



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

**Request for
 Quotation**

RFQ NUMBER
 639000024

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 MICHAEL AUSTIN
 304-558-2402

RFQ COPY
 TYPE NAME/ADDRESS HERE

VENDOR

Caron East

SHIP TO

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
02/02/2009	Net 30 days	Delivered	Final Dest	N/A

BID OPENING DATE: 02/11/2009 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM NO. 7						
CHANGES AND ADDITIONS TO THE SPECIFICATIONS ATTACHED.						
BID OPENING DATE AND TIME REMAINS 02/11/09 @1:30 P.M.						
NO OTHER CHANGES						
0001	11	EA		840-45	\$4,191	\$46,101
GPS POSITIONING SYSTEMS WITH RECEIVER						
0002	32	EA		840-45	\$13,003.25	\$416,104
GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION						
***** THIS IS THE END OF RFQ 639000024 ***** TOTAL:						\$462,205

RECEIVED
 2009 FEB 10 AM 10:07
 WV PURCHASING
 DIVISION

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *[Signature]* TELEPHONE: (301)724-4490 DATE: Feb 10, 2009

TITLE: sales rep FEIN: 52-1633407 ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

**GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)**

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid.
3. All quotations are governed by the *West Virginia Code* and the *Legislative Rules* of the Purchasing Division.
4. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
5. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.
6. Payment may only be made after the delivery and acceptance of goods or services.
7. Interest may be paid for late payment in accordance with the *West Virginia Code*.
8. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
9. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
10. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
11. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.
12. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, this Contract may be deemed null and void, and terminated without further order.
14. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, and available online at the Purchasing Division's web site (<http://www.state.wv.us/admin/purchase/vrc/hipaa.htm>) is hereby made part of the agreement. Provided that, the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
15. **WEST VIRGINIA ALCOHOL & DRUG-FREE WORKPLACE ACT:** If this Contract constitutes a public improvement construction contract as set forth in Article 1D, Chapter 21 of the West Virginia Code ("The West Virginia Alcohol and Drug-Free Workplace Act"), then the following language shall hereby become part of this Contract: "The contractor and its subcontractors shall implement and maintain a written drug-free workplace policy in compliance with the West Virginia Alcohol and Drug-Free Workplace Act, as set forth in Article 1D, Chapter 21 of the West Virginia Code. The contractor and its subcontractors shall provide a sworn statement in writing, under the penalties of perjury, that they maintain a valid drug-free work place policy in compliance with the West Virginia and Drug-Free Workplace Act. It is understood and agreed that this Contract shall be cancelled by the awarding authority if the Contractor: 1) Fails to implement its drug-free workplace policy; 2) Fails to provide information regarding implementation of the contractor's drug-free workplace policy at the request of the public authority; or 3) Provides to the public authority false information regarding the contractor's drug-free workplace policy."

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division.
2. **SPECIFICATIONS:** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Complete all sections of the quotation form.
4. Unit prices shall prevail in case of discrepancy.
5. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
6. **BID SUBMISSION:** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130



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 804-558-2402

VENDOR

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BUYER

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
12/04/2008	Net 30 days	hand delivered	final des	n/s
BID OPENING DATE: 12/23/2008		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UQP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	EA		840-45	4191	4191
GPS POSITIONING SYSTEMS WITH RECEIVER						
0002	1	EA		840-45	13,003.25	13,003.25
GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION						
OPEN END CONTRACT						
<p>TO PROVIDE (GPS) GLOBAL POSITIONING SYSTEM WITH RECEIVER, ANTENNA, AND USER INTERFACE. DEVICE MUST USE MICROSOFT WINDOWS MOBIL 6 AND FULLY COMPATABLE WITH EXISTING TRIMBLE PATHFINDER OFFICE SOFTWARE CURRENTLY USED BY THE WEST VIRGINIA DIVISION OF HIGHWAYS AND GPS POSITIONING CONSTANTLY OPERATING REFERENCE STATIONS. PER THE ATTACHED SPECIFICATIONS.</p> <p>THE MODEL/BRAND/SPECIFICATIONS NAMED HEREIN ESTABLISH THE ACCEPTABLE LEVEL OF QUALITY ONLY AND ARE NOT INTENDED TO REFLECT A PREFERENCE OR FAVOR ANY PARTICULAR BRAND OR VENDOR. VENDORS WHO ARE BIDDING ALTERNATES SHOULD SO STATE AND INCLUDE PERTINENT LITERATURE AND SPECIFICATIONS. FAILURE TO PROVIDE INFORMATION FOR ANY ALTERNATES MAY BE GROUNDS FOR REJECTION OF THE BID. THE STATE RESERVES THE RIGHT TO WAIVE MINOR IRREGULARITIES IN BIDS OR SPECIFICATIONS IN ACCORDANCE WITH SECTION 148-1-4(F) OF THE WEST VIRGINIA LEGISLATIVE RULES AND REGULATIONS.</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *[Signature]* TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

TITLE: Sales Rep FEIN: 52-1633407 ADDRESS CHANGES TO BE NOTED ABOVE

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LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>EXHIBIT 3</p> <p>LIFE OF CONTRACT: THIS CONTRACT BECOMES EFFECTIVE ON AND EXTENDS FOR A PERIOD OF ONE (1) YEAR OR UNTIL SUCH "REASONABLE TIME" THEREAFTER AS IS NECESSARY TO OBTAIN A NEW CONTRACT OR RENEW THE ORIGINAL CONTRACT. THE "REASONABLE TIME" PERIOD SHALL NOT EXCEED TWELVE (12) MONTHS. DURING THIS "REASONABLE TIME" THE VENDOR MAY TERMINATE THIS CONTRACT FOR ANY REASON UPON GIVING THE DIRECTOR OF PURCHASING 30 DAYS WRITTEN NOTICE.</p> <p>UNLESS SPECIFIC PROVISIONS ARE STIPULATED ELSEWHERE IN THIS CONTRACT DOCUMENT, THE TERMS, CONDITIONS AND PRICING SET HEREIN ARE FIRM FOR THE LIFE OF THE CONTRACT.</p> <p>RENEWAL: THIS CONTRACT MAY BE RENEWED UPON THE MUTUAL WRITTEN CONSENT OF THE SPENDING UNIT AND VENDOR, SUBMITTED TO THE DIRECTOR OF PURCHASING THIRTY (30) DAYS PRIOR TO THE EXPIRATION DATE. SUCH RENEWAL SHALL BE IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE ORIGINAL CONTRACT AND SHALL BE LIMITED TO TWO (2) ONE (1) YEAR PERIODS.</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICES SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM TO THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.</p> <p>OPEN MARKET CLAUSE: THE DIRECTOR OF PURCHASING MAY AUTHORIZE A SPENDING UNIT TO PURCHASE ON THE OPEN MARKET, WITHOUT THE FILING OF A REQUISITION OR COST ESTIMATE, ITEMS SPECIFIED ON THIS CONTRACT FOR</p>						

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<p>IMMEDIATE DELIVERY IN EMERGENCIES DUE TO UNFORESEEN CAUSES (INCLUDING BUT NOT LIMITED TO DELAYS IN TRANSPORTATION OR AN UNANTICIPATED INCREASE IN THE VOLUME OF WORK.)</p> <p>QUANTITIES: QUANTITIES LISTED IN THE REQUISITION ARE APPROXIMATIONS ONLY, BASED ON ESTIMATES SUPPLIED BY THE STATE SPENDING UNIT. IT IS UNDERSTOOD AND AGREED THAT THE CONTRACT SHALL COVER THE QUANTITIES ACTUALLY ORDERED FOR DELIVERY DURING THE TERM OF THE CONTRACT, WHETHER MORE OR LESS THAN THE QUANTITIES SHOWN.</p> <p>ORDERING PROCEDURE: SPENDING UNIT(S) SHALL ISSUE A WRITTEN STATE CONTRACT ORDER (FORM NUMBER WV-39) TO THE VENDOR FOR COMMODITIES COVERED BY THIS CONTRACT. THE ORIGINAL COPY OF THE WV-39 SHALL BE MAILED TO THE VENDOR AS AUTHORIZATION FOR SHIPMENT, A SECOND COPY MAILED TO THE PURCHASING DIVISION, AND A THIRD COPY RETAINED BY THE SPENDING UNIT.</p> <p>BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.</p> <p>THE TERMS AND CONDITIONS CONTAINED IN THIS CONTRACT SHALL SUPERSEDE ANY AND ALL SUBSEQUENT TERMS AND CONDITIONS WHICH MAY APPEAR ON ANY ATTACHED PRINTED DOCUMENTS SUCH AS PRICE LISTS, ORDER FORMS, SALES AGREEMENTS OR MAINTENANCE AGREEMENTS, INCLUDING ANY ELECTRONIC MEDIUM SUCH AS CD-ROM.</p> <p>REV. 04/11/2001</p> <p>PURCHASING CARD ACCEPTANCE: THE STATE OF WEST VIRGINIA</p>						

SIGNATURE *[Signature]* TELEPHONE (301) 724-4490 DATE Jan 25, 2009

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PROPOSOR

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12/04/2008	Net 30 days	Hand Del	Final Dest	N/A
BID OPENING DATE: 12/23/2008		BID OPENING TIME: 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>CURRENTLY UTILIZES A VISA PURCHASING CARD PROGRAM WHICH IS ISSUED THROUGH A BANK. THE SUCCESSFUL VENDOR MUST ACCEPT THE STATE OF WEST VIRGINIA VISA PURCHASING CARD FOR PAYMENT OF ALL ORDERS PLACED BY ANY STATE AGENCY AS A CONDITION OF AWARD.</p> <p>EXHIBIT 10</p> <p>REQUISITION NO.:</p> <p>ADDENDUM ACKNOWLEDGEMENT</p> <p>I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.</p> <p>ADDENDUM NO. S:</p> <p>NO. 1</p> <p>NO. 2</p> <p>NO. 3</p> <p>NO. 4</p> <p>NO. 5</p> <p>I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS.</p> <p>VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES</p>						

639000024

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *[Signature]* TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

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ADDRESS CORRESPONDENCE TO ATTENTION OF
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 304-558-2402

RFQ COPY
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PURCHASER

SUPPLIER

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
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 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

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12/04/2008	Net 30 days	Hand Delivered	Final SDest	N/A
BID OPENING DATE: 12/23/2008		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.</p> <p>..... <i>Carol West</i> SIGNATURE</p> <p>..... <i>CAROL WEST</i> COMPANY</p> <p>..... <i>Feb. 10, 2009</i> DATE</p> <p>REV. 11/96</p> <p>NOTICE</p> <p>A SIGNED BID MUST BE SUBMITTED TO:</p> <p>DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130</p> <p>THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:</p> <p>SEALED BID</p> <p>BUYER: 33</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *Carol West* TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

TITLE: Sales Rep FEIN: 52-1633407 ADDRESS CHANGES TO BE NOTED ABOVE

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VENDOR

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LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
RFQ. NO.: 639000024						
BID OPENING DATE: 2/11/2009						
BID OPENING TIME: 1:30 P.M.						
PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID:						
----- (301) 724-6139 -----						
CONTACT PERSON (PLEASE PRINT CLEARLY):						
----- Chris Robson -----						
***** THIS IS THE END OF RFQ 639000024 ***** TOTAL:						462,205

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *[Signature]* TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009
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- Device must contain integrated GPS receiver, antenna, and user interface.
- Device must use a Microsoft Windows Mobile 6 operating system with a minimum of 128 MB RAM and 1 GB of non-volatile flash data storage capacity and a minimum 520 MHz processor.
- Display must be a minimum of 3.5 inches with 480x640 resolutions and be sunlight readable with LED backlight.
- Must meet or exceed durability standards for IP 55.
- Battery should be internal and provide a minimum of 27 Watt hours which will power the device all day.
- Must contain at least one SD card slot compatible for standard SD and also SDHC (high capacity) storage cards.

