired location for each time interval.
- Display and print information in table and polar plot format.

4.1.3.4. [Baseline Processing](#)

The software shall be capable of performing the following:

- Import data from the receiver, the manufacturers binary data input file, and data in the Receiver Independent Exchange Format (RINEX).
- The software must have an interactive data check-in module that displays all station and occupation information in tabular format and provides the user the capability of editing the station name, height of instruments, feature codes, receiver configurations, and antenna configurations prior to processing.
- Provide the user the capability of processing all baselines observed (independent and dependent) or a user-selected subset.
- Process Static, Fast/Rapid Static, Stop-and-Go Kinematic, and Continuous Kinematic data in a single processing session automatically.
- Provide the user the capability to perform the following functions:
 - Enable/disable specific satellites
 - Enable/disable GPS observable

- Change the maximum number of iterations
- Change the elevation mask
- Utilize precise ephemerides
- Application of tropospheric and ionospheric corrections
- Baseline rejection parameters.
- Automatic cycle slip fixing and solution.
- Select the optimum baseline solution based on statistical analysis.
- Provide the user the capability to display all baseline solutions.
- Must allow the viewing and printing of graphical Residual Plots for analysis of baseline processing results.
- Export a detailed baseline solution summary that indicates the quality of the estimated baseline along with the baseline coordinate information (i.e. baseline components (dX, dY and dZ), distance, etc.)

The Department desires a software package that can process observational data using the multi-station processing technique and multiple baseline processing.

4.1.3.5. Utilities

The software shall be capable of performing the following:

- Possess a graphical browser that permits the user to view or print the stations and baselines within a project.
- Perform graphical loop closures. In addition, the software shall provide the user the capability to view the baseline quality of specific baseline solutions.
- Create customized project reports that include the reference and adjusted station coordinates, baseline solution summaries, and detailed baseline reports.
- A transformation module shall be provided that is capable of datum transformations and coordinate conversions. The transformation module must use NADCON as its transformation utility. The transformation module shall be capable of accepting points from the database or keyboard entry.

4.1.3.6. Mapping

The software shall be capable of performing the following:

- Integrate with vendor supplied baseline processing and adjustment software.
- Support textual and graphical survey data editors.
- Ability to import NGS Data Sheets which are downloaded directly from the Internet (http://www.ngs.noaa.gov/cgi-bin/ds_radius.prl).
- Support the following projections: (1) Plane; (2) Transverse Mercator; (3) Mercator; (4) Lambert Conformal; and (5) Plane Transformations.
- Perform the following transformations: (1) 7 parameter; (2) 3 parameter; (3) plane transformation; (4) height adjustments; (5) NADCON; and (6) geoid models; and (7) user definable projections.
- Possess feature code processing module with line connectivity module that automatically generates drawings.
- Export AASHTOWare® Survey Data Management System (SDMS®) calculated (.CAL) file or (.PAC) file.
- Possess a flexible file formatter to create user defined ASCII input and output files.

4.2 Standard of Performance

The vendor shall successfully demonstrate the use of the proposed hardware as a condition of accepting the bid. A standard of performance must also be met for all equipment by performing the function for which it is intended for a period of forty-five (45) consecutive calendar days, beginning at the conclusion of the initial training period, at an effectiveness level of 98 percent. In the event the equipment does not meet the standard of performance during the initial forty-five (45) consecutive calendar days, the standard of performance test shall continue on a day-by-day basis until the standard of performance is met for a total of forty-five (45) consecutive days. The GPS Survey System shall not be accepted and no charges shall be paid until the performance requirements have been maintained for a period of forty-five (45) consecutive days. If the GPS Survey System fails to meet the standard of performance after one hundred twenty (120) calendar days from commencement of the performance period, the Arkansas State Highway and Transportation Department may require a replacement system or terminate the contract.

5.0 PERFORMANCE REQUIREMENTS

Vendors must respond to the performance requirements in this section in accordance with the instructions given in Section 2.0(d) above.

5.1 GPS Survey System Requirements

System accuracy is specified under Table "GPS Survey System Accuracy" and the accuracy obtained assumes that a minimum of five satellites is tracked continuously while utilizing both L1 and L2 signals.

GPS Survey System Accuracy				
Survey Technique	Accuracy (at σ)		Occupation Times	Initialization Times
	Horizontal	Vertical		
Rapid Static/FastStatic	5 mm + 1 ppm (σ)	5 mm + 1 ppm (σ)	Varies	
Static	3 mm + 1 ppm (σ)	5 mm + 1 ppm (σ)	Varies	
Real-Time Kinematic	10 mm + 2 ppm (σ)	20 mm + 2 ppm (σ)	<15seconds	< 1 minute

6.0 SUPPORT REQUIREMENTS

Vendors must respond to the support requirements in this section in accordance with the instructions given in [Section 2.0\(e\)](#) above.

