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Header @ 7

List View

General Information | Contact | Default Values | Discount | Document Information | Clarification Request

Procurement Folder: 1006767

Procurement Type: Central Purchase Order

Vendor ID: 000000213488

Legal Name: DUNCAN PARNELL INC

Alias/DBA:

Total Bid: \$454,434.00

Response Date: 03/29/2022

Response Time: 11:12

Responded By User ID: ygrow79

First Name: York

Last Name: Grow

Email: york.grow@duncan-parn

Phone: 434-962-3248

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Solicitation Description: CORS GNSS Receivers and Components (81220064)

Total of Header Attachments: 7

Total of All Attachments: 7



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

**State of West Virginia
 Solicitation Response**

Proc Folder: 1006767
Solicitation Description: CORS GNSS Receivers and Components (81220064)
Proc Type: Central Purchase Order

Solicitation Closes	Solicitation Response	Version
2022-03-31 13:30	SR 0803 ESR03292200000005953	1

VENDOR
 000000213488
 DUNCAN PARNELL INC

Solicitation Number: CRFQ 0803 DOT2200000146
Total Bid: 454434
Response Date: 2022-03-29
Response Time: 11:12:50

Comments: Duncan-Parnell is pleased to provide a response to this CRFQ and have included our pricing response as well as other requested documentation. Duncan-Parnell has been an Authorized Trimble Dealer for over 25 years serving the Mid-Atlantic and Southeast, including the State of West Virginia. We have been supporting the WVDOT for many years with Trimble GNSS needs including the existing Trimble CORS base station network. We look forward to the opportunity to continue our commitment to this agency.

As you review the bid response, we would like to draw specific attention to several items. We are responding with the Trimble Alloy GNSS receiver and Zephyr 3 Geodetic Antenna as specifically requested by the two part numbers identified in Exhibit A Pricing Page and the Final_CRFQ_Form. However, per the additional requirements detailed in the CRFQ Specifications, we are including the additional, necessary part numbers as required such as additional capabilities of the Alloy GNSS receivers, five-year warranty, and an upgrade to the existing PIVOT software. The existing Trimble Pivot software owned by WVDOT does not support all specifications outlined in 4.1.1.80-82. We are providing the necessary software upgrade to ensure complete compliance. For more details on this and our compliance with all other specifications, we would ask you to review our response notes in the CRFQ Specifications as attached.

FOR INFORMATION CONTACT THE BUYER
 John W Estep
 304-558-2566

john.w.estep@wv.gov

Vendor
Signature X

FEIN#

DATE

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Trimble Alloy GNSS Receiver 109100-00 or Equal	24.00000	EA	15127.750000	363066.00

Comm Code	Manufacturer	Specification	Model #
52161526			

Commodity Line Comments:

Extended Description:

Trimble Alloy GNSS Receiver 109100-00 or Equal

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	Trimble Zephyr 3 Geodetic Antenna Kit 158295-00 or Equal	24.00000	EA	3807.000000	91368.00

Comm Code	Manufacturer	Specification	Model #
43221712			

Commodity Line Comments:

Extended Description:

Trimble Zephyr 3 Geodetic Antenna Kit 158295-00 or Equal

SPECIFICATIONS

1. **PURPOSE AND SCOPE:** The West Virginia Purchasing Division is soliciting bids on behalf of WV Department of Transportation to establish a contract for the one-time purchase of GNSS (global navigation satellite system) receivers and its related components.

WV Department of Transportation owns and operates a current license of Trimble CORS (continuous operation reference station) software. The GNSS receivers and its related components must be compatible with Trimble CORS software with the last official product and/or firmware release at the date of release of this tender.

2. **DEFINITIONS:** The terms listed below shall have the meanings assigned to them below. Additional definitions can be found in section 2 of the General Terms and Conditions.
 - 2.1 **"Contract Item"** means components provided by a qualified manufacturer that is authorized to sell the equipment as more fully described by these specifications.
 - 2.2 **"Pricing Page"** means the pages, contained in wvOASIS or attached as Exhibit A, upon which Vendor should list its proposed price for the Contract Items.
 - 2.3 **"Solicitation"** means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.
 - 2.4 **"API"** means application programming interface.
 - 2.5 **"BINEX"** means binary exchange: an open and operational binary format for GNSS data.
 - 2.6 **"CMR"** means compact measure record.
 - 2.7 **"CORS"** means continuous operating reference station.
 - 2.8 **"FTP"** means file transfer protocol.
 - 2.9 **"GNSS"** means global navigation satellite system.
 - 2.10 **"GPS"** means global positioning system.
 - 2.11 **"MSM"** means multiple signal message.
 - 2.12 **"NEBS"** means network equipment-building system.
 - 2.13 **"NTRIP"** means networked transport of RTCM via internet protocol.

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- 2.14 "POE" means power over ethernet.
- 2.15 "PPM" means parts per million.
- 2.16 "PPP" means precision point positioning.
- 2.17 "RAIM" means receiver autonomous integrity monitoring.
- 2.18 "RINEX" means receiver independent exchange format.
- 2.19 "RMS" means root metered square.
- 2.20 "RNDIS" means remote network driver interface specification.
- 2.21 "RTCM" means radio technical commission for maritime.
- 2.22 "RTK" means real-time kinematic.
- 2.23 "SBAS" means satellite-based augmentation systems.
- 2.24 "UDR" means user datagram protocol.
- 2.25 "VRS" means virtual reference station.

3. QUALIFICATIONS: Vendor, or Vendor's staff if requirements are inherently limited to individuals rather than corporate entities, shall have the following minimum qualifications:

- 3.1 Vendor must provide, upon request, attestation from Trimble showing its bid product is compatible with the State's current owned Trimble CORS software.
- 3.2 Vendor must provide, upon request, showing their experience with having successfully completed support of an existing VRS (virtual reference station) network modernization consisting of a full exchange of network CORS in excess of fifty (50) stations managed via one transaction with equal to receivers for this solicitation.

COMPLY: Duncan-Parnell is offering the Trimble Alloy and upgrade to the existing Pivot software which is completely compatible with the currently owned Trimble CORS (Pivot) software.. Duncan-Parnell has deployed a full exchange of 51 network CORS in a single transaction with South Carolina Geodetic Survey in 2020.



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4. GENERAL REQUIREMENTS:

4.1 Mandatory Contract Item Requirements: Contract Item must meet or exceed the mandatory requirements listed below.

4.1.1 Quantity of Twenty-four (24) Trimble Alloy GNSS Receiver 109100-00 or Equal.

Vendor must provide a product with the following minimum features: Technology and Tracking Capabilities

4.1.1.1 The receiver must be able to track all signals on all the available frequencies from the following GNSS constellations:

- GPS: L1 C/A, L2E/L2P, L2C, LS
- GLONASS: L1 C/A, L1P, L2 C/A, L2P, L3 CDMA
- GALILEO: L1 CBOC, ESA, ESB, ESAItBOC, E6
- BEIDOU: B1, B2, B3
- L-Band - GNSS Augmentation signals

COMPLY: The Trimble Alloy receiver tracks the following frequencies

- GPS: L1C, L1 C/A, L2E (L2P), L2C, L5
- GLONASS: L1 C/A2 and unencrypted P code, L2 C/A and unencrypted P code, L3 CDMA
- Galileo: E1, E5A, E5B and E5AltBOC, E6
- BeiDou: B1, B2, B3, B1C, B2A
- QZSS: L1 C/A, L1C, L1S, L2C, L5, LEX/L63
- IRNSS: L5, S-Band
- SBAS: L1 C/A (EGNOS/MSAS GAGAN/SDCM), L1 C/A and L5 (WAAS)
- L-Band: Trimble RTX™

4.1.1.2 The receiver must be enabled to utilize positioning information and data from the following GNSS constellations:

- GPS: L1 C/A, L2E/L2P, L2C, LS
- GLONASS: L1 C/A, L1P, L2 C/A, L2P, L3 CDMA
- GALILEO: L1 CBOC, ESA, ESB, ESAItBOC, E6
- BEIDOU: B1, B2, B3

COMPLY: The alloy receiver includes the following constellations and frequencies

- GPS: L1 C/A, L2E/L2P, L2C, LS
- GLONASS: L1 C/A, L1P, L2 C/A, L2P, L3 CDMA
- GALILEO: L1 CBOC, ESA, ESB, ESAItBOC, E6
- BEIDOU: B1, B2, B3, B1C and B2A



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4.1.1.3 The receiver must be able to track all signals on all the available frequencies from the following GNSS SBAS (satellite-based augmentation systems):

- EGNOS: L1 C/A
- MSAS: L1 C/A
- WAAS: L1 C/A, L5

COMPLY: Trimble Alloy is able to track SBAS: L1 C/A (EGNOS/MSAS GAGAN/SDCM), L1 C/A and L5 (WAAS).

4.1.1.4 The receiver must be able to simultaneously track all available signals on all satellites, including those signals from satellites marked as unhealthy.

COMPLY: Trimble alloy tracks all available signals from all available healthy and unhealthy satellites. Tracking unhealthy satellites can be enabled or disabled in the receiver Web UI.

GPS			GLONASS			Galileo			BeiDou			QZSS			SBAS		
SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	23	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	24	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	25	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	26	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	16	<input checked="" type="checkbox"/>	<input type="checkbox"/>	27	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	17	<input checked="" type="checkbox"/>	<input type="checkbox"/>	28	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	18	<input checked="" type="checkbox"/>	<input type="checkbox"/>	29	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	19	<input checked="" type="checkbox"/>	<input type="checkbox"/>	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	31	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	21	<input checked="" type="checkbox"/>	<input type="checkbox"/>	32	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	22	<input checked="" type="checkbox"/>	<input type="checkbox"/>												

Enable All Ignore Health All Disable All
OK Cancel

Satellite Enable/Disable ?

GPS			GLONASS			Galileo			BeiDou			QZSS			SBAS		
SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health	SV	Enable	Ignore Health
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	17	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	18	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	19	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	20	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	21	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	22	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	23	<input checked="" type="checkbox"/>	<input type="checkbox"/>									
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	16	<input checked="" type="checkbox"/>	<input type="checkbox"/>	24	<input checked="" type="checkbox"/>	<input type="checkbox"/>									

Enable All Ignore Health All Disable All
OK Cancel

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4.1.1.5 The receiver must be able to track satellites to an elevation angle of 0 degrees.

COMPLY: The satellites tracking on the Alloy receiver can be set to an elevation angle from 0°.

Tracking?

Elevation Mask °

Everest™ ▾

Clock Steering ▾

Type	Signal	Enable	Options
GPS	L1 - C/A	<input checked="" type="checkbox"/>	
GPS	L2E	<input checked="" type="checkbox"/>	L2C or L2E ▾
GPS	L2C	<input checked="" type="checkbox"/>	CL ▾
GPS	L5	<input type="checkbox"/>	
SBAS	L1 - C/A	<input checked="" type="checkbox"/>	
SBAS	L5	<input checked="" type="checkbox"/>	
GLONASS	L1 - C/A	<input checked="" type="checkbox"/>	
GLONASS	L1P	<input type="checkbox"/>	
GLONASS	L2P	<input type="checkbox"/>	
GLONASS	L2 - C/A	<input checked="" type="checkbox"/>	
GLONASS	L3	<input checked="" type="checkbox"/>	Data + Pilot ▾
Galileo	E1	<input checked="" type="checkbox"/>	Data + Pilot ▾
Galileo	E5 - A	<input type="checkbox"/>	
Galileo	E5 - B	<input type="checkbox"/>	
Galileo	E5 - AltBOC	<input checked="" type="checkbox"/>	Data + Pilot ▾
Galileo	E6	<input type="checkbox"/>	
BeiDou	B1	<input checked="" type="checkbox"/>	
BeiDou	B1C	<input checked="" type="checkbox"/>	
BeiDou	B2	<input checked="" type="checkbox"/>	
BeiDou	B2A	<input checked="" type="checkbox"/>	
BeiDou	B2B	<input type="checkbox"/>	
BeiDou	B3	<input checked="" type="checkbox"/>	
QZSS	L1 - C/A	<input checked="" type="checkbox"/>	
QZSS	L1S	<input type="checkbox"/>	
QZSS	L2C	<input checked="" type="checkbox"/>	
QZSS	L5	<input checked="" type="checkbox"/>	

4.1.1.6 The receiver shall have enough physical and independent channels to accommodate all requested signals. Dynamic channel allocation is not an acceptable substitute for physical channels.

COMPLY: The Maxwell 7 GNSS chipset which is used on the Alloy receiver, provides 672 channels for simultaneous satellite tracking and anti-spoofing capabilities.

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4.1.1.7 The receiver must have the ability to enable and disable any code and carrier multipath rejection or mitigation technology.

COMPLY: Trimble EVEREST Plus™ multipath signal rejection can be enabled or disabled on the Alloy receiver UI.

Tracking?

Elevation Mask °
 Everest™
 Clock Steering

Type	Signal	Enable	Options
GPS	L1 - C/A	<input checked="" type="checkbox"/>	
GPS	L2E	<input checked="" type="checkbox"/>	<input type="text" value="L2C or L2E"/> <input type="button" value="▼"/>
GPS	L2C	<input checked="" type="checkbox"/>	<input type="text" value="CL"/> <input type="button" value="▼"/>
GPS	L5	<input type="checkbox"/>	
SBAS	L1 - C/A	<input checked="" type="checkbox"/>	
SBAS	L5	<input checked="" type="checkbox"/>	
GLONASS	L1 - C/A	<input checked="" type="checkbox"/>	
GLONASS	L1P	<input type="checkbox"/>	
GLONASS	L2P	<input type="checkbox"/>	
GLONASS	L2 - C/A	<input checked="" type="checkbox"/>	
GLONASS	L3	<input checked="" type="checkbox"/>	<input type="text" value="Data + Pilot"/> <input type="button" value="▼"/>
Galileo	E1	<input checked="" type="checkbox"/>	<input type="text" value="Data + Pilot"/> <input type="button" value="▼"/>
Galileo	E5 - A	<input type="checkbox"/>	

4.1.1.8 The receiver must have the ability to enable and disable any pseudorange and/or phase smoothing.

COMPLY: The Alloy receiver web UI allows to enable or disable any pseudorange and/or phase smoothing.

Epoch Interval

Measurements
 Positions

Options

Concise
 R-T Flag
 Send Raw GPS Data
 Send Raw SBAS Data
 Include SV Flags2

Multi-System Support
 Smooth Pseudorange
 Smooth Phase
 Include Doppler

GPS Ephemeris
 GLONASS Ephemeris
 Galileo Ephemeris
 QZSS Ephemeris
 BeiDou Ephemeris
 SBAS Ephemeris
 Almanac

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4.1.1.9 The receiver must have the ability to enable and disable any receiver's clock correction system.

Comply: The clock steering can be enabled and disabled in the receiver UI.

Tracking ?

Elevation Mask °

Everest™ ▾

Clock Steering ▾

Type	Signal	Enable	Options
GPS	L1 - C/A	<input checked="" type="checkbox"/>	
GPS	L2E	<input checked="" type="checkbox"/>	L2C or L2E ▾
GPS	L2C	<input checked="" type="checkbox"/>	CL ▾
GPS	L5	<input type="checkbox"/>	
SBAS	L1 - C/A	<input checked="" type="checkbox"/>	
SBAS	L5	<input checked="" type="checkbox"/>	
GLONASS	L1 - C/A	<input checked="" type="checkbox"/>	
GLONASS	L1P	<input type="checkbox"/>	
GLONASS	L2P	<input type="checkbox"/>	

4.1.1.10 The receiver must allow the ability to recover unfiltered and unsmoothed pseudorange, signal-to-noise, Doppler, and carrier phase true observables from all signals individually. It is not acceptable to artificially generate observables from the primary signals for the other signals

COMPLY: The Alloy receiver uses each available signal to generate observations accordingly. The Alloy is not generating artificially observables from the primary signal for other signals.

4.1.1.11 The receiver shall support RAIM (receiver autonomous integrity monitoring) to detect and reject degraded signals to improve position quality

COMPLY: The Alloy receiver has a proprietary Receiver Autonomous Integrity Monitor (RAIM) system to detect and reject degraded signals to improve position quality.

4.1.1.12 When and if the United States of America Department of Defense (DoD) disables the GPS (global positioning system) anti-spoofing, the receiver must be capable of tracking GPS L1 and L2 phase and P code observables.

COMPLY: The Alloy receiver tracks P code on L1 and L2



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Input and Output Formats

4.1.1.13 The receiver must support the following real-time correction formats for input and output:

- RTCM 2.x versions and RTCM 3.x versions including MSM 1 through 7 messages

COMPLY: The Alloy receiver can stream and receive RTCM 2.x and 3.x with MSM 3 to MSM7.

RTCM

Disabled Version: 3.3 (MSM) Type: RTK

Bandwidth limit :

Advanced Settings

Fugro Type 4087 Variants:

Measurements from Unhealthy SVs:

Reference Station Records:

L2 Signal: Legacy with L2 - CS fallback

Multiple Signal Message Settings

MSM Records: MSM4 Streaming Mode:

GPS: Off

GLONASS: MSM3

GLONASS: MSM4

Galileo: MSM5

QZSS: MSM6

BeiDou: MSM7

OK Cancel

- CMR, CMR+ and CMRx

COMPLY: The Alloy receiver can stream and receive CMR, CMR+ and CMRx. As CMR is a Trimble format, it is compatible with all Trimble receivers.

4.1.1.14 The receiver must support the following real-time formats for observables:

- RTCM 3.x including MSM 1 through 7 messages
- BINEX
- Receiver's proprietary format

COMPLY: The Alloy receiver streams the following real time formats:

Correction Formats: – CMR, CMR+, CMRx, GAGAN, RTX, RTCM 2.x, RTCM 3.x

Observables: – RT17, RT27, BINEX, RTCM 3.x incl MSM3 to MSM7

Position/Status I/O: – NMEA-0183 v2.30, GSOF

4.1.1.15 The receiver must support the input and output of position and status information with NMEA-0183 protocol.

COMPLY: Position/Status I/O: – NMEA-0183 v2.30, GSOF

4.1.1.16 The receiver must be capable of providing a data output up to 100 Hz.

COMPLY: Up to 100Hz Data output is provided by the Alloy receiver.



