



Form GSOP 1-PIN (04/98)

STATE OF CALIFORNIA
 Department of General Services - Office of Procurement
PURCHASE ORDER

<i>Purchase Order No.</i>	<i>Rev.</i>	<i>Date</i>
62105		6/30/2008

<i>Supplier No.</i>	<i>Solicitation No.</i>	<i>Delivery Date</i>	<i>FOB Point</i>	<i>Invoice Terms</i>
204384	56926	60 Days ARO	Destination	

CALIFORNIA SURVEYING AND DRAFTING SUPPLY 4733 AUBURN BLVD SACRAMENTO, CA 95841 Attn: BRUCE GANDELMAN Phone: 800-243-1414	<i>S</i> DEPT. OF TRANSPORTATION <i>h T</i> SHIPPING & RECEIVING MS35 <i>i o</i> 1820 ALHAMBRA BLVD, <i>P</i> SACRAMENTO, CA.95816 Attn: ADRIAN DAVIS 916 227-7328	<i>C</i> DEPT. OF TRANSPORTATION <i>h a T</i> DIV. OF R/W & LAND SURVEY <i>r o</i> 1120 N STREET, MS-37 <i>g e</i> SACRAMENTO, CA 95814	
	<i>Agency Billing</i> 60057	<i>Agency Purchase Estimate</i> 22-0438KM	<i>Purchase Estimate</i> <i>Revision</i> 67126 2
	<i>Agency Contact</i> KATIE MCCLAIN	<i>Phone</i> 916-227-5668	<i>Date Received</i>

<i>Item No.</i>	<i>Quantity</i>	<i>Unit</i>	<i>Commodity Code</i>	<i>Description</i>	<i>Unit Price</i>	<i>Extension</i>
<p>This purchase order is being awarded on JULY 31, 2008 pursuant to Government Code Section 13332.17. Any encumbrances made pursuant to this purchase order shall be construed to have been made on the last day of the preceding fiscal year.</p> <p>The general provisions for Non-IT commodities are hereby incorporated by reference. These General Provisions can be obtained by phoning (916) 375-4400 or by accessing our website at:</p> <p>www.documents.dgs.ca.gov/pd/modellang/GPnonIT0407.pdf</p> <p>THE FOLLOWING INFORMATION IS PROVIDED FOR AGENCY USE ONLY:</p> <p>Prime Contractor: NS</p>						
32	EA		6675-999-9999-7	SURVEYING EQUIPMENT & SUPPLY (AS DESCRIBED) Trimble R8 Model 2 GNSS Rover Kit, 450-470Mhz Receive only #R8201-51-66	21,050.0000	673,600.00
23	EA		6675-999-9999-7	SURVEYING EQUIPMENT & SUPPLY (AS DESCRIBED) Trimble R8 Model 2 GNSS Base Kit, 450-470Mhz Receive Only #R8200-91-66	21,050.0000	484,150.00
<u>PO Miscellaneous Charges and Discounts</u> TRADE IN ALLOWANCE						<u>Dollar Value</u> 105,750.00
Total Value:						1,052,000.00

Sales and/or use tax to be extra unless noted above

<i>Buyer</i> SHANNON KELLER	<i>Phone</i> 916-375-4606	<i>BOC Number</i>
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Department of General Services - Office of Procurement

PURCHASE ORDER CONTINUATION

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62105		6/30/2008	204384	CALIFORNIA SURVEYING AND