GPS Receiver

- Must be integrated, dual frequency GPS receiver with L1 (code and carrier) and L2 (carrier) with internal antenna. Must be able to track a minimum of two WAAS satellites simultaneously.
- Must be capable of 30cm accuracy with a minimum number of five satellites and maximum PDOP of 6.
- With an optional external antenna, GPS positions must be capable of 10cm level accuracy.

Device Software

- Software must use full capability of GPS receiver for feature and attribute data collection.
- Software must be fully compatible with existing Trimble Pathfinder Office software currently held by WV DOH. GPS positions recorded with this software must be able to be processed with differential corrections by the existing Pathfinder Office.
- Features and attribute templates must be fully editable and created within the device software. The attributes should include the ability to use pick or category listings.
- Software must be allow viewing of multiple background images at the same time while showing GPS collected data and current GPS position. These background images should include but not limited to the following geo-referenced formats: MrSID, JPEG, TIFF, and BMP.

Specifications
Global Positioning System
Continuously Operating Reference Stations

The goal of this project is to build the infrastructure required for the development of "smart" transportation applications for the State of West Virginia. Technological advances in mapping and surveying has outpaced supporting infrastructure that enables engineering design and construction, spatial management of assets, and navigation. At the heart of this rapid advance in technology is the Global Positioning System (GPS).

In response to GPS technology, government entities, from state to the federal level, are working to increase efficiency by making GPS-related technologies more readily available, while reducing liabilities by insuring compatibility. The National Geodetic Survey has guided this effort by establishing the National GPS Constantly Operating References Stations (CORS) program. The National CORS system is a network of hundreds of GPS base stations whose data are made publicly available for various post-processing applications. In particular, CORS data is utilized to calculate GPS-derived positions with horizontal and vertical accuracies of less than a few centimeters. The National CORS system benefits from multi-purpose cooperative endeavors involving government, academic, commercial, and private organizations.

The infrastructure we are building would provide real-time kinematic (RTK) capabilities for the State of West Virginia which will significantly improve the accuracy of Global Positioning system (GPS) surveying in the State of West Virginia by comparing satellite data with known reference stations.

We are planning to implement the most recent advancement in GPS technology - the scalable GPS reference station infrastructure. GPS infrastructure consists of permanent or semi-permanent GPS receivers operating continuously (24/7). By implementing this infrastructure the State will receive several benefits:

- Geospatial Community no longer needs to set up a separate base station to achieve centimeter accuracy.

- Provide the infrastructure necessary to reduce the cost of future build/design construction projects.
- Life saving capabilities (ex: Sago mining disaster)
- Integrate with a national system that connects with surrounding states.
- Common coordinate reference frame.
- Reference station security.
- Reduced cost for state and private sector field crews for field setup and equipment cost.

Projected users of this information include the West Virginia Department of Transportation, US Army Corps of Engineers, US National Geodetic Survey, WV Department of Environmental Protection, WV Department of Natural Resources, WV Department of Mine Safety, WV Department of Homeland Security, WV Department of Agriculture, and other state and federal agencies. Private and academic institutions as well as research centers would receive significant benefit.

Location and Requirement:

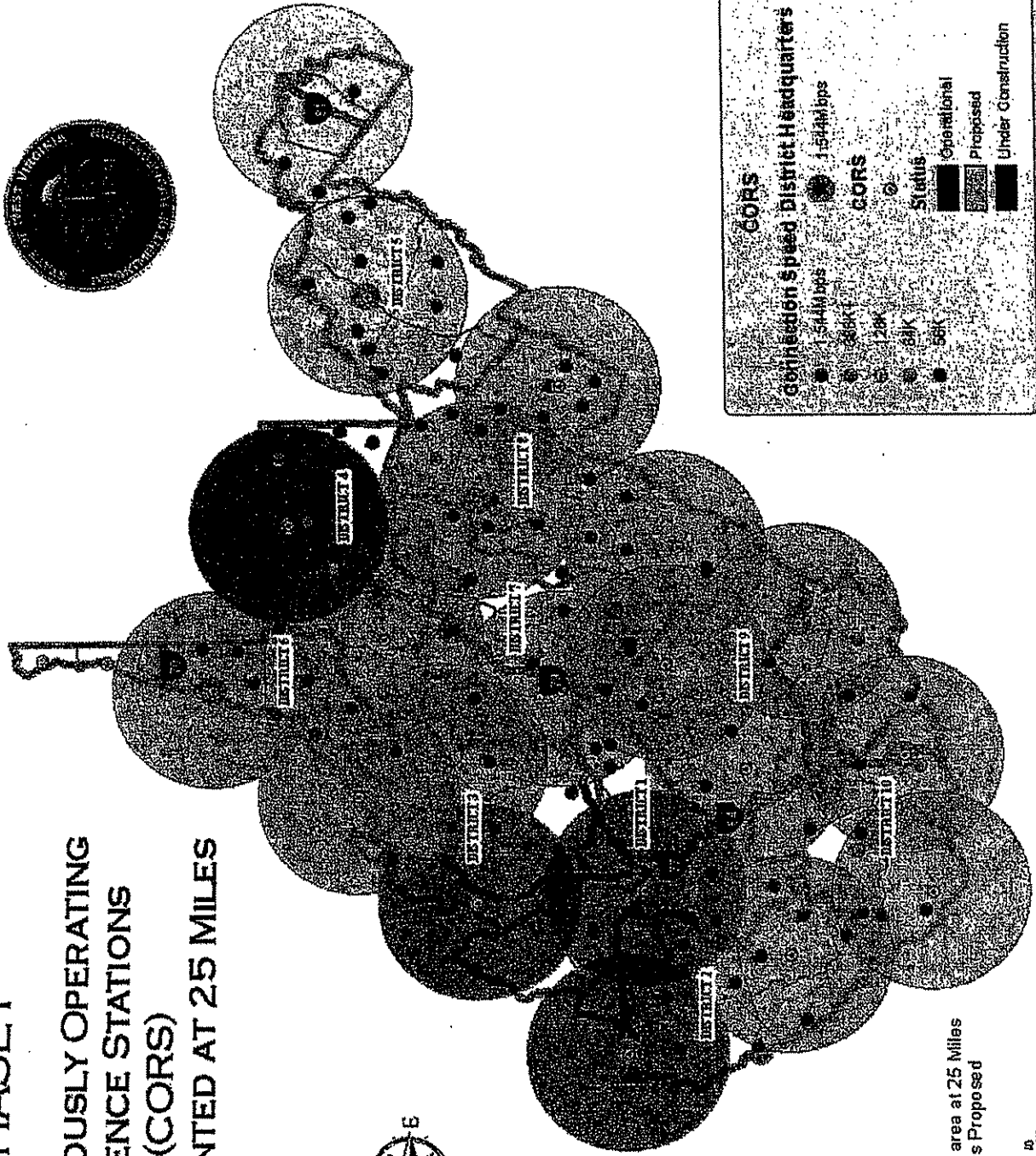
The implementation for this project will consist of two phases. Phase 1 will be the initial densification as shown in figure 1 which will consist of a total of 16 reference stations at the 25 mile radius covering the State. Phase 2 will consist of the improved densification with the goal of reducing the coverage radius to 15 miles but not to include more than 16 additional reference stations. The anticipated time between Phase 1 and Phase 2 will consist of one year.

The station will be located at the District office if the location permits; if not, we shall use any of the fuel sites or county offices since there are some requirements for the installation. All potential sites should be verified with the National Geodetic Survey to meet the requirements of the National Geodetic Survey – continuously Operating Reference Stations – National CORS program. If the requirements are not met, we will evaluate other State-owned facilities to meet the requirements.

The network should be set up as Multiple Base – One address. With this setup, as you move closer to one base and away from the one you are currently connected to, it will automatically switch to the closer base.

The receivers should have multiple ports, allowing for corrections to be broadcast multiple ways. The receivers should also have RS232 ports that would allow for local CMR or RTCM correction transmission or a remote dial-up through a modem. The RS232 ports will need to be available for the DOH survey crews or contractors to connect their radio and broadcast a correction when in weak cell coverage areas. This will benefit the DOH by providing the ability to connect cellular modems and gaining selective IP addresses for use in real time monitoring of bridge towers or other structures. In addition, the use of radio repeater will be required to work with link (cell) connections to the reference station. The receiver should have the ability to use radio repeaters with air link (cell) connections. The air link modem or cell phone would dial up to the CORS Station, then the data would rebroadcast through a radio repeater into the areas of poor cell phone coverage to allow real time surveying.