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4.1.1.17 The receiver must provide at a minimum one pulse per second (PPS) output.

COMPLY

4.1.1.18 The receiver must support input of external events.

COMPLY

4.1.1.19 The receiver must support external weather stations and tilt sensors.

COMPLY. The Alloy receiver supports the following sensors.

- Paroscientific Met3, Met3A, Met4 and Met4A
- Vaisala PTU300
- Applied Geomechanics D700 and MD900 series

Measurement and Position Performance

4.1.1.20 The receiver shall support differential, real-time kinematic (RTK) and static post-processing positioning using industry standard formats.

*COMPLY: Correction Formats: – CMR, CMR+, CMRx, GAGAN, RTX
RTCM 2.x, RTCM 3.x, SDC
Post Processing: RINEX*

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4.1.1.21 The receiver must support code differential positioning with a performance of 0.25 m + 1 ppm RMS in horizontal and 0.50 m + 1 ppm RMS in vertical.

COMPLY: The Trimble Alloy exceeds specification for sections .20, .21, .22

Differential Positioning Code differential GNSS positioning

Horizontal. 0.25 m + 1 ppm RMS

Vertical. 0.50 m + 1 ppm RMS SBAS

differential positioning accuracy

Horizontal. 0.50 m RMS Vertical.

. 0.85 m RMS

Static GNSS Surveying

High Accuracy Static Horizontal

. 3 mm + 0.1 ppm RMS Vertical

. 3.5 mm + 0.4 ppm RMS

Static & Fast Static

Horizontal. 3 mm + 0.5 ppm RMS

Vertical. 5 mm + 0.5 ppm RMS Real

Time Kinematic Surveying

Single Baseline < 30km

Horizontal. 8 mm + 1 ppm RMS

Vertical. 15 mm + 1 ppm RMS

Networked RTK

Horizontal. 8 mm + 0.5 ppm RMS

Vertical. 15 mm + 0.5 ppm RMS

Initialization time. typically <10 seconds

Initialization reliability. typically >99.9%

4.1.1.22 The receiver must support SBAS differential positioning with a performance of 0.50 m RMS in horizontal and 0.85 m RMS in vertical.

COMPLY: Please reference 4.1.1.20



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4.1.1.23 The receiver must support static post-processing positioning with a performance of 3 mm+ 0.1 ppm RMS in horizontal and 3.5 mm+ 0.4 ppm RMS in vertical.

COMPLY: The Trimble Alloy exceeds specification for sections .20, .21, .22

Differential Positioning Code differential GNSS positioning

Horizontal. 0.25 m + 1 ppm RMS

Vertical. 0.50 m + 1 ppm RMS SBAS

differential positioning accuracy

Horizontal. 0.50 m RMS Vertical.

. 0.85 m RMS

Static GNSS Surveying

High Accuracy Static Horizontal

. 3 mm + 0.1 ppm RMS Vertical

. 3.5 mm + 0.4 ppm RMS

Static & Fast Static

Horizontal. 3 mm + 0.5 ppm RMS

Vertical. 5 mm + 0.5 ppm RMS Real

Time Kinematic Surveying

Single Baseline < 30km

Horizontal. 8 mm + 1 ppm RMS

Vertical. 15 mm + 1 ppm RMS

Networked RTK

Horizontal. 8 mm + 0.5 ppm RMS

Vertical. 15 mm + 0.5 ppm RMS

Initialization time. typically <10 seconds

Initialization reliability. typically >99.9%

4.1.1.24 The receiver must support RTK positioning with single baseline of less than 30 km, with a performance of 8 mm+ 1 ppm RMS in horizontal and 15 mm + 1 ppm RMS in vertical.

COMPLY: Please reference 4.1.1.23



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- 4.1.1.25** The receiver must support RTK positioning with networked RTK solution with a performance of 8 mm + 0.5 ppm RMS in horizontal and 15 mm + 0.5 ppm RMS in vertical.

COMPLY: Please reference 4.1.1.23

- 4.1.1.26** Receiver shall support on-board absolute PPP in real-time, via both Internet Protocol (IP) and L-Band satellite delivery.

COMPLY: Please reference 4.1.1.23

Physical and Environmental

- 4.1.1.27** The receiver must include a display with a screen and a physical keyboard. The keys must be illuminated so they are visible in the dark.

COMPLY: The Trimble Alloy has Front Panel Display with 4-line x 32 character reversible OLED display , 7 button input configuration – Adjustable LED backlighting.



- 4.1.1.28** The receiver's screen must support rotation so the displayed information can be read normally if the receiver is installed upside down.

COMPLY: The Trimble Alloy may be installed upside down and display reversed.

- 4.1.1.29** The receiver's display must allow the basic configuration of the receiver, including network configuration parameters, antenna model, antenna height, position, and station name.

COMPLY: All setup parameters are configurable from the front panel of the Trimble Alloy. In addition, using the built-in Wi-Fi a full configuration may be done using a smartphone.



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4.1.1.30 The receiver must weigh no more than 2 kg (4.5 lbs) with at least one battery installed.

COMPLY: The Trimble Alloy weight is 2.34 kg (5.17 lbs)

4.1.1.31 The GNSS receiver must have passed NEBS certification for use in a telecom installation environment.

COMPLY: During 2021 the Trimble Alloy has passed rigorous, destructive testing and passed NEBS certification for major telecom owners.

4.1.1.32 Receiver must meet the following environmental specification:

- Operating temperature: -40 degrees C - +65 degrees C
- Humidity: 100% condensing
- Fully sealed with IP68 certification
- Shock: 1 meter drop on hard surface

COMPLY: The following is a snap from the Trimble Alloy data sheet. Please note the IP68 environmental specification has become increasingly beneficial to network owners in that receivers are often installed in harsh environmental conditions.

ENVIRONMENT

Operating Temperature ¹	-40 °C to +65 °C (-40 °F to +149 F)
Storage temperature.....	-40 °C to +80 °C (-40 °F to +176 F)
Humidity.....	100% condensing
Shock	
Operating.....	.40 g per MIL-STD-810G Table 5.16.6-VII
Non-Operating.....	.75 g per MIL-STD-810G Table 5.16.6-VII
	Designed to survive 1m bench drop
Vibration	
Operating.....	MIL-STD-810G Fig. 5.14.6C-1 Category 4
Ingress protection.....	IP68 Certified per IEC-60529 - waterproof/dustproof (1m submersion for 1 hr)

Power Specifications and Management

4.1.1.33 The receiver shall offer a minimum of two power inputs supporting both AC and DC operation, with an input power range of 9.5 to 28 V DC.

COMPLY: The Trimble Alloy exceeds spec in that three power inputs plus internal hot swappable batteries add tremendous value.



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ELECTRICAL

- Power over Ethernet (PoE) 802.3af (Type 1), 802.at (Type 2)
- 9.5 to 28 V DC input on 2 Lemo ports
 - User-configurable power-on voltage
 - User-configurable power-down voltage
- User-configurable 12 V DC power output on serial port #2
- Integrated dual hot-swappable smart batteries (7.4 V, 7800 mA-hr, Li-Ion batteries) with up to 15 hours of continuous operation
- Seamless switching between external/internal power sources
- Configurable minimum input voltage for battery charging
- Integrated battery charging circuitry
- Power Consumption – 3.8 W or higher, dependent on user settings

4.1.1.34 The receiver must support Power over Ethernet (PoE) 802.3af (type 1) and 802.at (type 2) as a means of powering the receiver. PoE must allow for user configurability to enable or disable this feature.

COMPLY: The Trimble Alloy incorporates Power over Ethernet (PoE) 802.3af (type 1) and 802.at (type 2). All configuration is manageable through the front panel or UI.

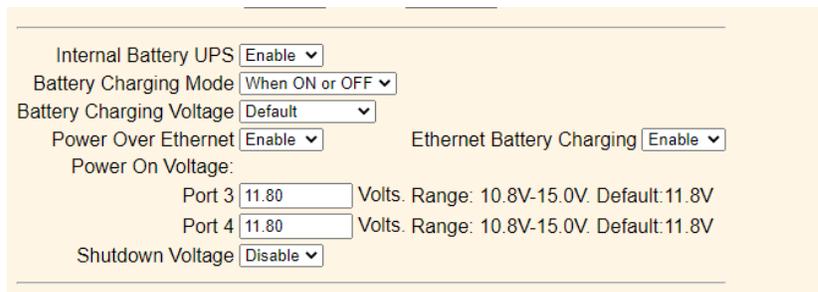
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4.1.1.35 The receiver shall have a power consumption of less than 5.5 W while tracking all satellite signals and having the Wi-Fi connection active.

COMPLY

4.1.1.36 The receiver must feature power-on and power-down with user configurable voltages.

COMPLY: The power on and power off can be configured in the Alloy receiver UI.



4.1.1.37 The receiver must be capable of supporting dual hot-swappable lithium-ion batteries with level of charge indicator in the batteries and include at minimum a quantity of two (2)-one included with the unit and one spare.

COMPLY: The Alloy uses dual hot-swappable lithium-ion batteries. The Battery level can be viewed in the display.

DISPLAY



Description	Description
1 Serial number	5 Firmware version
2 IP address	6 Battery 1
3 Number of satellites and positioning mode	7 Battery 2
4 UTC date and time	8 Logging status

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- 4.1.1.38** The batteries of the receiver shall be capable of operating the unit without external power supply for up to at least 15 hours. This feature must be use configurable.

COMPLY: The Alloy has an Integrated dual hot-swappable smart battery (7.4 V, 7800 mA-hr, Li-Ion batteries) with up to 15 hours of continuous operation. the use of internal battery can be configured in the receiver Web UI.

The screenshot shows the following configuration options:

- Internal Battery UPS: Enable
- Battery Charging Mode: When ON or OFF
- Battery Charging Voltage: Default
- Power Over Ethernet: Enable
- Ethernet Battery Charging: Enable
- Power On Voltage:
 - Port 3: Volts. Range: 10.8V-15.0V. Default: 11.8V
 - Port 4: Volts. Range: 10.8V-15.0V. Default: 11.8V
- Shutdown Voltage: Disable

- 4.1.1.39** The receiver must feature an integrated internal battery charger with a configurable minimum input voltage for battery charging.

COMPLY: The internal battery charger can be configured in the Web UI.

The screenshot shows the following configuration options:

- Internal Battery UPS: Enable
- Battery Charging Mode: When ON or OFF
- Battery Charging Voltage: Programmable
- Battery Charging Minimum: Volts. Range: 10.8V-15.0V. Default: 12.0V
- Power Over Ethernet: Enable
- Ethernet Battery Charging: Enable
- Power On Voltage:
 - Port 3: Volts. Range: 10.8V-15.0V. Default: 11.8V
 - Port 4: Volts. Range: 10.8V-15.0V. Default: 11.8V
- Shutdown Voltage: Disable

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4.1.1.40 The receiver's integrated charger must be user-configurable to allow the option of setting when the batteries must be charged. The options available must be the following:

- Charge when the receiver is On or Off
- Charge when the receiver is On
- Charge when the receiver is Off
- Never charge the batteries

COMPLY: See screenshot from the receiver Web UI.

The screenshot shows a configuration page for battery charging. It includes the following settings:

- Internal Battery UPS: Enable
- Battery Charging Mode: When ON or OFF
- Battery Charging Voltage: When ON or OFF (selected), When OFF, When ON, Never
- Power Over Ethernet: Enable
- Ethernet Battery Charging: Enable
- Power On Voltage: Never
- Port 3: 11.80 Volts. Range: 10.8V-15.0V. Default: 11.8V
- Port 4: 11.80 Volts. Range: 10.8V-15.0V. Default: 11.8V
- Shutdown Voltage: Disable

4.1.1.41 The integrated charger must be capable of charging from PoE input with user configurability to enable/disable this feature

COMPLY

4.1.1.42 The receiver must support seamless switching between the internal and external power sources without any kind of interruption in its operations.

COMPLY

4.1.1.43 The receiver must automatically restart after loss of power. When powering-up the receiver must operate with the same configuration it had when powered-down or when loss of power event happened, including all real-time data output and all logging sessions.

COMPLY

4.1.1.44 The receiver's front panel display brightness and lightning must be user configurable remotely from the receiver's user interface. The front panel display must also feature a power saving function.

COMPLY: These settings are configurable in the receiver Web UI.

Data Logging

4.1.1.45 The receiver must include an embedded (non-removable) solid state memory with up to 24 GB of space.

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COMPLY: The Alloy GNSS receiver as proposed includes internal solid state memory with 8GB of logging space. The internal memory is included in the receiver test for vibration and shock (IP68 certified) to maintain operation and logging during high motion events such as landslides and earthquakes. Optionally, the internally memory may be upgraded to 24GB.

4.1.1.46 The receiver must be compatible with removable external memory supporting more than 1 TB of logging space.

COMPLY: The Trimble Alloy supports USB external memory.

4.1.1.47 The receiver must support true logging rates from 100 Hz to 600 seconds. Data generation with artificial methods is not a valid alternative.

COMPLY: The Alloy GNSS receiver supports logging rates from 50Hz to 600 seconds and through additional options may be upgraded to 100Hz.

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4.1.1.48 The receiver must provide a combined logging rate of more than 180 Hz with all independent logging sessions.

COMPLY: Different Logging sessions with different logging rates can run simultaneously on the receiver. combined logging rate of more than 180 Hz .

INFRA Measurements 1 Sec. Positions Off	Continuous 60 Min.	Logging /Internal/INFRA/2022/03/23/ 2203231200I.T02	<input checked="" type="checkbox"/>
test1 Measurements 0.02 Sec. Positions 1 Min.	Continuous 60 Min.	Logging /Internal/test1/2022/03/23/ 5841R40054202203231200A.T02	<input checked="" type="checkbox"/>
test2 Measurements 0.01 Sec. Positions 1 Min.	Continuous 60 Min.	Logging /Internal/test2/2022/03/23/ 5841R40054202203231200B.T02	<input checked="" type="checkbox"/>
test3 Measurements 0.05 Sec. Positions 1 Min.	Continuous 60 Min.	Logging /Internal/test3/2022/03/23/ 5841R40054202203231200C.T02	<input checked="" type="checkbox"/>
test4 Measurements 0.1 Sec. Positions 1 Min.	Continuous 60 Min.	Logging /Internal/test4/2022/03/23/ 5841R40054202203231200D.T02	<input checked="" type="checkbox"/>
test5 Measurements 1 Sec. Positions 1 Min.	Continuous 60 Min.	Logging /Internal/test5/2022/03/23/ 5841R40054202203231200E.T02	<input checked="" type="checkbox"/>
test6 Measurements 2 Sec. Positions 1 Min.	Continuous 60 Min.	Logging /Internal/test6/2022/03/23/ 5841R40054202203231200F.T02	<input checked="" type="checkbox"/>

4.1.1.49 The receiver must support 12 independent and concurrent logging sessions.

COMPLY: The Alloy receiver can host up to 12 logging sessions simultaneously. The logging session can be on internal as well as on external memory.

4.1.1.50 The receiver must be capable of producing both RINEX and BINEX file formats internal to the receiver without the need for external tools/converters.

COMPLY: The Alloy provides download of BINEX or RINEX files.

	2203231100I.T02	Convert		2022-03-23T11:00:00 GPS	2.157 MB	<input type="checkbox"/>	
	2203231000I.T02	Convert and Download					<input type="checkbox"/>
	2203230900I.T02	RINEX 3.02 Observables & Ephemeris					<input type="checkbox"/>
	2203230800I.T02	RINEX 2.11					<input type="checkbox"/>
	2203230700I.T02	RINEX 2.12 w/QZSS					<input type="checkbox"/>
	2203230600I.T02	RINEX 3.00					<input type="checkbox"/>
	2203230500I.T02	RINEX 3.02					<input type="checkbox"/>
	2203230400I.T02	RINEX 3.03					<input type="checkbox"/>
	2203230300I.T02	RINEX 3.04					<input type="checkbox"/>
	2203230200I.T02	BINEX					<input type="checkbox"/>
	2203230100I.T02	Google Earth					<input type="checkbox"/>
	2203230000I.T02	Convert		2022-03-23T04:00:00 GPS	2.269 MB	<input type="checkbox"/>	
	2203230000I.T02	Convert		2022-03-23T03:00:00 GPS	2.384 MB	<input type="checkbox"/>	

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*The RINEX or BINEX files can be obtained via FTP Push from the alloy receiver.
There is no need for any further tools to get RINEX/BINEX files from the Alloy*

The screenshot shows a configuration window with the following settings:
File System: /Internal
Path Style: Flat
Name Style: ###JJJx
Pool: Off
FTP Push: Off (radio button 1 is selected)
Convert: A dropdown menu is open, showing a list of conversion options. The option "Zipped V2.11 RINEX (Observable & Ephemeris)" is highlighted in blue.
Email Push:
Buttons: OK, Cancel

4.1.1.51 The receiver must be capable of pushing logged and converted data files to three separate FTP servers.

COMPLY

4.1.1.52 The receiver must be capable of sending logged and converted data files via email.

COMPLY

The screenshot shows a configuration window with the following settings:
File System: /Internal
Path Style: Flat
Name Style: ###JJJx
Pool: Off
FTP Push: Off (radio button 1 is selected)
Convert: BINEX
Email Push:
Convert: Zipped V3.03 RINEX (Observables & Combined Ephemeris)
Email To:
Buttons: Cancel

4.1.1.53 The receiver must support both a configurable ring buffer style memory deletion scheme as well as session specific memory pools with similar functionality. Additionally, data must be able to be protected from being overwritten in the case of external events input.