<i>Item No.</i>	<i>Quantity</i>	<i>Unit</i>	<i>Commodity Code</i>	<i>Description</i>	<i>Unit Price</i>	<i>Extension</i>
<u>FOR THE PURPOSE OF THIS AWARD</u>						
Only Free On Board (FOB) Destination will be accepted.						
<u>ELECTRICAL AND MECHANICAL EQUIPMENT</u>						
All electrical and mechanical equipment furnished shall comply with the California Administrative Code; Title 8 (Industrial Safety Orders), Title 24 (State Building Standards Law) and Title 17 (Public Health). All electrical equipment furnished shall be grounded with any exceptions only as approved in the referenced applicable titles.						
<u>DELIVERY</u>						
To schedule a delivery, please contact the receiving clerk at (916) 227-9356 to make arrangements for date and time of delivery. Delivery may be rejected if appointment has not been scheduled. Please have the freight description, total pieces, PR #080LS019, and Purchase Order Number available. Delivery Contact: Dick Davis at 916-227-7328. Delivery Hours: 7:30 a.m. to 12:00 p.m. and 1:00 p.m. to 3:00 p.m. Delivery Address: 1820 Alhambra St., Sacramento, Ca 95816						
Drivers are required to use their own pallet-jack with loads that require a forklift.						
<u>REJECTION AND ACCEPTANCE</u>						
This purchase order will be subject to acceptance testing to ensure the equipment acquired operates in accordance with the technical specifications as warranted by the contractor and evidences a satisfactory level of performance.						
<u>WARRANTY</u>						
Equipment shall operate satisfactorily and have a minimum warranty period of one year from date of delivery to the State. If the manufacturer's standard warranty exceeds this period then the standard warranty shall be in effect. Vendor shall bear all material, labor and transportation costs for repair of defects and failures occurring within the warranty period.						
<u>INVOICE AND PAYMENT</u>						
All inquiries regarding payment or invoice status should be directed to Caltrans Accounts Payable in Sacramento at 800-303-1160 or 916-227-8946. Supplier shall send invoices to: Department of Transportation Attn: Sabrina Daniel Division of Right of Way and Land Surveys 1120 N Street, MS-37 Sacramento, Ca 95814						
<u>CASH DISCOUNT</u>						
Caltrans will honor cash discounts, if offered by the supplier. Payment to the supplier will be made in accordance with the cash discount terms and conditions specified on the invoice and the terms will be calculated after the testing period, date of acceptance.						

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PURCHASE ORDER CONTINUATION

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<i>Item No.</i>	<i>Quantity</i>	<i>Unit</i>	<i>Commodity Code</i>	<i>Description</i>	<i>Unit Price</i>	<i>Extension</i>
<p><u>SALES TAX</u></p> <p>Sales tax was not included in the bid pricing and is not part of this award. Sales tax should be added at time of invoicing. The sales tax rate applied should be based on the rate of the area the product is to be delivered to.</p>						
<p><u>CHANGE ORDERS</u></p> <p>This Purchase Order may be amended, modified, or terminated at any time by mutual agreement of the parties in writing. Change orders amending, modifying or terminating the Purchase Order, including any modifications of the compensation payable, may be issued only by the State Procurement Officer. All such change orders shall be in writing and issued only upon written concurrence of the supplier. Termination, as that term is used in this section, does not include the following provisions as stated in the General Provisions (GSPD-401 Non-IT Commodities, Revised and Effective 4/12/2007): Page 3 - Section 22: Termination for Non-Appropriation of Funds, Page 3 - Section 23: Termination for the Convenience of the State, and Page 3 - Section 24: Termination for Default.</p>						
<p><u>SCPRS</u></p> <p>This Purchase order has been registered into the state contact and procurement registration system (https://www.scprs.dgs.ca.gov/). The registration number is 26600708325787.</p>						

SPECIFICATIONS FOR GLOBAL NAVIGATION SATELLITE SYSTEM SURVEYING EQUIPMENT March 2008

I. Scope

These specifications establish the technical requirements for the procurement of survey/geodetic grade Global Navigation Satellite System (GNSS) equipment for the California Department of Transportation (Department).

The equipment furnished under these specifications shall be the latest model in current production that meets the requirements of these specifications. Models currently in production modified to meet these specifications are acceptable. If models currently in production are modified to meet these specifications, the equipment shall operate in conformity with these specifications for the expected service life of the equipment, including subsequent hardware, software, or firmware upgrades or modifications.

All equipment offered under these specifications shall be new. Used, demonstrator, prototype, or discontinued models are not acceptable.