PHASE I
CONTINUOUSLY OPERATING
REFERENCE STATIONS
(CORS)
REPRESENTED AT 25 MILES



CORS

Connection Speed: District Headquarters

- 1-544Mbps
- 1-544Mbps

CORS

- 1-544Mbps
- 1-544Mbps

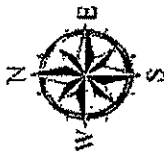
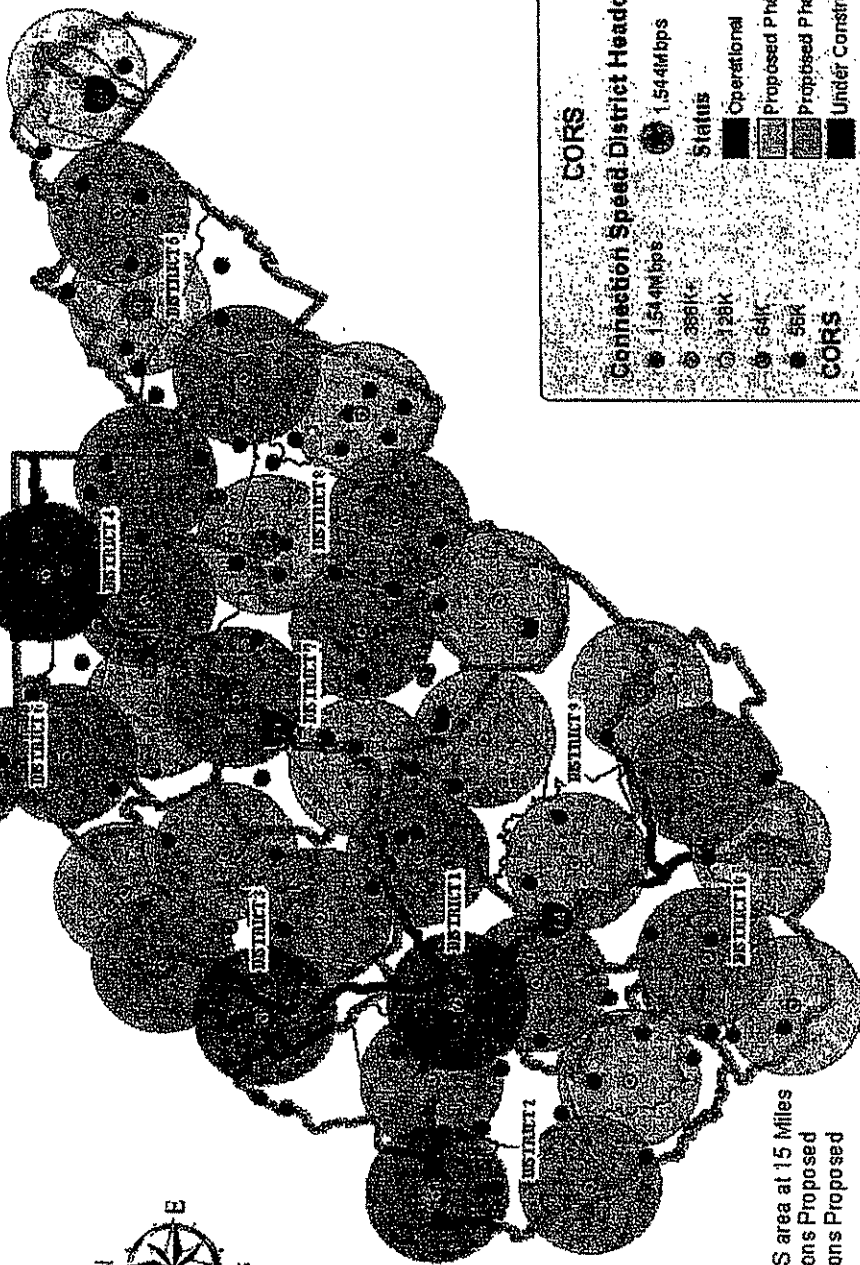
Status

- Operational
- Proposed
- Under Construction

Coverage of CORS area at 25 Miles
 Phase I: 16 Stations Proposed



PHASE II
CONTINUOUSLY OPERATING
REFERENCE STATIONS
(CORS)
REPRESENTED AT 15 MILES



Coverage of CORS area at 15 Miles
 Phase I: 16 Stations Proposed
 Phase II: 17 Stations Proposed



CORS

Connection Speed: District Headquarters

- 1.544Mbps
- 386K
- 128K
- 64K
- 56K

Status

- Operational
- Proposed Phase I
- Proposed Phase II
- Under Construction

CORS

TECHNICAL SPECIFICATION

100 - GENERAL

This specification defines the requirements for GPS Continuously Operating Reference Station equipment and software. All provided items must be standard production models. For each station the hardware will consist of a GPS Geodetic receiver with dual frequency, and many independent channels, up to 20Hz sampling, ~ 1 mm phase precision, with a masonry building mounting kit, antenna, power supply, data cable(s), antenna pre-amp, power supply, manuals, training and support. The system must track all signals from all three global satellite positioning constellations (GPS-Glonass-Galileo) and will need to track 72 channels, with the incorporation of GPS, GPS L1 C/A, L1 and L2 P, L1 and L2 phases, GPS L2C, L5, GLONASS L1 C/A Code, L1 P and L2 P, L1 and L2 phase, and Galileo – IOC/FOC. The receiver must provide all information required for precise surveying with all types of RTK and GIS rovers. Output from the base station must provide GPS, RTK, WASS/EGNOS and DGPS data for transmission from the site by radio or phone, or for distribution from a control center by radio, phone or Internet. RTCM, CMR and CMR+ formats must be supported. Receiver must be capable of meeting requirements for a Continuously Operating Reference Station (CORS) for geodetic, survey, high-accuracy GIS and monitoring applications. The software is to provide the necessary tools for configuration of CORS hardware, receiver operation, data collection and manipulation. NOTE TO VENDORS: The WVDOT currently operates Trimble Brand GPS survey equipment. Any modifications to the Department's equipment for the purposes of compatibility with the provided Stations equipment and/or software shall be at the full expense of the Vendor.

200 - SYSTEM HARDWARE

All GPS hardware that will be included in the bid will be of the same make and model. All hardware and software (including available software specified under ADDITIONAL REQUIREMENTS) shall be from and supported from one source or manufacturer.

201 - RECEIVER

The Vendor shall supply a multi-frequency, minimum 72 channel (GPS L1/L2, L2C, L5, GLONASS L1/L2), network compatible GNSS receiver for CORS reference station purposes.

201.1 – Compliance

- Class B Part 15 and Part 90 FCC certification
- ACMA AS/NZS 4296 approval
- US ST/SG/AC.10.11/Rev. 3, Amend. 1 and 10/27/Add. 2 (Li-Ion Battery)

201.2 – Physical Requirements

- Rugged and suitable for use in field environments that may be hot, cold, wet or dusty.
- Must meet waterproof specification IP67.
- Electronics must be fully sealed from sand, dust and moisture.
- Capable of sustaining vibrations under operating mode according to mil spec MIL-STD 810-F
- Able to operate to measurement specification in temperatures between -40° to +65°C (-40°F to +149°F).
- 100% condensing humidity proof.
- Able to be transported or stored in the following temperature range without sustaining damage to the equipment -40° to +80°C (-40°F to 176°F).

201.3 - Power requirements

- Nominal voltage range of 9 VDC to 30 VDC.
- Multiple power source inputs
- Include over-voltage protection on all power inputs.
- Include reverse polarity protection.
- Allow for power inputs over 30 V without sustaining damage.
- Have nominal power consumption of no more than 4.8W

- Turn on automatically when connected to a DC source that is produced by the manufacturer's AC power supply.
- Auto switch between power sources
- The GNSS receiver must automatically switch between power sources. There must not be a cycle slip or a new logging file created.
- Must be equipped with a non-field-removable Li-Ion battery capable of powering the unit for minimum 12 hours

201.4 - Internal Data Storage

- Minimum 64 MB internal data storage
- Provide for memory expansion via USB-compatible memory media or hard drive
- The internal memory must not be removable.
- Data must be stored in non-volatile RAM.
- Be capable of downloading memory via HTML web browser, Internet Explorer 6.0 or later, Firefox (v1.50) and FTP client.

201.5 – Signal Tracking

- Must support, in RINEX notation: L1, C1, P1, D1, L2, P2, D2*, L5, R1 & R2. On L1: C/A Code, Carrier Phase and Doppler; On L2: P Code (derived under encryption) or, when available, L2C, Carrier Phase On L5 (when available).
- When L2C signals are available, the receiver must be capable of tracking and logging L2C-L and L2C-M range data as the L2 pseudo range.
- Must be able to track and compute corrections available from WAAS geostationary satellites.
- Provide improved tracking in areas of high radio interference such as under power lines, around airports, near radio-intensive construction sites.
- Must be capable of tracking a WAAS / EGNOS / MSAS satellite for real time free of cost differential positioning and base station location.

201.6 – Operation

- Receiver must be capable of logging data at operator selected intervals of 0.1, 0.2, 0.5, 1, 2, 5, 10, 15, 30, 60, 300, 600 seconds.
- The system must be controlled by an HTML web browser; Internet Explorer v 5.0 or newer
- Must have RTCM Output Version 2.1, 2.2, 2.3 and 3.0 available as a standard.
- Must support Virtual Reference Stations server operation as a standard.
- The Receiver must support CMR output and RTCM V2.0 (Type 1 and 3) simultaneously via separate ports.

202 - ANTENNA

The vendor shall supply a multi-channel GNSS antenna that provides a keyboard and display for CORS reference station purposes.

- Cable of receiving GNSS multi-frequency GPS L1, L2 and L2C, L5, as well as GLONASS L2 and L2 frequencies.
- Must operate in the following temperature range -40°C to +70°C (-40°F to 158°F)
- Must be able to be transported and stored in the following temperature range -55°C to +85°C (-67°F to 121°F).
- Must pass the following environmental standards MIL-810-F Figure 514.5c-17 vibration levels on each axis, (while operational) and Shock tested table MIL-810-F Table 516.5-I a 2m (6.56ft) drop (while operational).
- Must be sealed and 100% humidity proof protected against Dust, Wind, Rain, Sand and Snow.
- Sub-millimeter phase center error and enhanced right-hand circular polarization.
- Provide low elevation tracking technology
- Phase center with a <1mm precision stability.
- Must be high gain of at least 50dB on all frequencies.
- Must have a TNC connector for cable connection
- Must have a non-removable ground plane at least 30cm (11.8”) in diameter to reduce ground based multipath.

202.1 – Interfaces

- Minimum three independently configurable RS232 ports for serial data input or output.
- Internal LAN interface
- Support an RJ45 connector with links to 10BaseT/100BaseT networks
- PPP server capability through a serial port to enable remote operations.
- All network functions must be performed through a single IP address
- Network connection must allow multiple security options for varying levels of user access.
- Must support streaming of GNSS observables, RTCM, or CMR data over TCP/IP or UDP links.
- Must support configuration using a web browser over HTTP links.
- Must allow download of logged data files using either FTP or HTTP.
- Minimum three ports capable of handling baud rates up to 115,200.

203 - Software/Firmware

The following specifications outline the requirements of software used to control and manage multiple GNSS CORS stations from a central location.

203.1 - General:

- The Software must be a fully integrated software solution for all functionalities needed at the control center of a reference station network.
- The Software must be capable of working as a system with commercially offered GPS/GLONASS receivers.
- All reference station receivers within the network must be controlled by the software.
- The software must archive all reference station data for Post-Processing services, and processes receiver data epoch by epoch to create RTK Network Corrections from single stations and /or Virtual Reference Stations (VRS), which improve the RTK and DGPS fieldwork.

- The software must also be able to provide both Master Auxiliary Concept style and Non-Physical or Computed Reference Station style Network RTK Corrections as described the RTCM 10403.1 standards.
- Must support legacy RTK and DGPS equipment using RTCM version 2.3 in a VRS mode while also *simultaneously* supporting RTCM 3.1Net style corrections in a Master Auxiliary format.

In general the software must be able to perform the following functions:

- Data collection from the reference stations
- Data storage and processing in the control center
- Produce correction data to field users
- Detect if real-time Ethernet connections to CORS have been lost. Upon re-connection the software must automatically download all remote CORS receiver memories and store the data in existing files. This will assure the State of a high degree of data integrity.
- The Software must work as a fully-integrated system with existing State-owned CORS receivers.