COMPLY: The Alloy supports the ring buffer style memory deletion as well as a file protection

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File Protection?

Enable:

Protect Before Events: Minutes

Protect After Events: Minutes

Communication Interfaces

4.1.1.54 The receiver must include at least four physical serial ports. Serial port hubs or adaptors connected to the physical ports of the receiver are not a valid alternative.

COMPLY: Four serial connections are provided via four separate physical ports.

4.1.1.55 The receiver must include at least one USB port supporting remote network driver inter- face specifications (RNDIS) in device and host modes.

COMPLY: The Alloy receiver has one Mini-B USB 5-pin / RDNIS (Device and Host modes).

4.1.1.56 The receiver must have a built-in Ethernet RJ45 communications port allowing for TCP/IP configuration of all receiver features, data files, and data streams. Must be compliant with IEEE 802.3.

COMPLY: The Alloy receiver has an ethernet: one RJ45 (Full-duplex, auto-negotiate 100Base-T).

4.1.1.57 The receiver must have a Wi-Fi 802.11 b/g connection supporting client mode and access point. The Wi-Fi connection must support WPA/WPA2/WEP64/WEP128 encryption. The Wi-Fi connection in access point mode must allow TCP/IP configuration of all receiver features, data files, and data streams.

COMPLY

4.1.1.58 The receiver must include a 2.4 GHz Bluetooth radio supporting up to three simultaneous connections.

COMPLY

4.1.1.59 The receiver must have a communication port supporting 10 MHz external frequency input.

COMPLY

4.1.1.60 The receiver must have a minimum of 10 unique TCP/IP ports. "Unique" means that one multicast TCP/IP port (allowing multiple connections) only counts as 1 TCP/IP port. Each port must be fully configurable independent of

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the other ports and outputs.

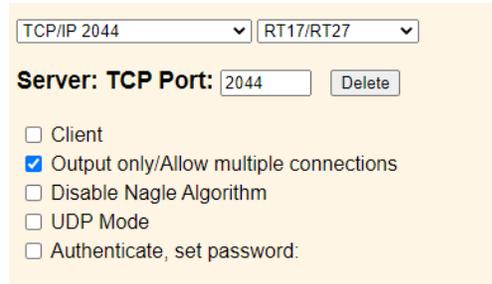
COMPLY: The Alloy receiver can stream observation data through 10 different ports. Each port can stream a different data format. See screenshot below from the Alloy receiver We UI.

Type	Port	Input	Output
TCP/IP	2044	-	RTCM_V3
TCP/IP	2045	-	RT27(1Hz)
TCP/IP	2524	-	BINEX(1Hz)
TCP/IP	2548	-	-
TCP/IP	2578	-	-
TCP/IP	2645	-	-
TCP/IP	5018	-	RT27(1Hz)
TCP/IP	10.2.156.242 5055	-	-
TCP/IP	5060	-	-
TCP/IP	5066	-	-

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- 4.1.1.61** The receiver TCP/IP ports must support User Datagram Protocol (UDP), client and server connections. The TCP/IP ports must support password protection.

COMPLY: The Alloy receiver supports UDP communication and TCP. The TCP port supports password protection.



TCP/IP 2044 RT17/RT27

Server: TCP Port: 2044 Delete

Client
 Output only/Allow multiple connections
 Disable Nagle Algorithm
 UDP Mode
 Authenticate, set password:

- 4.1.1.62** The receiver must include at least three independent NTRIP Clients.

COMPLY: See below user interface

- 4.1.1.63** The receiver must include at least three independent NTRIP Servers.

COMPLY: See below user interface

- 4.1.1.64** The receiver must include at least three independent NTRIP Casters supporting at least 30 different NTRIP logins.

COMPLY: See below user interface

- 4.1.1.65** The receiver must feature a fully configurable FTP server. It must support the FTP REST command.

COMPLY, data can be accessed via built in FTP Server

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I/O Configuration?

Type	Port
TCP/IP	2044
TCP/IP	2045
TCP/IP	2524
TCP/IP	2548
TCP/IP	2578
TCP/IP	2645
TCP/IP	5018
TCP/IP	10.2.156.242 : 5055
TCP/IP	5060
TCP/IP	5066
IBSS/NTRIP Client 1	-
IBSS/NTRIP Client 2	-
IBSS/NTRIP Client 3	-
IBSS/NTRIP Server 1	-
IBSS/NTRIP Server 2	-
IBSS/NTRIP Server 3	-
NTRIP Caster 1	2101
NTRIP Caster 2	2102
NTRIP Caster 3	2103
Serial	COM1 (115K-8N1)
Serial	COM2 (115K-8N1)
Serial	COM3 (115K-8N1)
Serial	COM4 (115K-8N1)
Bluetooth	1
Bluetooth	2
Bluetooth	3
USB	-

Security

4.1.1.66 The receiver must have a secure network connection (secure means via an encrypted, authenticated session) as well as provide various access levels to the receiver controls.

COMPLY: The Alloy receiver allows different access levels for users.

Security: Enabled
 Limit NTRIP Caster Connections: Disabled
 Current User: admin

User Name	Receiver Config	File Download	File Delete	Edit Security	NTripCaster
admin	<input checked="" type="checkbox"/>				
TQAUser	<input checked="" type="checkbox"/>				
SI		<input checked="" type="checkbox"/>			
sti		<input checked="" type="checkbox"/>			

COMPLY: The Alloy receiver supports HTTPS connection as well as SSL encryption.

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HTTP Enable:

HTTP Server Port:

HTTP Secure Enable:

HTTP Secure Port:

High Security:

Boot Monitor IP Port:

4.1.1.67 The receiver must support IP filtering for incoming connections.

COMPLY: IP filtering can be configured in the receiver UI.

IP Filtering and QoS?

IP Filtering

Enable:

IP Address				Bits : Netmask
<input type="text" value="10"/>	<input type="text" value="2"/>	<input type="text" value="44"/>	<input type="text" value="107"/>	Disabled <input type="button" value="v"/>
<input type="text" value="10"/>	<input type="text" value="2"/>	<input type="text" value="44"/>	<input type="text" value="107"/>	Disabled <input type="button" value="v"/>
<input type="text" value="10"/>	<input type="text" value="2"/>	<input type="text" value="44"/>	<input type="text" value="107"/>	Disabled <input type="button" value="v"/>
<input type="text" value="10"/>	<input type="text" value="2"/>	<input type="text" value="44"/>	<input type="text" value="107"/>	Disabled <input type="button" value="v"/>
<input type="text" value="10"/>	<input type="text" value="2"/>	<input type="text" value="44"/>	<input type="text" value="107"/>	Disabled <input type="button" value="v"/>

Browser IP Address : 10.2.44.107

4.1.1.68 The receiver must support TLS v.1.2.

COMPLY

4.1.1.69 The receiver must be IPV6 compatible.

COMPLY

4.1.1.70 The receiver must have the possibility of being configured to use custom TLS certificates.

COMPLY

System Features

4.1.1.71 The receiver must have the ability of being configured without the use of any kind of proprietary software.

COMPLY: All settings and configuration can be done on the receiver Web UI.



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- 4.1.1.72** The receiver must have an user interface in the form of web page embedded in the receiver and compatible with most web browsers available (ie: Mozilla Firefox, Google Chrome, etc.). The receiver web interface must be compatible with the mobile device versions of the web browsers.

COMPLY

- 4.1.1.73** The receiver's web interface must feature help or reference information in the form of context-sensitive menus.

COMPLY

- 4.1.1.74** The receiver must allow alert configuration to automatically inform of any changes in the position, data logging, configuration, tracking, power, communications, and system access events.

COMPLY: The Alloy receiver support email alerts for various functions, including:

Alert after a reboot

Alert when no satellites are tracked

Alert when Receiver controls are changed

Provide a daily tracking/status summary

Alert if the data logging terminates or the memory is full

Alert if a TCP/IP link or other communication link fails

Alert if the FTP push fails

Alert if a user attempts to log on and is denied access

Alert when the receiver starts or stops using its internal battery

Alert when the receiver is about to shutdown due to low power

Alert when the receiver operating temperature is getting too high or too low

Alert if logging to external USB drive is resumed

Alert when new firmware is available for update

Alert when DDNS update failed

Alert when external frequency is enabled and changes detection state

When a crash occurs, send diagnostic info (including configuration) to Trimble.

Alert when IBSS/NTRIP connection changed

Alert if position type changes

Alert if antenna exceeds minimum offset

- 4.1.1.75** The receiver must enable monitoring of its own absolute position to centimeter level accuracy using a PPP solution independent from the WVDOT CORS network. Communications of PPP correction data must not depend upon ground-based IT infrastructure. There must be no annual



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subscription costs for the PPP integrity feature. Out of tolerance alerting via both graphical user interface and email of any detected change in

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antenna position must be automatically initiated. The tolerance at which alerts are generated shall be user configurable depending upon the solution type in use. When this tolerance is exceeded, the receiver must be able to automatically stop sending correction data until the antenna moves back within tolerance.

COMPLY: The Alloy receiver is capable of monitoring its own absolute position to centimeter level accuracy. The owner can be alerted if the antenna falls over, is moved, and so forth. A station position must be entered (latitude, longitude, and height) to monitor against, and set up alarms can be configured to outline thresholds. Owners may define the acceptable movement of various positioning modes (autonomous, DGPS, RTK, SBAS, RTX, etc.). A Trimble Alloy receiver can both receive corrections and determine a real-time position as well as take the reference position and generate corrections for transmission. Also definable is the amount of time to wait before an alarm is issued. Usually, email alerts are configured and sent, but there is also a graphical warning on the web interface.

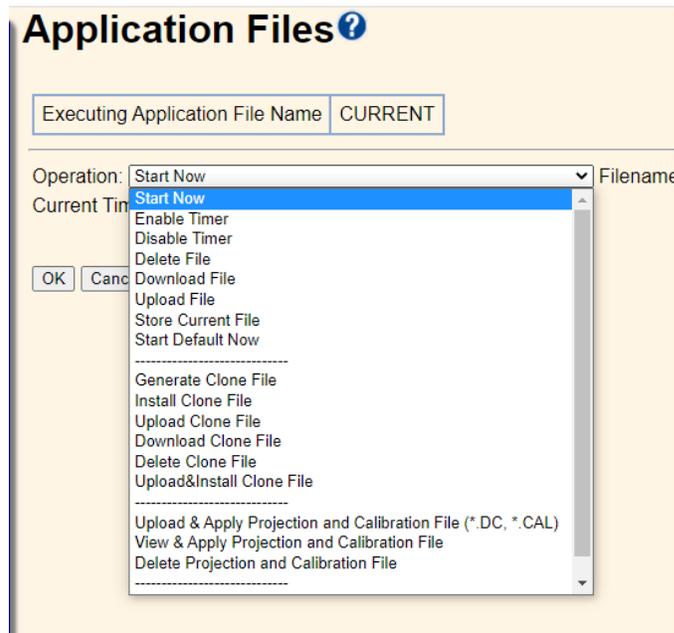
- 4.1.1.76** The receiver must have a built-in (internal) spectrum analyzer to identify spurious jamming signals in the GNSS frequency range. The spectrum analyzer must display information in real-time and also from the past 24 hours in the form of interactive charts, with zooming and panning capabilities.

COMPLY: The Trimble Alloy receiver has a built-in spectrum analyzer. This is a tool for analyzing frequency spectra of all GNSS bands tracked by the receiver and integrated in the web interface of the receiver for identifying potential generating interference signals.

- 4.1.1.77** The receiver must have the ability to save the configuration of the receiver in a downloadable file and upload it to other receivers to reconfigure them remotely.

COMPLY: The receiver setting can be downloaded as a clone file. The clone file can be uploaded to other Alloy receivers to configure them

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- 4.1.1.78** The receiver must have a well-documented application programming interface (API) allowing the configuration and management of the system and supporting user authentication.

COMPLY: The Alloy receiver has a programmatic interface which allows config and management of the receiver with user authentication support

- 4.1.1.79** It must be possible to retrieve logged data from the receiver by using the API.

COMPLY: All functionality to manage logged data is possible via the Alloys integrated application programming interface.

Software Capability

- 4.1.1.80** WVDOT owns and operates an existing Trimble VRS software system. The proposed receiver must have full compatibility of all signals with the existing software including BeiDou BDS3.

COMPLY: Duncan Parnell Inc's proposal for Trimble Alloys includes receivers configured with features enabled for GPS / GLONASS/ Galileo / Beidou (including BDS3) and RTX. The Trimble receiver forms an integrated solution with the WVDOT existing Trimble PIVOT software. The Alloy receiver and PIVOT software are engineered as an interoperable system



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by Trimble Inc. The benefit to the State of this solution is that there is one source of support, training, expansion, and warranty. This greatly simplifies management of the system in that all questions and needs are managed by one single manufacturer.

In addition critical functionality such as storage integrity assures the State that postprocessing files are maintained to the highest degree even if communications are temporarily interrupted between the Alloy and PIVOT software.

Trimble RTX aboard the Alloy receivers assures the state of the highest levels of data quality in that the receivers have a second fully independent correction source to use. This continuous checking of the receivers positions and alarming for out of tolerance conditions assures the state that even if adverse environmental conditions disrupt communications, rapid coordinate checking and establishment can be managed.

- 4.1.1.81** The vendor must assure the WVDOT that all receivers will be supplied along with any software modules needed to provide full GNSS compatibility with the existing software. The vendor must confirm the state that no additional software is required for full compatibility of all GNSS signals (GPS, GLONASS, Galileo, BeiDou including BDS3) from their proposed GNSS receiver.

COMPLY: Duncan Parnell Inc. is committed to the WVDOT in that our offering will provide a complete GNSS solution capable of receiving, managing and distributing GNSS information from all constellations including GPS, GLONASS, Galileo, BeiDou including BDS3. WVDOT as an owner and operator of Trimble PIVOT software will be supplied with the additional PIVOT processors/modules needed to take full advantage of the GNSS constellation and the Alloys. These processors are simple add-on modules for the existing software.

Duncan Parnell Inc. is an authorized dealer for Trimble products. As an authorized dealer we have access to all software and hardware infrastructure solutions as well as expertise gained via providing these solutions to other DOT's.

- 4.1.1.82** Remote firmware upgrades of the receivers must be demonstrated through use of the existing CORS network management software without the addition of external applications or software modules.

COMPLY: Trimble Pivot Platform can upload the FW file into the Alloy receiver and starts the FW upgrade in the Alloy receiver without the need of any other software.



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- 4.1.1.83** Communication between the server and the CORS receivers have the flexibility to operate as:
- Dial-up modem (landline/cellular/GSM/high-speed wireless)
 - Internet, intranet, local or wide area networks (TCP/IP)
 - Direct serial link (RS232)

COMPLY

Properties - GNSS Receiver [GROSSHOEHENRAIN]	
Selected Station	
Selected station	GROSSHOEHENRAIN
Receiver Information	
Manufacturer	TRIMBLE
Name	TRIMBLE NETR9
Decoder	
Decoder group	Real-time
Communication mode	Active - "fire and forget"
Incoming Connection	
Connection type	NTRIP Client
Connection Settings	
Caster name	TCP/IP Client
Port	TCP/IP Server
SSL/TLS	Modem
	Serial
	NTRIP Client
	RTPD Client

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4.1.1.84 Streaming of raw data from the proposed receiver shall be via formats compatible with the existing software and not requiring additional modules or software modifications.

COMPLY: The Trimble Alloy communicates via an efficient T02 data format with the Trimble PIVOT solution. The solution was engineered as a system whereby the Alloys and software form a fully integrated system rather than a compilation of individual parts.

4.1.1.85 Vendor must demonstrate that the existing WVDOT Software is compatible and capable of performing the following receiver configurations without the use of any external apps:

- General receiver settings
- Satellite tracking parameters
- Data logging parameters

COMPLY: Trimble Pivot Platform is able to control the receiver, General settings can be made from the SW, set elevation mask, enable or disable frequencies in the receiver, creating logging session in the receiver internal memory, controle receiver internal RTX.

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Properties - GNSS Receiver [GROSSHOEHENRAIN]	
Receiver Control	
Elevation cutoff [°]	5
Azimuth dependent cutoff	Not set
Tracking interval	1 Hz
Remote Access	
Receiver name	
HTTP port	80
User name	
Password	
Advanced	
Phase smoothing	No
Clock steering	Yes
L2 tracking	L2C and Legacy
L2C Code	CM / CL
Enable L5	Yes
L5 code	IQ
GLONASS tracking	CA and P
Enable Galileo	Yes
Enable SBAS	Yes
Enable QZSS	Yes
Enable BeiDou	Yes
Enable IRNSS	Yes
Receiver Internal RTX	
Control receiver internal RTX	No
Data Logging	
Enable data logging configuration	Yes
Data logging	Off
Tracking interval	1 Hz
Continuous logging rate	1 h
File system	Internal
External Sensor	
Enable external sensor configuration	No
Internal Sensor	
Temperature threshold [°C]	50
Voltage threshold [V]	12
Storage Integrity	
Enable storage integrity connection	Yes

- Downloads raw of data, analyses, reformats, archives and distributes GPS data via a FTP and web server

COMPLY: The SW can actively download raw observation data from the receiver. The real time data stream can be reformatted in RINEX, T02, T01, DAT, TGD and stored on the server.