6.1 Training

A qualified representative of the manufacturer shall provide instruction in the operation, calibration, and maintenance of the GPS Survey System at no extra cost. This instruction shall be provided to at least six (6) operators, engineers, and engineering specialists who have previous GPS experience. The purpose of the instruction shall be to train six (6) operators, engineers, and engineering specialists with the features, operation, calibration and maintenance of the GPS Survey System. The training is to be schedule no later than forty-five (45) calendar days after delivery and installation of the GPS Survey System. A training session shall consist of a two (2) day session, or longer if necessary, with a two (2) day follow-up approximately one (1) year later. At the conclusion of training, all trainees should be able to operate the GPS Survey System in all normal production modes.

The vendor shall provide a proposal on the training and include, but not necessarily limited to, the following: topics of instruction; format of training; and number of days of training.

The successful bidder will be notified if the above training is necessary.

6.2 Warranty

The successful bidder shall guarantee the GPS Survey System against defective workmanship or materials for a period of thirty-six (36) months of actual field services, commencing with the successful completion of the standards of performance. Any defect of workmanship, material, or software failure that develops during the first year of field operation shall be replaced, repaired or corrected at no expense to the Department. During the last thirty (30) days of the warranty period, the GPS Survey System shall be checked and service personnel will make any necessary adjustments from the company.

If the vendor's standard warranty is for a period in excess of thirty-six (36) months then the standard warranty shall apply.

If the vendor's standard warranty is for a period of less than thirty-six (36) months then appropriate extended warranties shall be included as an item on the [Attachment B – Itemized Summary Sheet](#), to increase the standard warranty to thirty-six (36) months.

6.3 Maintenance Support

The manufacturer of the GPS Survey System must provide maintenance support. Include with the bid response, your maintenance policies with regard to hardware and software problem diagnosis, error resolution and charging policies. The bid response must state in detail the terms and conditions of the monthly maintenance agreement for the proposed GPS Survey System. Such statements must include but not be limited to the following:

- The location and staffing of the closest services point;
- How preventive maintenance is scheduled;
- The nature and frequency of preventive maintenance;
- The size and location of your spare parts inventory;
- The total size of your maintenance organization and response time for maintenance.

Response time on maintenance calls shall be the time between the receipt of a call by the vendor's representative including any answering services, and the arrival, ready for repair work, of the maintenance personnel at the customer's site. State the response time to remedial service that your company is willing to commit to.

6.4 Firmware and Software Upgrades

Within the warranty period stated in [Section 6.2](#), the vendor shall provide, at no extra cost, any and all released firmware and software upgrades to the GPS Survey System. The vendor shall indicate in the bid their method and procedure of supplying and installing firmware and software.

ATTACHMENT A – REFERENCE DATA SHEET FOR VENDER

Provide company name, address, contact person, telephone number, and appropriate information of contracted services that are similar to this solicitation document. (Any subcontractor arrangements for the completion of this work shall be listed on a separate bid page.)

Company Name: _____

Address: _____

Contact Person: _____

Phone Number: _____ Services Provided: _____

Company Name: _____

Address: _____

Contact Person: _____

Phone Number: _____ Services Provided: _____

Company Name: _____

Address: _____

Contact Person: _____

Phone Number: _____ Services Provided: _____

Company Name: _____

Address: _____

Contact Person: _____

Phone Number: _____ Services Provided: _____

ATTACHMENT B – ITEMIZED SUMMARY SHEET FOR VENDOR

PRODUCT(S) SUPPLIED:

LIST ALL ITEMS AND QUANTITIES AS REQUIRED BY THIS BID INVITATION.

THE QUANTITIES SHALL BE FOR ONE (1) SYSTEM. THE BID TOTAL SHALL REFLECT THE SYSTEM BID TOTAL TIMES (X) THE NUMBER OF SYSTEMS.

(USE AS MANY SHEETS AS NECESSARY)

<u>ITEM NO.</u>	<u>DESCRIPTION MAKE, AND MODEL NUMBER</u>	<u>QUANTITY</u>	<u>UNIT</u>	<u>AMOUNT</u>
1	GPS Survey System			
a.	GNSS Receiver/Antenna	2	EA	
b.	External Radio/Modem Kit	1	EA	
c.	Survey Data Collector	1	EA	
d.	Fixed-Height Tripod	1	EA	
e.	Tripod w/Antenna Mast	1	EA	
f.	Rover Pole and Bipod Kit	1	EA	
g.	Internal Rover Battery	4	EA	
h.	External 6AH Battery	2	EA	
i.	Office Software Suite	1	EA	
SYSTEM BID TOTAL:				
NUMBER OF SYSTEMS:				2
2	Training (if requested)	1	Lump	
BID TOTAL:				