203.2 - Distribution of RTK data:

- The control center software must be capable of generating RTCM or CMR format RTK correction data. The software must be capable of generating RTCM and CMR simultaneously and distributing them on separate ports.
- The software must be capable of simultaneously operating as:
 - a single-base correction generator
 - RTCM 3.1 NET (Master Auxiliary Concept – MAC) standard generator
 - Virtual Reference station (Non-Physical or Computed Reference Station) generator
 - DGPS and RTK correction generator – simultaneously
 - FKP format must be supported *simultaneously* with other formats.

The Software must manage following tasks in this order:

- The software must take streamed (real-time raw data) from all connected reference stations and process the data to produce correction parameters for all observables.
- Antenna phase center corrections (relative or absolute) must be pre-catalogued in the software and are added to the observables.
- The control center software must compute models of ionospheric error, tropospheric error, orbit errors and real-time Multipath.
 - Tropospheric model: Based on a Modified Hopfield Model the software must compute corrections for the troposphere for the reference station. Tropo-model parameters must be sent with each data-block from the Network Processor.
 - Ionospheric model: Based on a Single Layer Model the software must compute corrections for the ionosphere for the reference station. Ionmodel parameters must be sent with each data-block from the Network Processor Processor.
 - Orbit model: Based on ultra rapid orbits the software must compute corrections for the satellite orbits for the reference stations.
- The carrier phase ambiguities must be fixed for the network stations.
- All the parameters of the network error influences must be stored in a database or in the Windows Registry
- Models must be used to predict the errors at each discrete users location.
- A Virtual Reference Station (VRS) must be created for the user location when requested via a rover's NMEA GGA position string. Network Corrections must be sent to the rover in the field using using a bi-directional IP based communication such as: GPRS, CDMA2000, IDEN.
- The VRS data is transmitted to the user in standard formats (RTCM 2.3 messages 18 and 19), RTCM 2.3 messages 20,21, message, released RTCM 3.1 and RTCM3.1NET messages or CMR.

203.3 - Data Communication to the Reference Station Receivers:

- Control Center software must be capable of full IP control of ethernet connected GNSS CORS receivers.
- The Control Center software must be capable of decoding all major brand GNSS CORS receivers.
- The software must be capable of decoding RTCM 3.1 messages with 1 Hz update rate as alternative real-time data input.
- Capability for remote configuration of the CORS Receivers must be via TCP/IP.
- The software must be able to support the following communication types to the Reference Station Receivers:
 - Serial Port Handler: connecting a data source (receiver, network router modem) using a serial cable directly to the software.
 - Socket Client: for connecting the software with the data source (receiver, network router) within a WAN/LAN using a TCP/IP interface. In this case, the data source will act as Socket Server.
 - Socket Server: for connecting the software with the data source (receiver, network router) within a WAN/LAN using a TCP/IP interface. In this case, the data source will act as Socket Client.
 - TAPI Ver 1.4 -2.2 Data Modem: For a connection to the data source (network router modem) via telephone line using any type of modem supported by Windows TAPI interface.
 - Multicast Socket Server: Multiple connections on one TCP/IP address on the same port
- The software must be able to accept Trimble RT27 raw data as streamed from existing GNSS CORS.
- The software must support a backup data line and be capable of automatically switching to a backup communications scheme if the main data line fails. The switch to a backup communications line must be user adjustable from the time of the main communication line failure.

- The software must be able to split the incoming raw data from the reference station receivers to another IP address to share the data with other service providers.

203.4 - Software Features:

- The software must be installed on a central computer(s).
- The software must not require a computer to be installed at each CORS site.
- The software must run under Windows Server 2003.
- The software must be configurable to use backup computers in a way that will allow distributed processing across multiple servers, provide redundancy, provide redundant archiving and split data to other services.
- The backup computer configuration capabilities must be documented and installed in at least three State DOT systems.
- The software must be able to run modular on different computers to support any network size and to support any numbers of incoming connections from field RTK rovers.
- The software must be able to process a network of 50 stations or more on one single PC computer.
- The graphical user interface of the software must contain the following items: a menu bar, a status bar, a navigator pane, an information pane, graph windows, output windows and control windows.
- The Software must be able to control an unlimited numbers of Reference Station Receivers.
- The software must be able to display the data (network) latency of the incoming data from the reference stations. This display must be in the form of a continuously updating bar graph showing latest packet delay and average network latency over a known number of epochs. This display must be capable of showing status and latency of all stations in a single window.
- The software must be able to analyze the data quality of the Reference Station Receivers.

- The software must be able to do Real-Time Multipath analyses of the reference station antennas and display this data as a color-coded polar plot.
- The software must be able to display temperature and voltage for suitably equipped receivers.
- The software must be able to save and load different configurations (without terminating the software).
- The software must be able to analyze and check the following subjects (with graphical and numerical display):
 - Point Position Analysis: showing difference, with respect to time, of north, east, height and horizontal differences between calculated and known position in meters
 - Single Point Position: computation of position averages and standard deviations from a receivers raw data
 - Raw Data: analysis and display of consistency of dual-frequency data for each satellite
 - Ionospheric Analysis: values show the effects on the measurement of satellites. These must be displayed for L1 in meters or as Total Electronic Count of the ionosphere. Values must be available in a single window for the current epoch, mean for the past 60 seconds, standard deviation for the past 60 seconds, minimum and maximum values over the past 60 seconds.
 - RAIM (Receiver Autonomous Integrity Monitoring) Analysis: The software must perform two RAIM functions. First, a receiver must monitor its own integrity without external position information. Second the RAIM capability must cross check to a Single-Point Position.
 - Availability: calculates and reports the availability of satellite observations. This data must be capable of being stored in a MS Office Access database
- The Software must be able to utilize Predicted Ultra Rapid Orbits published on the Internet by NASA Jet Propulsion Labs and the University of Bern.
- The software must be able to perform continuous coordinate monitoring of the reference stations. Graphical displays of the results must be implemented in the

software. The coordinate monitoring analysis must be capable of detecting errors in defined coordinates, wrong definition of antenna heights or antenna types.

- The software must have a network model integrity function.
- Software must be able to store multiple different files in RINEX, compact RINEX and Trimble .DAT format for each station as supplied by existing State-Owned CORS.
- The software must be able to support the NGS cooperative CORS file site structure.
- The software must be able to upload the RINEX data on a FTP Server automatically.
- The Software must be able to simultaneously support two network wide-area modelled real-time techniques.
- The software must display the I95 Index.
- Optionally, the software must be able to provide a web based solution for the delivery of RINEX data and provide VRS (modelled) RINEX data for a user-defined position.
- The Control Center software must be capable of distributing logged-on Rover locations via NMEA format to other applications.
- The software must be able to run continuous statistical analysis of rover positioning precision and accuracy, as well as initialization time and reliability.

203.5 - Alarm Generation:

The software must be able to generate alarms based on the following status:

- *Disk Watch*: Low disk space
- *Receivers*: No data from receiver
- Low virtual memory
- Station not available, corrections for station not available
- *RTK*: Not enough satellites fixed for a station
- *DGPS*: Not enough satellites fixed for a station
- *Rover positioning*: Initialization reliability too low, Initialization time >200 seconds, RMS of 3D position too high

If one of the software modules reports an error, an alarm window must pop up. Once an alarm is issued based on the individual configuration, the software must support different actions to perform after the alarm is issued:

- Send E-mail(s)
- Send compact E-mail(s)
- Play acoustic signal
- Send modem command
- Send boot command to power switch.
- Run a batch file

203.6 - Data Communication to the Users in the Field:

- Software must support the RTCM 3.1 standard
- Software must support the RTCM 3.1NET standard
- Software must support the RTCM 2.3 standard
- Software must support the CMR and CMR+ formats
- The software must be able to provide VRS and networking corrections in FKP at the same time.
- The software must be able to provide unlimited numbers of individual VRS stations to the users in the field
- The software must be able to support GSM, GPRS, CDMA2000, 1xRTT, IDEN for rover connections.
- The software must be able to support a dial-in broadcast when using GPRS.
- The software must be able to support NTRIP when using IP capable cellular connections.
- The software must provide user Authentication through username and password when using IP capable cellular connections.

203.7 - References:

- The supplier must state a proven track record supplying hardware and software for GNSS networks using the VRS technology.
- The supplier must state at least three networks with more than 100 reference stations connected supporting the VRS or FKP technology.
- The supplier must have installations in three or more networks of at least 50 stations owned and operated by North American State Departments of Transportation.
- The supplier must manufacture and own all rights to supplied hardware and software under a common label.

ADDITIONAL REQUIREMENTS:

This software must enable a single PC to centrally control and monitor all reference stations in network. Software must provide user with graphical analysis tools for monitoring the quality of the GPS reference network. Must provide user defined warnings and alarms and will notify the user or users on computer screen and/or text messages over cellular phone or pager when there are problems with the system. Software must be stable on MS Windows platforms. Software must log raw data in real-time and covert data to rinex files for storage on a central networked computer or server. Software must be able to compute and provide differential correctors using RTCM format for each station through the computer network.

The manufacturer must have been in business for a minimum of 5 years.

Annual service agreements or extended warranties must be available.

Minimum of 2 year warranty on hardware.

VENDOR PREFERENCE CERTIFICATE

Certification and application* is hereby made for Preference in accordance with West Virginia Code, §5A-3-37. (Does not apply to construction contracts). West Virginia Code, §5A-3-37, provides an opportunity for qualifying vendors to request (at the time of bid) preference for their residency status. Such preference is an evaluation method only and will be applied only to the cost bid in accordance with the West Virginia Code. This certificate for application is to be used to request such preference. The Purchasing Division will make the determination of the Resident Vendor Preference, if applicable.

- 1. Application is made for 2.5% resident vendor preference for the reason checked: Bidder is an individual resident vendor and has resided continuously in West Virginia for four (4) years immediately preceding the date of this certification; or, Bidder is a partnership, association or corporation resident vendor and has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or 80% of the ownership interest of Bidder is held by another individual, partnership, association or corporation resident vendor who has maintained its headquarters or principal place of business continuously in West Virginia for four (4) years immediately preceding the date of this certification; or, Bidder is a nonresident vendor which has an affiliate or subsidiary which employs a minimum of one hundred state residents and which has maintained its headquarters or principal place of business within West Virginia continuously for the four (4) years immediately preceding the date of this certification; or,
2. Application is made for 2.5% resident vendor preference for the reason checked: Bidder is a resident vendor who certifies that, during the life of the contract, on average at least 75% of the employees working on the project being bid are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,
3. Application is made for 2.5% resident vendor preference for the reason checked: Bidder is a nonresident vendor employing a minimum of one hundred state residents or is a nonresident vendor with an affiliate or subsidiary which maintains its headquarters or principal place of business within West Virginia employing a minimum of one hundred state residents who certifies that, during the life of the contract, on average at least 75% of the employees or Bidder's affiliate's or subsidiary's employees are residents of West Virginia who have resided in the state continuously for the two years immediately preceding submission of this bid; or,
4. Application is made for 5% resident vendor preference for the reason checked: Bidder meets either the requirement of both subdivisions (1) and (2) or subdivision (1) and (3) as stated above; or,
5. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked: Bidder is an individual resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard and has resided in West Virginia continuously for the four years immediately preceding the date on which the bid is submitted; or,
6. Application is made for 3.5% resident vendor preference who is a veteran for the reason checked: Bidder is a resident vendor who is a veteran of the United States armed forces, the reserves or the National Guard, if, for purposes of producing or distributing the commodities or completing the project which is the subject of the vendor's bid and continuously over the entire term of the project, on average at least seventy-five percent of the vendor's employees are residents of West Virginia who have resided in the state continuously for the two immediately preceding years.