REQUEST FOR QUOTATION CORS GNSS Receivers and Components

Ephemeris Source	
Use ephemeris from receiver	No
Storage Type	
Storage type	RINEX
Folder	
Storage path	RINEX DAT
Folder structure	T01 T02 TGD
Add station code to folder structure	No
Naming convention	Short
Filtering	Yes
Data rate	1 Hz
Next File	
Start the next observation file after ...	1 h
Lower case only	No
Compress	

This archived data can be converted and distributed via the TPP Web App using the Reference Data Shop



Trimble® Pivot Web

Home > Reference Data Shop

- Home
- Sensor Map
- Position Scatter Plot
- Status Messages
- Network Information
 - IRIM/GRIM
 - IR5 Ionosphere
 - IRIM/GRIM
 - Online Post Processing
 - Reference Data Shop

Reference Data Shop - Overview

This service allows you to obtain GNSS data for reference stations in the network or a virtual reference station. You can order and immediately download the requested data files with

[Start new order](#)

Not yet downloaded orders:

No. Request time (local time) Items Status File size Action

- Home
- Sensor Map
- Position Scatter Plot
- Status Messages
- Network Information
 - IR5 Ionosphere
 - IRIM/GRIM
 - Online Post Processing
 - Reference Data Shop
- Atmospheric Conditions
 - IPWV Map
 - Station Chart
 - Condition Chart
 - IPWV Contour Map
 - IPWV Surface Map
 - IPWV Surface Map Animation
 - TEC Contour Map
 - TEC Surface Map
 - TEC Surface Map Animation
- My Account
 - Personal Data
 - Change Password
 - Logins
 - Sessions
 - VRS Scope
 - VRS Scope Level
 - Active Subscriptions
- Organization Details
 - Active Subscriptions
 - Expiring Subscriptions
- Administration
 - Status Messages
 - Add Status Messages
 - Edit Status Messages
 - Regions
 - Add Regions
 - Edit Regions
 - User Management

Reference Data Shop - Reference Stations

Choose one or more reference stations by clicking in the list or in the map. If you want to select multiple stations from the list, press and hold down the CTRL key and click with the mouse.

Available Reference Stations

GROSSHOEHENRAIN
 HOEHENBRUNN
 MAINBURG
 SINDELSDORF
 TRAUNSTEIN

[<< Back: Station Type Selection](#) | [Next: Time Selection >>](#)

GNSS data management by existing software with proposed CORS

4.1.1.86 The CORS receiver vendor must demonstrate that the existing software performs the following tasks automatically and periodically at user-defined times and intervals without the use of external applications or software.

- Retrieve primary logged data files.
- Check all downloaded data for completeness and retrieve



Response - DOT2200000146

**REQUEST FOR QUOTATION
CORS GNSS Receivers and
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- missing data automatically from the internal receiver memory.
- Convert to RINEX or to Hatanaka compact RINEX.
 - Perform splitting, appending and decimating data as required by Administrator.
 - Archive files, clean-up files after user-defined period of time for user defined file types based on two mechanisms, remaining free disk space and file age.
 - Distribute files to FTP or WEB servers for easy access by the GNSS user community.
 - Generates event logs, alarms and warnings on receiver status, network status and data quality status.

COMPLY: The described functionality is currently in operation with the WVDOT's existing software and NetR5 GPS receivers. The Trimble Alloy will replace the NetR5 receivers and enhance the above functionality with full GNSS data.

- 4.1.1.87** The vendor must demonstrate full functionality with the existing WVDOT software to manage assure completeness of CORS data. The completeness of data is of high value to WVDOT as it assures users will have access to complete postprocessing records. Steps of a successful demonstration compatible with this section are:
- CORS and software operate as intended archiving data on both the receiver and in software.

**REQUEST FOR QUOTATION
CORS GNSS Receivers and
Components**

- If an IT network connection is lost the CORS must demonstrate continued logging of data.
- When the IT network connection is restored, the software will query the CORS and receive access to download the full database of the CORS.
- In the event of an IT outage, data from the CORS must be compatible to facilitate import of the data needed for "filling in" missing epochs in the existing WVDOT software database. This action will complete the record stored within the existing software and assure WVDOT of near 100% complete data logs.

COMPLY: The functionality as described is managed via Trimble Storage Integrity. This functionality as described is enabled in the WVDOT existing system.

Warranty

- 4.1.1.88** The receiver must include at a minimum five (5) year manufacturer's warranty from the date of purchase with next business day replacement.

COMPLY: Duncan Parnell Inc is committed to supporting the state of West Virginia. We currently maintain inventory for spares in Charlotte, North Carolina

- 4.1.1.89** The receiver must include lifetime firmware updates without the need of purchasing maintenance contracts.

COMPLY: Lifetime firmware warranty is a standard feature of the Trimble Alloy

4.1.2 Quantity of Twenty-four (24) Trimble Zephyr 3 Geodetic Antenna Kit 158285- 00 or Equal. Vendor must provide a product with the following minimum features:

- 4.1.2.1** Geodetic antenna must track the following frequencies from GNSS constellations:
- GPS: L1, L2, L5
 - GLONASS: G1, G2, G3
 - GALILEO: E1, E5ab, E6
 - BEIDOU: B1, B2, B3

COMPLY



**REQUEST FOR QUOTATION
CORS GNSS Receivers and
Components**

Specifications	Trimble Zephyr 3 Geodetic Antenna
Minimum tracking elevation	0 Degrees
Practical tracking elevation	<3 Degrees
Supported positioning signal bands	L1/L2/L5/G1/G2/G3/E1/E5ab/E6/B1/B2/B3
Supported SBAS signal bands	WAAS, EGNOS, QZSS, Gagan, MSAS, OmniSTAR®, RTX™

The antenna must be compatible with the following SBAS:

- EGNOS
- WAAS
- GAGAN
- MSAS

COMPLY: The proposed Trimble Zephyr 3 Geodetic antenna receives IRNSS: L5, S-Band SBAS: L1 C/A (EGNOS/MSAS), L1 C/A and L5 (WAAS) L-Band: OmniSTAR VBS, HP and X

4.1.2.2 The antenna must be compatible with correction services broadcast via L-band.

COMPLY: The ZG3 is compatible with the correction service RTX via L-band.

4.1.2.3 Phase center stability greater than 2 mm.

COMPLY:

- Phase-center repeatability <1 mm
- Phase-center accuracy 2 mm or better
- Antenna gain 50 dB ±2dB

4.1.2.4 Minimum tracking elevation: 0 degrees.

COMPLY: Data sheets are included which contain more detailed tracking information

4.1.2.5 Practical tracking elevation: less than 3 degrees.

COMPLY

4.1.2.6 Minimum Antenna gain: 50db.

COMPLY



**REQUEST FOR QUOTATION
CORS GNSS Receivers and
Components**

4.1.2.7 Diameter at least 34.0 cm.

COMPLY: The advantage of the Trimble Zephyr Geodetic 3 antenna is that it incorporates a fully enclosed ground plane for multipath mitigation. The ground plane is manufactured of a composite material which reduces weight and wind loading while also effectively reducing multipath for all GNSS frequencies.

4.1.2.8 Weight less than 2.0 kg.

COMPLY: The Trimble Zephyr Geodetic 3 weight 1.36KG

https://trl.trimble.com/docushare/dsweb/Get/Document-410894/022543-429G_Antenna_BRO_USL_0817_LR.pdf

4.1.2.9 Absolute calibration file from IGS (ANTEX format) must be available.

COMPLY: <https://geodesy.noaa.gov/ANTCAL/>

4.1.2.10 Powered by receiver with supplied voltage between 3.5 V DC and 20V DC.

COMPLY: The ZG3 operates from 3.5 to 20 V DC input. This voltage is supplied from the Alloy receiver via the coaxial cable.

4.1.2.11 Nominal impedance: 50 Ohms.

COMPLY: The antenna and supplied TimesMicrowave LMR400 has a nominal impedance of 50 ohms

4.1.2.12 Antenna shall operate in humidity, high winds, sandstorm and blowing rain.
Proven survivability from tornado and hurricane.

COMPLY: The Trimble Zephyr Geodetic 3 antenna is 100% humidity proof and fully sealed. Zephyr Geodetic 3 antennas operated by the Louisiana State University survived Hurricane Katrina. Additionally, the following photos show the Trimble Zephyr Geodetic installed at a Trimble distributors office which survived the Murfreesboro EF4 tornado.

https://en.wikipedia.org/wiki/Tornado_outbreak_of_April_9%E2%80%9311,_2009#:~:text=From%20Wikipedia%2C%20the%20free%20encyclopedia,from%20the%20EF4%20Murfreesboro%20tornado



**REQUEST FOR QUOTATION
CORS GNSS Receivers and
Components**



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Components**

4.1.2.13 Temperature range: -40 degrees C - +85 degrees C.

COMPLY

Temperature Operating.....-55 °C to +85 °C (-67 °F to 185 °F)

Storage -55 °C to +85 °C (-67 °F to 185 °F)

4.1.2.14 Humidity up to 100%.

COMPLY

4.1.2.15 Shock rating: 2m drop on hard surface.

COMPLY: Shock resistance on hard surface 2m (6.56ft)

4.1.2.16 Vibration rating: MIL-STD-810-F on each axis.

COMPLY: The Zephyr Geodetic 3 antenna meets MIL-STD-810-F on each axis. Trimble's data sheet is available via this link:

https://trl.trimble.com/docushare/dsweb/Get/Document-410894/022543-429G_Antenna_BRO_USL_0817_LR.pdf

4.1.2.17 Cable connector: threaded neill conclman equipped

COMPLY: The Trimble Zephyr Geodetic 3 antenna and Alloy use Threaded Neill-Cncelman (TNC) connectors. The impedance of the TNC connector matches the 50 ohm impedance of the cables and equipment thereby ensuring minimal signal loss.

4.1.2.18 Mounting: 5/8" - 11 Female

COMPLY: The 5/8"-11 Trimble equipped antenna will readily attach to existing leveling mounts owned by WVDOT

4.1.2.19 Optional external radome must be available for the antenna upon request.

COMPLY: A radome is not included within our quotation but may be added to the Zephyr antenna at any time. NGS does not recommend the use of radomes.

4.1.2.20 The absolute calibration file for the antenna and external radome bundle must be available from IGS (ANTEX format).

COMPLY: The absolute calibration is available:

<https://www.ngs.noaa.gov/ANTCAL/LoadFile?file=ngs14.atx>



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Components

4.1.2.21 GNSS Antenna Cable for Continuously Operating Reference Stations must meet the following features:

- Length of cable: 30 m.
- Impedance: 50 Ohms.
- Maximal frequency: at least 1.0 GHz.
- Loss at 1.5GHz: less than 0.2 dB/m.
- The cable shall operate in humidity, high winds, sandstorm and blowing rain.

COMPLY: A 30M antenna TimesMicrowave LMR400 cable will be supplied.

Cable details are published via this link:

[LMR-400.pdf \(timesmicrowave.com\)](#)

4.1.2.22 Antenna Kit must include at a minimum: five (5) year manufacturer's warranty from date of purchase with next business day replacement.

COMPLY: Duncan Parnell Inc is committed to supporting the West Virginia DOT.

4.1.3 **Alternate bids that are equal to, meet, or exceed the specifications and requirements listed are invited. In order to receive full consideration, such alternate bids should be accompanied by sufficient descriptive literature and/or samples to clearly identify the offer and allow for a complete evaluation and will be required prior to award. The use of brand name or equal specifications is for describing the minimum standard of quality, technical performance and installation characteristics required and are not intended to limit or restrict competition.**



REQUEST FOR QUOTATION
CORS GNSS Receivers and
Components

4.1.3.1 Additionally, if alternate 'or equal' products are proposed, the vendor must include as part of their bid, all software, travel, hardware and services needed to migrate current WVDOT systems and data/files; train WVDOT staff; test systems; and test ALL migrated data/files. All information currently residing in the existing system(s) must be migrated. This process must be done with no interruption to the current business process within WVDOT and be totally completed within three (3) months of contract award.

5. CONTRACT AWARD:

5.1 Contract Award: The Contract is intended to provide Agencies with a purchase price for the Contract Items. The Contract shall be awarded to the Vendor that provides the Contract Items meeting the required specifications for the lowest overall total cost as shown on the Pricing Pages.

5.2 Pricing Page: Vendor should complete the Pricing Page by providing a total cost for the GNSS receivers and related components. Vendor should complete the Pricing Page in full as failure to complete the Pricing Page in its entirety may result in Vendor's bid being disqualified.

Vendor should type or electronically enter the information into the Pricing Page to prevent errors in the evaluation.

6. ORDERING AND PAYMENT:

6.1 Ordering: Vendor shall accept orders through wvOASIS, regular mail, facsimile, e mail, or any other written form of communication. Vendor may, but is not required to, accept on-line orders through a secure internet ordering portal/website. If Vendor has the ability to accept on-line orders, it should include in its response a brief description of how Agencies may utilize the on-line ordering system. Vendor shall ensure that its on-line ordering system is properly secured prior to processing Agency orders on-line.

6.2 Payment: Vendor shall accept payment in accordance with the payment procedures of the State of West Virginia.

REQUEST FOR QUOTATION
CORS GNSS Receivers and
Components

7. DELIVERY AND RETURN:

- 7.1 **Shipment and Delivery:** Vendor shall ship the Contract Items immediately after being awarded this Contract and receiving a purchase order or notice to proceed. Vendor shall deliver the Contract Items within sixty (60) working days after receiving a purchase order or notice to proceed.

Contract Items must be delivered to Agency - Attention: Dustin Feazell at 1900 Kanawha Blvd, Building 5, Room A720, Charleston, WV 25314.

- 7.2 **Late Delivery:** The Agency placing the order under this Contract must be notified in writing if the shipment of the Contract Items will be delayed for any reason. Any delay in delivery that could cause harm to an Agency will be grounds for cancellation of the Contract, and/or obtaining the Contract Items from a third party.

Any Agency seeking to obtain the Contract Items from a third party under this provision must first obtain approval of the Purchasing Division.

- 7.3 **Delivery Payment/Risk of Loss:** Vendor shall deliver the Contract Items F.O.B. destination to the Agency's location.

- 7.4 **Return of Unacceptable Items:** If the Agency deems the Contract Items to be unacceptable, the Contract Items shall be returned to Vendor at Vendor's expense and with no restocking charge. Vendor shall either make arrangements for the return within five (5) days of being notified that item(s) are unacceptable or permit the Agency to arrange for the return and reimburse Agency for delivery expenses. If the original packaging cannot be utilized for the return, Vendor will supply the Agency with appropriate return packaging upon request. All returns of unacceptable items shall be F.O.B. the Agency's location. The returned product shall either be replaced, or the Agency shall receive a full credit or refund for the purchase price, at the Agency's discretion.

- 7.5 **Return Due to Agency Error:** Items ordered in error by the Agency will be returned for credit within 30 days of receipt, F.O.B. Vendor's location. Vendor shall not charge a restocking fee if returned products are in a resalable condition. Items shall be deemed to be in a resalable condition if they are unused and in the original packaging. Any restocking fee for items not in a resalable condition shall be the lower of the Vendor's customary restocking fee or 5% of the total invoiced value of the returned items.

REQUEST FOR QUOTATION
CORS GNSS Receivers and
Components

8. VENDOR DEFAULT:

8.1 The following shall be considered a vendor default under this Contract.

- 8.1.1 Failure to provide Contract Items in accordance with the requirements contained herein.
- 8.1.2 Failure to comply with other specifications and requirements contained herein.
- 8.1.3 Failure to comply with any laws, rules, and ordinances applicable to the Contract Services provided under this Contract.
- 8.1.4 Failure to remedy deficient performance upon request.

8.2 The following remedies shall be available to Agency upon default.

- 8.2.1 Immediate cancellation of the Contract.
- 8.2.2 Immediate cancellation of one or more release orders issued under this Contract.
- 8.2.3 Any other remedies available in law or equity.

9. MISCELLANEOUS:

9.1 No Substitutions: Vendor shall supply only Contract Items submitted in response to the Solicitation unless a contract modification is approved in accordance with the provisions contained in this Contract.

9.2 Vendor Supply: Vendor must carry sufficient inventory of the Contract Items being offered to fulfill its obligations under this Contract. By signing its bid, Vendor certifies that it can supply the Contract Items contained in its bid response.

10. Contract Manager: During its performance of this Contract, Vendor must designate and maintain a primary contract manager responsible for overseeing Vendor's responsibilities under this Contract. The Contract manager must be available during normal business hours to address any customer service or other issues related to this Contract. Vendor should list its Contract manager and his or her contact information below.

Contract Manager: York D. Grow

Telephone Number: 804-368-7525

Fax Number: 804-496-6320_____

Email Address: york.grow@duncan-parnell.com_



John W Estep
Department of Administration
State of West Virginia
2019 Washington Street, East
Charleston, West Virginia 25305

RE: DOT2200000146

Dear Mr. Estep:

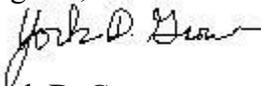
Duncan-Parnell is pleased to provide a response to this CRFQ and have included our pricing response as well as other requested documentation. Duncan-Parnell has been an Authorized Trimble Dealer for over 25 years serving the Mid-Atlantic and Southeast, including the State of West Virginia. We have been supporting the WVDOT for many years with Trimble GNSS needs including the existing Trimble CORS base station network. We look forward to the opportunity to continue our commitment to this agency.

As you review the bid response, we would like to draw specific attention to several items. We are responding with the Trimble Alloy GNSS receiver and Zephyr 3 Geodetic Antenna as specifically requested by the two part numbers identified in Exhibit A – Pricing Page and the Final_CRFQ_Form. However, per the additional requirements detailed in the CRFQ Specifications, we are including the additional, necessary part numbers as required such as additional capabilities of the Alloy GNSS receivers, five-year warranty, and an upgrade to the existing PIVOT software. The existing Trimble Pivot software owned by WVDOT does not support all specifications outlined in 4.1.1.80-82. We are providing the necessary software upgrade to ensure complete compliance. For more details on this and our compliance with all other specifications, we would ask you to review our response notes in the CRFQ Specifications as attached.

109100-00 Trimble Alloy GNSS Receiver also includes enablement for Galileo, Beidou, and RTX. These are covered under a full five year warranty with an extra Alloy Receiver available for next-day delivery in case of a service need. It also provides the required Pivot RTXNet Package upgrade to the existing Pivot software owned by WV DOT.