The equipment furnished under these specifications shall be nationally advertised and available in the United States.

II. General Requirements

- A. The system shall consist of a single unit containing the GNSS receiver, GNSS antenna, internal UHF receive-only radio, and internal battery. These components, collectively, shall be referred to as the "GNSS unit" for these specifications.
- B. The GNSS unit shall have the ability to perform Global Positioning System (GPS) surveys in conformance with the procedures contained in the Department's *Surveys Manual*. The manual is available at:
www.dot.ca.gov/hq/esc/geometronics/SurveysManual/Manual%20TOC.html
- C. The GNSS unit shall have the ability to perform according to the manufacturer's specifications for static and fast-static surveys when used in conjunction with the Department's existing GPS/GNSS equipment. The GNSS unit shall also have the ability to perform according to the manufacturer's specifications for kinematic and real-time kinematic surveys when used in conjunction with the Department's existing GPS/GNSS equipment as a rover unit. The Department's inventory of GPS/GNSS equipment is comprised of the following:

- Trimble Navigation 4700 GPS Receiver
 - Trimble Navigation 5700 GPS Receiver
 - Trimble Navigation R8 GPS Receiver
 - Trimble Navigation R8 GNSS Receiver
 - Trimble Navigation TSCe w/Survey Controller Software
 - Trimble Navigation TSC2 w/Survey Controller Software
 - Trimble Navigation Trimble Geomatics Office (TGO) Software
 - Trimble Navigation Trimble Business Center (TBC) Software
- D. The GNSS unit shall have Federal Communication Commission (FCC) Class B Parts 15, 22, and 24 certification.
- E. When properly configured, the GNSS unit shall have the ability to be operated in the following configurations:
- on a tripod;
 - on a rover pole.
- The unit shall be mounted on these configurations with a 5/8"x11 male thread.
- F. The GNSS unit shall have the ability to utilize a data modem capable cellular telephone (including Bluetooth enabled phones) or data modem for the real-time kinematic survey and real-time network communication link.
- G. The GNSS unit shall have the ability to use the Department's existing GPS site calibrations.

III. Physical Requirements

- A. The GNSS unit, including the internal UHF radio, shall be no larger than 8" long, 8" wide, and 5" high, including connectors.
- B. The GNSS unit, including the internal UHF radio, internal battery, and standard UHF antenna, shall weigh no more than 3.0 lbs.

IV. Environmental Requirements

- A. The GNSS unit shall be rugged and suitable for use in field environments that may be hot, cold, wet, or dusty.
- B. The GNSS unit electronics shall be fully sealed from sand, dust, and moisture.
- C. The GNSS unit shall be able to operate to specifications in temperatures between -20°C to +55°C.

- D. The GNSS unit shall be able to be transported or stored in temperatures between -40°C to +70°C without sustaining damage.
- E. The GNSS unit shall be able to withstand an accidental drop of 2 m (6.6 ft) onto a hard surface with no damage to the operational ability or structural integrity of the unit.
- F. The GNSS unit shall be waterproof and sealed to prevent damage from an accidental submersion.
- G. The GNSS unit shall not be less than 100% condensing humidity proof.
- H. The GNSS unit connector(s) shall fully seal the unit when the proper connector(s) is/are attached.
- I. The GNSS unit shall be supplied with integral dust cap(s) to protect and seal the connector(s) when no cable(s) or antenna is/are connected.

V. Power Requirements

A. General

1. The GNSS unit shall be powered by an internal, removable rechargeable battery with the ability of providing power to the unit for a minimum of five (5) hours operation without replacing the battery or requiring the battery to be recharged.
2. The GNSS unit shall have a minimum of one DC external power input to support a variety of external power sources, including:
 - external battery;
 - a 12 volt automotive battery;
 - uninterruptible power source (UPS);
 - solar.
3. The GNSS unit shall include over-voltage protection on all power inputs.
4. The GNSS unit shall include reverse polarity phase protection.