Bidder understands if the Secretary of Revenue determines that a Bidder receiving preference has failed to continue to meet the requirements for such preference, the Secretary may order the Director of Purchasing to: (a) reject the bid; or (b) assess a penalty against such Bidder in an amount not to exceed 5% of the bid amount and that such penalty will be paid to the contracting agency or deducted from any unpaid balance on the contract or purchase order.

By submission of this certificate, Bidder agrees to disclose any reasonably requested information to the Purchasing Division and authorizes the Department of Revenue to disclose to the Director of Purchasing appropriate information verifying that Bidder has paid the required business taxes, provided that such information does not contain the amounts of taxes paid nor any other information deemed by the Tax Commissioner to be confidential.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), Bidder hereby certifies that this certificate is true and accurate in all respects; and that if a contract is issued to Bidder and if anything contained within this certificate changes during the term of the contract, Bidder will notify the Purchasing Division in writing immediately.

Bidder: CARON EAST Signed: [Signature] Title: SALES REP Date: Feb 10, 2009

*Check any combination of preference consideration(s) indicated above, which you are entitled to receive.

STATE OF WEST VIRGINIA
Purchasing Division**PURCHASING AFFIDAVIT****VENDOR OWING A DEBT TO THE STATE:**

West Virginia Code §5A-3-10a provides that: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

PUBLIC IMPROVEMENT CONTRACTS & DRUG-FREE WORKPLACE ACT:

West Virginia Code §21-1D-5 provides that: Any solicitation for a public improvement construction contract shall require each vendor that submits a bid for the work to submit at the same time an affidavit that the vendor has a written plan for a drug-free workplace policy in compliance with Article 1D, Chapter 21 of the West Virginia Code. A public improvement construction contract may not be awarded to a vendor who does not have a written plan for a drug-free workplace policy in compliance with Article 1D, Chapter 21 of the West Virginia Code and who has not submitted that plan to the appropriate contracting authority in timely fashion. For a vendor who is a subcontractor, compliance with Section 5, Article 1D, Chapter 21 of the West Virginia Code may take place before their work on the public improvement is begun.

ANTITRUST:

In submitting a bid to any agency for the state of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the state of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the state of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the state of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership or person or entity submitting a bid for the same materials, supplies, equipment or services and is in all respects fair and without collusion or fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

LICENSING:

Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agencies or political subdivision. Furthermore, the vendor must provide all necessary releases to obtain information to enable the Director or spending unit to verify that the vendor is licensed and in good standing with the above entities.

CONFIDENTIALITY:

The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures and rules. Vendors should visit www.state.wv.us/admin/purchase/privacy for the Notice of Agency Confidentiality Policies.

Under penalty of law for false swearing (West Virginia Code §61-5-3), it is hereby certified that the vendor acknowledges the information in this said affidavit and is in compliance with the requirements as stated.

Vendor's Name: CAROL EAST
 Authorized Signature: [Signature] Date: 2/10/2009



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 639000024

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 MICHAEL AUSTIN
 304-558-2402

RFQ COPY
 TYPE NAME/ADDRESS HERE

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
12/11/2008	net 30 Days	Hand Del	Final Dest	N/A
BID OPENING DATE: 12/23/2008		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM #01						
LINE 1 GPS POSITIONING SYSTEMS WITH RECEIVER						
	READS: QUANTITY 1					
	TO READ: QUANTITY 11					
LINE 2 GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION.						
	READS: QUANTITY 1					
	TO READ: QUANTITY 11					
BID OPENING DATE AND TIME REMAINS 12/23/08 @ 1:30 P.M						
NO OTHER CHANGES						
0001	11	EA	840-45	GPS POSITIONING SYSTEMS WITH RECEIVER	4,191	46,101
0002	11	EA	840-45	GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION	13,003.25	143,035.75

SIGNATURE: *[Signature]* SEE REVERSE SIDE FOR TERMS AND CONDITIONS

TITLE: Sales Rep FERN 52-1633407 TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 639000024

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 MICHAEL AUSTIN
 804-558-2402

RFQ COPY
 TYPE NAME/ADDRESS HERE

VENDOR

SHIP TO

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED 12/11/2008	TERMS OF SALE Net 30 days	SHIP VIA Hand Del	FOB Final Dest	FREIGHT TERMS N/A
BID OPENING DATE: 12/23/2008		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM #02						
LINE 2 GPS POSITIONING SYSTEMS CONSTANTLY OPERATING STATION.						
	READS: 11					
	TO READ: 32					
NO OTHER CHANGES						
0001	11	EA		840-45	4191	46101
GPS POSITIONING SYSTEMS WITH RECEIVER						
0002	32	EA		840-45	13,003.25	416,104
GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *[Signature]* TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

TITLE: Sales Rep FEIN: 52-1633407 ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

REQ NUMBER
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PAGE
 1

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 304-558-2402

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 TYPE NAME/ADDRESS HERE

DIVISION OF HIGHWAYS
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 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
12/22/2008	Net 30 days	Hand Del.	Final Dest	N/A
BID OPENING DATE: 01/07/2009		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM #03						
BID OPENING DATE AND TIME CHANGE						
FROM: 12/23/2008						
TO: 01/07/2009						
NO OTHER CHANGES						
0001	11	EA	840-45	GPS POSITIONING SYSTEMS WITH RECEIVER	4191	46101
0002	32	EA	840-45	GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION	13003.25	416104
***** THIS IS THE END OF RFQ 639000024 ***** TOTAL:						462205

SIGNATURE: *[Signature]* SEE REVERSE SIDE FOR TERMS AND CONDITIONS

TITLE: Sales Rep FEIN: 52-1633407 TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
639000024

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF
MICHAEL AUSTIN
304-558-2402

RFQ COPY
 TYPE NAME/ADDRESS HERE

POSTING

SHIP TO

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
01/06/2009	Net 30 Days	Hand Del	Final Dest	N/A
BID OPENING DATE: 01/21/2009		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UQP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM NO. 4						
BID OPENING DATE AND TIME CHANGED						
FROM: 01/07/2009 AT 1:30 P.M.						
TO: 01/21/2009 AT 1:30 P.M.						
NO OTHER CHANGES						
0001	11	EA		840-45	4191	46101
GPS POSITIONING SYSTEMS WITH RECEIVER						
0002	32	EA		840-45	13,003.25	416,104
GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION						
***** THIS IS THE END OF RFQ 639000024 ***** TOTAL:						462,205

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: *[Signature]* TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

TITLE: Sales Rep FEIN: 52-1633407 ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 639000024

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 MICHAEL AUSTIN
 804-558-2402

RFQ COPY
 TYPE NAME/ADDRESS HERE

PURCHASER

SHIP TO

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
01/16/2009	Net 30 Days	Hand Del	Final Dest	N/A
BID OPENING DATE: 01/28/2009		BID OPENING TIME: 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM NO. 5						
BID OPENING DATE AND TIME CHANGED						
FROM: 01/21/09 AT 1:30 P.M.						
TO: 01/28/09 AT 1:30 P.M.						
NO OTHER CHANGES						
0001	11	EA		840-45	4191	461101
GPS POSITIONING SYSTEMS WITH RECEIVER						
0002	32	EA		840-45	13,003.25	416,104
GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION						
***** THIS IS THE END OF RFQ 639000024 ***** TOTAL:						462,205

SIGNATURE: *[Signature]* SEE REVERSE SIDE FOR TERMS AND CONDITIONS

TITLE: Sales Rep FEIN: 52-1633407 TELEPHONE: (301) 724-4490 DATE: Jan 25, 2009

ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 639000024

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 MICHAEL AUSTIN
 304-558-2402

RFQ COPY
 TYPE NAME/ADDRESS HERE

VENDOR

SHIP TO

DIVISION OF HIGHWAYS
 CHIEF OF INFORMATION SYSTEMS
 BUILDING 5
 1900 KANAWHA BOULEVARD, EAST
 CHARLESTON, WV
 25305-0430 304-558-0408

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
01/26/2009	Net 30 days	delivered	Final Dest	N/A

BID OPENING DATE: 02/11/2009 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM NO. 6						
BID OPENING DATE AND TIME CHANGED						
FROM: 01/28/09 AT 1:30 P.M.						
TO: 02/11/09 AT 1:30 P.M.						
NO OTHER CHANGES						
0001	11	EA		840-45	\$4,191	\$46,101
GPS POSITIONING SYSTEMS WITH RECEIVER						
0002	32	EA		840-45	\$13,003.25	\$416,104
GPS POSITIONING SYSTEM CONSTANTLY OPERATING STATION						
***** THIS IS THE END OF RFQ 639000024 ***** TOTAL:						\$462,205

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>Christie Wilb</i>	TELEPHONE (301) 724-4490	DATE Feb 10, 2009
TITLE Sales Rep	FEIN 52-1633407	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

ADDENDUM NO. 7

Page 16, Technical Specifications, Section 202, Antenna

Revise specification to read:

Specification: The vendor shall supply a multi-channel GNSS antenna.

Page 17, Technical Specifications, Section 202.1 – Interfaces

Move the ten bullets to: Item 201.7

ADD THE FOLLOWING TO THE END OF SECTION 100

Vendor's CORS Hardware and Firmware Support Agreement shall be extended to Five Years. Vendor should review the attached "Phase I" and "Phase II" with station addresses for Station Locations.

ADD THE FOLLOWING BID ITEMS:

Phase 1 Software

Quantity: 1

Vendor shall provide Multiple Base Software for unlimited number of CORS Stations to Interface via a WVDOH provided high speed internet network and network hardware. Phase 1 Software will permit individual Base Stations to come online as installs are completed. Vendor will provide remote Software Support, Upgrades, and Warranty for Phase 1 Software for a period of five years from date of issued Purchase Order.

- The Control software must be capable of communicating with CORS using native Trimble RT17 and TRT27 protocols to assure compatibility with currently-owned state equipment.
- Detect if real-time Ethernet connections to CORS have been lost. Upon reconnection the software must automatically download all remote CORS receiver memories and store the data in existing files. This will assure a high degree of data integrity.
- The software must work as a fully-integrated system with existing State-owned CORS receivers.
- The software must be capable of simultaneously operating as:
 - A single-base correction generator
 - RTCM 3.1 NET (Master Auxiliary Concept - MAC) standard generator
 - Virtual Reference Station (Non-Physical or Computed Reference Station) generator
 - DGPS and RTK correction generator – simultaneously
- The software must incorporate SPAM filters for web site registration and post-processing services.
- The software will validate registration entries, searching for duplicate entries or assigning login values for new users. All users will be required to key in a security code for registration validation.