158285-00 Trimble Zephyr 3 Geodetic Antenna Kit also includes a total of five years of warranty and an extra antenna available for next-day delivery in case of a service need.

Regards,



York D. Grow
MGIS Solutions Manager
Duncan-Parnell, Inc.



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

State of West Virginia
 Centralized Request for Quote
 Audio/Video

Proc Folder: 1006767
Doc Description: CORS GNSS Receivers and Components (81220064)
Proc Type: Central Purchase Order

Reason for Modification:

Date Issued	Solicitation Closes	Solicitation No	Version
2022-03-16	2022-03-31 13:30	CRFQ 0803 DOT2200000146	1

BID RECEIVING LOCATION

BID CLERK
 DEPARTMENT OF ADMINISTRATION
 PURCHASING DIVISION
 2019 WASHINGTON ST E
 CHARLESTON WV 25305
 US

VENDOR

Vendor Customer Code: 213488
Vendor Name : Duncan-Parnell, Inc
Address : 305 Suite K
Street : Ashcake Rd.
City : Ashland
State : Virginia **Country :** United States **Zip :** 23005
Principal Contact : York D. Grow
Vendor Contact Phone: 434-962-32489 **Extension:**

FOR INFORMATION CONTACT THE BUYER

John W Estep
 304-558-2566
 john.w.estep@wv.gov

Vendor Signature X *York D. Grow*

FEIN# 560561956

DATE March 29, 2022

All offers subject to all terms and conditions contained in this solicitation

ADDITIONAL INFORMATION**REQUEST FOR QUOTATION:**

The West Virginia Purchasing Division is soliciting bids on behalf of WV Department of Transportation to establish a contract for the one-time purchase of GNSS (global navigation satellite system) receivers and its related components. WV Department of Transportation owns and operates a current license of Trimble CORS (continuous operation reference station) software. The GNSS receivers and its related components must be compatible with Trimble CORS software with the last official product and/or firmware release at the date of release of this tender. Per the Bid Requirements, Specifications, Terms and Conditions attached to this solicitation.

INVOICE TO		SHIP TO	
DEPT. OF TRANSPORTATION 1900 KANAWHA BLVD E, BLD. 5 RM-720		DEPT. OF TRANSPORTATION 1900 KANAWHA BLVD E, BLD. 5 RM-720	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
1	Trimble Alloy GNSS Receiver 109100-00 or Equal	24.00000	EA	\$15,127.75	\$363,066.00

Comm Code	Manufacturer	Specification	Model #
52161526	Trimble, Inc.	Alloy GNSS Receiver	109100-00

Extended Description:
Trimble Alloy GNSS Receiver 109100-00 or Equal

INVOICE TO		SHIP TO	
DEPT. OF TRANSPORTATION 1900 KANAWHA BLVD E, BLD. 5 RM-720		DEPT. OF TRANSPORTATION 1900 KANAWHA BLVD E, BLD. 5 RM-720	
CHARLESTON	WV	CHARLESTON	WV
US		US	

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Total Price
2	Trimble Zephyr 3 Geodetic Antenna Kit 158295-00 or Equal	24.00000	EA	\$3807.00	\$91,368.00

Comm Code	Manufacturer	Specification	Model #
43221712	Trimble, Inc.	Zephyr 3 Geodetic Antenna Kit	158285-00

Extended Description:
Trimble Zephyr 3 Geodetic Antenna Kit 158295-00 or Equal

SCHEDULE OF EVENTS

Line	Event	Event Date
1	Tech Questions due by 10:00am	2022-03-24

	Document Phase	Document Description	Page
DOT2200000146	Final	CORS GNSS Receivers and Components (81220064)	3

ADDITIONAL TERMS AND CONDITIONS

See attached document(s) for additional Terms and Conditions

GENERAL TERMS AND CONDITIONS:

1. CONTRACTUAL AGREEMENT: Issuance of an Award Document signed by the Purchasing Division Director, or his designee, and approved as to form by the Attorney General's office constitutes acceptance by the State of this Contract made by and between the State of West Virginia and the Vendor. Vendor's signature on its bid, or on the Contract if the Contract is not the result of a bid solicitation, signifies Vendor's agreement to be bound by and accept the terms and conditions contained in this Contract.

2. DEFINITIONS: As used in this Solicitation/Contract, the following terms shall have the meanings attributed to them below. Additional definitions may be found in the specifications included with this Solicitation/Contract.

2.1. "Agency" or "Agencies" means the agency, board, commission, or other entity of the State of West Virginia that is identified on the first page of the Solicitation or any other public entity seeking to procure goods or services under this Contract.

2.2. "Bid" or "Proposal" means the vendors submitted response to this solicitation.

2.3. "Contract" means the binding agreement that is entered into between the State and the Vendor to provide the goods or services requested in the Solicitation.

2.4. "Director" means the Director of the West Virginia Department of Administration, Purchasing Division.

2.5. "Purchasing Division" means the West Virginia Department of Administration, Purchasing Division.

2.6. "Award Document" means the document signed by the Agency and the Purchasing Division, and approved as to form by the Attorney General, that identifies the Vendor as the contract holder.

2.7. "Solicitation" means the official notice of an opportunity to supply the State with goods or services that is published by the Purchasing Division.

2.8. "State" means the State of West Virginia and/or any of its agencies, commissions, boards, etc. as context requires.

2.9. "Vendor" or "Vendors" means any entity submitting a bid in response to the Solicitation, the entity that has been selected as the lowest responsible bidder, or the entity that has been awarded the Contract as context requires.

3. CONTRACT TERM; RENEWAL; EXTENSION: The term of this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below:

Term Contract

Initial Contract Term: This Contract becomes effective on the effective start date listed on the first page of this Contract and the initial term ends on the effective end date also shown on the first page of this Contract.

Renewal Term: This Contract may be renewed upon the mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any request for renewal should be delivered to the Agency and then submitted to the Purchasing Division thirty (30) days prior to the expiration date of the initial contract term or appropriate renewal term. A Contract renewal shall be in accordance with the terms and conditions of the original contract. Unless otherwise specified below, renewal of this Contract is limited to _____ successive one (1) year periods or multiple renewal periods of less than one year, provided that the multiple renewal periods do not exceed the total number of months available in all renewal years combined. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

Alternate Renewal Term – This contract may be renewed for _____ successive _____ year periods or shorter periods provided that they do not exceed the total number of months contained in all available renewals. Automatic renewal of this Contract is prohibited. Renewals must be approved by the Vendor, Agency, Purchasing Division and Attorney General's office (Attorney General approval is as to form only)

Delivery Order Limitations: In the event that this contract permits delivery orders, a delivery order may only be issued during the time this Contract is in effect. Any delivery order issued within one year of the expiration of this Contract shall be effective for one year from the date the delivery order is issued. No delivery order may be extended beyond one year after this Contract has expired.

Fixed Period Contract: This Contract becomes effective upon Vendor's receipt of the notice to proceed and must be completed within _____ days.

Fixed Period Contract with Renewals: This Contract becomes effective upon Vendor's receipt of the notice to proceed and part of the Contract more fully described in the attached specifications must be completed within _____ days. Upon completion of the work covered by the preceding sentence, the vendor agrees that maintenance, monitoring, or warranty services will be provided for _____ year(s) thereafter.

One Time Purchase: The term of this Contract shall run from the issuance of the Award Document until all of the goods contracted for have been delivered, but in no event will this Contract extend for more than one fiscal year.

Other: See attached _____

4. AUTHORITY TO PROCEED: Vendor is authorized to begin performance of this contract on the date of encumbrance listed on the front page of the Award Document unless either the box for “Fixed Period Contract” or “Fixed Period Contract with Renewals” has been checked in Section 3 above. If either “Fixed Period Contract” or “Fixed Period Contract with Renewals” has been checked, Vendor must not begin work until it receives a separate notice to proceed from the State. The notice to proceed will then be incorporated into the Contract via change order to memorialize the official date that work commenced.

5. QUANTITIES: The quantities required under this Contract shall be determined in accordance with the category that has been identified as applicable to this Contract below.

Open End Contract: Quantities listed in this Solicitation/Award Document are approximations only, based on estimates supplied by the Agency. 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.

Service: The scope of the service to be provided will be more clearly defined in the specifications included herewith.

Combined Service and Goods: The scope of the service and deliverable goods to be provided will be more clearly defined in the specifications included herewith.

One Time Purchase: This Contract is for the purchase of a set quantity of goods that are identified in the specifications included herewith. Once those items have been delivered, no additional goods may be procured under this Contract without an appropriate change order approved by the Vendor, Agency, Purchasing Division, and Attorney General’s office.

6. EMERGENCY PURCHASES: The Purchasing Division Director may authorize the Agency to purchase goods or services in the open market that Vendor would otherwise provide under this Contract if those goods or services are for immediate or expedited delivery in an emergency. Emergencies shall include, but are not limited to, delays in transportation or an unanticipated increase in the volume of work. An emergency purchase in the open market, approved by the Purchasing Division Director, shall not constitute of breach of this Contract and shall not entitle the Vendor to any form of compensation or damages. This provision does not excuse the State from fulfilling its obligations under a One Time Purchase contract.

7. REQUIRED DOCUMENTS: All of the items checked below must be provided to the Purchasing Division by the Vendor as specified below.

BID BOND (Construction Only): Pursuant to the requirements contained in W. Va. Code § 5-22-1(c), All Vendors submitting a bid on a construction project shall furnish a valid bid bond in the amount of five percent (5%) of the total amount of the bid protecting the State of West Virginia. The bid bond must be submitted with the bid.

PERFORMANCE BOND: The apparent successful Vendor shall provide a performance bond in the amount of 100% of the contract. The performance bond must be received by the Purchasing Division prior to Contract award.

LABOR/MATERIAL PAYMENT BOND: The apparent successful Vendor shall provide a labor/material payment bond in the amount of 100% of the Contract value. The labor/material payment bond must be delivered to the Purchasing Division prior to Contract award.

In lieu of the Bid Bond, Performance Bond, and Labor/Material Payment Bond, the Vendor may provide certified checks, cashier's checks, or irrevocable letters of credit. Any certified check, cashier's check, or irrevocable letter of credit provided in lieu of a bond must be of the same amount and delivered on the same schedule as the bond it replaces. A letter of credit submitted in lieu of a performance and labor/material payment bond will only be allowed for projects under \$100,000. Personal or business checks are not acceptable. Notwithstanding the foregoing, West Virginia Code § 5-22-1 (d) mandates that a vendor provide a performance and labor/material payment bond for construction projects. Accordingly, substitutions for the performance and labor/material payment bonds for construction projects is not permitted.

MAINTENANCE BOND: The apparent successful Vendor shall provide a two (2) year maintenance bond covering the roofing system. The maintenance bond must be issued and delivered to the Purchasing Division prior to Contract award.

LICENSE(S) / CERTIFICATIONS / PERMITS: In addition to anything required under the Section of the General Terms and Conditions entitled Licensing, the apparent successful Vendor shall furnish proof of the following licenses, certifications, and/or permits upon request and in a form acceptable to the State. The request may be prior to or after contract award at the State's sole discretion.

The apparent successful Vendor shall also furnish proof of any additional licenses or certifications contained in the specifications regardless of whether or not that requirement is listed above.

8. INSURANCE: The apparent successful Vendor shall furnish proof of the insurance identified by a checkmark below and must include the State as an additional insured on each policy prior to Contract award. The insurance coverages identified below must be maintained throughout the life of this contract. Thirty (30) days prior to the expiration of the insurance policies, Vendor shall provide the Agency with proof that the insurance mandated herein has been continued. Vendor must also provide Agency with immediate notice of any changes in its insurance policies, including but not limited to, policy cancelation, policy reduction, or change in insurers. The apparent successful Vendor shall also furnish proof of any additional insurance requirements contained in the specifications prior to Contract award regardless of whether that insurance requirement is listed in this section.

Vendor must maintain:

- Commercial General Liability Insurance** in at least an amount of: \$1,000,000.00 per occurrence.
- Automobile Liability Insurance** in at least an amount of: _____ per occurrence.
- Professional/Malpractice/Errors and Omission Insurance** in at least an amount of: _____ per occurrence. Notwithstanding the forgoing, Vendor's are not required to list the State as an additional insured for this type of policy.
- Commercial Crime and Third Party Fidelity Insurance** in an amount of: _____ per occurrence.
- Cyber Liability Insurance** in an amount of: _____ per occurrence.
- Builders Risk Insurance** in an amount equal to 100% of the amount of the Contract.
- Pollution Insurance** in an amount of: _____ per occurrence.
- Aircraft Liability** in an amount of: _____ per occurrence.
- State of West Virginia must be listed as additional insured on Insurance Certificate. Certificate holder should read as follows:

- State of WV
1900 Kanawha Blvd. E. Bldg. 5
Charleston, WV 25305

Notwithstanding anything contained in this section to the contrary, the Director of the Purchasing Division reserves the right to waive the requirement that the State be named as an additional insured on one or more of the Vendor's insurance policies if the Director finds that doing so is in the State's best interest.

9. WORKERS' COMPENSATION INSURANCE: Vendor shall comply with laws relating to workers compensation, shall maintain workers' compensation insurance when required, and shall furnish proof of workers' compensation insurance upon request.

10. [Reserved]

11. LIQUIDATED DAMAGES: This clause shall in no way be considered exclusive and shall not limit the State or Agency's right to pursue any other available remedy. Vendor shall pay liquidated damages in the amount specified below or as described in the specifications:

_____ for _____.

Liquidated Damages Contained in the Specifications.

Liquidated Damages Are Not Included in this Contract.

12. ACCEPTANCE: Vendor's signature on its bid, or on the certification and signature page, constitutes an offer to the State that cannot be unilaterally withdrawn, signifies that the product or service proposed by vendor meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise indicated, and signifies acceptance of the terms and conditions contained in the Solicitation unless otherwise indicated.

13. PRICING: The pricing set forth herein is firm for the life of the Contract, unless specified elsewhere within this Solicitation/Contract by the State. A Vendor's inclusion of price adjustment provisions in its bid, without an express authorization from the State in the Solicitation to do so, may result in bid disqualification. Notwithstanding the foregoing, Vendor must extend any publicly advertised sale price to the State and invoice at the lower of the contract price or the publicly advertised sale price.

14. PAYMENT IN ARREARS: Payments for goods/services will be made in arrears only upon receipt of a proper invoice, detailing the goods/services provided or receipt of the goods/services, whichever is later. Notwithstanding the foregoing, payments for software maintenance, licenses, or subscriptions may be paid annually in advance.

15. PAYMENT METHODS: Vendor must accept payment by electronic funds transfer and P-Card. (The State of West Virginia's Purchasing Card program, administered under contract by a banking institution, processes payment for goods and services through state designated credit cards.)

16. TAXES: The Vendor shall pay any applicable sales, use, personal property or any other taxes arising out of this Contract and the transactions contemplated thereby. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.

17. ADDITIONAL FEES: Vendor is not permitted to charge additional fees or assess additional charges that were not either expressly provided for in the solicitation published by the State of West Virginia, included in the Contract, or included in the unit price or lump sum bid amount that Vendor is required by the solicitation to provide. Including such fees or charges as notes to the solicitation may result in rejection of vendor's bid. Requesting such fees or charges be paid after the contract has been awarded may result in cancellation of the contract.

18. FUNDING: This Contract shall continue for the term stated herein, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise made available, this Contract becomes void and of no effect beginning on July 1 of the fiscal year for which funding has not been appropriated or otherwise made available. If that occurs, the State may notify the Vendor that an alternative source of funding has been obtained and thereby avoid the automatic termination. Non-appropriation or non-funding shall not be considered an event of default.

19. CANCELLATION: The Purchasing Division Director reserves the right to cancel this Contract immediately upon written notice to the vendor if the materials or workmanship supplied do not conform to the specifications contained in the Contract. The Purchasing Division Director may also cancel any purchase or Contract upon 30 days written notice to the Vendor in accordance with West Virginia Code of State Rules § 148-1-5.2.b.

20. TIME: Time is of the essence regarding all matters of time and performance in this Contract.

21. APPLICABLE LAW: This Contract is governed by and interpreted under West Virginia law without giving effect to its choice of law principles. Any information provided in specification manuals, or any other source, verbal or written, which contradicts or violates the West Virginia Constitution, West Virginia Code, or West Virginia Code of State Rules is void and of no effect.

22. COMPLIANCE WITH LAWS: Vendor shall comply with all applicable federal, state, and local laws, regulations and ordinances. By submitting a bid, Vendor acknowledges that it has reviewed, understands, and will comply with all applicable laws, regulations, and ordinances.

SUBCONTRACTOR COMPLIANCE: Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to comply with all applicable laws, regulations, and ordinances. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

23. ARBITRATION: Any references made to arbitration contained in this Contract, Vendor's bid, or in any American Institute of Architects documents pertaining to this Contract are hereby deleted, void, and of no effect.

24. MODIFICATIONS: This writing is the parties' final expression of intent. Notwithstanding anything contained in this Contract to the contrary no modification of this Contract shall be binding without mutual written consent of the Agency, and the Vendor, with approval of the Purchasing Division and the Attorney General's office (Attorney General approval is as to form only). Any change to existing contracts that adds work or changes contract cost, and were not included in the original contract, must be approved by the Purchasing Division and the Attorney General's Office (as to form) prior to the implementation of the change or commencement of work affected by the change.

25. WAIVER: The failure of either party to insist upon a strict performance of any of the terms or provision of this Contract, or to exercise any option, right, or remedy herein contained, shall not be construed as a waiver or a relinquishment for the future of such term, provision, option, right, or remedy, but the same shall continue in full force and effect. Any waiver must be expressly stated in writing and signed by the waiving party.