B. Power Management

The GNSS unit shall include a power management system that controls all power control functions, including, but not limited to, the following:

- providing a visual indicator to indicate what power port is being used.
- providing a visual indicator if a power source is low.
- automatically swapping to the next best power source available without any effect on the data being stored (cycle slip(s) or a new logging file created) when a power source is removed or drops below the minimum required power threshold.

C. Internal Battery

1. The internal battery shall be a fully sealed battery.
2. The internal battery shall be rechargeable and removable from the unit.
3. The internal battery shall be protectively enclosed from the environment when installed within the GNSS unit.
4. One internal battery shall power the GNSS unit for a minimum of four (4) hours when logging data externally in post-processing mode or operating as a rover in real-time kinematic or real-time network mode.

D. Battery Charger

The GNSS unit shall include an individual battery charger capable of charging the internal battery or batteries. The charger shall have the following features:

- capable of holding two or more batteries at one time.
- intelligently choosing which battery to charge when charging.
- provide a visual indicator to indicate if the battery is ready to charge, charging, and completed charging.

VI. Memory Requirements

- A. The GNSS unit shall have a minimum of 10MB of internal memory for raw data storage.
- B. External data storage shall be possible when connected to an external data collector or directly to an IBM compatible personal computer or workstation running MS Windows 95/98/Me/XP/2000/NT 4.0.
- C. The GNSS unit shall not require a PC card, compact flash card, secure digital card, or other removal storage device to be present in order to operate and output RTK position to an external data collector or CE/CE.NET device with compatible CE/CE.NET software.

VII. Antenna Requirements

- A. The GNSS antenna component of the unit shall be capable of receiving the following frequencies: L1 (1575.42 MHz), L2 (1227.6 MHz), L5 (1176.45MHz) and GLONASS L1/L2. The unit shall also be capable of receiving the L2C signal without a hardware upgrade.
- B. The GNSS antenna component of the unit shall have a 4-point antenna feed for sub-millimeter phase center error and enhanced right-hand circular polarization.
- C. The GNSS antenna component of the unit shall have a stable horizontal phase center with a stability of less than 1 mm precision.
- D. The GNSS antenna component of the unit shall provide low elevation tracking technology.
- E. The GNSS unit shall be capable of receiving data from a Wide Area Augmentation System (WAAS) satellite for real time differential positioning and base station location. This feature shall not require the use of an additional antenna to track and use WAAS satellites.

VIII. UHF Radio Requirements

- A. The GNSS unit shall include an internal integrated UHF receive-only radio system meeting the following specifications:
 - capable of storing up to 20 user programmable frequencies in preset channels.
 - having the ability to change frequencies (channels), baud rates, and message formats using an external data collector.
 - having the ability to display the actual radio frequency (in MHz) on an external data collector when changing radio frequency.
- B. The GNSS unit shall include a connection for the UHF radio antenna. Internal antennas are not acceptable.
- C. The radio component of the unit shall be able to receive RTCM or RTK broadcast data via an external radio or wireless link through any of the unit's serial ports.
- D. The radio component of the unit shall be capable of receiving the following formatted broadcast messages:
 - CMR+ and CMRII
 - RTCM v2.1, v2.3, and v3.0
- E. The radio component of the unit shall be provided in the 450 - 470MHz band, at 25 KHz spacing, to be compatible with existing radio equipment and the

Department's existing Federal Communication Commission (FCC) radio station license.

IX. Interface Requirements

A. Ports

1. The GNSS unit shall have, as a minimum, one 3-wire serial port and one full RS232 port for serial input/output and data collector control.
2. The GNSS unit shall provide at least one port capable of handling baud rates up to 115,200 bps.
3. The GNSS unit shall provide a DB9-F connector to support external data modem capable cellular telephone, data modems, external third-party radios, and other serial communications devices.
4. The GNSS unit shall include a single cable that provides power and RS-232 communications in an office environment.