- The software security code activation will make use of CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart) to generate security code
- The Control Centre software must be capable of distributing logged-on rover locations via NMEA format to other applications.

Phase 2 Software Upgrade Quantity: 1

Vendor shall provide VRS Network Software Upgrade for unlimited number of CORS Stations to Interface via a WVDOH provided high speed internet network and network hardware. Vendor will provide remote Software Support, Upgrades, and Warranty for Phase 2 Software for a period of five years from date of issued Purchase Order. Vendor will supply a recommended Minimum Network Server / Hardware Component List for full VRS Network Upgrade to insure WVDOH IT Professionals specify and provide adequate network hardware from the system start up. Vendors should be aware the CORS Network might be expanded to include additional surrounding States CORS Stations to insure full Network coverage of the State of West Virginia.

Masonry Building Mounting Kit

Vendor must supply a sketch and parts list of supplied components of the proposed Masonry Building Mounting Kit. Vendor must refer to NGS Technical Specification Document titled "Guidelines for New and Existing Continuously Operating Reference Stations (CORS)" Dated " February, 2006" to insure the Masonry Building Mounting Kit design complies with those requirements set forth to be designated as a "National CORS". This line item also includes all previously unaddressed CORS installation hardware components in this bid document including: Low signal loss GPS Antenna Cables, GPS Antenna inline lightning arrestor, Uninterruptable power supply for CORS Receiver.

Vendor requirement

- The supplier must state at least three (3) networks with more than 100 reference stations connected supporting the VRS or FKP technology.
- The supplier must have installations in three or more networks of at least 50 stations owned and operated by North American State Departments of Transportation.
 - The networks must be operating and not consist of sales whereby equipment is uninstalled or non-commissioned.
 - The system(s) must be in operational use as part of a real-time network to be considered references.

West Virginia Department of Transportation:

Proposed COR Stations Phase I & II

17. Seth Substation
 WV 3 – 0.75 Mi. South of Jct. CR 3/3
 304-837-3642
 Boone County

18. Hurricane Substation
 WV 34 – 0.2 Mi. East of Hurricane Creek Road
 304-562-6641
 Putnam County

19. Maysel Stockpile
 Jct. WV 4 & WV 36
 Clay County

20. Crum Substation
 US 52 – 2.5 Mi. South of Jct. WV 152
 304-393-4052
 Wayne County

21. Roane County Headquarters
 296 Charleston Road
 Spencer, WV 25276
 304-927-0962

22. District Three Headquarters
 624 Depot Street
 Parkersburg, WV 26101
 304-420-4595

23. Taylor County Headquarters
 Route 2, Box 502
 Grafton, WV 26354
 304-265-6110

24. Aurora Substation
 US 50 – 0.5 Mi. West of Aurora
 304-735-3311
 Preston County

25. Grant County Headquarters
 HC 59, Box 245

Petersburg, WV 26847
 304-257-4455

26. Slanesville Substation
 WV 29 – 0.8 Mi. East of Jct. CR 3 & CR 45/20
 304-496-7387
 Hampshire County

27. Pine Grove Substation
 WV 20 – 0.3 Mi. West of Pine Grove
 304-889-3251
 Wetzel County

28. Brooke County Headquarters
 RD 2, Box 615
 Wellsburg, WV 26070
 304-238-1199

29. District Seven Headquarters
 255 Depot Street
 Weston, WV 26452
 304-269-0407

30. Pickens Substation
 CR 45 – at the Jct. of CR 46/1 & CR 45
 304-924-5544
 Randolph County

31. Thornwood Stockpile
 CR 28/19 – 0.2 Mi. North of US 250 near Bartow
 Pocahontas County

32. Summers County Headquarters
 HC 77, Box 99
 Hinton, WV 25951
 304-466-2802

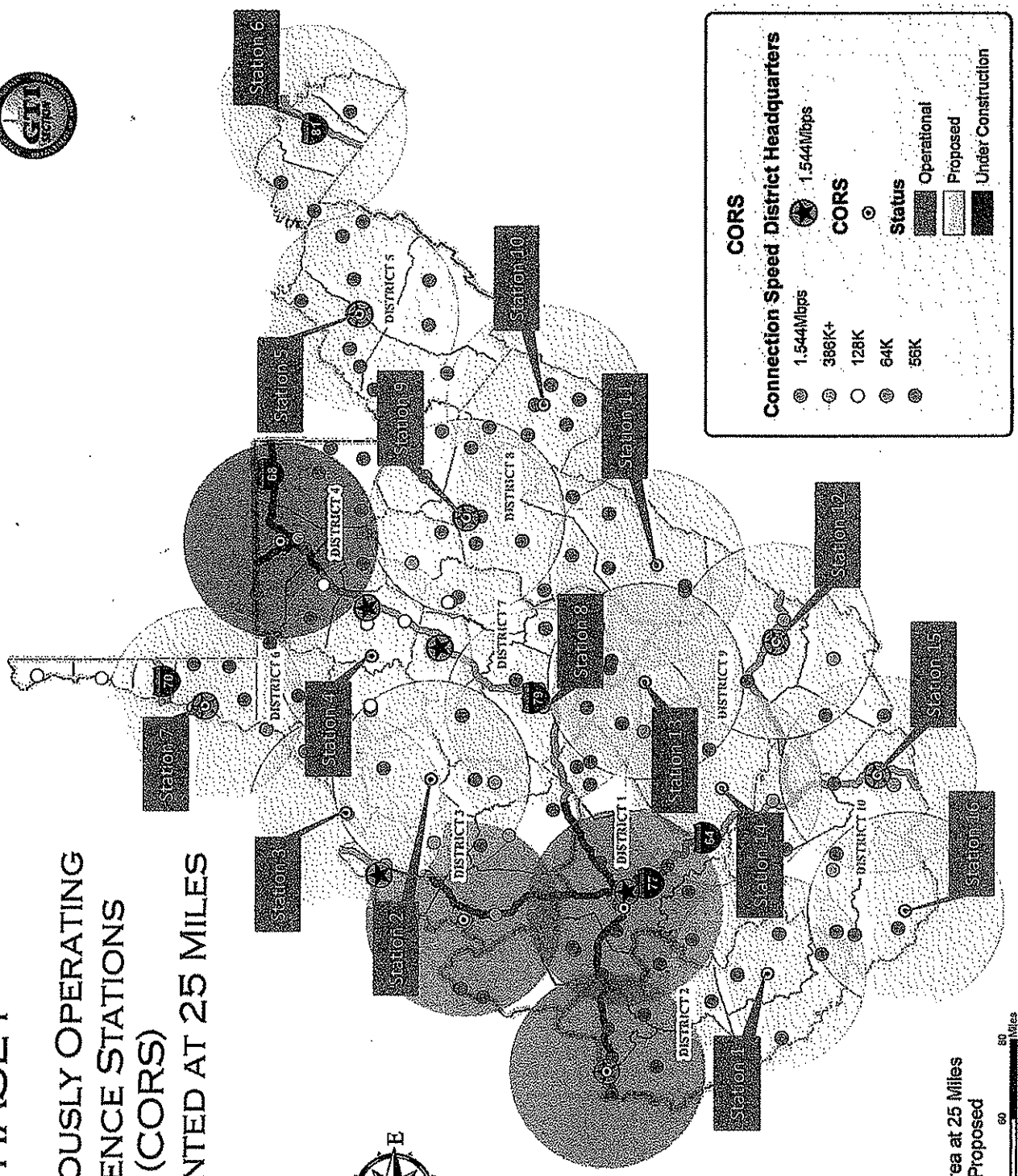
33. District Ten Headquarters
 270 Hardwood Lane
 Princeton, WV 24740
 304-487-5228

West Virginia Department of Transportation:

Proposed COR Stations Phase I & II

1. Logan County Headquarters
P.O. Box 511
Wilkinson, WV 25653
304-792-7035
2. Smithville Stockpile
WV 47 - 0.2 Mi. East of Jct. WV 47 & WV 165
Ritchie County
3. Colin Anderson Stockpile
Near WV 2 - 3.2 Mi. North of Jct. WV 2 & WV 16
Pleasants County
4. Corridor D, Section 2 (Tunnel Hill)
US 50 Flinderation Rd.
West Clarksburg, WV 26426
304-627-2410
5. District 5 Headquarters
P.O. Box 99
Burlington, WV 26710
304-289-3521
6. Berkeley County Headquarters
1867 Rock Cliff Drive
Martinsburg, WV 25401
304-267-0060
7. District Six Headquarters
1 DOT Drive
Moundsville, WV 26041
304-843-4000
8. Braxton County Headquarters
1001 State Street
Gassaway, WV 26624
304-364-5238
9. District Eight Headquarters
P.O. Box 1516
Elkins, WV 26241
304-637-0220
10. Pendleton County Headquarters
P.O. Box 36
Franklin, WV 26807
304-358-2702
11. Pocahontas County Headquarters
Rt. 1, Box 51
Marlinton, WV 24954
304-799-4867
12. District Nine Headquarters
103 1/2 Church Street
Lewisburg, WV 24901
304-647-7450
13. Curtin Substation
8238 Ridgewood Rd.
Craigsville/Fenwick, WV
Nicholas County
304-846-9501
14. Fayette County Headquarters
1885 East Main Street
Oak Hill, WV 25901
304-256-6940
15. District Ten Headquarters
270 Hardwood Lane
Princeton, WV 24740
304-487-5228
16. Yukon Substation
WV 83 - West of Jct. WV 16, near War
304-875-3845
McDowell County