26. SUBSEQUENT FORMS: The terms and conditions contained in this Contract shall supersede any and all subsequent terms and conditions which may appear on any form documents submitted by Vendor to the Agency or Purchasing Division such as price lists, order forms, invoices, sales agreements, or maintenance agreements, and includes internet websites or other electronic documents. Acceptance or use of Vendor's forms does not constitute acceptance of the terms and conditions contained thereon.

27. ASSIGNMENT: Neither this Contract nor any monies due, or to become due hereunder, may be assigned by the Vendor without the express written consent of the Agency, the Purchasing Division, the Attorney General's office (as to form only), and any other government agency or office that may be required to approve such assignments.

28. WARRANTY: The Vendor expressly warrants that the goods and/or services covered by this Contract will: (a) conform to the specifications, drawings, samples, or other description furnished or specified by the Agency; (b) be merchantable and fit for the purpose intended; and (c) be free from defect in material and workmanship.

29. STATE EMPLOYEES: State employees are not permitted to utilize this Contract for personal use and the Vendor is prohibited from permitting or facilitating the same.

30. PRIVACY, SECURITY, AND CONFIDENTIALITY: The Vendor agrees that it 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. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/default.html>.

31. YOUR SUBMISSION IS A PUBLIC DOCUMENT: Vendor's entire response to the Solicitation and the resulting Contract are public documents. As public documents, they will be disclosed to the public following the bid/proposal opening or award of the contract, as required by the competitive bidding laws of West Virginia Code §§ 5A-3-1 et seq., 5-22-1 et seq., and 5G-1-1 et seq. and the Freedom of Information Act West Virginia Code §§ 29B-1-1 et seq.

DO NOT SUBMIT MATERIAL YOU CONSIDER TO BE CONFIDENTIAL, A TRADE SECRET, OR OTHERWISE NOT SUBJECT TO PUBLIC DISCLOSURE.

Submission of any bid, proposal, or other document to the Purchasing Division constitutes your explicit consent to the subsequent public disclosure of the bid, proposal, or document. The Purchasing Division will disclose any document labeled "confidential," "proprietary," "trade secret," "private," or labeled with any other claim against public disclosure of the documents, to include any "trade secrets" as defined by West Virginia Code § 47-22-1 et seq. All submissions are subject to public disclosure without notice.

32. LICENSING: In accordance with West Virginia Code of State Rules § 148-1-6.1.e, Vendor 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 agency or political subdivision. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Upon request, the Vendor must provide all necessary releases to obtain information to enable the Purchasing Division Director or the Agency to verify that the Vendor is licensed and in good standing with the above entities.

SUBCONTRACTOR COMPLIANCE: Vendor shall notify all subcontractors providing commodities or services related to this Contract that as subcontractors, they too are required to be licensed, in good standing, and up-to-date on all state and local obligations as described in this section. Obligations related to political subdivisions may include, but are not limited to, business licensing, business and occupation taxes, inspection compliance, permitting, etc. Notification under this provision must occur prior to the performance of any work under the contract by the subcontractor.

33. ANTITRUST: In submitting a bid to, signing a contract with, or accepting a Award Document from any agency of the State of West Virginia, the Vendor agrees to 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 Vendor.

34. VENDOR CERTIFICATIONS: By signing its bid or entering into this Contract, Vendor certifies (1) that its bid or offer was made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership, person or entity submitting a bid or offer for the same material, supplies, equipment or services; (2) that its bid or offer is in all respects fair and without collusion or fraud; (3) that this Contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law; and (4) that it has reviewed this Solicitation in its entirety; understands the requirements, terms and conditions, and other information contained herein.

Vendor's signature on its bid or offer also affirms that neither it nor its representatives have any interest, nor shall acquire any interest, direct or indirect, which would compromise the performance of its services hereunder. Any such interests shall be promptly presented in detail to the Agency. The individual signing this bid or offer on behalf of Vendor certifies that he or she is authorized by the Vendor to execute this bid or offer or any documents related thereto on Vendor's behalf; that he or she is authorized to bind the Vendor in a contractual relationship; and that, to the best of his or her knowledge, the Vendor has properly registered with any State agency that may require registration.

35. VENDOR RELATIONSHIP: The relationship of the Vendor to the State shall be that of an independent contractor and no principal-agent relationship or employer-employee relationship is contemplated or created by this Contract. The Vendor as an independent contractor is solely liable for the acts and omissions of its employees and agents. Vendor shall be responsible for selecting, supervising, and compensating any and all individuals employed pursuant to the terms of this Solicitation and resulting contract. Neither the Vendor, nor any employees or subcontractors of the Vendor, shall be deemed to be employees of the State for any purpose whatsoever. Vendor shall be exclusively responsible for payment of employees and contractors for all wages and salaries, taxes, withholding payments, penalties, fees, fringe benefits, professional liability insurance premiums, contributions to insurance and pension, or other deferred compensation plans, including but not limited to, Workers' Compensation and Social Security obligations, licensing fees, etc. and the filing of all necessary documents, forms, and returns pertinent to all of the foregoing.

Vendor shall hold harmless the State, and shall provide the State and Agency with a defense against any and all claims including, but not limited to, the foregoing payments, withholdings, contributions, taxes, Social Security taxes, and employer income tax returns.

36. INDEMNIFICATION: The Vendor agrees to indemnify, defend, and hold harmless the State and the Agency, their officers, and employees from and against: (1) Any claims or losses for services rendered by any subcontractor, person, or firm performing or supplying services, materials, or supplies in connection with the performance of the Contract; (2) Any claims or losses resulting to any person or entity injured or damaged by the Vendor, its officers, employees, or subcontractors by the publication, translation, reproduction, delivery, performance, use, or disposition of any data used under the Contract in a manner not authorized by the Contract, or by Federal or State statutes or regulations; and (3) Any failure of the Vendor, its officers, employees, or subcontractors to observe State and Federal laws including, but not limited to, labor and wage and hour laws.

37. PURCHASING AFFIDAVIT: In accordance with West Virginia Code §§ 5A-3-10a and 5-22-1(i), the State is prohibited from awarding a contract to any bidder that owes a debt to the State or a political subdivision of the State, Vendors are required to sign, notarize, and submit the Purchasing Affidavit to the Purchasing Division affirming under oath that it is not in default on any monetary obligation owed to the state or a political subdivision of the state.

38. CONFLICT OF INTEREST: Vendor, its officers or members or employees, shall not presently have or acquire an interest, direct or indirect, which would conflict with or compromise the performance of its obligations hereunder. Vendor shall periodically inquire of its officers, members and employees to ensure that a conflict of interest does not arise. Any conflict of interest discovered shall be promptly presented in detail to the Agency.

39. REPORTS: Vendor shall provide the Agency and/or the Purchasing Division with the following reports identified by a checked box below:

Such reports as the Agency and/or the Purchasing Division may request. Requested reports may include, but are not limited to, quantities purchased, agencies utilizing the contract, total contract expenditures by agency, etc.

Quarterly reports detailing the total quantity of purchases in units and dollars, along with a listing of purchases by agency. Quarterly reports should be delivered to the Purchasing Division via email at purchasing.division@wv.gov.

40. BACKGROUND CHECK: In accordance with W. Va. Code § 15-2D-3, the State reserves the right to prohibit a service provider's employees from accessing sensitive or critical information or to be present at the Capitol complex based upon results addressed from a criminal background check. Service providers should contact the West Virginia Division of Protective Services by phone at (304) 558-9911 for more information.

41. PREFERENCE FOR USE OF DOMESTIC STEEL PRODUCTS: Except when authorized by the Director of the Purchasing Division pursuant to W. Va. Code § 5A-3-56, no contractor may use or supply steel products for a State Contract Project other than those steel products made in the United States. A contractor who uses steel products in violation of this section may be subject to civil penalties pursuant to W. Va. Code § 5A-3-56. As used in this section:

- a. "State Contract Project" means any erection or construction of, or any addition to, alteration of or other improvement to any building or structure, including, but not limited to, roads or highways, or the installation of any heating or cooling or ventilating plants or other equipment, or the supply of and materials for such projects, pursuant to a contract with the State of West Virginia for which bids were solicited on or after June 6, 2001.
- b. "Steel Products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two or more or such operations, from steel made by the open heath, basic oxygen, electric furnace, Bessemer or other steel making process.
- c. The Purchasing Division Director may, in writing, authorize the use of foreign steel products if:

1. The cost for each contract item used does not exceed one tenth of one percent (.1%) of the total contract cost or two thousand five hundred dollars (\$2,500.00), whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project; or
2. The Director of the Purchasing Division determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

42. PREFERENCE FOR USE OF DOMESTIC ALUMINUM, GLASS, AND STEEL: In Accordance with W. Va. Code § 5-19-1 et seq., and W. Va. CSR § 148-10-1 et seq., for every contract or subcontract, subject to the limitations contained herein, for the construction, reconstruction, alteration, repair, improvement or maintenance of public works or for the purchase of any item of machinery or equipment to be used at sites of public works, only domestic aluminum, glass or steel products shall be supplied unless the spending officer determines, in writing, after the receipt of offers or bids, (1) that the cost of domestic aluminum, glass or steel products is unreasonable or inconsistent with the public interest of the State of West Virginia, (2) that domestic aluminum, glass or steel products are not produced in sufficient quantities to meet the contract requirements, or (3) the available domestic aluminum, glass, or steel do not meet the contract specifications. This provision only applies to public works contracts awarded in an amount more than fifty thousand dollars (\$50,000) or public works contracts that require more than ten thousand pounds of steel products.

The cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than twenty percent (20%) of the bid or offered price for foreign made aluminum, glass, or steel products. If the domestic aluminum, glass or steel products to be supplied or produced in a “substantial labor surplus area”, as defined by the United States Department of Labor, the cost of domestic aluminum, glass, or steel products may be unreasonable if the cost is more than thirty percent (30%) of the bid or offered price for foreign made aluminum, glass, or steel products. This preference shall be applied to an item of machinery or equipment, as indicated above, when the item is a single unit of equipment or machinery manufactured primarily of aluminum, glass or steel, is part of a public works contract and has the sole purpose or of being a permanent part of a single public works project. This provision does not apply to equipment or machinery purchased by a spending unit for use by that spending unit and not as part of a single public works project.

All bids and offers including domestic aluminum, glass or steel products that exceed bid or offer prices including foreign aluminum, glass or steel products after application of the preferences provided in this provision may be reduced to a price equal to or lower than the lowest bid or offer price for foreign aluminum, glass or steel products plus the applicable preference. If the reduced bid or offer prices are made in writing and supersede the prior bid or offer prices, all bids or offers, including the reduced bid or offer prices, will be reevaluated in accordance with this rule.

43. INTERESTED PARTY SUPPLEMENTAL DISCLOSURE: W. Va. Code § 6D-1-2 requires that for contracts with an actual or estimated value of at least \$1 million, the vendor must submit to the Agency a supplemental disclosure of interested parties reflecting any new or differing interested parties to the contract, which were not included in the original pre-award interested party disclosure, within 30 days following the completion or termination of the contract. A copy of that form is included with this solicitation or can be obtained from the WV Ethics Commission. This requirement does not apply to publicly traded companies listed on a national or international stock exchange. A more detailed definition of interested parties can be obtained from the form referenced above.

44. PROHIBITION AGAINST USED OR REFURBISHED: Unless expressly permitted in the solicitation published by the State, Vendor must provide new, unused commodities, and is prohibited from supplying used or refurbished commodities, in fulfilling its responsibilities under this Contract.

45. VOID CONTRACT CLAUSES – This Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

DESIGNATED CONTACT: Vendor appoints the individual identified in this Section as the Contract Administrator and the initial point of contact for matters relating to this Contract.

York D. Grow MGIS Solutions Manager
 (Name, Title)
 York D. Grow, MGIS Solutions Manager
 (Printed Name and Title)
 305K Ashcake Rd, Ashland, Va 23005
 (Address)
 804-368-7525 / 804-496-6320
 (Phone Number) / (Fax Number)
 york.grow@duncan-parnell.com
 (email address)

CERTIFICATION AND SIGNATURE: By signing below, or submitting documentation through wvOASIS, I certify that: I have reviewed this Solicitation in its entirety; that I understand the requirements, terms and conditions, and other information contained herein; that this bid, offer or proposal constitutes an offer to the State that cannot be unilaterally withdrawn; that the product or service proposed meets the mandatory requirements contained in the Solicitation for that product or service, unless otherwise stated herein; that the Vendor accepts the terms and conditions contained in the Solicitation, unless otherwise stated herein; that I am submitting this bid, offer or proposal for review and consideration; that I am authorized by the vendor to execute and submit this bid, offer, or proposal, or any documents related thereto on vendor's behalf; that I am authorized to bind the vendor in a contractual relationship; and that to the best of my knowledge, the vendor has properly registered with any State agency that may require registration.

By signing below, I further certify that I understand this Contract is subject to the provisions of West Virginia Code § 5A-3-62, which automatically voids certain contract clauses that violate State law.

Duncan-Parnell, Inc.
 (Company)

York D. Grow MGIS Solutions Manager
 (Authorized Signature) (Representative Name, Title)

York D. Grow, MGIS Solutions Manager
 (Printed Name and Title of Authorized Representative)

March 29, 2022
 (Date)

804-368-7525 / 804-496-6320
 (Phone Number) (Fax Number)



Alloy

GNSS REFERENCE RECEIVER

THE FUTURE OF GNSS IS HERE

Trimble's all-new Alloy GNSS receiver offers powerful performance with the latest GNSS technology in a sleek new design that is easy and intuitive to use. Whether you need GNSS for campaign work or in permanent installations, the flexible configuration delivers reliable, robust data when and where you need it.

MODERNIZED GNSS TRACKING

Using powerful Trimble 360 receiver technology in combination with dual Trimble Maxwell™ 7 chipsets, the Alloy GNSS receiver supports all known and planned GNSS constellations, ensuring your GNSS data is robust and reliable.

INTELLIGENT DESIGN

Review Key Info at a Glance

With a four-line angled display you can read all important information such as satellite tracking, position solution type, data logging, IP address, Wi-Fi®, firmware information and battery status right on the home screen. Set-up and verifying status information is now quick and easy.

Plug in and get to work

Multiple ports are easily accessible without the need for adaptors in a configuration that makes it simple to plug in a variety of external sensors and antennas.

Power when you need it

Alloy provides the most robust power options for any GNSS system. Featuring multiple power inputs with dual hot-swappable batteries, power over Ethernet, and advanced power management features, the Trimble Alloy GNSS receiver is ideal for any GNSS base station deployment.

Stackable Design

With a versatile, stackable design the Alloy GNSS receiver is built with a lightweight rugged aluminum alloy chassis which features IP68 certification. When you need to organize multiple units for deployment, simply stack and prep.

CONFIGURABLE ALERTS 24/7

Using Trimble Sentry™ technology, you can easily configure alerts that will automatically inform you of any changes to the position, data logging, configuration, tracking, power, communications, and system access events. Combined with advanced security measures such as IP filtering and multi-level user access, Trimble Sentry ensures continued operation of your Trimble Alloy GNSS receiver.

TRIMBLE RTX ON BOARD

The Alloy GNSS receiver is available with Trimble RTX™ advanced positioning technology allowing for rapid real-time network coordination. Whether this is for base station deployment or monitoring, Trimble RTX remains locked onto your real world absolute position.

COMMUNICATION

The Trimble Alloy GNSS receiver supports a wide range of communication protocols including Ethernet, Bluetooth®, and Wi-Fi for flexible easy access via the built-in Web User Interface and mini-Web User Interface for mobile devices.

DATA

Storage

The Alloy GNSS receiver is able to store more data in less space by using specialized compression formats. Up to twelve independent high-rate data logging sessions can be stored internally, and using USB storage you can be sure the data you collect and store is specific for your application.

Access

Leveraging advanced communication protocols, data can be accessed via the user interface, built in FTP Server, or configured to be pushed to remote FTP sites or email accounts in multiple industry formats.