B. Bluetooth

1. The GNSS unit shall have a fully sealed Bluetooth communications port.
2. The GNSS unit shall display the Bluetooth symbol to indicate it can transmit and receive Bluetooth signals.
3. The GNSS unit shall have the ability to be controlled by a Trimble data collector that is Bluetooth supported. This feature shall not require additional devices to be externally attached to the GNSS unit.
4. The GNSS unit shall have the ability to be controlled by a Trimble data collector that is Bluetooth supported while using an external cellular telephone or modem.

C. Display

The display on the GNSS unit shall have a method for indicating the following information without requiring a data collector to be connected:

- if the supplied power is acceptable or low;
- status of the battery in use;
- satellites are being tracked;
- tracking four (4) or more satellites, less than four (4) satellites, or no satellites;

- the broadcast signal (wireless or radio) has been accepted from a broadcasting device on the same frequency as the unit's radio.

D. Keyboard

1. The GNSS unit shall have a minimum of one key.
2. The GNSS unit shall have a simple one key power-on feature without the requirement of an external data collector or personal computer or workstation to be connected.
3. The user shall be able to reset the GNSS unit using a single key operation without the requirement of an external data collector or personal computer or workstation to be connected.

X. GNSS Signal Requirements

A. Signal Tracking

1. The GNSS receiver component of the unit shall have the ability to track the following GNSS signals:
 - GPS
 - L1 C/A Code
 - L2 C Code
 - L1/L2/L5 Full Cycle Carrier
 - GLONASS
 - L1 C/A Code
 - L1 P Code
 - L2 P Code
 - L1/L2 Full Cycle Carrier
2. When Anti-Spoofing (A/S) (P-code encryption) is activated, the GNSS receiver component of the unit shall measure L1 C/A pseudo ranges, L2 and L5 range measurements, and the full cycle L1, L2, and L5 carrier phases.
3. The performance of the GNSS receiver component of the unit shall not be lower during times when A/S is activated, compared to during times when A/S is not activated.
4. The GNSS receiver component of the unit shall include extremely low noise C/A code tracking technology.
5. The GNSS receiver component of the unit shall include multipath mitigation technology.

6. The GNSS unit shall, after the loss of satellite tracking, provide re-acquisition of both L1 and L2 GPS signals within 15 seconds.
7. The GNSS unit shall report Signal-to-Noise Ratio (SNR) values for L1, L2, and L5 GPS signals and GLONASS L1/L2 signals for all satellites, in Decibel / Hz (dB/Hz) referenced to a 1 Hz bandwidth.
 - SNR values shall be reported in the same units for L1 and L2 and using the same algorithm.
 - SNR values shall be available both via the visual display and via ASCII output in real time.
8. The GNSS receiver component of the unit shall have the ability to track and compute corrections available from a WAAS satellite.

B. Channels

1. The GNSS receiver component of the unit shall be able to track GPS L1 (1575.42 MHz), L2 (1227.6 MHz), L5 (1176.45 MHz), and GLONASS L1/L2 on up to 12 satellites simultaneously.
2. The GNSS receiver component of the unit shall have a minimum of 72 channels.

C. RF Section

1. The GNSS receiver component of the unit shall have technology that enhances low power satellite signal acquisition.
2. The GNSS receiver component of the unit shall include satellite acquisition technology that increases it's ability to maintain a firm lock on signals once acquired.
3. The GNSS receiver component of the unit shall include satellite acquisition technology that provides improved tracking in areas of high radio interference, such as under power lines, around airports, and near other radio-intensive sites.
4. The GNSS receiver component of the unit shall include satellite acquisition technology that also increases the ability to work near trees with minimal signal lock loss.

D. WAAS Tracking

The GNSS unit shall be capable of receiving data from a Wide Area Augmentation System (WAAS) satellite for real time differential positioning and

base station location. This feature shall not require additional hardware or firmware options to track and use WAAS satellites.