PHASE I
CONTINUOUSLY OPERATING
REFERENCE STATIONS
(CORS)
REPRESENTED AT 25 MILES



Coverage of CORS area at 25 Miles
 Phase I: 16 Stations Proposed

CORS

Connection Speed District Headquarters

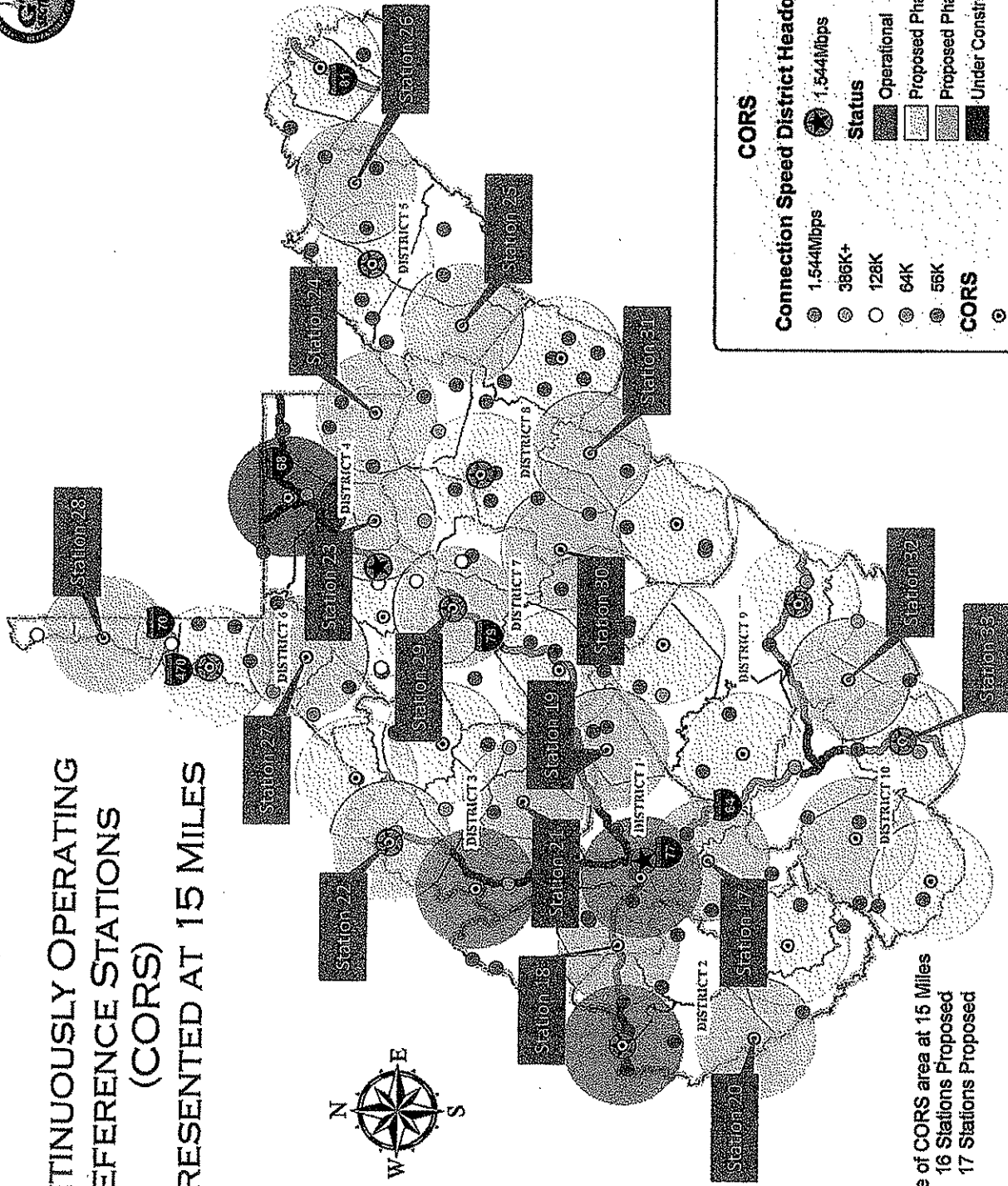
- 1.544Mbps
- 386K+
- 128K
- 64K
- 56K

CORS

- Operational
- Proposed
- Under Construction



PHASE II
CONTINUOUSLY OPERATING
REFERENCE STATIONS
(CORS)
REPRESENTED AT 15 MILES



CORS

Connection Speed District Headquarters

- 1.544Mbps
- 386K+
- 128K
- 64K
- 56K

Status

- Operational
- Proposed Phase I
- Proposed Phase II
- Under Construction

CORS

-

Coverage of CORS area at 15 Miles
 Phase I: 16 Stations Proposed
 Phase II: 17 Stations Proposed





GRS-1

Mobile Mapping & GIS Solution



All-in-one handheld GNSS Receiver and Field Controller

- INTERNAL GNSS (GPS + GLONASS) SATELLITE RECEIVER
- QUAD-BAND AND CDMA INTERNAL CELLULAR
- 806MHZ XSCALE PROCESSOR
- WINDOWS® MOBILE 6.0 OPERATING SYSTEM
- 2.0 MEGAPIXEL CAMERA, BAR CODE READER
- 256MB SDRAM, 1GB FLASH
- INTERNAL MAGNETIC COMPASS
- BUILT-IN BLUETOOTH® WIRELESS TECHNOLOGY AND WIFI CONNECTIVITY

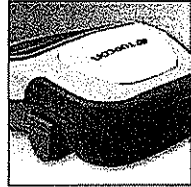
All-in-one

If you are looking for an all-in-one, rugged handheld GNSS (GPS + GLONASS) receiver and field controller, look no further than Topcon's GRS-1. With 256MB of SDRAM and an 806MHz processor on-board, the GRS-1 provides the fastest handheld performance on the market. Collect L1 GNSS satellite positioning and timing measurements with the internal GNSS receiver. In addition, with the Windows® Mobile 6.0 operating system you can run Topcon applications or third party software. Internal cellular capability makes network solutions possible.



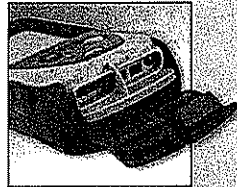
Built-in 2.0 Megapixel Camera with Bar Code Reader

That's right, the GRS-1 comes with a 2.0 megapixel camera with autofocus for taking pictures. Store photos on-board with the 1GB of Flash memory or use the external SD card slot for additional memory. The digital camera also doubles as a bar code reader. Scan information directly into a text field or come up with your own unique application, the possibilities are endless with this function!



Extra Memory

With 1GB Flash standard, the GRS-1 is loaded with memory. But if you need more, the SD card slot and the mini USB Host functionality can provide additional memory. Use the USB mini port as both a Host and Client. This functionality allows for expanded memory and easy file transfer through USB flash drives or SD memory cards.



Bluetooth® and WiFi

Built-in Bluetooth® wireless technology and WiFi connectivity come standard. No need for expensive upgrades or CF cards. Use your device in a typical Hotspot to surf the web, check weather or e-mail files back to the office. When not in use, Topcon also provides a way to turn Bluetooth® and WiFi off to conserve battery power.

Built to give you the power you need, Topcon's GRS-1 is the perfect solution for any GIS field project.



Topcon Positioning Systems, Inc.
7400 National Drive • Livermore, CA 94550
www.topconpositioning.com

Specifications subject to change without notice

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GRS-1 Specifications

Number of Channels

72 GPS/Glonass L1/L2, GPS L2C

Accuracy

DGPS
Static
PP Kinematic
RTK

<1m* (1 sigma)
L1 (1 sigma)
H: 3mm + 0.8ppm
V: 4mm + 1ppm
L1 + L2
H: 3mm + 0.5ppm
V: 5mm + 0.5ppm
L1 (1 sigma)
H: 10mm + 1ppm
V: 15mm + 1ppm
(1 sigma)
H: 10mm + 1ppm
V: 15mm + 1ppm

Realtime DGPS

RTCM, Beacon, WAAS, EGNOS, MSAS

CORS Beacon

Yes with BR-1

Processor

PXA320

Processor Speed

806MHz

Operating System

Windows® Mobile 6.0

Memory

256MB SDRAM
1GB Flash

Interface

USB
Card Slot

Mini Port
SD

GNSS Receiver

GPS + GLONASS

Cell Phone Modem

Quad band GSM, CDMA

Input/Output

Bluetooth®, USB, Serial, ANT, and Power

Bluetooth®

Bluetooth Standard v1.2

Display

3.7" VGA LCD

Built-in Camera

2.0 Megapixel, Bar Code Reader

Keyboard

3 Key plus Virtual Keyboard

Magnetic Compass

Internal, 4 degree accuracy

Expansion Connector

Weatherproof Communication Port

Battery Life

5 hrs in GPS mode,

3.7 hrs GPS + cell phone mode

Battery Type

2500mAh Removable, Li-Ion Rechargeable

Dimensions

8.38" x 3.66" x 1.81" (213 x 93 x 46mm)

Weight

1.7lbs (0.77kg)

Environmental

IP66, 1 meter drop

-20° to 50°C Operating Temperature

-10° to 50°C Operating with camera

-30° to 60°C Storage Temperature

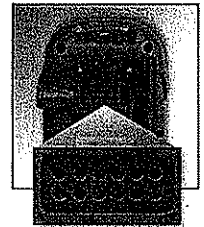
*<50cm with external antenna

Additional Features

Expansion Connector: Located on the back of the GRS-1 is a weatherproof communication port for increased functionality and future communications.

Internal Magnetic Compass: Utilizing compass bearing with GNSS positioning, the magnetic compass allows for additional measurements to be taken from a single location.

Virtual Alpha Keyboard: A virtual keyboard is provided on the screen for data entry.



Expansion Connector

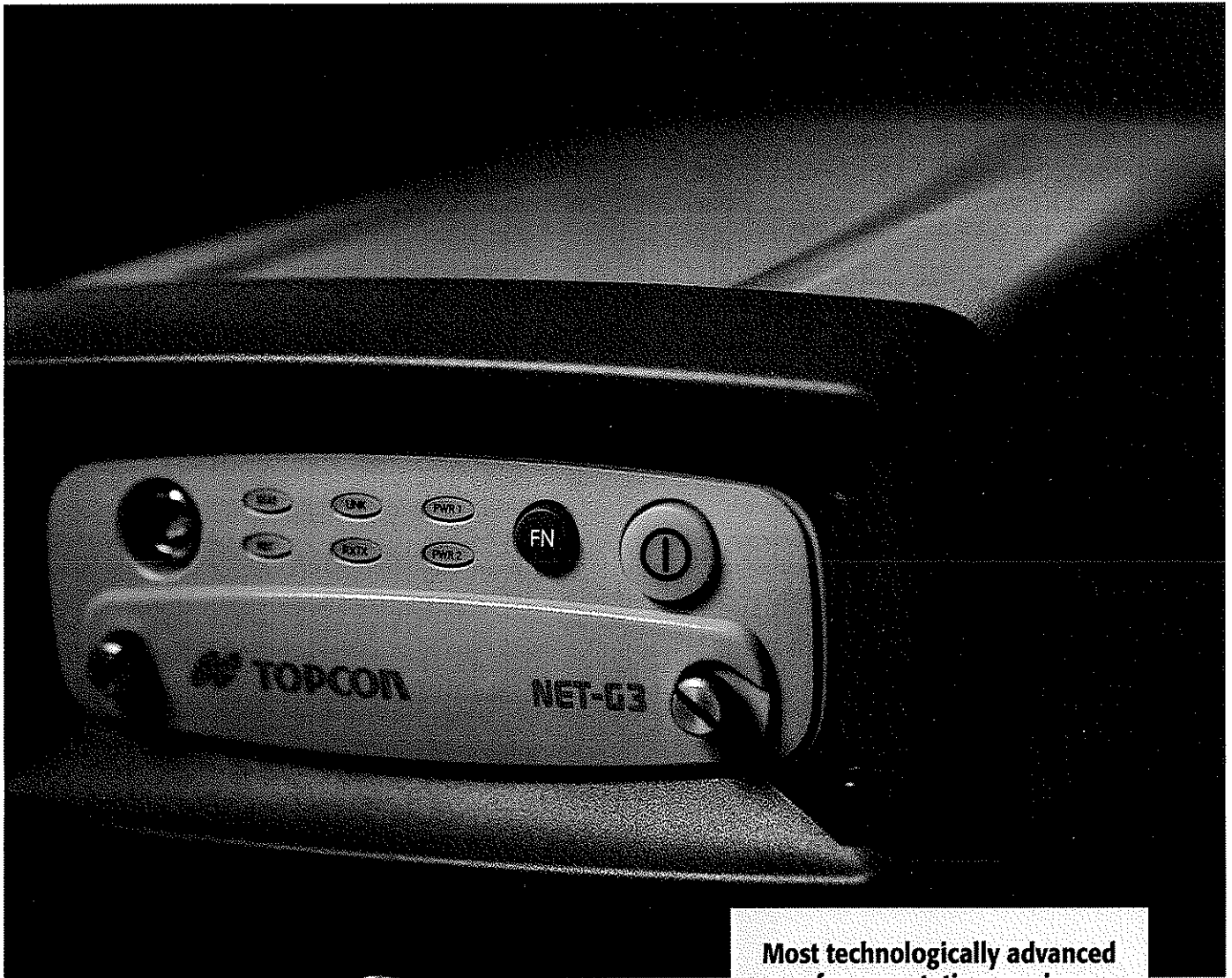
Your local Authorized Topcon dealer is:

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NET-G3A

TOPCON

REFERENCE STATION RECEIVER



**Most technologically advanced
reference station receiver**



- PARADIGM-G3[®] CHIP –
TRIPLE CONSTELLATION TECHNOLOGY
- SUPER LOW POWER CONSUMPTION
- 144 UNIVERSAL CHANNEL SATELLITE TRACKING
- SUPERIOR SIGNAL TRACKING AND PERFORMANCE
- 100 PERCENT COMPATIBLE WITH ALL SIGNALS FOR
BOTH EXISTING AND FUTURE PLANNED SATELLITE
NAVIGATION SYSTEMS

It's time.

The new NET-G3A receiver from Topcon is the most technologically advanced reference station receiver in the World today. At the core of this receiver is Topcon's new Paradigm G3® chip. Over 75% smaller than existing GPS chip technology, the new Paradigm G3® boasts some huge gains in both capability and performance.

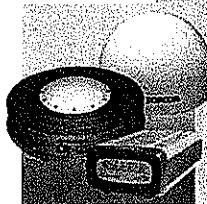
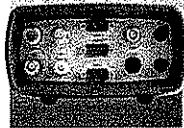
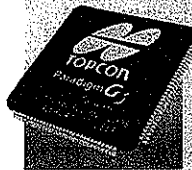
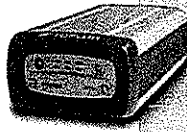
The NET-G3A, incorporating Topcon's new G3 chip technology, is the World's First reference receiver to provide Universal Signal Tracking – all signals from all three global satellite positioning constellations (GPS-Glonass-Galileo). Using a unique patented technology, the NET-G3A incorporates 144 Universal Tracking Channels, capable of tracking all signals from all satellite systems that are currently in use and planned for the future.

Through simple firmware changes, the selection of which signals and codes tracked can be changed very easily. Should new signals or frequencies be added or changed in the future, they can be accommodated through receiver firmware only, without expensive and inconvenient hardware changes.

The benefit for the consumer of reference network hardware is the new NET-G3A receiver put in place today, will provide the most complete signal tracking technology available now and well into the future, eliminating the hassles of upgrading hardware as satellite signals change. With the incorporation of GPS, GPS L2C and L5, as well as Glonass and Galileo signals; Topcon offers the ultimate network receiver solution, providing the very best reference station solution for your network users.

Along with the new G3 technology, the NET-G3A boasts complete system connectivity. USB, Ethernet, and four serial ports combined with an industry leading 50Hz data rate, the NET-G3A offers high speed connections both in and out of the reference station.

When used with its companion the CR-G3 choke ring antenna the NET-G3A receiver is the reference station of today and for tomorrow. Offer network users a complete signal solution – the new NET-G3A with Topcon's revolutionary G3 satellite tracking technology. All positioning constellations – all signals – all the time. Only from Topcon, the World leader in advanced positioning technologies.



Specifications

Tracking:

Number of Channels	144 Universal Channels
Signals Tracked:	
GPS	L1, L2, & L5 carrier, CA, L1 P, L2 P, L2C
GLONASS	L1, L2, & L5 carrier, L1CA, L2CA, L1 P, L2 P
GALILEO	E2-L1-E1, E5a
WAAS/EGNOS	Yes
Antenna Type	CR-G3 Choke ring, G3-A1 Geodetic

Accuracy:

Real time RTK accuracy	H: 10mm+1ppm V: 15mm+1ppm
Post processed Static	H: 3mm+0.5ppm V: 5mm+0.5ppm

Data & Memory:

Internal Memory	None
Additional Memory	Removable CF Memory Card up to 2GB and USB Host that allows the ability to plug in a USB memory stick or a USB mass storage device.
Data Update/Output Rate	1 - 50Hz Selectable
Real Time Data Output	TPS, RTCM SC104 ver 2.1, 2.2, 2.3, and 3.0, CMR, CMR+, BINEX
ASCII Output	NMEA 0183 version 2.1, 2.2, 2.3, and 3.0
Other I/O Signals	1pps, Event Marker, External Frequency input, 50 Hz frequency output
Control & Display Unit	GUI external software interface

Communications:

TCP/IP Address	Up to 5 different address ports standard
NTRIP	Client and Server functionality
Ports	4 Serial 1 USB 2 Power 1 Ethernet
HTML Web Browser	Web Browser access via Internet Explorer and Firefox

Physical Characteristics:

Status Indicators	6x3 color LED's
User Interface	2 Key
Dimensions (W x H x L)	166mm x 93mm x 275mm 6.54" x 3.66" x 10.83"
Weight	2.4 Kg (5.29 Lbs)

Power:

External Power Input	6 to 28 Volts DC
Internal Power	2 Lithium Ion batteries 7.4 Volts, 6000 mA-hr
Typical Power Consumption	Less than 4.0 Watts
Power Ports	2, 1 primary, 1 secondary

Environmental:

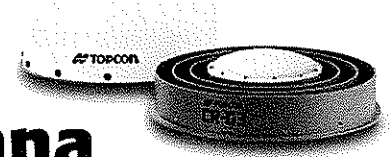
Enclosure	Aluminum
Operating Temperature	-40°C to 65°C
Storage Temperature	-40°C to 75°C
Environmental Specification	IP67 waterproof/dustproof



Topcon Positioning Systems, Inc.
7400 National Drive
Livermore, CA 94550
www.topconpositioning.com

Specifications subject to change without notice
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P/N: 7010-0770 Rev. D-Prelim Printed in U.S.A. 01/09

Your local Authorized Topcon dealer is:



CR-G3 Choke Ring Antenna

The Topcon CR-G3 all weather, newly-designed choke ring antenna provides GPS L1, GPS L2, GPS L5 signal reception as well as GLONASS L1 and L2 bands and Galileo for precision geodetic applications including GNSS reference networks and infrastructure monitoring.

Performance
Operating Frequency Range L1 GPS/GLONASS 1586.5 ± 25 MHz L2 GPS/GLONASS 1236 ± 20 MHz L5 GPS 1176 ± 12 MHz
Out-of-Band Rejection L1 ± 100 MHz -30 dBc (typical) L2 ± 100 MHz -60 dBc (typical)
LNA Gain: 30 dB (typical)
Gain at Zenith (90°) GPS L1 7 dBic (minimum) GPS L2 7.5 dBic (minimum) GPS L5 6 dBic (minimum) GLONASS L1 5.5 dBic (minimum) GLONASS L2 6 dBic (minimum)
Gain Roll-Off (from Zenith to Horizon) GPS L1 -15.5 dB GPS L2 -18.5 dB GPS L5 -18 dB GLONASS L1 -15.5 dB GLONASS L2 -18.5 dB
Noise Figure: 1.8 dB (typical)
VSWR ≤ 2.0 : 1
Differential Propagation Delay (typical) L1 1.5 ns L2 3 ns L5 1 ns
Nominal Impedance: 50 Ohm

Physical and Electrical
Size Diameter 380 mm (Antenna without Anti-snow Dome) 380 mm (with Topcon Anti-snow Spherical Dome) 415 mm (with SCIGN Anti-snow Short Dome)
Height 138.5 mm (Antenna without Anti-snow Dome) 292 mm (with Topcon Anti-snow Spherical Dome) 287 mm (with SCIGN Anti-snow Short Dome)
Weight 4.7 kg (Antenna) 1.1 kg (Topcon Anti-snow Spherical Dome) 5.8 kg (Antenna with Topcon Anti-snow Spherical Dome)
Power Input Voltage: +3 to +18 VDC Current Consumption: 30 mA (typical)
Connector: N female
Environmental MIL-STD-810F: Temperature (Methods 501.4, 502.4) Operating Range: -50°C to +70°C Storage Range: -55°C to +85°C
Humidity, Fully Sealed and Waterproof Salt Fog, 5% (Method 509.4)
Vibration - Category 20, Composite Wheeled/Tracked Machine Exposure, along each of 3 axes (Method 514.5, Table 514.5C-VII and Figure 514.5C-3)
Mechanical Shock , along each of 3 axes (Method 516.4, Procedure I, Functional Shock, Table 516.5-II, Figures 516.5-10 - accelerative forces up to 40g)
Waterproof: IEC 60529 IPX7 Dustproof: IEC 60529-IP6X Drop Test: Repeated drops from the height of 1 m on asphaltic concrete surface. All sides – top, bottom and border.
RoHS Compliant: Yes

The antenna calibration is published on the NGS website at: <http://www.ngs.noaa.gov/ANTCAL/>.

Topcon Positioning Systems, Inc.
 800-443-4567
www.topconpositioning.com

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References currently implemented governmental CORS/RTK networks

- Tennessee DOT – 24 stations NGS CORS - 1 designated IGS – planned expansion to approximately 50 stations w/Topnet
 - Jim Waters, PE, RLS
Assistant Director - Region 2 Design, CADD, Surveys & Aerial Surveys
Tennessee Department of Transportation
Suite 1300, James K. Polk Building
Nashville, Tennessee 37243-0348
(615) 741-0450
 - (615) 532-2799 FAX
Jim.Waters@state.tn.us
- NrcAN – Canadian Government – All IGS stations – w/Topnet for receiver management. Equivalent of NGS in the U.S.
- GeoTOP – Italy – 150 stations
- QPos-Netherlands NetPOS National Network Netherlands – 31 stations
- 06GPS – Netherlands – 13 stations

Caron East Positioning Network:

Currently 44 GPS+Glonass (dual constellation) bases on line

1 Full Time staff IT professional for maintenance:

WWW.caroneast.com

Administrator Chris McMahan

Phone: (301) 724-4490