Benefits

- ▶ Dual Trimble Maxwell 7 chipsets combined with a powerful processor provides the ultimate in tracking and processing power
- ▶ Ethernet and Wi-Fi support provide ease of access, configuration, and transfer of data. Using the built-in Web user interface gives instant access to a simple to use configuration suite
- ▶ Dual hot-swappable internal batteries with integrated charging make Alloy suitable for use in the office or remote locations, and anywhere in-between
- ▶ The intelligent design features multiple connectors and stackable housing, making Alloy easy to configure for deployment
- ▶ Designed to an IP68 certification Alloy is ready for any environment
- ▶ Includes firmware for life so it's easy to keep your Alloy reference receiver up-to-date with the latest features, enhancements and security updates, free to install from www.alloy.trimble.com





SPECIFICATIONS¹

GNSS TECHNOLOGY

- Trimble RTX World-Wide Corrections
- Advanced Trimble dual Maxwell™ 7 GNSS chipset provide 672 channels for simultaneous satellite tracking
- Trimble EVERESTPlus™ multipath signal rejection
- Trimble 360 receiver technology
- High precision multiple correlator for GNSS pseudorange measurements
- Spectrum Analyzer to troubleshoot GNSS jamming
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Signal to Noise ratio reported in dB-Hz
- Proven Trimble low elevation tracking technology
- Proprietary Receiver Autonomous Integrity Monitor (RAIM) system to detect and reject degraded signals to improve position quality

SATELLITE TRACKING

- GPS: L1 C/A, L2E (L2P), L2C, L5
- GLONASS: L1 C/A² and unencrypted P code, L2 C/A and unencrypted P code, L3 CDMA
- Galileo: L1 CBOC, E5A, E5B & E5AltBOC, E6
- BeiDou: B1, B2, B3
- QZSS: L1 C/A, L1C, L1 SAIF, L1S³, L2C, L5, LEX/L6⁴
- IRNSS: L5, S-Band
- SBAS: L1 C/A (EGNOS/MSAS), L1 C/A and L5 (WAAS)
- L-Band: Trimble RTX™

INPUT/OUTPUT FORMATS

- Correction Formats:
 - CMR, CMR+, CMRx, GAGAN, RTX, RTCM 2.x, RTCM 3.x, SDCM
- Observables:
 - RT17, RT27, BINEX, RTCM 3.x
- Position/Status I/O:
 - NMEA-0183 v2.30, GSOF
- Up to 100 Hz Output
- 10 MHz External Frequency Input
 - Normal input level 0 to +13 dBm
 - Maximum input level +17 dBm, ±35 V DC
 - Input impedance 50 Ohms @ 10 MHz; DC blocked
- 1 PPS Output
- Event Input
- Met/Tilt Sensor Support

POSITIONING PERFORMANCE

Differential Positioning	
Code differential GNSS positioning ⁵	
Horizontal	0.25 m + 1 ppm RMS
Vertical	0.50 m + 1 ppm RMS
SBAS differential positioning accuracy ⁶	
Horizontal	0.50 m RMS
Vertical	0.85 m RMS
Static GNSS Surveying⁵	
High Accuracy Static	
Horizontal	3 mm + 0.1 ppm RMS
Vertical	3.5 mm + 0.4 ppm RMS
Static & Fast Static	
Horizontal	3 mm + 0.5 ppm RMS
Vertical	5 mm + 0.5 ppm RMS
Real Time Kinematic Surveying⁵	
Single Baseline < 30km	
Horizontal	8 mm + 1 ppm RMS
Vertical	15 mm + 1 ppm RMS
Networked RTK⁷	
Horizontal	8 mm + 0.5 ppm RMS
Vertical	15 mm + 0.5 ppm RMS
Initialization time	typically <10 seconds
Initialization reliability	typically >99.9%

COMMUNICATION

- Serial Ports:
 - Two 9-pin Male
 - Two 7-pin Lemo
- USB: one Mini-B USB 5-pin / RDNIS (Device and Host modes)
- Ethernet: one RJ45 (Full-duplex, auto-negotiate 100Base-T)
 - HTTP, HTTPS, TCP/IP, UDP, FTP, NTRIP Caster, NTRIP Server, NTRIP Client
 - Proxy server, Routing table, NTP Server, NTP Client support
 - Email Alerts and File Push
- WiFi: 802.11 b/g, access point and client mode, WPA/WPA2/WEP64/WEP128 encryption
- Bluetooth⁸: Integrated 2.4 GHz Bluetooth; supports 3 simultaneous connections

¹ Specifications subject to change without notice.

² L2 C/A on GLONASS-M satellites.

³ Plan to support L1S in 2018 after fully operational in satellite.

⁴ LEX / L6 supported on QZSS Block I satellites.

⁵ Accuracy may be subject to degradation by multipath interference, obstructions, satellite geometry and atmospheric conditions. Always follow recommended survey practices.

⁶ Depends on WAAS/EGNOS system performance.

⁷ Networked RTK PPM values are reference to the closest physical base station.

⁸ Bluetooth type approvals are country specific.

DATA LOGGING

Storage Capacity:	
Onboard Memory (Journaling)	up to 24 GB ⁹
External Memory ¹⁰	greater than 1 TB
Maximum Data Logging Rate	100 Hz
Maximum Combined Data Logging Rate	188 Hz
File Durations	1 minute to continuous
Storage Sessions	12 concurrent independent sessions with dedicated memory pooling
File Formats	T02, T04, BINEX, RINEX v2.x/3.0x, Google Earth KML/KMZ
File Naming Conventions	Multiple
Data Retrieval and transfer	HTTP, FTP Server, USB
Events	Definable file protection on events

PHYSICAL SPECIFICATIONS

Alloy receiver dimensions (W x L x H L x W x H)	20.98 cm x 21.36 cm x 7.62 cm (8.41 in x 8.26 in x 3 in)
Alloy receiver dimensions with brackets attached (L x W x H)	26.77 cm x 21.36 cm x 8.3 cm (8.41 in x 10.54 in x 3.27 in)
Weight	2.34 kg (5.17 lbs)

ENVIRONMENT

Operating Temperature ¹¹	-40 °C to +65 °C (-40 °F to +149 °F)
Storage temperature	-40 °C to +80 °C (-40 °F to +176 °F)
Humidity	100% condensing
Shock	
Operating	40 g per MIL-STD-810G Table 5.16.6-VII
Non-Operating	75 g per MIL-STD-810G Table 5.16.6-VII Designed to survive 1m bench drop
Vibration	
Operating	MIL-STD-810G Fig. 5.14.6C-1 Category 4
Ingress protection	IP68 Certified per IEC-60529 - waterproof/dustproof (1m submersion for 1 hr)

USER INTERFACE

- Front Panel Display
 - 4-line x 32 character reversible OLED display
 - 7 button input configuration
 - Adjustable LED backlighting
- Multiple language support for front panel and web UI - Chinese, Dutch, English, Finnish, French, German, Italian, Japanese, Norwegian, Polish, Portuguese, Russian, Spanish, Swedish
- Web User Interface: Allows remote configuration, data retrieval, and firmware updates over HTTPS/HTTP

ANTENNA SUPPORT

Output Voltage	5 V DC nominal
Maximum output current	150 mA
Maximum cable loss	12 dB
Recommended antennas	Trimble Zephyr 3 Geodetic, Trimble GNSS-Ti v2 Choke Ring, Trimble GNSS Choke Ring

SECURITY

- HTTP login
- HTTPS/SSL
- Programmatic Interface authentication
- NTRIP
- IP Filtering

ELECTRICAL

- Power over Ethernet (PoE) 802.3af (Type 1), 802.at (Type 2)
- 9.5 to 28 V DC input on 2 Lemo ports
 - User-configurable power-on voltage
 - User-configurable power-down voltage
- User-configurable 12 V DC power output on serial port #2
- Integrated dual hot-swappable smart batteries (7.4 V, 7800 mA-hr, Li-Ion batteries) with up to 15 hours of continuous operation
- Seamless switching between external/internal power sources
- Configurable minimum input voltage for battery charging
- Integrated battery charging circuitry
- Power Consumption – 3.8 W or higher, dependent on user settings

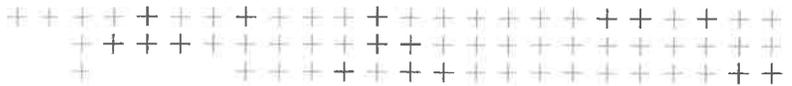
REGULATORY COMPLIANCE

- FCC Part 15 (Class B device), CISPR 32, 24
- RED CE Mark
- RCM
- UN 38.3 – ST/SG/AC.10/27/Add.2 Rev.5 (Li-Ion battery)
- IEC 62133 (Ed.2) and EN 62133: 2013 (Li-Ion battery)
- RoHS, China RoHS, WEEE

⁹ Trimble's highly efficient T02 data logging format makes this equivalent to 32 GB to 55 GB for competitive receivers.

¹⁰ Solid state drives are recommended for optimal performance.

¹¹ To protect the removable Li-Ion batteries from extreme temperatures, the internal battery charger only charges batteries from -20 C to +50 C (-4 °F to +122 °F)



Alloy GNSS REFERENCE RECEIVER

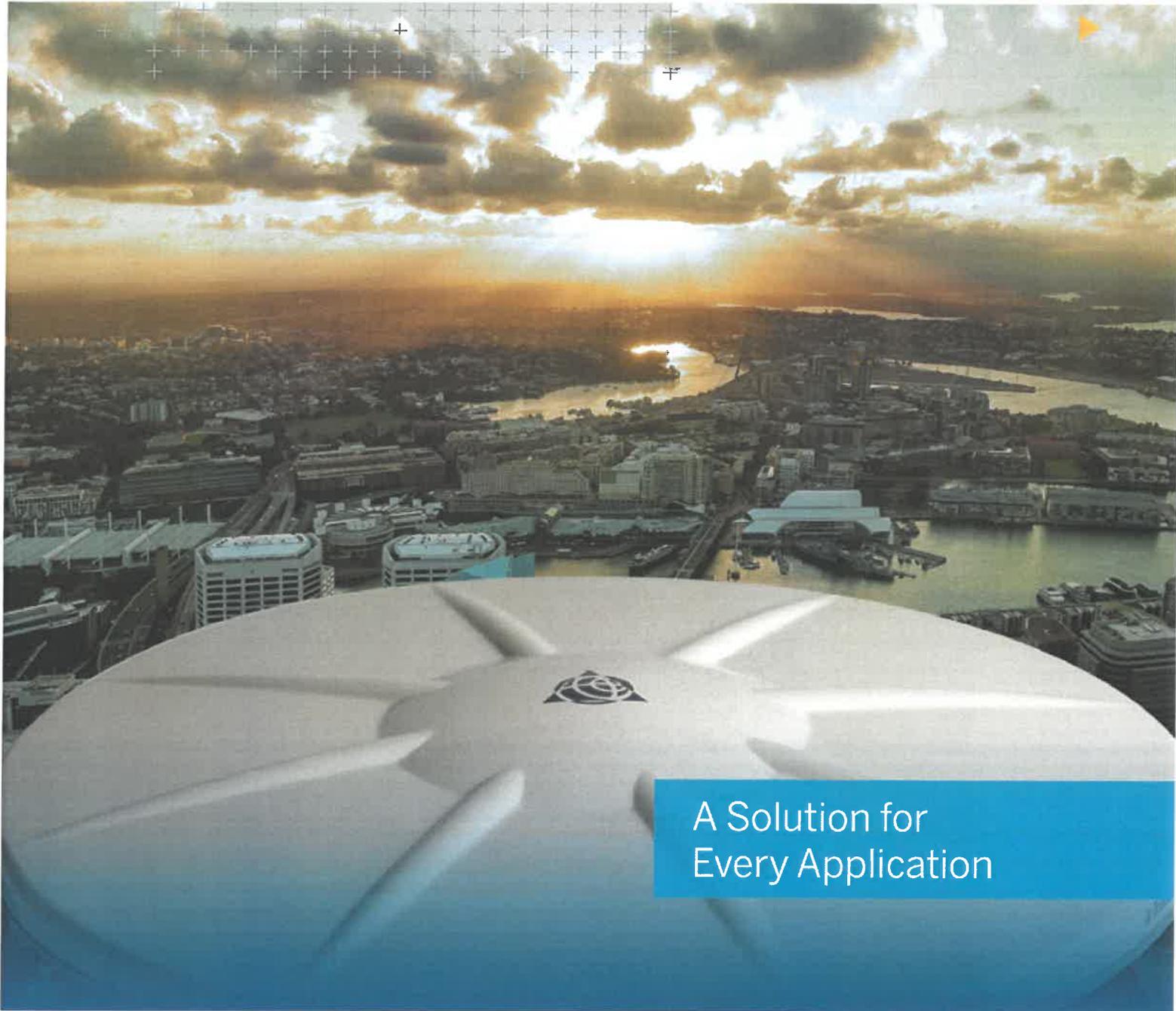
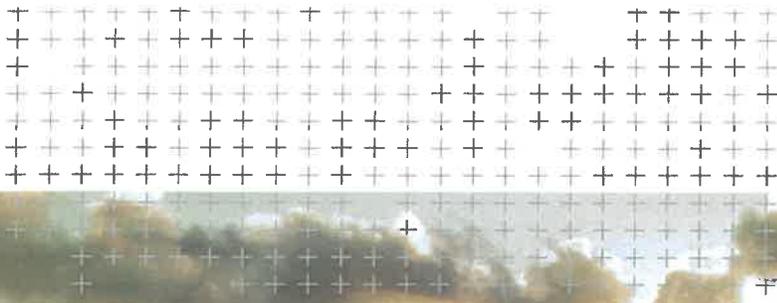
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NORTH AMERICA
Trimble Inc.
10368 Westmoor Drive
Westminster CO 80021
USA
1-888-8792-207 (Toll Free)

EUROPE
Trimble Germany GmbH
Am Prime Parc 11
65479 Raunheim
GERMANY
+49-6142-2100-0 Phone

ASIA-PACIFIC
Trimble Navigation
Singapore Pty Limited
3 HarbourFront Place
#13-02 HarbourFront Tower Two
Singapore 099254
+65-6348-2212 Phone

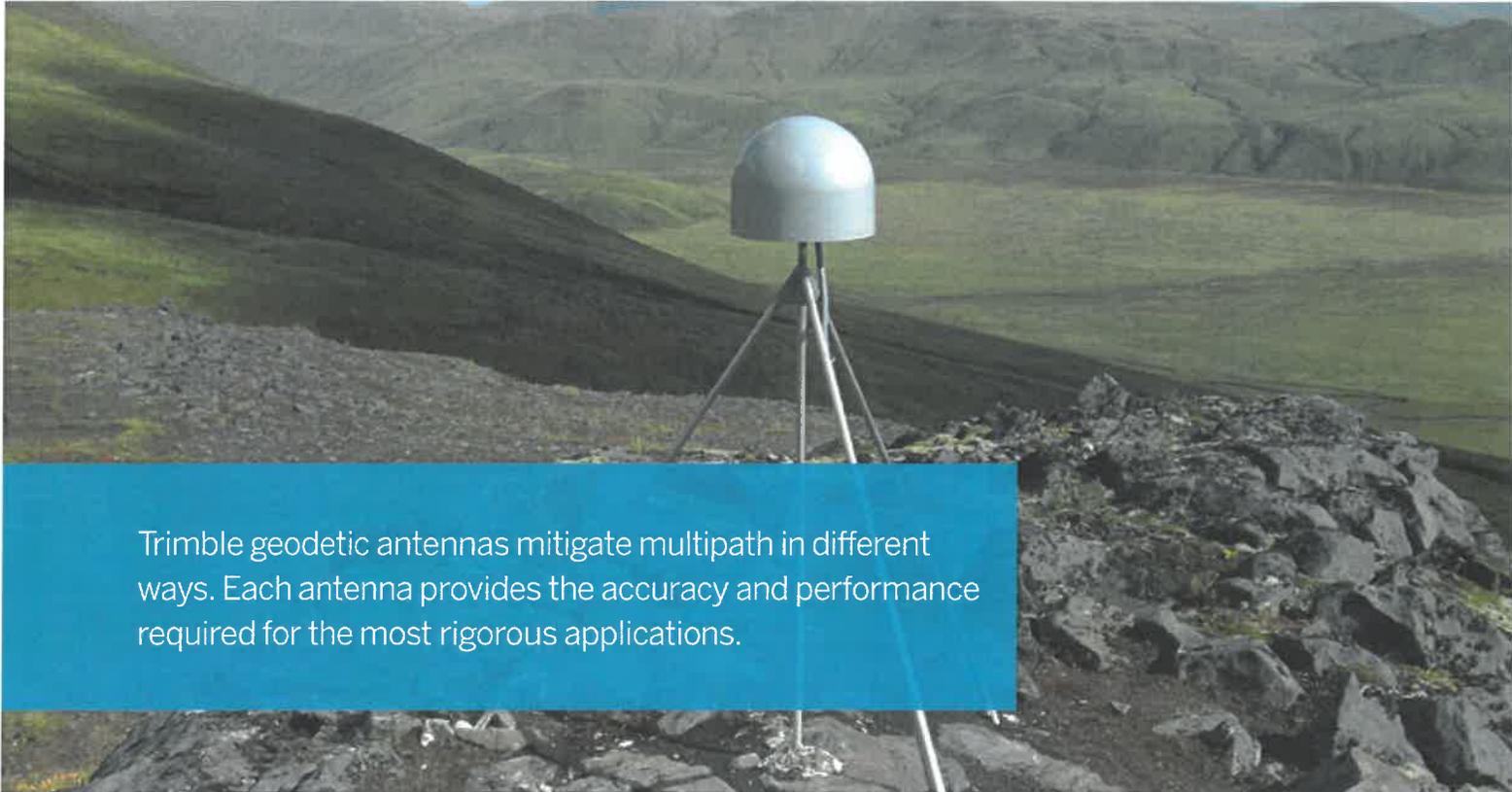
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A Solution for
Every Application

Trimble GNSS Geodetic Antennas

Trimble GNSS Geodetic Antennas



Trimble geodetic antennas mitigate multipath in different ways. Each antenna provides the accuracy and performance required for the most rigorous applications.

TRIMBLE GNSS GEODETIC ANTENNAS—NOW YOU HAVE A CHOICE

Three proven antennas to achieve geodetic accuracy and long-term performance

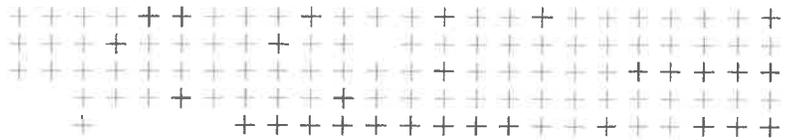
Critical to the value of any GNSS network are the antennas that keep constant watch on GNSS satellite signals. Trimble geodetic antennas provide network operators with the assurance of long-term operation and unsurpassed performance.

Trimble offers three styles of antennas designed for geodetic applications—the Trimble® Zephyr 3 Geodetic antenna, the Trimble GNSS-Ti v2 Choke Ring antenna and the Trimble GNSS Choke Ring antenna. Each option is proven to deliver the exacting performance that network operators demand to ensure long-term success. In addition, three unique antenna designs provide the flexibility to reach a wide range of operational goals.

Setting the geodetic standard

All Trimble GNSS geodetic antennas conform to strict standards of consistency and performance to deliver the best possible low elevation tracking.

Trimble geodetic antennas meet or exceed phase-center eccentricity standards of 2 mm, and offer industry-leading multipath mitigation. Trimble's geodetic-quality antennas maximize positioning performance and consistency through tightly-controlled manufacturing practices, extensive testing and innovative engineering.