XI. Performance Requirements

A. General

1. With an adequate number of satellites visible, with minimal or no obstructions, when there is minimal multipath or ionospheric activity, and when the reference station position is correct, the GNSS unit shall meet or exceed the following accuracies:
 - Static and Fast-Static Surveying
 - Horizontal ± 5 mm + 0.5 ppm RMS
 - Vertical ± 5 mm + 1 ppm RMS
 - Kinematic Surveying
 - Horizontal ± 10 mm + 1 ppm RMS
 - Vertical ± 20 mm + 1 ppm RMS
2. When used in real-time kinematic surveying, the GNSS unit shall be able to initialize within 10 sec. + 0.5 times the baseline length in km, up to 30 km. The unit shall also be able to initialize automatically while moving, with a reliability of greater than or equal to 99.9%.

B. Data Logging

1. The GNSS unit shall have the capability of logging data at operator-selected intervals of 0.1, 0.2, 0.5, 1, 2, 5, 10, 15, 30 and 60 seconds.
2. The GNSS unit shall have the capability of streaming NMEA data at logging intervals of 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 15, 30 and 60 seconds
3. The GNSS unit shall automatically return to default parameters (i.e. elevation mask, PDOP mask, etc.) when powered on.

C. Survey Techniques

1. The GNSS unit shall be capable of performing static, fast-static, post-processed kinematic, real-time kinematic, and real-time network surveys when used with a Trimble data collector. This ability shall allow for full control and status information of the survey process via the data collector.
2. During a real-time kinematic or real-time network survey, the GNSS unit shall be able to collect raw data for post-processed infill processing when the communication link is broken.

D. Multiple Base Station Operation

The GNSS unit shall have the ability to operate with up to four (4) base stations on a single radio frequency. All four (4) base stations shall be able to send their data once per second in a unique 1/4-second slot, without interfering with each other, even if they are within radio range.

XII. Technical Support

- A. Technical support shall be an element of the firmware support included with the purchase of this equipment. The vendor shall provide a toll free (from anywhere in California) telephone number for verbal inquires and a web site that allows for email inquires for technical support for the equipment furnished under these specifications for a period of twelve (12) months after delivery. An inquiry shall receive a response within 24 hours. Automated telephone systems, automated email replies, or self-help web sites for technical support are not acceptable.
- B. At the end of the 12-month period for firmware support included with this purchase, the vendor shall offer to the Department the opportunity to purchase continued support for this equipment. The above requirements for technical support shall also apply to the continued firmware support.
- C. The cost of technical support shall be considered as included in the bid cost of the equipment and no separate payment shall be made therefore.

XIII. Warranty

- A. All equipment furnished under these specifications shall be warranted against defects in material and workmanship for a period of not less than twelve (12) months. If the manufacturer's standard warranty period, for any of the components furnished under these specifications, exceeds this period, then the standard warranty period shall be in effect.
- B. Warranty repairs shall be provided at a factory authorized service and repair facility as specified by the manufacturer. The equipment shall be shipped to and from the service and repair facility by over night delivery service. The Department shall pay for the cost of shipping to the service and repair facility. The vendor shall pay the cost of returning the equipment to the Department. The equipment shall be repaired and shipped to the Department by the vendor within ten (10) working days of receipt of the equipment.
- C. If the equipment is not repaired and returned to the Department within ten (10) working days, the vendor shall provide an equivalent replacement unit to the Department. The replacement unit shall be shipped directly to the office that

submitted the Department's equipment for repair. The Department shall have free (no cost) use of said replacement unit until the Department's equipment is repaired and returned for use. All shipping and shipping insurance costs, to and from the Department, for the replacement unit shall be paid by the vendor.

D. The cost of the warranty shall be considered as included in the bid cost of the equipment and no separate payment shall be made therefore.

I have received, read and agree to all technical and administrative requirements as stated in the Specifications for Global Navigation Satellite System Surveying Equipment document for Solicitation # 56926, of eleven (11) pages.


Signature of Vendor
California Surveying & Drafting Supply Inc.

BRUCE GANDELMAN
Printed Name

7-9-2008
Date