TRIMBLE GNSS CHOKE RING ANTENNAS

Originally conceived in the mid 1980s, the choke ring's ground plane has been widely adopted by the scientific community. The Trimble GNSS choke ring ground plane uses the Jet Propulsion Labs (JPL) design, which is considered the standard of scientific geodetic antenna ground planes. In addition to updating the electronics to improve low-noise amplification and GNSS tracking, Trimble has modernized the GNSS choke ring antenna so that it can track all existing and proposed public GNSS constellations. These include GPS, Glonass, Galileo, Beidou, QZSS, and IRNSS. By improving upon the signal reception characteristics, GNSS choke ring antennas greatly improve performance in harsh signal environments.

The Trimble GNSS-Ti v2 Choke Ring antenna offers the benefits of the JPL designed choke ring ground plane with proven Trimble antenna element technology. Built on the technology of the Trimble Zephyr 3 Geodetic element, this antenna has a proven track record of exceeding high accuracy performance specifications in some of the most demanding environments on Earth.

The Trimble GNSS Choke Ring antenna includes a Trimble-exclusive Dorne & Margolin quad-dipole element. A standard by which all other geodetic antennas are judged, the D & M element serves as the control in published relative antenna models. The design is also proven to offer excellent long term stability.

To ensure the best possible performance, Trimble requires that the element manufacturer conduct supplemental performance testing and provide proof of passing on all Trimble GNSS Choke Ring antenna elements. As a final step to guarantee geodetic performance, all assembled choke ring antennas undergo additional Trimble-exclusive precision rotation testing to verify a phasecenter eccentricity of no more than 2 mm. Every Trimble GNSS Choke Ring antenna comes with a certificate displaying the rotation test results specific to that antenna.



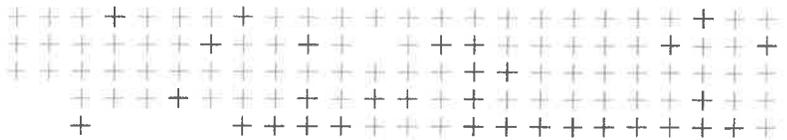
TRIMBLE ZEPHYR GEODETIC 3 ANTENNA

In the years following the launch of the choke ring antenna, Trimble developed an alternative means to achieving geodetic-quality results. Design goals included increasing accuracy and eliminating the frequency dependent ground plane design. First produced in 2001, the GPS-capable Trimble Zephyr Geodetic antenna was the high-performance result of those efforts. In 2006, Trimble released the next generation Zephyr Geodetic 2, adding full GNSS signal compatibility to the proven Zephyr Geodetic antenna.

Then, in 2016, Trimble released the Zephyr 3 Geodetic antenna bringing the next generation of signal reception quality to the already proven GNSS Zephyr Geodetic 2 design. By improving upon the signal reception characteristics, the Zephyr 3 Geodetic antenna greatly improves performance in harsh signal environments.

Consistently delivering phase-center eccentricities of less than 1 mm, the Zephyr 3 Geodetic antenna's performance guarantees that even in a large network, all stations will be capable of delivering accurate, repeatable measurements. This is not the only advanced feature of the Trimble Zephyr 3 Geodetic antenna—it also offers the unique Trimble Stealth™ ground plane. This resistive ground plane consumes unwanted signals before they can reach the receiving element and corrupt measurements. This modern, hightechnology approach to multipath mitigation is more compact than the original choke ring design and allows for the use of an integrated, low-profile radome over the entire antenna element and ground plane assembly. The Trimble Zephyr 3 Geodetic antenna's design reduces wind loading and antenna weight so that a lighter mounting structure can offer geodetic quality results while minimizing environmental impact.

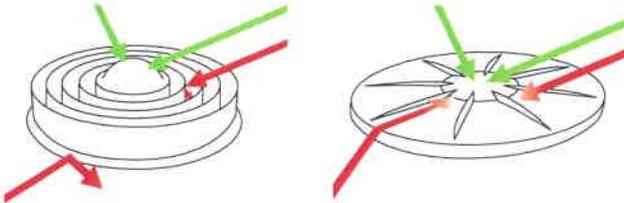
Yet another benefit of the Stealth ground plane is its frequency independent performance. It mitigates unwanted signals throughout the rapidly-expanding GNSS spectrum. The Trimble Zephyr 3 Geodetic antenna is designed to receive all existing and proposed public GNSS signals, including GPS, Glonass, Galileo, Beidou, QZSS, and IRNSS. In addition, these antennas are used in the highest accuracy IGS reference frame networks where only the best possible long-term performance is accepted.



GROUND PLANES AND MULTIPATH SIGNALS

- ▶ Signals striking at shallow angles attempt to create surface waves
- ▶ Signals from below the horizon must be eliminated

Desirable signals are shown in green; undesirable signals are shown in red.



1) Choke Ring weakens multipath signals

2) Zephyr 3 Geodetic consumes multipath signals

MANAGING MULTIPATH

The extended ground plane of a geodetic antenna is intended to stop all multipath signals that come from near or below the horizon. These unwanted signals often reflect off of more than one surface and many have right-hand circular polarization (RHCP) characteristics that the antenna will readily accept. With a conventional metal disk ground plane, unwanted signals can actually strike the top of the ground plane, or its edge, at a shallow angle.

Those signals then propagate along the surface of the plane and are easily conducted directly into the receiving element. This is called a surface wave. An effective geodetic ground plane must block below-horizon signals from entering the element while also prohibiting surface waves.

Trimble's JPL-designed choke ring and Stealth ground planes both accomplish these tasks, but in very different ways. The choke ring antenna reflects signals that come from below. For signals that would otherwise be captured as surface waves, the choke ring draws these signals into the choke channels where they repeatedly reflect and encounter other reflected signals until they lose all energy or are reflected away from the receiving element.

The Trimble Stealth ground plane uses electrical resistance rather than frequency-tuned rings to keep unwanted signals from reaching the antenna element. With its resistive ground plane, signals that strike the plane from any direction are drawn into the Stealth plane. Here, they encounter increasing electrical resistance, which rapidly converts their radio energy into tiny amounts of harmless heat. The signals lose all energy before they can reach the element and cause interference.

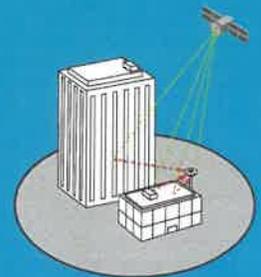
WHICH ANTENNA IS RIGHT FOR YOU?

The choice of what kind of antenna you ultimately choose is driven by your operational needs. Depending upon your priorities, it may become clear that one antenna style is a better fit for your particular application. For example, are you running a network or performing a geodetic campaign? Does an external organization dictate the antenna style that you must use? Are size and weight important considerations for installation or long-term deployment? Although there are many different factors to consider and evaluate before making this important decision, Trimble has a solution that will meet your precise needs.

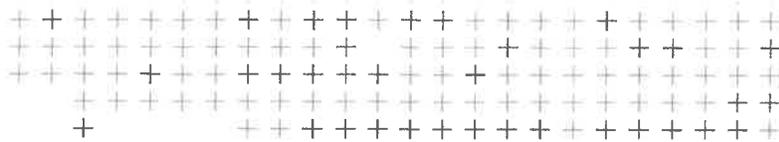
PROPER ANTENNA PLACEMENT

Geodetic antennas are designed to provide accurate measurements even in imperfect conditions, but this does not mean that a geodetic antenna will give peak performance no matter where it is deployed. Therefore, selecting the best possible location for a reference antenna is very important because the measurements will be relied upon for many years.

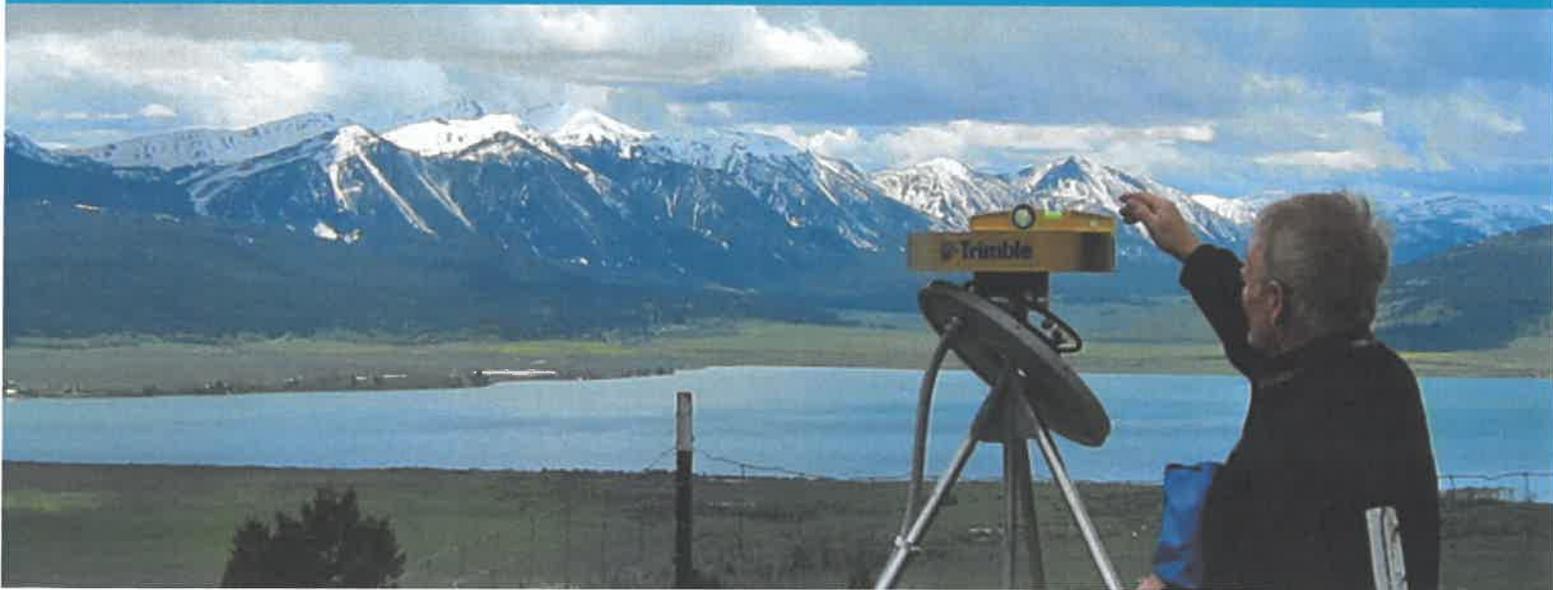
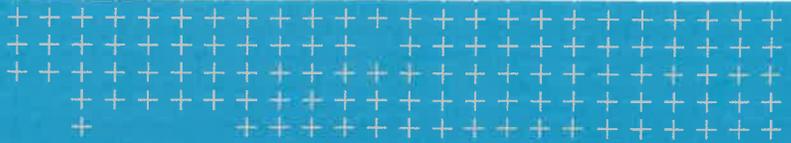
The following are very basic requirements for an antenna installation. Note that some governing bodies require significant additional features in an antenna monument and its location.



- ▶ The antenna mount must be stable in changing weather conditions and temperatures. By definition, a reference antenna should not move.
- ▶ The antenna sky view should be clear to the horizon within a 100 m radius to reduce multipath signal interference.
- ▶ The antenna should be a minimum of 1.5 m above nearby signal reflectors to reduce multipath signal interference.
- ▶ There should not be any high-power transmitting antennas within 300 m to prevent RF interference.



Specifications	Trimble Zephyr 3 Geodetic Antenna	Trimble GNSS-Ti v2 Choke Ring Antenna	Trimble GNSS Choke Ring Antenna
Minimum tracking elevation	0 Degrees	0 Degrees	0 Degrees
Practical tracking elevation	<3 Degrees	<5 Degrees	<5 Degrees
Supported positioning signal bands	L1/L2/L5/G1/G2/G3/E1/E5ab/E6/B1/B2/B3	L1/L2/L5/G1/G2/G3/E1/E5ab/E6/B1/B2/B3	L1/L2/L5/G1/G2/G3/E1/E5ab/E6/B1/B2/B3
Supported SBAS signal bands	WAAS, EGNOS, QZSS, Gagan, MSAS, OmniSTAR®, RTX™	WAAS, EGNOS, QZSS, Gagan, MSAS, OmniSTAR, RTX	WAAS, EGNOS, QZSS, Gagan, MSAS, OmniSTAR, RTX
Phase-center accuracy	2 mm or better	2 mm or better	2 mm or better
Phase-center repeatability	<1 mm	<1 mm	<1 mm
Maximum phase-center eccentricity	2 mm	2 mm	2 mm
Antenna gain	50 dB ±2dB	50 dB ±2dB	50 dB ±2dB
LNA features	Trimble's advanced second generation filtering to reduce interference by nearband transmitters	Trimble's advanced second generation filtering to reduce interference by nearband transmitters	Advanced filtering to reduce interference by high power out-of-band transmitters
LNA signal margin	13 dB	13 dB	13 dB
Supply voltage	3.5 V DC to 20 V DC	3.5 V DC to 20 V DC	3.5 V DC to 20 V DC
Supply current (maximum)	125 mA	125 mA	125 mA
Power consumption (maximum)	440 mW – 700 mW	440 mW - 700 mW	440 mW
Dimensions	34.3 cm diameter x 9.3 cm height 13.5 in diameter x 3.66 in height	38 cm diameter x 14.6 cm height 15 in diameter x 5.75 in height	38 cm diameter x 14 cm height 15 in diameter x 5.5 in height
Weight	1.36 kg (3 lb)	4.3 kg (9.5 lb)	4.3 kg (9.5 lb)
Element type	Dual four-point-feed patch	Dual four-point-feed patch	Phase-ripple-tested Dorne & Margolin AIL C-146
Polarization	Enhanced right-hand circular	Enhanced right-hand circular	Right-hand circular
Axial ratio	2 dB at Zenith	2 dB at Zenith	2 dB at Zenith
Voltage Standing Wave Ratio	2.0 maximum	2.0 maximum	2.0 maximum
Left-hand circular polarization (LHCP)	20 dB minimum	20 dB minimum	20 dB minimum
RoHS compliant	Yes	Yes	No
Multipath mitigation technologies	LHCP rejection and resistive ground plane	LHCP rejection and 1/4 wave choke ring ground plane	LHCP rejection and 1/4 wave choke ring ground plane
Ground plane design	Trimble Stealth resistive	JPL designed 1/4 wave choke ring	JPL designed 1/4 wave choke ring
Coaxial connector	TNC Female	N Female	N Female
External radome	46291-00 available	59314 available/recommended	59314 available/recommended
Shock rating	2 m (6.56 ft) drop	1 m (3.28 ft) drop	1 m (3.28 ft) drop
Vibration rating	MIL-STD-810-F on each axis	4.3 GRMS, random vibration profile; Z axis only	4.3 GRMS, random vibration profile; Z axis only
Humidity	100% humidity proof, fully sealed	100% humidity proof, fully sealed	100% humidity proof, fully sealed
Temperature Operating	-55 °C to +85 °C (-67 °F to 185 °F)	-55 °C to +85 °C (-67 °F to 185 °F)	-55 °C to +85 °C (-67 °F to 185 °F)
Storage	-55 °C to +85 °C (-67 °F to 185 °F)	-55 °C to +85 °C (-67 °F to 185 °F)	-55 °C to +85 °C (-67 °F to 185 °F)
Mounting thread	5/8" -11 Female	5/8" -11 Female	5/8" -11 Female



Trimble Dealer Address

NORTH AMERICA
Trimble Advanced Positioning
10368 Westnoor Drive
Westminster, Colorado 80021
USA
800-480-0510 (Toll Free)
+1 720-887-6100 Phone
+1 720-887-6101 Fax

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TRANSFORMING THE WAY THE WORLD WORKS



STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

CONSTRUCTION CONTRACTS: Under W. Va. Code § 5-22-1(i), the contracting public entity shall not award a construction contract to any bidder that is known to be in default on any monetary obligation owed to the state or a political subdivision of the state, including, but not limited to, obligations related to payroll taxes, property taxes, sales and use taxes, fire service fees, or other fines or fees.

ALL CONTRACTS: Under W. Va. Code §5A-3-10a, 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: (1) the debt owed is an amount greater than one thousand dollars in the aggregate; or (2) the debtor is in employer default.

EXCEPTION: The prohibition listed above does not apply where a vendor has contested any tax administered pursuant to chapter eleven of the W. Va. Code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Employer default" means having an outstanding balance or liability to the old fund or to the uninsured employers' fund or being in policy default, as defined in W. Va. Code § 23-2c-2, failure to maintain mandatory workers' compensation coverage, or failure to fully meet its obligations as a workers' compensation self-insured employer. An employer is not in employer default if it has entered into a repayment agreement with the Insurance Commissioner and remains in compliance with the obligations under the repayment agreement.

"Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

AFFIRMATION: By signing this form, the vendor's authorized signer affirms and acknowledges under penalty of law for false swearing (W. Va. Code §61-5-3) that: (1) for construction contracts, the vendor is not in default on any monetary obligation owed to the state or a political subdivision of the state, and (2) for all other contracts, that neither vendor nor any related party owe a debt as defined above and that neither vendor nor any related party are in employer default as defined above, unless the debt or employer default is permitted under the exception above.

WITNESS THE FOLLOWING SIGNATURE:

Vendor's Name: Duncan-Parnell, Inc. YORK D. GROW

Authorized Signature: [Signature] Date: March 25, 2022

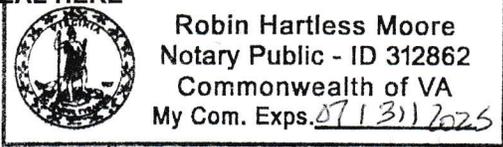
State of Virginia

County of Rockbridge, to-wit:

Taken, subscribed, and sworn to before me this 25th day of March, 2022.

My Commission expires July 31st, 2025.

AFFIX SEAL HERE



NOTARY PUBLIC [Signature]